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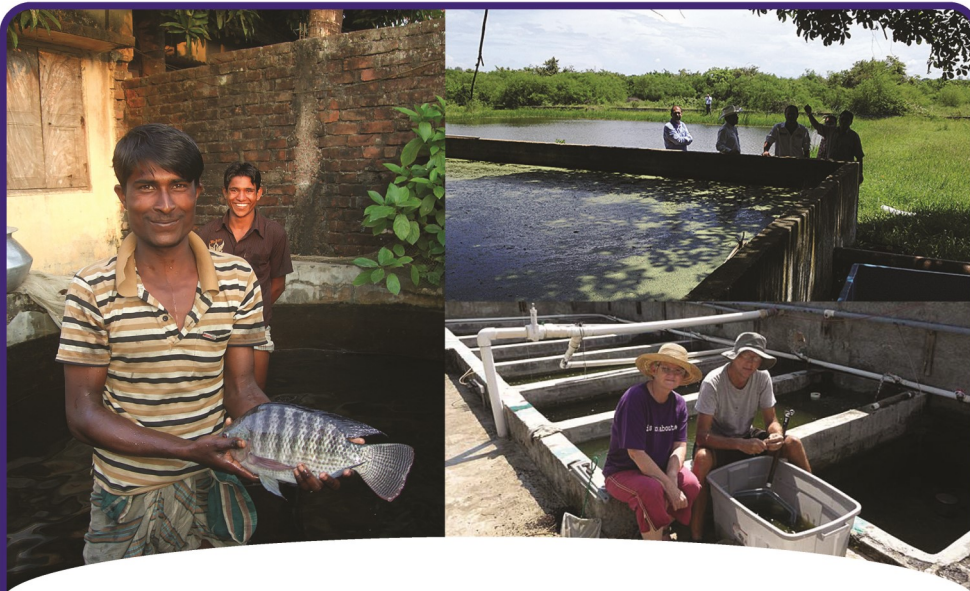
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* Cover picture: Successful techniques for Pacific black snook broodstock management and captive spawning



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Is your broodstock performing well?



Sea Bream (*Sparus aurata*)

By Kostas Domalis, Hatcheries Segment Sales & Technical Support Manager, BioMar Hellenic

Proper nutrition and farm management of broodstock is a crucial, yet often underestimated factor in Mediterranean farming of Sea Bass and Sea Bream. This article aims at highlighting and reflecting on practices in farm management and nutrition of broodstock in order to possibly increase the efficiency of this particular segment in aquaculture.

The quality of the eggs significantly affects the expected production results of the hatchery. Stable high quality of eggs is an essential prerequisite for avoiding problems with deformities (mostly of the head), larval survival in the first 15 days after hatching and many others.

To ensure the availability of eggs throughout the year, hatcheries use artificial photoperiod programs in special in-house broodstock tanks. Any failure of the processes in these broodstock tanks can result in insufficient availability and quality of eggs for the coming years.

In recent years, many Sea Bass and Sea Bream hatcheries have invested time and resources in programs for genetic selection. The aim is to select the appropriate broodstock that suits their specific needs for fast growth of the fry, lower FCR during fattening stages, better body shape, pathogen resistance, etc.

Vertical transmission of pathogens

The health status of the broodstock can have a negative influence and even destroy the production outcome of the hatchery. As egg disinfection cannot



Sea Bass (*Dicentrarchus labrax*)

protect effectively various other preventive measures against vertical transmission of pathogens from broodstock to eggs and larvae are applied.

Horizontal transmission of pathogens

In the past, it was common practice to feed the broodstock on fresh or frozen fish, mussels and squid. Usually, it was given without any prior processing.

Some hatcheries still feed fresh feed. However, this practice is most likely to create various problems related to biosafety.

Fresh feeds may be infected by pathogens and these may be horizontally transferred to the broodstock and many strategies have - in vain - been applied in order to exclude this risk.

Checking the fresh or frozen feed before

giving it to the broodstock would only detect known pathogens, such as Nodavirus.

Gamma-ray sterilization is a certified method that can be used to sterilize feeds in order to reduce the load of pathogens. Several other methods of preservation and processing of fresh feeds are applied but these are either not sterilisation methods or they degrade the nutritional value of the feed.

Pollutants and cold chain issues

All seafood, if human grade quality or not, contains pollutants, for example heavy metals. For broodstock living exclusively on fresh feeds there is a high risk that these pollutants concentrate in dangerous quantities in the broodstock, increasing the risk of deformities and negatively affecting larval survival.

Problems in the cold chain, in the

transfer to the unit, in its storage and even during thawing and segmentation or grinding can greatly deteriorate the quality of the fresh feed.

Pollution of tanks

Feed residues and broodstock faeces consisting of indigestible parts such as shells, bones, etc. dirty the tanks. Some of these residues float and when the eggs are transported the residues might end directly in the hatching and larval tanks.

The use of fattening feeds

Fattening feeds are not designed for keeping fish in good shape for years and they do not cover the particular nutritional needs of mature broodstock and usually cause a number of health problems in the population, damaging internal organs. Fatty degeneration of the liver is a prime example.

As a consequence, some hatcheries try to improve fattening feeds with on the spot interventions. They mix fattening feed with oils, vitamins and other nutritional ingredients. This process increases costs and burdens the farm's operations. Fattening feeds are relatively low in DHA, EPA & ARA. It does not help if the hatchery manager tries to enhance the fatty acids profile by externally adding high-cost HUFAs which are essential for broodstock if he does not have the knowledge for supporting them with the appropriate antioxidants and vitamins.

Feed pellets designed for broodstock

Some hatchery managers tend to believe that big fish like broodstock are "easy"

and do not hide any surprises. So why should they ask for a specialized broodstock feed? However, the quality of eggs deteriorates slowly without apparent sharp fluctuations and may go unnoticed.

The design and production of specialized feeds for broodstock requires knowledge and a willingness to invest. Knowledge about the needs of a hatchery and about which nutrients need to be transferred from the broodstock to the eggs and further on to the yolk sac of young larvae have to be acquired.

With a total that does not exceed 300 tons the broodstock feed market for Sea Bream and Sea Bass is a niche market. The BioMar Group decided to take the step into this niche market. In its factory in Greece BioMar produces two types of broodstock feeds for marine species: EFICO Genio 413 that is specially

formulated for high quality egg production and EFICO Genio 403 for fast recovery after spawning. EFICO Genio 413 and EFICO Genio 403 are available in 8 mm pellets suited to be fed to broodstock of all sizes.

Scientific research and hands-on experience of broodstock-unit-managers have identified that the most important aspect of feed composition for broodstock feed is its fatty acid profile. Arachidonic Acid (ARA, C20:4 n-6) is considered to be the X-factor of the maturation process. In the development of EFICO Genio 413 BioMar R&D has taken this into consideration. Combined to premium quality raw materials this gives an optimal fatty acid composition to the feed and maximum chances to get numerous and best quality eggs with improved survival during the first Days Post Hatching of the larvae.

In the formulation of broodstock feeds BioMar uses raw materials that are extremely specialized and hard to find and on occasion even the suppliers do not have them in stock. Sophisticated production processes and skilled process operators take into account not to deteriorate the nutritional value of the variety of very specific raw materials and to apply a very precise dosage of the often expensive raw materials like for instance ARA.

Most hatcheries in the Eastern Mediterranean area have seen the results of broodstock feeds EFICO Genio 413 and EFICO Genio 403 in practice: directly measurable results i.e. quality and quantity of eggs, egg size, percentage of fertilized eggs, etc., and most importantly a very good survival of the larvae at least in the first 10 very critical Days Post Hatching and low deformity rates.

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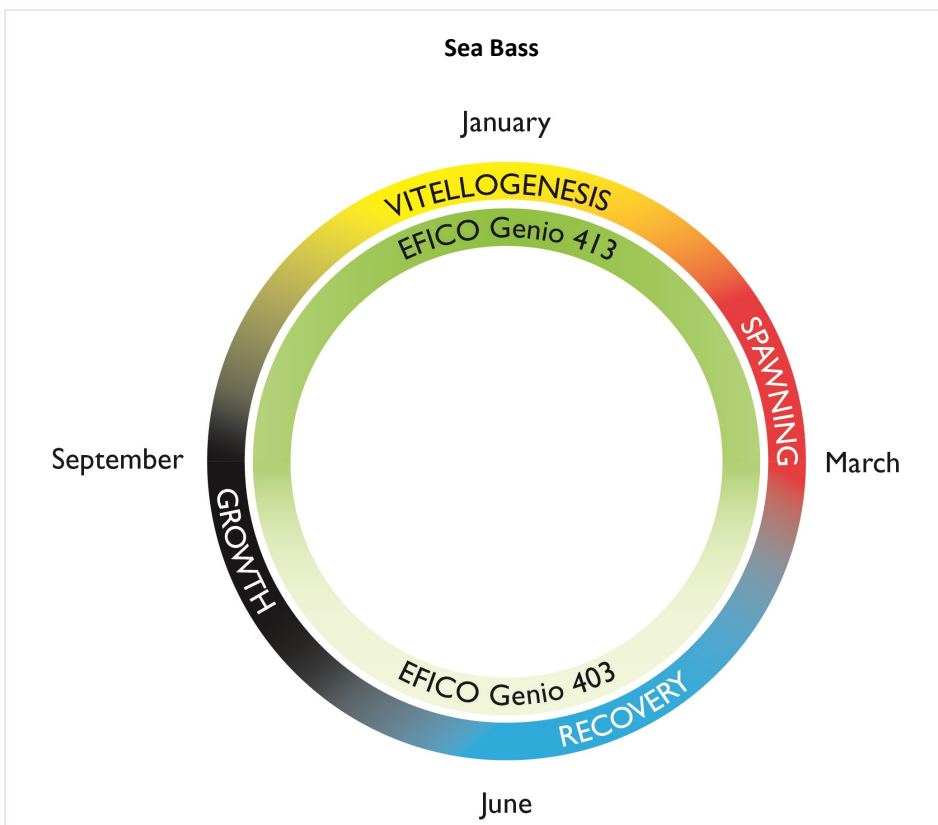
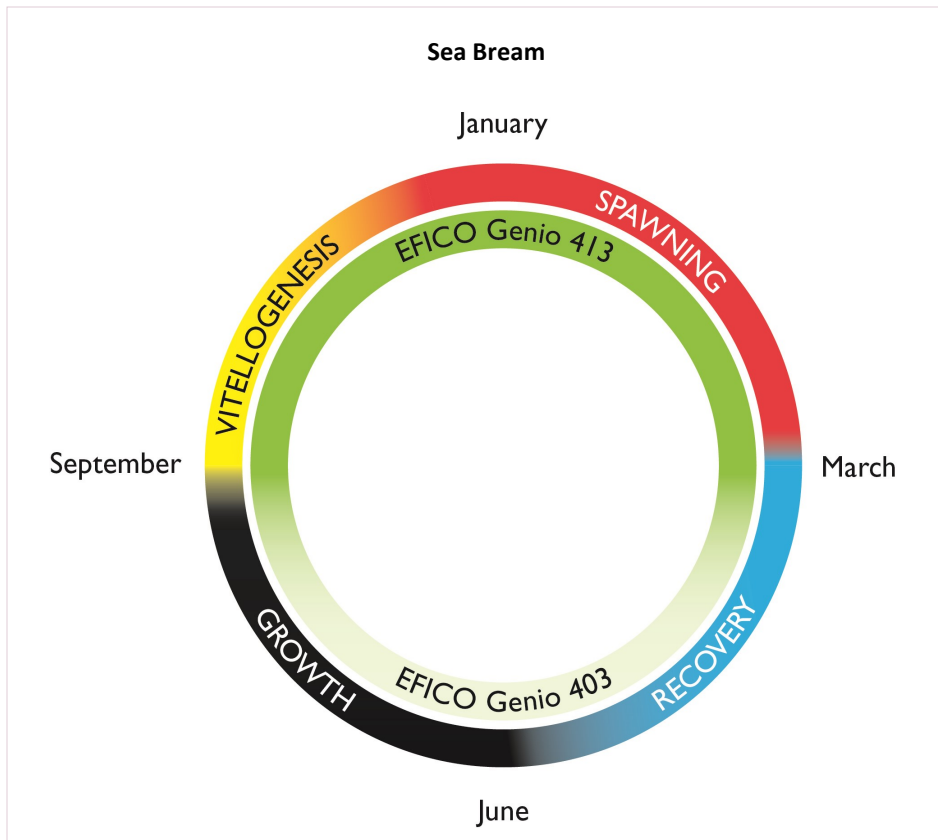
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Best possible feeding of broodstock aims for achieving a stable and strong breeding performance of broodstock fish in order to obtain a high yield of high quality eggs and thereby give the next generation of fish the best possible start in life. BioMar recommends the use of feed types EFICO Genio 413 and EFICO Genio 403 in combination, depending on the phase of life cycle of the fish.

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More information



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Aquafeed Horizons

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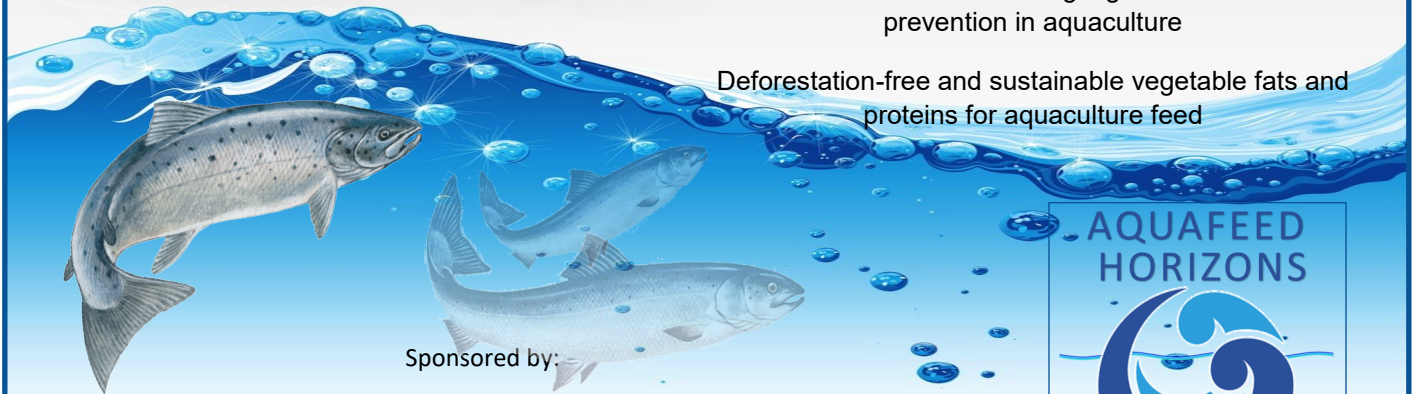
Mycotoxins in aquaculture: occurrence and impact in rainbow trout (*Oncorhynchus mykiss*).

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Care and feeding of bivalve broodstock

By Eric Henry, PhD, Research Scientist, Reed Mariculture Inc.

Bivalve aquaculture is increasingly dependent on hatchery production of spat. Environmental disturbances (pollution, ocean acidification, climate change, harmful algae blooms, disease outbreaks) are reducing the reliability of natural spat collection, while the demand for spat is increasing as many bivalve producers struggle to meet growing consumer demand for bivalves. Bivalve hatcheries are therefore expanding capacity to compensate for reduced natural production of spat. But hatcheries are also essential for production of genetically selected lines with improved

performance characteristics, for production of triploids, and for production of exotic species in locations where no naturalized populations can supply spat. Hatcheries can artificially create conditions of temperature and photoperiod to enable spawning of exotic species, and to extend the spat production season of native species. Early production of spat makes possible a longer growing season and consequently larger, more robust seed with improved survival and growth capacity.

Hatchery production success is critically

dependent on the quality and productivity of the broodstock, which both depend on 1) the broodstock genetic background, 2) the physical environment, and 3) the quantity and quality of the feed provided. Hatcheries “condition” broodstock by providing the optimal combination of these factors. What follows is a synopsis of broodstock conditioning practices, based on the review article by Utting (Aquaculture 155:45-54, 1997) and the FAO Hatchery Culture of Bivalves manual (Helm et al. 2004).

1) Broodstock genetic background

Broodstock animals may be harvested from wild populations near the hatchery to ensure that offspring will be well-adapted to the local environment. Or they may be individuals selected from previous generations reared at the hatchery that exhibit desirable traits such as disease resistance, rapid growth, and preferred shell shape or color. Genetically selected stocks may also be available from breeding programs at universities or laboratories of fisheries departments.

Triploid animals are commercially desirable because they are infertile, and so no metabolic resources are diverted from meat production to gonad development. Triploids are particularly advantageous for oyster growers because they can be marketed at any time of the year, since there is no spawning season when they are

unpalatable. To produce triploid oysters, the most reliable method is to purchase male tetraploids from commercial suppliers, whose diploid sperm are used to fertilize eggs from hatchery females.

Whenever broodstock is brought in from a location remote from the hatchery, the animals must be kept in a separate quarantine facility in the hatchery until they can be confirmed to carry no diseases. The quarantine facility must have restricted access by hatchery personnel, with strict biosecurity measures, and effluents must be disinfected.

2) Physical environment

Broodstock should be housed in a quiet area of the hatchery where it will not be exposed to disturbances such as vibrations or sudden changes in light due

to movements of personnel near the holding tanks. A flow-through water supply can take advantage of natural phytoplankton as food source, but then temperature and salinity control is not practical, and untreated water can bring in harmful algae blooms, parasites and pathogens. A recirculating water system avoids these problems, and also prevents loss of algae feed via outflow.

Control of light exposure and temperature and salinity of the water is required to optimize physiological condition and gametogenesis, maximize synchronization of spawning, or to induce spawning outside the normal spawning season. Gametogenesis can be induced in most bivalves by an increase in temperature, but for any given species the amount and duration of temperature increase required can depend on previous condition, quantity and quality of food supply, and sometimes photoperiod.

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For tropical bivalves spawning is often more intermittent, with no distinct seasonal pattern. A chilling strategy can be used to stimulate reproductive development: Broodstock is held at 5 to 10 °C below ambient water temperature, with moderate feed rate, for four to six weeks, then temperature is gradually increased to ambient, resulting in increased synchrony of gametogenesis.

3) Food supply

Proper management of feeding is critical for controlling timing of reproduction, for good broodstock fecundity, and for ensuring good survival of larvae. Feed rates must be adequate, but excessive feeding can stimulate somatic growth and suppress gametogenesis. Appropriate feed rates (dry weight of algae/meat dry weight of broodstock) are typically 3-6%/day, with the higher rates being appropriate at higher temperatures. For best results feed should be provided to broodstock without interruption.

Reproduction may be enhanced in colder climates by a two-stage conditioning procedure. Early in the season, before broodstock would naturally begin gametogenesis, the temperature is elevated enough to increase metabolism without stimulating gametogenesis. Relatively high feed rates (e.g. 6%/day) are provided for 4 to 6 weeks to increase

glycogen reserves, which will be converted to gamete lipids during gametogenesis. Then feed is reduced to 2% -3%/day and the temperature is gradually raised to stimulate gametogenesis.

Food quality is of course no less important than quantity. The quality of natural phytoplankton from ambient water can be high, but is not reliable, and may not be available in colder seasons. Cultured microalgae used for broodstock conditioning should be the same high-quality strains used by hatcheries for larviculture, most commonly strains of *Chaetoceros*, *Isochrysis* (especially the "Tahitian" strain, now known as *Tisochrysis*), *Pavlova*, *Tetraselmis*, and *Thalassiosira*. All these strains provide significant quantities of essential long-chain highly unsaturated fatty acids (HUFAs), most importantly EPA and DHA. Although it can require significant extra effort for a hatchery to produce multiple species of algae to feed broodstock, a mixture of strains can always be expected to be nutritionally superior to any single strain. Egg HUFA reserves have been shown to be important for larval growth and survival, particularly under stressful conditions.

Fortunately, it is no longer necessary for hatcheries to maintain production of several species of algae for broodstock conditioning in the larviculture off-

The quality of natural phytoplankton from ambient water can be high, but is not reliable, and may not be available in colder seasons.

season. These high-quality algae can be purchased in the form of refrigerated liquid concentrates, such as Reed Mariculture's Instant Algae® products. These liquid concentrates have specified concentrations and so are suitable for continuous automated feeding to broodstock using a dosing pump. Reed Mariculture's Shellfish Diet 1800® provides a blend of 6 species of algae, and is used to feed all bivalve life stages from first-feeding larvae to broodstock.

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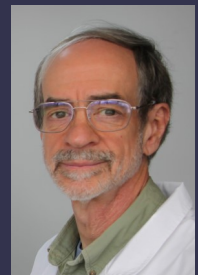
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Successful techniques for Pacific black snook broodstock management and captive spawning

Kevan L. Main, Matthew J. Resley and Nicole R. Rhody, Mote Marine Laboratory, Directorate of Fisheries and Aquaculture, Sarasota Florida

Research on Pacific black snook (*Centropomus nigrescens*) conducted at Mote Marine Laboratory from 2014-2016 focused on production of fingerlings for stock enhancement (Resley et al., 2014). Black snook, like other snook species, are euryhaline and are able to inhabit freshwater, estuarine and marine environments (Gunther 1995; Robins et al., 1991). *C. nigrescens* are a highly sought after game fish (Olander 2015) from Mexico to Ecuador and have strong potential as an aquaculture species due to their large size and culinary value (Figure 1).

Collection, Acclimation and Quarantine

Wild adult black snook were collected in 2013 and 2014 near Puerto Jimenez, Costa Rica, transported to the Tranquility Management, R.L. site and acclimated in recirculating systems for at least 2 weeks prior to shipping. Fish were then transported to the San Jose airport and shipped by airfreight to Miami, Florida. Upon arrival, the fish were transported by truck to Sarasota, Florida. At the time of collection, broodstock weight ranged from 1.64-5.02 kg and total length was



Figure 1. Female black snook during sampling event.

52-78 cm. Upon arrival at Mote Aquaculture Research Park (MAP), the fish were placed in a 48 m³ broodstock holding tank (6.1 m in diameter by 1.83 m deep) and water depth was maintained at 1.52 m. Two broodstock populations were established at MAP for maturation and spawning research trials. Broodstock tanks were filtered through a

closed recirculating system, allowing complete control of their environmental parameters. To maintain tank clarity and water quality, each tank was equipped with a solids filter, a 900 L moving bed reactor for biofiltration, a protein skimmer, and two 150-watt ultraviolet light sterilizers. For egg collection, a bulkhead on the side of the tank



Figure 2. Fresh frozen diet for black snook.

funneled water and skimmed eggs off the tank surface into a 780-L egg collection tank. Newly acquired fish were acclimated to the holding tanks and weaned onto a diet of shrimp and thread herring. When all of the fish had been eating well for at least a week, we performed a prophylactic copper sulfate treatment (0.2 ppm for 30 days) to control parasites (i.e., *Cryptocaryon* and *Amyloodinium*) on newly introduced wild broodstock.

Feeding Strategies

Black snook broodstock were fed to satiation every other day a diet of shrimp and thread herring (Figure 2), at a 50/50 ratio. The diet was based on feeding requirements and spawning research conducted at MAP with common snook (Neidig et al. 2012). The daily food ration for the broodstock was adjusted based on tank biomass and feeding behavior and ranged from 2.0 to 3.0% of the tank

biomass. Although no mortalities were observed with *C. nigrescens* due to thiamine deficiency, we have seen and resolved mortalities in common snook broodstock with the addition of thiamine to the broodstock diet. Therefore, we supplemented the black snook diets with thiamine at 40 mg/kg tank biomass. The thiamine was supplemented to the diet by quartering 250 mg vitamin B1 commercial tablets that were placed inside the muscle of the thread herring fed.

Photothermal Conditioning Strategies

Photothermal conditioning strategies utilized for black snook were based on proven strategies developed for common snook (*C. undecimalis*) at Mote Marine Laboratory (Rhody et al., 2014). Photoperiod was maintained by two banks of fluorescent lights (each containing two 10,000oK daylight Coralife® VHO bulbs) that were on a

timer, providing a gradual sunrise and sunset. Temperature was controlled with an in-line 126,000 btu heater/chiller. Because there was no published information on the timing of black snook spawning in the wild, we gathered annual average day length and temperature data for southwest Costa Rica and developed photothermal regimes to identify optimal resting and spawning conditions. We identified a photothermal regime of 12 hours of light and 12 hours of dark and temperature of 26°C as good resting conditions (Figure 3). Under these conditions, black snook slightly reduced feeding and no maturation was observed. For spawning, we used a photothermal regime of 13.5 hours of light and temperature of 30°C; maturation and induced spawning occurred under these conditions.

Broodstock Sampling and Induced Spawning

All the broodstock were individually tagged with a passive integrated transponder (PIT) microchip to track growth, perform health checks and assess the level of maturation of the fish. Sampling this species was optimal 6-8 wks after they reached maturation conditions, and we allowed 6-8 wks for recovery from handling stress in between sampling events. The reproductive status of each female was identified using oocyte classification adapted for common snook (Neidig et al., 2000; Rhody et al. 2013). Only mature female black snook were implanted with a dose of 75 µg/kg Gonadotropin-releasing hormone analog (mGnRH_a), and all fish were revived and returned to the tank. Implants were delivered using a non-degradable co-polymer of Ethylene and

Vinyl Acetate (EVAc) (Zohar and Mylonas 2001), administered with a 12-gauge needle and implanted into the dorsal muscle behind the second dorsal spine. All implants used in our trials were fabricated by the Institute of Marine and Environmental Technologies (University of Maryland, Baltimore, MD, USA). Male maturation was assessed, but hormone therapy was not applied for the first three spawning events. Percent fertilization dropped below 4% for the third spawn, so all males were implanted with mGnRH α at 25 μ g/kg at all future sampling events. Following this change in protocol, no spawn was collected with a fertilization rate below 40%. Spawning usually occurs 24-30 hours post-implantation, and spawns were obtained 1-3 days after sampling. Between 2014 and 2016, we successfully spawned *C. nigrescens* 9 times and produced

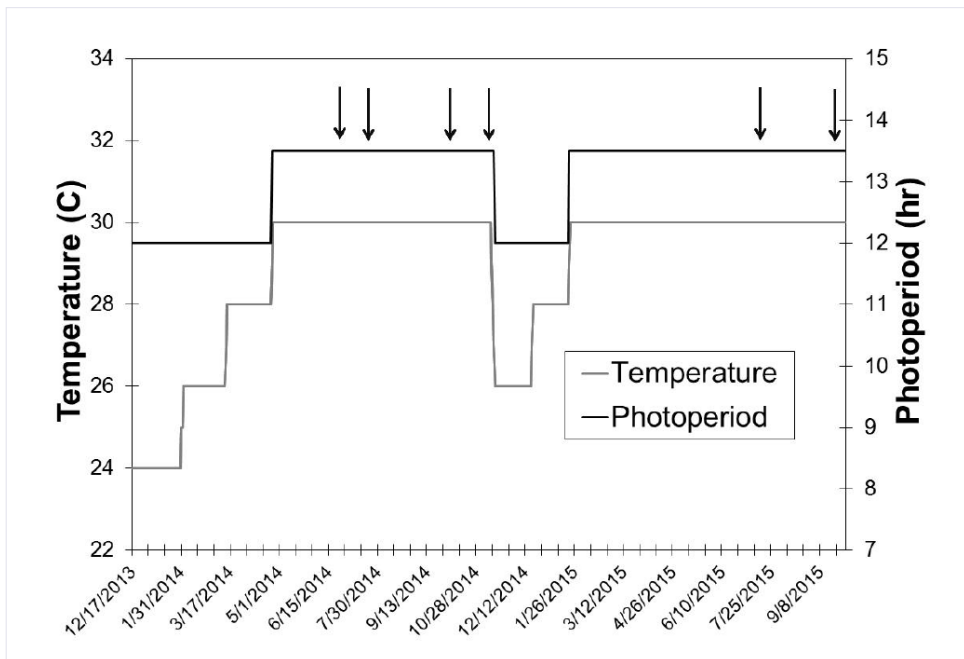


Figure 3. Photothermal chart for Black Snook in Tank 1. Arrows indicate sampling events when mature females were observed and spawning events occurred.

fertilized eggs (Figure 4), larvae (Figure 5) and fingerling (Figure 6) snook for

production trials. Reproductive bottlenecks were also observed in

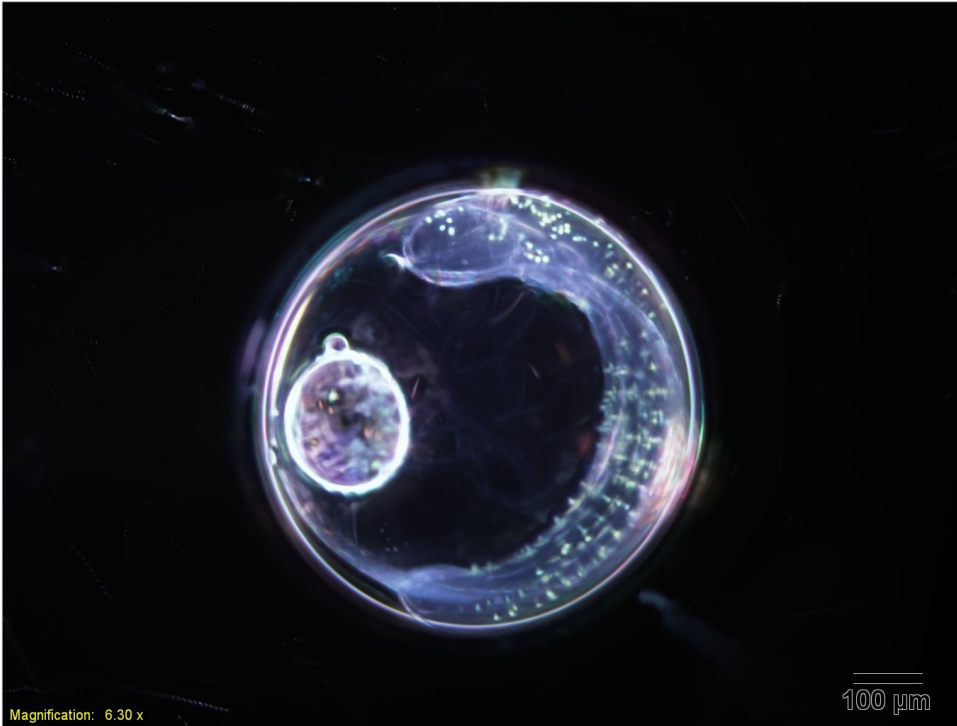
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Figures (top to bottom): Figure 4. Black snook embryo (10.5 hours after fertilization); Figure 5. Black snook larvae 3 days after hatching; Figure 6. Fingerling black snook 45 days after hatching.

C. nigrescens and were similar to those observed in *C. undecimalis* (Rhody et al., 2014).

Future broodstock research goals for Pacific black snook include identification of optimal broodstock diets to improve egg/larval quality, optimization of hormone induction therapies, and new spawning strategies to increase participation of mature broodstock in spawning events.

References

Escárcega, R.S., 2010. Acclimatization to the captivity of black snook *Centropomus nigrescens* (Günther, 1864), in rustic ponds in the coast of Michoacán, Mexico. Michoacán University of San Nicolas de Hidalgo, Mexico. MSc thesis.

Gunther Nonell, J. 1995. Growth of Pacific snook (*Centropomus nigrescens*) juveniles at different salinities. *Unicencia* 12:35-38.

Neidig, C.L., N. Brennan, P. Caldentey, K. Leber, K. Main, M. Resley, N. Rhody and C. Yanes-Roca. 2012. Marine aquaculture and stock enhancement in Florida: Research and development. FWC contract number 10087, Florida Fish and Wildlife Conservation Commission, Palmetto, FL, USA.

Olander, D. 2015. The World's Top 100 Game Fish: A ranking of the world's major saltwater game fish according to 61 top anglers and skippers. *Sport Fishing Magazine*.

Resley, M.J., M. Nystrom, C. Yanes-Roca, K.M. Leber and K.L. Main. 2014.

Controlled Maturation and Spawning of Captive Black Snook. *World Aquaculture*, September 2014: 29-34.

Rhody, N.R., C. Puchulutegui, J.B. Taggart, K.L. Main and H. Migaud. 2014. Parental contribution and spawning performance in captive common snook *Centropomus undecimalis* broodstock. *Aquaculture* 432, 144-153.

Robbins, C.R., R.M. Bailey, C.E. Bond, J.R. Bond, E.A. Brooker, R.N. Lachner and W.B. Scott. 1991. World fishes important to North Americans. Exclusive of species from the continental waters of the United States and Canada. *American Fisheries Society Special Publication* 21: 243 pp.

Zohar, Y. and C. Mylonas. 2001. Endocrine manipulations of spawning in cultured fish: from hormones to genes. *Aquaculture* 197: 99-136.

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Litopenaeus vannamei

susceptible to low dose mycotoxins

By Rui Gonçalves, Scientist Aquaculture and João Sendão, Manager of Aquaculture Center for Applied Nutrition (ACAN) at BIOMIN

Mycotoxins in aquaculture feeds

The awareness of mycotoxin-related issues in aquaculture has grown as feed manufacturers and producers realize the importance of mycotoxins and their potential to negatively impact production. Recent reports shows that in Asia, plant meals sourced, e.g., soybean meal, wheat, wheat bran, corn gluten meal, and rice bran, were mostly contaminated with *Fusarium* mycotoxins zearalenone (ZEN), deoxynivalenol (DON) and fumonisins (FB). This contamination is later reflected in the finished feeds for shrimp and fish with values higher than 2 ppm in certain samples.

Mycotoxin synergisms

Considering that compound feed contains a mixture of several raw materials and that mycotoxigenic fungi are usually capable of producing more than one mycotoxin, it is no surprise that most finished feed would be contaminated by several mycotoxins. According to the BIOMIN Mycotoxin Survey data from 2016, shrimp feeds sampled in Southeast Asia had an average of four different mycotoxins per sample. Samples were mainly contaminated by DON, ZEN, FUM and 15-AcDON (Figure 1). In general the

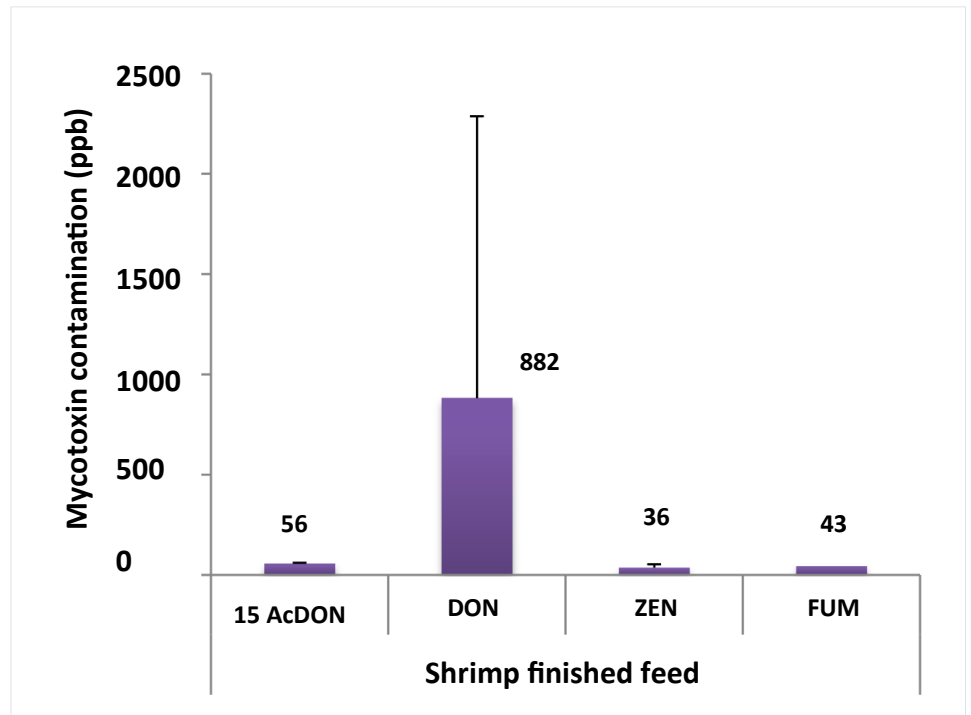


Figure 1: Mycotoxin occurrence in SE Asia for shrimp commercial feeds

mycotoxins levels found in 2016 in shrimp feeds were slightly lower for ZEN and FUM when compared with contamination of same mycotoxins found in 2014, for the same region (ZEN = 60 and FB = 173 ppb). In the case of DON, the contamination found in 2016 (882 ± 1405.34 ppb) is much higher than contamination found in 2014 (DON = 161 ppb). It is important to have in mind that mycotoxins contamination pattern and levels can change considerably from year

to year—even in same region and for the same commodities due to weather conditions and other plant stressors factors. As a result, producers should regularly monitor raw commodity and finished feeds for mycotoxin contamination.

Testing *vannamei* sensitivity to *Fusarium* mycotoxins

A 36-day feeding trial was conducted to

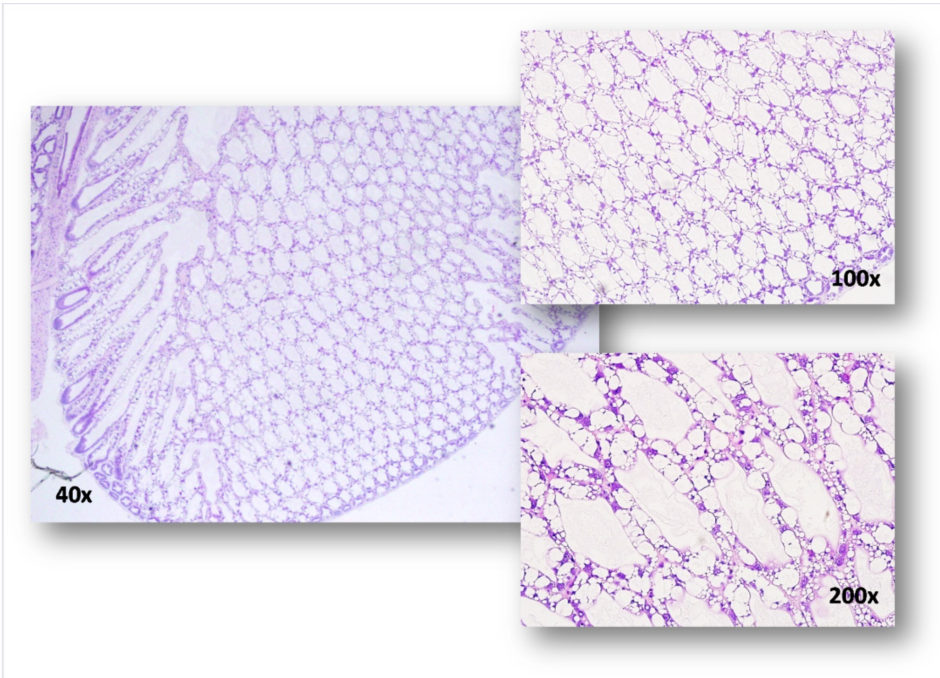


Figure 2: Histological slides showing a normal and healthy Hepatopancreas (Control group)

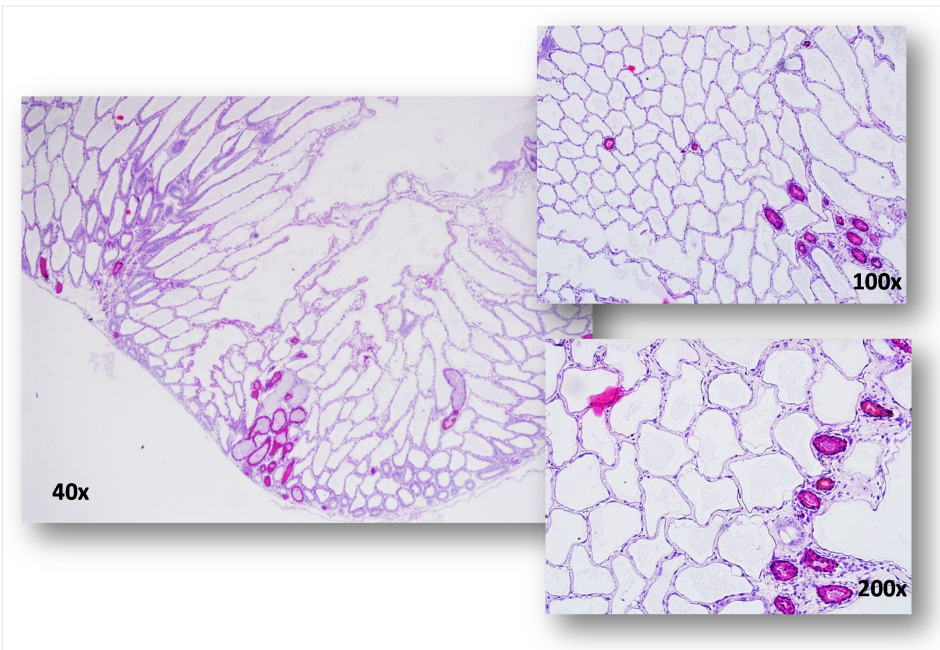


Figure 3: Histological slides showing an irreversible damaged of Hepatopancreas (Treatment: 0.5DON+0.6FUM)

determine the effects of realistic contamination levels of FUM and deoxynivalenol DON, alone and combined, on growth performance, selected health indices (data not shown)

and hepatopancreas histology of white leg shrimp. Six treatments were established in triplicate. Treatments: Control (no mycotoxins); 0.6FUM (0.6 ppm of FUM); 0.5DON (0.5 ppm of DON);

0.6FUM+0.5DON (0.6 ppm of FUM combined with 0.5 ppm of DON); 0.6FUM+0.5DON+Mycofix® Plus 5.0 (0.6 ppm of FUM combined with 0.5 ppm of DON plus Mycofix® Plus 5.0) and Mycofix® Plus (positive control; no mycotoxins only Mycofix® Plus 5.0) were established. Mycotoxin levels in feed were confirmed by liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) before starting the experiment. Mycofix® Plus 5.0 was developed to protect animal health by deactivating mycotoxins found in contaminated feed. The product combines three strategies – biotransformation, adsorption and bioprotection– in order to provide the most complete commercially available protection against the negative effects of mycotoxins.

***Vannamei* commercial production can be impacted by DON and FUM**

Low levels of FUM (0.6 ppm) and DON (0.5 ppm), alone or combined showed a clear negative impact on growth performance of *L. vannamei*. DON at 0.5 ppm had a big negative impact on all the parameters measured: final body weight (FBW), specific growth rate (SGR) and feed conversion rate (FCR). FCR was the most impacted parameter with an increase of 32% over the control. It is important to mention that the average contamination value of DON observed on shrimp diets during 2016 was 800 ppb—higher than the tested contamination. Fumonisin also negatively influenced the performance of shrimp—though not as severely as for DON. Interestingly, the combination of both mycotoxins increased the negative effects when compared to single mycotoxin effects.

This data shows, for the first time, the possibility for synergistic negative effects on shrimp and how serious these effects can be, with an impressive 15% decrease in FBW, 24% decrease in SGR and 88% increase in FCR when compared to control.

Litopenaeus vannamei is sensitive to DON and FUM at levels normally found on commercial shrimp feeds. The negative effects shown in this experiment for DON at 500 ppb can demonstrate the serious impact of these mycotoxins on the commercial production of *L. vannamei*.

Mycofix® Plus proved to be efficient in reducing the negative effects of mycotoxins. The inclusion of Mycofix® Plus 5.0 on diets containing 0.5 ppm of DON and 0.6 ppm of FUM, could almost fully neutralize the negative effects of the mycotoxins and even improved the majority of the growth parameters such as the weight gain in 6% over control and improved SGR in 7%. Mycofix® Plus alone also showed to improve performance in the absence of mycotoxin contamination, mainly justified by the presence of Biomin® Bioprotection Mix in Mycofix® 5.0, which provides an extra immune and liver support. Regarding the histopathological damage caused by the combined mycotoxins, a high prevalence of degradation/deformation of the tubules of epithelial cells, a high number of empty tubules and the presence of haemocytes around the atrophied tubules were observed (Figure 2 and 3).

Table 1: Growth performance results.

Treatments	FBW (g)	Δ (%)	SGR (%/day)	Δ (%)	FCR	Δ (%)
Control	3.66		2.09		1.90	
0.6FUM	3.57	↓ 2	2.01	↓ 4	1.98	↑ 4
0.5DON	3.28	↓ 10	1.80	↓ 14	2.51	↑ 32
0.5DON+0.6FUM	3.10	↓ 15	1.59	↓ 24	3.58	↑ 88
0.5DON+0.6FUM+ Mycofix® Plus 5.0	3.90	↑ 6	2.22	↑ 7	2.12	↑ 11
Mycofix® Plus 5.0	3.95	↑ 8	2.29	↑ 10	1.80	↓ 6

FBW = Final average body weight in grams; Δ = Variation in percentage comparing to control; SGR = Specific growth rate; FCR = Feed conversion ratio.

Conclusions

The experiment results confirm that *Litopenaeus vannamei* is sensitive to DON and FUM at levels normally found on commercial shrimp feeds. The negative effects shown in this experiment for DON at 500 ppb can demonstrate the serious impact of these mycotoxins on the commercial production of *L. vannamei*. The combination of DON and FUM multiplied the negative effects on shrimp compared to single mycotoxin contamination—which is especially important since commercial shrimp feed contained on average 4 mycotoxins per sample. Mycofix® Plus 5.0 was shown to be an efficient solution to decrease the negative impact of FUM and DON on shrimp.


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The importance of biosecurity in broodstock feed

The successful aquaculture businesses of the future will be the ones that embrace science, knowledge and control in every part of their value chain. A good place to begin is getting to know what your broodstock actually eats, writes OddGeir Oddsen, CEO of feed producer, ProChaete.

Risky business

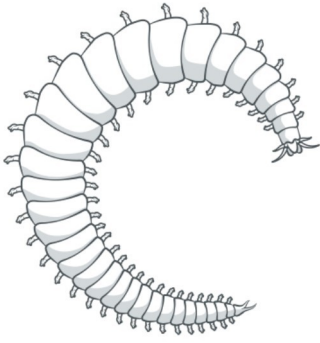
Shrimp farming is, and has always been, risky. A shrimp farm is a sum of many different biological parts, some of which can be subject to various forms of diseases, predators, contaminants, water pollution or even poachers. Traditionally, the shrimp industry has been riddled with much more disease than, say, the salmon industry. One of the reasons is the lack of rules, regulations and restrictions in the transport end of the shrimp industry, allowing operators to transport infected shrimp - pathogen carriers – from one location to the next. And the tough restrictions in the salmon industry have proved effective.

That being said, the vast number of small operators in the shrimp farm industry makes it much more difficult to enforce any kind of regulatory system.

Then there's the feed. Broodstock feed - as well as shrimp feed in general – caught in the wild, runs the risk of carrying disease. Using wild caught feed represents a risk for any shrimp farmer. In addition, water conditions play a big part in the health and welfare of farmed shrimp, and should be monitored and controlled as effectively as possible. Fortunately, it looks like the industry is improving along with the quality of the product.

We are getting better

These days, many extensive shrimp farms are gradually transforming. Farms that essentially used to be primitive mangrove dams covering enormous areas were (and still are) difficult to control. In addition to little or no control over water conditions, farmers run the risk of being plagued by pests, predators or poachers. A seemingly simple addition of a roof over each dam, for instance, could make it much easier for a farmer to gain control. Farmers are making their units easier to control is an ongoing trend, and it secures a steady output of healthy shrimp. Backyard farming is turning into professional farming. This switch bears witness to the fact that knowledge is the



We only use protein from farmed polychaetes, and we measure the nutritional value of our proteins before adding the very best and necessary nutrients in our semi moist feed.

future.

And intensive, knowledge-based farming is the future of aquaculture for several reasons: Extensive farming is, in addition to the aforementioned lack of control, also too reliant on damming up large areas for production. And if shrimp farming takes too much of a toll on the surrounding environment, we will undoubtedly witness the rise of sustainable, intensive farming closer to the marketplace. Intensive, effective, indoor farms with lower transport costs will become the industry standard.

The future is feed

Knowledge-based shrimp farming relies on each farmer obtaining as much knowledge as possible about every aspect of his or her operation. And, believe it or not, the cycle starts with broodstock feed. Without proper knowledge about what the broodstock is fed, we will never have proper knowledge about the condition of its offspring. And broodstock will never deliver an offspring of a higher quality than the feed they have been given. This is why the quality of any broodstock feed should meet several requirements: First of all, it should not be wild-caught proteins, which may be disease carriers.

Broodstock feed should be biosecure. In addition, broodstock feed should have an exceptionally high nutritional value, maximizing the quality of the output. At ProChaete we take every step of the process very seriously. We only use protein from farmed polychaetes, and we measure the nutritional value of our proteins before adding the very best and necessary nutrients in our semi moist feed. Amino acids, fatty acids, vitamins, minerals and pigments are carefully measured out to optimize our broodstock feed. In addition, we irradiate all our feed to ensure it is sterilized. We feel that biosecure, nutritionally safe broodstock feed this is the only solution for a rapidly improving industry where the standards are getting higher every day.

By 2050, the world population will have surpassed nine billion people. A safe, effective and sustainable aquaculture industry holds the key to feeding them in a healthy, nutritious way. Some of the solution lies in the quality of the broodstock feed.

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More information



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Freshwater microalgae rich in omega-3 fatty acids as rotifer feed in marine hatcheries: A case of success with *Nannochloropsis limnetica*

By Federico G. Witt, Ph.D., Production Director of AlgaEnergy S.A.

Inert feeds are available in the aquaculture market for mass production and enrichment of microinvertebrates that in turn are used as live-feed for fish larvae in hatcheries. However, as in the wild, microalgae represent the most suitable feed for rotifers (Figure 1) and other filter feeders. For this purpose, many hatcheries bear their own microalgae cultivation facilities. Nevertheless, the microalgae production equipment requires a large illuminated area and a constant dedication of skilled personnel; therefore, the tendency is to outsource this service to microalgae producing companies that ensure high quality biomass and guarantee the supply of the most proper strains thorough the year.

Although good rotifer growth rates can be attained using the ubiquitous freshwater *Chlorella*, marine strains of the eustigmatophyte *Nannochloropsis* have proven to be more suitable due to their higher content in omega-3 PUFAs, mainly eicosapentaenoic acid (EPA, 20:5-

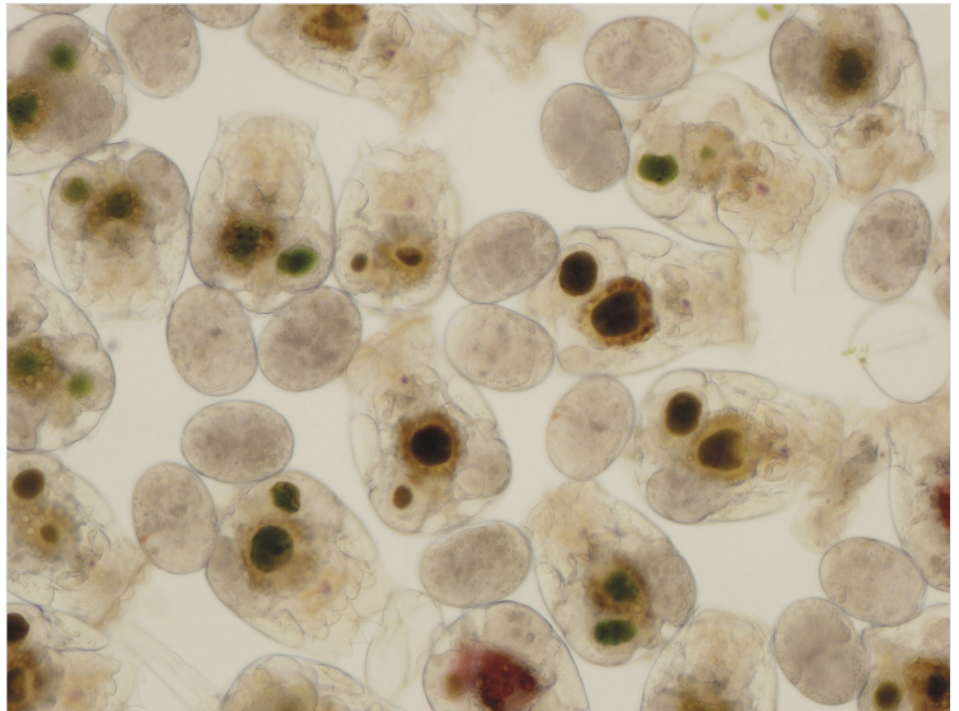


Figure 1: *Brachionus plicatilis*

n3). Indeed, these marine strains of the genus *Nannochloropsis* are used worldwide in the live food chain required for the cultivation of fish larvae.

The use of the freshwater species *Nannochloropsis limnetica* was evaluated in comparison to the marine *N. gaditana* by a recognized team of the University of

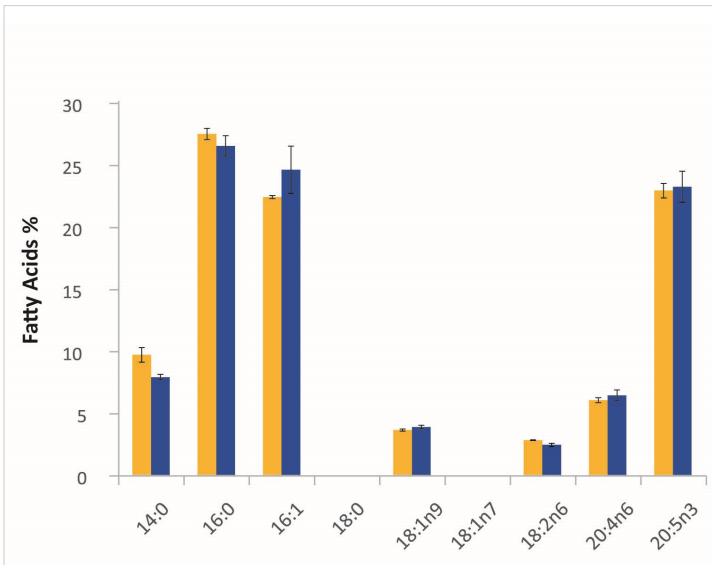


Figure 2: Fatty acids profile of *N. gaditana* (yellow) and *N. limnetica* (blue) in semicontinuous cultures (40% of daily renewal of the cultures). Values are means \pm SD (n = 3).

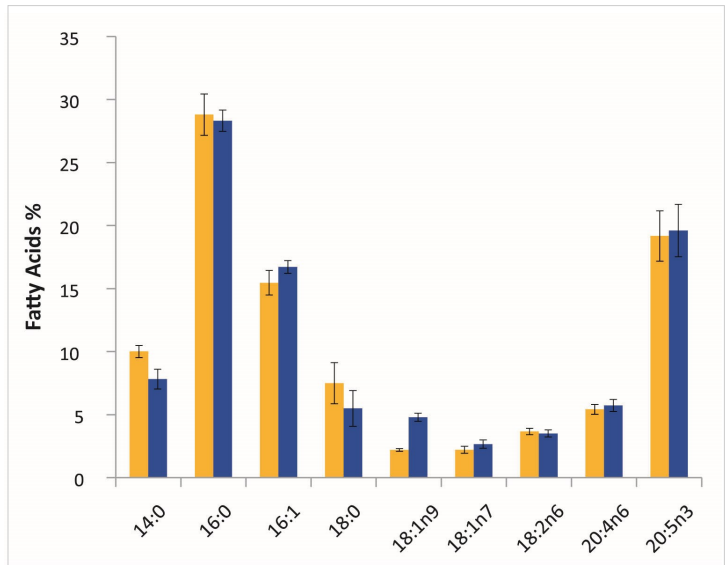


Figure 3: Fatty acid profiles of *B. plicatilis* fed with *N. gaditana* (yellow) and *N. limnetica* (blue) during 5 days. Values are means \pm SD (n=3).

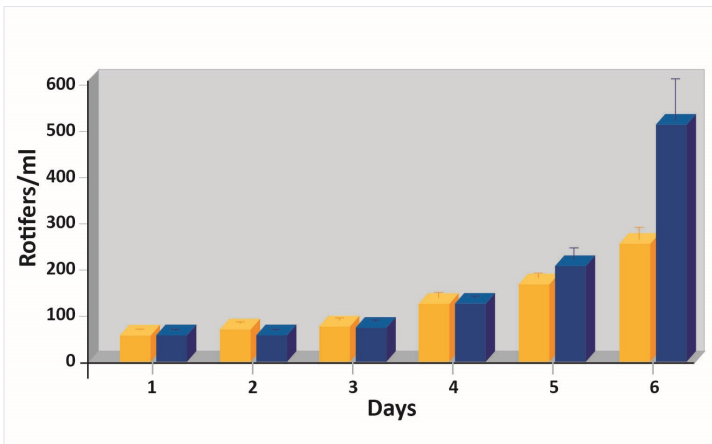


Figure 4: Growth of *B. plicatilis* with *N. gaditana* (yellow) and *N. limnetica* (blue).

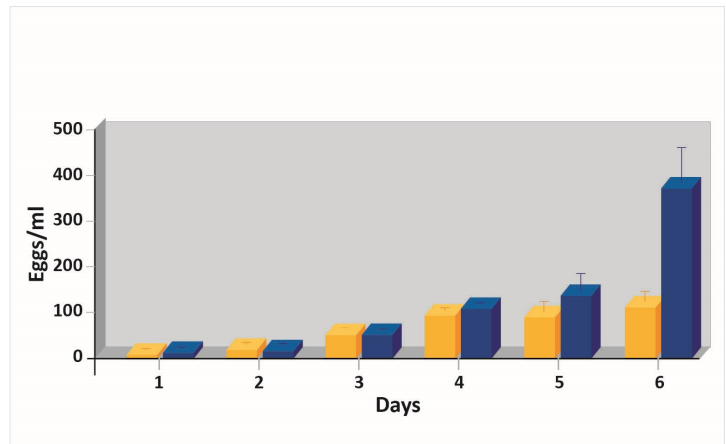


Figure 5: Eggs in cultures of *B. plicatilis* fed with *N. gaditana* (yellow) and *N. limnetica* (blue).

Santiago de Compostela in the frame of an ambitious research project (CENIT VIDA -Integral Algae Valorisation- www.algaenergy.es/en/project/cenit-vida/).

At lab scale it was shown that *N. limnetica* could be cultured in semi-continuous cultures in the temperature range between 15°C and 27°C, with highest productivities at 22°C, equivalent to those of *N. gaditana* (0.64 g l⁻¹ day⁻¹).

Moreover, the nutritional values of *N. limnetica* and *N. gaditana* were compared at laboratory-scale for the cultivation of *B. plicatilis*. Fatty acids analysis revealed similar profiles in both species (Figure 2) and these profiles were maintained in the biomass cultures of filter-feeders raised with high algal rations (Figure 3). However, both *B. plicatilis* concentrations and egg ratios of the rotifer cultivated with *N. limnetica* doubled those attained with the same doses of *N. gaditana* (Figures 4 and 5).

In hatchery-scale experiments in which *B. plicatilis* was fed with baker's yeast supplemented either with on-site produced fresh microalgal cultures or with concentrated algae, similar growth results were obtained for both microalgal species in 5-day batch cultures, although higher dry weights and slightly better egg ratios were observed with the freshwater strain.

Despite the results of the study had demonstrated the potential of this



Figure 6: General view of the production plant in Arcos de la Frontera. Vertical Tubular PBRs are shown on the left, Horizontal Tubular PBRs are placed in the middle and Vertical Flat Panels are shown on the right of the photograph. At the back, the Combined Cycle Power Plant belonging to Iberdrola (1.6 GW of installed capacity) is shown.

freshwater species for marine aquaculture, it was still necessary to prove the economic feasibility of the application of *N. limnetica* at an industrial scale. Many strains perform well indoors but then fail when applied on industry. Hence, *N. limnetica* was cultured outdoors in large closed photobioreactors (PBR) at an

industrial production plant belonging to AlgaEnergy located in the south of Spain, near to Arcos de la Frontera, close to Cádiz, in Andalusia, a high irradiated region that is considered optimal for the cultivation of microalgae.

It is well known that one of the limiting

factors for the mass production of microalgae is the availability of an inexpensive source of CO_2 : as an outstanding advantage, this production plant harnesses the CO_2 of the flue gases from an adjacent combined cycle power plant (Figure 6).

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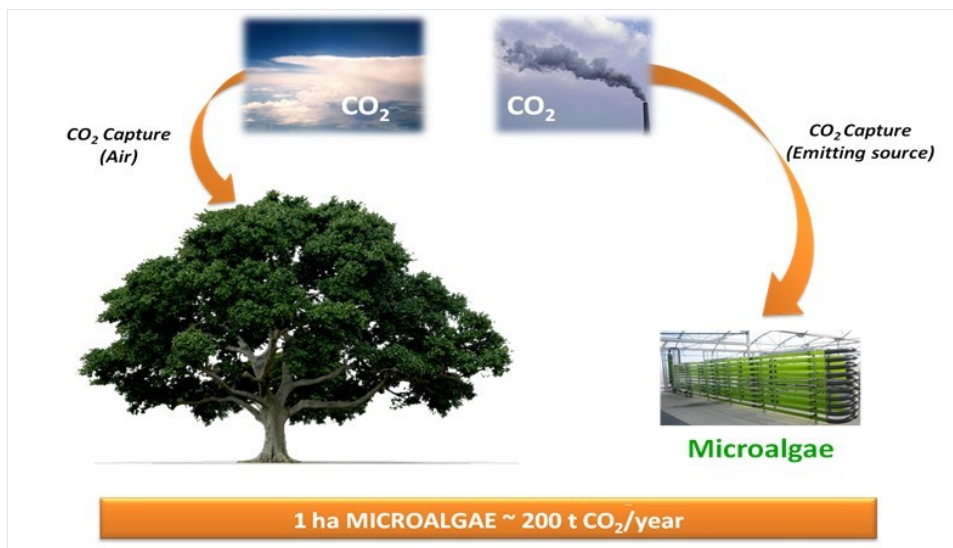


Figure 7: CO₂ photosynthetic biofixation capacity of microalgae

The last necessary achievement was the development of a suitable and economically profitable culture medium; this issue was solved by the elaboration of a specific formula using agricultural commercial fertilizers. Both tubular PBR (total volume=15,000 l) and vertical flat panels (total vol=22,000 l) were tested for the cultivation of *N. limnetica*. *N. limnetica* through the second semester of 2016, and the growth rates were again comparable to those of the relative marine species *N. gaditana*. As an average, 20% of the culture could be harvested daily in a semi-continuous way. The biomass was concentrated to a paste containing 20% algae DW by means of a disk stack centrifuge and its nutritional quality was even better than that of cultures raised in the laboratory, with EPA representing 37% of the total fatty acids and protein accounting for 44% of the algal dry weight.

Last, but not least, an ethical and environmental advantage should be considered. The use for aquaculture of microalgae biomass that benefits from the biofixation of industrial CO₂ captured directly from the chimneys imply an

active contribution to the health of the planet. Indeed, every kilogram of microalgae produced implies the photosynthetic fixation of 2 Kg of CO₂ (Figure 7) and, due to the high productivity of these microorganisms in closed PBRs, the intensive use of 1 ha for microalgae production can contribute yearly to the reduction of ca. 200 Tm of CO₂ emissions. As a result, a new tubular PBR made of 45 kilometers of high quality glass tubes, with a capacity of 95,000 l is being installed in this production plant for the massive cultivation of *Nannochloropsis*.

We can conclude that the feasibility of the intensive culture of the freshwater *N. limnetica* and the use of its biomass for growth and enrichment of rotifers with omega-3 fatty acids in marine hatcheries was demonstrated. As consequence, a new product for fish larvae live food chain based on *N. limnetica* was developed for the AlgaePiscis® commercial line of AlgaEnergy. This product shows higher performance than the equivalent ones produced with marine strains of the same genus and, additionally, the occurrence of any potentially

pathogenic marine bacteria, such as vibrio, is discarded. Furthermore, the environmental benefits derived from the mass cultivation of this strain in an industrial production facility that contributes to the biofixation of CO₂ from flue gases should be taken into consideration.

References

1. Ferreira M. et al. (2009) Enriching rotifers with "premium" microalgae. *Nannochloropsis gaditana*. *Marine Biotechnology* 11:585–595.
2. Freire I. et al. (2016) *Nannochloropsis limnetica*: A freshwater microalga for marine aquaculture. *Aquaculture* 459:124–130.
3. Kobayashi, T. et al. (2008) Effect of combination feeding of *Nannochloropsis* and freshwater *Chlorella* on the fatty acid composition of rotifer *Brachionus plicatilis* in a continuous culture. *Fisheries Science* 74:649–656.
4. Krienitz L., Wirth W. (2006) The high content of polyunsaturated fatty acids in *Nannochloropsis limnetica* (Eustigmatophyceae) and its implication for food web interactions, freshwater aquaculture and biotechnology. *Limnologia* 36:204–210.
5. Reboloso-Fuentes M.M. et al. (2001) Biomass nutrient profiles of the microalga *Nannochloropsis*. *J Agric Food Chem* 49:2966–2972.

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INVE Aquaculture – a Benchmark company - keeps investing in innovations

By Kristel De Schutter, INVE Aquaculture

Secrets to staying ahead: finding additional ways to innovate

At a time when environmental headwinds and economic uncertainty are leading some companies to slow their support for R&D, INVE Aquaculture, part of Benchmark Holdings plc believes investment in innovation and product development is needed now more than ever.

Investing today to solve the problems of tomorrow

Innovation is a fundamental focus for INVE, with substantial resources allocated every year to developing new specialty products and enhancing their existing portfolio.

The Company's network of R&D centers around the world, and its commitment to providing products and services urgently needed today whilst investing to solve the problems of tomorrow means the aquaculture leader can contribute more effectively than ever to their clients' sustainable growth and long-term success.

These test centers also play an important



Staff at the INVE Tropical Aquaculture Research Center in Thailand

role in training INVE's commercial staff and providing demonstrations and training for key customers.

Building a future-proof team and pipeline

INVE have built a skilled team of more

than 37 researchers and staff based at their innovation headquarters in Belgium and two testing centers in Italy and Thailand.

Across their global operations they have increased capacity, recently attracting several leading specialists to their team. They have also expanded and upgraded

their research facilities to support the development of their growing pipeline of 25 new products which is driven by market-intelligence and insights gained from their approach of working side by side with customers in over 70 countries.

INVE have built a skilled team of more than 37 researchers and staff based at their innovation headquarters in Belgium and two testing centers in Italy and Thailand. They have also expanded and upgraded their research facilities to support the development of their growing pipeline of 25 new products.

Warm water and nutrition trials — Thailand

The capacity of INVE's Tropical Aquaculture Research Centre (ITARC) close to Chonburi – a shrimp and tilapia producing area in Thailand - has been doubled by adding a new larval/juvenile unit consisting of 60 tanks, upgrading the facility for commercial-scale hatchery and on-growing testing, and through the addition of dedicated rooms for Artemia and small-scale evaluations. The existing facility, consisting of a 70-tank larval unit and wet and dry labs, have also been completely renovated. The main species reared at the site are penaeid shrimp and tilapia.

Temperate water and nutrition trials — Italy

INVE Aquaculture Research Centre (IARC), pictured below, was formerly a commercial bream and bass hatchery producing 3 million fry a year. The facility has now been completely renovated and upgraded, giving more room for larval replicate testing, different broodstocks,



rotifer and Artemia test productions, and analytical lab facilities. Principal species are seabream and seabass with capacity to take on additional aquaculture species.

State-of-the-art R&D and innovation — Belgium

Nutritional and health engineers specialized in Artemia, larval fish, larval shrimp and microbiology, immunology, aquatic diseases and diet processing technology coordinate research products. The team has unique access to up-to-date analytic labs, small-scale test facilities and pilot-scale feed processing equipment.

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More information

In December 2015, INVE Aquaculture joined Benchmark Holdings giving INVE unique access to Benchmark's aquaculture R&D testing facilities in Scotland, Thailand, USA, Brazil and Colombia. Combined with their existing and new research partnerships worldwide, INVE is well positioned to take a leading role shaping a sustainable future for aquaculture.

To find out more, visit
www.inveaquaculture.com

Directory of

BROODSTOCK FEEDS



FVG select 2017

FIAAP VICTAM **grapas**

13 – 14 JUNE 2017 · KOELNMESSE, COLOGNE, GERMANY

FVG Select 2017 is a new event which will be organized by Victam International BV. The event will focus on a series of high quality industry **conferences** and **matchmaking** with colleagues and clients in the **animal feed processing, grain processing, ingredients & additives, aquafeed, petfood and biomass pelleting** industries. The event will be complemented by an **industry expo** for a select group of companies.

THE CONFERENCES AND DELEGATE PROFILES

Tuesday 13th June

1. PETFOOD FORUM EUROPE

Production technology and specialist ingredients for dry petfoods.

Organizer: WATT Global Media

Delegate profile: CEOs, directors, mill and plant managers, head and senior nutritionists, formulators from dry petfood production plants.

2. THE GLOBAL MILLING CONFERENCE WITH GRAPAS

Processing technology and additives used within flour milling and grain processing.

Organizer: Perendale Publishing

Delegate profile: CEOs, directors, mill and plant managers, nutritionists from flour mill, rice mills and grain processing plants.

3. VICTAM FEED PROCESSING CONFERENCE

Production technology and equipment used within the animal feed production processes.

Organizer: Wageningen University and IFF

Delegate profile: CEOs, directors, mill and plant managers, head and senior nutritionists, feed formulators from commercial feed production plants, integrators, etc.

● Evening **network reception** for exhibitors, delegates and visitors.

A fee of €95 per person (valid for two days) will be charged to each individual attending the event, both exhibitors and visitors, and includes lunch, two coffee and tea breaks a day, the network reception and access to our matchmaking service. A separate fee will be charged for each conference. More details can be found on our website.

Wednesday 14th June

1. FIAAP ANIMAL NUTRITION

The use of specialist additives and ingredients used within the production of animal feeds.

Organizer: WATT Global Media

Delegate profile: Head and senior nutritionists, feed formulators, CEOs, directors, mill and plant managers from commercial feed production plants, integrators, specialist feed producers, etc.

2. AQUAFEED HORIZONS

Production technology and specialist ingredients for aquaculture feeds.

Organizer: Aquafeed.com

Delegate profile: CEOs, directors, mill and plant managers, head and senior nutritionists, feed formulators, integrators, specialist aquaculture feed producers, etc.

3. BIOMASS PELLETING

Production technology for the pelleting of bio-degradable materials for biomass pellets.

Organizer: AEBIOM (The European Biomass Association)

Delegate profile: CEOs, directors, mill and plant managers from biomass pelleting plants.

THE INDUSTRY EXPO

There will be 9m² and 18m² standard shell scheme booths available during the two day event. The expo will take place in the adjoining hall to the conference rooms and will also be the venue for all the refreshments.

EVENT ORGANIZERS

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BROODSTOCK FEEDS






Links to datasheets available in PDF and digital versions



SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Aller Aqua	Aller Rep EX	Fish	Broodstock feed	Pellets	ALLER REP EX is a thoroughly tested feed, which has proved its stability by ensuring the production of robust and fertile eggs. ALLER REP EX is generally used all year round.	 DATASHEET
Aller Aqua	Aller Sturgeon REP EX	Sturgeon	Broodstock feed	Pellets	ALLER STURGEON REP EX is developed for broodstock sturgeon, and the first choice for many fish farmers in established sturgeon-producing countries. The feed ensures a high yield of strong and fertile eggs and is the right choice whether the goal is roe for breeding or caviar of the highest quality.	DATASHEET
Aquafauna Bio-Marine, Inc.	Madmac MS	Shrimp	Broodstock feed	Powdered	MadMac is a dry powdered diet used to prepare fresh maturation feed for shrimp. It contains binders which maintain water stability for at least 8 hours. MadMac contains Algamac DHA so broodstock consume this essential fatty acid for superior quality eggs.	DATASHEET
BernAqua – NV	Royal Oyster	Shrimp	Broodstock feed	Cold Extrusion	This maturation diet is a supplementary diet to fresh feeds normally used in shrimp maturation such as squid, <i>Artemia</i> Biomass or polychaetes. Royal Oyster improves the conditions of females and speeds up their recovery after each spawn. Royal Oyster improves nauplii quality and pigmentation. Royal Oyster is produced by means of extrusion and is covered by a special coating that avoids leaching/nutrient loss in water. Furthermore, Royal Oyster keeps the water quality intact.	DATASHEET
CreveTec	Broodstock Pellets	Shrimp	Broodstock feed	Pellets	Pellet with 54 % proteins. Contains krill and squid.	
CreveTec	Maturation Pellets	Shrimp	Broodstock feed	Semi-moist pellets	Semi-moist pellets with 10 % fresh polychaetes.	

SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Epicore/ Megasupply 	Epizym AGP (M)	Marine and freshwater microalgae	Algae Growth Media For Large and Outside Culture Tanks	Liquid	EPIZYM-AGP-M is a concentrated medium for producing high levels of nutritious marine algae and other phytoplankton used for feeding shrimp and other marine animals. It is a one-pack, liquid version of the trace elements, micro-nutrients, vitamins and minerals of the Guillard's f/2 medium with added cellular growth stimulants.	 DATASHEET
Epicore/ Megasupply 	Epifeed MBF	Shrimp	Broodstock feed	Pellets	EPIFEED-MBF is a specially formulated dry diet that provides excellent nutrition for maintaining prolific spawners and for improving reproductive performance. It represents an enormous step towards a bio-secure system in all production areas by replacing fresh natural feed.	DATASHEET
Frozen Ocean 	Frozen Marine Polychaetes	Shrimp, Marine Fish	Broodstock	Whole, frozen	Frozen Ocean marine polychaetes (sea worms) have been sterilized and certified as free of virus. They are blast frozen to ensure the highest retention of nutrients. Their high concentration of Omega-6 and Omega-3 fatty acids provides an excellent source of nutrients. They also have significant amounts of proteins, lipids, DHA, EPA, and vitamins E and C.	DATASHEET
Frozen Ocean 	Frozen Copepods	Shrimp, Marine Fish	Larvae, PL., Fry Nursery, Broodstock	Whole, frozen	Frozen Ocean copepods have been sterilized, analyzed, and certified as free of virus, and they have a low content of water. Copepods are a proven substitute for up to 50 % of the consumption of <i>Artemia</i> cysts.	DATASHEET
Frozen Ocean 	Frozen <i>Artemia</i> Biomass	Shrimp, Marine Fish	Larvae, PL., Fry Nursery, Broodstock	Whole, frozen	<i>Artemia</i> biomass has been sterilized and certified as free of virus. It has a low content of water and is uniform in size. Shelf life of up to 3 years if stored frozen at temperatures of -18 °C (-0.4 °F) or less.	DATASHEET
Gold Coin Biotechnologies SDN BHD	GCMAT-SH1 Broodstock and Maturation Feed	Shrimp	Broodstock	Maturation diet powder mix	Mix the maturation powder mix with water at hatchery level to prepare semi-moist feed to reduce usage of live and fresh foods and lowers the bio-security risks associated with those. This feed contains high level of marine proteins, vitamins, omega-3 PUFAs and highly digestible ingredients for fast growth.	

SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Gold Coin Biotechnologies SDN BHD	VT Gold	Shrimp	Broodstock	Maturation diet powder mix	VT Gold is a ready-to-use shrimp maturation feed supplemented with immune stimulants to improve shrimp resistance to disease and reduce biosecurity risks. It contains premium quality and high level of marine proteins, vitamins, omega-3 PUFAs and other nutritional and digestible ingredients that promotes fast growth and good ovary maturation.	
Hai Yu Enterprise Co., Ltd.	Hai-Yu Giant River Shrimp Broodstock Berried Feed	Shrimp	Broodstock feed		After eyestalk ablation, broodstock needs a special formula to enhance the quality of fertilized ova. In this stage it needs a unique nutrition to mature the ovarian and to spawn healthier eggs.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu Giant River Shrimp Broodstock Maturity Feed	Shrimp	Broodstock		The gonad maturation stage is a critical moment for nutrition needs of shrimp broodstock. Hai-Yu Shrimp Broodstock Maturity Feed is designed and produced for the critical demand. It can accelerate and boost shrimp gonad to reach maturity. It is easily digested and absorbed and helps produce healthier eggs.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu Giant River Shrimp Broodstock Growth Feed	Shrimp	Broodstock	Pellet	Using professional nutrition structural formula specially for shrimp broodstock can enhance and boost the broodstock to grow healthy and mature quickly. Hai-Yu Shrimp Broodstock Growth Feed is applied with advanced pelletized technology to reach at least 5-hour stability in the water. Longer stability can keep the complete nutrition and manage the feeds easily and conveniently.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P.MONODON/ KURUMA SEA-WATER Shrimp Broodstock Berried Feed	Shrimp	Broodstock		After eyestalk ablation the broodstock needs a special formula to enhance the quality of fertilized ova. In this stage it needs unique nutrition to mature the ovarian and to spawn the healthier eggs.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P.MONODON/ KURUMA SEA-WATER Shrimp Broodstock Maturity Feed	Shrimp	Broodstock		In gonad maturation stage of shrimp broodstock , it is a critical moment for nutrition needs. Hai-Yu Shrimp Broodstock Maturity Feed is designed and produced for the critical demands. It can accelerate and boost shrimp gonad to reach maturity. And it is easy to be digested and to be absorbed and helps the eggs healthier.	DATASHEET

SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P.MONODON/ KURUMA SEA-WATER Shrimp Broodstock Growth Feed	Shrimp	Broodstock	Pellet	Using professional nutrition structural formula specially for shrimp broodstock can enhance and boost the broodstock to grow healthy and mature quickly. Hai-Yu Shrimp Broodstock Growth Feed is applied with advanced pelletized technology to reach at least 5-hour stability in the water. Longer stability can keep the complete nutrition and manage the feeds easily and conveniently.	 DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P. Vannamei Shrimp Broodstock Berried Feed	Shrimp	Broodstock		After eyestalk ablation the broodstock needs a special formula to enhance the quality of fertilized ova. In this stage it needs a unique nutrition to mature the ovarian and to spawn the healthier eggs.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P. Vannamei Shrimp Broodstock Maturity Feed	Shrimp	Broodstock		In gonad maturation stage of shrimp broodstock, it is a critical moment for nutrition needs. Hai-Yu Shrimp Broodstock Maturity Feed is designed and produced for the critical demands. It can accelerate and boost shrimp gonad to reach maturity. And it is easy to be digested and to be absorbed and helps the eggs healthier.	DATASHEET
Hai Yu Enterprise Co., Ltd.	Hai-Yu P. Vannamei Shrimp Broodstock Growth Feed	Shrimp	Broodstock		Using professional nutrition structural formula specially for shrimp broodstock can enhance and boost the broodstock to grow healthy and mature quickly. Hai-Yu Shrimp Broodstock Growth Feed is applied with advanced pelletized technology to reach at least 5-hour stability in the water. Longer stability can keep the complete nutrition and manage the feeds easily and conveniently.	DATASHEET
Inve Aquaculture 	Fish Breed-M	Fish	Broodstock	Powdered	A consistent, high quality powdered concentrate for moist broodstock feeds. Decreases or eliminates the use of fresh fish feed, thus reducing risk of infection. Optimizes productivity while offering consistent spawning and fertilization rates.	
Inve Aquaculture 	Lansy Breed	Fish	Broodstock	Pellets	Soft pellets that enhance the nutritional quality of the offspring and provide a more predictable output. Allows for better and increased egg production. Available in 8, 12 or 24 mm pellets.	

SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Inve Aquaculture 	BREED-S FRESH	Shrimp	Broodstock	Semi-moist pellets	Pioneering, soft shrimp maturation diet with fresh marine ingredients. Replaces up to 70% of the fresh feed. Offers full biosecurity, a consistent nutritional quality and superior egg quality while boosting the spawning performance.	
Phibro Animal Health Corporation	PAQ-Gro for Hatchery	Shrimp, Tilapia	Broodstock		PAQ-Gro for Hatchery is a proprietary blend of natural ingredients, specifically formulated for the early stages of aquaculture development, showing good bioavailability following extrusion. The product can be integrated into aquafeed by top-coating after feed production or in the premix before pelleting or extrusion.	
Phibro Animal Health Corporation	PAQ-Nanno Paste	Sea Bream, Sea Bass, Barramundi, Grouper	Broodstock	Paste	PAQ-Nanno Paste is an effective and easy to use microalgae paste. PAQ-Nanno Paste is a concentrated biomass of high quality <i>Nannochloropsis sp.</i>	
ProChaete Innovations Ltd 	Grow Pro	Shrimp	Broodstock	Pellet	Grow PRO is high quality grower feed for shrimp. It is biosecure and sustainably created. Grow PRO is a complete feed, intended for intensive farming of shrimps.	DATASHEET
ProChaete Innovations Ltd 	Semi-Moist Pro	Fish	Broodstock	Pelleted	Semi Moist PRO can be used as a complete feed or in combination with, or in transition to, SPF Polychaete PRO and Squid PRO. It gives a balanced diet for both sexes. The product is designed for use 2-4 weeks prior to the broodstock's productive cycle and until its end. Semi Moist PRO is the only semi moist product on the market containing polychaetes.	DATASHEET
ProChaete Innovations Ltd 	SPF Polychaete Pro	Fish	Broodstock	Frozen polychaetes	SPF Polychaete PRO is a high quality product that helps to provide a predictable supply chain. SPF Polychaete PRO is cultured marine polychaetes (<i>Nereis virens</i>) to be used as a broodstock shrimp feed. SPF Polychaete PRO has a good fatty acid profile to secure a good start for Nauplii, providing high numbers of Nauplii/female and low deformity and a high fertilization rate.	DATASHEET

SUPPLIER	PRODUCT NAME	SPECIES	PRODUCT TYPE	FORM	DESCRIPTION	DATASHEET
Reed Mariculture  Reed Mariculture <small>ENSURING HATCHERY SUCCESS</small>	Instant Algae Shellfish Diet 1800®	Bivalve Shellfish; Ascidians/ Tunicates; Sea Urchins; Soft Corals; Brine Shrimp; and Copepods	Broodstock	Microalgal blend; 8% dry weight	Shellfish Diet 1800 is a mix of six marine microalgae that have all demonstrated success with a variety of Shellfish including Oysters, Clams, Mussels, and Scallops. Shellfish Diet can be used with pre-set larvae all the way up through broodstock as complete live algae replacement.	
SPAROS Lda	BROODFeed BROOD- FeedLean	Marine fish, e.g., amberjack, yellowtail, meagre, grouper, sole, seabream and seabass	Broodstock	Dry extruded	Part of the HATCHERY FEEDS by Sparos broodstock products meet nutritional requirements at specific stages of sexual maturation resulting in optimal fecundity and egg quality, while maintaining fish health. Feeds contain ultra-premium ingredients at used in hatchery feeds microdiets for fish larvae. These are highly digestible marine protein sources, enhanced levels of arachidonic acid and other HUFAs, marine phospholipids, vitamins, minerals, nucleotides and natural antioxidants including carotenoids.	
Zeigler	EZ Mate	Shrimp	Maturation	Form into worm	Partial replacement for fresh maturation foods to promote increased nauplii production and brood stock health. Completely biosecure and contains high levels of pigments, HUFA's, vitamins, and minerals.	DATASHEET
Zeigler	Maturation Supplement	Shrimp	Broodstock	Pellet	Promotes rapid ovarian development and increased mating in maturation systems.	DATASHEET
Zeigler	Shrimp Broodstock	Shrimp	Broodstock	Pellet	Power-packed with special ingredients for stronger, healthier brood stock and improved reproductive performance.	DATASHEET

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ORGANIZATION NAME	DESCRIPTION
AquaBioTech Group / ABT Inovia	ABT Inovia is an independent aquatic biotechnology and aquaculture research and training entity with its own dedicated Research & Development (R&D) facilities based in Malta. The facility is able to provide tailored R&D services to clients from across the aquaculture sector, with needs ranging from the formulation, test-batch production and in-vivo testing of aquatic animal feeds, additives and enrichments, through to vaccine efficacy and safety testing. The facility also undertakes a large number of larval trials for various species, testing livefeed enrichments, larval diets and production techniques using new technologies so as to benchmark hatchery and grow out systems
Aqua UGent	Extensive R&D and consultancy services based on proprietary model systems in nutritional research, hatchery management and other areas. We provide multidisciplinary expertise and innovations to facilitate your development and testing of live and compound feeds, raw materials, additives, probiotics and more.
BernAqua NV	BernAqua NV, is dedicated to Larval feed production for shrimp and fish, is a Neovia brand specialist in animal nutrition and health. Dynamic innovation, based on continuous field evaluation, has given BernAqua a unique product portfolio, setting new trends in the hatchery feed market confirming BernAqua as world-wide market leader in the hatchery feed market.
Cerulean Aquaculture Consulting	Cerulean Aquaculture Consulting offers a range of services to the aquaculture community, including business planning support, market assessment, husbandry methods, research planning, and grantsmanship. Specialized areas of expertise include aquafeed formulation and alternative ingredient development, Omega-3 fatty acids –sourcing and marketing, and more.
Hai Yu Enterprise Co., Ltd	Larval feed production R&D and consultancy services.
Nofima AS	Nofima offer the best solutions to develop and test new ingredients and feeds. We have extensive knowledge in technology and raw materials, and highly skilled scientists. Nofima provide research along the whole value chain, from feed ingredient to food for human consumption and market analyses.
Sparos Lds	Larval nutrition R&D and consultancy services; Larval feed production for R&D purposes; Fish larvae trials to develop / benchmark additives and ingredients. Customs larval feeds for hatcheries, e.g., supplemented in vitamins, specific fatty acids, phytotherapeutics.



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8– 9: XXVIII FEAC Congress and the V Animal Nutrition Congress, Cordoba, Spain	http://www.fefac.eu/news.aspx?CategoryID=2063&EntryID=22943
13– 14: FVG Select (by Victam International), Cologne, Germany	http://www.victam.com/?i=372
14: Aquafeed Horizons Europe, Cologne, Germany	http://feedconferences.com
26 – 30: World Aquaculture, Cape Town, South Africa	http://www.marevent.com/WA2017_CAPETOWN.html
July	
23– 26: BIO World Congress	https://www.bio.org/events/bio-world-congress
24– 27: Asian-Pacific Aquaculture 2017, Kuala Lumpur, Malaysia	https://www.was.org/meetings/Default.aspx?code=APA2017
31– Aug 3: U.S.F.W.S. Aquatic Drug Approval workshop	https://www.fws.gov/fisheries/aadap/aquaculture_workshop.html
August	
8- 10: FishAdapt: Global Conference on Climate Change Adaptation for Fisheries and Aquaculture	https://www.fishadapt.com/modules/conference/
16- 17: Aquaculture Roundtable Series (TARS) 2017	http://tarsaquaculture.com
September	
2- 5: Fish Ethology & Welfare (FEW) - Summer Shoal 2017	http://www.fair-fish.net/FEW2017/
4- 7: Larvi 2017 - Fish and Shellfish Larviculture Symposium	http://www.aquaculture.ugent.be/larvi/
October	
1– 3: 2017 BioMarine Business Convention	http://www.biomarine.org/rimouski2017/2017-biomarine-program/
3– 6: GOAL 2017	https://www.aquaculturealliance.org/goal/
4– 6: XIV International Symposium on Aquaculture Nutrition	https://sites.google.com/a/uabc.edu.mx/sina17/
17– 20: Aquaculture Europe 2017	http://www.aquaeas.eu/meetings/events-diary/71-default/75-conf-trade-show/289-aquaculture-europe-2017
18– 20: International Livestock, Dairy, Meat Processing and Aquaculture Exposition, Indonesia	http://www.ildex-indonesia.com
25– 27: Aquaculture Vietnam 2017 Expo & Forum	http://www.aquafisheriesexpo.com/vietnam



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