

POLYCHAETE FEEDS

A new company is harnessing the well established benefits of marine worms with the advantages of extrusion technology, to produce feeds for a variety of aquacultured species and growth stages.

The impetus for setting up ProChaete Innovations Ltd in 2013 was a very simple one – perceiving a gap in the market for an aquaculture feed which can help answer this question: How can we continue to expand the supply of farmed seafood without further depleting the ocean’s natural resources?

The company is primarily the brainchild of Odd Geir Oddsen, who has many years experience of working at senior levels in the fields of salmon aquaculture and feed production. With an academic background in molecular biology, earlier in his career, Oddsen was responsible for facilitating the successful integration of Skretting’s Technology department into Nutreco Aquaculture. His role involved setting up and commissioning a state of the art R&D feed mill. He also engaged

directly in technology development, and obtained two patents.

In subsequent years, Oddsen served as MD of farmed salmon producer Pan Fish Scotland, and oversaw its transition to stand-alone company Lighthouse Caledonia. He then became CEO of global salmon egg producer Salmobreed.

During all of this time, he became increasingly aware of the pressing need to find alternatives to fishmeal as a supply of marine protein in aquaculture feed.

“It’s clear that, with an increasing world population, and growing demand for better-quality food for that population, we’re going to become more and more dependant on aquaculture,” said Oddsen. “It’s also clear that we can’t continue to over-exploit wild-capture fisheries, because so many of them are unsustainable.

“I’m aware, from my involvement in feed production, salmon farming and now shrimp farming and processing, that the major feed companies are putting enormous effort into



Odd Geir Oddsen

finding alternative sources of protein, to take the pressure off fish meal. However, successful use of plant protein to feed piscivorous fish is self-limiting. We need to find other answers.”

With this in mind, Oddsen was particularly interested by a

Welsh company, which was starting to develop pelleted aquaculture feed based on farmed polychaetes (marine worms). When this company ceased trading, he set up

ProChaete Innovations, to use the IP and competence it had obtained, and take forward the work of perfecting polychaete-based feeds for a variety of species and growth stages.

ProChaete works with a company farming polychaetes (*Nereis virens*) in bio-secure ponds in Wales – an area many hundreds of miles away from any open-water shrimp farming, and therefore hundreds of miles away from any potential sources of shrimp disease.

The company's special competence is in producing polychaete-based extruded feeds, for the larval stage and onwards.

The best feed gives the best results...

Looking for a safer, more convenient larvae and maturation feed for your shrimp? ProChaete uses polychaetes grown in biosecure units in the UK to produce processed feeds in a variety of formats. We can supply in batch sizes to suit all growers, from the smallest to the largest.

We also produce feed and feed additives for finfish growers. Use of polychaetes in feed has been shown to enhance flavour, due to the beneficial presence of high levels of bromophenols.

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“Shrimp need polychaetes as a component of their food prior to spawning. Traditionally, broodstock shrimp are fed with live or frozen polychaetes, as well as squid, oysters, mussels and Artemia. This means headaches for farmers, who need to have a complex infrastructure around chilling and freezing. On top of this, we know that wet feed will disintegrate when it hits the water. Important nutritional elements will leach out and thus be wasted,” said Oddsen.

“ProChaete Innovations is the only company that creates a pellet from these ingredients. A pellet is easier to store, handle and to feed to the shrimp.”

The shrimp industry has traditionally used wild-harvested worms for maturation purposes. However, if these worms are harbouring parasites, viruses or bacteria they could be passed on to the brood stock and thence to the offspring via vertical transmission, so the offspring is infected. Being able to deliver a feed based on farmed worms, tested and proved free of all major pathogens (and processed at high temperature during the extrusion process) will at

least secure a feed base that does not spread diseases into the industry.

Larvae feed

ProChaete’s speciality extruded shrimp larvae feeds range in size from <100 microns up 1000 micron (1 mm). There is therefore a suitable feed for every stage of larval growth, from first feeding to PL.

“We’re aware that research on early feeding regimes demonstrates a need for at least some live feed in the earliest stages,” said Oddsen. “We are therefore careful to point out that our Stage 1 feed should be used early, but not alone in the first days of larvae development.”

A further four grades of larvae feed, including a nursery feed, see the animals through to readiness for grow-out. ProChaete is using twin-screw extruder, thus achieving the necessary heat treatment, which offers more protection from degeneration (nutrient leaching) and microbial degradation. In this way feeds can be consistently manufactured to very small sizes.

Maturation feeds

The company also produces pelleted feed for shrimp broodstock, and its benchmarking trials indicate good maturation rates and good fertility. Various studies have shown that inclusion of polychaetes in the diet improves gut health in the animals, which reduces the risk from viruses, bacteria or other parasites. The worms have also a unique fatty acid profile, which the brood female is able to pass on to her offspring. The offspring need these fatty acids to become



Harvesting polychaetes

more robust in the early development stages.

Polychaetes are nutritionally adequate as maturation diets for shrimp since they contain an appropriate fatty acid profile with high levels of linolenic and docosahexaenoic acids. There is also the presence of methyl farnesoate in some polychaete species (including *Nereis virens*), which has been shown to induce gonad maturation in penaeids (Racotta et al., 2003).

Using research carried out by the predecessor company, as well as its own on-going R&D, ProChaete has perfected both a semi-moist and a dry version of its Maturation Feed, and feedback from users is very positive.

"I'm aware that many growers are reluctant to alter their regime of using wet feed with a mixture of squid / mussels and worms, on the basis that this has worked well for them in the past," said Oddsen. "Our research has shown that breeding performance using polychaete-based pelleted feed is every bit as good as that which you get using traditional wet feed. We found that optimal results in terms of fertility and healthy nauplii come from using a mix of polychaetes and other protein sources in the pellets – shrimp fed on this

diet outperform those on traditional diets. (see figure 1).

The polychaetes also have anti bacterial and anti fungal properties, and some very new research from the University of Swansea confirms just how important this is.

"The real beauty of pelleted feed lies in ease of use," points out Oddsen. "It's ideally suited to automatic feeding systems, and also makes secure storage and inventory control much simpler."

Finfish hatcheries

ProChaete also produces feed tailor-made for the hatchery stages of a wide variety of finfish, and is working on this with one of the major feed companies.

Oddsen feels that mimicking nature is better than working against her: "If you look at the natural feeding grounds of different species you will often find them as bottom feeders which have polychaetes as a main part of their diets. For instance, sole will not survive without polychaete as a major part of their weaning feed. Wrasse is another species that is a picky feeder, but which seems to like polychaetes. There is a reason why young animals, both sea creatures and birds, eat worms and why they

also make good fishing bait: worms are eminently palatable and easily digestible."

The company is currently co-operating with others, including Marine Harvest, in a wrasse-breeding project at the University of Stirling's Institute of Aquaculture.

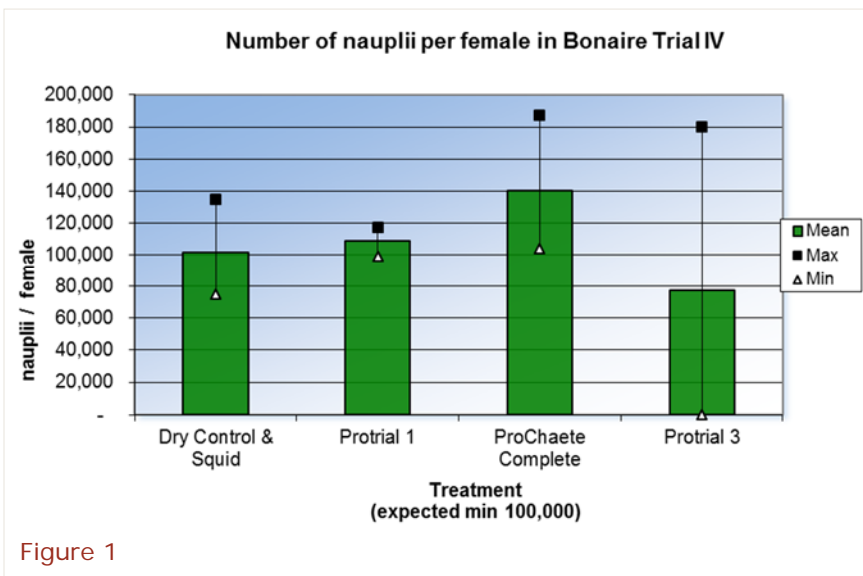


Figure 1