

Micro-diet research held up because of lack of funding

USING live food to feed Atlantic halibut larvae and young juveniles is proving to be an expensive bottleneck to its commercial production, reports **BERNADETTE TOURNAY**.

However, if the halibut were early weaned with formulated micro-diets, it could considerably reduce costs and enable production to be scaled up, as well as providing a consistent source of nutrition in terms of availability and quality.

Despite this, though, progress in developing micro-diets - which are made mainly from fishmeal, fish oil, vitamins and phospholipids - is not being pursued aggressively enough in Norway due to lack of funding, according to Dr Howard Browman of the Norwegian Institute of Marine Research, Austevoll Research Station.

"Research funding in Norway is like a lottery, only a small percentage of all projects requested in aquaculture research are financed, particularly projects concerned with feeding by fish larvae," he says. "Since larval feeding and weaning from live food to commercial diets is a critical bottleneck, this means that many projects that would be valuable for the industry are never conducted."

Kjell Nass, production manager of Norwegian commercial feed producer Risorfish AS, has estimated the cost of producing one Atlantic halibut juvenile at currently around NOK 1.20 (about US\$0.20) of which 55% is Artemia and Artemia enrichment feeds and 31% is labour costs plus energy and investments.

"The benefit of substituting live feeds with micro-feeds would depend on the cost of micro-feeds and, as survival rates are still low and vary a lot in halibut production, the quality of the diet would be essential for the economics. If it is better than Artemia and increases survival the costs drop and vice versa," says Nass.

Browman's research to date has concentrated on cod, Atlantic halibut and haddock, species that are currently being developed for large scale commercial production in Norway and elsewhere. For these species, the transition from live to encapsulated micro-diets is especially difficult. So far the best results in weaning Atlantic halibut larvae from live feed to micro-diets has achieved only half the growth rate achieved using live food.

In order to find ways of increasing the growth rate



Dr Howard Browman (left) says a lack of micro-diets for species such as halibut is keeping the production process expensive. Anne Berit Skiftesvik and Syed Yahya Yacoub are working with Browman on projects to get halibut quickly weaned off live feed and onto commercial micro-diets

Browman and his colleagues, Anne Berit Skiftesvik, Syed Yahya Yacoub and Ingegerd Opstad, have submitted two, three-year research projects to the Research Council of Norway which they hope will eventually win funding.

The first project, 'Identifying stimulants that enhance gut enzyme activity in marine fish larvae' aims to overcome one of the problems with micro-diets. This initial research has led them to believe that larvae do not digest micro-diets efficiently due to low levels of gut enzyme activity which is tuned to live prey.

The team's study would try to enhance the larvae's gut enzymes, a process which has not yet been systematically trialled.

This would be attempted by stimulating the larvae's taste organs using chemical compounds that are present in live prey which would in turn stimulate the gut enzymes which would be activated in anticipation of being fed.

According to Browman, this is a process which occurs through an autonomic endocrine reflex known as the cephalic reflex (CR) which has been identified in adult fish but never studied in fish larvae.

"We propose to identify specific feeding stimulatory compounds in copepods, a natural prey for many marine fish larvae, which increase the gut enzyme activity

in marine fish larvae. In fish it is known that taste substances are species specific. Hence, we will also test whether there is species specificity in chemicals that induce the gut enzyme," says Browman.

The second project, 'Early weaning of Atlantic halibut larvae using chemical stimulants' hopes to increase the feeding rate by halibut larvae

of micro-diets by using amino acids - a major feeding stimulatory compound - as olfactory stimulants for juvenile halibut. In a preliminary study already carried out, intense food search behaviour was induced by adding an extract of red shrimp (*Pandalus borealis*) to the water.

"This leads us to hypothesize that a chemical environ-

ment that stimulates feeding can be developed for halibut larvae in culture tanks and that this will improve the consumption of micro-diets," says Browman.

"The principal objective of this project is to test whether extract of red shrimp will increase the ingestion of weaning diets and thereby increase growth rates and to identify the active compounds

in this extract that stimulates feeding. Extracts of copepods which are the natural prey of fish larvae would also be tested."

He adds that while convinced that micro-diets will eventually replace live feed, in order to get to that stage it will take many years of intense research with each species since each requires a specific diet.

New appointment at Troutlodge

TROUTLODGE company president Jim Barfoot has announced the appointment of Andrew Barfoot as director of sales and marketing, a new position at the Washington State-based US hatchery company.

Andrew Barfoot comes to Troutlodge after spending several years in operations and sales management in private business. His experience also includes time spent in the waters at Troutlodge, growing and spawning fish.

"We are excited about Andrew coming on board to lead the

marketing and sales effort of our international sales team of representatives," says Jim Barfoot. "His first priority is to get to know the customers and provide the service they expect and deserve."

To assure proper administration and flow of orders and deliveries, Colleen Byers, formally domestic sales administrator and a nine year employee of Troutlodge, has been promoted to the position of manager of sales logistics.

"This new sales team of Andrew, Colleen and support staff is better

than ever prepared to handle thousands of egg shipments - regardless of size - with great precision. This is a promise I make and plan to keep," says Jim Barfoot.

He says that the demand for Troutlodge Advantage Eyed rainbow trout eggs has never been higher. The company is already the world's largest private producer of eyed salmonid eggs, expanded sales into five new countries last year, bringing the international sales effort to over 40 countries.

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Alvestad Marin AS
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Tel: +47 24 20 00 30
post@alvestadmarin.com

www.alvestadmarin.com