Aquatic Animal Health Training Scheme – Training for prawn farmers in sample collection

Prawn Sampling Workshop

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In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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Executive Summary

The workshop delivered hands-on training in prawn sampling to 22 industry participants. It focussed on delivering training in (1) Emergency Response Procedures for reporting and investigating disease outbreaks and (2) Selective Breeding Program Procedures for virus monitoring and exclusion, pedigree tracking to avoid inbreeding and genetic improvement. The workshop was organised and delivered by Drs Ian Anderson (QDAF), Jeff Cowley and Melony Sellars (CSIRO, ARC Hub for Advanced Prawn Breeding (HAPB)) with collectively ~65 years of research, diagnostics, pathology and policy support to industry. It was held at Sea World, Gold Coast, Qld, on 29 July 2015 and encompassed the seven objectives listed below.

- A refresher on Emergency Response procedures (Ian Anderson, QDAF)
- Emergency Response prawn sampling requirements and procedures (Ian Anderson, QDAF)
- Prawn sampling needs and procedures for prawn pedigree analysis and viral infection screening as part of breeding programs (Jeff Cowley, CSIRO/JCU)
- Provision of detailed sampling protocols and prawn dissection kits
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR and histology to meet Emergency Response needs procedural requirements (Ian Anderson, QDAF with CSIRO assistance)
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR-based pedigree analysis and viral screening to meet breeding program needs (Jeff Cowley/Melony Sellars, CSIRO/JCU)
- Provision of postage and courier procedures and a list of QDAF and CSIRO/JCU contacts (Ian Anderson, QDAF)

The outcome of the workshop was that the 22 participants, representing 10 prawn farms or supporting companies, now have an enhanced knowledge and the technical expertise as well as reference literature and instruments for sampling prawns to assist both in disease emergency responses, and in managing the genetics and viral infection status of domesticated breeding stocks. The training of the workshop participants will be amplified by them passing on knowledge and skills to other farm/hatchery staff.

Verbal and questionnaire feedback indicate that the workshop training was well received, but identified a need for industry members to have access to an affordable and rapid pathogen screening service to assist them assess the potential disease risks of using wild broodstock captured from different geographical locations in northern Australia.

Keywords

Penaeus monodon; Penaeid prawn; Penaeid shrimp; Breeding Program; Emergency response; Pathogen detection; Viral screening; Prawn sampling

Introduction

In the event of a declared or listed disease being suspected as the cause of mortality, or a major mortality event occurs, at a prawn farm, the farm is obliged to report this event to the relevant State/Territory Departments of Agriculture/Fisheries and to take appropriate immediate actions as directed by this jurisdiction. By having intimate knowledge of sampling requirements and what peripheral farm background data are needed to investigate a disease epizootic, farm managers and staff can assist with the initial emergency response by collecting and providing high quality samples to the State aquatic animal diagnostic laboratories. This will ensure accurate pathology and detection test information which results in a confirmed diagnosis of the cause of disease/mortality. Knowing what tissues to collect and having documented procedures, technical skills as well as equipment and materials needed to collect, preserve and transport these diagnostic specimens is critical to farms/hatcheries being able to directly assist State laboratories to investigate such disease events.

Some larger farms with dedicated hatcheries in Australia are now running, or wanting to run, selective breeding programs using captive-reared domesticated prawns. There is also a desire to know what potentially pathogenic viruses could be introduced into farms via the use wild broodstock that may be infected with different viruses depending on their capture location. In breeding programs managed to date by CSIRO, hatchery/farm staff have had to be guided and assisted in collecting tissues non-sacrificially for the purposes of undertaking molecular testing for pedigree and other genetic analyses as well as for determining viral infection loads to select disease-tolerant prawns for breeding. Having farm staff with the knowledge and technical skills as well as the documented procedures, equipment and materials needed to collect, preserve and transport tissues to undertake genetic and viral testing should reduce breeding program costs. This is turn should entice more farms to engage with research providers to benefit from the rewards from improved production yields that can be derived from establishing such programs.

When disseminated for feedback, the workshop aspirations for providing hands-on training to prawn hatchery/farm staff in sampling requirements/procedures for disease emergency response and breeding program purposes was identified as a priority need by the APFA executive and key members, QDAF, CSIRO Agriculture Flagship and the ARC-HAPB.

Objectives

The Workshop aimed to disseminate policy information to prawn hatchery/farm staff regarding their responsibilities to report and contain infectious disease outbreaks, to provide information on the potential benefits of undertaking breeding programs and to provide 3 h hands-on training in sample collection, preservation and transport. Specifically the objectives were:

- A refresher on Emergency Response procedures
- Emergency Response prawn sampling requirements and procedures

- Prawn sampling needs and procedures for prawn pedigree analysis and viral infection screening as part of breeding programs
- Provision of detailed sampling protocols and prawn dissection kits
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR and histology to meet Emergency Response needs and procedural requirements
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR-based pedigree analysis and viral screening to meet breeding program needs
- Provision of postage and courier procedures and a list of QDAF and CSIRO/JCU contacts
- Attendee feedback questionnaire

Method

Upon funding being obtained through the FRDC Aquatic Animal Health Subprogram (AAHS) and ARC-HAPB, Helen Jenkins (APFA Executive Officer) placed registration information for the workshop to the 2015 Australian Prawn & Barramundi Farmers Symposium website. A workshop information brochure was also placed on this website and circulated to APFA and affiliated industry members. A link to the workshop was placed in the news feed of the ARC-HAPB website and advertised via Tweeter to direct interest to the Workshop registration link.

The Workshop was held at Sea World Resort, Gold Coast, Qld on 29 July 2015. This date preceded the 2015 Australian Prawn & Barramundi farmers Symposium held at the same venue on 30-31 July 2015. By having the workshop coincide with this symposium, work disruption and travel costs to participants from regional areas were minimized. The workshop was also run at no cost to participants outside of their travel, accommodation and registration costs for the symposium.

The Workshop included presentations and 3 h of technical demonstrations and hands-on tuition in sampling of live and euthanized prawns. It was run by Dr Melony Sellars, Dr Jeff Cowley and Miss Tansyn Noble (CSIRO and ARC-HAPB) and Dr Ian Anderson (QDAF), and covered:

- A PowerPoint refresher on Emergency Response procedures (Ian Anderson, QDAF) (**Appendix 1**)
- PowerPoint Emergency Response prawn sampling requirements and procedures (Ian Anderson, QDAF) (**Appendix 2**)
- PowerPoint on Prawn sampling needs and procedures for prawn pedigree analysis and viral infection screening as part of breeding programs (Jeff Cowley, CSIRO/JCU) (**Appendix 3**)
- Provision of detailed sampling protocols and prawn dissection kits (**Appendix 4**)
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR and histology to meet Emergency Response needs procedural requirements (Ian Anderson, QDAF with CSIRO assistance)
- Hands-on demonstrations followed by participant practice in prawn dissection and tissue sampling and preservation for PCR-based pedigree analysis and viral screening to meet breeding program needs (Jeff Cowley/Melony Sellars, CSIRO/JCU)
- Provision of postage and courier procedures and a list of QDAF and CSIRO/JCU contacts (**Appendix 5)**
- Attendee feedback questionnaire (**Appendix 6)**

Hands-on experience was provided to each participant in sampling tissue from prawns using the dissection kits and detailed sampling and tissue preservation protocols provided at the workshop. A take-home folder containing all presentations and reference material was provided to each participant.

All PowerPoint presentations and sampling and tissue preservation protocols were supplied to the APFA to disseminate to members and other external parties upon request, and are attached to this report as appendices. The attendee feedback questionnaire scores were tabulated and forms have been scanned and attached to this report as an appendix.

Results, Discussion and Conclusion

By undertaking the workshop, prawn hatchery/farm staff were provided with an opportunity to enhance their knowledge of disease emergency response responsibilities and procedures to minimize impacts as well as of sampling and information requirements to assist disease investigation. It also allowed participants to practice techniques for collecting and preserving different prawn tissues appropriately for different laboratory analysis methods (histopathology/molecular testing).

As a result of the workshop, those hatcheries/farms that sent participants will now be better prepared and equipped to assist in disease investigations by having staff more familiar with and skilled in collecting and preserving samples for laboratory analysis. Staff knowledge and skills were also enhanced for prawn samples for molecular laboratory analyses to determine prawn pedigrees and limit potential impacts of viral disease in domesticated stocks being reared for selective breeding purposes.

Workshop participants and their affiliations are listed in **Table 1**. Participants attended from 5 farms/hatcheries, 3 companies affiliated with the prawn farming industry, a Barramundi farm/Australian Barramundi Farmers Association and QDAF.

Table 1: Workshop participants and affiliations.

Name	Organisation represented
Matt Briggs	Ridleys
Tony Charles	Australian Prawn Farms (APF)
Matt West	Australian Prawn Farms (APF)
Andrew Smith	Australian Prawn Farms (APF)
Warwick Nash	QDAF
John Maloney	Pacific Reef Fisheries (PRF)
Brad Callcott	Pacific Reef Fisheries (PRF)
Wayne de Bartolo	Pacific Reef Fisheries (PRF)
Matt Gardner	Pacific Reef Fisheries (PRF)
Alistair Dick	Proaqua
Brian Murphy	Gold Coast Marine Aquaculture (GCMA)
Joe Boontang	Gold Coast Marine Aquaculture (GCMA)
Marty Phillips	PEJO Enterprises, President Aust. Barramundi Farmers Assoc.
Marcell Boaventura	Ridleys
Justin Holgate	Ridleys
James Tyrer	Seafarms Group
Dan Willams	Seafarms Group
Kathiga Kumanan	Seafarms Group
Scott Symonds	Campwin Beach
Luke Keeton	Keeton US
Mike Moore	Keeton US
Kurt Hansen	Keeton US

The workshop was well received and proactive, with questions being asked and answered during the PowerPoint information presentations. Discussions during the presentations identified different needs for affordable viral screening (see Recommendations). The hands-on technical sessions provided every participant with the opportunity to handle and dissect various tissue types from prawns for preservation by various methods with one-on-one tuition from a workshop co-ordinator (**Appendix 7**).

The attendee questionnaire forms captured impressions on the workshop quality (using a 1-5 ranking system with 1 = poor, 3 = average, 5 = excellent) in terms of its PowerPoint content, hands-on practical session and confidence of the attendee to train others in prawn sampling for the Emergency Response and Selective Breeding components of the workshop (**Appendix 6)**. Scores for all content were above average, nearing excellent (**Table 2**). The questionnaire also captured comments from 5 participants:

"Great presentations, all information and experience helps", Dan Williams, Seafarms Group

"Slide print-outs beneficial", Scott Symonds, Campwin Beach

"Display dissections on project next time", no name provided

"Great workshop, very practical, well organised and relevant. Very glad I attended. Well done", Tony Charles, Australian Prawn Farms (APF)

"Good hands-on experience", Joe Bootang, Gold Coast Marine Aquaculture (GCMA)

Table 2: Average scores for prawn sampling workshop attendee questionnaire.

Workshop Component	Average Rank	
	Emergency Response Procedures	Breeding Program Procedures
PowerPoint information	4.5	4.5
Hands-on practical session	4.8	4.6
Confidence to train others & send samples	4.5	4.3

Scoring scale: 1 = poor, 3 = average, 5 = excellent

To conclude, the workshop was highly successful and well received as demonstrated by attendee numbers exceeding expectations, by attendees being keen to participate in the hands-on technical sessions and by the positive feedback received in the questionnaire. The Australian prawn farming industry now has 22 better trained individuals with knowledge and skills to train others in sampling prawns in the event of a disease emergency response or to assist manage a selective breeding program.

Implications

In the event of a declared disease or major mortality (suspected to be caused by an infectious agent) occurring at a prawn farm in Australia, farm management are obliged to report this to their appropriate State Government Department (eg. QDAF in QLD). In such circumstances, farm management can be requested to take certain actions to mitigate an infectious agent from escaping from the farm. More commonly the farm/hatchery will be requested to collect, preserve and send samples of diseased prawns to expedite a confirmed disease diagnosis through laboratory analyses. It is of great benefit to government and industry that early in a response to an emergency disease the prawn hatchery/farm manager/staff have strong knowledge of the epidemiological information to collect and a clear knowledge and skills to collect, preserve and transport the appropriate clinical samples to ensure a diagnosis of the disease. With this outcome in mind, the workshop was successful.

The prawn farming industry in Australia remains reliant primarily on progeny derived from wild broodstock, and thus concerns exist about the potential for viral diseases capable of impacting farm productivity to be introduced from infected broodstock. Viral screening of samples collected non-sacrificially from broodstock could assist in managing these concerns. However, current testing costs prohibit this from being practical unless used to select virus-free founder broodstock for domesticated breeding. Most of the larger prawn hatcheries/farms in Australia now either run or are in the process of establishing selective breeding programs. To manage viral infection and inbreeding and to select for disease tolerance and other beneficial production traits difficult to quantify, hatcheries/farms are increasing requiring testing of breeding populations. Having staff trained in sample needs and processes to accommodate such testing will thus be essential. Again with this outcome in mind, the workshop was successful.

Recommendations

The workshop identified a need for prawn hatcheries/farms to have access to affordable pathogen screening services to assist them identify and manage potential disease risks of using wild broodstock from North Queensland, Joseph Bonaparte Gulf or other remote locations in northern Australia. Alternatively, disease risks could be assessed by targeted surveillance of prawns inhabiting these regions for pathogens of most concern. To obtain this assistance, the APFA are encouraged to discuss options for developing an affordable pathogen screening system, how development of this system could be funded and how a screening service could be provided most cost-effectively with relevant State and Federal authorities. An affordable pathogen screening service were also requested to assist farms with breeding programs to select for either uninfected broodstock or broodstock infected at low loads with pathogens of concern. By repeating such a selection process over several breeding cycles, it has been identified to progress establishment of disease tolerant breeding populations that minimize the likelihood of disease impacts in farmed progeny. If a novel method can be developed to fulfil hatchery/farm needs for affordable pathogen screening, it will need to be benchmarked for each pathogen against tests either endorsed by the World Organisation for Animal Health (OIE) or generally recognised as a gold-standard in terms of both analytical and diagnostic sensitivity and specificity. Ideally novel methodologies will be flexible to allow incorporation of screening for new and emerging pathogen threats. Surveillance for pathogens in wild-caught *Penaeus monodon* broodstock used in hatcheries to generate seedstock for farming was also identified as a priority for further investigation in FRDC Project 2013/036 Aquatic Animal Health Subprogram: Viral presence, prevalence and disease management in wild populations of the Australian Black Tiger prawn (Penaeus monodon).

Extension and Adoption

The workshop in itself provided extension directly to the prawn farming industry by providing hands-on training in prawn sampling procedures to industry personnel. Further extension has and will continue through workshop presentations and sampling protocols being advertised and made easily accessible on the APFA website. Extension will also be facilitated by workshop attendees passing on their new knowledge and technical competencies to other staff.

Project coverage

Registration for the workshop was advertised at (1) https://research.jcu.edu.au/itrh-apb/news-and-events/prawn-sampling-workshop (2) http://www.eventbrite.com.au/e/ridley-aqua-feed-australian-prawn-barramundi-farmers-symposium-tickets-15793210919 (3) http://apfa.com.au/events/, and (4) https://twitter.com/Advanced_prawn/status/616460923016888321
Attendance: Attendee numbers were exceeded with 22 registered participants representing 10 commercial enterprises affiliated with prawn farming.
News on event: https://research.jcu.edu.au/itrh-apb/news-and-events/prawn-sampling-workshop

Project materials developed

All project documents including the Workshop PowerPoint presentations, Sampling protocols and Feedback Questionnaire results are attached to this report as appendices.