

17. ARTEMIA: THE TURNING POINT – INDUSTRY RESEARCH PRIORITIES IN A WORLD SHORT OF ARTEMIA

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ARTEMIA FACTS

- Less than 20% of world demand is available due to continued poor harvest from the Great Salt Lake which has come about mostly from non-conductive environmental conditions for cyst production. New sources such as Turkmenistan cannot fill the GSL gap and meet the growing demand.
- There is a rapid escalation in price which will affect all aquaculture businesses — research and commercial alike.
- There is a shift towards higher value product; shrimp and marine finfish are dominating.
- The usage period needs to be *absolutely minimised*; in all species there is a need to reduce the use of *Artemia* by feeding rotifers for longer and weaning to artificial diets sooner.
- Maximum benefit has to be derived from each hatched nauplii. *Artemia* can no longer be looked on as an inexhaustible ‘bank’. Care must be taken in *all aspects* of *Artemia* use.
- Effective diets for co-feeding are available. The introduction of a dry diet of appropriate size, even at the onset of *Artemia* feeding, assists to reduce *Artemia* usage.

DERIVING MAXIMUM BENEFIT...ROTIFERS

- Maximum benefit *must be* derived from the live feeds available.
- Use rotifers for longer periods — for up to three days longer before introducing *Artemia*.
- Efficient batch culture of rotifers is required. Over 800 million active rotifers per millilitre of water can easily be harvested every 5 days in a well-run batch rotifer culture system.

¹ Primo Aquaculture Pty Ltd. (See details in appendix.)

- Enrich rotifers — tissue enrichment to maximise benefit to larvae using either a very good quality *Nannochloropsis* and *Isochrysis* mix for 12 hours (plus), or DHA Protein Selco for 6 hours. If also using Culture Selco for the culture, the final enrichment levels are the highest possible for tissue enrichment, which is preferable to gut-only enrichment.
- Possible use of different rotifer strains like the Super Small strain rotifers from Japan which are here in Australia. There may be Australian strains that have potential?
- My experience is that there are varying levels of success in commercial hatcheries with batch rotifer culture. Help is therefore required to assist hatcheries to develop and adopt effective batch culture procedures and techniques. There are nothing like 'hands on' demonstrations by people who have practical skills in commercial-scale rotifer production to help iron out the 'glitches' in a commercial hatchery.

DERIVING MAXIMUM BENEFIT... ARTEMIA

- To derive the maximum benefit from *Artemia*, hatcheries need to follow standard operating procedures — recommended guidelines for hatching and storage of *Artemia* nauplii result in a *much more efficient* use of the *Artemia* cysts.
- Recommended instructions for temperature, pH, cyst density, etc. are geared towards the premium production and storage of energy-rich Instar I *Artemia* with a large yolk reserve. Points to remember are:
 1. Hatch the required amount only, and hatch according to the instructions.
 2. Temperature is to be as constant as possible.
 3. Keep the pH constant — above 8.
 4. Aerate sufficiently to keep all cysts in suspension.
 5. Use low hatch density, e.g. 1 g/L.
- Fatten the *Artemia* nauplii through enrichment. Commercial products that can increase the biomass of *Artemia* by up to 50% and deliver nutritional value *are available*. Enrichment of *Artemia*

with HUFA's and other elements not only provides for a living capsule to transfer essential nutrients to the cultured animals, but also results in a larger and more energy-rich *Artemia*.

- Standard enrichment procedures (48 hours) on the average result in a 30% increase in *Artemia* biomass. In practice, this means that one can still feed the same amount of *Artemia* meat while hatching 30% fewer *Artemia* cysts. *Artemia* biomass can be increased by 50% when one goes beyond the present standard procedures and enriches *Artemia* for 72 hours.
- Once again, I know from experience that 'hands on' demonstrations by people who have knowledge in commercial-scale *Artemia* hatching and enrichment procedures can greatly assist hatchery operators to help iron out the bottlenecks in a commercial hatchery and improve their economic performance.

MAXIMUM BENEFIT ALSO INCLUDES ADOPTING A PROCEDURE OF CO-FEEDING

- Use co-feeding diets — Introduce a dry diet of appropriate size at the onset of *Artemia* feeding. Diets such as Lansy R1 or NRD 1/2 are especially designed for the co-feeding phase where a dry diet is introduced early. The diet should be presented in a solution and hand-fed by beaker, several times a day.
- Wean as early as possible — The use of high-quality weaning diets also assists in early weaning due to their physical and nutritional character. Weaning must be undertaken using the correct strategy which takes into consideration tank hydrology, feed demand, larval conditions and patience!
- Increase the survival of post-weaned fish through the use of appropriate diets. The degree of effective *Artemia* substitution is a function of the nutritional and physicochemical characteristics — the 'quality' — of the diets, plus zootechnical aspects in the applied culture techniques. Today, hatcheries and researchers alike should focus on making the most out of these diets in order to effectively substitute *Artemia* nauplii.
- It is important to note that the quality differences between different feed products will obviously become more significant when substituting *Artemia* at higher levels. The selection of any

nutrient product today should therefore be dominated by diet quality over any other parameter.

- Assistance is needed to develop practical feeding guides for commercially cultured species in the various regions of Australia in order to improve the fundamentals.

EXAMPLES OF IMPROVEMENTS REQUIRED IN TWO AUSTRALIAN COMMERCIAL SPECIES DEPENDENT ON *ARTEMIA*

- Snapper
- Barramundi

The following figures are based on a survey, by Primo Aquaculture P/L, of commercial hatcheries (February 2000).

Snapper fry production per kilogram of Artemia

20 mm fry post-weaned

Best production run in Australia = 9250 fry

Average in Australia = 7900 fry

Average in Japan 1999 = 22 000

Best practice needed to achieve in 2000 in Australia = 20 000 fry

Barramundi fry produced per kilogram of Artemia

20 mm fry post-weaned in intensive system

Best run in Australia 2000 = 36 570 fry

Average run in Australia 1999 = 17 200 fry

Best practice needed to achieve in 2000 in Australia = 25 000 fry

CONCLUSION...

- This *is not* the time to top tune.
- This *is* the time to ensure that all commercial systems are running smoothly and achieve maximum efficiency to survive.
- Commercial products available *are a result of research* that is ongoing.
- Therefore, the immediate scientific priority for industry should be the transfer of existing applied technologies to assist the development of the industry.

REFERENCE

Artemia Crisis... and Solutions, INVE Aquaculture N.V.

