

18TH MEETING OF MEAT RESEARCH WORKERS
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RADAPPERTIZATION OF MEATS - PRESENT STATUS

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ABSTRACT

The scientific feasibility of using ionizing radiations to preserve highly perishable protein foods, such as meat and poultry, for long periods of time under non-refrigerated conditions has been proven under the U. S. Army Radiation Preservation of Foods Program. Technology is well advanced for radappertized (irradiation sterilized) ham, bacon, pork, pork sausage, beef, corned beef, chicken, codfish cakes and shrimp and, except for the determination of the irradiation dose requirements, for lamb, turkey and hamburg (ground beef with binders).

Because preservation of foods by ionizing radiation is an important peaceful application of atomic energy, the Army's program is periodically reviewed in depth by the Joint Committee of Atomic Energy, Congress of the United States. The name of the program, because of its wide application to civilian needs and to food industries in the United States and the world over, was changed to the National Food Radiation Program, effective 27 February 1970.

The main objective of the food radiation program at this time is to prove to the satisfaction of the U. S. Food and Drug Administration, Department of Health, Education and Welfare (FDA), and to the U. S. Department of Agriculture (USDA) that radappertized beef is safe for unrestricted human consumption.

By applying recent technological advances in radiation processing (i.e. selection of irradiation source, irradiation in the frozen state, use of the 12D dose for destruction of Clostridium botulinum spores), the issues of induced radioactivity, excessive destruction of nutrients and hazards from botulism have been effectively solved. The major remaining wholesomeness issues, requiring additional proof, are the absence of carcinogens, mutagens, teratogens and toxic radiolysis products in radappertized beef and other radappertized foods.

On March 1, 1971, the U. S. Army Medical Research and Development Command after a thorough coordination with the FDA and the USDA, awarded a 54 month contract to an industrial laboratory to conduct extensive beef feeding studies with rats, mice and dogs. The study involves radappertized beef (4.7 to 7.1 Mrad at $-30^{\circ} \pm 10^{\circ}\text{C}$) preserved by both the gamma rays from a Cobalt-60 source and electrons from a linear accelerator. Frozen beef, thermally sterilized canned beef, and a semipurified laboratory diet or chow diet serve as controls. The beef accounts for 35% of the solids of the experimental diets. The protocol involves feeding the parent generations of rodents for their entire life span and through four generations. The dogs will be on test for over three years to allow opportunity for delivery of three litters per bitch. The animal feeding studies started in late Fall 1971.

In this presentation the technological requirements in general, and for specific meats, will be described. The topics to be discussed are: raw material, additives, enzyme inactivation, packaging (metal containers and flexible pouch laminates), minimum irradiation sterilizing doses for specific meats, non-refrigerated storage stability, and organoleptic quality.

A 20 minute, 16 millimeter, film will be presented showing processing, including the Cobalt-60 and electron irradiation, of the beef for the wholesomeness study.