

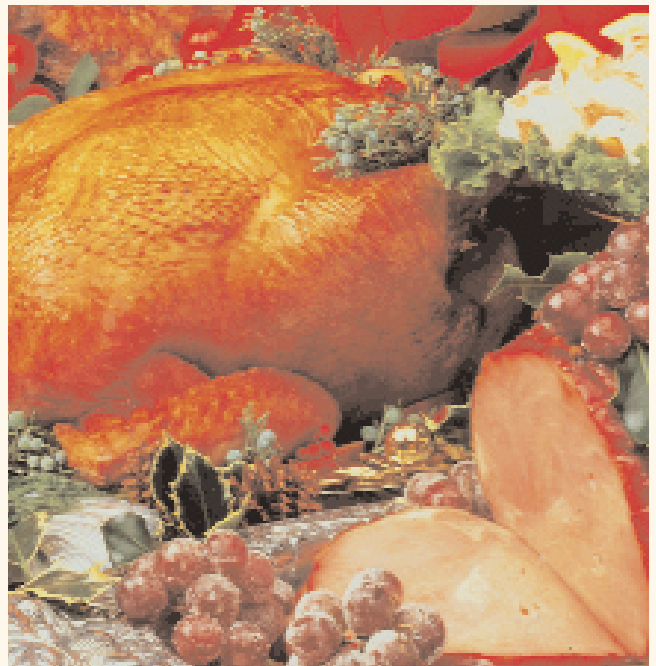
How Safe are Smorgasbord Foods?

Smorgasbords are an increasingly popular style of food service in Western Australia. In restaurants, patrons are encouraged to serve themselves with a wide variety of hot and cold foods. Many of the foods are 'potentially hazardous', which means that food poisoning bacteria may grow easily on them. Potentially hazardous foods include meats, hams, seafood and mayonnaise-based salads.

The WA Health (Food Hygiene) Regulations 1993 require proprietors to supervise smorgasbords and ensure that food is displayed safely. (See 'How Safe is my Smorgasbord?', overleaf.)

A microbiological survey of selected, potentially hazardous smorgasbord foods was undertaken as part of the Western Australian Food Monitoring Program.

Samples of roast beef, ham, cooked prawns and mayonnaise-based salads were collected by Environmental Health Officers (EHOs) from 11 local governments. A total of 134 samples were analysed to determine if they were safe to eat, and to assess how well they had been handled. (See 'Which Microbiological Tests were Chosen and Why?')



Is smorgasbord food safe to eat?

Of all samples tested, 120 (90%) complied with food safety guidelines and were unlikely to cause food poisoning. However, 84 (63%) showed signs of poor food handling. For the 121 samples which had temperatures recorded, 83 (69%) were displayed at unsafe temperatures between 5°C and 60°C.

The results are summarised in Table 1 and discussed below.

Food type	Total samples analysed	Safety		Handling		Temperature	
		Good	Poor	Good	Poor	Good	Poor
Roast beef	16	14 (99%)	2 (12%)	11 (59%)	5 (31%)	7* (50%)	7* (50%)
Ham	31	29 (94%)	14 (6%)	5 (16%)	26 (94%)	5 (16%)	26 (94%)
Cooked prawns	30	26 (97%)	4 (13%)	19 (60%)	12 (40%)	13 (43%)	17 (57%)
Mayonnaise	57	51 (99%)	6 (11%)	16 (29%)	41 (72%)	12# (23%)	41# (77%)

* Temperatures taken of only 14 samples.

Temperatures taken of only 53 samples.

Roast beef:

Food safety: Sixteen samples of roast beef were submitted for analysis. Most, 14 (87%), were considered safe to eat and unlikely to cause food poisoning. One sample exceeded the guidelines for *E-coli*, and another for *Staphylococcus aureus*.

Food handling: Five samples (31%) showed evidence of poor food handling. One sample had a low total plate count (TPC) with a high total coliform count, which suggested that cross-contamination between raw and cooked food may have taken place. This sample also contained *Staphylococcus aureus*, probably transferred to the food after cooking by poor food handling, e.g. scratching face and then handling the food.

Temperature control: Three roast beef samples (19%) were displayed above 60°C and complied with both the food safety and food handling guidelines. Temperatures were recorded for 11 of the 13 cold roast beef samples and seven (64%) of these were displayed unsafely, i.e. between 6°C and 20°C.

Ham:

Food safety: A total of 31 ham samples were analysed, 29 (94%) of which were considered safe to eat. Two samples exceeded the guidelines for food poisoning bacteria: one containing *E-coli* and the other *Staphylococcus aureus*. *Listeria monocytogenes* was detected in three samples (10%), but in numbers well below the guideline limit.

Food handling: Twenty-six samples (84%) showed evidence of poor food handling, with only five samples (16%) having TPCs of less than one million and total coliforms of less than 100. It is not unusual for ham products to have high TPCs. Ham products undergo a considerable amount of food handling during processing, e.g. cutting, slicing, weighing and packing. The products may then be stored for prolonged periods, sometimes a few weeks, before use. Small numbers of bacteria that may contaminate the food at the factory will have plenty of time to grow to large numbers during this storage period, especially if the temperature at any stage is above 5°C.

Temperature control: Only five (16%) of the ham samples were displayed at safe temperatures. The displayed temperatures ranged from 2°C to 20°C.

Cooked prawns:

Food safety: Out of 30 cooked prawn samples analysed, 26 (87%) complied with the food safety guidelines. Two of the remaining poor samples contained *Staphylococcus aureus* and two *E-coli*. One sample with a high level of *E-coli* also contained large numbers of *Listeria monocytogenes* (141 organisms per gram). Two of these samples (including the sample containing *Listeria monocytogenes*) were displayed above 10°C. Small numbers of *Listeria monocytogenes* were also detected in one other sample, but at a level unlikely to cause food poisoning.

Food handling: High TPC and total coliforms indicating poor food handling were found in 12 samples (40%). Boiling prawns during processing should kill any bacteria present. Elevated TPCs and total coliform levels would suggest that post-cooking contamination and poor temperature control could be responsible for the poor results.



Temperature control: Display temperatures for 17 (57%) samples ranged between 6°C and 15°C.

Mayonnaise-based salads:

A variety of mayonnaise-based salads were sampled, including coleslaw, potato, pasta, rice and various vegetable and seafood salads. The mayonnaise was separated from the other ingredients and only this was analysed.

Food safety: A total of 57 mayonnaise-based salads were analysed. Of these, 51 (90%) were considered to be safe to eat and unlikely to cause food poisoning. However, unacceptable levels of *E-coli* were found in four (7%) samples and *Staphylococcus aureus* in two (3%) samples.

Food handling: Evidence of poor food handling was apparent in 41 samples (72%). It is not unusual for salad products to have high TPC and total coliform counts. If vegetables are not washed thoroughly, bacterial contamination is carried through to the final product. For convenience, some restaurants purchase pre-prepared salads or pre-prepare their own salads. They may then be stored for some time, sometimes several days, before being served. If salads are stored above 5°C any bacteria on them may multiply rapidly resulting in large numbers being present in a ready-to-eat product.



Temperature control: Temperature was recorded for 53 salads. Of these, 41 (77%) were stored at unsafe temperatures.

How Safe is the Food from Smorgasbords?

The vast majority (90%) of the smorgasbord foods sampled in this survey were considered safe for consumption as they did not contain common food poisoning bacteria. However, eight (6%) were contaminated with excessive levels of *E-coli* and six (4%) with coagulase-positive *Staphylococci*. None of the samples tested contained *Salmonella* species.

All samples were analysed for TPC and total coliforms to provide an indication of how the food had been handled. The results indicated that 84 (63%) of the samples may have been subjected to poor food handling during preparation, storage or display. Of the 121 samples where the display temperature was recorded, 83 (69%) were displayed at unsafe temperatures.

As 10% of samples did not comply with microbiological guidelines and over two-thirds were displayed at unsafe temperatures, there is a risk that food poisoning from food displayed on smorgasbords not complying with the WA Health (Food Hygiene) Regulations 1993 will occur.

What can be done?

All potentially hazardous foods displayed during smorgasbord meals must be held at safe temperatures. Every care should be taken to ensure that the food displayed is of the highest quality. Proprietors should only use the best quality ingredients.

During preparation, every care should be taken to wash vegetables thoroughly, as this will remove any soil (and coliforms). Frequent hand washing by food handlers, and the use of soap and warm water, will protect food from *E-coli* and *Staphylococcus* contamination.

Contamination of food displayed on a smorgasbord can be minimised by adequate supervision and intervention. This is extremely important to prevent patrons contaminating the food. If food is displayed at unsafe temperatures for prolonged periods, introduced bacteria from sneezes, dirty utensils, fingers and hair will grow to numbers sufficient to cause food poisoning.

Using the checklist, see if each smorgasbord complies with the legislation. Smorgasbord proprietors are dealing with very high-risk foods. To protect the food (and the business) they should implement a food safety program so all staff are trained in food hygiene. Ask an EHO about the FoodSafe Program.

Recommendations:

While most samples collected for this survey were of an acceptable standard, further improvements to protect public health and safety could be achieved by:

- Environmental Health Officers regularly monitoring smorgasbords to ensure that proprietors are complying fully with the WA Health (Food Hygiene) Regulations 1993
- Proprietors routinely assessing the safety of their smorgasbords using the 'How Safe is my Smorgasbord?' checklist.

Which Microbiological Tests Were Chosen and Why?

All samples were analysed for a range of bacteria to determine if the food:

- a) Was safe to eat (i.e. contained no common food poisoning bacteria)
- b) Had been properly handled.

There are no statutory microbiological standards for ready-to-eat roast beef, cooked prawns or mayonnaise-based salads. However, Standard C1 of the Australian Food Standards Code specifies that ham must not contain more than 100 organisms per gram (org/g) of coagulase-positive *Staphylococci*.

a) Food safety tests:

If a food complies with all listed Health Department of WA guidelines for ready-to-eat foods, it is considered bacteriologically safe and unlikely to cause food poisoning. A food that exceeds these limits has the potential to cause food poisoning.

Escherichia coli (*E-coli*) not exceeding 10 org/g. These bacteria are found in the bowel, and their presence in food is an indication of faecal contamination. This can occur either through inadequate hand washing when handling food, or through inadequate cooking.

Listeria monocytogenes not exceeding 100 org/g. *Listeria* are common bacteria which are found in the environment and on the surfaces of raw unwashed vegetables. Food poisoning with flu-like symptoms can result from eating food contaminated with *Listeria monocytogenes*. As *Listeria* infection can result in miscarriage or stillbirth, pregnant women are advised to avoid those ready-to-eat foods which have a high potential for supporting large numbers of *Listeria monocytogenes*, e.g. processed meat products, pre-prepared salads, processed diced chicken, soft cheeses and seafood. (For more information see the *Listeria Infection and Pregnancy* leaflet.)

Coagulase-positive *Staphylococci* not exceeding 100 org/g. *Staphylococcus aureus* are bacteria found on the skin, and in the nose, saliva and bowel of humans. These bacteria produce toxins that are not destroyed by cooking. Detection of coagulase-positive staphylococci indicates that the food may have been poorly handled and its consumption could cause food poisoning. Infection from *Staphylococcus aureus* produces symptoms of diarrhoea, nausea and vomiting about one to eight hours after eating the infected food. The symptoms last for about 24 hours.

Salmonella species not to be present in 25 grams of food. Hundreds of species of *Salmonella* are known and they are a major cause of food poisoning. They are found in the bowel and intestines of humans and animals (especially chickens) and produce food poisoning symptoms that commence up to two days after eating the infected food. The symptoms include nausea, stomach cramps, diarrhoea, fever and headache.

All roast beef samples were analysed for the presence of *Clostridium perfringens*. These bacteria are sometimes found in large joints of meat, stews and gravies which have been cooled and reheated. The symptoms of this type of food poisoning, which last for about 24 hours, include stomach pains, diarrhoea and occasionally nausea and vomiting. *Clostridium perfringens* was not detected in any of the roast beef samples.

b) Food handling tests:

Total plate counts (TPCs) and total coliform counts give an indication of the adequacy of food handling.

- The total plate count (TPC) counts all bacteria (both good and bad) present in a sample of food. A high TPC, i.e. more than one million organisms per gram, indicates a poorly handled food.
- Coliforms are found in the faeces of animals and humans, and also in soil and on plants. The total coliforms test represents the total of all coliforms present in a sample of food. Not all types cause food poisoning, so a food with a high total coliform count may not be harmful to human health. However, total coliform levels of more than 100 coliforms per gram indicate that a food has become contaminated or may have been inadequately cooked or processed.
- The TPC and total coliform tests do not give enough information to determine if a food is capable of causing food poisoning. However, they do indicate that a food may have:
 - Been stored out of refrigeration for a prolonged period
 - Not been properly cooked
 - Been contaminated following cooking.

A high TPC with a high total coliform count indicates that a food has not been cooked properly and/or may have been subjected to contamination from poor food handling. A high TPC and low total coliforms count indicates poor refrigeration during storage. A low TPC with a high total coliforms count indicates possible cross-contamination between raw and cooked foods.


How Safe is my Smorgasbord?

A smorgasbord is defined as food displayed for sale to which the public has access, that forms a meal or part of a meal, for consumption on the premises and may include self-service of that food. The WA Health (Food Hygiene) Regulations 1993 detail minimum requirements for smorgasbord meals. It is an offence not to comply with these requirements. Proprietors should use this checklist to see if they are meeting their legal responsibilities.

<ul style="list-style-type: none"> • Smorgasbord meal operations must be adequately supervised for the duration of the meal. • All dishes or other items of food displayed must have separate clean serving utensils. • A person, when serving food during a smorgasbord meal, must use the utensils provided. • A person must not touch any food displayed during a smorgasbord meal, other than fresh unprepared fruit, with his or her hands. 	<p>Do staff:</p> <ul style="list-style-type: none"> • Know who supervises the smorgasbord? • Know what to do when: <ul style="list-style-type: none"> - A patron sneezes over the display - Handles food - Drops a utensil on the floor and returns it to the food - Uses utensils from one food for another? • Clean up spillages? • Have their duties written down? • Put clean utensils out when food is replaced? 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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The following provisions apply to all smorgasbord display meals except at private functions where food is available for less than 1½ hours, e.g. a wedding reception. However, to maximise food safety, proprietors are encouraged to adopt these provisions whenever possible.


<ul style="list-style-type: none"> • All potentially hazardous foods displayed during smorgasbord meals must be held below 5°C or above 60°C at all times. <p><i>Potentially hazardous foods are capable of supporting the rapid growth of food poisoning micro-organisms. These foods include meats, seafood, dairy products, mayonnaise-based salads, eggs, etc. Food poisoning bacteria can multiply very quickly between 5°C and 60°C to numbers capable of causing food poisoning, so keep food out of this 'temperature danger zone'.</i></p>	<p>Do staff:</p> <ul style="list-style-type: none"> • Routinely monitor and record temperatures of foods on display? • Know what to do if foods have been held at unsafe temperatures? • Have a written procedure to follow so they know what to do? 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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 Bains-marie are designed to maintain the temperature of food, not to heat it up. Therefore, always pre-heat the bain-marie before placing hot food into it. Never place cold food in a bain-marie.

<ul style="list-style-type: none"> • All food displayed must be protected from airborne contamination by an approved barrier <p>This can be a purpose-built sneeze guard for the entire display or may be an enclosed container for individual foods.</p>	<ul style="list-style-type: none"> • Is the food protected from airborne contamination? • Is the sneeze guard kept clean? 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<ul style="list-style-type: none"> • A sign prohibiting the customers from smoking while serving food must be installed in the view of customers at the smorgasbord. 	<ul style="list-style-type: none"> • Can the sign be seen by customers? • Do staff know what to do if a customer smokes while serving food from the smorgasbord? 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<ul style="list-style-type: none"> • Food must not remain on display for longer than four hours, and must not be re-served. <p><i>This does not apply to whole fruits, vegetables and food packaged in containers which protect the food from contamination. Potentially hazardous foods may be displayed for longer than four hours provided they are displayed at safe temperatures.</i></p>	<p>Do staff:</p> <ul style="list-style-type: none"> • Routinely monitor the time food has been on display? • Know where to dispose of the food at the end of four hours? 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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 Remember! Bacteria double every 20 minutes at room temperature. So keep hot food above 60°C and cold food below 5°C.

Who was involved in this survey?

Metropolitan local governments:

Bayswater, Fremantle, Melville, Perth, Stirling and Wanneroo.

Country local governments:

Ashburton, Broome, Bunbury, Geraldton and Harvey.

PathCentre, Queen Elizabeth II Medical Centre, Nedlands.

Food Safety, Health Department of Western Australia.

For more information contact:

Your local government Environmental Health Officer
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