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Seaweed feed hope to improve abalone aquaculture

Integrating aquatic plants into aquaculture production systems is an area of rapidly growing interest internationally, as South Australian Nuffield Scholar and hatchery manager Adam Butterworth discovers.

By Catherine Norwood

Australian abalone may prefer to feed on red seaweed, but South Australian Nuffield Scholar Adam Butterworth says a fast-growing green seaweed species has great potential as a cultivated food source for Australian abalone farms.

Adam Butterworth is manager at the South Australian Oyster Hatchery on the Eyre Peninsula, part of the Australian Southern Seafood group of companies, producing oyster spat for the South Australian industry. However, he has long been interested in seaweed and abalone production and believes cultivating the two in an integrated system could make way for the recommissioning of abalone production facilities at hatchery, which were closed in 2005 after encountering production difficulties.

His Nuffield Scholarship, sponsored by the Fisheries Research and Development Corporation, has allowed him to visit leading aquaculture operations and industry events in the US, Mexico, South Africa, Ireland and New Zealand.

He says the growing interest in seaweed as an integrated part of aquaculture is reflected in the number of papers delivered on the subject at the International Seaweed Symposium he attended in Ensenada, Baja, Mexico.

“In 2001 there was only one paper on multi-trophic aquaculture systems and in 2010 there were 10 papers,” he says. Multi-trophic production uses the waste from fish or molluscs to help grow seaweed, which in turns provides feed for those fish or molluscs, as part of an integrated system.

“At the World Aquaculture Society’s 2010 Aquaculture Conference in San Diego, 40 per cent of the presentations were about marine plants – it’s a huge growth area.”

Mr Butterworth says new uses for seaweed are constantly being discovered in the food, nutraceutical and pharmaceutical industries. However his Nuffield research has focused on uses in aquaculture and aquaculture production systems.

He explored red and green seaweed species while in South Africa, with research pointing to suitable abalone growth rates from fast growing green seaweeds.

“Red seaweeds generally grow more slowly and while Australia has a great diversity of red seaweeds, most prefer relatively cool water. Many are also adapted to nutrient-poor conditions. On the other hand, *Ulva* spp. (a green seaweed) thrives in nutrient-rich waste-water and has many other characteristics that make it an ideal candidate for aquaculture.”

Growth rates in abalone also improve when the seaweed has a high protein content, which can be increased by ensuring seaweeds receive a high nitrogen input.

Mr Butterworth says seaweed’s filtering capacity could also help improve water quality and reduce production costs by reducing the need for water treatment.

“Seaweed adds oxygen to the water during photosynthesis, strips carbon dioxide and takes up ammonia. Pumping water to keep it oxygenated is one of the major costs in Australian abalone aquaculture. But if you can cascade water through a series of tanks, some of which have seaweed growing in them, you can increase oxygen levels in the water supplied to abalone tanks and reduce requirements.”

He also explored recirculation systems in mollusc aquaculture as an option for improving biosecurity, influencing water temperature and saving pumping costs. The land-based abalone facilities at the Eyre Peninsula site use a flow-through system, drawing fresh supplies of local seawater.

“Recirculation, even for broodstock or nursery stages of abalone culture, could allow sterilisation of incoming water to prevent entry of pathogens. In the event of a disease outbreak breeding stock can be protected.”

Mr Butterworth says his site research also indicates that when the facilities were in production, temperature spikes had reduced abalone immunity and resulted in bacterial infections. But cooling water when temperatures climb above 22°C – on average less than 14 days a year – could significantly reduce abalone mortality at the location.

He says the long-term outlook for Australian abalone markets is good due to product quality, although production margins are tight. Seaweed, in an integrated multi-trophic system, may be able to further improve quality, reliability and profitability. Mr Butterworth plans to use ulva seaweed species for further trials, but with more than 2000 species native to Australia, there will be plenty of seaweeds to choose from.

For more information contact Adam Butterworth 08 8683 4662, adam@saoysterhatchery.com.au

PHOTOGRAPH

High-resolution photographs of Mr Butterworth can be downloaded from www.coretext.com.au/communications_images.php.

Please contact Catherine Norwood at Coretext Communications (03) 9670 1168, cnorwood@coretext.com.au if you have any problems accessing images.

Captions:

Butterworth01 Visiting an abalone nursery in Abagold South Africa, Nuffield Scholar Adam Butterworth found small abalone grown in shallow tanks, on plastic 'hides' (pictured) and fed only on seaweed, most of which was grown on site.

Butterworth02 Nuffield Scholar Adam Butterworth with the seaweed Gracilaria, a species native to the Port Lincoln area, which he plans to include in trials to identify a species suitable as a feed for cultured abalone.

Applications open for 2011 Scholarships

Applications are now open for Nuffield Australia Farming Scholarships for travel in 2011 and will close on 30 June, 2010. Winners will be announced in October 2010. Scholarships are for primary producers aged 28 to 40 years, although applications outside this range may be considered.

Each scholarship is valued at \$28,000, sponsored by major agribusiness and industry groups across Australia. All scholars take part in a six week Global Focus Program, with up to 10 weeks of individual travel to investigate a topic of their choice.

Scholars say it has been a life changing experience, building self-confidence and decision-making skills and introducing them to a network of leading primary producers and agricultural leaders around the world.

Nuffield Australia chairman David Brownhill says personal growth is a huge benefit of the program. Its primary aim is to improve the skills of Australian primary producers, provide a global perspective of agriculture and help scholars bring back new ideas and strategies for the benefit of both individual scholars, and their respective industries.

Recent scholars have been drawn from a wide pool of primary industries and include grain and rice growers, fishers and aquaculturists, chicken, beef, lamb, goat and pork producers, woolgrowers, dairy farmers, apiarists, orchardists, horticulturalists and vignerons. Study topics have varied from the basics of production such as soil, water, crop varieties, weeds and disease to production systems, new technologies, natural resource management, biofuels, carbon trading, supply systems, marketing and public relations.

Scholars are selected for their farming and leadership capabilities, and potential to make a valuable contribution to the future of Australian agriculture. They join a growing international network of scholars, which has more than 200 members in Australia and 1300 members worldwide.

Application forms are available from Nuffield Australia on 03 5480 0755, via email, enquiries@nuffield.com.au, or from the website www.nuffield.com.au.

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