

Food Safety: the essential ingredient

OzFoodNet – fresh produce and foodborne disease in Australia

The 2006 United States outbreak of *Escherichia coli* O157 associated with spinach has highlighted the role of fresh produce in foodborne disease outbreaks. Australia has also experienced foodborne disease outbreaks associated with produce, such as cucumbers, lettuce, alfalfa sprouts, rockmelons, paw paws and orange juice. Since fruit and vegetables are often eaten without cooking this key food safety control measure is not available to consumers.

In 2006 OzFoodNet, Australia's national foodborne illness surveillance and investigation system, was involved in the investigation of three outbreaks associated with fresh produce. All were due to *Salmonella* contamination and affected people in multiple states. The first outbreak affecting more than 120 people was linked to *Salmonella* Oranienburg contamination of alfalfa sprouts. The second outbreak occurred in October with more than 120 salmonellosis cases associated with consumption of *Salmonella* Saintpaul contaminated rockmelon. In November 2006 there was a small outbreak of *Salmonella* Litchfield associated with paw paw.

There are several possible reasons why there has been a recent increase in outbreaks associated with fresh produce, including:

- an enhanced ability to detect and investigate multi-state outbreaks through OzFoodNet
- new knowledge of the role of bacteria and their attachment to produce
- centralised growing and distribution may provide more opportunities for contamination along the farm to retail chain

Produce may be contaminated on the farm via poor quality irrigation water or animal faeces (either directly or indirectly). A solution to the issue of microbial contamination of fresh produce is not straightforward, especially

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as each fruit and vegetable has different characteristics. Rough surfaces of some fruits, vegetables and seeds for sprouting can harbour microorganisms. Some fruit and vegetables are available pre-cut and this increases the surface area for potential contamination and/or microbial growth if the cut product is not stored at chill temperatures.

It is important that industry associations and governments work together to identify ways to prevent foodborne illness arising from fresh produce. Food Standards Australia New Zealand is planning to develop primary production and processing standards for the fresh produce industry.

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Inactivation of viruses by high pressure processing

Research that investigated the effects of high pressure processing (HPP) on hepatitis A virus in oysters was completed by a PhD student, Stephen Grove, in 2006. The work was funded by the Australian Food Safety Centre of Excellence (AFSCoE).

Hepatitis A is a foodborne virus that is transmitted via the faecal-oral route and infection is passed from person to person via foods and beverages contaminated with faeces or by direct personal contact. Foods most susceptible include those eaten without cooking such as fresh produce which may be irrigated with contaminated water, and bivalve shellfish (such as oysters) which may be grown in waters contaminated by human faecal effluent.

Oysters feed by filtering particulate matter such as algae from the surrounding water. They can accumulate viruses and other pathogenic microorganisms if they are present in the water during feeding. Once accumulated, viruses may take weeks to purge from an oyster, long after faecal coliform counts of the harvest waters have declined to permitted levels. The common practice of consuming oysters raw or mildly cooked means contaminating viruses within the oyster will not be inactivated prior to consumption, potentially resulting in foodborne infection.

In 1997, more than 400 hepatitis A cases, including one death, were linked to consumption of contaminated oysters harvested from the Wallis Lakes area in NSW. The source of the virus was probably untreated human sewage effluent which flowed from upstream of the oyster lease areas because of unusually high rainfalls. As a result of this outbreak, NSW adopted the internationally recognised Australian Shellfish Quality Assurance Program (ASQAP). The Program has been highly effective in the control of oyster-borne illness. In May 2006 Food Standards Australia New Zealand's Primary Production and Processing Standard for Seafood was introduced. This states that businesses involved in the primary production or processing of oysters must implement a documented food safety management system that effectively controls food safety hazards (http://www.foodstandards.gov.au/_srcfiles/FSC_Standard_4_2_1_Seafood_PPP_v88.doc).

The non-thermal technique of HPP is currently used in the United States to extend the refrigerated shelf life of oysters by inactivating spoilage microorganisms without altering sensory or nutritional qualities. Pressure is applied to oysters submerged in water within a pressure vessel and varies between 250 and 450 megapascal (MPa). Oysters are also shucked by the process, releasing the adductor muscles that hold the oyster shells tightly closed, enabling easy removal of meat without shell damage.

The AFSCoE PhD research investigated the effect of a range of pressure and processing times at different salt concentrations, on the viability of hepatitis A virus in artificially contaminated oyster meat. At a pressure of 450 MPa, a 100 fold reduction of hepatitis A in oyster meat was achieved by a 300 second treatment time. The sensitivity of hepatitis A virus to HPP was increased by lower salt concentrations within the oyster meat. A predictive model of the data was developed, and may be used by oyster processors to predict the inactivation of hepatitis A resulting from a particular treatment.

Australian canned foods – safe from chemical contaminants

The potential for chemical contaminants to migrate from packaging materials into foods has raised concern as a potential food safety hazard. Steel cans require protective lacquers for some classes of foods, such as those containing high levels of acid. These lacquers prevent can corrosion and the development of unsightly staining of food. Since the 1990s most of these protective lacquers have been based on epoxy resins. Bisphenol A (BPA), its di-glycidyl ether (BADGE) and BADGE's related compounds have been shown to migrate from epoxy can linings into food.

BADGE is a compound that has the potential to act as a human endocrine modulator if ingested. Endocrine modulators are chemicals that interfere with the endocrine system which is responsible for hormone secretion. Although many industrial compounds are suspected of affecting endocrine function in humans, no studies have definitively linked this to the levels found in food. However, public concern about exposure to these compounds has not abated. The key issue is their concentration in our diet; therefore regulatory authorities specify limits for their tolerable daily intake (TDI). The TDI is an estimate of the amount of a substance that can be consumed daily over a lifetime without appreciable risk. Australian canned food manufacturers who export their products face severe costs in recall of stock and loss of market access if specified TDI limits are exceeded. In January 2007, the European Food Safety Authority set a new TDI for BPA of 0.05 milligram per kilogram of body weight (http://www.efsa.europa.eu/en/science/afc/afc_opinions/bisphenol_a.html). This limit was decided upon after extensive testing and evaluation of the toxicology of BPA.

Australian canned food manufacturers have been pro-active in ensuring that migration of contaminants from packaging into foods is not a risk to consumers. Research to determine the factors affecting contaminant migration from Australian cans into food was conducted by Food Science Australia in 2002, with assistance from representatives of the packaging and lacquer industries. To determine if any contaminants found in the canned food were present prior to canning (for example, from processing water), samples taken before and after canning were analysed. Sixteen different food types were analysed including vegetables, meat, cheese, fish and desserts. The study also aimed to determine the effects of differing storage conditions on the level of contaminant migration into food. Samples were analysed over a six month period under temperate and tropical conditions.

For all samples tested, levels of BADGE or its related compounds were below the level set by the European Commission which is one milligram BADGE per kilogram of food (http://www.eu.nl/food/fs/sc/scf/out28_en.pdf). Although contaminant levels detected were too low to allow for conclusive comparisons, it appeared that storage times and temperatures did not adversely affect contaminant migration from can linings.

The study showed that the current manufacturing practices for Australian canned foods do not represent a health hazard for Australian or overseas consumers.

State food safety and hygiene news

New South Wales

The NSW Food Authority released a new Fact Sheet in December 2006 titled 'Food Safety for Caterers'. It lists the practices to be avoided when preparing food, to minimise the risk of food poisoning:

- Under-cooking
- Slow reheating and slow cooking under low heat (providing an ideal growth temperature for bacteria)
- Improper cooling
- Incorrect storage and transport temperatures
- Cross contamination between raw and ready-to-eat foods
- Cooking food too far in advance of use
- Poor personal hygiene of food handlers

Guidelines are provided that explain how the above problems can be avoided. They include the use of thermometers to ensure food reaches an adequate temperature during cooking, reducing portion sizes to aid cooling and staff training. To view this fact sheet visit: http://www.foodauthority.nsw.gov.au/industry/pdf/Catering_safety_tips.pdf

South Australia

The 2005 *Salmonella* outbreak associated with Tasmanian bakery products, responsible for over 70 foodborne illness cases, prompted the South Australian (SA) government to implement a targeted inspection and education program for SA bakeries. Prior to implementing these programs, the SA Department of Health conducted a survey designed to obtain a baseline of hygienic standards in these bakeries and the results were released in January 2007.

Products considered to be a higher food safety concern, such as those containing fresh cream or custard fillings, were collected from 98 bakeries between April and June 2006. A total of 290 samples were analysed for *Salmonella* spp., coagulase positive staphylococci, *Escherichia coli* and standard plate count. Results were compared against the acceptability criteria in the Food Standards Australia New Zealand (FSANZ) guidelines for ready-to-eat food. According to the FSANZ criteria two products had unsatisfactory *E. coli* counts (≥ 100 cells per gram) and 41 products had unsatisfactory standard plate counts (≥ 10 million cells per gram). No *Salmonella* or coagulase positive staphylococci were detected. The SA government plans to repeat the survey in 2008 as an indicator of the success of their inspection and education programs. The full report can be obtained from: <http://www.dh.sa.gov.au/pehs/Food/survey-sweet-baked-goods-jan06.pdf>

Victoria

Victorian food businesses and community organisations that handle food are subject to complex local, state and federal food regulations. In October 2006 the Victorian Competition

and Efficiency Commission (VCEC) released details of their planned review of these regulatory systems. The Victorian Government, who commissioned the review, aims to reduce the economic impact of food regulations while still maintaining a high standard of food safety and quality. The review has already gathered information from the Victorian food industry, regulatory bodies, and other interested parties and round table discussions were held in December. By mid-April 2007 the Commission plans to release a draft report, outlining their plan for how the regulatory systems can be streamlined to ease the burden on those working in the Victorian food industry. For further information or to make a submission to the Commission, visit the VCEC website: <http://www.vcec.vic.gov.au/CA256EAF001C7B21/0/A73A68080F80AFBCA2571E9001D0A44?OpenDocument>

Australian food recalls during 2006

During 2006 there were 58 consumer level food recalls in Australia. The majority of these were due to undeclared allergens (for example peanuts) or contamination by foreign matter (for example glass). The next most common cause was microbial contamination with a total of 13 recalls. *Listeria monocytogenes* or *Salmonella* spp. were the microorganisms most frequently implicated. Three recalls were conducted as a result of processing faults, two were due to possible microbial contamination through inadequate or failed processing and the other was due to the presence of an allergen caused by the addition of an incorrect ingredient. Other reasons for recalls involved incorrect or non-permitted use of chemicals or ingredients.

In New Zealand the most common reason for a food recall in 2006 was the presence of foreign matter (38 percent of 26 recalls), followed by undeclared allergens (23 percent) and microbial contamination (19 percent). Quality issues or chemical contamination were the cause of the remainder of recalls in New Zealand.

A noticeable trend in recall data over recent years is that Australia and New Zealand both had marked increases in the number of recalls due to undeclared allergens from 2002 to 2003. In Australia during 2002 there were 8 food recalls due to the presence of allergens, whilst in 2003 there were 40 with most of these consumer initiated. These increases can be attributed to the introduction of mandatory warning statements on labels for products containing specified food allergens and greater consumer awareness of the food allergen issue.

Recall data can be used to raise awareness in the food industry about hazards that frequently occur. Food businesses can then take steps to prevent further occurrences through factoring in this information when developing or reviewing food safety programs.

The Australian recall information was sourced from <http://www.foodstandards.gov.au/foodmatters/foodrecalls/archiveconsumerlevelrecalls/index.cfm> and the New Zealand information was from <http://www.nzfsa.govt.nz/recalls/consumers.htm>.

The Australian Food Safety Centre of Excellence: Workshop Series

DESIGN AND INTERPRETATION OF FOOD SAFETY SAMPLING PLANS

LOCATIONS:

Melbourne (15 March), Adelaide (22 March) and Perth (29 March)

WHO SHOULD ATTEND:

Production personnel involved in designing and using sampling plans for lot acceptance

DELIVERY:

Presentations and practical application, exercises and group discussion. Bringing your own laptop, with Microsoft® Excel, will be an advantage.

CONTENTS:

This one day course will introduce and explain the three main types of sampling plans:

- 2-class attributes sampling plans
- 3-class attributes sampling plans
- Variables sampling plans

OTHER TOPICS COVERED:

- Operating Characteristics (OC) curves and their interpretations
- Determining the number of allowable number of non-conformances
- Special Intensity sampling

The focus will be on applying sampling plans to food related situations, e.g. evaluation of acceptance based on concentration of microorganisms. In particular, the International Commission on Microbiological Specifications for Food (ICMSF) case definitions will be discussed and evaluated.

COURSE PRESENTER:

Dr Andreas Kiermeier
South Australian Research and Development Institute

VENUE/TIMES:

MELBOURNE:

9:30 am until 5:00 pm
Food Science Australia
671 Sneydes Road, Werribee

ADELAIDE:

9:00 am until 5:00 pm
Meeting Rooms 1 & 2, Level 14
25 Grenfell Street, Adelaide

PERTH:

9:00 am until 5:00 pm
Curtin Graduate School of Business
78 Murray St, Perth

COST:

\$660 (incl. GST) per participant includes course material, lunch, morning and afternoon teas.

BOOKINGS:

www.foodsafetycentre.com.au/sampling2007/

ENQUIRIES:

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