

POMS UPDATE # 8 October 2017

This POMS newsletter consists of a trip report from New Zealand where we were investigating the impacts of the OsHV-1 virus over seven years, and how the New Zealand oyster industry has adapted and managed around this disease.

OSHV-1 (PACIFIC OYSTER MORTALITY SYNDROME) IN NEW ZEALAND, SEPTEMBER 2017

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Summary

- Approximately 60% of NZ oyster spat are wild caught on sticks, the rest are single seed, largely triploids from the hatchery at Cawthron Institute.
- Opinions on the ongoing effects of POMS varied, but overall most oyster growers are optimistic that POMS is not a major issue anymore and the larger companies especially are almost back to prePOMS production levels after seven years.
- A general comment from all oyster growers was that the effects of POMS are very site specific and each POMS affected farmer needs to work out how to best farm oysters in their growing area.
- Farming techniques are generally considered to not be very important to increasing survival during POMS outbreaks, although many farmers reduced the regularity and/or intensity of handling during POMS and some reduced densities.
- Most farmers described major POMS outbreaks occurring in spring and autumn, and several mentioned rapidly changing temperatures during neap tides as a trigger for outbreaks.
- Recovery from POMS has been variable between growing areas, from almost full recovery in some areas, to significant levels of mortality still occurring in others. No clear explanation was provided, other than more productive areas appear to be recovering best.

Introduction

The current value of aquaculture in New Zealand (NZ) is approximately NZ \$500 million, and the Government has a goal to raise it to NZ \$1 billion by 2025. Diseases and biosecurity are recognised as the most important issue facing aquaculture, and the NZ Government's Aquaculture Strategy includes strengthening their biosecurity system by increasing capacity and capability to respond.

Production of Pacific oysters in New Zealand in 2016 was approximately 2000 tonnes, with an estimated total revenue of NZ\$30-35 million. Over 70% were exported and Australia was the largest market, with export revenue earned from Australia of NZ \$6.4 million. Of total oyster exports by value, 71% were frozen half shell and 25% live chilled (from Aquaculture New Zealand's booklet: A sector overview with key facts and statistics).

Pacific Oyster Mortality Syndrome (POMS) first occurred in NZ in 2010, where it is referred to as the oyster herpes virus. Initial effects were devastating with mass oyster mortalities in many areas, but New Zealanders have generally learnt to live with the virus and oyster production levels have nearly returned to those prior to POMS.

We felt that much could be learnt from the New Zealand experience with POMS, which would be relevant to oyster growers in Tasmania and hopefully assist them to manage their farms around POMS. As a consequence, we visited New Zealand and attended the annual two day conference Aquaculture NZ, as well as a specially organised OsHV-1 forum at Cawthron Institute, and interviewed a number of oyster farmers, mainly on the North Island.

As expected, there were various and sometimes differing opinions on how to farm Pacific oysters in a POMS environment in NZ. We have generally provided the most common view, and given alternatives where appropriate.

Differences between Pacific oyster farm operations in NZ and Australia

There are several major differences between oyster farming in NZ and in Tasmania. Of particular relevance is that the majority (around 60%) of oyster spat in NZ is wild caught. At present only one major company and one smaller farming operation are using a significant quantity of single seed hatchery produced spat; all other farmers are catching their own spat from the wild. Another large company is planning to increase production using hatchery spat, whilst another is not interested in selective breeding as they rarely see any effects of POMS now, and branding their oysters as wild catch is important to their marketing. Many other smaller farmers believe that they could not afford to buy spat.

Kaipara Harbour has been a major catching area for decades, but catches have declined in recent years, resulting in a reduction in production by at least one of the larger companies. Mahurangi Harbour is now the prime catching region and some tension exists between regular users of this catching area and those farmers who have recently moved in. This harbour was affected by POMS in the first couple of years, but has had limited mortality in recent years. Farmers tend to put their sticks in the water after the first major mortality of the season because subsequent survival is generally higher. Some also put out two-three times the number of sticks to allow for mortality due to POMS.



Production systems for wild caught spat are different. Bundles of sticks are placed in estuaries known to have large natural spat settlement. The oyster larvae settle on these sticks and several months later these sticks with attached oysters are transferred to other estuaries where the bundles are broken up, and single layers of sticks are placed on racks in the intertidal zone. When they reach market size, clumps of oysters are removed from the sticks and sent to processors where the clumps are broken up into single oysters. The majority of these oysters are opened and snap frozen on the half shell for the export trade. Most oyster growing areas in NZ are highly productive and although these oysters often have misshapen shells, they have high meat to shell ratios and receive the same price as single seed oysters. Oysters that are not of sufficient quality for the half shell trade are shucked and the meats are sold in small plastic pots (called pottles) that are stocked on most supermarket shelves.

The oyster industry in NZ is dominated to a greater degree by four large companies (Moana, BioMarine, Sea Products and Clevedon Coast Oysters) than in Tasmania. These large companies process their oysters as well as those from contract and other growers at their depots, and generally manage their own marketing. Moana, the largest company is based on single seed from the hatchery and nursery at Cawthron, which is moved to a nursery area at Croiselles Harbour in the Marlborough Sounds at 8 mm, and then to farms throughout the North Island for growout. However, the occurrence of POMS in Croiselles Harbour in 2015/16 has resulted in some modifications to this procedure. They also ongrow overcatch which is about one third of their production, and they process stick grown oysters from other farmers. Moana has a continuous production cycle with no seasonal effects, and produces 1.2 million dozen oysters per year; 80% is exported, the majority to Australia, also to China and Russia, and they are struggling to meet market demand. 80% of their production is frozen half shell and 20% live oysters, with 10-15% sold fresh locally. Next year their production will be back to normal level before POMS.

OsHV-1 virus is not a notifiable disease in NZ so movement restrictions have not been applied. Also biosecure facilities are not required, e.g. Cawthron does not need to have biosecurity certification to conduct research on this virus.

Impact of OsHV-1 on businesses and employment

Comments on the effects of POMS on businesses varied. One major operator said that no one had gone out of the industry, other than Sandfords, a major fishing and aquaculture operation in NZ. Everyone agreed that Sandfords were ready to move out of oysters and that POMS virus was the final motivation. Large oyster companies, in particular, Moana, bought up a number of smaller farms as people moved away or retired. In some areas they have progressively bought all leases in a bay so they can manage/control all oyster farming operations in that body of water. They have also subcontracted oyster farmers in a number of estuaries across the north island to ongrow oysters for them (generally supply them with 50 mm juveniles and buy back at market size). Moana largely saw POMS as providing a business opportunity for them

We were informed that a number of smaller farmers moved out of the industry due to POMS ; they were generally older, part time and their businesses were marginal, catching wild spat and ongrowing on sticks. Other smaller operators temporarily moved out of the industry and took on other employment until better oyster survival and financial situations occurs. Some farmers have started returning to the industry where recovery from POMS in their bays has been significant. However, a number of growers are waiting for better financial conditions before they start farming oysters again. Some smaller farmers have also survived by growing oysters for large companies

under contract. A researcher told us that POMS had had a major impact on small farmers, with high unemployment of employees that affected rural communities, but this was not documented.

A couple of smaller farmers (Nat Upchurch on Waiheke Island and Andrew and Lisa Hay at Mahurangi Bay) changed their operations after the POMS outbreak. Instead of selling oysters to processors at low prices, they processed and marketed the oysters themselves, with a greater proportion sold as fresh product to obtain a premium price. They retained and grew all oysters that they could, including overcatch. Costs of production were reduced by cutting staffing back and largely running their operations by themselves. These farmers developed successful local markets, including attending local food markets, developing relationships with restaurateurs, running oyster farm tours and opening their own local outlet for oysters. They are now running profitable enterprises and have employed new staff.

For Nat Upchurch, it has taken seven years to return to pre-POMS production levels. His selectively bred triploid spat have had exponentially increasing survival rates, and he had no mortalities in the 2016/17 summer. However, he is now nervous that these unchallenged stock could be affected by POMS next spring, even though they will be larger. Nat has been buying approximately three times the amount of seed that he requires, but this year dropped it back to two times. He believed that the lethality of the virus has not changed as significant mortality still occurs in wild seed overcatch during POMS outbreaks. Nat used to buy 6-8 mm seed, but since POMS buys 2.4-3 mm seed and exposes these oysters to POMS so he can ongrow survivors, because once exposed few further mortalities occur. He also has not observed mortalities in large oysters. Nat sells 80% of his oysters as live product, including one tonne per week in each of Waiheke Island and Auckland. His oysters take 14 months from 2-3 mm to market size with selectively bred spat.

Another small farmer extended his operation from just sending product to processors to processing oyster meats himself into small tubs, usually 12 per tub, which are sold locally, including in the supermarkets.

After POMS the price of oysters rose quickly, up 20% almost immediately and now 35% since the first POMS outbreak. Export value of oysters is NZ\$ 12 per dozen. Oyster depot shop prices averaged \$18 per dozen standards and jumbos \$25 per dozen.

Farming operations:

Many farmers that we spoke to said that they first observed mortalities in autumn 2010 but this was not reported until the next major outbreak in spring 2010, and by then oysters on sticks had been moved to many areas. The initial impact was devastating for most farmers with mortalities of up to 95%. However, farmers differed in that some observed this level of mortality across all size ranges,

Pottles of oysters



whereas others had mainly mortalities in spat and juveniles. We were also told that many of the smaller oyster farmers have not changed their practices, and continue to catch spat from the wild and ongrow on sticks as before. They either don't understand, or are prepared to take the risk of effects of POMS.

Opinions varied on the level of handling that affected mortality from POMS. Most farmers continued to handle during the POMS season, but not during an outbreak, and generally more gently than previously. A large farmer is considering sorting his oysters on the farm, rather than returning to the depot. One farmer commented that if the oysters are not handled, then they are likely to die from flat worms and sedimentation.

Vince Syddall, Operations Manager Oysters at Moana, the largest Pacific oyster aquaculture company in NZ, advised that POMS was very variable, and he had not observed any consistent pattern of effect. He also noted that hotspots occur in some growing areas, where higher mortalities occur in most years. Their first hit was the worst with 95% loss of spat and 60% mortality of stock over all. The first sign of POMS for them is when they observe the oysters being 'dozy' and very slow to close, and they stop handling them at this stage. However, they return to normal handling after one week. Moana does not test for the virus. Moana continues to grade through the POMS season, except when the oysters are 'dozy'. They generally have two procedures (i) grow to 50 mm in Marlborough Sounds and transfer to the North Island in winter. Oct-Nov 16 only lost 10-15%. (ii) 3-8 mm spat grown in mesh bags, then BSTs. Across all Moana farms the mortality is now 25-30%. Vince and another Moana manager believe that fast growing oysters have the highest mortality rates; runts are preferred even though they take longer to grow, because they are likely to get to maturity. Moana largely uses mesh envelopes for grow out on farms.



Another Moana manager of approx. 100 ha of farms further north in Whanganoa Harbour said that they handle oysters all summer, although the frequency has been reduced and is more gentle and careful than before POMS. They keep the oysters cooler and move them more quickly; the stocking

density has also been lowered across the harbour although the waters are very productive. Mortality is variable and patchy across this harbour; last year mortality ranged from almost nothing to 30% in mature stock and up to 80% in spat. They have both diploids and triploids, use BSTs and envelopes, ongrow overcatch (which is significant), and have stick cultured oysters from contract growers.

In contrast, a Moana manager near the northern tip of the North Island said that mortalities at their sites had decreased from 95% when POMS first arrived, to 5% over the last three years. They ongrow juveniles from approximately 30 mm. During neap tides, the stock are held high in the water column.

Most people commented that oysters that had survived an outbreak were unlikely to succumb to future outbreaks, although this was not always the case in a few locations.

Researchers at Cawthron have been investigating mechanisms underlying resistance in specific family lines. They have been exposing spat to viral challenges and monitoring the survival of select families in different growing environments, in particular low oxygen. Contrary to Moana managers, they found that slower growth did not increase viral resistance; front runners were equally as resilient. Also a fast growing resilient family had higher antioxidant capacity.

Environmental Conditions

Environmental conditions for growing oysters are good over most of NZ, reportedly 90% of oyster farming areas grow and fatten oysters well, and grow-out time from spat to market size is 12-18 months.

An important comment from almost all oyster farmers and researchers that we spoke to was that the effects of POMS varied from site to site and across locations. They emphasised that each farmer needs to know his own farm environment and determine how to best operate his farm under these specific conditions.

Most farmers said that major mortalities tended to occur in Spring and in Autumn, with minor outbreaks in between. Several also said that rapidly changing temperatures appeared to trigger disease outbreaks. There was no baseline environmental information when POMS first occurred, and temperature, for example, is still not routinely monitored. The temperature range for POMS observed by Vince Syddall at Moana was 18-24°C, and he suggested that 18 ° during a neap tide was likely to trigger an outbreak.

Numerous farmers highlighted the importance of neap tides in triggering POMS, when the water flow is slower and the oysters are immersed and exposed to the virus for a larger proportion of time. Some farmers lift their bags up during this period, so they are out of the water for longer.

Wild stock were also thought to be likely to be a factor in causing outbreaks.

The rate of recovery from POMS has been observed to be variable between sites, with the only explanation given was that recovery was quicker in more productive sites. In sites where few live oysters remain, predation by fish on farmed stock has become an issue.

Selective Breeding for POMS resistance/resilience.

Many farmers believe that wild caught spat have developed a natural resistance to POMS because only those most resistant survive and continue to breed naturally. As a consequence, these wild caught spat have rapidly developed resistance, ahead of hatchery produced selectively bred POMS

resistant spat. These farmers also believe that the wild spat have a broader resistance to disease than the 'monocultured' hatchery spat.

On the other hand, larger-scale farmers such as Moana and one smaller farmer Nat Upchurch, are either fully using selectively bred single seed oysters or are rapidly moving towards single seed only. They recognise the benefits of hatchery bred single seed – greater reliability of supply from a hatchery than wild caught spat, capability for year round production using triploid oysters that do not spawn, and increasing resistance to OsHV-1 being developed in selectively bred oysters. Another major producer wishing to expand production also noted the unreliability of wild caught spat, and is planning to incorporate single seed in their production systems in the near future.

A selective breeding program for a variety of parameters including OsHV -1 resilience has been underway at Cawthron Institute since 2011, with progressive improvement in survival rates. Average spat survival at 10 mm for the 2015 families was 46% at Waiheke and 62% at Whangaroa, with top performing families 85% and 89% respectively. The next stage is commercialisation, with a refocus on breeding objectives, better understanding resilience mechanisms and mitigating future threats.

Other Issues

Bonamia ostrae in native flat oysters

In 2015 *B. ostrae* was discovered in farmed flat oysters (*Tiostrea chilensis*) in the Marlborough Sounds area, in addition to *B. exitiosa*. *B. ostrae* is generally more lethal to oysters than *B. exitiosa*, and is the cause of Bonamiosis in Europe. Recommendations at that time to destock these farms by various animal health personnel were ignored. *B. ostrae* was subsequently discovered in May 2017 on two flat oyster farms in Big Glory Bay on Stewart Island. These farms are near the Foveaux Strait wild population of flat oysters that are harvested, and because the wild harvest is more valuable than the aquaculture sector, these farmed oysters as well as those in the Marlborough Sounds area, have been ordered by the NZ Government to be destocked. This was a controversial issue while we were in NZ. However, unlike in Tasmania, NZ legislation includes compensation for oyster farmers. The wild fishery does not want flat oyster aquaculture to occur, and a move to green mussels is being recommended.

Keynote address on Biosecurity

George Chamberlin, President of the Global Aquaculture Alliance, gave a key note address, stating that biosecurity is the single biggest issue affecting aquaculture production worldwide.

His overall recommendations for disease management were:

- Movement of animals must be restricted and controlled
- Broodstock must be pathogen free
- Must have quarantine processes
- Good management practices are essential, e.g. for biosecurity, sanitation, minimising stress
- Veterinary services are available
- Zoning required for disease management,

He discussed the need for risk assessment: prioritization of risks, risk management planning and risk communication. In particular, he stressed the need for zone (area) management for farms in a waterway as they are not independent of one another. This includes Biosecurity Area Management which is coordinated and collaborative across the aquaculture zone.

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Nat Upchurch, Te Matuku Oysters
Garth Richards, Moana NZ
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Finally, a couple of quotes from oyster farmers:

Vince Syddall "Luck probably plays the biggest part in POMS"['

and Nat Upchurch on Waiheke Island "You've got to have live oysters to have biotoxin problems".

Note: Past copies of POMS Updates newsletters, presentations at the Industry Forum and research reports are available at:

<http://www.imas.utas.edu.au/research/fisheries-and-aquaculture/publications-and-resources>

and scroll down to Oysters.