



**Unit III - Topic 9**  
**Irradiation of Poultry**

**Food Irradiation:**

Irradiation does not make foods radioactive, compromise nutritional quality, or noticeably change the taste, texture, or appearance of food. In fact, any changes made by irradiation are so minimal that it is not easy to tell if a food has been irradiated.

Food irradiation (the application of ionizing radiation to food) is a technology that improves the safety and extends the shelf life of foods by reducing or eliminating microorganisms and insects. Like pasteurizing milk and canning fruits and vegetables, irradiation can make food safer for the consumer. The Food and Drug Administration (FDA) is responsible for regulating the sources of radiation that are used to irradiate food. The FDA approves a source of radiation for use on foods only after it has determined that irradiating the food is safe.

**Why Irradiate Food?**

**Irradiation can serve many purposes.**

- Prevention of Foodborne Illness – to effectively eliminate organisms that cause foodborne illness, such as *Salmonella* and *Escherichia coli* (*E. coli*).
- Preservation – to destroy or inactivate organisms that cause spoilage and decomposition and extend the shelf life of foods.
- Control of Insects – to destroy insects in or on tropical fruits imported into the United States. Irradiation also decreases the need for other pest-control practices that may harm the fruit.
- Delay of Sprouting and Ripening – to inhibit sprouting (e.g., potatoes) and delay ripening of fruit to increase longevity.
- Sterilization – irradiation can be used to sterilize foods, which can then be stored for years without refrigeration. Sterilized foods are useful in hospitals for patients with severely impaired immune systems, such as patients with AIDS or undergoing chemotherapy. Foods that are sterilized by irradiation are exposed to substantially higher levels of treatment than those approved for general use.

**How Is Food Irradiated?**

**There are three sources of radiation approved for use on foods.**

- Gamma rays are emitted from radioactive forms of the element cobalt (Cobalt 60) or of the element cesium (Cesium 137). Gamma radiation is used routinely to sterilize medical, dental, and household products and is also used for the radiation treatment of cancer.
- X-rays are produced by reflecting a high-energy stream of electrons off a target substance (usually one of the heavy metals) into food. X-rays are also widely used in medicine and industry to produce images of internal structures.
- Electron beam (or e-beam) is similar to X-rays and is a stream of high-energy electrons propelled from an electron accelerator into food.



## **Is Irradiated Food Safe to Eat?**



The FDA has evaluated the safety of irradiated food for more than 30 years and has found the process to be safe. The World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC) and the U.S. Department of Agriculture (USDA) have also endorsed the safety of irradiated food.

**The FDA has approved a variety of foods for irradiation in the United States including:**

- Beef and Pork
- Crustaceans (e.g., lobster, shrimp, and crab)
- Fresh Fruits and Vegetables
- Lettuce and Spinach
- Poultry
- Seeds for Sprouting (e.g., for alfalfa sprouts)
- Shell Eggs
- Shellfish - Molluscan  
(e.g., oysters, clams, mussels, and scallops)
- Spices and Seasonings

### **How Will I Know if My Food Has Been Irradiated?**

The FDA requires that irradiated foods bear the international symbol for irradiation. Look for the Radura symbol along with the statement “Treated with radiation” or “Treated by irradiation” on the food label. Bulk foods, such as fruits and vegetables, are required to be individually labeled or to have a label next to the sale container. The FDA does not require that individual ingredients in multi-ingredient foods (e.g., spices) be labeled. It is important to remember that irradiation is not a replacement for proper food handling practices by producers, processors, and consumers. Irradiated foods need to be stored, handled, and cooked in the same way as non-irradiated foods, because they could still become contaminated with disease-causing organisms after irradiation if the rules of basic food safety are not followed.

### **Irradiation and additive combinations on the pathogen reduction and quality of poultry meat**

Irradiation is an effective processing technology for eliminating pathogens in poultry meat. Addition of antimicrobial agents during processing can be another approach to control pathogens in poultry products. However, the adoption of irradiation technology by the meat industry is limited because of quality and health concerns about irradiated meat products. Irradiation produces a characteristic aroma as well as alters meat flavor and color that significantly affect consumer acceptance. The generation of a pink color in cooked poultry and off-odor in poultry by irradiation is a critical issue because consumers associate the presence of a pink color in cooked poultry breast meat as contaminated or undercooked, and off-odor in raw meat and off-flavor in cooked meat with undesirable chemical reactions. As a result, the meat industry has difficulties in using irradiation to achieve its food safety benefits. Antimicrobials such as sodium lactate, sodium diacetate, and potassium benzoate are extensively used to extend the shelf-life and ensure the safety of meat products.



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However, the use of these antimicrobial agents alone cannot guarantee the safety of poultry products. It is known that some of the herbs, spices, and antimicrobials commonly used in meat processing can have synergistic effects with irradiation in controlling pathogens in meat. Also, the addition of spices or herbs in irradiated meat improves the quality of irradiated poultry by reducing lipid oxidation and production of off-odor volatiles or masking off-flavor. Therefore, combinations of irradiation with these additives can accomplish better pathogen reduction in meat products than using them alone even at lower levels of antimicrobials/herbs and irradiation doses.