



World Aquaculture '99 Conference

by Berni Aquilina

The four-day World Aquaculture '99 conference, held in Sydney from April 26, was an eclectic gathering of scientists, owners, government workers and industry employees, representing all aspects of aquaculture. Of more than 800 papers about 30 were devoted to pearling.

George Kailis of Broome Pearls, part of the M.G. Kailis Group and the second biggest producer of pearls in Australia, opened the Pearl Oyster session with a broad overview of worldwide pearling trends including the Japanese downturn, increasing dominance of Chinese freshwater pearls, growth in Tahiti and Indonesia, and Australia's market niche for high-value pearls.

Managing the Australian industry

Australian Fisheries Department people spoke about the framework supporting the pearling industry in Australia based on *Pinctada maxima*. Talks by Peter Rogers, Heather Brayford (both from Fisheries Western Australia) and Chris Robertson (Queensland Department of Primary Industries) on industry management and development revealed the different positions in each state.

Western Australia has a long-established and highly regulated pearl culture industry, worth more than Au\$ 200 million a year. The industry is co-operatively managed by Fisheries Western Australia in liaison with sixteen licensed pearl

farmers through the Pearl Producers Association, and with advice from the statutory Pearling Industry Advisory Committee. Its wildstock fishery is controlled by licences, quotas, fishing zones and size limits; hatchery production is also regulated. A strategic planning process guides research and development. Overall, co-operative management is intended to help make policy and pass legislation that will develop the industry, stabilise the market and ensure a sustainable harvest of pearl oysters.

By contrast, the Queensland pearling industry, with production valued at about Au\$ 1 million a year, is less developed and less regulated. It has also been hampered by a lack of wild pearl oysters, although a recently established hatchery promises future growth. Currently there are no quotas and no limit to the number of farms in Queensland. The Queensland Pearl Industry Association, representing 11 companies, is keen to see sustainable expansion. They have recently developed a 'draft strategic plan' which includes seeking protected areas for pearl oyster restocking, a code of practice for pearl farming, and investigation of a selective breeding programme to enhance the quality of pearls produced.

John Benzie from the Australian Institute of Marine Science reported on research into the genetic structure of pearl oyster populations in Western Australia, from which preliminary results indicate considerable genetic diversity.

Mexico

Mexico is a country with an ancient pearling history but which is just starting commercial pearl culture. Richard Fassler, from the State of Hawaii, described recent developments in the farming and marketing of Mexican pearls, including contributions made by University research institutes and individual efforts.

One self-taught entrepreneur is now producing and marketing (mostly *mabe*) pearls from *Pteria sterna* and *Pinctada mazatlanica*. Richard's advice to other nations wishing to begin pearl farming, based on Mexico's experience, is to start small, use available resources and knowledge, find a market niche, use jewellers to add value to the product, and build up through reinvestment.

In Mexico, wild oyster stocks have been overexploited in the past and are now insufficient to support a commercial industry. The Baja California Sur State University has been working since 1993 on research to promote commercial pearl enterprises. Héctor Acosta-Salmón described the procedures used for the first major hatchery production of *P. sterna* in Mexico and Erika Martínez-Fernández talked about creating pearl oyster beds in La Paz Bay using hatchery-produced spat.

Trials at various sites showed that protection from predators is essential but hard to achieve, maintenance of the beds is required, and calm oceanographic conditions will enhance results. It's a labour-intensive operation but one that might help to replenish Mexico's depleted resources.

Technician training and seeding techniques

Pearling has the potential to play an important part in the economic development of many nations, especially of the Pacific region. However a major problem confronting these nations is the high cost and limited availability of pearl-seeding technicians. One solution is to train local technicians. Maria Haws described a University of Hawaii Sea Grant Extension Program aimed at providing this kind of training on *P. margaritifera*.

The first phase of the programme, which was planned to begin in July 1999, will thoroughly document current technician practices with a manual and video showing pearl-seeding procedures. The video format is good for non-speakers of English and for people not used to written learning methods. An endoscopic camera was used to get close-up views of the seeding operation, which certainly gives a technician's perspective. It is not expected that the manual and video alone will suffice for training, but they will give

an initial overview of grafting procedures. Aspiring technicians at the conference were keen to receive a copy of the video.

Pearl farmers also will benefit from familiarisation with seeding methods as this can help them monitor technicians' performances. The group's future work will attempt to improve seeding methods and to transfer this information to industry.

John Lucas, from James Cook University in Australia, spoke about work already done with John Norton and others in the Cook Islands, aimed at improving the percentage of gem quality pearls from *P. margaritifera* oysters. Treatments incorporating modern surgical techniques were applied to the seeding operation: oysters were relaxed using propylene phenoxylol, operation sites were disinfected using Betadine solutions, and incisions were closed with cyanoacrylate adhesives.

Very high mortalities occurred when the relaxant was used, the exact cause of which has not been established. Antiseptics gave no significant improvement over standard methods. Using an adhesive to close the incision did not significantly affect bead rejections, although it did reduce the percentage of pearls that initially had 'tails'. The adhesive produced an adverse effect on oyster tissue and there was a higher death rate, compared to the control, in the six weeks following the seeding operation.

Unfortunately running seawater or other facilities for cleaning technician's instruments was not available during this study, although in many places it is now a standard item.

Pearl oyster health

Australian Fisheries pathologists gave a couple of talks about pearl oyster health. John Humphrey reported the results of a national survey, conducted over a three-year period, which provides baseline data for future disease identification.

Overall, Australian pearl oysters are relatively free of serious pathogens. Brian Jones outlined the strict quarantine and inspection precautions that are used in Western Australian hatcheries and pearl farms to ensure that diseases do not establish or spread.

Interestingly, in a Mollusc Health session the previous day, Mike Hine had mentioned that an emerging disease has been confirmed in Akoya pearl oysters in Japan (details are yet to be published). Increasing attention is now being given to risks posed by the frequent movement of technicians and their instruments between and within countries.

Husbandry

Several people presented results of oyster growth studies. Mehdi Doroudi studied the effect of different densities of micro-algae on the growth of *P. margaritifera* larvae. He found that the food density for optimal growth was 20,000 cells per ml. Paul Southgate found in nursery grow-out trials that the best growth for *P. margaritifera* was obtained when oysters were held in 24-pocket panels, compared with using trays, mesh inserts in 8-pocket panels, or isolated mesh bags. Conventional 'ear hanging' was a close second for strong growth, although an audience participant suggested that this method could cause bacterial build-up if the shell is drilled so far in that the mantle is damaged.

Joseph Taylor reported that in suspended grow-out of *P. maxima* spat the lower the stocking density the better for growth, survival and the minimisation of deformities.

Of great interest was the news that Maxima Pearling Co has recently collaborated with the Centre for Marine Biofouling & Bio-Innovation and the Cooperative Research Centre for Aquaculture in successful trials for novel coatings to prevent biofouling in shellfish aquaculture. Patrick Moase, from Maxima Pearling Co, described the damage done to *P. maxima* shell by boring sponges (*Cliona* spp.), its associated deterioration of pearl quality, and its cost to industry.

Traditional treatments include freshwater immersion, formalin, high salinity water (45 ppt) and desiccation. Rocky de Nys, from the Centre for Marine Biofouling & Bio-Innovation at the University of New South Wales, presented results from the biofouling trials. A coating designed to kill *Cliona* spp. was 90% effective after two weeks, and after four months (including two cleans) no oysters had been re-infected. Another coating was designed to prevent settlement of barnacles and other fouling organisms.

Twelve weeks after large-scale application to one-year old pearl oysters the number of barnacles on each of the treated oysters averaged two, compared with around 30 on each of the control animals. The coatings are designed to be effective for up to six months and contain biodegradable, non-toxic antifouling compounds.

They will be available commercially under the names 'PearlSafe' for the *Cliona* dip (around August 1999) and 'PearlClear' (early 2000) for the biofouling spray. The distributors will be Colours & Chemicals Pty Ltd, Australia (a division of Wattyl Paints). Rocky de Nys (e-mail: r.denys@unsw.edu.au) can provide further information.

As yet, the effect of the coatings on growth rates and pearl quality has not been investigated.

Pearls

Bob Rose provided statistics on pearls harvested from hatchery-reared *P. maxima* oysters at an Indonesian farm. Results for shape were similar to those of Australian crops with 26% round, 14% semi-round, 27% drop, 13% button, 11% baroque and 9% circle. Colour, however, reflected the tendency for Indonesian pearls towards yellow and gold, compared with mostly silver and white for Australian pearls. Percentages by colour were 37% silver, 32% yellow, 13% cream, 9% gold, 7% other mixed, and 2% silver-blue.

Abalone pearls from *Haliotis* species are a new prospect, often with strong colour appeal. Efforts to culture abalone pearls are being made in Australia, New Zealand and Baja California, according to Richard Fassler.

Cultured *mabe* pearls are more common than loose pearls, which are unlikely ever to be 'round', given the active, muscular nature of the animal. Natural pearls from abalone are typically quite jagged and baroque, often with the appearance of sharks' teeth. In a panel discussion during the abalone session, Richard spoke with Mike McKenzie (NZ), Rod Ewing (NZ) and Derek Cropp (Aus) about their experiences growing abalone pearls. Mike has cut his production of *mabe* pearls by half this year because outlets to market them are not available.

Nuclei

Various substitutes for round pearl nuclei, presently made from threatened Mississippi River mussels, are being tested. George Ventouras from Paragon Pearling had samples of nuclei made from a processed material, called Bironite, that displays the basic characteristics of mussel shell. Bironite nuclei are white, with a uniform structure, and can be easily manufactured in large or small sizes (Editor's note: see contribution by Michael Snow, below).

In general

As is typical of conferences, World Aquaculture '99 was stimulating and exhausting. Apparently it was the biggest pearling turnout since Pearls '94 in Hawaii, and it was a great opportunity to talk with far-flung colleagues.

It was unfortunate that some of the scheduled speakers from overseas were unable to come to the Conference, so we missed perspectives from India,

Burma and the Philippines. Personally, I'd have preferred a greater opportunity for informal networking—if refreshments were provided just outside the meeting rooms, instead of several minutes walk away, this might have been easier.

There was evidence of the dissociation of academic research from farm-based research, fuelled in part by the secrecy that many pearl companies see necessary for their eminence.

Notwithstanding the several collaborative projects described above, there is still information being tied up for years that would benefit the pearling industry as a whole and its competitive position with respect to other jewellery industries.

Some academic research could benefit immediately from knowledge common among pearl farmers, and producers are only now coming to realise the usefulness of studies begun decades ago on the structure of nacre and the pearl formation process.

Bio-coated nucleus is a current hot topic (following Japanese studies reported ten years ago in the open literature), of which there was no mention at the conference, although many farms are trying out this approach. These illustrate the need for better exchange of information; a need only partially satisfied by WAS '99.

(Abstracts from WAS '99 are presented on pages 24–36, in the Abstracts section, Ed.)



Employment levels in pearl culture in French Polynesia: a correction

Dear Sir,

I read your article 'Pearls vs. Tuna' in the SPC Pearl Oyster Bulletin no. 11 from July 1998 with great interest. While the pearl culture industry is developing rapidly in French Polynesia, I feel that your figures concerning employment in this sector are, to say the least, optimistic, i.e. you spoke of 23,000 to 34,000 jobs created 'on the outlying atoll islands'.

Almost all pearl farms are located in the Tuamotu and Gambier island groups that only had 15,370 inhabitants at the time of the 1996 census. The labour force represents about 42% of this population, i.e. 6427 people, from which must be deducted all those who do not making a living from pearl culture as not all of the islands in these groups are suitable for this industry.

It is generally estimated that the number of pearl culture-related jobs is between 3000 and 4000. Your estimate seems to have been extrapolated from a 1989 figure to which you applied the production growth rate, but it seems that increased production was the result of very large pearl farms using increasingly modern methods which make possible scale economies and significant

increases in productivity. Family production, which is more job-intensive, accounts for only 10 to 20% of total production.

It certainly is true that pearl culture has led to spectacular repopulating of these island groups. Between 1988 and 1996, the population increased 106% on Apataki, 80% on Arutua, 30% on Kaukura, 88% on Fakarava, 191% on Kauhei, 75% in the Gambier Islands, 57% on Makemo, 132% on Ahe, 79% on Manihi, 44% on Makatea, and 46% on Rangiroa. These figures, which are themselves remarkable, demonstrate the benefits of pearl culture for the islands concerned. But they only involve a small part of French Polynesia and I do not believe that indirect jobs are on the scale you suggest as storage and marketing of this light-weight product require a much less elaborate infrastructure and less manpower than is needed for the tuna industry.

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