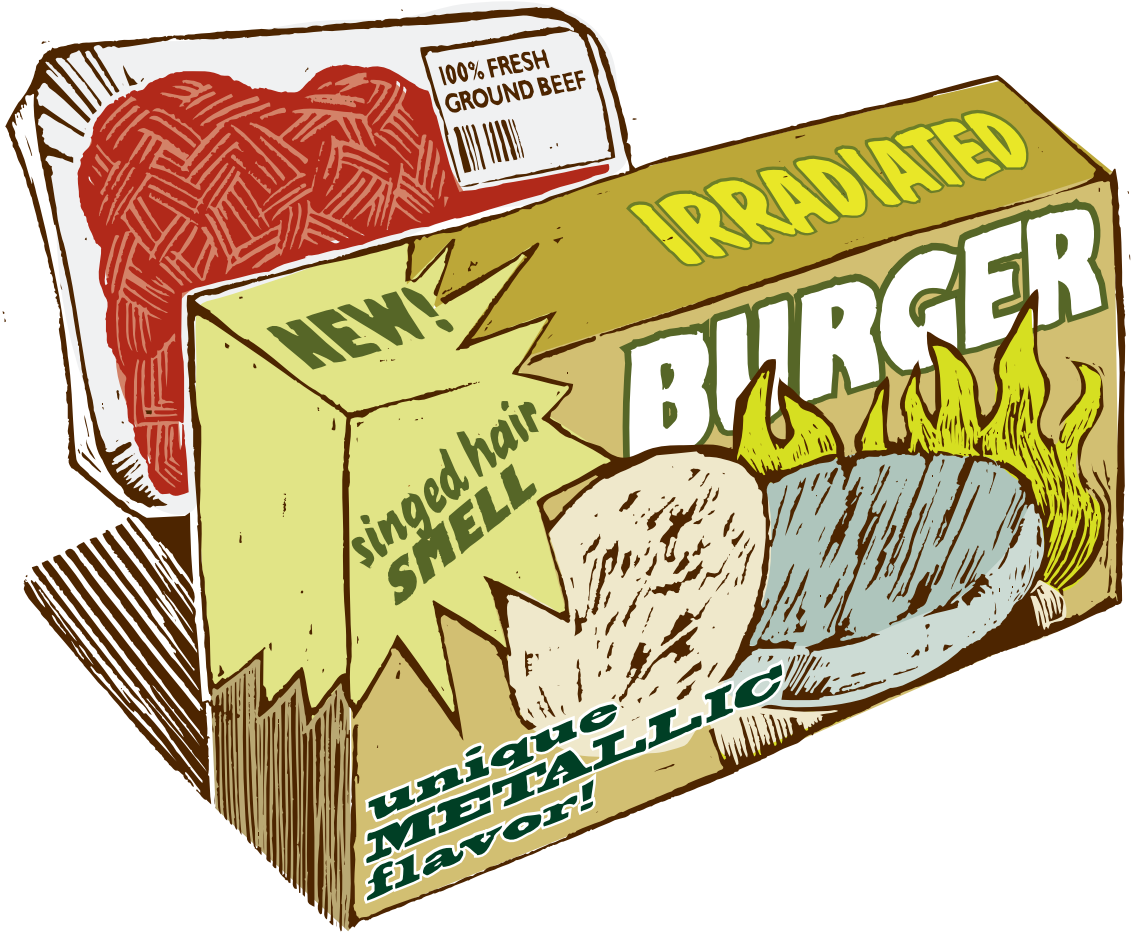

Food Irradiation: A Gross Failure

The strange, sickening impacts on the smell, taste, color, and texture of food exposed to radiation

CENTER FOR FOOD SAFETY

FOOD& WATER WATCH

Table of contents

Abstract

Irradiated foods are abnormal. Based on research compiled directly from the scientific literature, this report describes the strange, sickening impacts on the smell, taste, color, and texture of food exposed to this invasive "treatment." Whether meat, poultry, shellfish, or vegetable, this quality damage occurs across many food types. This report also presents evidence on the markedly higher costs of irradiated food and on the irradiation industry's dire economic straits. The three are intertwined: poor-quality food items that are more expensive than their normal, non-irradiated, counterparts lead to ruined irradiation companies. This report concludes that commercial scale irradiation is a failure — and a gross one at that. Yet, it is a failure that has pulled in millions of dollars over the past five decades in Federal taxpayer support for research aimed at trying to fix the very damage the treatment inflicts on food quality.

Primary Authors

Peter Jenkins, Policy Analyst, Center for Food Safety

Mark Worth, Senior Researcher, Food and Water Watch

The Center for Food Safety is a non-profit public interest and environmental advocacy membership organization established in 1997 for the purposes of challenging harmful food production technologies and promoting sustainable alternatives.

CENTER FOR FOOD SAFETY
660 Pennsylvania Ave. SE, Suite 302
Washington, DC 20003
Tel: (202) 547-9359
Web: www.centerforfoodsafety.org

Food & Water Watch is a new consumer organization which fights corporate control of our food and water while advocating for a safe and sustainable food and water supply.

FOOD AND WATER WATCH
611 Pennsylvania Ave. SE
Box 233
Washington DC 20003
Tel: (202) 797-6550
Web: www.foodandwaterwatch.org

NOTE: This report describes past advocacy efforts of the Center for Food Safety and Public Citizen's food campaign. In November 2005, Public Citizen's food campaign moved to a new organization called Food & Water Watch, which is the organization releasing this report with the Center for Food Safety.

The past contribution of Public Citizen to this report is gratefully acknowledged.

Report design and illustration by Tim Hill www.psycosm.com

Printed on recycled paper

Background

Despite a half-century of research, experimentation, promotion, and test marketing—much of which was unwittingly supported by U.S. taxpayers—food irradiation has proven to be an unrealistic solution to our national food safety challenges. Consumers should not be exposed to the toxicological and nutritional risks that irradiation poses. Scientists have known about the potential hazards from the early days of the technology in the 1950s and 1960s, and more problems have revealed themselves over the decades of research.

More than four years of advocacy by the authors of this report has aimed at documenting the toxicological and nutritional risks posed by this invasive technology (see Box 1.) Much of this advocacy highlighted the numerous published studies on potential mutagenic effects (involving potential damage to genes) in mammals, as well as the important 2001 study that linked colon tumor promotion in laboratory rats to new chemical compounds that are found only in irradiated foods, known as 2-alkylcyclobutanones (2-ACBs).

We have raised other critical issues that FDA has inadequately responded to, or outright failed to address. We have supplied evidence that irradiation:

- forms volatile toxic chemicals such as benzene and toluene;
- causes stunted growth in lab animals fed irradiated foods; and
- was legalized in defiance of FDA's own regulations and guidelines that mandate a thorough health and safety review.

Now to the topic of this report — why "A Gross Failure"? Here we document how irradiation can actually ruin the flavor, odor, appearance, and texture of common foods. Published research on irradiated foods repeatedly finds that they smell **ROTTEN, METALLIC, BLOODY, BURNT, GRASSY**, and generally off. The taste is described as like **SULFUR, SINGED HAIR, BURNT FEATHERS, BURNT OIL**, and **RANCID FAT**. Meats can turn **GREEN, BROWN, RED**, or **YELLOW**. Irradiated oysters give off a **YELLOW SALIVA-LIKE** excretion. Serious questions arise as to whether this food is wholesome enough to eat.

Despite 50 years of research based on massive taxpayer and private funding, food scientists still do not fully understand how this quality damage occurs. Much of the ongoing research, in fact, is focused on devising new ways to hide or mask the most objectionable aspects of these changes, trying to reduce them to levels at which most consumers cannot detect them.

These quality problems, in addition to major technological and financial hurdles, have caused the recent industry failures, including the spectacularly flopped efforts to mass-market irradiated ground beef in grocery stores, restaurants, and throughout U.S. public schools.

Irradiated foods are not normal. Below are representative descriptions of their strange qualities, followed by some indicators of the industry's dire economic situation. No doubt the two are intertwined: ruined

Box. 1. Summary of 4 Years of Advocacy by The Center for Food Safety and Public Citizen on Food Irradiation

Formal comments filed to FDA dockets on five pending food irradiation petitions: 9

Attachments to these comments: 48

Formal irradiation revocation petitions filed: 1

Attachments: 14

Ph.D. consultants retained: 3

Published Ph.D./MD review papers cited in comments that state safety concerns: 8

Unpublished Ph.D./MD review papers cited in comments that state safety concerns: 4

Other Ph.D./MDs endorsing safety concerns cited from published literature: 25 (minimum)

Published positive mutagenic studies of animals/cells cited:

- in vivo: 12 (1 human)
- in vitro: 6

Other cited published studies of concern:

- colon tumor promotion—1
- hemoglobin increase—2 (1 unpublished human)
- other in vivo health effects—7 (minimum)
- oxidation (egg powder)—1
- trans fat increase (ground beef)—1
- published and unpublished studies of nutritional impacts—various

food quality leads to ruined companies. The conclusion is inescapable: commercial scale food irradiation is a failure — and a gross one at that.

NOTE TO READERS: From here on this report is not based on the opinions of The Center for Food Safety or Food and Water Watch. It is based primarily on quotes found in research reports and on statements by scientists, government officials, and industry representatives, from 1955 to 2005. All instances of emphasis in the quotes, shown here in bold type, are added. Internal literature cites are omitted.

Ruined odor

Irradiating components of beef resulted in a "**SWEET BURNT ODOR**," a "**STRONG ODOR OF HYDROGEN SULFIDE**," and a "**STRONG BURNT ODOR**".... The off-odors in irradiated meat are formed from sulfur-containing compounds.

—Batzer, O.F., and D.M. Doty. 1955. Nature of undesirable odors formed by gamma irradiation of beef. *Agricultural and Food Chemistry*, 3:64-67.

"Irradiation of cured cooked ham resulted in higher **OFF-ODOR** scores than all other treatments immediately following irradiation thus indicating a change in quality.... Irradiation processing increased lipid oxidation for all treatments (raw-uncured, raw-cured, cooked-cured)."

—Houser, T.A., et al. 2003. Effects of irradiation on properties of cured ham. *Journal of Food Science*, 68:2362-2365.

"The acceptance of the meat odor was consistent with the irradiation odor intensity. As the irradiation odor intensity increased, the preference of meat odor decreased. Most trained panelists rated irradiation odor as an off-odor. [Taste] panelists could easily distinguish between odors of irradiated and nonirradiated meat.... Irradiation and storage of meat in vacuum packaging may be desirable for long-term storage, but may reduce the acceptance of irradiated meat."

—Ahn, D.U. 2000. Quality characteristics of vacuum-packaged, irradiated normal, PSE, and DFD pork. *Swine Research Report*, Iowa State University, ASL-R695.

"Irradiation odor intensity increased [in a] dose-dependent manner in frozen pork patties. Irradiation odor lasted longer in frozen than in refrigerated pork patties and some [taste] panels could detect irradiation odor after 3 months of frozen storage. Panels characterized vacuum-packaged irradiated meat odor as **ROTTEN EGG, SWEET, BLOODY, COOKED MEAT** or **BARBECUED CORN, BURNT, SULFUR, METALLIC, ALCOHOL** or **ACETIC ACID**. Those words also were found in other [previous] studies."

—Ahn, D.U., and C. Jo. 1999. Quality characteristics of vacuum-packaged pork patties irradiated and stored in refrigerated or frozen conditions. *Swine Research Report*, Iowa State University, ASL-R1712.

"Irradiated meat products can develop a characteristic odor described as '**BLOODY SWEET**' or '**BARBECUED CORN-LIKE**.' [Two researchers] reported that dimethyl trisulphide was the most potent and obnoxious volatile compound from irradiated raw chicken."

—Zhu, M., et al. 2005. Control of Listeria monocytogenes contamination in ready-to-eat meat products. *Comprehensive Reviews in Food Science and Food Safety*, 4:34-42.

"Irradiated raw pork, regardless of packaging, produced more volatiles than nonirradiated patties and developed a characteristic aroma shortly after irradiation."

—Ahn, D.U., et al. 1998. Effect of muscle type, packaging, and irradiation on lipid oxidation, volatile production and color in raw pork patties. *Meat Science*, 49:27-39, as cited in: D.U. Ahn et al. 1999. Volatiles production and lipid oxidation in irradiated cooked sausage as related to packaging and storage. *Journal of Food Science*, 64:226-229.

"A major concern associated with meat irradiation is lowered meat quality, which is related to free radical reactions and off-odor production.... However, it is still unclear which volatile compounds are responsible for such off-odors in irradiated meat and how the volatiles are generated."

—Chen, X., et al. 1999. Lipid oxidation, volatiles and color changes of irradiated pork patties as affected by antioxidants. *Journal of Food Science*, 64:16-19.

"Off-odor scores were significantly higher for the irradiated ham treatments compared with nonirradiated control regardless of length of storage period.... In addition, Zhu and others reported higher sulfur odor scores by a trained sensory panel for turkey ham irradiated at 2.0 kGy relative to controls.... The irradiation treatment increased off-flavor scores for the frankfurters, and this effect did not change significantly during storage."

—Houser, T.A., et al. 2005. The effects of irradiation at 1.6 kGy on quality characteristics of commercially produced ham and pork frankfurters over extended storage. *Journal of Food Science*, 70:S262-266.

References cited in a Ph.D. dissertation on irradiated oysters found that the treatment caused "**GRASSY**" and "**OXIDIZED**" odors.

—Dixon, D. W. 1996. "The Influence of Gamma Radiation upon Shellstock Oysters, and Culturable and Viable but Nonculturable *Vibrio vulnificus*." A dissertation presented to the Graduate School of the University of Florida, at p. 38.

In sum, irradiation creates objectionable odors in beef, ham, pork, chicken, turkey, sausage, frankfurters, and oysters.

Ruined taste

"Our trained taste testers noted a slight but distinct **OFF-TASTE** and smell in most of the irradiated beef and chicken we cooked and sampled, likening it to **SINGED HAIR**. In the beef, the taste was detectable even with a bun, ketchup and lettuce."

—Anon. 2003. The truth about irradiated meat. *Consumer Reports*. August.

A trained taste panel found that hamburgers irradiated at 1.0 kGy had a **RANCID FAT TASTE** and greasy appearance, and that the raw hamburgers were dark brown.

—Chirinos, R.R.O., et al. 2002. Inactivation of Escherichia coli O157:H7 in hamburgers by gamma irradiation. *Brazilian Journal of Microbiology*, 33:53-56.

Cites studies that found that irradiated chicken tasted like "**HOT FAT**," "**BURNED OIL**" and "**BURNED FEATHERS**;" and that irradiated pork tasted like "**BARBECUED CORN**."

—Jo, C., and D.U. Ahn. 2000. Production of volatile compounds from irradiated oil emulsion containing amino acids or proteins. *Journal of Food Science*, 65:612-616.

"Irradiation increased the production of acetaldehyde, which could be related to a **METAL-LIKE** flavor in irradiated hams... [I]rradiation has significant influence on odor/flavor of vacuum-packaged turkey ham. Both sensory panelists and volatiles analysis showed that there were significant changes in sulfur-related odor/flavor in RTE [ready-to-eat] turkey products by irradiation."

—Zhu, M.J., et al. 2004. Effect of irradiation on the quality of turkey ham during storage. *Animal Industry Report*, Iowa State University, A.S. Leaflet R1854.

In sum, irradiation generates objectionable flavors in ground beef, chicken, pork, and turkey ham.

Ruined color

"Irradiation significantly decreased the redness of ground beef, and the visible color of beef **CHANGED FROM A BRIGHT RED TO A GREEN/BROWN**.... Because color changes in irradiated beef were uniquely distinguishable...it would be very difficult to implement irradiation technology in beef without controlling discoloration problems.... [D]etailed information on the color components in irradiated beef is not understood yet."

—Nam, K.C., and D.U Ahn. 2003. Effects of ascorbic acid and antioxidants on the color of irradiated ground beef. *Journal of Food Science*, 68:1686-1690.

"Irradiation **INCREASED REDNESS** regardless of pork-quality type, and the increases were proportional to irradiation dose. Irradiation increased the production of sulfur-containing volatiles.... [I]rradiation reduced the preference scores of all 3 pork-quality types."

—Nam, K.C., et al. 2001. Lipid oxidation, color, volatiles, and sensory characteristics of aerobically packaged and irradiated pork with different ultimate pH. *Journal of Food Science*, 66:1225-1229.

"Color is the major sensory attribute determining consumer acceptance of meat. The normally expected color for cooked poultry breast meat is grayish brown. Whenever cooked poultry breast meat shows pink or red color, consumers suspect that the meat is undercooked or contaminated. Irradiation **INCREASED REDNESS** of vacuum-packaged [precooked turkey breast] meat, and the redness was distinct and stable."

—Nam, K.C., and D.U. Ahn. 2002. Mechanisms of pink color formation in irradiated precooked turkey breast meat. *Journal of Food Science*, 67:600-607.

"Irradiated pork and turkey became redder due to irradiation. [For irradiated beef], yellowness increased with dose and storage time. The extent of color change was irradiation dose-dependent. Visual evaluation indicated pork and turkey increased in redness whereas beef decreased in redness as dose levels increased."

—Nanke, K.E., et al. 1998. Color characteristics of irradiated vacuum-packaged pork, beef, and turkey. *Journal of Food Science*, 63:1001-1006.

"Electron-beam irradiation significantly increased the oxidation of...acids and cholesterol in egg yolk powder...Irradiation caused color change in egg yolk powder."

—Du, M., and D.U. Ahn. 2000. Effects of antioxidants and packaging on lipid and cholesterol oxidation and color changes of irradiated egg yolk powder. *Journal of Food Science*, 65:625-629.

In sum, irradiation causes objectionable color changes in beef, pork, turkey, and egg yolk powder.

Ruined texture

"Irradiated chicken breasts had more cooking loss than nonirradiated chicken breasts. Zhu and others found that irradiation significantly increased...loss of water from pork loins compared with that of nonirradiated samples. The mechanism for irradiation-induced water loss is not clear, but 2 theories exist: (1) irradiation may damage the integrity of membrane structure of muscle fibers, and (2) irradiation may denature muscle proteins, thus reducing water-holding capacity.... Lewis and others found that the texture attributes were lower in irradiated chicken breasts 14 days and 28 days after irradiation.... "

—Zhu, M., et al. 2005. Control of Listeria monocytogenes contamination in ready-to-eat meat products, *Comprehensive Reviews in Food Science and Food Safety*, 4:34-42.

In the FDA's own Risk Analysis for irradiation of raw oysters, a study cited for demonstrating the treatment's effectiveness found also that irradiation at levels of 2 kGy or greater, as FDA has recently approved, produced an "**UNPLEASANT YELLOW EXUDATE**." That researcher later described the exudate as resembling "**SALIVA**."

—Andrews, L. S. et al. 2002. "Gamma irradiation processing to reduce the risk of Vibrio infections from raw oysters." (unpublished presentation at the Institute for Food Technologists 2002 Annual Meeting), abstract at http://ift.confex.com/ift/2002/techprogram/paper_11111.htm; L.S. Andrews, pers. comm., Aug. 24, 2005.

"**ELECTROLYTE LEAKAGE** of lettuce increased with higher radiation doses and was correlated to soggy appearance. The leakage of lettuce irradiated at 2 kGy and higher doses was significantly higher than that of non-irradiated lettuce."

—Sommers, C., et al. 2004. Irradiation of ready-to-eat foods at USDA's Eastern Regional Research Center—2003 update. *Radiation Physics and Chemistry*, 71:511-514.

In sum, irradiation leads to objectionable texture changes in chicken breasts, pork loins, oysters, and lettuce.

Weight loss
or reduced weight gain in feeding studies

Several animal feeding studies document a connection between eating irradiated foods and lowered weights. The mechanism for this effect is not clearly understood, that is, whether it is due to toxicity, nutritional deficits, or the animals' rejection of the irradiated diet based on sensory differences.

Large groups of rats received two types of irradiated strawberry supplements to their diets—one in liquid form by stomach tube, the other eaten in powder form. Male rats that ate the irradiated strawberry powder diet showed a "**STATISTICALLY SIGNIFICANT GROWTH RETARDATION**" compared to male rats that ate the control diet that contained the same powder that was not irradiated.

—Verschurren, H., G. Van Esch, and J. Van Kooy. 1966. Ninety day rat feeding study on irradiated strawberries. *Food Irradiation–Quarterly International Newsletter*, 7(1-2):A17-A21.

"In general, the irradiated foods produced a **DEPRESSED GROWTH RATE**.... The effect of the radiation variable is significant.... Higher intake coupled with the lower growth rates of rats on the rations containing irradiated carrots resulted in a lower [food] efficiency."

—Tinsley, I.J., et al. 1970. The growth, reproduction, longevity, and histopathology of rats fed gamma-irradiated carrots. *Toxicology and Applied Pharmacology*, 16:306-317.

Dogs eating irradiated diets weighed 11.3% less than dogs fed unirradiated diets.

—Spiher, A.T. 1968. Food irradiation: An FDA report. *FDA Papers*, Oct.

"A **TENDENCY FOR LOWER BODY WEIGHTS** were noted in both sexes of rats receiving 1.0 and 3.0% irradiated thaumatin [a sugar alternative that could soon reach the marketplace]. No body weight retardation was noted in rats fed 3% non-irradiated thaumatin. Food consumption in controls and treated animals showed no clear differences."

—Hagiwara, A. et al. 2005. Thirteen-week feeding study of thaumatin (a natural proteinaceous sweetener), sterilized by electron beam irradiation, in Sprague-Dawley rats. *Food and Chemical Toxicology*, 43: 1297-1302.

The bottom line:
Higher costs for poorer quality food

The irradiation industry's marketing strategy was that claims of safety improvements for their products would override the quality problems, particularly if food scientists could find ways to mask the worst damage. The linchpin to this strategy was that consumers were not likely to buy it if the cost premium was too high. Federal government agencies aided this strategy by publicly embracing the industry's optimism and estimating that irradiated ground beef and other meats would cost only a few more cents per pound, but then their price premium estimates grew over time:

"Will irradiated foods cost more? Irradiated products sold to date have cost slightly more than their conventional counterparts. Some industry experts estimate the increase at **TWO TO THREE CENTS PER POUND** for fruits and vegetables and **THREE TO FIVE CENTS A POUND** for meat and poultry products.... Food trade groups say that as irradiated foods become more widespread, their cost is likely to drop."

—Food Irradiation: A Safe Measure. FDA, Jan. 2000. www.fda.gov/opacom/catalog/irradbro.html

"Will irradiated meat and poultry cost more? Yes. The estimate is **TWO TO FIVE CENTS MORE PER POUND**. However, consumers may decide that the benefits from irradiation outweigh the extra cost."

—Irradiation of Raw Meat and Poultry: Questions and Answers. Food Safety and Inspection Service, USDA, May 2000. www.fsis.usda.gov/OA/pubs/qa_irrad.htm

"What is the estimated additional cost of irradiated ground beef compared to non-irradiated product? USDA estimates that irradiated ground beef items will cost an additional **13 CENTS TO 20 CENTS A POUND**, resulting from the additional handling and packaging required for irradiated products, the cost of the irradiation process, and the post-irradiation sampling for pathogen testing."

—Questions and Answers on Irradiated Ground Beef. Food and Nutrition Service, USDA, May 29, 2003. www.fns.usda.gov/cga/PressReleases/2003/irradiation-qas.htm

However, the USDA seriously underestimated the cost of irradiated ground beef for the National School Lunch Program (NSLP). In May, 2003, USDA lifted its long-standing ban on serving that product as part of the program, which serves 27 million children annually. The USDA's Agricultural Marketing Service then obtained three different sets of bids for irradiated ground beef for the NSLP during the summer of 2004—**AND REJECTED ALL OF THEM DUE TO THEIR PROHIBITIVE COST**. The only supplier to bid was Swoyersville, Pennsylvania-based Qualipaq, whose bids ranged from $2.51 down to $2.07 per pound, each of which the USDA rejected. These compared to the price that the NSLP was paying at that time for non-irradiated ground beef of $1.73 per pound, i.e., **A MINIMUM PRICE PREMIUM OF 34 CENTS PER POUND**.

As a result of the excessive price—and due to very low demand from only a few districts scattered around the country—no U.S. schools are known to have served any irradiated ground beef from the NSLP to date. Qualipaq had planned to use an irradiation plant near Philadelphia to supply its bid, but the plant shut down in April, 2005, in large part due to the NSLP rejection.

In the retail marketplace, the cost differential has been even higher, as shown below.

"Irradiated meat has another drawback. It costs more. At Super G, for example, 85 percent lean SureBeam costs $2.99 a pound (with a discount card) while the card price for store brand 85 percent lean beef is $2.49 a pound. [A differential of **50 CENTS PER POUND**.] Shoppers need a good reason to pay a 20 percent premium. SureBeam might be safe, but as far as the average shopper is concerned, so is the store brand of ground beef. So, why pay more?"

—Post, K. 2003. If Beefs Don't Kill Irradiated Meat, Lean Sales Might. *Press of Atlantic City*, June 13.

A price check with Wegman's Allentown, Pennsylvania, store in October, 2005, found irradiated burger sold only as frozen patties.

- "BeSure" irradiated: $6.99 for eight 4-oz patties = $3.50/lb
- "Philly Gourmet" (the only other frozen patties) non-irradiated: $7.49 for twelve 4-oz patties = $2.50/lb.

Thus, while sold in smaller quantities, the irradiated hamburgers were a full **$1 PER POUND MORE**.

In short, all of the FDA and USDA cost estimates on their websites, above, were grossly optimistic. And, remarkably, all three of those mistaken web pages are still online in late 2005.

An industry in free fall

Not surprisingly, given the quality damage and significantly higher cost of their products, the food irradiation industry appears dead in the water—at least for now. Very few irradiated items are actually sold to consumers, representing a virtually invisible fraction of food sales nationwide. The industry's leading company, SureBeam, filed for Chapter 7 bankruptcy (complete liquidation, not reorganization) in January, 2004. Some quotes illustrating this collapse:

Brian Dalziel of Cedar Rapids, Iowa, based Mitec, said: "Our research shows that consumers are apathetic. They won't seek out, or avoid, irradiated items. Selling irradiation as a value-added product will fail."

—Mitchell, R. 2004. Meat irradiation down...but not out. *The National Provisioner*, June.

"Should you buy it? There's no reason to if you cook meat thoroughly. Irradiation actually destroys fewer bacteria than does proper cooking."

—Anon. 2003. The truth about irradiated meat. *Consumer Reports*, August.

A spokesperson for the Pick 'n Save grocery chain in Milwaukee, which dropped SureBeam beef in 2001, said: "There has been absolutely no consumer acceptance."

—Herzog, K. 2001. Zapped hamburgers not on shopping list. *Milwaukee Journal Sentinel*, July 27.

Former SureBeam Vice President Dennis Olson said after the company went bankrupt in 2004 that there was "no momentum at all" in the irradiation business. "The company over built, and the overhead became too great. Our entire processing volume would have comprised less than half the capacity of a single plant. We needed to grow three-hundred to four-hundred percent to cover the overhead in the facilities."

—Mitchell, R. 2004. Meat irradiation down...but not out. *The National Provisioner*, June.

"[T]he market did not evolve," said Steven Grover of the National Restaurant Association. "It just never caught on in the restaurant industry."

—Frumkin, P. 2004. Food irradiation future dims as SureBeam folds. *Nation's Restaurant News*, Feb. 9.

"Germany is now an extreme opponent to this technology, despite the fact it used to be one main contributor to this technology and to the proof of its wholesomeness. The European Community is blocked by this attitude from Germany and by the lacking enthusiasm of its (formerly 15, now 25) members.... The downfall of ICGFI [the International Consultative Group on Food Irradiation] is due to the fading interest of many governments of formerly leading countries. As a consequence, in Europe the expertise in food irradiation is fading away.... The public support

for food irradiation is decaying: The National Agricultural Library at Beltsville, USA, is too short of funds in order to maintain its services on food irradiation, the U.S. Army Natick laboratories are about to be closed down including its group on food irradiation; the Federal Research Centre for Nutrition and Food at Karlsruhe, Germany, is reducing its services for the traditional on-line 'Bibliography on Food Irradiation'."

—Ehlermann, D.A. 2005. Four decades in food irradiation. *Radiation Physics and Chemistry*, 73:346-347.

A further note on Dr. Ehlermann's points: The authors of this report discovered on a Spring, 2005, visit to the USDA Agricultural Research Service's Food Safety Research Unit in Wyndmoor, Pennsylvania, that irradiation research has been discontinued there as a primary program focus.

A recent informal survey by Public Citizen of Publix grocery stores in Florida, Georgia, South Carolina, Alabama and Tennessee revealed that only half the stores carry irradiated ground beef. The chain, one of the largest in the Southeast, once claimed to stock the product in all of its more than 700 stores. Another Public Citizen survey showed that 15 major grocery chains that once sold irradiated ground beef no longer offer it. Dairy Queen restaurants once prominently served SureBeam-treated hamburger, but company officials told Public Citizen in August, 2004, that they stopped carrying it.

A new cobalt-60 irradiation plant in Milford Township, near Philadelphia, closed for good in Spring, 2005, after just 18 months of operation, amid widespread local opposition. The plant, CFC Logistics, was owned by a subsidiary of Pennsylvania-based Hatfield Quality Meats, a large meat packer.

Today, irradiated ground beef is only prominently marketed by a few small grocery chains, a food mail-order service, and a home-delivery firm. Information on the amounts sold is not released. A small number of irradiation plants treat relatively small quantities of food, chiefly spices. Only one commercial U.S. irradiator is believed to generate its primary income from irradiating food—Food Technology Service (FTS), at a small plant near Tampa. In a further affirmation of industry weakness, on October 25, 2005, FTS announced it had been officially notified by the NASDAQ stock exchange that FTS failed to maintain a minimum stock value of $1.00 over the preceding 30 trading days as required by NASDAQ rules. That temporarily made FTS stock a potential candidate for de-listing altogether.

Conclusion

The numerous problems afflicting the irradiation industry documented here are encouraging to advocates for more sensible solutions to food safety concerns. However, the irradiation industry has been cyclical since the 1960s. Despite the recent technical and marketing failures, history indicates that the industry—propped up by allies in the Federal government—will try again to revive itself.

With each new marketing attempt, irradiation backers spread the same myths—that irradiated foods are proven to be 100% safe;—that the treatment does not form toxic chemicals or otherwise change the food's composition;—they taste, smell, and look no different;—and they cost just a few pennies more than non-irradiated foods. A waning of public attention could allow resuscitation of this unwanted technology, even in the near future.

Some recent developments point to this. Plants have opened or are on the drawing boards in Australia, Mexico, New Zealand, the Philippines, and other countries aiming to ship irradiated fruits, vegetables, and meats to the United States and elsewhere. A flood of irradiated imports could exacerbate the trend towards globalized supply that has already bankrupted tens of thousands of mostly small U.S. farmers and ranchers and forced many of our food processors out of business. Further, the United Nations-affiliated Codex Alimentarius Commission has approved the irradiation of any food at high, virtually unlimited, doses, despite the risks.

Additionally, Congress has attempted to weaken the already bare-bones labeling laws for irradiated food, to allow irradiators to call their products "pasteurized" or other terms more palatable than "irradiated". The above-cited research verifies that the changes caused in this food are "material" and that consumers must be clearly informed of the process applied, which is not now the case for restaurant food, school lunches, or mixed-ingredient foods containing irradiated substances. To FDA's credit it has resisted Congress's attempts to weaken our labeling laws so far, but that could change any time.

Regardless of the label, why would rational consumers want food laced with toxicity concerns; nutritional deficits; disgusting odor, taste, color and texture problems; plus with a major cost premium on top? In this, as in other areas, consumers are demonstrating more sense than government officials by staying away from this technology *en masse*.

In the meantime, taxpayers have quietly paid untold millions of dollars for research on ways to eliminate the "gross" qualities outlined in this report, which has largely occurred at publicly-supported agricultural research universities and at Federally-funded laboratories of the Departments of Agriculture and Defense, and the former Atomic Energy Commission. Private companies have no doubt spent millions in research and development also in seeking to eliminate these objectionable qualities, however, those expenditures are hidden. Yet, those internal company costs clearly have contributed to the technology's lack of commercial viability.

What you can do

Your help is needed to prevent the spread of this technology:

- Urge the FDA, USDA, and your Congressional representatives to ban irradiated foods until or unless its manifold problems—including its lack of wholesomeness documented here—are resolved in a public, transparent way. The most direct way to approach FDA is to support the pending petition to revoke the past approval for irradiated ground beef—please go to http://ga3.org/campaign/irradiatedgroundbeef and fill in the comment form.

- Oppose any attempts by Congress or FDA to further weaken the already weak labeling laws. Check our websites for future updates on this: Center for Food Safety, www.centerforfoodsafety.org, and Food and Water Watch, www.fwwatch.org.

- Oppose the serving of irradiated foods in your local school district, including working through your parent-teacher organizations, due to the unacceptable risks to our vulnerable children, its inadequate labeling, and its gross quality.

- Encourage your local grocers and restauranteurs not to carry irradiated foods, keeping in mind that irradiated food sold in groceries must be clearly labeled, but this is not true for restaurants.

- Buy wholesome organic food, which cannot be irradiated legally.

- Become a member of the Center for Food Safety and Food and Water Watch to support our efforts against this technology; see https://secure.ga3.org/03/support_us and www.foodandwaterwatch.org, or call (202) 547-9359 or (202) 797-6550, respectively.

Thank you!