

Food irradiation: Are there hazards?

Most groups that have reviewed radiation as an insecticide and bactericide for use on stored grains, fresh produce and meats (SN: 3/3/84, p. 138) have given the technology unqualified approval. However, several environmental groups have decided to protest the Food and Drug Administration's (FDA) proposal to substitute irradiation for use of the now-banned pesticide, ethylene dibromide (EDB).

Washington, D.C.-based consumer advocate Sidney Wolfe, who directs Public Citizen's Health Research Group (HRG), terms the idea of irradiating food "perfectly ridiculous," based on a review of toxicology studies and the concept's potential costs. Both in formal comments that Wolfe's group has filed with FDA and a summary of that document, HRG points to a 1982 review by FDA of 413 toxicological studies of irradiated foods: FDA found 344 (84 percent) of the studies either inconclusive or inadequate to demonstrate safety. "Of the remaining, 32 [studies] indicated adverse effects," the HRG report says. In fact, the HRG report says FDA's initial assessment that the 37 remaining studies indicated the safety of irradiation was later revised to just five studies.

Wolfe's group also points to a pair of Russian studies involving rats fed food irradiated with gamma rays at doses up to 5.6 megarads. One study reported development of kidney disease, the severity of which "was directly dependent on the dose of irradiation of the food products." The other study found evidence of testicular damage, also apparently related to the radiation levels used on the food.

Two Indian studies that HRG cites in its comments to FDA showed development of abnormal white blood cells (a condition known as polyploidy) in children and monkeys fed wheat within three weeks of its having received 74-kilorad radiation doses. Another pair of Indian studies was cited in the formal comments filed with FDA by Kathleen Tucker, president of the Health and Energy Institute in Washington, and by Robert Alvarez, director of the Environmental Policy Institute's nuclear power and weapons project.

These studies showed that irradiated wheat, maize, sorghum, pearl millet, potatoes and onions produced more aflatoxin than nonirradiated samples of the same commodities after each was infected with *Aspergillus* fungi. Ironically, Tucker and Alvarez note, the Environmental Protection Agency ranks aflatoxin 1,000 times more carcinogenic than EDB.

Finally, all three groups expressed serious concern to FDA over a March 1984 report of 12 toxicology studies using irradiated chicken meat that were performed for the Agriculture Department's Food Safety Laboratory in Philadelphia. Mice fed irradiated chicken in one study showed: an increase in testicular tumors, more lesions including cancer, development of the kidney disease reported in one of the Russian studies and reduced lifespans for a subgroup of animals fed irradiated food. Another study found a radiation-dose-related increase in deaths among offspring of flies fed irradiated chicken.

The environmental groups suggest alternative food preservation and pesticide treatments that they believe might prove in the long run safer and more economical.

Veterans' compensation bills

The U.S. Senate approved last week a bill that would require the federal government to establish guidelines—and where appropriate, standards and criteria—for adjudicating claims by military veterans for alleged disabilities attributable to exposure to Agent Orange (SN: 5/19/84, p. 314) and radiation during above-ground nuclear tests (SN: 11/19/83, p. 330). A related bill passed the House of Representatives last year. A House-Senate committee is expected to begin ironing out differences between the bills after their Memorial Day recess.

The stuff tough birds are made of

It's *not* your imagination; the chicken that grandma slaughtered and served up on the farm was more tender than commercially processed birds sold by most grocers today. In tests comparing the shear force needed to cut through cooked breast meat in hand-plucked versus mechanically plucked birds, Tommy Goodwin of the University of Arkansas in Fayetteville found machine-plucked chickens a full two and a half times tougher. Requiring 8.7 kilograms (kg) of force per gram of meat, what's needed to chew it approaches the 10 kg/gram level at which "50 to 60 percent of the consumers will start complaining," Goodwin notes.

The researcher's tests showed that not only the pre-plucking scald, but also each of the two plucking stages contribute individually to toughness. "There have to be chemical changes occurring," Goodwin explains, but what they are is not yet known. All samples were held, or aged, 24 hours—itsself a tenderizing step—before cooking. Those mechanically plucked birds also chilled before cooking took only 7.4 kg/gram to cut.

These data indicate consumers wouldn't object to commercial processing if a bird were merely plucked, chilled and trucked to market, Goodwin says. But, he points out there's a growing trend to sell "deboned" chicken: "I'm told 68 percent of the chicken that's sold in Houston is at the deboned stage." During the first 8 hours off the bone, Goodwin explains, significant cold-induced shrinking of the muscle occurs. This "cold shortening" of deboned meat is basically irreversible, and can contribute to shear-force values well in excess of 10 kg/gram, Goodwin maintains. However, he says, many processors find it uneconomical to hold up their assembly lines—while eviscerated carcasses age—when they're processing 70,000 birds a day.

"Rigor mortis starts developing in [chicken] about 20 to 30 minutes after slaughter"—faster than in beef, he says. Freezing halts that process and will lock that toughness in, so he recommends aging a bird 8 hours before freezing. However, if the bird has not been boned, a consumer can counter the toughening effects of early freezing by thawing chicken and holding it in the refrigerator 24 hours—on the bone—before cooking.

"So much of our poultry is going into what we call 'further-processed items,' like chicken patties," Goodwin says. Many are frozen or precooked—without aging—right at the processing plants. The result has not gone unnoticed by consumers, he says. It's giving chicken a tough image.

Research notes

- Fenugreek is a staple among spices flavoring many Asian and Middle Eastern cuisines. Now a researcher at Hebrew University of Jerusalem in Rehovot, Israel, is investigating its pharmacological potential for diabetics. When the spice was added in small amounts to the diet of diabetic rats, Zecharia Madar found signs that it delayed transfer of the sugar glucose from the stomach to the blood. Madar now plans to study whether fenugreek affects humans similarly, perhaps reducing their need for insulin to control blood-sugar levels.
- On a per-weight basis, eggs are relatively rich in iron. However, virtually none of their iron is ever absorbed by the body, research conducted at the University of Missouri in Columbia now shows. That's because 95 percent of an egg's iron occurs in the yolk, tightly bound to phosvitin, a phosphorus-rich protein. Unless its bond to phosvitin is broken, the body cannot use the iron, and research by Karen Albright, Dennis Gordon and Owen Cotterill now shows that heating—as in cooking—has no effect on the bond. Yet to be answered, Gordon notes, is whether foods eaten with eggs lose the potential bioavailability of their iron too—either because their iron binds with phosvitin in the digestive tract, or because phosvitin affects the intestinal wall's absorption of iron.