

# The facts about food irradiation

Food Act 2006

## What is food irradiation?

Irradiation of food means subjecting the food to ionising radiation, other than ionising radiation imparted to food by measuring or inspection instruments, involves exposing the food to a radiation field. The *Australia New Zealand Food Standards Code* (the Code) sets the standards for food irradiation in Australia and New Zealand under Standard 1.5.3 *Irradiation of food*.

Where a food is permitted to be irradiated, any of the following forms of ionising radiation:

- (a) gamma rays from the radionuclide cobalt 60;
- (b) X-rays generated by or from machine sources operated at an energy level not exceeding 5 megaelectronvolts;
- (c) electrons generated by or from machine sources operated at an energy level not exceeding 10 megaelectronvolts.

## Why is food irradiated?

Food is irradiated for many reasons. It is used by food processors to destroy bacteria including the parasites, moulds and yeasts that spoil food, and *salmonella* and *campylobactor* that cause illness. Irradiation can treat insect infestation, microbiological contamination and extend the shelf-life of food. It also ensures that food products are suitable for international trade by meeting rigid import standards of quality and quarantine.

## What is the process of food irradiation?

Food undergoing the irradiation process never comes into direct contact with the radiation source. The source is in a room that is designed to protect workers and the external environment from the radiation within it. The food is moved into the radiation field via a conveyor belt.

The gamma rays, x-rays or electrons irradiating the food kills bacteria, insects and pathogens and renders them biologically inactive and unable to reproduce.

## Is irradiated food radioactive?

No. The amount of radiation to which the food is exposed is carefully monitored to ensure the desired outcome is achieved without harming the food. The food itself does not become radioactive because the radiation used in the process does not have enough energy to alter the molecular structure of any of the atoms in the food. It is therefore impossible for this radiation to make the food radioactive and no radiation remains after the food has been treated.

## How does irradiation affect the food?

When performed in accordance with good manufacturing practice, food irradiation has been shown to be a safe and effective way to extend shelf life, eradicate pests and inactivate food poisoning bacteria.

## Does irradiation affect the food's nutritional value?

All food preservation methods change the composition of the food in some way. Some methods change the taste, appearance, texture, composition or nutritional value of the food more than others. However, research has shown that in the case of irradiation, the change in the chemical composition of the food is minimal. Many of the resulting compounds are the same as those formed when food is cooked or preserved in more traditional ways.

Just as vitamins vary in their sensitivity to heat, they also vary in their sensitivity to radiation. This sensitivity depends upon the conditions under which the food is irradiated. Vitamins A, B1 (thiamine), C, E and K in foods are relatively sensitive to radiation, while some other B vitamins such as riboflavin, niacin and vitamin D are not.

At the irradiation conditions recommended, these losses are in the order of 10-20% or less and are comparable to those seen with other forms of food preservation, such as thermal processing (e.g. cooking), and drying. Macronutrients (e.g. protein, carbohydrates and fat) and essential minerals are not affected.

## Can irradiation be used to improve rotten food?

No. Nothing can re-generate rotten food. Food irradiation will also never replace proper food handling procedures in the food distribution system or in the home.

## Does irradiation kill all bacteria in food?

No. Irradiation does not kill all bacteria. For example, it does not kill the bacteria that cause botulism. It also does not kill viruses or bacterial toxins.

## Are irradiation facilities safe for workers and the environment?

Yes. Queensland Health administers the *Radiation Safety Act 1999*, which imposes strict requirements on companies that possess radioactive sources. These regulations oversee the importation, use, storage, transport and disposal of a radiation source or radioactive substance.

## Is the irradiation of food permitted in Australia?

Food irradiation is permitted in Australia **only for certain types of food**, when used for a certain purpose and within specified 'absorbed dose' levels, set out under Standard 1.5.3 of the Code.

Permitted foods include certain types of fruit and vegetables, herbs and spices and plant material for a herbal infusion.

Fruit and vegetables listed in table 1 may be irradiated for the purpose of pest disinfection for a phytosanitary objective, if the absorbed dose is 150Gy- 1kGy.

Herbs and spices listed in table 1 and plant material for a herbal infusion may be irradiated for the purpose of:

- controlling sprouting and pest disinfection, including the control of weeds, if the absorbed dose is no higher than 6 kGy.
- bacterial decontamination, if the absorbed dose is 2kGy- 30kGy.

**Table 1. Permitted foods for irradiation.**

Fruit and vegetables	Herbs and spices	Plant material for a herbal infusion
<p>Apple, apricot, blueberry, bread fruit, capsicum, carambola, cherry, custard apple, honeydew, litchi, longan, mango, mangosteen, nectarine, papaya (paw paw), peach, persimmon, plum, rambutan, raspberry, rockmelon, scallopini, strawberry, table grape, tomato, zucchini (courgette)</p>	<p><i>Herbs</i>                      Angelica; Balm leaves (<i>Melissa officinalis</i>); Basil; Bay leaves; Burnet, great (<i>Banguisorba officinalis</i>); Burnet, salad; Burning bush (<i>Dictamnus albus</i>); Catmint; Celery leaves; Chives; Curry leaves; Dill (<i>Anethum graveolens</i>); Fennel; Hops; Horehound; Hyssop; Kaffir lime leaves; Lavender; Lemon balm; Lemon grass; Lemon verbena; Lovage; Marigold flowers (<i>Calendula officinalis</i>); Marjoram; Mints; Nasturtium leaves (<i>Tropaeolum majus</i> L.); Parsley; Rosemary; Rue (<i>Ruta graveolens</i>); Sage; Sassafras leaves; Savoury, summer, winter; Sorrel; Sweet cicely; Tansy; Tarragon; Thyme; Winter cress; Wintergreen leaves (<i>Gaultheria procumbens</i> L.); Woodruff (<i>Asperula odorata</i>); Wormwoods (<i>Artemisia</i> spp.).</p> <p><i>Spices</i>                      Angelica seed; Anise seed; Calamus root; Caper buds; Caraway seed; Cardamom seed; Cassia buds; Celery seed; Cinnamon bark; Cloves; Coriander, seed; Cumin seed; Dill seed; Elecampane root; Fennel seed; Fenugreek seed; Galangal, rhizomes; Ginger, root; Grains of paradise; Juniper berry; Licorice root; Lovage seed; Mace; Nasturtium pods; Nutmeg; Pepper, black, white; Pepper, long; Pimento, fruit; Tonka bean; Turmeric, root; Vanilla, beans.</p>	<p>Fresh, dried or fermented leaves, flowers and other parts of plants used to make beverages, but does not include tea.</p>

## Can food be irradiated more than once?

Food that has been irradiated may be re-irradiated if any of the following conditions is met:

- (a) the food is prepared from food, including ingredients, that have been irradiated at levels that do not exceed 1 kGy;
- (b) the food contains less than 50 g/kg of irradiated ingredients;
- (c) the required full dose of ionising radiation was applied to the food in divided doses for a specific technological reason.

## How will I know if the food I eat is irradiated?

The label on a package of food that has been irradiated or that has an ingredient or component of food that has been irradiated, must include a statement to the effect that the food, ingredient or component, has been treated with ionising radiation.

If the irradiated food is an ingredient or component of a food, this declaration may be included in the ingredient list or elsewhere on the label.

If the food is exempt from full labelling requirements as set out in Standard 1.2.1 of the Code, the declaration must be displayed on, or in connection with, the food.

## Record keeping

A person who irradiates food must keep records in relation to:

- (a) the nature and quality of the food treated; and
- (b) the lot identification; and
- (c) the minimum durable life of the food treated; and
- (d) the process used; and
- (e) compliance with the process used; and
- (f) the minimum and maximum dose absorbed by the food; and
- (g) an indication whether or not the product has been irradiated previously and if so, details of such treatment; and
- (h) the date of irradiation.

The records must be kept at the facility where the food was irradiated until at least 1 year after the minimum durable life of the irradiated food.

## For further information

The Queensland Department of Health has a variety of fact sheets with detailed information on food safety. These can be accessed at [www.health.qld.gov.au/public-health/industry-environment/food-safety](http://www.health.qld.gov.au/public-health/industry-environment/food-safety).

If you have any further questions relating to the irradiated food, contact your local Queensland Health Public Health Unit. Contact details for Public Health Units can be found at [www.health.qld.gov.au/system-governance/contact-us/contact/public-health-units](http://www.health.qld.gov.au/system-governance/contact-us/contact/public-health-units).