A Dangerous Deal

How Irradiated Foods Are Putting Colorado Consumers at Risk

A Special Report

Colorado Public Interest Research Group

Critical Mass Energy and Environment Program

November 2003

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This document can be viewed or downloaded at www.copirg.org and www.citizen.org/cmep

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The mission of CoPIRG is to deliver persistent, result-oriented public interest activism that protects the consumers in Colorado, encourages a fair sustainable economy and fosters responsive democratic government.

Public Citizen, founded by Ralph Nader, is a non-profit research, lobbying and litigation organization based in Washington, D.C. Public Citizen advocates for consumer protection and for government and corporate accountability, and is supported by more than 150,000 members throughout the United States.

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Executive Summary

Irradiated foods, which are exposed to radiation to kill bacteria, extend shelf-life and eliminate invasive pests, present an array of potential health risks to consumers.

These foods have already entered Colorado's food supply through several supermarkets and may soon be served to children in public school cafeterias.

What is Irradiated Food?

Irradiating food is accomplished by exposing it to ionizing radiation via one of three technologies: gamma rays, X-rays or electron beams. There are two main concerns associated with "treating" food with radiation: nutritional value is decreased, and changes occur in the chemical composition of food. When food is blasted with radiation, new chemical compounds can be formed, some of which have never been found to occur naturally in any food on Earth.

In experiments dating to the 1950s, a wide range of health problems have been observed in test animals fed irradiated foods, including mutations and other genetic damage, fetal death and other reproductive problems, cancer, organ and immune system damage, blood disorders, stunted growth and nutritional deficiencies. A small number of studies have revealed certain health problems in adults and children.

Irradiation depletes the nutritional value of food by destroying or disrupting vitamins, enzymes, proteins and other nutrients. Virtually all vitamins exposed to this process suffer measurable losses. Vitamin B_6 in irradiated beef, for example, has been shown to be decreased by 91 percent after 15 months.

FDA Failures

To this day the U.S. Food and Drug Administration *has not established a safety level for irradiated foods*. The FDA's guidelines allow food to be exposed to radiation equivalent to as high as *one billion* chest x-rays.

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Irradiated food has already entered Colorado's food supply. First, consumers can purchase irradiated foods at King Soopers, City Market, Avanza, and Sun

Mart stores. Yet, the average consumer has not been sufficiently informed about the risks these foods present, and are also not aware of the failures of the FDA to uphold its own standards of food safety during the authorization process.

Second, Colorado school districts are currently deciding whether or not to include irradiated meat in school lunches.

On May 29, 2003, the U.S. Department of Agriculture lifted the prohibition on irradiated meat in the National School Lunch Program. Starting in 2004, school districts throughout the country will have the option of serving this product in school lunches at an additional cost of 13 to 20 cents more per pound. The almost complete lack of research on how exposure to irradiated foods could affect a child's development makes this decision unacceptable.

Finally, local ranchers could feel the side-effects from widespread sale of irradiated foods. Throughout the state, they could be forced to compete with corporations able to take advantage of lower production and labor costs in foreign countries. Irradiated foods can be stored without spoiling for longer periods of time, allowing foods produced elsewhere to be shipped here and sold at local markets.

Ranching contributes half of the $4.5 billion dollars generated by agriculture in Colorado, and the potential impacts of their loss are enormous.

Recommendations

Colorado's consumers are faced with a changing set of values and rules concerning how our food is raised, processed, and sold. Our ranching communities are competing in an emerging international market while still searching for local buyers. Consumers' trust in familiar grocery stores is being challenged by the presence of irradiated foods on their shelves.

Our children may end up eating a product that has not been tested for potential adverse health effects in any meaningful way by the agencies charged with that responsibility.

The Colorado Public Interest Research Group and Public Citizen recommend several solutions to these problems:

- The state of Colorado should pass a ban on serving irradiated foods in schools or, at the very least, make it mandatory for schools serving irradiated food to provide written notification to parents, have signage in the cafeteria, and always provide a non-irradiated meal option.
- Individual Colorado school districts should pass resolutions banning irradiated foods in their respective school lunch programs.
- Supermarkets should remove irradiated foods from their shelves, or ensure clear labeling of irradiated ingredients.
- Based on new research, the FDA should suspend pending approvals of ready-to-eat foods and seafood.
- The FDA should exercise the precautionary principle by issuing a moratorium on irradiated food. The USDA should reverse its approval of irradiated beef in the National School Lunch Program until conclusive studies have been done to determine "safe" levels of chemicals in irradiated beef – particularly in terms of exposure to children.

A Dangerous Deal

Introduction

Food-borne illness is on the rise, so the meat industry is scrambling to protect its image and searching for a quick-fix solution to cover its liability without having to revamp its faulty production practices. The *Denver Post* recently reported that the ConAgra plant in Greeley, Colo., found contaminated meat 63 times in the weeks before finally recalling 18.6 million pounds of beef in 2002 that was ultimately connected to 46 serious illnesses and one death.[1]

Concurrently, the food irradiation industry is looking for a market, and the two have teamed up to tout irradiation as the next pillar in food safety. But, is food irradiation truly the solution?

Evidence shows that irradiating food alters its chemical composition while also lowering its nutritional value – all in the name of covering up the improper practices occurring in food processing plants and bringing larger profits through longer shelf-life. Real answers to the problem of food-borne illness will ensure cleaner and safer processing facilities, and will never involve technologies that have not been thoroughly tested for consumer safety.

By exploring the history of how food irradiation has been legalized and what the potential health risks are, an informed decision is clear. Zapping our food with radiation forsakes consumer safety in the pursuit of corporate profit. Until the FDA more thoroughly studies the safety of irradiated foods, these products should not be made available to consumers in any way.

What is Irradiated Food?

The Process

Irradiation exposes food to ionizing radiation in order to kill bacteria and prolong shelf-life. The term radiation describes a wide spectrum of energy sources that can kill microorganisms such as *E. coli*, *Salmonella*, and *Listeria*, among others. Irradiation can extend shelf life by killing spoilage bacteria, mold and other microorganisms.

The process can be accomplished by one of three technologies: gamma rays, X-rays, or an electron beam (electrons moving close to the speed of light.) X-rays are seldom used because they are the most expensive to produce. Electron beams are created with linear accelerators, some of which are based on technology originally developed for the Star Wars missile-defense program. Gamma rays are created by radioactive isotopes (usually cobalt-60), and are the most commonly used technology for irradiation.

Regardless of whether ionizing radiation comes from radioactive materials or "e-beams," however, its effect on food is the same. The only difference is how the radiation is produced.

When food is exposed to radiation, new chemicals can be produced and beneficial nutrients are often destroyed. Ionizing radiation, by definition, can cause electrons to be knocked out of their orbits and to begin bouncing around freely, forming charged molecules called free radicals. As these free radicals collide, new chemical compounds called "radiolytic products" can be formed. Some of these chemicals are unique to irradiated foods and have not been adequately studied for safety.

In 1977, the Federation of American Societies of Experimental Biology discovered that 55 chemical compounds found in irradiated beef do not occur naturally in beef, do not occur naturally in any food, or grew in concentration due to irradiation.[2] For example, the presence of benzene – a known human carcinogen according to the Environmental Protection Agency[3] – increased by 650 percent.

Dozens of foods, from eggs to spices to ground beef to chicken breasts, are now legally exposed to radiation. However, because of the structural changes caused by the irradiation

process, not all foods can withstand the process and still be edible. In one group of studies, for example, only 9 of 27 fruits were able to withstand the change in cell chemistry involved, including strawberries, mangoes, papayas, apricots and figs.[4] Currently, the ones most likely to be found in your grocery stores are strawberries, mangoes, and papayas.

Foods that have passed the test have still been found to lack the texture and taste found in untreated samples.[5] In August 2003, *Consumer Reports* described how professional taste tests found irradiated meat to have a "scorched taste and a smell reminiscent of singed hair." [6]

Federal Approval

The history of this process involves a number of federal departments, the U.S. Army, and scientists that were swept up in the possibilities of the Atomic Age. As the excitement surrounding the discovery of atomic power began, the scientific community searched for a variety of applicable uses. It also satisfied a need to alter the image of nuclear energy from one of death and destruction to a more positive, daily application. Although other ideas like plutonium-heated long-johns and atomic wristwatches failed, the irradiation of food has lingered.

The first documented attempts to irradiate food came in 1921, when it was discovered that radioactive waves killed *Trichnella spiralis*, a bacteria found in pork. During the mid-1960s, after 40 years of advances in atomic research, the Army sent several thousand pounds of irradiated bacon to soldiers serving in Vietnam. In 1968, however, it was discovered that research indicating premature death, cancer, and reproductive dysfunctions in lab animals fed irradiated foods had been kept from the FDA during the approval process.[7]

This discovery led to congressional hearings in 1968 at which Daniel Banes, then-FDA associate commissioner, expressed his concerns about this process.

Banes stated: "Our knowledge 8 or 10 years ago about the teratogenic [birth defect-causing] effect of drugs... was sketchy. In fact, it was practically nonexistent. The questions we ask now about the effects of drugs on the reproductive process and on metabolic systems and the biochemistry of the body are far more subtle and far more advanced. I submit, sir, that the same situation obtains with respect to irradiated food." The FDA revoked the Army's permit to irradiate bacon shortly afterward.

In the words of U.S. Representative Melvin Price, an Illinois Democrat and military veteran: "We were guinea pigs."[8]

The issue was revisited in the 1970s as the U.S. Department of Energy began to address the accumulation of radioactive waste produced in Hanford, Wash., and Savannah River, S.C. Both of these facilities played a role in the development of nuclear weapons, and the waste stored at the two sites required permanent containment and monitoring. The application of the waste for the irradiation process presented an attractive solution to this problem. Not only would new facilities need to be designed and built for the irradiation of foods, the costs of storing the waste would be defrayed by the profit earned.

In 1979, Hubert Blumenthal, then the FDA's toxicology director, called for the creation of the Irradiated Foods Committee (IFC), which recommended that foods exposed to high-level radiation be consumed by lab animals in order to determine safe levels. Only seven of 409 resulting toxicology studies were accepted by the FDA, with the remaining body of tests declared "deficient."[9]

These seven studies were also deficient according to FDA standards, but eventually became the major basis for future FDA rulings to legalize several types of food for irradiation.[10] During the period between 1983 and 2000, spices[11], pork[12], fruit, vegetables[13], poultry[14], beef, lamb[15], and eggs[16] were all authorized for irradiation.

The FDA's Irradiated Foods Committee stated in 1980: "From a practical point of view, it is anticipated that the actual human exposure [to irradiated food] will probably not exceed 10 percent in the near future... A worst case scenario would predict that 40 percent of the

human diet would consist of irradiated food."

The FDA's toxicological and nutritional assumptions for approving irradiation were based on the 10 percent estimate, and their own "worst case scenario" has still not been studied. Yet right now, the FDA is considering approving the irradiation of "ready to eat" foods, molluscan shellfish (such as clams, oysters and mussels), and crustacean shellfish (such as shrimp, crabs and lobsters). According to the National Food Processors Association, "ready to eat" foods alone comprise 37 percent of the typical American's diet. If this category of foods is approved, about half of the U.S. food supply could legally be irradiated.

Irradiated Food Presents an Unknown Risk

Research into Health Risks

The growing body of research surrounding irradiated food has led to two observations. First, irradiation reduces nutritional value. Second, a wide range of health problems have been observed in test animals fed irradiated foods, including mutations and other genetic damage, fetal death and other reproductive problems, cancer, organ and immune system damage, blood disorders, stunted growth and nutritional deficiencies.[17] A small number of studies have revealed health problems in adults and children.

As stated earlier, the irradiation process creates a number of chemicals that are suspected catalysts for cancer, birth defects and other health problems. These include benzene, toluene, methyl ethyl ketone, octane, acetone, ethanol, hexane, heptane, and pentane. (See Figure 1, this page.)

A number of serious concerns are raised in the studies that demonstrated potential dangers in irradiated food consumption. A chromosome abnormality called polyploidy was found in children who consumed recently exposed

Figure 1

The following chemicals have been detected in irradiated beef.[18] The FDA has never determined a "safe" level for the consumption of these chemicals as they occur in irradiated foods. Here are the health effects that have been associated with these chemicals.[19] Because the potential exposure of these chemicals via irradiated food is unknown, the potential health effects are unknown.

Benzene

Known human carcinogen and possible teratogen; may affect blood-forming organs, liver, immune system and central nervous system.

Methyl ethyl ketone

Possible human teratogen; may affect central nervous system.

Octane

May be harmful if ingested.

Toluene

Possible human teratogen; may affect central nervous system.

Heptane

Target organs include central nervous system.

Acetone

Harmful if ingested; long-term exposure may cause liver damage; target organs include central nervous system.

Ethanol

May cause birth defects and other reproductive problems; target organs include central nervous system, liver, blood, reproductive system.

Hexane

Target organs include central and peripheral nervous systems; may cause impaired fertility and central nervous system depression.

Pentane

Target organs include central nervous system.

irradiated wheat.[20] Adults who ate irradiated potatoes were diagnosed with elevated red blood cell counts.[21] Rats that drank solutions of 2-alkylcyclobutanones (2-ACBs) – previously unknown chemicals formed in certain irradiated foods – in conjunction with exposure to a known colon carcinogen developed more large tumors, more multiple tumors, and more preneoplastic lesions than rats only exposed to the carcinogen.[22] Carcinogenesis is the process in which normal cells are transformed into cancer cells. Irradiated sugar fed to rats created noticeable levels of radioactivity in their livers, kidneys, and stomachs.[23] When rats were fed irradiated beef, some of them suffered from internal bleeding.[24]

Another source of concern is the documented depletion of vitamins, enzymes, proteins and other essential nutrients. Research has proven that virtually all vitamins exposed to this process suffer losses. If the nutritional value of the food is reduced, then the further storage and eventual cooking compounds the problem.[25] In some cases 91 percent of vitamin B_6 in irradiated beef was lost after 15 months of storage.[26] If protecting consumers from food-borne illness is the goal, then why use a technology that may jeopardize health? Illnesses that result from malnutrition are equally unacceptable.

Child Development and Toxic Exposure

Dr. William W. Au works with the Department of Preventative Medicine and Community Health at the University of Texas Medical Branch in Galveston, Texas. In 2002, Dr. Au published a report in the *Journal of Hygiene and Environmental Health* that focused on the relationship between children and toxic substances.

Children have a higher activity rate and take in more air, water, and food per pound of body weight than the average adult. Accordingly, toxic substances are ingested at higher levels and therefore can have a greater effect.

Au's research indicates that embryos, fetuses, and children undergo tremendous physical changes that are dictated largely by what is eaten. This effect is especially important with the nutrients exchanged in utero between a mother and an unborn child.[27]

As the research documenting new substances found in irradiated products indicates, children eating irradiated foods may be affected at a greater rate than adults by 2-ACBs and other compounds formed.

Au states: "The scientific community and regulatory agencies have very little knowledge regarding how children respond to insult from toxic chemicals. However, certain scientific data indicate that children are more susceptible to toxic exposure than adults because they have proportionally more intake of food contaminants, active developmental processes, multiple exposure pathways and susceptible socio-behavioral activities. The formation of hazardous free radicals in irradiated food that can cause DNA damage is of serious concern."[28]

FDA Regulation is Inadequate

The FDA's protocols require that all food additives in the U.S. pass a 100-fold safety factor before human consumption can occur. To find the safety factor, they first establish the highest concentration of exposure to laboratory animals before harm, and then divide that by 100. Despite these regulations, to this day the FDA *has never established this safety level for irradiated foods*. The current allowable levels for irradiation are between 1 and 30 kiloGray – the equivalent of 33 million to 1 billion chest x-rays.[29]

Further, the agency has not tested or quantified all of the radiolytic products present in irradiated foods. The question of whether or not a radiolytic product in one type of food has the same safety level as a different radiolytic product in another type of food has not been properly assessed either. To date, after a review of FDA documents, these required testing protocols have never been met.[30]

Irradiated Foods Have Entered Our Food Supply

Despite the obvious risks irradiated foods present, their presence in American diets contin-

ues to expand. The food irradiation industry has not only convinced supermarkets to sell their product, but is also looking to public schools as a "captive audience." By working to include irradiated meat in the National School Lunch Program, they ensure a consistent buyer. By lengthening the shelf-life of foods through irradiation, corporate "agribusiness" can take advantage of lower production and labor costs in international markets. This is going to have a direct, negative impact on local ranchers searching for a domestic market.

The National School Lunch Program

Background

On May 29, 2003, the U.S. Department of Agriculture chose to include irradiated ground beef as one of the purchasable commodities in the National School Lunch Program, at 13-20 cents more per pound than regular ground beef. Each individual school district across the country will have the choice of whether or not to serve irradiated meat in their school lunches beginning on January 1, 2004.

During the comment period preceding the USDA decision, thousands of parents, teachers, students, and concerned citizens wrote letters. Ninety-three percent of these comments were opposed to including irradiated food in the National School Lunch Program. Therefore, the USDA acted in direct opposition to the expressed wishes of its constituents.

The inclusion of irradiated food in federal nutrition programs is not a new idea. The first attempt to include irradiated foods in the National School Lunch Program occurred in 2001. The Agricultural Marketing Service issued revised specifications for commodity contracts that would have permitted the purchase of irradiated foods in the USDA's National School Lunch Program. This created such a tremendous public outcry that USDA Secretary Ann Veneman was forced to promptly rescind these revised specifications.

The second attempt came on May 12, 2002, when the Farm Security and Redevelopment Act, commonly referred to as the Farm Bill, was signed into law. The Farm Bill contains a provision that required the Secretary of Agriculture not to prohibit irradiation when making commodity purchases for USDA nutrition programs, including the National School Lunch Program. Previously, the USDA had prohibited the use of irradiated food for federal nutrition programs. This provision effectively reversed that prohibition.[31]

Irradiation is not a cure-all for food safety problems in schools. In the past few years, several prominent media and government investigations have exposed a range of problems that can make school food unsafe, ranging from budget cuts to appalling conditions in crumbling school cafeterias. According to a 2000 USDA report, food poisoning from school meals is caused in part by lack of information and an inadequate communication system in food recall situations, and deteriorating food storage and preparation facilities that create hazards as food is prepared.[32]

Additionally, there is no federal regulation that requires irradiated food served in school cafeterias to be labeled. This is a violation of parental right-to-know. Much should be done to improve food safety in schools, but irradiation is not the solution. Instead of a questionable – and potentially hazardous – quick fix, our government ought to be promoting comprehensive solutions to food safety problems in our nation's school systems.

Irradiated Food and the Minnesota Public "Education Campaign"

During the USDA's open comment period, the agency simultaneously approved a grant of $151,245 to the Minnesota Department of Children, Families and Learning to conduct a pilot "education" program on serving irradiated food in school lunches. The very purpose of the project was to create a packet of information to send to school districts nationally that would push the acceptance of irradiated food in school lunches. In the language of the grant proposal, the authors stated: "A successful outcome of the

educational campaign will be acceptance and introduction of irradiated ground beef in select school districts." [33]

The designers of the biased study included nine "pilot partners," half of which had direct financial ties to the SureBeam Corporation, a major food irradiation company based in San Diego.[34] Two high-ranking officials, Elsa and Peter Murano, both at the USDA with jurisdiction over federal nutrition programs, also have ties to SureBeam.[35]

The pilot program included three Minnesota school districts: Spring Lake Park, Sauk Rapids, and Willmar. The study itself consisted of surveys sent to some school personnel and telephone surveys with only 50 parents in each district.

Based on their expressed goal of acceptance and introduction of irradiated ground beef in the three school districts, the project was a total failure. Only two of the districts actually completed the program. Superintendents realized that what they had agreed to, and what was actually being implemented, were two entirely different things.

The superintendent of Sauk Rapids pulled the district out of the program: "It was our sense that we were moving beyond the point of study and being positioned by all parties as being proponents of a product that we merely agreed to study as opposed to endorse."[36]

Due to many vocal parents who started an organization called Healthy Kids Minnesota, Spring Lake Park stated publicly that it would not buy irradiated beef for their school lunch programs. Willmar has also decided not to serve irradiated ground beef.[37]

School Districts Opt Out

Throughout the U.S., school districts and states have begun to take a public position on irradiated foods. Four school districts in California have already banned irradiated meat from their school districts. Many school districts across the country have publicly stated that they will not be purchasing irradiated meat this year or for the foreseeable future. To date, only three school districts have publicly stated that they wanted to purchase irradiated meat: Monroe, Ind.; Agra, Okla.; and Bennington, Neb. However, school districts must purchase the beef through their state departments of education, who in turn, must purchase it from the federal government. Many states are opting out for various reasons, and Indiana, Oklahoma, and Nebraska are among them. They have stated that the statewide demand is too low for the product and they will not be purchasing irradiated meat for those districts this year.

The most notable district to ban irradiated meat is the Los Angeles Unified School District. On September 9, 2003, with the urging of parents, teachers, and several public interest groups, the L.A. School Board unanimously passed a resolution banning irradiated foods from their school meals.[38] With 700,000 students, L.A. is the nation's second largest school district. School board member Julie Korenstein stated: "I always believe we need to err on the side of caution. I don't want our little children to end up being guinea pigs."[39]

Colorado and Irradiated Foods

In Colorado, food irradiation could have a direct impact in three ways. First, irradiated meat could soon be served to children in school lunches. Second, consumers can purchase irradiated foods at King Soopers, City Market, Avanza, and Sun Mart supermarkets. Finally, local ranchers throughout the state could be forced to compete with large corporations that are able to take advantage of lower production and labor costs in foreign countries – a luxury that agribusiness already enjoys.

Irradiated Food in Schools

Irradiated meat may soon appear in Colorado's public school systems. Unlike states like Indiana and Oklahoma, Colorado will provide irradiated beef for any district that requests it. There are currently 32,391 students receiving a free lunch in the Denver public school system, and another 7,096 eating school

lunches at a reduced price. If Denver public schools serve irradiated meat, more than 60 percent of their students could be exposed to this product.[40] Currently, no school districts have publicly stated that they will include it in their lunch programs. The Colorado Board of Education has been met by resounding silence from school districts on this choice.

Facts on Denver's Public School Lunch Program

Total student population:	72,168
Lunches served daily:	35,422
Students receiving free lunch:	32,391 (52%)
Students receiving reduced price lunch:	7,096 (11%)

By leaving the option open, Colorado school districts will be able to prevent irradiated beef from being served in their school cafeterias.

Irradiated Food in Grocery Stores

Irradiated food is already available at the local supermarkets. With four supermarkets in Colorado offering irradiated meat under the SureBeam label, consumers can purchase this product without being fully informed about the process. King Soopers, City Market, Sun Mart, and Avanza have all recently begun to stock irradiated meat on their shelves. King Soopers and City Market, along with their parent company Kroger Supermarkets, currently offer irradiated meat and papayas, which are often more expensive than regular products.[41]

Irradiated ground beef sold at King Soopers and City Market averages $1 more per pound than non-irradiated ground beef.[42] The typical consumer has not been sufficiently informed about the risks these foods present, and are also not aware of the failures of the FDA to uphold their own standards of food safety while authorizing their use.

The international symbol for irradiation: the 'Radura'

Federal labeling standards require that the "radura" – the international irradiation symbol – and the words "Treated with Irradiation" be present on the whole foods such as meat or mangoes. The radura is a flower with two petals in a broken circle. However, loopholes to the labeling laws include processed irradiated foods and foods served in schools, hospitals, or restaurants. For example, if an apple were irradiated, it would require a label, but applesauce, as a processed food, would not require a label.

Irradiated Foods Hurt the Ranching Community

A third impact on Colorado is the effect that the irradiated foods market could have upon the state's ranchers. Of the $4.5 billion that agriculture generated in Colorado in 2002, approximately 55 percent was the result of the ranching industry. There are currently 10,500 cow and calf operations that depend on a domestic market for their product.[43] Irradiated foods, in combination with equivalency agreements in trade practices, could further impair local ranchers' ability to compete for market share.

Equivalency agreements are a recent addition to U.S. domestic laws. Equivalency laws are designed to allow foreign goods produced under different rules and regulations "free passage" into the importing country's market without re-inspection at the border. Goods that meet the *exporting* country's laws and regulations must be allowed entry even if they do not precisely meet the standards of the *importing* country. Although the language and methods involved in each nation's regulations can differ, they can still be declared "equivalent" to each other.

With the passage of the North American Free Trade Agreement (NAFTA), equivalency has become a mainstay in U.S. trade with other nations. In order for U.S. meat producers to compete, many of the larger agribusiness corporations are moving operations overseas where labor is cheaper and environmental regulation is weak. This is hurting small domestic meat producers.

Equivalency agreements also present a dangerous option for Colorado consumers. Although the USDA has not inspected the beef that is imported, instead relying on the exporting country's rules, the product could still be stamped with a USDA grade stamp.[44] This could lead consumers to assume they are buying beef from the U.S. when they could be purchasing meat from other countries, with little or no awareness of the safety standards for inspection and processing.

In 2002, after a streamlined border inspection system was implemented, there was a 65 percent drop in the rate of imported meat and poultry being inspected.[45] Increasing fears of bio-terrorism, food-borne illness, and processing standards require an adequate response by U.S. officials to properly inspect any and all foods for sale to U.S. consumers. In addition, there is concern that the differing irradiation labeling laws in various countries could lead to unlabeled imported irradiated products.

As mentioned earlier, one of the major purposes of irradiation is to extend food shelf-life, which in turn makes overseas operations a more lucrative option.[46] It allows large meat producers to undercut local farmers with lower prices. As local, family ranchers are forced to compete in this new deregulated system of beef trade, they will eventually be put out of business.

As the food irradiation process becomes more prevalent in the U.S. and globally, production could further shift overseas where labor is less expensive and environmental safeguards more lax. Food produced internationally could then be irradiated and shipped back to the U.S. for sale.

Growers and ranchers in the U.S., already under heavy competition with global agriculture and corporate agribusiness, will be forced to further compete with overseas production prices. Irradiation facilities are now operating in more than 60 countries, and at more than 40 locations throughout the United States. Many more are in the planning and building phases. (There are no irradiation facilities currently located in Colorado.)[47]

Recommendations and Conclusions

Colorado's consumers are faced with a changing set of values and rules concerning how our food is raised, processed, and sold. Our ranching communities are competing in an emerging international market while still searching for local buyers. Consumers' trust in familiar grocery stores and the USDA is being challenged by the presence of irradiated foods on their shelves. Our children may end up eating a product that has not been tested for potential adverse health effects in any meaningful way by the agencies charged with that responsibility.

The Colorado Public Interest Research Group and Public Citizen recommend several solutions to these problems:

- The state of Colorado should pass a ban on serving irradiated foods in schools or, at the very least, make it mandatory for schools serving irradiated food to provide written notification to parents, have signage in the cafeteria, and always provide a non-irradiated meal option.
- Individual Colorado school districts should pass resolutions banning irradiated foods in their respective school lunch programs.
- Supermarkets should remove irradiated foods from their shelves, or ensure clear labeling of irradiated ingredients.
- Based on new research, the FDA should suspend pending approvals of ready-to-eat foods and seafood.
- The FDA should exercise the precautionary principle by issuing a moratorium on irradiated food. The USDA should reverse its approval of irradiated beef in the National School Lunch Program until conclusive studies have been done to determine "safe" levels of chemicals in irradiated beef – particularly in terms of exposure to children.

Appendix

Chemical Compounds Formed in Irradiated Beef

The most thorough study ever known to be conducted on the chemical changes that occur in irradiated foods was commissioned by the U.S. Army. Of 65 chemicals indentified in irradiated beef, 5 do not occur naturally in any food, 35 are not naturally occuring in beef, and 15 grew in concentration due to irradiation.

Not natural to beef

2-Methyl pentanal
Butane
Butene
Decene
Decyne
Dimethyl sulfide
Dodecanal
Dodecane
Dodecene
Ethane
Ethene
Ethyl mercaptan
Heptadecadiene
Heptadecane
Heptadecene
Hexadecanal
Hexadecane
Hexadecenal
Hexadecene
Nonane
Nonene
Octadecanal
Octene
Pentadecane
Pentadecene
Propane
Tetradecadiene
Tetradecanal
Tetradecane
Tetradecene
Tridecane
Tridecene
Undecanal
Undecane
Undecene

Not natural to any food

Hexadecadiene
Octadecenal
Pentadecadiene
Pentadecanal
Undecyne

Grew in concentration due to irradiation

2-Butanone *
2-Methyl butane
2-Methyl pentane
2-Methyl propane
2-Methyl propene
Acetone
Benzene *
Decane
Ethanol
Heptane
Heptene
Hexane *
Octane
Pentane
Toluene *

Source: "Evaluation of the health aspects of certain compounds found in irradiated beef." Federation of American Societies for Experimental Biology, Bethesda. Prepared for U.S. Army Medical Research and Development Command, Fort Detrick, Maryland. August 1977. Supplements I and II, March 1979.

* Known or suspected to cause cancer or birth defects.

Notes

[1] "2002 meat recall exposed perilous gaps in safety net." *Denver Post*, Oct. 3, 2003.

[2] "Evaluation of the health aspects of certain compounds found in irradiated beef." Life Sciences Research Office, Federation of American Societies for Experimental Biology, Bethesda, Maryland. Prepared for U.S. Army Medical Research and Development Command, Fort Detrick, Frederick, Maryland, Contract No. DAMD-17-76-C-6055. August 1977. Supplements I and II, March 1979.

[3] Integration Risk Information System. National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency. <www.epa.gov/pgispgm3/iris/>

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[31] (I) USE OF APPROVED FOOD SAFETY TECHNOLOGY. –

(1) IN GENERAL. –In acquiring commodities for distribution through a program specified in paragraph 2, the Secretary shall not prohibit the use of any technology to improve food safety that –
(A) has been approved by the Secretary; or
(B) has been approved or is otherwise allowed by the Secretary of Health and Human Services
(2) PROGRAMS.- A program referred to in pragraph (1) is a program authorized under-
(A) this Act;
(B) the food Stamp Act of 1977 (7 U.S.C. 2011 et seq.):
(C) the Emergency Food Assistance Act of 1983 (7 u.S.C. 7501 et seq.);
(D) the Richard B. Russell National School Lunch Act (42 U.S.C. 1751 et seq.); or
(E) the Child Nutrition Act of 1966 (42 U.S.C. 1771 et seq.)"

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