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## Food Irradiation: *Approved Applications in the U.S.*

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The U.S. first issued a patent for using ionizing radiation to kill bacteria in food in 1905. Passage of the 1958 Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act legally defined ionizing radiation as a food additive, rather than a process. Therefore, food irradiation is regulated by the Food and Drug Administration (FDA) in the U.S. There must be pre-market review and acceptance by the agency. A summary of approved food irradiation processes is provided in the following table.

<b>Date</b>	<b>Food/Product</b>	<b>Dose (kGy)*</b>	<b>Purpose</b>
1963	Wheat and wheat flour	0.2 - 0.5	Disinfestation of insects
1964, 1965	White potatoes	0.05 - 0.15	Inhibit sprouting (and extend shelf life)
1983	Spices and dry vegetable seasonings (38 commodities)	30 maximum	Disinfestation of insects and decontamination
1985	Pork (carcasses or fresh, non-heat processed cuts)	0.3 - 1.0	Control of <i>Trichinella spiralis</i>
1985, 1986	Dry or dehydrated enzymes	10 maximum	Control of insects and/or microorganisms
1986	Fruit	1 maximum	Delay of maturation (ripening) and disinfestation
1986	Fresh vegetables	1 maximum	Disinfestation of insects
1986	Herbs	30 maximum	Control of microorganisms (decontamination)
1986	Spices	30 maximum	Control of microorganisms
1986	Vegetable seasonings	30 maximum	Control of microorganisms
1990	Poultry, fresh or frozen	3 maximum	Control of microorganisms (including <i>Salmonella</i> )
1995	Meat, frozen and packaged (solely for use in NASA)	44 minimum	Sterilization (destruction of microorganisms)
1995	Animal feed and pet food	2 - 25	Control of <i>Salmonella</i>
1997, 1999	Red meat, meat products (uncooked) <ul style="list-style-type: none"> <li>• chilled (refrigerated)</li> <li>• frozen</li> </ul>	4.5 maximum 7.0 maximum	Control of microorganisms

\* With food irradiation, the “dose” should not be confused with something added to the food. The “dose” for food irradiation is the amount of radiation absorbed by the food and is not the same thing as the level of energy transmitted from the radiation source(s). The dose is controlled by the intensity of radiation and the length of time the food is exposed.

*kGy* stands for *kilogray*, the unit for measuring the amount of radiation energy absorbed by food when it is exposed to the ionizing radiation. A *gray* (Gy) equals one joule per kilogram; a *kilogray* is 1000 Gy.

The treatment levels approved by FDA are often grouped as follows:

1. *Low* doses – up to 1 kGy
  - a. Control insects in grains
  - b. Inhibit sprouting in white potatoes
  - c. Control *trichinae* in pork
  - d. Inhibit decay and control insects in fruits and vegetables
2. *Middle* doses – 1-10 kGy
  - a. Control *Salmonella*, *Shigella*, *Campylobacter* and *Yersinia* in meat, poultry and fish
  - b. Delay mold growth on strawberries and other fruits
3. *High* doses – greater than 10 kGy
  - a. Kill microorganisms and insects in spices
  - b. Commercially sterilize foods, destroying microorganisms of public health concern

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