

Food Irradiation

What is food irradiation?

Food irradiation is a food safety technology that effectively destroys disease-causing bacteria from foods. Like pasteurization of milk and pressure-cooking of canned foods, irradiating food kills bacteria and parasites that could otherwise cause food-borne disease.

Since the early 70's, NASA astronauts have eaten food sterilized by irradiation to avoid getting food-borne illness while in space.

The effects of irradiation on the food, and on animals and people eating irradiated food, have been studied for more than 50 years. These studies show clearly that when irradiation is used appropriately:

- disease-causing germs are reduced or eliminated
- the food does not become radioactive
- the nutritional value of the food is essentially unchanged

What happens when food is irradiated?

Radiation is energy that travels in waves. Examples of radiation include radio waves, microwaves, X-rays and gamma rays. Three different irradiation technologies exist: gamma rays, electron beams and X-rays.

The process is the same no matter which of the three types of rays are used. The energy from the rays is transferred to the molecules in the food product, converting atoms and molecules to ions by removing electrons. These ions disrupt the normal functions of the bacteria, including reproduction. The disrupted bacteria cannot cause food-borne illness. Because the temperature of the food does not rise significantly, irradiation is often called cold pasteurization. By contrast, microwave ovens increase the molecular motion of water molecules in foods. This makes heat and cooks the food.

The energy from the rays passes through the food and its packaging. This is similar to the way microwaves pass through food, or X-rays pass through teeth at the dentist.

The dose of irradiation is usually measured in a unit called the Gray, abbreviated Gy. This is a measure of the amount of energy transferred to the food being irradiated. Different bacteria and different foods require different doses of irradiation to be effective.

How does irradiation affect foods?

At the levels of energy used to kill bacteria, changes in the food are so small that it is not easy to determine whether or not a food has been irradiated. There are no significant changes in the amino acid, fatty acid, or vitamin content of irradiated food. Because none of the energy remains in the food, there is no 'residual' effect on bacteria. This means that irradiated foods need to be handled the same way as non-irradiated foods, following the rules of basic food safety in order to prevent contamination during processing, storage, cooking, etc.

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How safe are irradiated foods?

The safety of irradiated foods has been endorsed by many groups, including the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) of the United Nations.

Worldwide, 50 countries permit irradiation of food. Irradiation is a regulated food process in Canada. Health Canada is responsible for determining which foods can be irradiated, and what levels of radiation can be used. Regulations for the labeling of irradiated foods are administered by the Canadian Food Inspection Agency and apply equally to all domestic and imported foods in Canada.

Several foods are currently approved for irradiation and sale in Canada, including potatoes and onions, wheat (including flour), and spices. In 1998, the Canadian Cattlemen's Association requested that Health Canada approve irradiation of ground beef as an option for consumers looking to further reduce the potential for food-borne illness from bacteria like E coli 0157:H7. The United States approved ground beef irradiation in 1997.

How can I tell if food has been irradiated?

Government regulations state that all wholly irradiated foods in Canada must be clearly identified with both a written statement such as 'irradiated' and the international symbol called the 'radura':



Canadian law requires ingredients that make up more than 10 percent of the final food to be identified as irradiated. Labelling applies to bulk displays, package labels and food advertisements. If a minor ingredient of the food – one that makes up less than 10 percent of the final food, such as a spice – has been irradiated, the food is not required to be labeled as irradiated.