FOOD

Safety & Hygiene

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Australian Food Safety Centre of Excellence

Food Safety: the essential ingredient

Safety based use-by date marking

The current definition of a use-by date in the Australian Food Standards Code (AFSC) is a significant departure from the meaning in earlier legislation. A perusal of the date marking of foods in the chill cabinets of supermarkets suggests that many manufacturers are not aware of the change and its implications.

The Standard 1.2.5, Date Marking of Packaged Food, of the AFSC reads in part: 'the Standard requires packaged food, with some exceptions, to be date marked, and prohibits the sale of packaged food after the expiration of the use-by date, where such a date is required'.

The use-by date now means 'the date which signifies the end of the estimated period, if stored in accordance with any stated storage conditions, after which the intact package of food should not be consumed because of health and safety reasons'. Thus, it is now an offence to sell packaged food past its use-by date and this form of date marking is now tied to food safety.

The best-before date is now the open date which most packaged foods carry and is defined in the AFSC as 'the date which signifies the end of the period during which the intact package of food, if stored in accordance with any stated storage conditions, will remain fully marketable and will retain any specific qualities for which express or implied claims have been made'.

The original concept of open date marking was governed by quality factors only with safety, hopefully, built in to other factors such as good manufacturing practices and correct storage temperature. This remains the concept inherent in the Codex Alimentarius (2001) which defines the use-by date as the date which signifies the end of the estimated period under any stated storage conditions after which the product probably will not have the quality attributes normally expected by the consumers. After this date, the food should not be regarded as marketable.

The National Advisory Committee on Microbiological Criteria for Food (NACMCF) in the US was asked by its supporting federal agencies to provide advice on the requisite scientific parameters for establishing safety based use-by dates for refrigerated ready-to-eat (RTE) foods to help reduce the incidence of foodborne illness. The NACMCF has now published its considerations for establishing safety based date labels (SBDL). These are to be found in the Journal of Food Protection 2005.68.8.1761-1775 and make instructive reading.

The Committee has determined that, 'if the SBDL concept is pursued, *Listeria monocytogenes* is the appropriate target organism for refrigerated RTE foods that support its growth.

What's inside

At the same time, it noted that an SBDL will not prevent illness if the food is heavily contaminated, held at high temperatures, or otherwise abused.

Food Standards Australia New Zealand has recall guidelines for packaged RTE foods found to contain *L. monocytogenes* at the point of sale. There is a nil tolerance (in 25g) for RTE foods requiring refrigerated storage and able to support growth of *L. monocytogenes* and a tolerance level of 100/g for all other packaged RTE foods. The action levels proposed are intended for recall purposes only and state that 'manufacturers must still strive for nil tolerance in their packaged RTE products'.

Web resources:

Shelf Life of Foods Fact Sheet – available from:
www.foodscience.afisc.csiro.au and
www.foodsafetycentre.com.au

The Australian Food Standards Code:
www.foodstandards.gov.au/foodstandardscode/

Food Standards Australia New Zealand Recalls and Surveillance:
www.foodstandards.gov.au/recallssurveillance

Fresh produce continues to cause illness overseas

The reported incidence of foodborne illness associated with fresh produce is small in Australia (Food Safety and Hygiene, November 2001). Sliced lettuce and pre-cut melon have been implicated. A wider range of prepared fruits and vegetables has been associated with illness in the US and elsewhere. Some significant points can be made about foodborne illness associated with horticultural products. Produce associated outbreaks can be difficult to identify as they can be widespread geographically, produce can be used in multiple dishes and people may not recall the multiple components or garnishes of a meal. In addition, there are limitations in effectively decontaminating fresh produce and therefore strict control measures are needed during harvest and packing.

continued overleaf

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Salmonella infections and tomatoes in the United States

A recent issue of Morbidity and Mortality Weekly Report (2005. 54. 13. 325-328) carries a report of outbreaks of *Salmonella* infections associated with the consumption of Roma tomatoes in the northern summer of 2004.

In the largest outbreak, 429 culture-confirmed salmonellosis cases were identified in nine states, all occurring amongst people who had eaten at sites of one delicatessen chain. Multiple serotypes were involved with the majority of cases being caused by *S.* Javiana. No deaths occurred, but 30 percent of patients were hospitalised.

The delicatessen chain had purchased pre-sliced tomatoes from a single processor for all of its 302 stores in five states. *S.* Anatum, indistinguishable from that of five cases in four states, was isolated from pre-sliced Roma tomatoes sampled at a site of the delicatessen chain. When the tomatoes were removed from all the chain outlets, the outbreak subsided.

A second outbreak involved 125 confirmed cases of *S.* Braenderup infection. The case-control study showed patients were more likely than controls to have eaten out multiple times during the five days preceding illness onset. Using meal information from 27 case patients and 29 controls, investigators queried restaurant managers about specific types of cheese, lettuce and tomatoes used in dishes eaten by customers. Roma tomatoes were the only exposure significantly associated with illness. The restaurants had purchased whole tomatoes from local distributors.

In the third, much smaller outbreak, multiple serotypes were involved. All patients (7) ate at the same restaurant. Roma tomatoes were the suspected vehicle because they were the only common food exposure among all patients.

Salmonella infections have been linked to tomatoes in the US since 1990. Contaminated tomatoes in the 1990 outbreak and another outbreak in 1993 were traced to a single packing house. A HACCP program was developed and implemented at this packing house and disseminated to the tomato industry (Dairy, Food and Environmental Sanitation 1996. 16. 9. 549-553). Whilst the three critical control points in the tomato handling system identified in this program are more in line with Good Manufacturing Practices and Good Agricultural Practices and would not meet the current Codex Alimentarius definition of a critical control point, they remain important in reducing the microbiological hazards associated with tomatoes. They are: (i) cleaning and inspection of bins used to transport fruit; (ii) water quality maintenance in the packing house dump tank(s); and (iii) hand sorting of individual tomatoes on the packing line. This work has subsequently been expanded upon by the same workers (Applied and Environmental Microbiology 1995. 61. 6. 2127-2131).

Salmonella can enter plants through roots, flowers and through cracks in the fruit skin, the stem seal or the plant itself. At least several serotypes of *Salmonella* have been shown to grow in cut tomatoes at ambient temperatures to populations exceeding one million/g (International Journal of Food Microbiology 1991. 13. 177-182). The pH of many varieties, especially when overripe, is not sufficiently low to inhibit pathogen growth.

The current knowledge of mechanisms of tomato contamination and methods of eradication of *Salmonella* in fruit appear inadequate to fully define interventions that will ensure produce safety. The officials reporting these latest incidents in the US caution that health professionals should be aware of tomatoes as a possible vehicle when investigating *Salmonella* outbreaks.

Hepatitis A linked to green onions from Mexico

The February 2004 issue of Food Safety and Hygiene carried a brief report of a serious outbreak of Hepatitis A infection in the US associated with green onions. Of 601 patients identified, at least 124 were hospitalised and three died.

A more complete report of the incident is now contained in the New England Journal of Medicine 2005.353.890-897.

The green onions were apparently contaminated before arrival at a restaurant which was the point of infection for most, if not all, of the reported cases. A combination of factors contributed to what the authors describe as 'the unprecedented size of the Pennsylvania outbreak and the high attack rate observed'. Nearly 2000 people were estimated to have dined at the restaurant during the few days of the peak exposure period. All were offered mild salsa – the food item most strongly associated with the illness – on seating. The mild salsa contained tap water, green onions, canned tomatoes, canned green chillis, a spice mix and diced white onions.

Green onions were washed with tap water and chopped as needed in an electric dicer dedicated for the onions only. The dicer was cleaned each day.

Chopped onions were refrigerated in plastic containers for up to two days. There were opportunities for the intermingling of uncontaminated and contaminated green onions stored in a common container. Also, excess liquid from washing or melted ice might have facilitated diffusion of Hepatitis A virus through the chopped onions.

A Food and Drug Administration trace-back investigation found that two farms in Northern Mexico were the source of green onions shipped to the affected restaurant at the time of infection. The implicated green onions were apparently contaminated with Hepatitis A virus before or during packing into shipping boxes on the farms in Mexico. Food service workers at the restaurant were tested for recent infection with the virus and any infected workers were shown not to be the source of the outbreak.

The green onions from the implicated farms were probably delivered to other restaurants, but no other simultaneous restaurant associated outbreaks of Hepatitis A were identified. Contamination might have been confined to a small portion of the harvest or contaminated produce may not have been recognised as the source of infection among persons who did not recall exposure.

Shiga toxin producing *Escherichia coli* in Australia

Barry Combs, Public Health Officer, OzFoodNet, SA

Introduction

Shiga toxin-producing *Escherichia coli* (STEC) was first recognised as a significant cause of gastroenteritis in 1982 following two outbreaks in the United States[1]. Subsequently, STEC infection was associated with haemolytic uremic syndrome (HUS), a serious complication that can result in death. HUS may develop in 5–10 percent of persons infected with STEC[2,3].

It is thought that most STEC infections develop from eating undercooked beef and lamb, or eating agricultural produce and drinking water that have been contaminated with animal manure[2]. Outbreaks of disease can be quite large, such as one in Scotland in 1996 with 512 cases and 20 deaths[4]. Apart from the societal costs associated with this disease, the financial costs to food producers can be substantial with one outbreak in the USA resulting in the recall of 18,600 tons of ground beef and beef trimming[5].

STEC Infections in Australia

In Australia, during 1999–2004, there was a mean of 49 reports of STEC each year. The notification rate in Australian States and Territories varies considerably, from an average of 0.07 cases per 100,000 population in NSW, to an average of 2.6 cases per 100,000 population in South Australia (Table 1). South Australia has similar notification rates to the United States, where reported cases range from 2.1–2.9 per 100,000 population[6]. The differences in notification rates between Australian jurisdictions are likely to be due to the types of diagnostic test used and

numbers of samples tested. South Australia has screened all diarrhoeal stools containing blood with a sensitive polymerase chain reaction test for STEC since 1997 in response to a large HUS outbreak in 1995[7].

The majority of cases reported in Australia are sporadic, which is consistent with other countries. In most cases the sources of sporadic infections are never identified. Outbreaks or case control studies of sporadic infection provide the best information on causes. A case control study of sporadic cases in South Australia found an association between the consumption of berries and illness[8]. Further studies on sporadic STEC infections are being conducted in Australia by OzFoodNet. Overseas studies on sporadic STEC infection have found there is an increased risk from eating undercooked ground beef[9] and contact with farm animals[10].

During 2004, the main serotypes causing infection in Australia were O157 (58 percent), followed by O111 (16 percent) and O26 (13 percent)[11]. This serotype prevalence is similar to findings in other countries. One study in the US found that O157 was the predominant serotype with other serotypes found in the remaining 54 percent of isolates[12].

STEC serotypes that are commonly found in human infections have also been detected among Australian animals. A large range of STEC serotypes, including serotypes O157, O26, O91, O113, O111 have been isolated from cattle[13].

In Australia, of nine STEC outbreaks investigated between 1995 and mid-2005, (Table 2), five were detected in South Australia, which has enhanced surveillance of bloody stool specimens. A range of different serotypes was associated with the outbreaks, with O111 detected in three outbreaks. In two thirds of the outbreaks, many of the cases developed the serious illness HUS. Australia's largest outbreak occurred in 1995 when 23 children developed HUS. The outbreak investigation implicated Mettwurst, made from a mixture of pork, beef and lamb meat and, whilst other serotypes were detected, O111 was the main serotype associated with this outbreak.

In summary, outbreaks of STEC have occurred in Australia caused by several different serotypes. In Australia, the cause of sporadic STEC cases and many STEC outbreaks is unknown, although some animal sources have been identified. Studies into sporadic STEC infection should, in the future, help to determine what foods or behaviours increase the risk of STEC infection and provide the basis for preventative measures.

Acknowledgements

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Table 1. Notification rates of STEC infection in Australian states (mean rates from 1999 to 2003 and rates for 2004)

Data sourced from the 'Communicable Diseases Network Australia - National Notifiable Diseases Surveillance System, personal communication and OzFoodNet Annual Reports[11].

	Mean notification rate (per 100,000 population)				
	NSW	QLD	VIC	SA	WA
1999–2003	0.07	0.19	0.07	2.6	0.10
2004	0.08	0.25	0.09	2.04	0.05

Table 2. Outbreaks of STEC in Australia from 1995 to 2005 (year-to-date, 7 October 2005)

State	Year	Setting	Vehicle of infection	Total no. of outbreak cases	No. HUS cases	STEC serotype	Reference
SA	1995	Community	Mettwurst	23[a]	23	O111, O157, O160	7
QLD	1996	Community	Unknown	6	0	O157	14
SA	1998	Community	Unknown	4	3	O113	15
NSW	1999	Community	Unknown	7[b]	7		16
NSW	1999	Community	Meat pizza	unknown	1	O15	17
SA	2002	Petting zoo	Animals	6	0	O26	–
SA	2003	Aged Care facility	Unknown	3	0	O111	18
QLD	2004	Rural community	Unknown	4	2	O86:H27	19
SA	2005	Church	Unknown	3	1	O111	–

[a] Non-HUS cases were not officially documented in this outbreak, although there were unofficial reports of large numbers of people with gastrointestinal illness who had consumed the implicated food.

[b] STEC was not detected in these cases, although one case had high level of antibodies against *E. coli* O157.

References – full title available from www.foodsafetycentre.com.au

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The Australian Food Safety Centre of Excellence
Third Annual Industry Forum

TOOLS FOR FOOD SAFETY

What's in the kit and what can it do for you?

MELBOURNE – Wednesday 23 November, 2005

Simplot Australia, Chifley Business Park, 2 Chifley Drive, Mentone VIC

SYDNEY – Thursday 24 November, 2005

Food Science Australia, 11 Julius Ave (enter from Delhi Rd)
Riverside Corporate Park, North Ryde NSW

ARRIVAL AND REGISTRATION FROM 1.00 PM
talks start 1.30 pm sharp

Connecting traditional food preservation technologies with science and systems to increase shelf life and safety: Tom McMeekin

In-house and external tools for validation of process and product safety: Belinda Chapman

Hardware tools for the research and analytical laboratories – an overview: Kari Gobius

AFTERNOON TEA

Molecular tools to establish the effectiveness of thermal preservation: Professor Stanley Brul, University of Amsterdam and Unilever Foods Research Centre, The Netherlands

Flexible tools – food safety objectives: Paul Vanderlinde

Data, mathematics and software tools for managing food safety: Tom Ross

The Australian Food Safety Centre of Excellence – your resource database tool and stakeholder needs discussion: Chris Hudson

Finish by 6.00 pm followed by LIGHT REFRESHMENTS

Cost: There is no charge for this event, but registration is essential for catering purposes

Bookings for Melbourne and Sydney at:
www.foodsafetycentre.com.au/forum2005.htm
OR fax booking slip below to: **02 9490 8367**

Name: .....

Company/Mail Address: .....

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Phone: .....

Email: .....

Please tick location:

☐ **Melbourne** Wed, 23 Nov
☐ **Sydney** Thurs, 24 Nov

☐ Tick here if you wish to be kept informed of Food Safety Centre activities

Enquiries to Cathy Moir **02 9490 8579** or
forum2005@foodsafetycentre.com.au

The Australian Food Safety Centre of Excellence Workshop Series

DESIGN AND INTERPRETATION OF FOOD SAFETY SAMPLING PLANS

BRISBANE – Monday 5 December, 2005

Food Science Australia, Cnr Creek and Wynnum Roads, Cannon Hill, QLD

SYDNEY – Thursday 8 December, 2005

Food Science Australia, 11 Julius Ave (enter from Delhi Rd)
Riverside Corporate Park, North Ryde NSW

Who should attend: Production personnel involved in designing and using sampling plans for the purpose of lot acceptance. *Minimum of 15 participants is required to run the course. Maximum of 20 will be permitted for each training day.* ***Bookings must be received by 18 November.***

Delivery: Presentations and practical application, exercises and group discussion (~50% each of theory and practical). Course material will be provided. Bringing your own laptop will be an advantage.

Contents: The course will be presented by Dr Andreas Kiermeier, South Australian Research and Development Institute.

This one-day course will introduce and explain the three main types of sampling plans that can be used for any type of acceptance sampling. Other topics include: Operating Characteristics (OC) curves and their interpretations; determining the number of allowable number of non-conformances and special Intensity sampling. Special consideration will be given to 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.

Cost: $600 (incl. GST) per participant includes course material, lunch, morning and afternoon teas. *$100 discount for Food Safety Centre Core members*

Bookings for Brisbane and Sydney (by Nov 18) at:
www.foodsafetycentre.com.au/sampling2005/
OR fax booking slip below to: **03 6226 7450**

Name: .....

Company/Mail Address: .....

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Phone: .....

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Please tick location:

☐ **Brisbane** Mon, 5 Dec
☐ **Sydney** Thurs, 8 Dec

I am interested in attending this workshop in 2006, please keep me informed (tick your preferred workshop location below):

☐ Sydney ☐ Adelaide ☐ Melbourne ☐ Brisbane
☐ Albury/Wodonga area
☐ Other (please specify): .....

Enquiries to Sally Jones **03 6226 6280** or
sampling2005@foodsafetycentre.com.au

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