

Appendix 1: Potentially hazardous foods

In Standard 3.2.2 potentially hazardous food is defined as food that has to be kept at certain temperatures to minimise the growth of any pathogenic microorganisms that may be present in the food or to prevent the formation of toxins in the food. Potentially hazardous foods are also referred to as 'temperature control for safety (TCS) foods'.

Potentially hazardous foods have certain characteristics that support the growth of pathogenic microorganisms or the production of toxins. Factors affecting microbial growth include the nutrients, moisture, acidity (pH) and gas atmosphere of the food. If the combination of these factors creates a favourable environment and the food is not kept under temperature control, microorganisms can grow and form toxins. If the levels of pathogenic microorganisms or toxins reach unsafe levels, foodborne illness may result.

While toxin formation is generally associated with the growth of pathogenic microorganisms, it can also result from food decomposition. For example, the amino acid histidine, present at various concentrations in fish muscle, can be broken down by certain bacteria to form scombrototoxin (histamine) if the fish¹ are not rapidly chilled shortly after capture.

What food is potentially hazardous?

Potentially hazardous foods are generally moist, nutrient-rich foods with a neutral pH. Examples of foods that are normally considered potentially hazardous include:

- raw and cooked meat/poultry or foods containing raw or cooked meat/poultry; for example burgers, curries, kebabs, pâté and meat pies
- foods containing eggs (cooked or raw), beans, nuts or other protein-rich food, for example batter, mousse, quiche and tofu
- dairy products and foods containing dairy products, for example milk, dairy-based desserts, bakery products filled with fresh cream or with fresh custard (yoghurt is not included here as it is an acidified product)
- seafood (excluding live seafood) and foods containing seafood, for example sushi
- sprouted seeds, for example of beans and alfalfa
- prepared fruits and vegetables, for example cut melons, salads and unpasteurised juices
- cooked rice and both fresh and cooked pasta
- foods that contain any of the above foods, for example sandwiches, pizzas and rice rolls.

¹ Fish of the *Scombridae* family (e.g. tuna and mackerel) and *Scomberesocidae* family (e.g. saury) are commonly associated with histidine poisoning. Also see Fish in Appendix 4.

Notes

1. Some of the types of food listed will not be considered potentially hazardous if they have been processed in certain ways; for example, if a food contains certain additives or has been commercially sterilised (see below).
2. Many of the products require refrigerated storage to prevent food spoilage or achieve the stated shelf life.

If it is uncertain whether a manufactured food is potentially hazardous, advice should be sought from the manufacturer.

What food is not potentially hazardous?

If a food does not contain pathogens, or does not support the growth of a pathogen or toxin production, then it is not potentially hazardous.

Some foods (e.g. foods that are naturally acidic) in their natural state do not support pathogen growth because their intrinsic properties create an unfavourable environment. Other foods may have been processed in a way (e.g. dried, salted, acidified) that minimises microbial growth or has eliminated microorganisms in the food (e.g. commercially sterilised food). In addition, the use of certain chemical additives (e.g. nitrites, sulphites) or specialised packaging may minimise microbial growth in food.

The water activity (a_w ; related to moisture content) and pH of a food are two critical factors affecting microbial growth. Tables listing pH and water activity levels that will prevent microbial growth are provided in the Business Sector Food Safety Risk Priority Classification Framework (Food Regulation Standing Committee 2007) and these levels have been included in information on process limits in Appendix 3. Foods with water activity or pH levels below these critical values are not potentially hazardous foods.

Examples of food types considered to be not potentially hazardous:

- biscuits and crackers
- bottled marinades
- bottled pasta sauces
- bottled salsas
- confectionary
- dried fruit
- dry goods
- fermented dried meats
- fruit cake
- fruit juices
- hard cheeses
- honey and jam
- nuts in the shell
- peanut butter
- pickles
- plain breads and bread rolls
- plain cakes
- raw whole fruit and vegetables
- salad dressings
- sauces — asian/soy, ketchup style
- salted dried meats
- unopened canned foods
- yoghurts

Note that the foods listed as not potentially hazardous might become potentially hazardous when the food is opened or altered in some way; for example, opening a can of soup, cutting up a whole melon, slicing cured meat, or reconstituting dry foods. Any food that contains a potentially hazardous ingredient must also be considered a potentially hazardous food. For example, sushi rice correctly prepared with vinegar may be acidic enough to prevent pathogen growth, but adding fillings such as fish, chicken or vegetables would make the end product potentially hazardous.

Whole uncracked eggs might have pathogens present on the shell that can contaminate the inside contents when they are cracked. As such, raw egg pulp and foods containing raw eggs (e.g. aioli, tiramisu) are considered potentially hazardous unless they have been appropriately treated.

Some foods might contain certain pathogenic microorganisms but not support their growth. Although by definition such foods are not 'potentially hazardous' they can still be a food safety hazard. For example, food containing viruses such as hepatitis A or norovirus can cause foodborne illness even if the pathogen has not multiplied in the food.

Further information

The critical pH and water activity levels that will prevent microbial growth are provided in the *Business Sector Food Safety Risk Priority Classification Framework* (Food Regulation Standing Committee 2007). This risk profiling framework is used nationally to classify business types on the basis of food safety risk.

Further information is also available from jurisdictional material. For example:

- NSW Food Authority's guideline *Potentially Hazardous Foods — Foods That Require Temperature Control for Safety* includes temperature control recommendations for some Asian and European foods and various bakery products. This guidance includes some common food safety issues and advice on demonstrating alternative methods of compliance.
- Victoria Health's *Food Atlas* provides a useful overview of foods from different cultures, including the manufacturing process, the ingredients and the associated risk rating of the foods based on water activity and pH.

For information on specific foods see Appendix 4 and Jurisdictional websites in Resources and References.