

Food Safety: the essential ingredient

The effect of ambient temperature on foodborne salmonellosis

Two recently published studies look at the effect of ambient temperatures on the incidence of foodborne salmonellosis.

The first of these by Australian workers is part of a five-country collaborative study coordinated from the Epidemiology Unit of the London School of Hygiene and Tropical Medicine. This group examined the association between temperature and salmonellosis notifications in five state capitals: Adelaide, Perth, Brisbane, Melbourne and Sydney from 1991–2001 (*Epidemiology* **15** 2004 86). They found a positive association between monthly notifications and mean monthly temperatures of the previous month in every city studied. They conclude that the lag of one month suggests that temperature might be more influential earlier in the production process rather than at the food preparation stage. This conclusion is reached, at least in part, because of the effective exclusion of large outbreaks from the analysis. However the authors believe that they are likely to have underestimated the association between temperature of the previous month and notifications by excluding the data on outbreak months.

In the absence of temperature information from the previous month, the current month's temperature was found to be a good predictor and was consistent over all cities.

In the second study (*Epidemiology and Infection* **132** 2004 443), European members of a separate collaborating group studied the relationship between environmental temperature and reported *Salmonella* infections in ten European countries on a weekly basis. The time period covered varied from country to country over a range of 6–10 years.

Changes in infection control measures in the UK poultry industry caused a significant decline in the number of reported cases of salmonellosis in Scotland, and England and Wales after 1997. The period after January 1998 was therefore not included for these countries.

These authors also excluded cases linked to outbreaks where possible, as the relationship with temperature may be different for sporadic cases and for those linked to outbreaks.

They found on average, a linear association between temperature and the number of reported cases of salmonellosis above a threshold temperature of 6°C. The relationships were very similar in the Netherlands, England and Wales, Switzerland, Spain and the Czech Republic. The greatest effect was apparent for temperature one week before the onset of illness with diminishing but positive effects up to five weeks. The European workers conclude

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that higher temperatures around the time of consumption are important (in salmonellosis) and reinforce the need for further education in food handling behaviour.

It is interesting to speculate on the reason for these different results but they do tend to reinforce the need for a paddock to plate philosophy for food safety control. This is especially so when a recent Australian study (*Communicable Diseases Intelligence* **28** 2004 215) found that in the period 1995–2000, *Salmonella* species were responsible for 35 percent of 214 reported outbreaks. Of these *Salmonella* outbreaks, restaurants, commercial caterers, and take-away settings were associated with 61 percent. This confirms many studies (*Food Safety & Hygiene*, November 2002) which indicate that temperature misuse and cross contamination at the point of preparation are major hazards for foodborne illness outbreaks. Comparable data for sporadic cases is not available.

An earlier study in the UK of the effect of ambient temperatures and the incidence of foodborne illness (not restricted to salmonellosis) showed comparable results to the Australian study cited above (*International Journal of Biometeorology* **45** 2001 22.). The authors of that study found that there was a much stronger association between reported illness and temperatures 2–5 weeks earlier rather than the week in which illness was reported and the one preceding it.

They concluded that factors operating close to the point of consumption, either within or outside the home, are not the principal cause of the rise in food poisoning associated with warm summer conditions (in the UK).

The authors of the current European study point out in their paper that the data set used in this earlier study (general practitioner notifications based on clinical diagnosis) would be expected to contain a whole range of pathogens other than *Salmonella* sp., most importantly *Campylobacter* sp., that have a less clear relationship with short-term temperature variability.

As further information becomes available from many countries using improved surveillances and reporting systems, we can expect a clearer picture to emerge on the causes of foodborne illness and ways of reducing its incidence.

Plant food safety scheme for NSW

The NSW Government has released a draft *Food (Plant Products Food Safety Scheme) Regulation 2004* under the NSW Food Act 2003. The draft is specifically designed to cover food businesses that provide plant products from five areas: fresh cut fruits, fresh cut vegetables, vegetables in oil, unpasteurised juices, and seed and bean sprouts. These categories were identified as high priority in terms of food safety in a risk profiling of plant products.



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Australian Food Safety Centre of Excellence - NEWS

Industry Forum

The Australian Food Safety Centre of Excellence held its second annual industry forum focusing on science and sustainability on Wednesday, 1 December in North Ryde, NSW.

Social, environmental and economic sustainability is emerging as one of the most significant corporate challenges for today's business owners, particularly within the food industry. This forum discussed how the delivery of safe and quality food is critical to ensure the sustainability of both the food industry and high standards of public health.

To view the presentations and summary of discussion, visit the website:
www.foodsafetycentre.com.au/forum.htm

The Food Safety Centre launches the Allergen Resource Bureau

The Food Allergen Resource Bureau, a key initiative of the Australian Food and Grocery Council's (AFGC) Allergen Forum, is to be officially launched in April 2005.

The concept arose from last year's AFGC/AIFST Food Allergen Workshop, where a clear need was identified for a centralised source of information relevant to the Australasian food industry. The Australian Food Safety Centre of Excellence administers the Bureau on a membership basis.

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Recent updates to the website

- First Annual Report for the Australian Food Safety Centre of Excellence is available (November 2004)
- Food Safety ToolKit™ for Retail and Hospitality demonstration version (December 2004)
- Risk Ranger goes live (February 2005)
- Issues update...more information on acrylamide in foods (March 2005)

Under the draft regulation, the identified businesses will be required to establish food safety programs which comply with the principles and guidelines set out in the document, *Hazard Analysis and Critical Control Point (HACCP) System and Guidelines For Its Application*, published by the Codex Alimentarius Commission. A number of other industries (meat, dairy, seafood) are already regulated by the Authority in this way.

At the same time, the Authority has released a draft *Plant Products Manual* which contains technical detail and advisory information for the assistance of businesses affected by the impending legislation. The manual contains sections on licensing of food businesses, audits, fees and charges, good manufacturing practice and good hygiene practice. There is also a series of hazard tables for the product categories to be regulated.

Further information is available from the Authority by telephoning their Industry Contact Centre on 1300 552 406 or consulting the website:
www.foodauthority.nsw.gov.au

Microbiological hazards associated with sprouted seeds

We last discussed sprouts and foodborne disease in the November 2000 issue of *Food Safety and Hygiene*. We noted then that while there have been no confirmed outbreaks of foodborne illness from sprouts produced in Australia, seeds grown in Australia had been associated with outbreaks in other countries in the 1990s.

Australia continues to be without reported incidents but sprouts remain a high risk product based on the number and seriousness of outbreaks reported overseas. They are one of the plant products for which the NSW Food Authority is to introduce the requirement for food safety programs.

The Campden and Chorleywood Food Research Association Group has recently published a *Review of the microbiological risks associated with sprouts* as part of its continuing review series. This comprehensive review reiterates the key challenges associated with the safe production of sprouted seeds and some of these bear repeating here.

They include:

- Seeds have not been regarded traditionally as food products but as a crop to be replanted with only a small proportion set aside for food. Therefore historically the seeds may not always have been handled according to good agricultural practice.
- The majority of cases of foodborne disease recorded in the scientific literature were due to Salmonella or Escherichia coli.
- Storage, processing and shipping of seeds have the potential to introduce contamination due to unhygienic practices and equipment.
- Foodborne pathogens can increase rapidly during the sprouting of seeds. Absence of pathogens on seeds is therefore critical.
- There is currently no decontamination method that totally eliminates pathogens.

The review notes 33 reported outbreaks of illness associated with sprouts up to the end of 2001 with the majority having occurred in the United States. The US Food and Drug Administration (FDA) has made a concerted effort to educate producers and consumers of both alfalfa and mung bean sprouts on procedures to minimise the risk associated with these products. While the number of incidents reported annually did decline, the FDA has noted that alfalfa sprouts appear to be re-emerging as a significant vehicle for foodborne illness. There were five reported outbreaks in 2003 and two outbreaks up to mid-2004.

Most sprouted seed producers rely on treatment with relatively high concentrations of chlorine to reduce microbial load including pathogens on seeds for sprouting. However the reviewer concludes that further investigation into the use of combined treatments and novel procedures is necessary if a method is to be found for totally eliminating pathogenic microorganisms from seed sprouts.

Latest news – Sprouts cleared from deadliest foodborne disease outbreak

In our November 2000 bulletin we also discussed the 1996 outbreak of *E. coli* 0157:H7 in Japan which was initially attributed to white radish sprouts. Latest reports are that there was insufficient evidence for the Japanese government to link the sprouts to this outbreak (www.sproutnet.com). The Japanese government has been ordered by two lower courts and now the Japanese Supreme Court to pay compensation to sprout growers for business damages suffered from the unwarranted announcement.

The impact of meat and poultry safety regulation

Australian workers writing in the *International Journal of Food Microbiology* 92 2004 299 attempt to answer what they describe as a critical question: have changes to regulation of meat and poultry hygiene in Australia reduced the prevalence of disease (salmonellosis) from consumption of these products? They point out that there is a clear imperative from a Government point of view, and also for industries, to assess the impact of regulatory change on foodborne illness in terms of public health burden.

During the past decade, there have been major changes in regulation of meat and poultry hygiene in this country including the introduction of industry and government co-regulation and the use of company employed meat inspectors. All meat processors operate a hazard analysis and critical control point (HACCP) program approved and audited by the relevant authority. Regulation is supported by outcome-based Australian Standards detailing minimum requirements and mandating HACCP. This applies in the processing and distribution chain to the back of the retail store. Retailing and food service are not as yet regulated in the same manner and nor of course is the home.

The reviewers studied two periods, 1993/1994, before the new regulations were introduced and 2000/2001, five years after they were, when the reviewers believe the change should be having an affect. The study centred on the prevalence of *Salmonella* and followed two methods. Firstly, the annual rates of notified cases of salmonellosis were collated and, secondly, an attempt was made to match serovars of this organism isolated from meat and poultry before and after regulatory changes were made. Both published and unpublished data were used.

The reviewers found that, from the data available, salmonellosis generally trended higher over time both in terms of number of cases and rate/100,000 population. They concede that this trend could reflect enhanced surveillances capability but they could identify no significant changes either to laboratory or reporting systems over the period reviewed.

They also found that the relative frequency with which specific records of *Salmonella* species caused illness was similar between 1993/1994 and 2000/2001.

The conclusion reached in the review is that while there is evidence of improvement in the microbiological status of red meat and poultry at the processing level over the periods reviewed, this improvement has not led to any apparent reduction in case rates of salmonellosis.

A number of possible explanations for this observation are proposed, including:

- loss of control in processing plants can amplify prevalence and concentration of *Salmonella*;
- food safety plans have not yet been widely implemented at the food service level;
- handling food in the home contributes to an unknown number of incidents, and
- non-food sources have an unknown impact on salmonellosis.

Update on the Primary Production and Processing Standard for Poultry Meat

Adapted from:

www.foodstandards.gov.au/primaryproductionprocessingstandards/

In 2004, Food Standards Australia New Zealand (FSANZ) commenced work in consultation with other agencies of Australian governments, industry stakeholders and consumer groups on a whole-of-chain approach to food safety. This approach builds on the Food Safety Standards developed by FSANZ in 2000, which applied mandatory hygiene requirements to the production, manufacturing, retail and the food services sectors of the food supply chain Standards 3.2.2 and Standard 3.2.3. Standard 3.2.1 provided a food management system that could be used by States and Territories to require food businesses to implement a food safety program based on hazard analysis and critical control point (HACCP) principles.

In 2002, the Australia and New Zealand Food Regulation Ministerial Council gave FSANZ responsibility to extend its evidence-based standard-setting process to the primary sector.

FSANZ has commenced work on a number of Primary Production and Processing (PPP) Standards in this sector including the poultry meat industry.

The development of each PPP standard will involve the application of scientific risk analysis to the entire food chain – from production to consumption – and the introduction of management strategies commensurate with the risk. Two rounds of public consultation are included in the process.

The latest on the potential hazard of acrylamide in food

The joint Food and Agriculture Organization of the United Nations and the World Health Organization (FAO/WHO) Expert Committee on Food Additives (JECFA) met in February 2005 to evaluate the health risks of several food contaminants including a further evaluation of acrylamide toxicity. The Committee noted that the occurrence data evaluated at this meeting were more comprehensive than those at the specially convened FAO/WHO consultation in 2002.

We have previously discussed in our issues updates (www.foodsafetycentre.com.au/issues/acrylamide.htm) the FAO/WHO consultation in 2002 and

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another report commissioned by the US National Toxicology Program. With the data available, these indicated that there is negligible concern of neuropathic effects or adverse reproductive and developmental effects for exposures in the general population. At the time, there was insufficient information to come to a consensus on the cancer risk of acrylamide to humans.

During the recent round of consultation, JECFA concluded that, at estimated current levels of intake, acrylamide in food may be of health concern.

The Committee concluded that, on the basis of tests in animals, cancer was the most important toxic effect of acrylamide. Acrylamide is clearly genotoxic and carcinogenic in animal studies and is classified by the International Agency on Research on Cancer as 'probably carcinogenic to humans'. JECFA determined that available human studies were not suitable for use in the risk assessment of acrylamide in food. This was because data came either from studies originally designed to assess the potential cancer risk of dietary factors other than acrylamide, or the exposures were through inhalation and dermal contact and would not be compatible to dietary exposure.

To estimate the risk posed to humans through dietary exposure to acrylamide, JECFA used a risk assessment approach known as the Margin of Exposure. The results and key points from this assessment are available on the Food Safety Centre's web site.

Foodborne disease across Australia, October – December 2004

OzFoodNet is a national network of epidemiologists working with State, Territory governments and other organisations to investigate foodborne disease in Australia. During 2004, OzFoodNet strengthened surveillance of these very common diseases.

For many foodborne diseases, control measures are difficult to implement. In the July 2004 issue of *Food Safety & Hygiene*, we discussed outbreaks of Norovirus due to oyster meat imported from Japan. Since 2002, there has been seven outbreaks of gastroenteritis attributed to these imported products. One of these outbreaks occurred even though the oyster meat was cooked, which highlighted the difficulty of ensuring that these products were safe. In 2004, the importation of these raw oysters from certain geographic regions was restricted by the Australian Quarantine and Inspection Service (AQIS) unless they could be demonstrated safe for consumers.

During the fourth quarter of 2004, OzFoodNet sites reported 26 outbreaks of foodborne disease affecting approximately 458 people. Nineteen people were hospitalised as part of these outbreaks and there were no fatalities. Six of the outbreaks were due to *Salmonella*, three due to Noroviruses and two due to *Campylobacter*. In the majority of these outbreaks (22/26), investigators were unable to identify a food vehicle. Over half of the outbreaks (14) resulted from food prepared in restaurants or by commercial caterers.

There was one outbreak of histamine poisoning where a commercial caterer served rudderfish. Rudderfish is often marketed incorrectly, and should be sold as Escolar. In this instance, the Health Department was unable to collect fish samples to identify the species. Rudderfish and Escolar (see FDA Regulatory Fish Encyclopaedia: vm.cfsan.fda.gov/~frf/rfe0ec.html), have caused several outbreaks of histamine poisoning. Histamine compounds build up in the flesh of certain fish species (particularly of the scombroid family) due to the activity of spoilage bacteria. The symptoms of histamine poisoning usually occur within two hours of eating the fish and include numbness of the mouth and tongue, flushing, nausea, vomiting, sweating and diarrhoea. Escolar served as Rudderfish have also been known to cause keriorrhoea (orange oily stools) due to the high concentration of indigestible wax esters in the flesh of the fish (see *Food Safety & Hygiene*, March 2003). These fish are not suitable for use in food service industries because of the problems of histamine poisoning and indigestible wax esters.

There was also a small outbreak of illness amongst recreational fishermen in Victoria. The illness consisted of gastroenteritis and neurological symptoms following consumption of Redfin, although the exact cause was never identified.

It is important to recognise that many foodborne infections are not part of recognised outbreaks. The National Notifiable Disease Surveillance System (www.health.gov.au/cda/Source/CDA-index.cfm) recorded 6,927 cases of eleven diseases that are potentially foodborne. These common infections include: campylobacteriosis, salmonellosis, listeriosis and yersiniosis. Reports for several of these diseases were higher than for the same time period in 2003, including infections of *Campylobacter* (14 percent increase) and *Salmonella* (21 percent increase).

Improving investigation

In October 2004, OzFoodNet trialled – NetEpi (www.health.nsw.gov.au/public-health/epi/open_source_tools.html) – a web-based database for capturing patient information during community-wide outbreaks. To test the system, OzFoodNet epidemiologists in State and Territory health departments entered information about patients for a mock outbreak. The mock scenario was a fictitious outbreak of *Salmonella* Mordor involving wizards, elves, ents and hobbits attending a birthday party in Tasmania! The trial showed that web-based databases are excellent for collecting epidemiological data about individuals affected by an outbreak occurring over a wide geographic area. NetEpi was a useful tool to capture this information and will be used in the future.

In 2005, OzFoodNet will further improve coordination arrangements for outbreaks of foodborne disease. Two initiatives that will assist this are the development of guidelines for the investigation of multi-jurisdictional outbreaks, and a workshop to train people conducting epidemiological studies during outbreaks.

This article was contributed by OzFoodNet. For more information contact:

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