

A REVIEW OF THE FRDC ROCK LOBSTER POST-
HARVEST SUBPROGRAM

A Report to the Board of the Fisheries Research and
Development Corporation

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John McKoy and Sevaly Sen

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A REVIEW OF THE FRDC ROCK LOBSTER POST-HARVEST SUBPROGRAM

1. Terms of Reference

The terms of reference for the review were:

1. Review scientific aspects of projects within the Rock Lobster Post Harvest Subprogram to develop an understanding of the previous management of projects.
2. Collect and establish viewpoints of Australian research providers and researchers who could potentially contribute to a future subprogram.
3. Collect and establish viewpoints of potential end-users of research results from the past and future subprogram.
4. Review the current FRDC application relevant to a new subprogram administration with a view to make comment on its suitability for any future Rock Lobster Post-Harvest Subprogram.
5. Provide advice on the future scope of any proposed Rock Lobster Post-Harvest Subprogram and how this could be differentiated from research looking at enhancement and aquaculture.
6. Provide advice on how any future Rock Lobster Post-Harvest Subprogram could obtain funding from other sources, including industry.
7. Provide an R&D-needs direction plan for Rock Lobster Post-Harvest that provides direction for future research – this would form the basis of any new applications.
8. The review team will provide a draft report for review by FRDC.

Discussions with industry representatives and researchers, held from 6–9 September 1999 in Adelaide and Perth, form the main basis for this review. As subprogram documentation was unavailable at the time of the review (other than the application for the new subprogram), considerable reliance was placed on the opinions of these individuals and on presentations of research findings at the post harvest subprogram meetings held on 7 and 8 September 1999. A list of persons consulted is attached as Annex 1.

2. Business Environment Facing the Australian Rock Lobster Industry

In 1997/98, Australian landings of rock lobster were 16,087 tonnes, valued at just under \$374 million. Western Australia accounted for 56% of this value, followed by South Australia (21%), Tasmania (13%), and Victoria (4.4%). Almost all the rock lobster caught is exported, either live, frozen whole raw, frozen whole cooked or as frozen tails. In Western Australia, around 40% of lobster is exported live with just under 45% exported cooked whole. Around 95% of lobsters caught in South Australia are exported live, in Tasmania an estimated 70-80% are exported live or whole-cooked, whilst in Victoria around 50% are exported live. The main export markets are Japan, Taiwan, China and Singapore.

Export earnings were \$423.7 million in 1997/98, down from \$452.9m in 1996/97, largely due to the economic downturn in south-east Asian markets. The markets for live, frozen or cooked products differ throughout the year, so that landing as many lobsters as possible in a 'fit for live' condition enables processors to maximise their returns by choosing, at the time of landing, the optimal way to process the lobsters. Lobsters which are not 'fit for live' have to be cooked or tailed, thus reducing the options available to the processor.

The business environment in each State varies, affecting the opportunities available to and constraints within, the post-harvest sector. One of the main differences between Western Australia and other rock lobster producing states is that the number of processors in Western Australia is regulated. As a consequence, there is a small number of processors in Western Australia compared to South Australia and Tasmania, which have more fragmented processing sectors. However in all states, competition between processors for product is fierce.

The recent instability of the Japanese and other Asian economies, as well as forecast high landings of western rock lobster in Western Australia for the next two years, has meant that processors are looking for new markets, particularly in Europe. Relatively high import duties together with longer travel times are the main constraints to be overcome in developing these markets. The US market, historically an important market for western rock lobster, is again being developed, together with the Australian domestic market. Whilst the development of new markets is also a priority in South Australia and Tasmania, a bigger concern for fishers in South Australia is security of access rights to the fishery. In Tasmania, industry is concerned about decreasing the mortality rate of landed lobsters.

3. The Rock Lobster Post-harvest Subprogram to Date

The subprogram was constituted in 1996 following a review carried out by Dr Bruce Philips. Seven projects (Table 1) came under the subprogram with a total FRDC contribution of \$1,634,369. Costs exclude those incurred for coordination of the subprogram itself.

Research on the physiological tolerances of rock lobsters (both *Panulirus cygnus* and *Jasus edwardsii*) and some development of onshore storage and transportation protocols which had been carried out as part of earlier projects for FRDC also came under the subprogram. The results of this work were utilized by industry in modifying and developing handling techniques for rock lobsters for live export and for those being held for relatively long periods.

The initial projects within the subprogram focused on the development of an understanding of "stress" indicators, both immunological and physiological. The development of autopsy techniques and an autopsy manual in association with these projects was expected to have a wide application, especially to projects within the aquaculture and enhancement subprogram. Existing knowledge and good practice were developed into a code of practice for handling of live rock lobster. A project on

condition-assessment of southern rock lobster was also included in the subprogram, although this clearly had potential application well beyond post-harvest issues, notably for aquaculture.

Table 1: Projects under the Post Harvest Subprogram

Project	Research Provider	FRDC Contribution	Completion Date
Development of improved onshore storage and transportation protocols for the Western Rock Lobster	Curtin University of Technology	\$73,693	December 1995
Physiological investigation into methods of improving the post-capture survival of rock lobsters	University of Tasmania	\$68,807	August 1997
Rock Lobster autopsy study	Curtin University of Technology	\$8,701	November 1996
Code of Practice for handling live lobster	Western Australian Fishing Industry Council	\$144,450	September 1998
Condition and its Assessment in the southern rock lobster	SARDI	\$249,591	June 1999
Physiological Studies of Stress and Morbidity during Post Harvest Handling and Storage of Western Rock Lobster	Curtin University of Technology	\$355,444	October 1999
Physiological Studies of Stress and Morbidity during Post Harvest Handling and Storage of Western Rock Lobster	Queensland Department of Primary Industries	\$699,193	December 1999
Rock Lobster Autopsy Manual	Curtin University of Technology	\$34,490	December 1999

Outputs

Some of the projects within the subprogram are complete and final reports are being produced. The code of practice was published and an associated video (produced to aid in the extension of the information on good practice) has been completed.

Several of the key projects, especially those relating to the evaluation of the condition of rock lobsters at various stages of the handling and transport processes have yet to be completed. Presentations of research results at the subprogram meeting in Perth in September 1999 indicated, however, that a considerably improved understanding of the physiology and immunology of stress in *P.cynus* had been developed under the subprogram. However, the application, relevance and value of this understanding to solving current problems in the post-harvest elements of the industry are considered by industry to be very limited. This is because the research does not provide industry with the information needed to help alleviate critical stress points in the post harvest handling chain, and by so doing, reduce post harvest losses.

The apparent widespread use of the code of practice for handling live rock lobsters, combined with active on-board extension by processors, has reportedly led to

improvements in post harvest handling practices and, consequently, in the proportion of 'fit for live' lobsters landed.

With the exception of the code of practice, it appears that the uptake and application by industry of the ideas and information from the various projects within (and preceding) the subprogram has been variable. In part this seems to have arisen because strong competition between processors for supplies has provided limited incentives to fishers to change practices to improve product. The lack of adoption of research findings is probably also due to some projects not being well targeted at issues of strong concern to industry.

Coordination

The coordination of the subprogram in terms of the holding of annual subprogram workshops and steering committee meetings has been generally effective. However, some weaknesses in the coordination of the subprogram are apparent. These include variable input from industry in steering committee and subprogram meetings and limited room in the project selection and implementation processes for effective scientific peer review. Communication outside the meetings has been good in terms of interactions between researchers involved in the various subprogram projects, but very limited in terms of communication of results to potential end users.

4. Viewpoints of research providers and researchers

The researchers we spoke to thought that the workshops held under the subprogram yielded positive benefits because they enabled discussion and exchange of information and ideas. Also, the visits of project researchers to other participating institutions in the subprogram were considered to be beneficial, enabling the exchange of information and utilisation of the expertise of the visiting scientists.

5. Viewpoints of potential end-users

There are two aspects to industry viewpoints of the subprogram:

- their views concerning the operation and the results of the existing subprogram;
- their views on whether there should be a future subprogram for post-harvest research on rock lobster.

Concerning the existing subprogram, most of the potential end-users we spoke to were disappointed with the operation of, and research carried out, under the subprogram for the following reasons:

- (1) There was a general feeling that there was little industry involvement in research priority setting and subsequent selection of projects.
- (2) As a consequence of (1), there were questions about the relevance and value of some of the projects to industry. However, some of the outputs of the subprogram were considered beneficial, notably the code of practice for handling live lobster and the work on assessing optimum oxygen and temperature levels in holding tanks.

- (3) There was concern about the absence of an objective peer review process for research projects, both at the proposal and implementation stages.
- (4) Industry from states other than Western Australia had very limited participation in the subprogram workshops and were not strongly represented on the Steering Committee. As a consequence, it was felt that research on species other than Western rock lobster was neglected.

Concerning the need for a subprogram in the future, the majority of the end-users we spoke to felt that a subprogram (as opposed to separate projects) would be beneficial, provided the weaknesses they had identified in the current subprogram (described above) were rectified. The main benefits of a subprogram approach were considered to be the opportunity to exchange information and ideas with the research community and industry in other states, as well as the selection and implementation of research projects which generated value to the rock lobster industry as a whole.

6. Should there be a post-harvest rock lobster subprogram?

There are two aspects to this question. The first is whether further research into the post harvest aspects of rock lobster is needed. If the answer is yes, then the question is what would be the most appropriate framework within which the research should be undertaken? Concerning the need for further post harvest research, much more discussion with industry is required to identify research needs and the potential economic benefits to be gained from such research. Given the time available for this review and the need for further consultation with industry, we are not in a position to identify the post harvest research needs of industry, or conclude whether further research is required.

Research providers and industry clearly perceive that there are benefits to be gained from having a rock lobster post-harvest subprogram to facilitate coordination of research projects, communication between industry and researchers and the conduct of research projects that generate value to the rock lobster industry as a whole. We, therefore, endorse the development of a future rock lobster post-harvest subprogram, provided that further research in this area is warranted.

However, the expected benefits from a future subprogram can only be realized if:

- (i) structures and personnel enable the effective operation and coordination of the subprogram and;
- (ii) research issues addressed in the subprogram are well conceived and relevant to industry, and research results are adopted by industry.

Our discussions with researchers and industry indicate that any future subprogram should include:

- (i) A Steering Committee comprised of industry representatives from each of the rock lobster producing states. This committee should identify and prioritise research needs and on that basis, select research proposals for FRDC funding.

- (ii) A Scientific Committee, chaired by the subprogram leader, comprising the Principal Investigators of the subprogram, together with independent scientific advisors to conduct scientific reviews of projects.
- (iii) A committed and enthusiastic subprogram leader with an appropriate knowledge of the industry.
- (iv) A method, such as a newsletter, to regularly communicate research progress and results and other relevant activities to industry and research providers.
- (v) Scientific and/or Steering Committee meetings to be held at least once in all states participating in the subprogram.

Therefore, the subprogram structure described in the current application for FRDC (99/365) receives our support.

7. Differentiation with the Rock Lobster Enhancement and Aquaculture Research Subprogram

Research being carried out under the FRDC-funded Rock Lobster Enhancement and Aquaculture Subprogram (RLEAS) focuses on enhancement (including improving the market value of wild-caught lobster, such as supplementary feeding in sea or land-based cages) and aquaculture (rearing of rock lobster from eggs).

Any future research projects funded under the rock lobster post-harvest subprogram could be differentiated from those under RLEAS by focusing on the post-harvest aspects specific to wild caught lobsters (such as increasing the proportion of 'fit for live' lobsters landed) rather than aspects which might equally benefit both programmes (such as projects investigating methods to change the colour of lobster). However, there will always be some overlap in the research activities of each subprogram, especially in areas such as holding rock lobsters for significant periods of time.

Discussions with industry and research providers suggest that in the short term, at least, there is reluctance to merge RLEAS with any future post harvest subprogram. The main reason given is that a future rock lobster aquaculture or enhancement industry is regarded as a potential market competitor to the wild rock lobster industry. Consequently, there is concern that if the two subprograms were merged, research funds to the post harvest sector might be redirected to aquaculture and enhancement. Processors suggested that post harvest research, if required, should be differentiated from the needs of the aquaculture sector and focused on improving the value of the wild product. We suggest that, given the current reluctance of industry to merge the two subprograms, an effective mechanism of sharing information between subprograms be established. This might include an update of the research results of the other subprogram in the newsletter of each subprogram, representation in steering and subprogram workshops or a bi-annual joint workshop.

8. Industry Funding

We were unable to determine in any detail other sources for funding for any future subprogram although we think that the possibility of processors contributing to post harvest research should be explored further.

9. Research and Development Needs

The rock lobster post-harvest subprogram was conceived to address the needs of industry and generate economic benefits by reducing post harvest losses. With the exception of the code of practice and possibly the research carried out on onshore storage conditions and condition assessment (final results not yet available), industry representatives felt that few economic benefits have been generated from the other research projects.

This is mainly attributable to the research priorities of the subprogram being largely driven by researchers. Solutions to many of the issues identified by industry seem to lie in more effective application of existing knowledge and understanding (i.e. extension) rather than with the commissioning of more research. There are also clear differences in the perceived problems amongst fisheries, primarily due to the different species involved and the different management measures applied. This situation means that it will continue to be difficult to define projects with equal relevance across all rock lobster fisheries.

Given the time available for the review, it was not possible to identify directions for future research and development. And, as emphasised earlier, any future research and development plan should be developed with industry to address commercial problems. Effective uptake of results by industry is a critical factor in realizing the benefits of research so decisions on future research priorities should address industry concerns. There should also be a clear plan for appropriate extension of research results to improve their uptake by industry.

We also believe that the use of cost/benefit analysis in evaluating research proposals would highlight the areas of potential benefit to industry.

Finally we suggest that a more effective approach might be to develop a strategic research plan for the rock lobster industry as a whole which could form the basis for soliciting appropriate research proposals. Currently, there are research activities in the harvesting sector (stock assessment, bait trials), post-harvest sector, and aquaculture and enhancement sectors of the industry. Different levels of coordination exist within the three sectors, but there appears to be limited overall coordination or strategic planning of research activities. Clearly there is a need for some coordination mechanism to ensure that each of the sectors is aware of the activities of the others, that there is minimal overlap and maximum sharing of information.

9. Concluding Remarks

Seven projects constitute the current rock lobster post harvest subprogram. Four of these projects focus on immunological and physiological stress indicators for western rock

lobster. The remaining three projects looked at improving the post harvest survival of rock lobsters through improved handling and storage. With the exception of the code of practice on live lobster handling, which has been published and distributed, no final reports have been published for the projects that are already completed. Three projects are due for completion by the end of the year.

Although the subprogram and its associated projects were conceived to address the needs of industry, only the code of practice and, possibly, the research on onshore storage and condition assessment is considered by industry to be of value. We think that the limited relevance and benefit to industry of the remaining research projects can be attributed to limited input of industry in project selection as well as the absence of objective scientific peer review.

This review of the subprogram has highlighted the requirement for industry to play a more dominant role in determining what, if any, research is carried out in the post harvest sector.

Industry and research providers see benefits from a future post harvest subprogram in terms of coordination of research and exchange of results. We also endorse the concept of a separate subprogram to address post harvest research requirements. However, we consider these benefits will only be realised if the role of industry in the Steering Committee is considerably strengthened, if research proposals and implementation are subject to scientific peer review, and if there is effective coordination and communication between research providers, industry and other related subprograms. Finally, taking into account the preferences of industry we accept that, in the short term, a post harvest subprogram should remain separate to the Rock Lobster Enhancement and Aquaculture Subprogram, provided that mechanisms are put in place (such as a joint workshop) to ensure results are shared.

Finally we consider that a strategic plan should be developed for the industry that encompasses harvest, post harvest and aquaculture and enhancement research. This would provide clear direction to both industry and researchers, help to ensure that research is targeted on industry and management needs, and increase the likelihood of the adoption of research results and the generation of economic and management benefits.

ANNEX 1: LIST OF PERSONS MET

John Cole, WAFIC
Brad Crear , TAFI
Glen Davidson, QDPI/Curtin University
Roger Edwards, South Australia Rock Lobster Advisory Committee
Louis Evans, Curtin University
Patrick Hone, FRDC
Stephen Hood, MG Kaillis
Wayne Hosking, Geraldton Fishermens Cooperative
Glen O'Brien. Geraldton Fishermens Cooperative
John Mantillo, Rock Lobster Australia
Brett McCallum, WAFIC
Roy Melville-Smith, Fisheries WA
Richard Musgrove, SARDI
Brian Paterson, Centre for Food Technology, QDPI
Bruce Phillips, Curtin University
Leith Pritchard, Geraldton Fishermens Cooperative
Kim Redmond, South Australia Rock Lobster Advisory Committee
Patrick Spanoghe, QDPI/Curtin University
Daryl Spencer, South Australia Rock Lobster Advisory Committee
Richard Stevens, WAFIC
Rodney Treloggen, Tasmanian Rock Lobster Fishermens Association
Robert van Barneveld, RLEAS