



IRRADIATED MEATS

Energy savings, eliminating Salmonella, reducing nitrites, market expansion are potential benefits

Irradiation, as a food preservative, has been consistently tried and acquitted for some 30 years now. Scientific study indicates that the process is safe, wholesome and that, used commercially, could significantly reduce energy costs, yet the Food and Drug Administration is bound by law (Delaney Amendment) to classify this "process" as an "additive."

Nonetheless, Radiation Technology, Inc., located in Rockaway, N.J., is presently involved in irradiating meat and fish portions for commercial use. The company is being "inundated with requests, both here in the US and abroad," says company president Dr. Martin Welt, "from meat companies, shippers and transporters." He attributes this demand to the fact that irradiation would make it possible for processing plants to operate on a more uniform basis. Energy requirements would be reduced (one-seventh as much as the cost of canning, one-fifth the cost of freezing); Salmonella and other pathogens could be eliminated entirely; and the concentration of ni-

trites and other additives could be lessened with no less assurance that the product would be free from botulism.

WIDER MARKET

Since the meat industry is dealing with perishable materials, its distribution lines are limited to areas which have refrigeration facilities. Irradiation would expand the available market to include a much wider clientele e.g. campers, backpackers, emergency rations, institutions, airlines, railroads, buses, even vending machines. It would also cut down losses realized as a result of spoilage.

"All irradiation does," Dr. Welt explains, "is . . . it's like an invisible light wave that goes into the food and destroys all the bacteria." As long as food is irradiated in a sealed package (radappertized) "that food is not going to spoil." If the package is irradiated unsealed (radurized), the food is only pasteurized. Then the microorganisms are not eliminated, but their number will be greatly reduced, and the time it takes them to grow back to their original number is

equal to the shelf life extension. (A medium dose which merely destroys pathogens and parasites of public health significance is dubbed radication.)

Already Radiation Technology, Inc. has shipped irradiated ham, pork sausage, pork chops and beef steaks to the Fred Hutchinson Cancer Research Center in Seattle, Washington. These foods are being utilized by bone marrow transplant and chemotherapy patients who require a totally sterilized environment. In addition the company has made shipments of fresh codfish fillets via air to Holland where they can be kept refrigerated and sold as fresh fish for approximately three weeks. Most recently the company is in the process of sending radiation

Like an invisible light wave that destroys bacteria

sterilized steak, pork chops, ground beef patties, sausage, baked ham and nitrite free hot dogs to a Dr. S.H. Sims in Toronto, Canada who will use them during a five-month voyage he is making from Canada to Fiji.

PROBLEMS AND SOLUTIONS

Until quite recently, no one was alarmed about the rate of energy consumption; neither government nor food industry officials felt pressured to find alternatives. But now, of course, energy and hunger are perhaps the two greatest problems facing the world today. With this in mind, the Energy Research and development Administration (ERDA) has become a supporter of irradiation, seeing it as a way to reduce energy used in refrigeration and freezing.

But legal technicalities are still hanging general commercial applications up, even though an expert committee comprising members of the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and the International Atomic Energy Agency (IAEA), after studying available research data, has recommended that irradiation be reclassified as a food process.

Despite the fact the chairman of that committee was Dr. Henry Blumenthal, acting director of the Division of Toxicology, Bureau of

Foods, US Food and Drug Administration, the FDA itself is powerless to change the additive classification without an industry petition. One such petition for approval of radiation sterilized beef is presently being prepared for submittal by the Army. Petitions for chicken, pork and ham are expected to follow no later than 1981.

PROBLEMS

Very early experiments with irradiated beef produced an off-odor and off-taste, but this effect, it turned out, occurred only when the meat was exposed to very high dosages. Low doses, especially pasteurization level doses, (which would be adequate to kill Salmonella) showed no significant changes in smell or taste. And further experiments by the Army determined that these effects could be avoided altogether by pretreating the product with heat, packaging it under a partial vacuum in hermetically sealed containers and finally freezing the product before irradiation.

The very idea of radiation itself established fears in people's minds. Wouldn't irradiated meat become radioactive? But when the FDA questioned this possibility relative to the food portions used by the Hutchinson Cancer Research Center Dr. Welt pointed out, "The food these patients are eating has nothing to do with x-rays, nothing to do with radiation. It's just like eating a regular piece of meat." He said, when you cook a piece of meat over an open fire, as soon as you take it off the fire and back into the kitchen, you don't have any fire left in the meat.

Irradiation processed meat is capable of meeting sterilization requirements without any special preparation on the part of kitchen personnel. Ham, pork sausage, pork chops and beef steaks are among the items the Hutchinson Center has ordered from Radiation Technology, Inc. And patient response has been highly favorable, with no complaints of off-odor or taste; texture, moisture content and appearance were totally acceptable.

PROCESS OF PROOF

The Army began irradiation research as long ago as 1942. By 1955 they had completed short-term toxicity studies of 45 foods, and during the next four years, tested 54 more foods using human volunteers. No

cases of toxicity were found as a result of ingestion of these foods. The Surgeon General began studies of long-term toxicity, carcinogenicity and nutritional adequacy, and in 1965, concluded that "food (22 items including ground beef, pork loin, bacon and beef stew) fed to rats, dogs, mice and monkeys . . . has been found to be wholesome, safe and nutritionally adequate."

Irradiated bacon had already been approved for human consumption back in 1963, but that approval was recalled when the same data were submitted to support a petition for irradiated ham in 1968.

Even though past problems with irradiated foods were shown to be a result of limitations in understanding about nutrition, and not to irradiation as a process itself, new wholesomeness requirements were made mandatory upon re-examination of those earlier data at the time. All past years of testing were deemed irrelevant; the Delaney Amendment to the Food Drug and Cosmetic Act reclassified irradiation as an additive and required all future tests to follow

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a much more circuitous item-by-item path of approval.

Studies using the new regulations were initiated on beef in 1971, using meat sterilized by heat and by freezing as controls. These tests indicated no significant destruction of amino acids or vitamins thought to be sensitive to ionizing radiation, for as long as 15 months afterward, stored at room temperature.

These studies were finished in 1976. A petition is expected to appear before the FDA before year's end, but meanwhile Radiation Technology, Inc. is making a formal request through congress to change the Food, Drug and Cosmetic Act. The company is also petitioning the FDA on its own for approval of irradiation pasteurized poultry. It has, in fact, already petitioned the Secretary of Agriculture to stop interstate shipment of poultry in the U.S. unless

Irradiated meat . . .

the poultry can be shown to be free of Salmonella.

SIGNIFICANT EVIDENCE

"We are basing our request for approval on the approval of the World Health Organization and the approval of other nations," Welt says. And once the petition for poultry is passed, he will follow it with another on spices, and then one on tuna fish. "While that's going on we hope legislation can be enacted," he adds.

"It's not complicated, and it is supported amply by all the evidence in the world." After all, the astronauts and cosmonauts travelled to the moon with totally irradiated diets. And armed with evidence of this significance, having read every piece of literature available pertaining to irradiated foods, he wonders where do you stop? "Do you permit the use of nitrites, or do you go ahead and allow food to be irradiated, after 30 years of the most sophisticated research that has ever been performed in any food process in technology, and continue to say, as the FDA has done, 'well yes, but . . . yes, but . . . it might be, but . . . but . . . but . . . but . . .' *Nothing* has been found."

Welt attributes the additive status of irradiated foods to the fact that scientists "have one common denominator: they love to publish, they

Astronauts travelled to the moon with totally irradiated diets

love to talk, they love to do research." Ask a scientist if it would be possible to irradiate a molecule in such a way for it to recombine and form a new molecule ("which would be equivalent to my filling a hypodermic syringe and squirting it into the product," Welt explains) and that scientist would have to say yes, it is possible, although the probability of its occurrence is very small. "But once you've said it's possible," Welt

adds, "that's like putting another additive into the food. So we committed ourselves to 25 years of exhaustive research, much of it being carried out by the Army under changing conditions by the FDA."

Army tests have proven there is no loss in nutritional value. But as far as taste is concerned, Welt explains that in early days when food was irradiated at very high doses, "that was equivalent to getting a 12D reduction in botulism." Food irradiated at room temperature to get that level of reduction took on an off taste, but processing food in any way, even cooking it, affects its taste.

"Heat milk, and you get a difference in taste, but we found if we irradiated foods at a lower temperature," Welt said, the problem was eliminated. He insists that any food product irradiated by today's standards would taste roughly the same as a similar product that has not been irradiated.

He believes there is no sound reason for the law not to change since WHO, IAEA, and the director of Toxicology for the FDA have all unconditionally advocated irradiation and since no area of food processing has been studied to the "trillionth, the parts per billionth that we have done in this field." □

This article is based on interviews with Dr. Martin A. Welt, Ph.D., of Radiation Technology, Inc., Rockaway, N.J. and Karen Conn, Research Kitchen Supervisor, Fred Hutchinson Cancer Research Center in Seattle, Wash.; a paper delivered by Gary C. Smith, Texas A & M University, College Station, Texas entitled "Irradiation of Meat and Meat Products"; and a paper by Ari Brynjolfsson, Ph.D., US Army Natick Research and Development Command, Natick, Mass. entitled "The National Food Irradiation Program Conducted by the Department of Army," presented at the Institute of Food Technologists 36th Annual Meeting, Anaheim, Ca., June 1976.