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Food Safety in the Biotech Era

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Bad beef, killer cold cuts, mercury contaminated fish, and salmonella infected sprouts are just a few of the food scares that have made recent headline news. On top of this, there have been warnings about the need to safeguard the country's food supply from poisoning by terrorists. Added to this anxiety is the ongoing controversy here and abroad over the safety of genetically modified foods. Other evidence of this high interest in the topic of food safety is the extensive media coverage being received by Marion Nestle upon the publication of her new book *Safe Food: Bacteria, Biotechnology, and Bioterrorism*, (University of California Press, 2003). Nestle's provocative book has been stirring up considerable controversy as she takes food companies, government agencies, and the scientific community to task.

Food safety is a timely topic that is of importance to libraries serving the general public, the food industry, and academic programs ranging from food science to restaurant management. However, locating information on food safety is complex given the myriad of government agencies involved in the regulation of food production, processing, and distribution. Given the controversial nature of this subject, it is particularly important that librarians scrutinize information closely to ensure that it is not biased. This guest column assists librarians in sorting out the key agencies responsible for this fragmented oversight and in identifying the most credible sources of information on this highly politicized subject. Although a fair number of interesting books in addition to Nestle's *Safe Food* have been published on the topic, this column's focus is on sources most useful for reference service. Additionally, while there are a number of relevant research institutes, their inclusion is beyond the scope of this column.

The guest columnist is well qualified to write on this topic. Nabe serves as the Agriculture and Natural Resources Librarian at the University of Connecticut. He earned his library degree from the University of Illinois and holds a Bachelor of Science degree in Zoology from Southern Illinois University. In between earning these degrees, Nabe worked for the Forest Service and the National Marine Fisheries Service. Coincidentally, the latter agency plays a role in food safety as it conducts seafood inspections. Nabe has published on topics as wide ranging as the literature of evolution, building biology collections, the impact of the Internet on information services for the sciences, and the impact of e-journal bundling on academic libraries. *The Editor.*

Food safety is on a lot of people's minds of late, because of the emergence of genetically engineered crops, disturbing demands for food recalls, and the potential for bioterrorism via the nation's food supply. Less sensational, but more insidious, is the prevalence of individual cases of foodborne illness. One estimate of the impact of

foodborne illnesses in the U.S. is 81 million illnesses, 9000 deaths, and tens of billions of dollars per year[1]. The costs of the failure of food safety mechanisms are increased by food recalls; in September and October of 2002, one Wisconsin company alone recalled 2.8 *million* pounds of ground beef.[2] The changing economy, i.e., globalization, of the food supply is a growing concern, as an ever-increasing share of Americans' diets are produced and packaged outside of the U.S., where monitoring is usually less strict than it is here. Genetically engineered plants and animals (aka genetically-modified organisms), a very recent development whose health effects are unknown, are a matter of intense debate in this country and internationally.

To get a handle on the expansive mosaic of issues and component parts of food safety, this article assumes food safety to include pathogens and chemical substances, as well as genetic engineering, and issues of labeling and nutrition.

There is an incredible labyrinth of federal, state, and local government involvement in the protection of our food supply. No fewer than twelve federal agencies have some responsibility in this area, including five cabinet level departments, and several executive agencies. Because the larger part of food safety in the U.S. falls to these organizations, their responsibilities and the information available from their web sites are the focus of this column. Entries for other nongovernmental sites are included as *supplemental*, and in some cases, *alternative*, sources of information.

The Federal government's gateway to food safety information is at http://www.FoodSafety.gov/. To some extent, it provides unified access to the content of the agencies and sites described below, but only selectively. For comprehensive information, it is necessary to go to the individual web sites.

Government Agencies

U.S. Department of Health and Human Services:

Food and Drug Administration: Center for Food Safety and Applied Nutrition (CFSAN)

http://www.cfsan.fda.gov/list.html

CFSAN, a division of the Food and Drug Administration (FDA), with 800 employees, is responsible for all domestic and imported food sold, including shell eggs (but not meat and poultry), bottled water, and wine beverages with less than 7 percent alcohol. Overall, CFSAN regulates $240 billion worth of domestic food, $15 billion worth of imported foods, and approximately 50,000 food establishments in the U.S.[3]

Responsibilities:
Regulates food and color additives; ionizing radiation; foods and ingredients developed through biotechnology; proper labeling of foods (e.g., ingredients, nutrition health claims); dietary supplements, infant formulas, and medical foods. Inspects food production establishments and warehouses, including collecting and analyzing samples

for physical, chemical and microbial contamination; develops model codes and ordinances, guidelines and interpretations; works with states to implement them in regulating milk and shellfish and retail food establishments; establishes good food manufacturing practices and other production standards, such as plant sanitation, packaging requirements, and Hazard Analysis and Critical Control Point programs; works with foreign governments to ensure safety of certain imported food products; responsibility for recalls and enforcement; conducts research on food safety; educates industry and consumers on safe food handling practices.

Although FDA does not monitor meat and poultry (see Food Safety Inspection Service below), it does regulate animal feed and drugs through its Center for Veterinary Medicine (information at http://www.fda.gov/cvm/default.html).

Information available online:
Of most interest to consumers, recall and enforcement reports (including archives to 1999) are available at http://www.fda.gov/opacom/7alerts.html.
Additionally, this site includes press releases and facts sheets; good links to regulations for regulated products (food coloring, additives, pesticides, etc.); research reports; laboratory manuals; information on imports and exports; and a fish encyclopedia for identification.

Centers for Disease Control and Prevention (CDC)
http://www.cdc.gov/foodsafety/

Responsibilities:
The CDC, with 8,5000 employees overall, investigates sources of foodborne disease outbreaks; maintains a nationwide surveillance system; designs and implements electronic systems for reporting foodborne infections; works with other federal and state agencies to monitor foodborne disease outbreaks; develops and advocates public health policies to prevent foodborne diseases; conducts research to help prevent foodborne illness; and trains local and state food safety personnel.

Information online:
Concise information on foodborne illnesses; list of all infectious and communicable diseases transmitted through food handling; FoodNet (see below); list of foodborne outbreaks in the U.S.; *Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians*; *DPDx*, an online diagnostic and reporting resource for parasitic diseases; *Electronic Foodborne Outbreak Reporting System*, for use by state health officials; *Foodborne Outbreak Response and Surveillance Unit*, which provides outbreak reports and publications, as well as reporting forms; and a limited number of full-text articles.

FoodNet
http://www.cdc.gov/foodnet/

FoodNet is the CDC's online active surveillance network for the detection and reporting of foodborne illness outbreaks. It is the best source of information on the most common foodborne diseases and pathogens, and provides historical data on outbreaks.

U.S. Department of Agriculture:

Food Safety and Inspection Service (FSIS)
http://www.fsis.usda.gov/

Responsibilities:
The 7,600 inspection personnel of the FSIS oversee domestic and imported meat and poultry and related products, such as meat- or poultry-containing stews, pizzas and frozen foods, as well as processed egg products. FSIS conducts inspections of processing plants, performs tests on feed animals and animal products, monitors label law compliance, establishes standards for food additives in the preparation of meat and poultry products, monitors foreign inspection programs for safety in meat and poultry processing plants that export to the U.S., and inspects imported products.

Information available online: consumer publications; brief descriptions of procedures to ensure food safety at home; and the *Food Safety Educator*, an online newsletter of use primarily to educators in the field.

Most noteworthy is the recall information center, which lists all recalls by FSIS and usually includes a press release: http://www.fsis.usda.gov/OA/recalls/rec_actv.htm.

Cooperative State Research, Education, and Extension Service (CSREES)
http://www.reeusda.gov/

With U.S. colleges and universities, CSREES administers grants and develops research and education programs on food safety for farmers and consumers.

Information available online: funded research, food safety research newsletter.

National Agricultural Library, USDA/FDA Foodborne Illness Education Information Center
http://www.nal.usda.gov/fnic/foodborne/index.html

Maintains a database of computer software, audiovisuals, posters, games, teachers' guides and other educational materials on preventing foodborne illness.

Information online: the database; well organized list of links; Foodsafe discussion group archives and how to join (primarily for professionals); Hazard Analysis Critical Control Points (HACCP) Training Programs and Resources Database for food services professionals.

U.S. Department of Commerce:

National Oceanic and Atmospheric Administration (NOAA) - Seafood Inspection Division
http://seafood.nmfs.noaa.gov/

Responsibilities:
Through its voluntary, fee-for-service Seafood Inspection Program, NOAA inspects and certifies fishing vessels, seafood processing plants, and retail facilities for federal sanitation standards. All edible product forms ranging from whole fish to formulated products, as well as fish meal products used for animal foods, are eligible for inspection and certification. Compliant facilities are then eligible to use certification marks to indicate that they have been inspected. The Seafood Inspection Division also provides training to anyone involved in seafood handling.

Information available online: *Approved List of Fish Establishments and Products*; regulations and standards relating to seafood products; basic consumer tips; newsletter.

U.S. Department of the Treasury:

Alcohol and Tobacco Tax and Trade Bureau
http://www.ttb.gov/alcohol/

Responsibilities:
The Bureau has responsibility for alcoholic beverages except wine beverages containing less than 7 percent alcohol (see Center for Food Safety and Applied Nutrition above), and monitors distilleries, wineries, breweries, importers, and wholesalers. The Bureau tests for appropriate levels of regulated ingredients, and monitors labeling. It also investigates cases of adulterated alcoholic products, sometimes with help from the FDA.

Information available online: manuals; newsletters; alcohol production statistics; regulations.

U.S. Department of Homeland Security:

Customs and Border Protection
http://www.customs.ustreas.gov/

Works with federal regulatory agencies to ensure that all goods entering and exiting the United States do so according to U.S. laws and regulations.

Information available online: searchable database of Customs rulings; international trade agreements; links to regulations.

Department Of Justice:
http://www.usdoj.gov/

Responsibilities:
Prosecutes companies and individuals suspected of violating food safety laws. Through U.S. Marshals Service, seizes unsafe food products not yet in the marketplace, as ordered by courts.

Information available online: searchable press releases, annual report.

Federal Trade Commission:
http://www.ftc.gov/

Responsibilities:
The FTC is involved in food safety issues primarily by enforcing consumer laws that regulate unfair, deceptive or fraudulent practices, including deceptive and unsubstantiated advertising.

Information available online: searchable news releases, advertising guidelines.

U.S. Environmental Protection Agency (EPA):
http://www.epa.gov/

Responsibilities:
Like the Department of Justice and the FTC, the EPA ultimately has responsibility for all food types, within the scope of its activities. The EPA also establishes safe drinking water standards, regulates toxic substances, and determines the safety of new pesticides, sets tolerance levels for pesticide residues in foods, and publishes directions on safe use of pesticides.

Office of Pesticide Programs
http://www.epa.gov/pesticides/

Information available online: Pesticide Product Information System, which provides information on all registered pesticide products; the background and text of relevant laws and regulations; product alerts and recalls; consumer, worker, and specific chemical factsheets.

State and Local Governments:

Responsibilities:
State, and to a lesser degree local, governments play a prominent role in the protection of food quality in the U.S. Responsibilities and organization differ by state, but all inspect restaurants, grocery stores, and other retail food establishments. Some also monitor dairy farms, mills, and food manufacturing plants within local jurisdictions. They also have the authority to embargo unsafe food products made or distributed within state borders, and ultimately to close down non-compliant facilities within their borders.

To access official state web pages, use http://www.state.XX.us, where XX is the two letter abbreviation for the state. *www.FoodSafety.gov/*, the federal gateway to information, includes links to the responsible state agencies.

Other:

Food Safety Training and Education Alliance
http://www.fstea.org/

An alliance of government, consumer, and industry representatives whose mission is to "improve food safety training and education at the retail level." Included here for its excellent access to state food codes (http://www.fstea.org/resources/foodcodes.html)

Genetic Engineering

Regardless of personal opinion, there can be no doubt that many Americans view genetic engineering of food as a safety issue. In other countries, this is even more evident; e.g., many European and African countries ban the sale of meat products from genetically engineered livestock. Indeed, the European Union has banned commercial genetically-engineered crops, thought this policy is under review.[4] So-called terminator seeds (i.e., seeds genetically engineered so that mature plants cannot produce fertile seeds of their own) raise the stakes, in many eyes, from an issue of *food safety* to *food supply safety*. These manifestations of biotechnology are so new, scientific analysis can only be correspondingly in the development phase.

Much of the information available on the safety aspects of genetic engineering is therefore biased. Various stakeholders produce prolific amounts of what can only be called propaganda. More reliable resources will only arrive as impartial, long-term research is conducted. Following are a select list of sites that provide at least *some* factual data on the genetic engineering of food crops and animals, and/or provide representative views from the various players.

Animal and Plant Health Inspection Service (APHIS) – Agricultural Biotechnology
http://www.aphis.usda.gov/ppq/biotech/

APHIS has responsibility for regulating the movement, importation, and field testing of genetically engineered plants and microorganisms. This site provides information on the permitting process, links to regulations, and links to "Biosafety Resources." APHIS was transferred from the USDA to the new Department of Homeland Security in December, 2002.

List of Completed Consultations on Bioengineered Foods
http://www.cfsan.fda.gov/~lrd/biocon.html

The FDA has requested developers of genetically engineered food products to submit information on new products in order "to identify and discuss relevant safety, nutritional,

or other regulatory issues regarding the bioengineered food and then submit to FDA a summary of its scientific and regulatory assessment of the food." This is a list of products which have undergone this procedure (but is by no means a complete list of genetically engineered products).

Genetically Engineered Food Safety Problems
http://www.psrast.org/intropage.htm

A page from Physicians and Scientists for Responsible Application of Science and Technology. Scholarly articles from an international organization of scientists.

GE Food Alert Campaign Center
http://www.gefoodalert.org/pages/home.cfm

The Center is a coalition of seven organizations: Public Interest Research Group, National Environmental Trust, Institute for Agriculture and Trade Policy, Organic Consumers Association, Friends of the Earth, The Center for Food Safety, and Pesticide Action Network of North America. Information includes: reports from the coalition or its members, which may include useful statistics, histories and timelines, definitions, etc.; a list of Biopharmaceutical Plant Field Trials in the U.S; and press releases.

Food & Agriculture (Biotechnology Industry Organization)
http://www.bio.org/foodag/

The Biotechnology Industry Organization (BIO) is the biotech's trade and lobbying organization, with over 1,000 large and small biotech companies as members. This is BIO's (hardly unbiased) page on food issues. Information includes background pieces and material presented to various legislatures during debates of new budgetary or regulatory laws.

Legislation

Congressional Research Service Reports at the National Library for the Environment (NLE)
http://cnie.org/NLE/CRS/
The National Library for the Environment provides easy subject access to the Congressional Research Service Reports, which are excellent sources of information not only on newly introduced legislation, but also background information behind it. Simply search by "food safety"; the search can then easily be expanded using subject headings, if desired.

Books and Journals

Roberts, Cynthia A. *The Food Safety Information Handbook*.
Westport, CT: Oryx Press, 2001. ISBN 1-573-56305-6

Until the new millennium, there was no current, respectable reference book for food safety. Roberts' monograph is a comprehensive resource, providing especially strong coverage of the history of food regulation. All of part two, which is a bibliography/resource list, provides information about reports, books, newsletters, Internet sites, databases, educational materials, and government organizations. This is an affordable and accessible resource, of use and targeted to students and consumers.

Journal of Food Protection
Ames, Iowa: International Association for Food Protection, 1937 -. Monthly.
ISSN 0362-028X . Also available online at http://www.foodprotection.org.

This official publication of the Association publishes original, peer-reviewed research. Indexed in Medline/PubMed, CABDirect, Current Contents, and BIOSIS.

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2. "Wisconsin Firm Expands Recall Of Ground Beef For Possible E. coli O157:H7" (October 2, 2002). Accessed November 15, 2002, http://www.fsis.usda.gov/OA/recalls/prelease/pr086-2002.htm

3. *FDA/CSFAN Inside FDA: Center for Food Safety and Applied Nutrition* Accessed May 5, 2003, http://www.cfsan.fda.gov/~lrd/cfsan2.html

4. see *Europa - Genetically Modified Organisms (GMOs) - Community legislation in force – Authorisation* at http://europa.eu.int/comm/food/fs/gmo/gmo_legi_authorise_en.html