

FOOD TECHNOLOGY

Irradiated Food: Pro and Con

An Army nutrition expert believes irradiated food may some day be preferred. But an Army physician reports that radioactivity is measurable in food irradiated at large doses.

By TOVE NEVILLE

ONE ARMY FOOD EXPERT predicts that people may some day prefer irradiated food to canned or frozen, but a doctor in the Surgeon General's Office has "serious doubts as to the ultimate wholesomeness of irradiated food."

These two points of view represent the two basic problems of food irradiation: consumer acceptance and the safety and wholesomeness of such foods. Until these problems are solved, irradiated food will not be served either to the Armed Forces or civilians.

The Army has experimented with irradiated food since 1953. If food could be shipped and stockpiled without refrigeration for use as needed, military supply problems would be greatly simplified. Such food could also be brought to fighting areas lacking refrigeration.

As a result of Congressional interest, the Quartermaster Corps expanded its food irradiation program in 1955 to cover food items for both military and civilian use. This project, lasting until this year, was part of the Atoms for Peace Program.

Sterilized or Pasteurized

Irradiated foods are either sterilized or pasteurized by radioactivity. In sterilization, the food is first packed in sealed cans. When thoroughly irradiated, all bacteria in the food are killed, and the food will stay fresh as long as the container lasts and keeps the food from contact with the air.

Food sterilized by radiation is given 4,500,000 to 5,000,000 rads, or 4.5 to 5 megarads. A rad is a newly chosen unit of absorbed dose of radiation.

It is not now known how much radiation it takes to sterilize various foods. Tests are continuing to pinpoint the differing doses required for each kind of food. Acidity, density and the food's liquid-solid content help determine the amount of radiation required for sterilization.

The less dense a food, the easier it is sterilized. A liquid is generally more easily sterilized than a solid. To be on the safe side, high doses of radiation are given for sterilization. But taste tests of sterilized food show that the less radiation, the less loss of flavor and change of color and texture.

Therefore, a low-dose method, called pasteurization, has been adopted for many food items that are ordinarily kept only a short time, either in a refrigerator or at room temperature. This method kills only the bacteria on the outside of the food. However, it has increased the "shelf life" of such foods up to ten times.

In experiments, potatoes irradiated at 10,000 rads remained in good condition ten times longer than untreated ones. The treated potatoes were still fresh after 18 months at a temperature of 47 degrees Fahrenheit and had not sprouted, Col. William B. Levin, radiation officer for the Quartermaster General, told SCIENCE SERVICE.

He said that oranges irradiated at 150,000 rads were still fresh after 70 days at 45 degrees Fahrenheit.

Col. Levin said that one difficulty in feeding irradiated food to humans is that after a time they tire of eating foods having unaccustomed tastes.

However, sometimes people will become accustomed to eating a certain food in its canned form and actually prefer it to the natural form. He cited tomato juice as an example.

Tastes can change with education. Today the population is generally "educated" to drink pasteurized milk and has come to like and accept its taste. To most persons used to drinking pasteurized milk, the natural product would taste foreign and very likely disagreeable.

The Quartermaster Corps is trying to improve methods of irradiating foods to make them taste like the natural product or like the food people are accustomed to eating.

Irradiated ham and shrimp now taste more like the fresh products than do heat-

canned ham and shrimp, Col. Levin said. So also do chicken, pork and bacon.

Irradiating beef, yet retaining its natural flavor, has proved difficult. In early experiments, irradiated beef had a distinct, disagreeable taste and odor. Lately both the taste and smell have been improved.

Irradiated vegetables, like meats, have shown differing results. Many of them, such as carrots and pumpkin, approach their natural look, smell and taste. Others, such as cauliflower, celery and cabbage, are not so successfully irradiated.

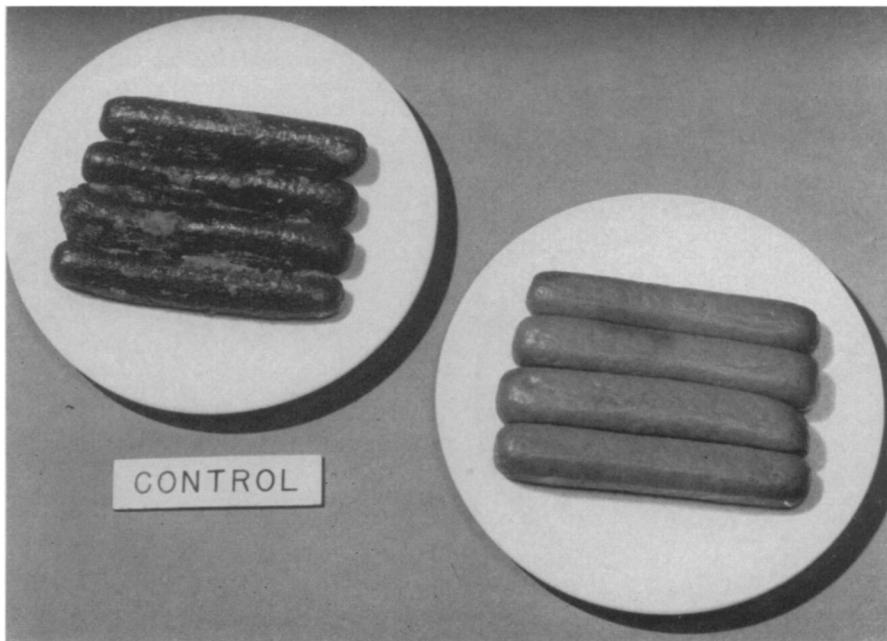
Such fruits as peaches and applesauce, when tested after six months, were both quite acceptable in taste and appearance, although the applesauce had turned a little dark, Col. Levin said.

He estimated that the price of irradiated food would some day be comparable to other preserved foods. Col. Levin believes that wholesomeness studies with animals during the next two years will prove the safety of irradiated food.

Wholesomeness Yet to Be Proved

But a physician of the U. S. Army Medical Research and Development Command, of the Surgeon General's Office, Col. Lawrence M. Hursh, is not as optimistic. He told SCIENCE SERVICE that he doubted whether the wholesomeness of irradiated food would be proved by the time current animal studies end in December, 1963.

The most important problem is that some of the methods used for irradiation at high doses leave measurable radioactivity in the food, Col. Hursh said.



COMPARING HOT DOGS—Both plates of hot dogs have been stored for four months at 72 degrees Fahrenheit. Control samples at left have not been treated in any way, while those at right have been irradiated.

Irradiation by linear electron accelerators at 24,000,000 electron volts (Mev) and by fuel rods under water has produced measurable induced radioactivity in foods at levels of several times the background radiation.

He said that irradiated food will be accepted for wholesomeness by the Surgeon General's Office when the U. S. Food and Drug Administration accepts it. He believes a cobalt source is the most promising for food irradiation. So far, no radioactivity has been measured in food irradiated by cobalt.

Col. Hursh said that when food is irradiated, the radiation modifies the atoms in the food to form peroxide, carbonyls and aldehydes from fatty acids. These chemicals are toxic at certain levels.

Animals feeding on irradiated food have shown such symptoms as hemorrhages in rats, ruptured hearts in mice and infertility in female dogs.

Adding vitamin K to the diet of the rats cleared up the hemorrhages but Col. Hursh said that more vitamin K was required than laboratory rats are fed in a normal diet.

Tests with mice on the irradiated diet showed that about 80% developed ruptured hearts. The control animals fed the same but non-irradiated diet did not develop ruptured hearts.

After eating irradiated food, some female dogs showed infertility. Tests with these animals are continuing so as to obtain more conclusive evidence.

Col. Hursh said that enzyme changes had also been observed in animals eating irradiated food. The enzymes are either increased or decreased.

For example, cytochrome oxidase was increased in rat livers from animals fed irradiated beef. This increase can be corrected by adding vitamin K to the diet. The close tie-up between cytochrome oxidase and vitamin K was not known before. Such new knowledge has been an important by-product of the animal studies, Col. Hursh said.

He also said that if irradiated foods were fed in any large amount to humans, the foods would have to be fortified with vitamins of all kinds since irradiation decreases the vitamin content in food.

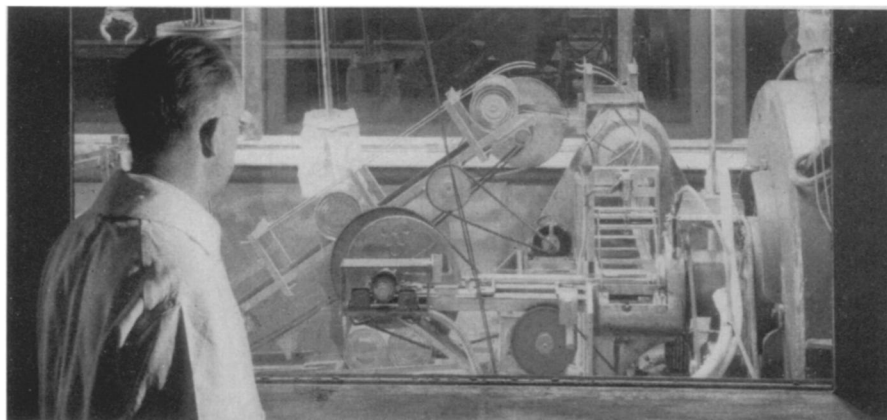
From July, 1960, the Quartermaster Corps will handle only strictly military items. The Atomic Energy Commission will take responsibility for the program of testing irradiated foods for civilians, mostly low-dose irradiated, or pasteurized, food items.

The Army and the AEC will cooperate and exchange information on their progress.

The Quartermaster Corps will have two radiation facilities. One, a cobalt-60 source of 1 mega-curie, being built by the AEC, is the largest in the world. The other is an electron source from a linear accelerator of 24,000,000 electron volts now being constructed.

Until the AEC entered the field, research in irradiated foods was done by private research institutes, universities and the Quartermaster Food and Container Institute for the Armed Forces in Chicago.

Science News Letter, July 2, 1960



STERILIZATION BY IRRADIATION—Fuel rods from nuclear power reactors are used to sterilize food in cans handled by a conveyor system. Cans are dropped in front of the entrance hole of tank (right) that contains a field of intense gamma radiation.

GENERAL SCIENCE

Atomic Land Sold at Gain

SALE OF atomic lands has proved a profitable venture for the Federal Government. Especially unusual for the Government, the venture has yielded a net profit approaching a million dollars.

The profit comes as the Government resells land it developed at Oak Ridge, Tenn., and Richland, Wash., communities built around atomic laboratories. Both communities are economically in good health and well on the way to becoming self-sufficient and self-governing municipalities.

The strong financial positions of the atomic age communities are the result of the Community Disposition Program set up by the Atomic Energy Community Act of 1955 and since then operated by the Federal Housing and Home Finance Agency.

Joseph S. Brown, director of the Program, reported to the Subcommittee on Communities of the Joint Committee on Atomic Energy that more than \$42,000,000 has been turned over to the U. S. Treasury from Oak Ridge and Richland real estate sales handled by his agency.

The sales promotion by Federal em-

ployees has been so successful that it has yielded a net profit of \$800,000 for the Government.

Mr. Brown predicted a net total of a million dollars would be accumulated by the time all the property under his jurisdiction is sold.

He recommended minor amendments to the Atomic Energy Communities Act which would permit more flexibility in financing and arranging terms of sale to expedite disposal of remaining properties. Oak Ridge has a greater amount of residential property unsold while Richland has a surplus of commercial land.

The proposed amendments would permit all properties in both communities to be cleared within six months, according to Mr. Brown.

Both in Richland and in Oak Ridge municipal governments and installations, schools, and hospital facilities have been transferred this year to the jurisdiction of the residents under provisions required by the respective states of Washington and Tennessee.

Science News Letter, July 2, 1960

CONSERVATION

Disease Hunts Foxes

AFTER BEING CHASED for centuries by pink-coated huntsmen and trapped, gassed and shot by farmers, the crafty fox is dying from a mysterious disease.

The disease is spreading fast across the country. Foxes are dying in hundreds throughout the English countryside from a virus disease that causes blindness and death in a few hours. Nobody knows where it comes from, but it is known to exist on fur farms in the United States.

Ministry of Agriculture experts estimate that the fox population of the country is very high and that 40,000 are killed each year by hunts, fox destruction

societies and farmers. One hunt can account for 300 foxes in a good season, and there are more than 200 hunting packs in Britain.

Several official and unofficial bodies have started investigations. The Animal Health Trust is carrying out an inquiry on behalf of the Masters of Foxhounds' Associations, while wider probes are being made by the Royal Veterinary College and the Cambridge Veterinary School. The Nature Conservancy has appointed a special officer to make a full scientific record of the outbreak.

Science News Letter, July 2, 1960