

ANIMAL ISSUES



Briefing

Irradiation of Meat

*April Mason
Department of Foods and Nutrition
Consumer & Family Sciences Extension*

Purdue Extension

Knowledge to Go

1-888-EXT-INFO

Situation

Disease causing microorganisms can get into the food supply. Controlled production practices and manufacturing help reduce the risk of food contamination, but even the most careful food production and processing techniques cannot eliminate all pathogens, especially in meat and poultry products. Irradiation of muscle foods can destroy pathogenic organisms, as well as substantially decrease spoilage organisms. FDA approval for irradiation use in pork to control Trichinella spiralis occurred in 1985. In 1990, the FDA approved irradiation to control illness-causing microorganisms in poultry. In December of 1997, the FDA approved irradiation in fresh and frozen red meat. The USDA followed in February of 1999, approving irradiation use in red meat to curb food-borne illnesses. Irradiation is the only known technique to completely eliminate Escherichia coli 0157:H7 in raw meat. Irradiation also significantly reduces levels of Salmonella, Listeria, and Campylobacter in raw meat products.

What We Know

Irradiation of a food product exposes that product to a controlled dose of ionizing radiation. The amount of radiation is measured in Gray (Gy) units. Approval of ionizing radiation use in foods is for a specific purpose (microbial control in the case of meats) and a specific radiation dose (Gy). The December, 1997 application of ionizing radiation accepted by the FDA was for meat, uncooked, chilled 4.5 kGy max and meat, uncooked, frozen 7.0 kGy max. Meat products undergoing this level of radiation are not sterilized, but pathogenic organisms are destroyed and spoilage organisms are decreased. The process is similar to the heat pasteurization of milk.

Irradiation of food products before FDA or USDA approval is very carefully tested. Wholesomeness of food products is tested in four main areas: radiological safety, toxicological safety, microbiological safety, and nutritional adequacy. The levels of radiation used in food irradiation are well below the energy levels needed to induce radioactivity. Food that is irradiated does not become radioactive.

Food products undergoing irradiation contain radiolytic products—chemical breakdown products. The amount and types of radiolytic products are dependent on the energy of radiation. Toxicological analysis of radiolytic products in meats indicates no toxic effects.

Microbiological safety of meat products is tested by measuring the minimum dose of radiation required to destroy a particular organism. The allowed radiation dose of 3.0 kGy is responsible for 99.999 percent destruction of Salmonella in chicken. A minimum dose of 1.5 kGy (well below the allowable 4.5 or 7.0 kGy) was shown to destroy E. coli 0157:H7 in red meat.

Irradiation can, depending on dose, affect the nutrient content of meats. At the levels of radiation approved for pork, it was calculated that only 2.3 percent of the thiamin (the most radiation sensitive water soluble vitamin) would be lost if all the pork in the United States was irradiated.

Consumers who would most benefit from irradiation of meats are those at greatest risk of food-borne illness—the young, the elderly, and individuals with compromised immune systems.

A great advantage of irradiation is that the process does not change the fresh character of the food product. Contrast this characteristic of irradiation with heat processing, where fresh products are changed after cooking or thermal processing.

What We Don't Know

Food processors have been reticent to invest in irradiation equipment to process food products, for fear of negative consumer reaction. Consumers have access to very little, if any, irradiated food product to

allow them to vote for or against irradiated food product with their food dollars. Studies coupling education and taste testing of irradiated foods, are highly effective in positively influencing consumer attitudes toward purchasing irradiated foods. Concerns for safe, wholesome food products could drive consumers to accept irradiation as a technology to safeguard them from health-threatening illnesses. Which comes first: availability of product or consumer demand for product? Consumer groups, and irradiator suppliers, food processors, and food companies as well as retail food suppliers will need to come together to accept the irradiation technology.

What We're Doing

Staff of the Purdue University Cooperative Extension Service and the Department of Foods and Nutrition have developed a curriculum with a videotape called "The Future of Food Preservation: Irradiation." The curriculum is aimed at consumers to increase their understanding of the process of irradiation, and what foods can be irradiated. Since the program's introduction in 1993, more than 1500 pre- and post-tests have been collected. Consumers increase their knowledge of food irradiation and positively change their attitudes about the process with the educational program. The majority of consumers who have seen the program indicate they would purchase irradiated food products if they were available in the state of Indiana.