

FOOD Facts

Winter 2001

FOOD SCIENCE AUSTRALIA
A JOINT VENTURE OF CSIRO AND AFISC



Better Freight, Better Fruit

Furry on the outside, vibrant green inside and filled with vitamins, antioxidants and minerals, the kiwifruit is one of New Zealand's major exports. In 2000, kiwifruit valued at NZ\$750 million were exported to 60 countries. ZESPRI International Limited is the world's largest exporter of kiwifruit with key markets in Europe, Japan, Korea, Taiwan and China.

To meet the demand of overseas markets, fruit must be of consistent firmness, colour and flavour. This also allows fruit to be strategically supplied to customers at premium prices. Consistency of quality is maximised by grading and controlling the temperature of fruit after harvest and during transport to market. Temperature variations lead to differences in the rate of ripening, which affects the quality and shelf life of fruit.

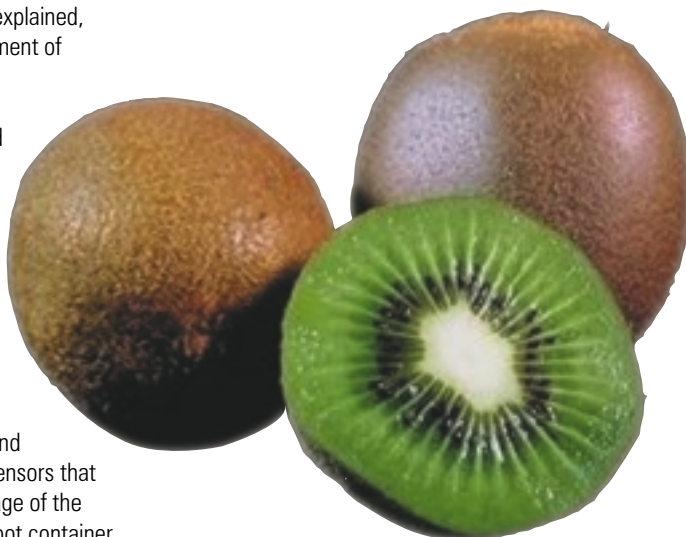
ZESPRI Innovation (the Innovation arm of ZESPRI Group Limited) has collaborated with Food Science Australia and Massey University to study a shipment of kiwifruit and make recommendations to improve the uniformity and quality of produce. Dr Nevin Amos of ZESPRI explained, "Initially, researchers studied a shipment of kiwifruit to assess temperature variability. Recommendations made by the research team can be applied to a range of fruit and vegetables with the potential of increasing export profits and demand."

Data loggers were used to record temperatures of the kiwifruit shipment at ten-minute intervals throughout the voyage from New Zealand to Europe. The variability of temperatures and rates of heating and cooling were measured using 640 sensors that were positioned to give good coverage of the length, width and height of the 40-foot container. The temperature around the fruit was measured with sensors placed in cartons on several layers of each pallet. In addition, temperatures of

delivery and return air were measured as well as the temperature outside the container.

Fruit was warm when cartons were loaded into the container. The fruit cooled over the first few days of shipment and then stabilised. During the steady-state period, temperatures inside the container varied by 5 to 6°C. Minimum temperatures always occurred on the left-hand side and, at times, were as low as -2°C. Maximum temperatures of around 4.5°C were recorded close to the container door. Delivery air temperatures across the width of the container varied by up to 3.5°C.

Dr David Tanner, Section Leader of Supply Chain Innovation at Food Science Australia commented, "The lack of temperature uniformity through time as measured in this work is highly likely to increase fruit variability. To overcome this, strategic management of fruit inventory, as well as improved handling practices, will need to be implemented."



continued next page

Results for today
Ideas for tomorrow



Electronic Nose – sniffing out commercial applications

Fruity, cowy, foxy and austere are words used by specialists to describe the smell of food. This vivid language indicates the complexity and sensitivity of the olfactory system.

The electronic nose is an analytical tool that uses special sensors to mimic the human nose. It generates a characteristic fingerprint of an odour, which is compared to data from different samples, batches and blends.

Brian Young from Food Science Australia commented, "Over the past four years, our researchers have used electronic nose technology to assist the food industry. We have investigated commercial applications including monitoring odours released from production plants, batch to batch variability and assessing food quality."

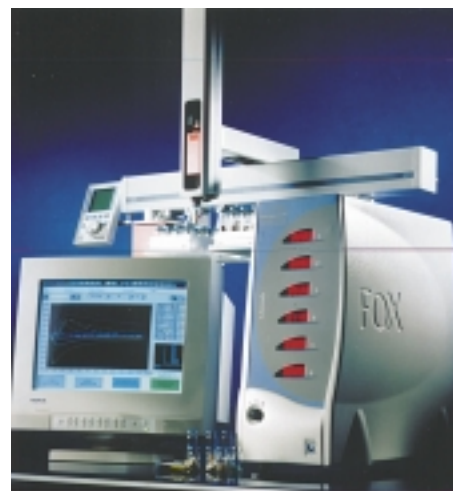
Electronic nose and quality testing of food

Consistent flavour and aroma are important in our appreciation of food. Deviations in these qualities may force a producer to adjust the manufacturing

process or withdraw a product from sale. Food Science Australia researchers are using electronic nose technology to assess food quality and variability. For example, this system has discriminated between types of coffee, cheese and olive oil and has also detected off-odours and food taints.

The distinctive aroma of Brazilian coffee or the attributes of a Greek olive oil can be visualised by plotting its fingerprint on an aroma map. The positioning of the fingerprint on an aroma map illustrates similarities and differences between a selection of imported and local olive oil products.

The electronic nose is also being used to monitor changes and detect foreign aromas in foods. For example, studies have shown that storage and seasonal variation affect the aroma of cheese. The electronic nose has also helped to identify the source of a flavour taint in confectionery. It was found that a residual compound in the packaging had permeated through the wrapping and altered the flavour of the sweets.



Electronic nose technology and the environment

The public is becoming increasingly aware of environmental and health issues associated with production plant emissions, and as a consequence of increasing development into rural areas.

Researchers from Food Science Australia have used a new type of artificial nose that combines sensor technology and gas chromatography. Its value is its portability, which allows sampling and analysis of odours *in situ*, enabling the monitoring of odours from facilities such as meat rendering plants, chicken farms and piggeries, without having to take air samples back to the laboratory for analysis.

Benefits

Traditional methods employed for measurement of odours such as gas chromatography/mass spectroscopy (GC/MS) and human sensory panels using olfactometry are expensive and labour-intensive. In addition, sensory analysis may be affected by an individual's sensitivity to aromas.

The electronic nose provides an objective, cost-effective, labour-saving method of analysing odours. This technology gives comparative information making it suitable for quick quality control testing.

For further information contact:
Brian Young, Food Science Australia, Werribee
03 9731 3492

Better Freight, Better Fruit

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The availability of this detailed temperature information will assist in marketing. To provide information about the entire shipment, temperatures should be recorded at both the core and surface of the pallet.

Air temperatures should also be monitored to identify areas that may be prone to low temperature injury.

The fruit stored in the hottest areas ripens fastest and should be first to be delivered to market.

The recommendations made during this trial will assist ZESPRI in supplying uniform fruit that meet overseas market specifications.

For further information contact:
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Kiwi Fruit Photos courtesy of Corel Gallery

The Board of Food Science Australia

Members of the Board of Food Science Australia contribute diverse skills and experience. They bring commercial focus to our activities and ensure that we are oriented to market trends.

However, client confidentiality is paramount – strict mechanisms are in place to ensure Board members have no access to information about our commercial contracts or even the identity of the clients.

Chairman, **Mr John Claringbould**, is Director Australasia and Asia - Effem Foods Pty Ltd. John is a member of Premier Brack's Food Industry Advisory Committee in Victoria, Chairman of Landcare Australia Ltd and Chairperson of the University of Melbourne's Institute of Land and Food Resources.

Recently he was made a Member of the Order of Australia for service to the food processing industry, through food science and industry bodies, as well as service to the environment and the community.

Dr Michele Allan is Group Manager, Operation Services, Bonlac Foods Pty Ltd. Michele has held a wide variety of leadership positions and combines solid business performance with academic grounding to ensure a thorough understanding of quality assurance systems, strategic quality management, manufacturing systems improvement, R&D leadership, change through people, and total quality management for pharmaceutical, chemical and food manufacturing.

Mr Enzo Allara is currently Regional Foods Director, Unilever Bestfoods Asia. He is also the Chairman of the Australian Food and Grocery Council and a member of the Prime Ministers Supermarket to Asia Council. With his extensive experience in the Australian and international food markets, he brings a global and regional perspective to priorities and investments in food research.

Dr Joanne Finkelstein, Department of Sociology at Sydney University is a sociologist with research and consultancy experience of consumer trends in Australia, Asia and USA. Her books on food, *Dining Out* and *Slaves of Chic*, are available in English, Italian, Japanese and Korean.

Professor Christopher Hudson is a Director of Meat and Livestock Australia and the Dairy R&D Corporation. He is immediate past President of

the Australian Institute of Food Science and Technology and is a Board Member of ANZFA. Two university appointments have promoted his interest in linkages between the food industry and academia. He is also interested in the strategic management of research and technology in the agri-food sector.

Mr Grant Latta is Executive Chairman of GCM Corp, an Investment Management Company which focuses on leveraged roll-up and management buy-in opportunities in Australia, New Zealand and Asia. He is also Chairman of the Grains Research and Development Corporation and Deputy Chairman of Export Finance and Insurance Corporation.

Mr Barry Kelly, Managing Director of Golden Circle comments, "I have worked in this industry for thirty-six years, the last eight as managing director, and have been instrumental in the restructuring of Golden Circle from being just a processor of its shareholders' produce, to a company focused on its consumers' needs through the use of new technologies and processes. This has included a concentrated focus on research and development in horticultural, product development and manufacturing areas."

Ms Chloe Munro is Secretary, Department of Natural Resources & Environment, Victoria and has had a wide-ranging career in both the public and private sectors in Victoria, New Zealand and

the UK. Chloe has held a range of senior management positions at the interface of corporate finance, public policy, risk management and implementing major change programs."

Dr Jim Peacock is the Chief of CSIRO Plant Industry. He is the most recent appointee on the Board, replacing Dr Chris Mallett. Jim is a Molecular Geneticist with research programs in a number of areas of Plant Development and Function. He is actively concerned with the uptake and commercialisation of research discoveries, particularly in the major food and fibre crops.

Professor Merilyn Sleigh, Dean of Life Sciences at the University of New South Wales, is a molecular biologist by training. She has previous experience in CSIRO and the biotechnology industry and a continuing involvement in the commercialisation of research outcomes through work with the Venture Capital Industry, and Unisearch, the commercialising arm of UNSW.

Mr Alan Tooth, Chief Executive Officer of the Dairy Farmers Group, comments, "My role on the Board is to provide one of the commercial links between science and industry, and to advise the management of Food Science Australia. At Food Science Australia we have a wealth of knowledge and intellectual property that is underutilised. The opportunity to use these resources locally and internationally is an opportunity Australian industry should embrace and expedite."



Food Science Australia Board members: Back row (L-R): Merilyn Sleigh, Alan Tooth, Barry Kelly, Grant Latta, Enzo Allara
Front row (L-R): Jim Peacock, Chloe Munro, John Claringbould, Joanne Finkelstein, Chris Hudson, Michele Allan

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Professional Development Opportunities

Food Polymer Science: Applications in Ingredient Functionality and Baking Technology – 4-7 September 2001 Sydney, NSW

This four day intensive course will describe the effects of water, as a near-universal solvent and plasticiser, on the diffusion limited behaviour of polymeric food materials and systems. The emphasis will be on the impact of water content on food quality, safety, stability, and technological performance.

Contact: Alison Johnson (03) 9731 3417

National University of Singapore & Food Science Australia Workshop Series – 6-7 September 2001 Singapore

This workshop series (jointly organised by the National University of Singapore and Food Science Australia) aims to promote and provide research and training for the food industry in Singapore and the Asian region.

The first workshop in the series will focus on food safety. These workshops are intended for a broad spectrum of food industry professionals, from R&D personnel (including basic and applied scientists, technologists, process engineers, and technical managers) to individuals involved in manufacturing and production, plant processing, packaging, preservation, quality control and assurance, and technical sales.

Contact: Murray Brown (03) 9731 3281

Approved Persons Course for Thermal Processing of Low-Acid Foods 15-19 October 2001

Food Science Australia, Werribee,
Victoria

Contact: Murray Brown (03) 9731 3281

FRESH - The Future in Food Safety and Processing Technologies for Value-added Horticultural Products 30-31 October 2001

Food Science Australia, Werribee,
Victoria

This international conference and exhibition will provide up-to-date reports on research conducted around the world. Participants will discuss their findings on the food safety challenge, international trends in processing and sanitation technologies for value-added horticultural products, washing systems and chlorine

New Faces

Dr Ragini Wheatcroft leads the Bioprocess Technology Section.



Ragini has extensive industry experience in microbiology, fermentation, and the production of value added products from industry by-product streams, including developing various extracts, animal feed ingredients and nutraceuticals.

alternatives, management of food safety risks and product quality. Invited international speakers include Edith Garrett (International Fresh-cuts Produce Association, USA), Dr Frederic Carlin (INRA, France), Dr Gerald Sapers (USDA, USA) and Dr Roy Betts (Campden & Chorleywood, UK).

Contact: Pam Tyers (03) 9731 3484

Functional Foods: Through Innovation to Market 14-15 March 2002 Melbourne, Victoria

This conference will explore the development and marketing of functional food products. It will bring together scientists and marketing/business development managers to encourage discussion and to conduct business in functional foods.

Key areas will include: The global market in functional foods; Developments through the entire value chain from on farm through processing delivery to the consumer; Case studies on science innovation and market outcomes; An update on the legislative issues surrounding functional foods; New opportunities for developing functional foods.

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