

## 22. CLEAN SEAS AQUACULTURE PTY LTD

BRENDAN SPILLMAN<sup>1</sup>

Clean Seas Aquaculture is a land-based marine finfish hatchery. The company began construction of the hatchery in January 1997 and had its first production run of snapper in August 1997. Production is based on the standard rotifer, *Artemia* and particulate diet system.

### SPECIES CULTURED

Snapper (*Pagrus auratus*) black bream (*Acanthopagrus butcheri*)

Future projects: yellowtail kingfish (*Seriola lalandii*) mullet (*Argyrosomus hololepidotus*).

### ALGAE

*Nanocloropsis oculata* is the main species cultured due to its suitability to bulk tank culture. Other species that have been cultured in the past include *Tetraselmis* and *Isochrysis* although these species do not seem to last very long in bulk culture. Algae are used for feeding to rotifer cultures as well as larval rearing in green-water.

The recent addition of an algal laboratory, where stock cultures are maintained, has increased species availability. Cultures are up-scaled to 20-L carboys which are then used as inoculums for 2.5-t fibreglass tanks housed indoors with skylights. Water is filtered to 1 µm, chlorinated and de-chlorinated prior to addition. Fertilisation of culture water is achieved using Aquasol at a rate of 40 g/t.

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<sup>1</sup> Clean Seas Aquaculture Pty Ltd. (See details in appendix.)

### **ROTIFERS**

Rotifer culture is undertaken in two 10-t fibreglass tanks and eight 1-t poly tanks. Feed consists of algae (daily) and fresh bakers yeast (twice daily). This is supplemented with twice-daily additions of a homemade boost product consisting of fish oil, egg yolk and water. Both tank types are run on a batch system, 1-t tanks running for about 6 days and 10-t running for about 12 days before harvest and re-inoculation.

Feed rates: Algae 100–200 L/d for 1-t tanks; 200–600 L/d for 10-t tanks.  
Yeast 0.2–0.4 g per million rotifers twice per day.

This system is quite reliable with cultures crashing very rarely.  
Small strain rotifers cultured at 300–500 per millilitre.

Enrichment is carried out in four 200-L poly tanks with Super Selco at 10–15 g per tank, twice daily (6–12 h)

This system allows harvest and feedout of 600–700 million rotifers per day without decline in overall population.

### **ARTEMIA**

Currently using CIS cysts, non-decapsulated. Hatching and culture in nine 500-L fibreglass tanks. Enrichment with DC DHA Selco 12 h and/or 24 h depending on number of enrichment tanks required.

This system allows a maximum of 2.4 kg of cysts to be hatched daily. Enrichment in five tanks allows five feedouts per day. *Artemia* are fed until they are approximately 50–60 days old.

### **PARTICULATE DIETS**

NRD diets (INVE Aquaculture) are used until approximately 60–70 days old, when it is replaced by Pivot and Gulf Feeds diets. Sales of fingerlings are made in another 10–20 days.

## PROBLEMS

As we have all seen in the past, wild harvests of *Artemia* cysts are unpredictable and therefore unreliable. To continue to develop various aquaculture ventures which heavily rely on this unpredictable harvest is obviously extremely risky. Commercial production of *Artemia* cysts in Australia's salt production areas or salt lakes could be a way of increasing reliability of this organism.

The development of a reliable alternative live food organism such as copepods is also an option. This would have more wide-reaching benefits, for example enabling the commercial culture of those species difficult to rear on *Artemia*. Pond culture of zooplankton, which would then be fed to fish in the hatchery, has possibilities. However, if out-of-season production is targeted, this strategy may not be viable.

However, I believe that both of these potential solutions to the *Artemia* crisis are only a short- to medium-term replacement. Ideally, we would be far better off to replace as much of the live food chain as we can. Development of an artificial replacement for *Artemia* would provide a more reliable alternative and would be likely to decrease costs due to reduced labour, floor space and equipment.

## PARTICULATE DIETS

We don't seem to have any problems with snapper in the early stages of culture. Our main problem remaining occurs beyond *Artemia*, when fingerlings are also weaned from imported to locally manufactured diets. At this time we experience problems with fish becoming thin and dying. Fingerlings transferred to sea cages do very well. However, fed the same diet in the hatchery they waste away. Is this due to weaning too late or a problem with diet composition, digestibility etc.? Are they getting something from wild prey in cages which helps in the digestion of artificial food?

### **WHAT IS THE MINIMUM SIZE FOR WEANING OFF ARTEMIA?**

Improvement in availability of quality, locally manufactured, particulate diets specifically formulated for target species will lower weaning size.