Position statement to industry on POMS research as at August 2013

This information was prepared by the POMS R&D Coordination Committee

Summary

Australian research is making rapid progress, has provided validated experimental data to complement information from overseas, and is in partnership with the New Zealand Pacific oyster industry. Use of genetically resistant Pacific oysters and husbandry practices that minimise mortalities throughout the production cycle will be required in order to farm Pacific oysters in the face of POMS.

Work on a laboratory infection model to support genetic selection is progressing well and will be trialled in early 2014. Commercially available diploid stocks of the best families (60 to 70% survival of juveniles and adults) are expected to be commercially available in mid to late 2018. As spat are more susceptible it will be critical to limit their exposure to high risk conditions. Water treatments to enable safe rearing of spat have been demonstrated while POMS induced mortality in adult oysters can be limited to 50% by growing at a high height. Proof of concept of an integrated production system is still required and is recommended as a new topic of research.

These projections assume funding will be available for selective breeding and, importantly, for operational trials to evaluate the combined effects of resistant stock and changed husbandry prior to commercial release.

Theme 1. Genetic selection for POMS resistance

Seafood CRC Project 2012/760 This project aims to understand patterns of genetic inheritance of POMS resistance and to begin the process of selecting for disease resistance. A series of trials (6 to date) have been done using the ASI Pacific oyster selective breeding population. Key findings so far are:

- The ASI selective breeding population has potentially useful levels of genetic variation for POMS. Resistance to POMS is heritable and a proportion of juveniles survive infection. Selective breeding for resistance is therefore possible.
- However, measuring resistance for an applied breeding program will need to be done using a laboratory challenge due to the vagaries and logistical difficulties of natural exposure in the field.
- The best families available now will not provide sufficient resistance to allow economic production of Pacific oysters in a POMS-affected region. Current data suggest that useful levels of resistance in juveniles and adults can be attained after a further three years of selection and testing, i.e. in mid 2016. The current population, which is unselected for POMS resistance, has a juvenile survival of about 10% (this appears to be comparable to other countries). Survival of the best families is expected to be 60 to 70% after a further 3 years of selection. Commercial diploid stocks from these families are expected to be available from hatcheries in mid to late 2018.
- Spat are known to be far more susceptible than juveniles or adults, and timelines to provide useful levels of resistance in spat are uncertain but are expected to be significantly longer. Timelines for resistant triploid stock will also be longer and the exact timing is dependent on the decisions of commercial hatcheries.

Selective breeding on its own will not provide a solution to POMS in the short or medium term. However, a workable medium term solution is expected through the use of stock with a moderate level of resistance and changed husbandry practices to limit disease severity. A critical aspect of husbandry in the medium term will be to limit the exposure of spat to high disease risk conditions.

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Theme 2. Development of a laboratory infection model for OsHV-1

FRDC project 2012/052

The objective of this project is to develop a procedure to consistently and reliably infect oysters with OsHV-1, the virus that causes POMS. Applications include screening Pacific oysters of different genotypes for evidence of a genetic basis for resistance to disease. Good progress has been made in the first 6 months of this project including:

- Isolation of a strain of OsHV-1 from oyster tissues from the first POMS outbreak in the Georges River, its propagation in disease free oysters, and long-term storage of the virus in the laboratory.
- A method of preserving virus in an ultra-low temperature freezer so that a single virus preparation can be used at the same dose in different trials over a long time frame.
- Successful infection of spat by immersion in virus. This has not been achieved previously and will be an invaluable method as it more closely resembles natural infection than does injection of virus into oysters and it is the only practical way to do the large scale screening (thousands of animals each year) required by the selective breeding program.

The repeatability of this procedure will now be evaluated and then it will be tested in parallel with natural exposure of oysters in the field. It is expected that these trials will commence early in 2014 by testing families produced by the CRC genetics project. The experimental infection procedure will also be supplied to collaborators in New Zealand.

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Theme 3. Epidemiology and husbandry practices to reduce economic losses

FRDC project 2012/032

This project addresses the identity of the virus, risk factors for disease outbreaks, mechanisms of transmission, identification of environmental reservoirs for the virus, means of inactivating the virus and the effect of environment and husbandry practices on mortality. The objective is to discover new ways to grow oysters so as to minimise losses. Important findings so far include:

- Mortality of adult oysters can be reduced by 25-50% by raising growing height 300 mm (triploid; age class 11-12 month), confirmed in controlled experiments over 2 years. The maximum cumulative mortality observed at this height was 50%. Oysters must be placed at high growing height before exposure to the virus. There is no benefit of high growing height for spat.
- Spat have been protected from POMS in an infected estuary by using land-based tanks or ponds with simple water treatments (filtration with UV, or 48h sedimentation). This is crucial information for hatcheries threatened by the likely spread of POMS. Further research to confirm these findings is being undertaken in 2013-2014, with results expected by mid 2014.
- The danger period for POMS in NSW waters appears to be November to May inclusive, but this is the subject of further research in 2013-2014.
- An integrated production system involving safe rearing of spat, avoidance of the danger period, promotion of rapid growth in winter, and protection of adults at high height has been proposed but requires field validation.
- Mechanisms of transmission, virus distribution and incubation period were identified through intensive monitoring in Woolooware Bay and the Hawkesbury River (NSW). With appropriate surveillance for OsHV-1, rational business decisions can be made regarding purchase of spat, emergency harvest and stock management to mitigate the financial impact of POMS on oyster farming businesses.

Information on natural reservoirs for OsHV-1, mechanisms of infection, the window of infection, safe spat rearing and environmental factors associated with outbreaks will become available during 2014.

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