18. Production of Live Microalgal Feed

Rodney Grove-Jones[1]

We have been using continuous algal production systems of original UK design in our oyster hatchery for the past seven years. The system has evolved over that period and continues to do so. Our experiences with producing high quality micro algae at a production scale are quite at odds with those expressed at the workshop. We find our continuous microalgal system both reliable and relatively cheap to run. It would appear that fish and prawn hatcheries could benefit from adopting algal culture techniques developed in the mollusc hatchery industry.

Our experiences culturing microalgae as live feed for oyster larvae are quite different to those reported by the majority of speakers at the workshop. We have found algal production using the continuous pasteurisation method to be both reliable and relatively inexpensive.

Our cultures are maintained in the log phase at stable cell densities of about 3-4 million cells per ml (Iso eq) for several weeks by continuously adding small quantities of treated seawater and harvesting continuously by overflow at the same rate. Consequently, cell densities do not become so high as to be self limiting and crashes due to exceeding sustainable densities do not occur.

The use of heat instead of filtration to limit the entry of undesirable bacteria to production scale cultures is another factor that reduces the likelihood of contamination and consequent loss of cultures. The system uses the basic Pasteurian principles of killing bacteria by heating seawater and then excluding or limiting opportunities for problematic bacteria to reinfect.

[1] The South Australian Oyster Hatchery Ltd. (See details in appendix.)

Pasteurisation is extremely effective in killing the marine bacteria of concern and is also very reliable. There are no filters to fail and pass unwanted pathogens, or to monitor and clean or replace. In the event of an extended power loss or the failure of the heating element (rare), the system automatically shuts down so that unpasteurised water cannot reach the cultures.

The pipework post pasteuriser is borosilicate glass and sealed as far as the culture vessel. Glass has the advantages of being relatively inert chemically, transparent and can take steam. Live steam is used to clean the pipes regularly, and steam, unlike chlorine, insures all micro organisms are killed. Furthermore it is non toxic and leaves no residues. The culture vessels are plastic bags and are used only once (for several weeks) then discarded. New bags are effectively sterile as far as the chance of contamination with marine bacteria is concerned and no bags are cleaned or reused. This saves labour and removes another opportunity for infection. The chance of infection is further reduced by an automatic harvest and distribution (to larvae) system that eliminates the need for staff to handle the algae or culture vessels.

Once it is set up, the main operating costs to run the system are labour and power. Typically, the labour input to run a system producing up to 10,000 litres per day is less than 15 hours per week. Power requirements are 3-4 kilowatts assuming you have a water and air supply (generally present in a hatchery situation). These are a fraction of the costs commonly associated with production scale algal cultures yet these figures are reality in several mollusc hatcheries around the world.

It is clear that the finfish, prawn and other hatchery industries using fresh micro algae as feed for larvae or live feed species can improve their success with algal production by adopting existing technologies from the mollusc hatchery industry.