

# food science at University of Otago by Phil Bremer

There is a worldwide shortage of Food Science/Consumer Food Science graduates! Therefore, students should be encouraged to think about a career in the food industry, which can offer a great diversity of jobs with great opportunity for travel and advancement. Graduates are well prepared for their food science careers thanks to many degrees requiring the completion of research projects, three of which are highlighted in this article.

First, we need to look at the courses available. In the Food Science Department at the University of Otago we offer three courses: Food Science, Food Innovation and Consumer Food Science.

In Food Science students can obtain a degree of Bachelor of Science (BSc), BSc (Hons), Master of Science (MSc) or a Doctorate (PhD). In Food Innovation students can obtain a Bachelor in Applied Science (BAppSci) or a BAppSci (Hons). In Consumer Food Science students can obtain a degree of Bachelor of Consumer and Applied Science (BCApSc), BCapSc (Hons), MCApSc or a PhD (see <http://www.otago.ac.nz/foodscience/>).

The Food Science degree is designed to equip graduates with the skills and knowledge to devise new food products, or to improve the quality, shelf life, production processes, or safety of foods. Food scientists require a broad educational background in basic sciences such as chemistry, biology, microbiology and biochemistry; and specialised training in food science. Level 3 subjects strongly recommended include chemistry, biology, math and statistics. Physics is also recommended. In their first year of study students generally take General Health Science (Basic Science) papers. In the second and third years of study the students develop knowledge of foods and food systems.

The Food Innovation degree is designed to provide students with sound training in food science as well strong business skills. The course, which involves real problem solving projects and research, has strong practical links with the food industry. Innovation in developing new food products, processes and business models is recognised as a key requirement for achieving the future vision of the NZ food and beverage industry. Students take marketing and management papers in addition to Food Science papers, with students requiring a similar background to the Food Science degree (see above).

Consumer Food Science is the study of what influences our food choices: culture, sensory perception (taste, appearance, smell, texture), food quality, diet, nutrition, lifestyle and marketing. This area of study provides an opportunity to combine papers in Sensory Science, Food Marketing and Management, Nutrition and Food Service, with Consumer Food Science. Students can enter this course from a wide range of academic backgrounds with a strong background in the basic sciences not being essential.

To highlight the variety of research projects available to students we will now look at projects that three of our PhD students are currently working on for the sea urchin or kina industry.

Sea urchin roe is considered a delicacy in many countries, including Japan, where it is currently commanding prices of up to US\$300/kg. Though New Zealand's coastal zones have significant stocks of sea urchin, previous attempts to export this potentially lucrative product to Japan have failed due to difficulties in quantifying desirable product attributes. This task has been immeasurably complicated by the fact that the wild-caught fishery produces roe, which range considerably in colour, texture, odour and flavour, from being sweet tasting, firm, well defined with a desirable yellow/orange colour to being bland or bitter, soft or leaky and with a pale or brown/black colouration. Of course it is impossible to tell anything about the roe until the kina is opened and in some cases consumed.

Kylie Phillips, a PhD student, has developed a method for the objective assessment of sea urchin sensory quality using descriptive sensory analysis and a trained sensory panel. She has found that the main sensory differences between sea urchins are largely due to the presence of attributes unique to each gender. Roe from male kina are sweeter and have a more pronounced dairy flavour, while roe from female kina can be bitter with a metallic flavour. The intermittent bitterness of roe from female urchins appears to be due to their reproductive cycle, with the roe becoming bitter prior to spawning. This information is useful to fishers as it will help them to optimize their harvesting plans.

To market kina roe to Asia the product has to arrive in top quality, and PhD student Wasseela Verachia is investigating the impact of post-harvest stress – in particular exposure to air and holding temperature prior to processing, on roe shelf life. This is important as sea urchins are currently harvested from remote coastlines and are held on deck for several days prior to processing. Wasseela has shown that stressing live kina will considerably reduce the high quality shelf life of processed roe, reducing yield, and causing a defect termed 'melting' which is visually unappealing and considerably reduces its value. Wasseela is optimizing handling regimes, and has developed simple tests that processors can use to assess stress.

Another PhD student, Dan Garama, is attempting to unravel the major factors influencing roe colour. Dan has optimized chromatography techniques to isolate and analyse carotenoids believed to control colour. Interestingly, Dan is finding that kina are more challenging than other sea urchin species, because compounds other than carotenoids appear to be playing a significant role by masking the carotenoids and this results in the undesirable brown/black roes. Dan's research will help to determine if roe colour can be enhanced if, prior to processing, the kina are held in sea cages and fed an appropriate diet for several weeks.

For further research projects visit: <http://www.nzifst.org.nz/careers/advisers.asp>

For further information about courses at Otago University visit: <http://www.otago.ac.nz/foodscience>

## References for the Burning Candle (page 32)

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