INNOVATING TO ADD VALUE

Research brings no guarantee of success but can pay enormous dividends. Collaborative oyster and paua projects underway with Seafood Innovations Ltd backing are showing great promise.

Jim Dollimore

The two different types of rope at work.

Learning the ropes to boost oyster farms

Matt Atkinson

An inventive new method for growing Pacific oyster spat could have major implications for the sector.

The technique is being trialled by Biomarine, a long-running oyster farming company in the Far North, in collaboration with Nelson's Cawthron Institute, which has oversight of the science, and with Seafood Innovations Ltd (SIL) backing.

Cawthron's lead scientist on the project, Julien Vignier, said it was looking at developing an alternative, more cost-effective technique to grow Pacific oyster spat.

Alternative media were being investigated to settle and grow triploid hatchery spat from 0.4mm up to 8mm, using both biodegradable and non-biodegradable ropes.

"Ideally, we will opt for biodegradable ropes which are attractive for spat and can degrade relatively quickly," Vignier said.

"Sections of this rope will be placed in suspended baskets and by the time the rope degrades, spat will be large enough to stay in the baskets."

Oyster spat are on-grown by Biomarine in baskets suspended on wires in inter-tidal zones.

Wild spat, mostly caught in Mahurangi Harbour, is variable in size and weight, whereas hatchery spat are more uniform, having been selectively bred.

However the current hatchery supply in New Zealand is constrained.

"With one hatchery in New Zealand, the supply capacity is constrained by the cost-intensive nursery system required to raise spat up to 8mm, a requirement in size for spat to fit into existing basket systems," Vignier said.

The hatchery, situated at the Cawthron Aquaculture Park near Nelson, produces triploid spat (as well as diploid spat), which has an extra set of chromosomes when compared with the naturally occurring diploids.

Like humans and many other organisms, oysters are made up of two sets of chromosomes - having more than two is rare and mostly found in invertebrates, along with some fish.

In the late 1970s a masters student, Standish Allen, at the University of Maine, was trying to create a faster-growing, fatter triploid salmon.

However, when the salmon eggs didn't respond, he turned his mind to oysters.

Allen developed methods to interrupt the natural breeding process and create triploid oyster spat.

Unfortunately, the discovery was not recognised at the time because of a lack of commercial viability for the newly-created oyster.

Jump forward 40 years and the development of infrastructure for hatcheries and breeding has seen the technique become a staple of Pacific oyster production.

And there are some major advantages the hatchery-produced spat have over the wild diploid spat.

"The main advantage of hatchery spat is that you have a reliable supply of spat that you can produce with superior genetics for traits such as rapid growth, condition, resilience to disease such as OsHV-1 or other environmental stress, or for greater consumer appeal," Vignier said.

"In addition, triploid oysters are typically sterile so they enable year round harvesting of quality product including over the summer months when diploid oysters ripen, spawn and become 'spent' rendering them unsuitable for market."

Biomarine is run by its founder, Jim Dollimore, who has been in the industry since 1978, when after leaving university he set up the marine farming company with a friend.

After dabbling in mussels, other shellfish and attempting to get permission for a kingfish project in the late 1990s, he has focused on oysters.

Dollimore's operations are based in the Kaipara and Mahurangi harbours, where he has 130 hectares of consents and currently produces 6 million oysters annually.

"We need to increase this considerably by developing our area

fully and using better stock and growing techniques," he said.

"I could see the necessity of introducing hatchery spat to our oyster production.

"This will enable us to offer a year-round supply, something our customers want. Equally important, it will also allow us to employ our processing staff permanently rather than seasonally."

There were teething problems with the project's first run on the ropes, Dollimore said.

"It was done at the start of summer so OsHV-1 virus issues occurred, which wasn't unexpected but is an added complication in analysing the results.

"We tried a lot of settlement options along with the single seed. The task now is to use what we have learned to modify the next experiment."

The OsHV-1 (Ostreid Herpes Virus type 1) infection causes mortality in the larvae and juveniles of several bivalve species including the Pacific oyster, according to the European Union Reference Laboratory.

"Infected larvae show a reduction in feeding and swimming activities and mortality can reach 100 per cent in a few days. Affected spat show sudden and high mortalities mainly during summertime."

Confirming that OsHV-1 will be a problem with young oysters had been the project's biggest learning so far, Dollimore said.

"We have learnt a little about what settlement surfaces perform best in the grow-out phase. We have also learnt a little about the requirements to get good settlement.

"We have trialled a number of ways of dealing with very small single seed and have been able to narrow down the options for next experiments."

If the project is successful, there would be many positive consequences for Biomarine, he said.

"If we can achieve our goal of year-round production we will be able to retain more of the major oyster consumers, we will be able to offer permanent employment, and we will be able to improve our profitability by making much better use of our investment in processing facilities.

He said he was grateful to SIL for helping extend the opportunities for hatchery spat use in New Zealand.

"We believe this will have a beneficial effect on the quality of our oysters and also the reputation of New Zealand oysters internationally. New Zealand oysters already have an excellent reputation for food safety and we hope the use of hatchery spat will extend this to consistent supply and even better quality."

Vignier agreed.

"It's a cool project using a very innovative approach which we hope will benefit the New Zealand oyster industry," he said.

"If the intermediate media works, Biomarine will be able to grow in a cost-effective manner early triploid spat.

"By dedicating a part of its production to hatchery-produced triploid spat, Biomarine capacity will be significantly increased and there would be summer market value benefits."

Adding value through research

An industry-led initiative, Seafood Innovations Limited (SIL), was established in 2004 as a joint venture research partnership between Seafood New Zealand and Plant and Food Research, with funding from the Ministry of Business, Innovation and Employment (MBIE) to promote research projects that grow the value of New Zealand's seafood exports.

Chief executive Mike Mandeno has been in the role since 2013 – below he outlines why it is important the seafood industry continues to build its international reputation, as a provider of premium seafood, by investing in science, and therefore its future:

Why research matters

The fundamental purpose of research within business context is to enable improvements. In the primary industries research aims to create or maintain economic value in two ways:

- By increasing the value of products sold - for example by improving quality, creating new products, or defining benefits of existing products
- By improving productivity, reducing costs, increasing efficiency, reducing waste or reducing risks.

Research is risky. When seeking novel solutions and new understanding, there is no guarantee of success. For that reason governments offer funding for research that benefits the private sector. This is intended to de-risk research investment by firms.

At Seafood Innovations Ltd, 50 per cent government funding is available. Risk can be further mitigated by collaboration between companies. This results in sharing of risk, cost and rewards.

On the subject of rewards, the companies that invest in each Seafood Innovations project own the resulting IP and enjoy a 3-5 year exclusivity period during which they can be the sole users of the IP. At the end of the exclusivity period companies are expected to licence the IP to other New Zealand seafood firms if requested on reasonable commercial terms.