

The Facts About Food Irradiation

Why are we interested in food irradiation?

Presently over 40 countries have approved applications to irradiate approximately 40 different foods. These include such items as fruits, vegetables, spices, grains, seafood, meat and poultry. More than half a million tonnes of food is now irradiated throughout the world on a yearly basis. Although this amount represents only a fraction of the food consumed annually, it is constantly growing. This trend is due to three main factors:

1. Increasing concerns over foodborne diseases

Foodborne diseases pose a widespread threat to human health and they are an important cause of reduced economic productivity. Studies by the US Center for Disease Control in 1999 estimated that foodborne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. Economic losses associated with such foodborne diseases are high-estimated between US \$6.5 billion and \$33 billion.

2. High food losses from infestation, contamination and spoilage.

The FAO has estimated that about 25% of all worldwide food production is lost after harvesting to insects, bacteria and spoilage. Economic losses due to insects and microbes have been estimated to fall between \$5 and \$17 billion yearly in the US alone. Food irradiation can help reduce these losses and can also reduce our dependence on chemical pesticides, some of which are extremely harmful to the environment (e.g. methyl bromide).

3. Growing international trade in food products.

As our economies become more global, food products must meet high standards of quality and quarantine in order to move across borders. Irradiation is an important tool in the fight to prevent the spread of deleterious insects and microorganisms.

Does the irradiation process make food radioactive?

No. Irradiation by gamma rays, X-rays and accelerated electrons under controlled conditions does not make food radioactive. Just as the airport luggage scanner doesn't make your suitcase radioactive, this process is not capable of inducing radioactivity in any material, including food.

Can irradiation be used to make spoiled food good?

No. Neither irradiation nor any other food treatment can reverse the spoilage process and make bad food good. If food already looks, tastes or smells bad - signs of spoilage - before irradiation, it cannot be "saved" by any treatment including irradiation.

How do I know if food has been treated with irradiation?

Special labels are required on irradiated foods, including the international symbol of irradiation, known as a "radura", and a statement indicating that the food was *treated with irradiation*.



This brochure has been prepared by the **UW Food Irradiation Education Group**, based on the information provided by:

<http://www.iaea.org/worldatom/inforesource/other/food/>
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodirradiation.htm>
<http://www.food-irradiation.com/>
<http://www.fda.gov/>

For more information:

Email: uw-food-irradiation@engr.wisc.edu

URL: uw-food-irradiation.engr.wisc.edu

What is Food Irradiation?

Food irradiation is a promising new food safety technology that can eliminate disease-causing microorganisms such as E. coli O157:H7, Campylobacter, and Salmonella from foods.

The Food and Drug Administration has approved irradiation of meat and poultry and allows its use for a variety of other foods, including fresh fruits and vegetables, and spices. The agency determined that the process is safe and effective in decreasing or eliminating harmful bacteria. Irradiation also reduces spoilage bacteria, insects and parasites, and in certain fruits and vegetables it inhibits sprouting and delays ripening.

The effects of irradiation on the food and on animals and people eating irradiated food have been studied extensively for more than 40 years. These studies show clearly that when irradiation is used as approved on foods:

- Disease-causing microorganisms are reduced or eliminated
- The nutritional value is essentially unchanged
- The food does not become radioactive

Irradiation is a safe and effective technology that can prevent many foodborne diseases.



How does irradiation affect food?

The process involves exposing the food, either packaged or in bulk, to carefully controlled amounts of ionizing radiation for a specific time to achieve certain desirable objectives.

When microbes present in the food are irradiated, the energy from the radiation breaks the bonds in the DNA molecules, causing defects in the genetic instructions. Unless this damage can be repaired, the organism will die or will be unable to reproduce. It matters if the food is frozen or fresh, because it takes larger radiation dose to kill microbes in frozen foods. The effectiveness of the process depends also on the organism's sensitivity to irradiation, on the rate at which it can repair damaged DNA, and especially on the amount of DNA in the target organism:

- **Parasites and insect pests**, which have large amounts of DNA, are rapidly killed by an extremely low dose of irradiation.
- It takes more irradiation to kill **bacteria**, because they have less DNA.
- **Viruses** are the smallest pathogens that have nucleic acid, and they are, in general, resistant to irradiation at doses approved for foods.

If the food still has living cells, they will be damaged or killed just as microbes are. This is a useful effect: it can be used to prolong the shelf life of fruits and vegetables because it **inhibits sprouting** and **delays ripening**.

Are irradiated foods still nutritious?

Yes, the foods are not changed in nutritional value and they don't become dangerous as a result of irradiation. At irradiation levels approved for use on foods, levels of the vitamin thiamine are slightly reduced, but not enough to result in vitamin deficiency. There are no other significant changes in the amino acid, fatty acid, or vitamin content of food. In fact, the changes induced by irradiation are so minimal that it is not easy to determine whether or not a food has been irradiated.

A big advantage of irradiated food, is that it is a cold process: the food is still essentially "raw", because it hasn't undergone any thermal process.

Are irradiated foods available now?

A variety of foods have been approved for irradiation in the United States, for several different purposes. For meats, separate approval is required both from the FDA and the USDA.

However, irradiated foods are not widely available yet. Some stores have sold irradiated fruits and vegetables since the early 1990s. Irradiated poultry is available in some grocery stores—mostly small, independent markets— and on menus of a few restaurants. On the other hand, most spices sold wholesale in this country are irradiated, which eliminates the need for chemical fumigation to control pests. American astronauts have eaten irradiated foods in space since the early 1970s. Patients with weakened immune systems are sometimes fed irradiated foods to reduce the chance of a life-threatening infection.

In addition, irradiation is widely used to sterilize a variety of medical and household products, such as joint implants, band-aids, baby pacifiers, cosmetic ingredients, wine and bottle corks, and food packaging materials.

Approval	Food	Purpose
1963	Wheat flour	Control of mold
1964	White potatoes	Inhibit sprouting
1986	Pork	Kill Trichina parasites
1986	Fruit and vegetables	Insect control Increase shelf life
1986	Herbs and spices	Sterilization
1990 - FDA 1992 - USDA	Poultry	Bacterial pathogen reduction
1997 - FDA 1999 - USDA	Meat	Bacterial pathogen reduction



Does irradiation destroy all bacteria?

No. Irradiation is equivalent to *pasteurization* for solid foods, but it is not the same as *sterilization*. Food irradiation can be an important tool in the war against illness and death from foodborne diseases. But it is **not a substitute for comprehensive food safety** programs throughout the food distribution system. In addition, food irradiation is **not a substitute for good food-handling practices** in the home: irradiated foods need to be stored, handled and cooked in the same way as unirradiated foods.

Will irradiation increase the cost of food?

Yes, any food processing method will add cost. Canning, freezing, pasteurization, refrigeration, fumigation, and irradiation will add cost to the food. These treatments will also bring benefits to consumers in terms of availability and quantity, storage life, convenience, and improved hygiene of the food.

The increase in price for irradiated fruits and vegetables is estimated at 2 to 3 cents per pound. Irradiated poultry and meat products are expected to cost 3 to 5 cents a pound more than non-irradiated meat. The price is likely to decline as irradiated foods become more widely available.