FACT SHEET:
Irradiation:
Zapping the wrong end of the food system

What is food irradiation?
Food irradiation is the process of exposing food to controlled amounts of an ionizing energy called "ionizing radiation" to kill harmful bacteria, microorganisms, viruses, and insects that might be present in the food, and extend shelf-life. Other uses include sprout inhibition and delay of ripening. This process involves damage to DNA, the basic genetic information for life. As a result, microorganisms that would normally cause spoilage cannot continue their activities. Insects that may be found in food would not survive, or be capable of reproducing as the process leaves them sterile. Plants cannot continue the natural ripening or aging process.

What foods can be irradiated in Canada?
Currently, onions, potatoes, wheat, flour, whole wheat flour, and whole or ground spices and dehydrated seasonings are approved for irradiation and sale in Canada.

Food	Purpose of Treatment
Potatoes	To inhibit sprouting during storage
Onions	To inhibit sprouting during storage
Wheat, flour, whole wheat flour	To control insect infestation in stored food
Whole or ground spices and dehydrated seasoning preparations	To reduce microbial load

In 2002, Health Canada has proposed regulatory changes which would expand the list of irradiated food permitted to be sold in Canada. The proposed additions are: fresh and frozen ground beef, fresh and frozen poultry, prepackaged fresh, frozen, prepared and dried shrimp and prawns, and mangoes. Currently, irradiation is not widely used on food in Canada. So far, the main use of irradiation in Canada has been on spices.

How can I tell if food has been irradiated?

Foods that have been wholly irradiated must be clearly labeled as 'irradiated', 'treated with irradiation' or 'treated by irradiation', and display the international radiation symbol. Food that is not pre-packaged must have a sign with this information displayed beside the food.
Foods that contain an ingredient which makes up more than 10% of the finished product must indicate which ingredients in the list have been irradiated. This also applies to bulk food items. However, if several ingredients making up a product are all under the 10% mark individually, there is no requirement for them to be labeled as "irradiated" even if the combined percentage of irradiated ingredients is above 10% of the final product.

Why is food irradiated?
Promoters of food irradiation try to sell this process as a food decontamination tool, an answer to industrial food production problems. It is important to know that toxins, viruses or bacterial spores are resistant to irradiation and as a result, irradiation may not produce the expected results. Also, it is possible for irradiated food to become contaminated after it has been treated, so proper storage, handling, and cooking are still very important. The irradiation levels that are suitable for use in foods usually do not destroy viruses. Irradiation is used for the following reasons:

- prevent food poisoning by reducing the level of harmful bacteria, such as E.Coli 0157:H7 in ground beef, Salmonella, Staphyloccoccus aureus (Staph), Listeria, Campylobacter in poultry, and parasites which cause food-borne diseases;
- increase the shelf life by slowing the ripening or sprouting in fresh fruits and vegetables;
- increase food miles by decreasing the rate at which food spoils therefore allowing food to be shipped further distances.

Does irradiation affect the food being irradiated?
Although irradiation does reduce some bacteria, studies have shown that odour, taste, colour, and texture may be negatively affected. ***Odour:*** "Sweet Burnt Odour", a "Strong Odour of Hydrogen Sulfide", and a "Strong Burnt Odour" are all phrases that have been used to describe irradiated beef. Irradiation of cured cooked ham resulted in an "Off Odour". Objectionable odours were also described when chicken, turkey, sausage, frankfurters, and oysters were irradiated. ***Taste:*** Trained taste testers noted a slight but distinct off-taste and smell in most of the irradiated beef and chicken comparing it to "singed hair". In beef, the taste was noticeable even with a bun, ketchup and lettuce. Objectionable flavours were also noticed in pork, turkey, and ham. ***Colour***: irradiation can decrease the redness of ground beef, and can change the colour from a bright red to a green/brown. However, in pork and poultry irradiation increases the redness leading consumers to suspect that the meat is undercooked when in fact it is fully cooked. ***Texture:*** More water loss was noted in chicken breasts and pork loins as well as there was a negative impact on lettuce and oysters.

There has also been some evidence that animals that ate irradiated food had a slower growth rate than animals that did not eat irradiated food. Other chemical compounds found in irradiated food have been shown to promote the development of cancer and cause genetic damage in rats. The proponents of irradiation claim that the safety improvements for food products would outweigh quality problems that come from irradiation. However, irradiated food has also been shown to cost more for the consumer because it is an expensive process.

Who does food irradiation benefit?
The food processing industry likes to pass irradiation off as the latest technology in food safety, and a way to keep dangerous organisms off of our food. In reality, what it does is give agribusiness the

go ahead to grow and process their food in unclean conditions. Irradiation may be seen by food processors as a potential solution to the problems of dirty conditions in slaughtering and food processing plants.

The increase in shelf life encourages globalization and consolidation of the food production, distribution and retailing industries. Globalization and consolidation have already contributed to family farmers, ranchers and small scale producers being forced out of business which has negatively impacted many communities.

How is it done?

The food is placed into containers, put on a conveyer belt, and passed through a shielded chamber. While it is in the chamber, the food is exposed to a radiation source. The specific procedure and the amount of radiation used depend on the type of food, and the reason the food is being irradiated. Foods may be irradiated wet or dry, thawed or frozen. Because the food is not heated by the irradiation process, it can be immediately stored, packaged or shipped.

There are three different types of radiation allowed: Gamma rays, X-rays, and electron beam radiation.

- *Electron irradiation* uses electrons accelerated in an electric field to a velocity close to the speed of light. This type of irradiation will only penetrate the product about an inch in depth. Electron facilities rely on substantial concrete shields to protect workers and the environment from any harmful exposure.
- *Gamma irradiation* uses radioactive isotopes or radioisotopes (Cobalt-60, Cesium-137). Food irradiation using Cobalt-60 is preferred by processors as this process can penetrate deeper and can be used to treat entire pallets or totes, reducing the need for handling. When not in use, the gamma ray source is stored in a pool of water which absorbs the radiation.
- *X-ray irradiation* is similar to gamma radiation in that it is able to penetrate food to several feet. It uses an electronic source that stops radiating when it is switched off.

Who is responsible for the regulation of irradiation in Canada?

The Joint Expert Committee on Food Irradiation, made up of the World Health Organization, Food and Agriculture Organization of the United Nations, and the International Atomic Energy Agency recommends that food irradiation be permitted to an average of 10 kilograys. Ten kilograys is equal to approximately 10 million to 100 million times the dose received during a hospital chest x-ray. Approximately 1kGy is used to increase shelf life or to prevent spoilage while 3kGy would be required to prevent food poisoning. A much higher dose is needed to kill parasites and insects. However, there is no maximum dose in Canadian regulations.

In Canada, several agencies are responsible for aspects of the irradiation process. They are the: Health Canada (Health Products and Food Branch as well as the Radiation Protection Bureau); Canadian Food Inspection Agency; and the Canadian Nuclear Safety Commission.

Does treatment by irradiation guarantee food safety?

No. Nothing can guarantee food safety. Food must still be handled, stored, and prepared properly at every stage. Irradiation cannot be used as a substitute for proper food practices and it can not restore food that has already been spoiled, prevent contamination from other sources, or prevent cross-contamination of other irradiated food.

Why should I be concerned about irradiation?

With more frequent and widespread outbreaks of e coli, Listeriosis, and Salmonella due to industrialization and concentration of food processing, large-scale food manufacturers are looking toward irradiation as a solution to kill bacteria. Irradiation is being promoted as a decontamination tool, an answer to the downfalls of today's modern industrial food production. Promoters push irradiation as a method to protect "children, the elderly and those with weakened immune systems". Instead, food producers should address the source of the problem – too fast processing lines and dirty conditions at plants – not promote an expensive, impractical and ineffective technology like irradiation.

Instead of irradiating our food, a healthier, safer method to ensure food safety would be to clean up the conditions in slaughtering and processing plants as well as to support local, socially responsible, small-scale farming. BFF

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For More Information – visit the Food Irradiation page at www.beyondfactoryfarming.org

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