

ASI Quantitative Genetics Analysis and Training Services 2014-15

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ASI

Thoroughbred Oysters

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Non-Technical Summary

2014/721: ASI Quantitative Genetics Analysis and Training services 2014-15

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PROJECT OBJECTIVES:

- 1 Analysis of phenotypic data collected on YC11 and YC12 generations of ASI family lines
- 2 Technology transfer of breeding program methodology to SOCo
- 3 Workshop training for family breeding programs

OUTCOMES ACHIEVED

Maintained ability to achieve 70% POMS resistant adult oysters in 5 years which is seen as an insurance policy for \$70 million per annum Pacific Oyster industry.

Maintained ability to ensure that POMS resistant oysters have desirable characteristics in other key commercially important traits (shell shape and strength, meat condition, growth rate and survival). Regardless of the spread of POMS this will lead to positive economic outcomes for Pacific Oyster growers.

ASI has coherent breeding strategy

The project has improved awareness of the processes, issues, logistics and practical constraints around the implementation of family breeding programs and all attendees at the training workshop have gained this improve awareness. In the case of ASI Board and reference group members this has improved the capacity of the reference group and Board members to deliver the above-mentioned ASI outcomes. For other training participants, particularly SoCo, it has enabled more informed decisions about their own breeding programs.

LIST OF OUTPUTS PRODUCED

A training workshop on the application of family breeding programs
Breeding decisions made for the 2014/15 breeding season
Report to SOCo on resourcing requirements for a SRO family breeding program

RESEARCH SUMMARY

This project primarily resulted in the genetic analysis to allow Australian Seafood Industries (ASI) to formulate of a breeding plan for the 2014 breeding season. The data analysis was completed and formed the basis for the breeding decisions for that year. In addition the data analysis resulted in the prioritisation of traits by industry stakeholders resulting in an agreed focus for breeding. The process resulted in training opportunities in the form of a workshop for Pacific Oyster and other industry participants to examine the requirements for managing a modern family based breeding program. The workshop was held in November 2014 and was the catalyst for the formation of the ASI Industry technical reference group which will serve an ongoing role in informing the direction and methodology for the program. Similarly the opportunity arose for technology transfer to the breeding program for Sydney Rock Oysters managed by The Select oyster Company (SOCo). This technology transfer resulted in the decision by SOCo to transition its breeding program from a mass

selected program to a family based breeding program. This will allow a multi trait selection focus which will allow issues with conditioning for disease resistant stock to be addressed.

ACKNOWLEDGEMENTS

We would like to acknowledge the Seafood CRC for providing funding for this project.

1. Introduction and Background

Australian Seafood Industries (ASI) manages the selective breeding program for the Australian Pacific oyster industry. This industry owned company has operated since 2004 and has successfully conducted numerous FRDC and Seafood CRC funded projects. Most recently ASI received funding from the Seafood CRC for a commercialization project to implement a compulsory levy to support selective breeding for resistance to the POMS virus. The project has had a successful output with ACCC granting interim approval for the levy which is being collected from Oct 13, 2014. ASI and CSIRO also have considerable experience of implementing a family breeding program in an aquaculture species and is willing to share that experience with other CRC participants contemplating or entering into a family based selective breeding program.

1.1 Need

In the long term the POMS Resistance Breeding Levy will secure the future of ASI and by extension selective breeding for Pacific Oysters. This in turn secures the investments made over many years by federal funding agencies. Due to delays achieving unanimous stakeholder support the approval for the levy has been later than anticipated but was formally adopted and implemented from October 13, 2014. As a result of this delay ASI was not in a position to enter into some key contracts in terms of provision of services for current data sets. The most pressing of these is the provision of genetic services undertaken by CSIRO. The support from CRC for this activity has opened up an training opportunity we would like to offer. There are a number of other participants in the CRC who are initiating family breeding programs or planning to initiate these programs. This project thus presents the opportunity of conducting the analysis as a training exercise for CRC participants including key stakeholders in the oyster breeding programs to improve understanding of the process and logistics of implementing family breeding program.

1.2 Objectives

- 1 Analysis of phenotypic data collected on YC11, YC12 and YC13 generations of ASI family lines
- 2 Technology transfer of breeding program methodology to SOCo
- 3 Workshop training for family breeding programs

2. Methods

Data Analysis

Data was collected on the YC11, YC12 and YC13 year classes of Pacific Oyster families at trial sites in Tasmania, New South Wales and South Australia by ASI staff members. Oyster families were measured for the traits of POMS resistance, general survival, growth rate, shell shape and meat condition. The data was initially compiled and checked by ASI staff before being sent to Peter Kube for genetic analysis. Estimated Breeding Values (EBV) were calculated for all traits using BLUP analysis of all collated ASI data. The software tool ASReml was used for generation of the EBV's. The EBV's then formed the basis for breeding decisions for the YC14 year

class of Pacific Oyster families which were produced across November and December at the Institute of Marine and Antarctic Studies (IMAS) at Taroona. The data was also used to estimate genetic gains for each trait under a variety of scenarios.

Technology transfer

Matt Cunningham and Peter Kube met with the SOCo board in Sydney on 23rd September 2014. The board was updated on the outcomes of recent R&D projects in terms of Sydney rock Oyster meat condition with particular reference to the relationship with disease resistance. The SOCo board were also briefed on the aspects required for implementation of a family based selective breeding program including approximate costings for undertaking core aspects. This provided a level of detail to SOCo directors to allow them to consider if family based selective breeding was an option for that company.

Based on the information provided the SOCo board requested that a full operational plan be developed collaboratively by Emma Wilkie (SOCo) and Mike Dove (NSW DPI) based on advice from Matt Cunningham and Peter Kube. A workshop involving the above mentioned was held in Hobart over 2 days on 14-15 October 2014. A top to toe approach for the operational requirements was detailed for the ASI breeding program and this approach was then tailored to the Sydney Rock Oyster selective breeding program. The resources required to do this was also calculated and a report was then produced by Mike Dove and Emma Wilkie for consideration by the SOCo board.

Workshop

A Workshop of the implementation of family breeding programs in Aquaculture was held on the 20th November 2014 at Holiday Inn, Melbourne Airport.

Participants:

Matt Cunningham (ASI)
Peter Kube (CSIRO)
Gary Zippel (SA grower, ASI)
Jill Coates (SA grower, ASI, SAOGA)
Adam Sandler (Oysters Tas)
Steve Jones (NSW grower)
Scott Parkinson (Shellfish Culture, TORC)
John Stubbs (Shellfish Culture)
Graeme Cameron (Cameron of Tasmania)
Ben Cameron (Cameron of Tasmania, TORC)
Greg Kent (Southern Cross Shellfish)
Ian Duthie (Seaperfect, TORC)
Graham Mair (Seafood CRC)
Xiaoxu Li (PIRSA-SARDI)

Guests:

Matt Briggs, Australian Prawn Farmers Association
Camila Martins, SouthSeas Abalone

The meeting aimed to meet three primary objectives;

- 1) To provide the group with a basic understanding of key selective breeding principles for family selection programs with particular reference to the ASI program for Pacific Oysters.
- 2) To present historical genetic trends for all traits and to forecast what genetic gains may be possible into the future under various scenarios in relation to trait focus.

- 3) To discuss and refine terms of reference and composition of the ongoing ASI industry reference group

3. Results

Data Analysis

The EBV's generated as part of this project formed the basis for breeding decisions for the YC14 year class of Pacific Oyster families which were produced across November and December at the Institute of Marine and Antarctic Studies (IMAS) at Taroona. The data was also used to estimate genetic gains for each trait under a variety of scenarios.

Technology transfer

The report generated as part of this project formed the basis for a decision by the SOCo board to progress to a family based breeding program and work has now commenced to overhaul the existing program.

Workshop

The workshop was held and attended by members of the oyster and other industries. The group were presented on all aspects of managing a selective breeding program using Pacific Oysters as a case study. The workshop was the catalyst for the formation of the ASI industry technical reference group.

4. Discussion

The analysis of data was an important service required by ASI to allow continued genetic gains to be achieved in commercially important traits most notably POMS resistance. Technology transfer of family based breeding program requirements has allowed SOCo to move toward this type of breeding program from a mass selection program. This will allow for multi trait selection which was previously not possible. As a result problems with conditioning of disease resistant stock will be able to be addressed. The workshop for the implementation of selective breeding programs resulted in a greater understanding of the principles and logistical requirements to manage selective breeding by industry stakeholders.

5. Benefits and Adoption

The benefits of this project will be realised as continued genetic improvement of key economic traits for Pacific Oysters. In addition to this the trait focus has now been defined and agreed to by industry stakeholders. These recommendations will be adopted by ASI pending board ratification.

For Sydney Rock oysters benefits will be realised as the transition from a mass selected breeding program to a family based breeding program. This will lead to further benefits realised as improvement in the conditioning of disease resistant family lines.

6. Further Development

Further development has occurred for Pacific Oysters by the formation of the ASI industry technical group which has subsequently met on one occasion. Terms of

reference and membership of the group has been developed for ongoing function. Further development has also occurred for Sydney Rock Oysters in terms of the operational development of the new breeding approach. Families have been produced and moved to the progeny test sites for data collection.

7. Planned Outcomes

Maintained ability to achieve 70% POMS resistant adult oysters in 5 years which is seen as an insurance policy for \$70 million per annum Pacific Oyster industry.

Maintained ability to ensure that POMS resistant oysters have desirable characteristics in other key commercially important traits (shell shape and strength, meat condition, growth rate and survival). Regardless of the spread of POMS this will lead to positive economic outcomes for Pacific Oyster growers.

ASI has coherent breeding strategy

The project has improved awareness of the processes, issues, logistics and practical constraints around the implementation of family breeding programs and all attendees at the training workshop have gained this improve awareness. In the case of ASI Board and reference group members this has improved the capacity of the reference group and Board members to deliver the above-mentioned ASI outcomes. For other training participants, particularly SoCo, it has enabled more informed decisions about their own breeding programs.

Linkages with CRC Milestone Outcomes

3.4.3 - Annual program of professional development training seminars, workshops and forums relevant to Research Program 1 outputs completed.

8. Conclusion

This project has had successful outcomes for both the Pacific and Sydney Rock Oyster industry. These outcomes will lead to improved oysters derived from these programs that will lead to economic benefits for growers of the two species in Australia.

9. References

Nil

10. Appendices

Nil