At this year’s AIFST annual convention, value adding seafood through food science was a key theme. Graham Fletcher, team leader, Seafood Technologies at the New Zealand Institute for Plant & Food Research delivered a compelling keynote address ‘Seafood Technology: Where have we been and where are we going’.

A microbiologist by training, Fletcher has 30 years’ experience in many aspects of seafood science, technologies and processing and collaborates with other institutes across the globe. His main interests are in safety, spoilage, shelf life, processing and packaging of chilled seafood and other foods.

Fletcher provided an overview of the latest innovations in seafood safety, packaging and enhancement for post-harvest processing from around the world. Here are some of the highlights.

Aquaculture
At US$125 billion, global aquaculture production in fresh-, brackish- and marine-waters has well exceeded the value of the wild catch. While aquaculture is more labour-intensive, which makes it more expensive in developed countries, it is less weather-dependent and therefore offers more predictable production with more control over the raw material.

However no matter which species are farmed, it is important they are of high value and that means focusing on premium fish with high margins such as salmon.

Harvesting
New Zealand is increasing its tonnage of exports and more mechanised methods of harvesting are being employed.

Special emphasis is given to techniques of ‘rested harvest’ in which fish with superior flesh qualities is produced by harvesting in ways that minimise the stresses on the fish resulting in better products suited to more discriminating markets.

Transport
Sea transport is limited mainly to frozen product as we can’t restrict autolytic changes in flesh that is chilled, whereas additives and gas packing can inhibit spoilage bacteria. Research into foam boxes made from expanded polylactic acid is promising as it offers the same insulation properties of Styrofoam but it is biodegradable in compost.

Handling
Better handling for an improved end product, achieved by flow ice and salt water, ice systems are used...
to keep fish temperatures to below -0.6°C to substantially reduce deterioration. Quality Index schemes are available for many species and automated NIR/Vis instruments are being investigated for online and at-line rapid assessments. Temperature control at the retail level must also improve in order to extend shelf life. While most supermarket fridges run at 4°C, chilled seafood should ideally be stored at 0°C to -1.5°C.

Automation
New Zealand designed and built automatic mussel openers are replacing people as 28 of these machines can open 90,000 mussels per hour compared with 36 workers who can only open 28,700 per hour. This increased automation isn't necessarily bad news for employees as a reduced unit cost and increase in production means that employees are still employed in other capacities.

To date automation has mainly been used on high-throughput species but greater adaptability in software and robotics in which operational heads can be exchanged on a prime machine base will provide the diversity to handle different tasks.

Safety
Better design of process plants with better fittings, materials, drains (stainless steel pipes) and surfaces allows for far greater sanitary compliance, which can avoid the need for the thousands of dollars spent on testing for listeria.

Shelf life
Consumer preference is for chilled over frozen fish, so the shelf life of fresh seafood must be increased.

New technologies other than heat to reduce bacterial content at the start of the shelf life include high-pressure processing for added value products (not raw fish), pulsed light, electric fields and cold plasma.

Modified atmosphere packaging and the use of carbon dioxide generated within the pack can prolong shelf life in new-style consumer packs.

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