

# Save August 11-13 for 2000 NOFA Summer Conference

by Dre Rawlings

The Summer Conference Committee-2000 had its' first planning meeting on October 7th. As your feedback is always important to us, we spent a large part of the evening going through the evaluations. We deliberated some reoccurring issues, and did some preliminary brainstorming for possible solutions.

Hot topics that we hope to address are more porta potties for the campers, more workshops for the entire family, the issue of loud children in workshops and how to deal with them, and more exciting workshops for the 11-12 year olds so they don't try to defect to the teen conference. We may well move the contradance to Friday night, and request speakers for the back of the auditorium on keynote night. For the fair we would like to add more adult games (like hammering skills, cross cut sawing, wood splitting, etc, get rid of the non-biodegradable balloons, make sure our face painting is done with only natural paints, and have two megaphones for the announcers. We will for sure bring back the dunk tank, but may charge more so we don't lose money on it. We will ask Hampshire to reorganize the line system in the food line, make sure the water isn't chlorinated for NOFA Nibbles, organize the program book a bit differently, and put a map in it. We are considering having only local organic food for the Hampshire menu, will make the names

## News Flashes

**BGH loses in Codex ruling.** The Codex Alimentarius, the UN Food Safety Agency, has ruled in favor of nations having the right to impose bans on Monsanto's recombinant Bovine Growth Hormone (rBGH). The surprising ruling overturned the findings of UN expert committees which as recently as last year absolved the hormone from veterinary and public health effects. Codex responded to studies undertaken by Health Canada and the European Commission in defense of their bans on the drug. Both Canadian and European veterinary reviews found increased incidence of mastitis, lameness and reproductive problems associated with rBGH. The European public health review confirmed reports of excess Insulin-like-Growth Factor One (IGF-1) in rBGH milk and determined that this poses major risks of breast and prostate cancer, as well as supporting cancer growth generally. The effect of the ruling will make it much harder for Monsanto or the US to go to the World Trade Organization to challenge bans on the drug as disguised trade barriers. *source: Our Toxic Times, September, 1999*

On October 4, **Monsanto announced it will not seek to market its "Terminator" seeds** — ones genetically engineered to themselves produce sterile seeds unless treated with a proprietary chemical. The company did not, however, rule out the possibility of continuing to research the Terminator technology, as it involves the much larger questions of how to "turn on" and "turn off" the expression of genes in cells. Other seed companies, also, are interested in developing such a technology. It would ensure repeat business from farmers by preventing them from replanting seed saved from crops originally purchased from the company. *source: New York Times, October 5, 1999*



photo by Jack Kittredge

### Participants enjoy a relaxed outdoor workshop at 1999 Conference

bigger on the name tags, have tags that stick on the holder, extend movie time, and ask participants not to wear synthetic perfumes.

Now's the time to work on procuring next year's keynote speaker. We've got a few promising options, and have been working on making the necessary inquiries. Our goal is to find a dynamic person who can inspire us, while speaking to our specific needs as farmers, gardeners, and nurturers of our earth. It's a pretty tall order, but we're excited by the possibilities. We will be choosing between William McDonough, Eliot Coleman, Winona LeDuke, and David Kline.

There are lots of wheels in motion! This year we are happy to announce that we will have TWO new women running the children's conference. They are Justine Johnson and Barbara Cohen. Both have youngsters of their own, so they've got some hands-on experience with the current programs. Their insightful ideas and enthusiasm promise to go a long way in making the conference even better in 2000! We also have new people in the teen conference - Chris Rawlings, exhibitions - Nancy Brunelle, and menu planning - Beth Ingham. We also welcome Joanne Duros to our committee. Erin Ames will be the coordinator of NOFA Nibbles. Erin is from CT - NOFA. Nibble will be run under their auspices this year. It's always great to get fresh ideas. These people, in conjunction with the rest of our faithful old guard, make for a lively mix of personalities, backgrounds, and experiences. We're bursting with millennial potential already!

Our next planning meeting is on December 5. We'll make final decisions on keynote, theme and logo at that meeting. We have had two theme submissions for the 2000 conference. We have extended the deadline for submissions to December 1. Please send any theme/logo ideas to Julie Rawson at the TNF address. If your theme/logo is selected, you will receive an all expenses paid trip to the conference.

There is also still time until the end of the year to submit workshop ideas for either the children's, teen or adult conference. Or if you have a specifically intergenerational workshop you would like to offer, we are soliciting ideas. Presenters receive free registration, \$25 and 2 meals. Contact Julie will your workshop ideas.

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# The US Food System: Bigger, but Safer?

At the same time as US government officials are reassuring Americans that our food supply has never been safer, we read about new, virulent microbes in meat, eggs and produce. We watch clips of US spokesmen chiding European trade officials for barring US beef on health grounds. We hear of massive recalls of hamburger contaminated with *E. coli*. Both the corporate agriculture partisans and local, organic activists are concerned about food safety. What's going on?

## The Natural Farmer Needs You!

The Natural Farmer is the newspaper of the Northeast Organic Farming Association (NOFA). All members receive a subscription as part of their dues, and others may subscribe for \$10 (in the US) or \$14 (outside the US). It is published four times a year at 411 Sheldon Rd., Barre, MA 01005. The editors are Jack Kittredge and Julie Rawson, (assisted by their kids), but most of the material is either written by members or summarized by us from information people send us.

Upcoming Issue Topics - We plan a year in advance so that folks who want to write on a topic can have a lot of lead time. The next 3 issues will be:

- Spring 2000 - Flowers for Market
- Summer 2000 - Bees
- Autumn 2000 - Transitioning to Organic

Moving or missed an issue? The Natural Farmer will not be forwarded by the post office, so you need to make sure your address is up-to-date if you move. You get your subscription to this paper in one of two ways. Direct subscribers who send us \$10 are put on our data base here. These folks should send address changes to us. Most of you, however, get this paper as a NOFA member benefit for paying your chapter dues. Each quarter every NOFA chapter sends us address labels for their paid members, which we use to mail out the issue. We don't keep copies of these, and if you moved or didn't get the paper, your beef is with your state chapter, not us. Every issue we print an updated list of "NOFA Contacts" on the last page, for a handy reference to all the chapter names and addresses.

As a membership paper, we count on you for articles, art and graphics, news and interviews, photos on rural or organic themes, ads, letters, etc. Almost everybody has a special talent or knows someone who does. If you can't write, find someone who can to interview you. We'd like to keep the paper lively and interesting to members, and we need your help to do it.

We appreciate a submission in any form, but are less likely to make mistakes with something typed than handwritten. To be a real gem, send it via electronic mail (JACKKITT@AOL.com) or enclose a computer disk (3 1/2 inch size). We use a Macintosh G3 with Microsoft Word but can with only modest difficulty convert IBM disks as well. Also, any graphics, photos, charts, etc. you can enclose will almost certainly make your submission more readable and informative. If you have any ideas or questions, one of us is usually near the phone - (978) 355-2853, fax: (978) 355-4046

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Northeast Organic Farming Association



As our agricultural and food processing systems have become larger, their managers have tried to apply industrial models in order to increase production. As any business school graduate will tell you, speed-up of production lines, lowering input costs, and redesigning products to embody more features are classic methods of selling more and cheaper widgets. Unfortunately for them, however, corn and carrots and cows aren't widgets. Instead, they are biological organisms of great complexity. As major changes take place in the living systems of which they are a part, they and those systems will respond.

When mechanical engineers analyzed the structural requirements of an automobile fender, they came up with a cheaper, lighter material of which it could be made. The resulting car was cheaper and lighter. When biochemical engineers analyzed the nutritional requirements of a cow, however, and came up with a cheaper and more easily available source of protein for feed, the result was mad cow disease.

This issue of the Natural Farmer is devoted to the topic of Food Safety. In it we cover many current threats to our food supply, and some of the responses proposed by both agribusiness and proponents of more local and organic farming. Thus you will find here articles on the specific diseases, contaminants, adulterations and technologies of our time. But we also try to frame this issue against the larger picture of biology itself. So you will also find some thoughtful analysis of how different, and immensely fascinating, the biological world is from the mechanical one.

Advertisements not only bring in TNF revenue, which means less must come from membership dues, they also make a paper interesting and helpful to those looking for specific goods or services. We carry 2 kinds of ads:

The NOFA Exchange - this is a free bulletin board service for NOFA members. Send in up to 100 words (business or personal) and we'll print it free in the next issue. Include a price (if selling) and an address or phone number so readers can contact you directly. If you're not a NOFA member, you can still send in an ad - just send \$5 along too!

Display Ads - this is for those offering products or services on a regular basis! You can get real attention with display ads. Send us camera ready copy and enclose a check for the appropriate size:

Full page (15" tall by 10" wide)	\$240
Half page (7 1/2" tall by 10" wide)	\$125
One-third page (7 1/2" tall by 6 1/2" wide)	\$85
One-quarter page (7 1/2" tall by 4 7/8" wide)	\$65
One-sixth page (7 1/2" tall by 3 1/8" wide), or (3 3/4" tall by 6 1/2" wide)	\$45
Business card size (1 1/2" tall by 3 1/8" wide)	\$12

note: These prices are for camera ready copy. If you want any changes we will be glad to make them - or to type set a display ad for you - for \$10 extra. Just send us the text, any graphics, and a sketch of how you want it to look. Include a check for the space charge plus \$10..

Many of the food safety problems discussed in this issue would never have developed had farming remained local and organic. They are a direct result of the attempt to industrialize agriculture. Even now, organic foods are free of many of the problems covered in this issue. But the problems are growing, and many will ultimately change how we can do business. For better or worse, we are all in this together — as the following little story illustrates:

### How to Grow Good Corn

James Bender, in his book *How to Talk Well* (New York: McGraw-Hill Book Company, Inc., 1994) relates the story of a farmer who grew award-winning corn. Each year he entered his corn in the state fair where it won a blue ribbon. One year a newspaper reporter interviewed him and learned something interesting about how he grew it.

The reporter discovered that the farmer shared his seed corn with his neighbors. "How can you afford to share your best seed corn with your neighbors when they are entering corn in competition with yours each year?" the reporter asked.

"Why sir," said the farmer, "didn't you know? The wind picks up pollen from the ripening corn and swirls it from field to field. If my neighbors grow inferior corn, cross-pollination will steadily degrade the quality of my corn. If I am to grow good corn, I must help my neighbors grow good corn."

He is very much aware of the connectedness of life. His corn cannot improve unless his neighbor's corn also improves.

So it is in other dimensions. Those who choose to be at peace must help their neighbors to be at peace. Those who choose to live well must help others to live well, for the value of a life is measured by the lives it touches. And those who choose to be happy must help others to find happiness, for the welfare of each is bound up with the welfare of all.

The lesson for each of us is this: if we are to grow good corn, we must help our neighbors grow good corn.

## Advertise in The Natural Farmer

Frequency discounts: if you buy space in several issues you can qualify for substantial discounts off these rates. Pay for two consecutive issues and get 10% off each, pay for 3 and get 20% off, or pay for 4 and get 25% off. An ad in the NOFA Summer Conference Program Book counts as a TNF ad for purposes of this discount.

Deadlines: We should receive your ad copy one month before the publication date of each issue. The deadlines are:

- January 31 for the Spring issue
- April 30 for the Summer issue
- July 31 for the Fall issue
- October 31 for the Winter issue

Contact: If you have questions, or want to reserve space, contact our advertising manager, Justine Johnson, at (413) 527-1920.

Disclaimer: The Natural Farmer cannot investigate the claims of advertisers and we don't vouch for anything advertised here. Readers are expected to exercise due caution when inquiring about any product or service. Different NOFA chapters have different standards for fertilizers, for instance, and a product acceptable in one state may be prohibited in another. Please check with your chapter when in doubt. Remember, however, that advertisers are helping support the paper and, when appropriate, please support them.

# News Notes

compiled by Jack Kittredge

**Six-mile "notification zones" have been established in England** around crop trials of genetically modified (GM) seed. The government will notify registered organic farms in such a zone 6 months ahead of any GM trial there. The six mile radius was based on research from the National Pollen Research Unit to quantify the risk of cross-pollination between conventional and GM crops, specifically how far corn pollen can be carried by wind or insects. Forty-two registered farms are currently within such zones and the Soil Association will examine each of these to see if certification is still warranted. *source: Organic Farming, Autumn, 1999*

A shrinking number of **larger and larger companies are dominating the seed trade**. The top five account for almost 60% of the pesticide market, 23% of the commercial seed market, and virtually 100% of the genetically modified seed market. Five years ago none of these companies would have appeared on the top five list.

Company	1998 US Seed Sales
Dupont (US)	\$1,835,000,000
Monsanto (US)	\$1,800,000,000
Novartis (Swiss)	\$1,000,000,000
Groupe Limagrain (Fr)	\$ 733,000,000
Savia S.A. de C.V. (Mex)	\$ 428,000,000
AstraZeneca (UK/Dutch)	\$ 412,000,000
KWS AG (German)	\$ 370,000,000
AgriBiotech, Inc. (US)	\$ 370,000,000
Sakata (Japan)	\$ 349,000,000
Takii (Japan)	\$ 300,000,000

Company	1998 US Pesticide Sales
Aventis (German)	\$4,676,000,000
Novartis (Swiss)	\$4,152,000,000
Monsanto (US)	\$4,032,000,000
DuPont (US)	\$3,156,000,000
AstraZenca (UK/Dutch)	\$2,897,000,000
Bayer (German)	\$2,273,000,000
Am. Home Prod. (US)	\$2,194,000,000
Dow (US)	\$2,132,000,000
BASF (German)	\$1,945,000,000
Makhteshim-Agan (Isrl)	\$ 801,000,000

*source: RAFI Update, September 7, 1999*

The Berkeley United School District, in California, is expected to approve a plan making its **school cafeterias offer all organic meals**. Students will grow some of their own food in school gardens, and the rest will come from local farmers. Under the plan milk will be BGH-free and no irradiated or genetically engineered foods will be allowed. The plan is expected to be expensive, said a representative of the California School Food Services Association, "but Berkeley is an unusual place," *source: personal Email quoting Reuters, September, 1999*

Hopes for **industrial hemp production** as a commercial venture have been dashed somewhat by trials conducted in Australia. According to NSW Agriculture, hemp in some trials failed to establish and in others yielded a disappointing crop. Approximately 12 tonnes per acre is required for a viable crop, estimated Dr. Richard Spurway, whereas the highest yielding trial plots gave up less than 7 tonnes per acre. *source: Acres Australia, May, 1999*

**A Vermont farmer's corn crop has been vandalized**. A section of Paul Knox's farm on Route 5 in Newbury was visited the night of August 24 by people who left anti-Bt corn literature and pictures of Monarch butterflies. A section of Knox's corn crop was destroyed. Knox has not said whether the corn was genetically engineered. This incident follows the destruction of a trial plot of genetically engineered corn at the University of Maine by a group calling itself "Seeds of Resistance" and vowing it would not be their last strike. *source: Vermont NOFA Notes, Autumn, 1999*

As we go to press the Food and Drug Administration (**FDA**) is **holding hearings** to explain their procedure to evaluate the public and environmental **safety of genetic engineering**, and get public reaction. The hearings are scheduled for Chicago on November 18, Washington DC on November 30, and Oakland California on December 13. *source: Associated Press release, October 18, 1999*

**Certification bodies** accredited by the International Federation of Organic Agricultural Movements (IFOAM) have announced they are **signing a multilateral agreement** among all members. The effect of the agreement will be to establish reciprocity between the groups so that any one automatically recognizes the other as valid. Such an agreement should greatly facilitate international trade in organic products, especially for processors who are mixing products of various programs in one value added product. *source: Email from Emily Brown Rosen, October, 1999*

**Monsanto's Roundup**, the best-selling weedkiller in the world, is **facing a ban in Europe** after a report shows that it also kills beneficial insects and spiders. Unrelated research in Sweden has linked the herbicide with the cancerous non-Hodgkins lymphoma. Monsanto "refutes absolutely" both claims. *source: personal Email communication, October 13, 1999*

**American Organic Standards (AOS) approved**. These are the strict standards written by a group of certification bodies under the aegis of the Organic Trade Association. Many organic groups hope that rapid adoption of the AOS by the 40 some disparate certification groups around the US will preempt the USDA's new standards, and the department will simply adopt the AOS and make them official. Thus far the AOS have not dealt with several important issues, including buffer zones and testing protocols for genetically engineered organisms, aquaculture, fiber standards and retailer/distributor guidelines. *source: Organic View, October 29, 1999*

The **new National Organic Program** from the USDA is still under development. Insiders expect the rule to be **released sometime shortly after the beginning of the new year** (but insiders have been badly embarrassed by USDA foot-dragging before!) *source: The Community Farm, Autumn, 1999*

The Scotts Company is reportedly working on **genetically engineered grasses** to give that "monoculture look" while tolerating heavy applications of herbicide to kill weeds. *source: Acres USA, September, 1999*

The Environmental Protection Agency (**EPA**) says **Dursban poses a safety risk** for those who use it. The agency cited a number of poisoning cases in which the pesticide was implicated. About 25% of 325 Dursban poisonings reported from 1993 through 1996 were serious enough to require hospitalization. Dow Chemical, maker of Dursban, responded that the EPA's risk assessment was misleading and based on "fundamental errors". EPA's analysis of Dursban is part of a huge project, required by Congress in a 1996 law, to check some 9000 pesticides for harmful residues in food, water and households. *source: Reuters dispatch, October 29, 1999*

NC+ Organics, a **seed company division specializing in organic seeds has been opened** in Lincoln, Nebraska. The division is a part of a seed cooperative formed by farmers 40 years ago which now employs over 100 people. Most certification groups have required organic seed when available, but often it is not easy to find. In some cases, organic farmers cannot even find seed not treated with fungicide. The new groups hopes to ease such problems, as well as develop seeds more suited to organic management than many of the current hybrids which are designed for heavy nitrogen applications and chemical weed control. The firm plans to have it's seed plantings certified, and also have third-party verification of seed as being free of genetic engineering. For more information about NC+ Organics, call 800-279-7999 or Email them at [organics@nc-plus.com](mailto:organics@nc-plus.com). *source: Personal Email, October 31, 1999*

Food Giant **Tyson announced that it will irradiate foods** next year. Tyson hopes to convince consumers that the process reduces health risks from bacteria as well as extends shelf life. Tyson is working with other food conglomerates to ease labeling restrictions, specifically to replace the radura symbol and word "irradiation" currently required with the term "cold pasteurization". *source: Northern Plains Sustainable Ag Society Newsletter, October, 1999*

A new study warns that **losses of plant species threaten modern agriculture**. The study, by Worldwatch Institute, found that varieties of wheat grown in China declined from 10,000 in 1949 to 1000 by the 1970s. In Mexico, farmers raise only 20% of the varieties they did in the 1930s. The study is critical of genetically engineered crops, saying that they are no solution to this loss of diversity. *source: Northern Plains Sustainable Ag Society Newsletter, October, 1999*

Let us thank these Friends of Organic Farming who have generously supported

**The Natural Farmer**

# NOFA Exchange

## Blow Your Own Horn!

Herb Pharm, a leading herbal extract company, is offering an **Herbaculture Work/Study Program** in the year 2000 on its 85-acre organic farm in southern Oregon. Program includes two eight-week sessions from March 13 thru June 30. Work involves cultivation and harvest of medicinal herbs in exchange for classes involving many aspects of organic farming and herbalism. Must be prepared for hard work. No monetary fee. Communal housing provided. To receive an application form, write to: Cassi McVay, Herb Pharm, P.O. Box 116, Williams, OR 97544. Deadlines to apply: Session 1 -12/1/99, Session 2 - 2/1/00. More info. Email: [cmcvay@herb-pharm.com](mailto:cmcvay@herb-pharm.com) or call (541)846-9121.

**Apprentice Wanted** — The Seedling Specialist grows organic annuals, perennials and vegetables. She seeks a responsible person to assist in organizing for 2000 season, develop promotional materials, plant and grow out seedlings to order, investigate sales venues, plant/dig perennials, design and install two historic gardens, answer client inquiries, and assist with sales. Early January 2000 to mid-July (flexible). No formal greenhouse; plants started under lights. Nonsmoker gets own room, shares bath, hearty (mostly vegetarian) meals. Stipend of \$25 per week, with good prospects of full-time work in the summer. House in Townsend, Mass., is seven miles to Boston trains. Join host in various horticultural courses. Call Priscilla Williams at (978) 597-3005. Email [priscilla@rigorousrecycler.com](mailto:priscilla@rigorousrecycler.com)

**Farm for Sale** - 59.5 acres, all open land. Half pasture and half tillable. Some trees planted over the years, house is rustic (80 year old) 9 room farmhouse with nice woodwork, 2 barns, 2 outbuildings. Farm is bordered on 2 sides by state owned woods. We are moving to larger acreage as our 2 teenagers want to farm and our dairy herd cannot be fed completely from owned land. Leases are hard to come by here. Asking \$105,000 but will work with farm oriented folks. Sherry & Walt Kaweck, 296 Greenwoods Rd., Alburg, VT 05440 (802) 796-3035

**Seeking organic farmer(s)** to revive one-acre farm garden in Manchester, twenty years dormant, mowed yearly. Exchange use for produce. For more information, call Bella @ 413-256-6454

The eco-village concept holds much promise because is not based on the perhaps largely impossible and failed communal way. Rather it is based on the proven success of cooperation, co-housing and the "cooperative". I think farming and living would be much easier and enjoyable if done in an intentionally cooperative way rather than in a strictly capitalistic or isolated way. If you don't use illegal drugs, are against war, want to see the best quality of life for the planet, other people and yourself **check out this eco-village proposal** at <http://homepage.fcgnetworks.net/journey>

**Farmer To Farmer Consulting Program** - Beginning in early 2000, the Regional Farm & Food Project in Albany, NY is hosting a Farmer-to-Farmer Consulting Program in which qualified farmers will be paired with accomplished farmers to receive assistance in all aspects of farm assessment in hopes of optimizing sustainability, profits and quality of life on the farm. There is no limit to the variety of farmers who can benefit from this program and all the farmer consultants are outstanding in their area(s) of expertise. For more information or to register, contact Ariel McCarthy at (518) 427-6537.

**For Sale - BCS sicklebar mower** 42", 50 lb. weight + extender, very good condition, \$275 or best offer; MH Pony - hydraulics, live PTO, single bottom plow, discs, belly cultivator, \$2,500 or best offer. Kevin F. Ennis, 20 Old Oak Pt. Rd., Hammond, NY 13646, 315-324-6076

**Direct Marketing Course** Offered to Livestock Producers - Beginning in January, 2000, the Regional Farm & Food Project will be offering a four-part educational course entitled Branding Your Beliefs. The course, which will run 4 Saturdays — January 22nd, February 26th, March 18th and April 29th within the Albany, Cobleskill NY area, promotes sound business planning and marketing strategies that will make direct marketing livestock a viable and successful aspect of your farm. This course assumes some experience raising livestock and a strong commitment to developing a livestock enterprise. For more information or to register, please contact Ariel McCarthy at (518) 427-6537.

Unique **apprenticeship opportunity**. The 2000 season at Roxbury Farm (in upstate New York) will offer apprentices the unusual opportunity to see an experienced farmer put new land into production and set up new facilities. Roxbury became the first CSA farm to deliver food to NYC, expanded to include 5 distribution sites in the Capital District and one at the farm itself, serving a total of 630 households. Roxbury is now moving to new land, 12 miles from its original site, where it can have long term security. We are looking for hard workers, both with and without previous farm experience. Contact Sarah or Jean Paul at: [roxburyfarm@hotmail.com](mailto:roxburyfarm@hotmail.com)

**Sufi community seeks experienced organic farmer** - The Abode of the Message, a community established by the Sufi Order of the west in 1975 seeks a farmer to manage a 3 acre expansion of existing farm. Applicant must be a team player, able to work with existing farmer in sharing some equipment and resources. New markets need to be developed. Fencing and irrigation need to be set up in clean field of rye/vetch. This is a great opportunity for someone interested in organic farming in a spiritual community. Contact Ed Triebe, Abode of the Message, 5 Abode Rd., New Lebanon, NY 12125. Email: [abodeoffice@aol.com](mailto:abodeoffice@aol.com). (518) 794-8090

**Allis Chalmers Model G** cultivating tractor. Ready to work. Cultivators, side dresser and 4 row planet Jr. seeder included. \$3500. Call Gordon Ridgway 860-672-0279

**Urban Agriculture Production Manager needed** - will maintain 2 acres of land in Roxbury, Massachusetts and plan, grow, market and distribute produce for shelters, soup kitchens and farmers market. Also will facilitate volunteer work days and educate youth on sustainable ag. Full-time, full year position with health insurance. Salary \$25,000 per year. Must start January 1. Send resume and cover letter to The Food Project, PO Box 705, Lincoln, MA 01773. For info: 781-259-8621 or [www.thefoodproject.org](http://www.thefoodproject.org)

**Grower's Assistant needed** - will work with Rural Ag Production Manager on a 21 acre plot in Lincoln, Massachusetts and be an integral part of growing marketing and distributing produce to shelters, soup kitchens, CSA and farmers market. Full-time position, salary \$350 per week, depending on housing. Send resume and cover letter to The Food Project, PO Box 705, Lincoln, MA 01773. For info: 781-259-8621 or [www.thefoodproject.org](http://www.thefoodproject.org)

Herbal Tip offers six "health teas" made from organic and wildcrafted herbs for caffeine-free, sugar-free beverages to enjoy hot or iced. With fun names indicating their purpose and glossy red packaging, Brain Friend, Cold-Be-Gone, Immune Tune, Digestive Calm, Women's Rites and Chill Out make great gifts for yourself or friends. The loose blends are available at \$10 in 4 oz. bags, \$11 for 4 oz. tins and \$4.50 for 1 oz. tins. Call toll free (888) 437-2847 (HERB TIP) for orders or more information.

**Internship position available** at Ol' Turtle Farm, 18 acre organically managed diversified vegetable farm located at the base of Mt. Tom Reservation in Easthampton, MA. 5 acres veggies marketed through a CSA with additional produce sold to stores and restaurants, 8 acres in cover crops. No experience necessary, but must have good work habits and be willing to work long days and weeks. Intern will have a private room, access to farm vegetables and receive a stipend. Contact Eileen, 385 East St., Easthampton, MA 01027 413-527-9122, email: [olturtle@javanet.com](mailto:olturtle@javanet.com)

For over 30 years George Hall has been farming organically. **Come learn greenhouse work**, CSA, farmers market, retail deliveries, farmstand, bee keeping and organic farming methods. We provide rustic housing, stipend, and veggies from the farm. 4 interns are wanted for year 2000, April - October (flexible). Call George Hall at 860-658-9297 (don't be alarmed by OGRE-like voice on the telephone!)

**Market garden/farm market manager wanted** for diversifying dairy operation on heavily traveled state highway between Trenton and Princeton, New Jersey. New farm market and on-farm dairy processing planned. 40+ acres available for fruit and vegetable production. Applicants should have demonstrated ability in growing/direct marketing of fresh produce. Salaried position and/or partnership considered. An opportunity with unlimited potential for the right person/s. Send letter of inquiry and resume to: Bryan Petrucci, American Farmland Trust, PO Box 987, DeKalb, IL 60015. Email: [bpetrucci@niu.edu](mailto:bpetrucci@niu.edu)

**For Sale - Certified organic hay**, grass/legume, square bales, 13% protein, 54% NDF, TDN 59%, NEL 0.57 Mcal/lb. \$120/ton plus trucking. Mountain View Farm, 518-692-7279

**Wanted: Organic Farmer** for Worcester (Massachusetts) Farmers Market, year 2000 season. We operate Monday and Friday at Worcester City Hall and Wednesday in a city-owned parking lot on the west side of Worcester. Hours: 9:30 am until 2 pm each day. Our season starts June 12, 2000 and ends October 27, 2000. If interested, call Andy O'Keefe, market manager, at (508) 7534-7761 or 800-448-0045

The Urban Herbalist all day **herbal medicine intensives** are held the 3<sup>rd</sup> Saturday of the month, March through November in Jamaica Plain (Boston) from 10 am to 4 pm. The 6 hours include 2 of a plant identification walk in my gardens, 2 making tinctures and salves in the kitchen, and 2 talking about the properties of 20 essential herbs. A herbal lunch is served and there are handouts as well as access to my extensive library. Pre-registration required, and the class is limited to 6 people per month. Call Mary Pat Palmer at 617-524-5377 or email me at [mpatpalm@earthlink.net](mailto:mpatpalm@earthlink.net) for a registration form and/or more information.

An **assistant manager position** is available at Old Depot Gardens in Montague, MA for the 2000 growing season. Management responsibilities might include bedding plant and cut flower production, market coordination, machinery and facilities maintenance, and aspects of vegetable production. Prior farming or agricultural experience is required. The position is seasonal and will begin in March and extend until October. Call Ryan at 413-367-2395 for more information.

**Apprentices/Interns wanted** for the 2000 growing season, April through October (flexible). River Brook Farm is small but diversified with goats, sheep, chickens and emus and a NOFA-NY certified vegetable operation. No experience necessary, but applicant must be willing to work all facets of the farm with long workdays. Offered is room, access to farm vegetables and a stipend. We are situated on the Delaware River in the wild and scenic waterways area. Many river activities are available. Please send resume to River Brook Farm, PO Box 2, Cohecton, NY 12726; 914-932-7952

**Wanted: Individual interested/experienced in organic vegetable production** for 2000 season and beyond. 40 acres NOFA certified vegetables. Hutchins Farm, 754 Monument St. Concord, MA 01742. 978-369-5041

**Internship Position:** at Wild Roots Farm, 110 acre diversified farmstead. 5 acres organic vegetables grown for CSA, homesite with young orchard, swimming pond, chickens, icelandic sheep, highland cow and lush forest. Interns will have the opportunity to learn CSA marketing, organic vegetable production, off the grid living, blueberry gorging and natural history. We are ten minutes from the Catskill Forest Preserve and 1/2 hour from Delaware River. Looking for two interns with a passion for learning experientially. Intern cabin, stipend and veggies. Amy and Wes Gillingham, 669 Cattail Road, Livingston Manor, NY 12758 (914) 439-4799

# Special Supplement on Food Safety

## Food Safety in Organic Vegetable Production by Elizabeth Henderson

As soon as I mentioned manure as an ingredient in the compost I used to grow the carrot, the ten year old boy, who had been munching on it happily, ran to the trash basket and spat it out. That, friends, is the emotional, scientific and social level of a lot of the discussion we have to deal with on food safety. Dennis Avery, and other apologists for the industrialized food system, play on this kind of uninformed fear response to divert public hysteria about microbes and food borne illnesses our way. Let us be prepared to defend our practices, and to counterattack by shifting from a narrow focus on germs to food safety in the broader sense of whole, healthy foods in a clean environment.

Let's start with the pathogens. Any farm producing vegetables to sell needs to have a clear process for preventing contamination of its crops. If you have livestock as well as vegetables, you must be careful to keep the animals separate from your food processing area. The Food and Drug Administration has published a "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables" that is actually quite sensible. The introduction to this document stresses that it is "guidance, and not a regulation," and a footnote declares that "an alternative approach may be used if such approach would effectively serve to reduce microbial hazards that could result in foodborne illness and if such approach satisfied applicable statutes and regulations." So the government is not yet mandating how we keep our veggies sanitary. If we all take reasonable care, we may yet be able to avoid legal requirements for chlorinated wash water and product irradiation.

As the FDA guide puts it, our goal is to reduce risk to our customers since "current technologies cannot eliminate all potential food safety hazards associated with fresh produce that will be eaten raw." Prevention of contamination is the key term. The guide recommends reviewing five "areas of concern:" 1. water quality, 2. manure/municipal biosolids, 3. worker hygiene, 4. field, facility, and transport sanitation, and 5. traceback (or what certification programs call audit trail). For copies of the FDA Guide you can write to Food Safety Initiative Staff, HFS-32, U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, 200 C Street S.W., Washington, D.C. 20204. You can also download a copy from the FDA website: [www.fda.gov](http://www.fda.gov). It is 41 pages long. I will not try to repeat what it says in this article; rather, I will address our particular concerns as organic producers.

The three main potential sources of contamination of fresh produce are manure, animal or human, water, and worker hygiene. Our organic certification standards cover only the first two of these areas.

### Manure

Proper manure handling is basic to organic vegetable growing. The third draft of the "American Organic Standards," (AOS) which the Organic Trade Association plans to make the base level for all US certification programs, has this to say about manure handling:



5.5.2. Animal manures are considered a valuable source of crop nutrients that must be properly handled. Composting of manure is recommended to stabilize nutrients, prevent environmental degradation, and prevent spread of pathogens.

5.5.2.1. Runoff diversion or other means must be implemented to prevent contamination of crop production areas with animal waste from adjacent livestock holding facilities, fields, or waste storage areas.

5.5.2.2. Raw (uncomposted manure shall be applied in a manner that prevents or minimizes contamination of crops, soil, or water by nitrates and bacteria, pathogenic microbes, heavy metals, and residues of prohibited substances.

5.5.2.2.A. Liquid extracts of manure ("manure tea") should not be applied to crops for human consumption unless the manure from which they are made has been composted or the application is made to soil only (no crop contact) with restrictions as described under 5.5.2.3. B.1 and 2.

5.5.2.3. Raw manure is considered a regulated material and must be composted unless it is applied:

5.5.2.3.A To a crop not intended for human consumption, including a cover crop; or

5.5.2.3.B On land used for crops intended for human consumption provided that the manure is incorporated into the soil, and applied to provide sufficient time to ensure the crop is safe for human consumption:

5.5.2.3.B.1. Raw manure may be applied no less than 90 days prior to harvest of a crop for

human consumption whose edible portion does not come in contact with soil surface or soil particles; or

5.5.2.3.B.2. Products likely to be eaten raw, nitrate accumulators (leafy greens), crops exposed to contact with soil, such as root crops, shall require 120 days between application of raw manure and harvest.

The NOFA-NY standards are slightly stricter than AOS requiring 60 days prior to planting of vegetable crops. Recognizing that not all composts are made with equal care, NOFA-VT even requires that compost be aged for three months before use on food crops, except in greenhouses.

To my astonishment, a few years ago I had a call from a member of my CSA who was nervous about bringing her children to the farm because we used bone meal as a fertilizer and she feared Mad Cow Disease. She set me to thinking about the sources of bone and blood meal. The spread of GMOs makes this issue sharper. While it seems extreme to worry about such minutia, if a cow is shot up with BST, will its bones or blood contain GMOs? Rather than torment myself with such questions, I have chosen to replace as many purchased inputs as I can. Instead of blood meal, I am using worm castings in my potting soil with good effect. I still buy rock phosphate, my replacement for bone meal. Composted chicken manure, high in phosphorus, might be a better substitute.

### Water

Clean water for irrigation and washing of vegetables is essential. The AOS document states that irrigation water cannot contain "any prohibited material intentionally added by the producer." However, "prohibited materials resulting from unavoidable residual environmental contamination may be used, provided crops meet residue standards." The NOFA-NY certification program recommends that farmers and processors investigate the sources of the water they use for potential contamination problems and test the water if pollution is suspected. The program offers to work with growers "to develop corrective measures." Like NOFA-NY, the AOS requires that wash water meet drinking water standards.

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Whether chlorine in the wash water does more harm than good is currently under debate. The FDA guide, while stressing prevention over corrective actions once contamination has occurred, presents a list of antimicrobial agents as options to consider including chlorine, ozone, and ultraviolet irradiation. The AOS, in section 5.8.2., states that "Chlorine use should not exceed Maximum Recommended Disinfectant Limit so established." A footnote admits that this issue is "still under discussion," and calls on OTA and NOSB review of current research.

The Cornell Cooperative Extension advises that research shows that "chlorine solutions are no more beneficial than plain, potable water. While chlorine may work well to purify clear water or to sanitize clean kitchen surfaces, it does not seem to work well in the complex chemical environment of fruit and vegetable surfaces. In addition, a chlorine solution may leave residues of chlorinated compounds on the produce, and the amounts of safety of such possible residues have not been studied."

The "Seventh Generation Guide to A Toxic Free Home" has this to say: "Chlorine is an acutely toxic chemical created through the energy intensive electrolysis of sea water. This manufacturing process also creates extremely toxic byproducts...In addition to its direct toxic effects on living organisms, chlorine also reacts with organic materials in the environment to create other hazardous and carcinogenic toxins, including trihalomethanes and chloroform, and organochlorines...Chlorine is listed in the 1990 Clean Air Act as a hazardous pollutant and is on the EPA's Community Right-to-Know list." (p.29)

It seems to me there is no place for chlorinated wash water in organic vegetable processing.

#### Worker Hygiene and Health

Organic certification programs do not say anything about worker hygiene and health, though perhaps they should. As in a restaurant, a worker on a farm with unwashed hands or a contagious illness can contaminate fresh produce. Farmers should be aware of such dangers and be sure to have wash water and soap available near the bathroom (or outhouse), and alternative assignments for sneezing workers. Organic farmers should take at least as good care of their farmworkers as they do of their earthworms.

#### Eater Health

When I hear the repeated claims that the US food system is the safest in the world, I have to ask, "safe for whom?" Food safety means more than microbial contamination. Granted, the sanitation standards in most food processing plants, restaurants, food services and retail stores are adequate to ensure that most of the food distributed and sold in the US will not make you sick. But that is a rather narrow way to interpret food safety. A broader view would also include food quality, nutrition and freshness, the risk of hunger, the safety of the people who work in the food system, and the safety of the environment from the production and distribution of food. On all of those counts, the US food system does not win a top grade.

Organic agriculture offers a hopeful alternative. Organic farmers need to help inform our customers about these issues. We are up against a huge medical-pharmaceutical establishment that pushes pills instead of whole foods. Even the health food stores urge more pills - supplements, minerals, herbs in a powdered form, highly processed garlic - on their customers.

Since vitamin pills and supplements are selling so well, the processors are busy making "nutraceuticals," and venturing into "functional" foods. And I thought that all foods were functional and contributed to human nutrition. Shows how naive I can be! The new functional foods, such as Kellogg's psyllium-laced cereals designed to lower cholesterol, have medicinal qualities engineered into them. My local food buying club selects from a catalogue that offers a choice among breakfast cereals with St. John's Wort, Ginkgo biloba, or echinacea. Fast food stands in New York City are doing a booming business in "health smoothies," fruit-based juice concoctions for which the customer selects the ingredients from a list of fruit, medicinal herbs, vitamin and mineral supplements. Novartis has a new product called SMOG C, a mixture of grape seed extract and methionine-bound zinc supplement, which promises protection from damage caused by tobacco or air pollution. The next step is "Identity Preserved" crops: the big seed companies are selling farmers seed designed for targeted end purposes, such as high lauric acid canola, and high oil corn and sunflower blends. Research is under way to boost the anti-carcinogenic substances in grapes, onions, garlic, and other vegetables. A licensing agreement between Demegen, Inc. and Dow AgroSciences aims at increasing the protein content in food and feed crops.

What ever happened to the idea of a balanced diet of fresh foods in season? We must continue spreading the old truths about the path to health even when the obstacles are daunting.

The consumer in the US no longer needs to know how to cook, or even wash food. Fast food restaurants, work place food services, convenience stores, and vending machines supply 60% of the meals people eat. Half of the population eats breakfast in the car on the way to work. As the traditional housewife becomes an endangered species, food stores are becoming more like take-out restaurants, selling pre-cooked or half-cooked meals that can be eaten at home. My father-in-law, who lives in a suburb of New York City where a large proportion of the inhabitants commute to work, reports that every evening swarms of commuters drive from the train station to the supermarket where they pick up ready-made dinners before they zip home for the night. Frozen gourmet meals are on the shelf next to TV dinners in the freezer section. A growth sector in the produce industry is pre-cut packaged salads, made possible by improvements in packaging. Sales hit \$1.09 billion in 1997, for a 20 percent increase over 1996. Overall sales of all kinds of "fresh-cuts," including "baby" carrots (full-sized carrots cut into pieces lathe-turned for that baby shape), fruit, stir-fry mixes, and salad, added up to \$6 billion in 1997, for 10 percent of total produce sales. Industry publications predict \$19 billion in sales by 2003. American consumers will pay 2 to 3 times the cost of buying the separate ingredients to have their carrots peeled or their lettuce washed and cut up for them. Irradiation is the answer to keeping these pre-cuts "fresh" and microbe free, but it has no place in organic vegetable processing.

While Americans are eating more fruit and vegetables, there is evidence that the nutritional value of these foods is declining. For almost every vitamin and mineral, the 1997 USDA food composition tables show a decline of 15 to over 50 percent from the figures published in 1975. For example,

the calcium in 100 grams of broccoli has dropped from 103 mg. to 48 mg. An exception is the vitamin A content of the average carrot, which has risen 155.7 percent, although the vitamin C, calcium and iron have fallen. (The food composition tables are available for your perusal at [www.nal.usda.gov/fnic/cgi-bin/nut\\_s.pl](http://www.nal.usda.gov/fnic/cgi-bin/nut_s.pl)) According to staff at the USDA Nutrient Data Lab, the change in values results in part from more accurate testing methods, but also from shifts in the varieties available in the marketplace. As a grower, I have observed that suitability for mechanical harvesting, longer storage life and shipability outweigh nutritional content in the breeding of most commercial varieties. The catalogues I see for vegetable growers emphasize qualities such as stem length in new broccoli varieties that make harvesting easier, or uniformity and smoothness of skin in carrots to make peeling and cutting cheaper and faster. The nutraceuticals trend suggests that next year's catalogue will expand into nutrition in the narrow sense of targeted anti-oxidizing or anti-carcinogenic components.

For most of the population, our food system probably provides easy access to too many calories. Despite all the hype about low fat diets and cutting calories, we have more severely obese people than any other country in which I have traveled. And I do not mean pleasingly plump. I mean women my height (5'4") who weigh 300 pounds and more. Women in their twenties who can barely walk, and for whom bending over to tie their shoes is a real challenge. Eating disorders, obesity, and its opposite, anorexia, the obsessive refusal to eat, have become a major category of mental illness. We can only speculate on the causes - drinking gallons of sugar-laden sodas, eating processed foods made with cheap fats, lack of exercise, too much television, overcompensation for poor self-image through constant eating, terror at becoming overweight - but the shocking phenomenon remains.

In *The Unsettling of America*, Wendell Berry likens the food system to the circulatory system and points out that disease first impairs circulation and then stops it: "Only by restoring the broken connections can we be healed. Connection is health. We lose our health - and create profitable diseases and dependencies - by failing to see the direct connections between living and eating, eating and working, working and loving."

In our farms and gardens, we reconnect ourselves and others to the earth. The delicious taste of our organic vegetables is our strongest argument against the pharmaceuticals' distorted version of food as medicine. We choose varieties for taste and nutritional value. The way things are going, we will probably have to find a way to produce our own seed to be sure we have a secure supply. Organic agriculture is not an industry. We are part of a worldwide movement for a healthy planet which includes both food safety and food security. Participation in organic farming and gardening is better medicine than any spa. When our detractors fulminate against pathogenic microbes, we can offer our own definition of safe food:

- \*builds body health and strengthens the immune system;
- \*is produced non-destructively, without poisoning soil, water or air;
- \*provides safe work for producers all along the food chain from the field to the table;
- \*is accessible to all people at a price they can afford to pay.

# Big Ag Fights Back: Unleashing Dennis Avery, Dean Kleckner & the Attorneys

by Jack Kittredge

As more and more reports surface in the media of contaminated meat, produce laden with pesticide residues, and genetically engineered potato chips, the public is increasingly distrustful of the quality of their food. A survey released in November, 1998, by a concerned International Foods Safety Council (controlled by agribusiness) found that 89% of American consumers think food safety is "very important" as a national issue — more so than crime prevention. Seventy-seven percent said that safety concerns were affecting their eating habits and only 34% thought that government agencies and private business were doing an "excellent" job in keeping food safe.

This distrust is beginning to result in significant shifts in consumer spending. In 1998 over 5 billion dollars worth of organic food was purchased in the US, and organic sales are increasing 25% annually. Perhaps even more alarming for agribusiness are the results of a 1997 poll by biotech giant Novartis reporting that 54% of Americans say they would prefer "organic" to be the dominant food system.

Instead of taking a step back from their overcrowded feed lots, huge monoculture fields, and shiny new laboratories, however, to reconsider the long-term viability of industrial farming, big ag has decided to play rough. Fearful of the long term market trends and deeply concerned about the outpouring of support the organic industry received at the time of the National Organic Program, they have engaged public relations firms, right-wing think tanks and litigious lawyers to mount a concerted attack on organic food. Placing articles and opinion pieces in farm newspapers, the Knight-Ridder syndicate, the Wall Street Journal, the Washington Post, and PBS, for starters, they have tried to make a serious claim that organic food is dangerous to your health.

## Dennis Avery Leads Attack

The opening salvos have come from Dennis Avery, former food analyst at the USDA under Reagan. Avery now works as an economist for the Hudson Institute, a corporate funded (Archer Daniels Midland is one of their big donors) think-tank run by PR and lobbying firms. He is known as a publicist who makes large claims on pretty flimsy evidence. Among Avery's published statements about organic food are the following:

"Organic foods have clearly become the deadliest food choice."

"Organic farming deserves to remain small."

"Organic food is more dangerous than conventionally grown produce."

The gist of Avery's attack is that organic farmers use manure for fertilizer and refuse to use antibiotics, chlorine, preservatives, pasteurization, irradiation, or other techniques to sterilize their food after harvest. He fails to mention that manure is used by both organic and conventional farmers, or that raw manure is prohibited from being applied to crops under most organic standards — it must be composted at temperatures that destroy pathogens before use. Nor does he mention that even when applied directly in the field, manure cannot go on less than 60 days before a crop is harvested. Nor does he mention that organic farmers must abide by safe food production standards and are subject to the same local and state food safety laws as conventional farmers.

One of Avery's more egregious articles was picked up by the Wall Street Journal on December 8, 1998. In it he claimed that the US Centers for Disease

Control (CDC) had compiled data showing that people who eat organic and natural foods are eight times as likely as the rest of the population to be attacked by deadly new strains of *E. coli* and *Salmonella* bacteria. The CDC is a respected institution, so a lot of people probably believed the story. When the Organic Trade Association contacted the CDC, however, and spoke with Robert Tauxe, M.D., chief of the Food Borne and Diarrheal Diseases Branch, he stated that Avery's claims were "absolutely not true". Dr. Mitchell Cohen, director of the Division of Bacterial and Mycotic Diseases stated that the CDC has not conducted any study comparing risks from "eating either conventionally grown or organic/natural foods".

Fred Kirschmann, North Dakota organic farmer and member of the National Organic Standards Board, has called Avery's charges "...outrageous and undocumented. I don't know of a single case to date where food coming from a certified organic farm has been contaminated by a food-borne illness. All of the cases have been traced to either imported foods or food from large industrial operations."

## American Farm Bureau Joins Attack

Another voice in the attack on organic farming is that of the American Farm Bureau Federation (AFBF). The AFBF, while posing as the voice of the family farmer, really represents the interests of large corporate farms. They have consistently spoken out for the needs of industrial agriculture: no environmental restraints on farm chemical use, no labeling of controversial practices such as irradiation or genetic engineering, no upper limit on farm income when qualifying for subsidies, and world-wide free trade in agricultural products.

"Judging from the proliferation of upscale grocery stores," the AFBF sniffs, "some people think that if you pay more for food or if it is organically grown, it should be safer. That isn't the case, but farmers aren't arguing with it." The Federation notes the increased interest in organic methods among Iowa farmers, for instance, but chalks that up to greed: "...these Iowa farmers are finding a payoff...a good price...sometimes three to six times greater than that of conventionally grown crops."

After impugning the honesty and motives of organic farmers, the AFBF goes on to suggest that there is a far better way to be sure your food is safe than to buy organic — instead, make sure it is irradiated! Dean Kleckner, president of the AFBF, calls irradiation: "another significant tool to use to destroy harmful bacteria and further ensure the safety of America's meat products."

## Enter the Attorneys

Agribusiness was thoroughly frightened by the Alar scare 10 years ago. Apple sales plummeted after CBS News aired a report linking the ag chemical with cancer in humans. Many apple processors and farmers had an exceedingly bad year. Orchard owners in Washington state sued CBS over the report, but the case was dismissed because the burden of proof was on the farmers to prove the report was false.

In the early 1990s the American Feed Industry Association hired a Washington DC law firm to draft a model law to allow food producers to collect damages from anyone whose criticism of their food product resulted in loss of revenue. The model law was sent to state agricultural groups, which proceeded to lobby their legislators for passage, citing the losses experienced by the apple industry. Al-

though each state ended up with a somewhat different version of the law, by 1997 Alabama, Arizona, Colorado, Florida, Georgia, Idaho, Louisiana, Mississippi, North Dakota, Ohio, Oklahoma, South Dakota and Texas had passed agricultural product disparagement laws. Thirty states currently have passed or are considering such legislation.

Probably the most publicized use of this legal tool so far has been the suit brought by Texas cattlemen (under the False Disparagement of Perishable Food Products Act of 1995) against talk-show host Oprah Winfrey for remarks she made about beef on her national show. Her position was vindicated by a jury in 1998, although the cattlemen have appealed. Perhaps more ominous for similar but less well financed critics, however, is the fact that Ms. Winfrey spent over one million dollars on legal fees.

Other legal threats have had a chilling effect on open discussion of food quality and safety. Monsanto Company has aggressively threatened suit against publishers who question the safety of their herbicide "RoundUp" or their Bovine Growth Hormone. United Fresh Fruit and Vegetable Association lawyers tried to get the environmental group Food and Water to stop distributing a report questioning the health effects of irradiating fruits and vegetables.

Civil liberties attorneys have questioned the constitutionality of many of these product disparagement laws, but no one wants to be the one to test them — even if you emerge victorious, the legal fees may well bankrupt you. As a result, many individuals, newspapers, radio and TV stations have taken a "better safe than sorry" approach — requiring extensive documentation of any claim challenging an agricultural product's health or safety, and even then toning down strong language and allowing the target an opportunity to review the charges for "factual error" before publication. Needless to say, disputes over what is a "fact" can paralyze journalism.

## Big Ag Under Pressure

Such tactics on the part of agribusiness illustrate how concerned they are about the growing disenchantment throughout the developed world with industrial food. The dioxin debacle in Belgium, mad cow disease in Britain, the Hudson hamburger recall, Europe's refusal to accept genetically engineered crops or hormone-treated beef, Canada's banning of bovine growth hormone...the list goes on and on. Without markets in the developed countries willing to eat the products raised for world trade, huge sums will be lost. Big Ag's tactic is to stifle criticism by opponents and go on the offensive themselves. Consumers then will be left confused, with a difficult and questionable organic alternative, and a simple, cheap conventional one. They hope that Abe Lincoln was 2/3 right. It will be enough if they can fool some of the people all the time, and all of the people some of the time.

# Pesticides in Food

by Jack Kittredge

Globally, about 2.5 million tons of pesticides are applied annually — most targeted on agricultural crops. There are approximately 250 basic chemicals, made by more than 50 companies, registered for use as pesticides in food and feed production in the United States. About 20 of these are the primary ones used in agricultural production.

Pesticides can be classified according to their chemical structure:

**Inorganic** pesticides are broad-based poisons made from common natural chemicals like arsenic, copper, lead and mercury. These chemicals are generally highly toxic and indestructible. Because of these two features, these chemicals can accumulate in the environment.

**Natural** or **organic** pesticides are generally compounds extracted from plants. Many plants, like tobacco, chrysanthemum, and conifers, have evolved the ability to produce **secondary substances** that are used to deter herbivore consumption.

**Fumigants** are specific compounds in gaseous form that are used to sterilize soil and prevent pest infestation of stored grain. The use of these chemicals has been banned or reduced in many parts of the world because of the extreme danger associated to workers with their application.

**Chlorinated hydrocarbons** are synthetic organic compounds that affect the nervous system of the pest. They include such chemicals as DDT, chlordane, alrin, dieldrin, toxaphene, paradichlorobenzene, and lindane. These chemicals are highly resistant to decomposition and can remain in ecosystems more than 15 years.

**Organophosphates** are synthetic chemicals that have been developed as a by-product of human nerve gas research during World War II. These chemicals are 10 to 100 times more toxic than chlorinated hydrocarbons to animals larger than insects. Their persistence in the environment is quite short, however, usually on the order of hours to days. Some examples of organophosphates include parathion, malathion, dichlorvos, dimethyldichlorovinylphosphate (DDVP), and tetraethylpyrophosphate (TEPP).

**Carbamates** are urethanes that effect the nervous system of pests. They are very similar to organophosphates, and include such chemicals as carbaryl (Sevin), aldicarb (Temik), aminocarb (Zineb), carbofuran (Baygon), and Mirex.

**Microbial agents** are living organisms that are used to control pests. Some examples of microbial agents include lady bugs, parasitic wasps, viruses, and specific forms of bacteria.

Organophosphates, the most common group of pesticides in use today, work by interfering with the normal transmission of nerve impulses, and are effective against many types of insects. Though they do not persist in the environment like chlorinated hydrocarbons such as the banned DDT, organophosphates as a class are highly toxic, which is why some were produced as nerve agents during World War II. About 60 million pounds of organophosphates are used on about 60 million acres each year, and another 17 million pounds are used in the home and for other non-agricultural purposes. Alarmed by



their potential to harm the developing nervous systems of infants and children — who eat many foods with small amounts of organophosphate residues — environmental groups have called for a ban on many of these chemicals.

## Regulating Pesticides on Food

In 1993 the National Academy of Sciences issued a report strongly criticizing the US pesticide regulatory system for not adequately taking into account the specific risks pesticides pose for the young. From the summary:

“This report addresses the question of whether current regulatory approaches for controlling pesticide residues in foods adequately protect infants and children. The exposure of infants and children and their susceptibility to harm from ingesting pesticide residues may differ from that of adults. The current regulatory system does not, however, specifically consider infants and children. It does not examine the wide range of pesticide exposure patterns that appear to exist within the U.S. population. It looks only at the average exposure of the entire population. As a consequence, variations in dietary exposure to pesticides and health risks related to age and to such other factors as geographic region and ethnicity are not addressed in current regulatory practice.”

As a result of growing popular concern about pesticides, the Food Quality Protection Act of 1996 (FQPA) — born in a rare burst of bipartisanship on Capitol Hill — passed both houses of Congress in a period of eight days without a dissenting vote. The law mandated a broad overhaul of federal pesticide regulations to better assess and prevent risks to public health, particularly in children. It directed the EPA, for example, to apply “an additional tenfold margin of safety” for infants and children except when there is “reliable data” that a less stringent standard would be safe.

The law also requires the EPA to take into account the aggregate risk from different sources — drinking water and pest control efforts in the home, for example, as well as food — and to consider the cumulative effects of pesticides that act in a similar manner.

The FQPA has been the subject of furious infighting, however, since the EPA moved to implement it. The stakes for both industry and the general public are huge. Depending on how tough the EPA is in restricting pesticide use, farmers and other users may have to switch to more expensive alternatives. A year ago, alarmed by the direction the EPA was taking, the American Crop Protection Association warned that “sooner or later, virtually all pesticides and pesticides uses will be jeopardized.”

Then, a few months ago, all seven environmental and farm worker groups serving on an EPA advisory panel on the reassessment process resigned en masse. The pesticide industry and agribusiness interests, charged one environmentalist, had “hijacked” the process.

The intense battle over implementation of the new

law is a classic example of how the complex process of agency rulemaking is often far more important than congressional legislating. It is also an example of how difficult it is to translate a relatively simple goal — in this case ensuring Americans their food supply is safe — into practice.

“The science here is enormously challenging,” says a senior EPA official: “The act requires us for the first time ever to look at all the exposure pathways for these chemicals...All of it is very controversial.”

Among other things, the law requires the EPA to reexamine the allowable levels of hundreds of pesticides on individual crops — ultimately coming up with about 9700 new application level determinations.

The roughly four dozen organophosphates account for about half the millions of pounds of pesticides used in the US. Because they are so widely used — on grains, vegetables and fruits — and because of longstanding concerns about their safety, environmentalists have called on EPA Administrator Carol Browner to drastically curtail their use.

## Residues on Food

The ultimate fate of a pesticide depends not only on its chemical makeup and the crop on which it is applied, but also on the geographic and climatic conditions of the area. After application, a certain amount of the chemical will be broken down by sunlight, water, bacteria in the soil, and by other chemical and physical factors. Usually, the breakdown products are biochemically inactive compounds, however some may be more or less toxic than the original compound.

Storage conditions, cooking, and processing procedures also affect the amount of pesticide residue. To illustrate the effect of various processing techniques on pesticide residue, the National Food Processors Association analyzed the behavior of benomyl residues during preparation and processing of tomatoes, oranges, and apples.

Behavior of benomyl residues during preparation and processing

Food Form (Allowable Raw Product Tolerance)	ppm Benomyl		
	Tomatoes	Oranges	Apples
Raw	1.76	3.28	1.06
Raw, washed	.31	.75	.89
Juice, canned	.25	.07	.31
Puree	.02	-	-
Paste	.57	-	-
Catsup	.03	-	-
Oil	-	2.51	-
Sliced	-	-	.10
Sauce	-	-	.18

These data clearly indicate that some parts of the product may contain more pesticide residue than other parts. For instance, benomyl had a tendency to accumulate in the solids in tomato paste and the oil of oranges.

In all products tested, washing the raw product significantly reduced the amount of pesticide on the food — provided, of course, that the water you use to wash the product is itself residue-free. Several European studies have actually found levels of pesticide in rainwater which would make it illegal to drink. One study in Switzerland found levels of 2,4-dinitrophenol 40 times greater than the legal standard for drinking water, and a study of 41 storms over Europe found Atrazine coming down in rain above the drinking water standard in 9 storms (22% of them). Atrazine has also contaminated wells in more than half the counties of Iowa.

### Pesticide Exposure Risks

An analysis done by the Environmental Working Group of more than 110,000 government-tested food samples and detailed government data on children's food consumption found that multiple pesticides known or suspected to cause brain and nervous system damage, cancer, or hormone interference are common in foods many children consume.

\* More than a quarter million American children ages one through five ingest a combination of 20 different pesticides every day. More than 1 million preschoolers eat at least 15 pesticides on a given day. Overall, 20 million American children five and under eat an average of eight pesticides every day.

\* Every day, 610,000 children ages one through five — equal to all the kids of that age in the states of Washington and Oregon combined — consume a dose of neurotoxic organophosphate insecticides that the government deems unsafe. More than half of these unsafe exposures are from one pesticide, methyl parathion.

\* Preschoolers' eating habits are even more dramatically different from adults than previous data have shown—another factor driving pesticide risks. Taking their weight into account, kids 1 to 5 consume 30 times more apple juice, 21 times more grape juice, 7 times more orange juice than the average person in the population. Four million American 1-to-5-year-olds (20 percent) drink apple juice every day.

\* Ten years after Alar, apples are still loaded with pesticides. The average apple has four pesticides after it is washed and cored. Some have as many as ten. More than half the children exposed to an unsafe dose of organophosphate insecticides get it from apples, apple sauce or apple juice. Some apples are so toxic that just one bite can deliver an unsafe dose of organophosphates to a child under five.

Consumer's Union, publisher of *Consumer Reports* magazine, announced last February that many US fruits and vegetables carry pesticide residues exceeding the limits that EPA considers safe for children. Using US Department of Agriculture statistics based on 27,000 food samples from 1994 to 1997, the magazine looked at foods children are most likely to eat. Almost all the foods tested for pesticide residues were within legal limits, but were frequently well above the levels the Environmental Protection Agency says are safe for young children. According to the Consumer's Union Report, even one serving of some fruits and vegetables can exceed safe daily limits for young children.

Methyl parathion (an organophosphate) accounts for most of the total toxicity on the foods that were analyzed, particularly peaches, frozen and canned green beans, pears and apples. Late last year EPA said that methyl parathion posed an 'unacceptable risk' but that it had not taken any action to ban it or reduce its use.

A preliminary look at the data from the FDA's 1998 pesticide residue monitoring program, which studied over 7000 food samples looking for detect-

able residues of 355 pesticides, gives no reason for hope. A third of the foods tested had detectable residues, and almost 2% had residues in excess of allowable levels. Almost half the fruits showed residues, and 1% of domestically-grown (and almost 3% of imported) fruits carried illegal residue levels. Blackberries, strawberries, kiwis, and melons were particularly high. A comparable look at vegetables is even more alarming. Domestically raised vegetables exceed legal residue levels in 1.4% of the cases; imported ones, in 3.6%. Particular violators were

# Sprouts

by David Gould

There is increasing concern, both in the conventional and organic sectors, about microbial contamination in sprouts. One common practice which attempts to avoid this problem is treatment of sprouting seeds with chlorine, in doses ranging from extremely high "shock treatments" to somewhat lower concentrations. While some people claim these methods to be effective, scientific research (of which there has been very little on the subject of microbial control in sprouts) is inconclusive, stating that such methods are not the absolute insurance for which some people are hoping.

The chlorine "shock" usually involves treatments of seed with 2000 ppm chlorine in water for a period of about 5 minutes. (The federal government has recommended 20,000 ppm calcium hypochlorite in some cases!). Chlorination of water ranges in practice down as low as 80 ppm (or perhaps even less), but the exposure time to the seeds must be increased dramatically, usually 5 hours or more at these lower levels.

Both of the above methods pose some basic problems for the producer of certified organic sprouts. Since seeds begin imbibing water immediately, the chlorine in the water is also imbibed, thereby making the chlorinated water an ingredient in the final product. Organic certification standards state that water as an ingredient in organic foods must be in compliance with Safe Drinking Water Act limits for chlorine, namely no higher than 4 ppm, obviously much lower than the treatments described above.

Some organic operators have claimed that their final sprouts products can be analyzed (or already have been analyzed) by laboratories for residual chlorine, and the sprouts show no detectable residue. However, it must be stated that to our knowledge, there are not good laboratory protocols for detection of chlorine in food products, only for water, and this detection limit is above the 4 ppm tolerance set. Regardless of such claims about residue testing, organic certification is a production standard, not a residue standard; residue testing can be a useful tool, but thus far has not been so, in the case of sprouts and chlorine.

Perhaps a better way to think about the chlorine getting into the final food product is to calculate the amount of treated water imbibed by the seeds by 1) weighing the seeds pre- and post-treatment, 2) knowing the concentration of chlorine in the treatment water, and 3) calculating the amount of chlorine imbibed. What the chlorine does to the seed is a different, incompletely answered question.

Another factor which argues against use of chlorine to treat the outside of seeds is that seed coats are not impermeable to microbes, which can enter cracks and crevices in seed coats and lie in wait to infect the product later on, after the seed has been rinsed of its initial dose of disinfectant. Longer exposure times to the disinfectants might ameliorate this (as the seed takes in more and more treated water), but this is contrary to organic standards, for reasons already discussed.

peppers, peas, string beans, potatoes, collards and kale.

Among the pesticides most often found in the foods tested were DDT (21%), chlorpyrifos-methyl (18%), malathion (15%), endosulfan (15%), and dieldrin (10%). The top 5 for baby foods were chlorpyrifos (19%), endosulfan (17%), chlorpyrifos-methyl (12%), iprodione (11%) and malathion (10%).

No organic foods were listed in the FDA study.



Still, there is no question that microbial control is an important issue for all sprout producers. Fortunately there are methods which have proven themselves effective for certified organic production: facility cleanliness, good handling and sanitation (federally mandated limit). However, it must be stated very clearly that these above materials are approved by organic standards as generic materials alone, and that some commercial formulations may contain stabilizers or other "inert" compounds which make them prohibited for use in certified organic systems.

In closing, while microbial control is a real concern in sprout production, confidence in the safety of the foods should be possible in virtually all production systems, provided there is understanding of the factors involved in each individual operation, and vigilance and diligence are practiced.

*David Gould is an organic processing inspector who has worked for CCOF and Oregon Tilth.*

# Bacteria in Perspective

by Jack Kittredge based on work  
by Lynn Margulis and Dorion Sagan

The fear of bacteria is, in a way, a fear of life, of ourselves at an earlier stage of evolution. Every spoonful of garden soil contains some  $10^{10}$  bacteria; the total number in anyone's mouth is greater than the number of people who have ever lived. We rely on our personal bacterial populations to help us digest our food and to keep us healthy by restraining the overgrowth of harmful microbes. Babies born without their microbial symbionts must be kept alive in germ-free bubbles at the cost of \$100,000 per day!

Antoni van Leeuwenhoek, inventor of the earliest version of the microscope in the 1670s, described these beings when they swam around as "animalcules" — tiny animals. He was struck by their rapid changes in direction, odd shapes, and sheer quantity. In 1831 the half-blind Italian law student Agostino Bassi (1773-1856) proved the existence of infection by spreading muscardine (silkworm disease) from one fungus-infected worm to another. Nonetheless, a generation after Bassi showed that disease did not arise spontaneously, even Pasteur thought of bacteria only as agents of decay.

A turning point in our understanding occurred when Robert Koch (1843-1910) found bacteria in blood of cows stricken by anthrax. These little rods ("bacilli") grew from hardy bacterial spores. Feeding them blood serum, Koch, a German medical officer, learned to grow the bacteria in a liquid broth. He developed a stain for them, photographing the culprits by mounting a camera on a microscope. Yet the now-common notion that bacteria caused infectious disease was slow to be accepted. English nurse and philanthropist Florence Nightingale (1820-1910) denied "germs" as causes of illness to her death.

Louis Pasteur (1822-1895), who proved the microbial origin of such devastating diseases as foot and mouth disease, plague, and wine rot, set the tone of the relationship from the start. The context of the encounter between intellect and bacteria defined medicine as a battleground: bacteria were "germs", enemy agents to be destroyed. Different types of

bacteria were implicated in anthrax, gonorrhea, typhoid, and leprosy. Microbes, once amusing little anomalies, became demonized. Pasteur, like Howard Hughes after him, had a phobia about soil and germs. He avoided handshakes. Wiping down his crockery, he meticulously sought evidence of wood, wool, and other detritus in his food.

Some bacteria swim like animals, others photosynthesize like plants — still others do both — swim and photosynthesize all at the same time. We misinterpret them when their growth correlates with our decay like fungi. One or another of these microbial geniuses can detect light, produce alcohol, decompose water, waft hydrogen and fix nitrogen gas into an edible form. Some ferment sugar to vinegar, others convert sulfate ions or sulfur globules in salt water to hydrogen sulfide gas. They do all this and much more not because they are “pathogens” or in service to clean our human environment but because their survival imperative led to their invention of every major kind of metabolic transformation on the planet.

The smallest of them have a diameter only a thousand times greater than a hydrogen atom. If there were such a thing as angels that could dance on the head of a pin, bacteria would be they. Bacteria have already miniaturized, they have control of specific molecules about which human engineers dream. Far more complex than any computer or robot, the common bacterium perceives and swims toward its food. Choosing and approaching its destinations, bacteria propel themselves by flagella, corkscrew-shaped spinning protein filaments attached to living motors in the membranes of their cells. Complete with rings, tiny bearings, and rotors, they are called “proton motors” and spin at about 15,000 rpm. These proton motors move bacteria in the same way that “electric fan” outboard motors propel boats.

Rapidly reproducing, bacteria properly supplied with food and water double their cells in a half hour or faster. They have been and probably always will be the most important players in maintaining the biosphere. A single photosynthetic blue-green bacterium growing and dividing under ideal conditions could, in theory, produce all the oxygen now in the atmosphere in just a few weeks.

So significant are bacteria and their evolution that the fundamental division in life forms is not that between plants and animals. Rather the difference between prokaryotes (bacteria) — organisms composed of small cells with no nuclear membrane surrounding their genes — and eukaryotes (all other life forms, including humans, composed of cells with nuclear membranes) is the greatest one in the living world. In the first two billion years of life on Earth, bacteria — the planet’s only inhabitants — continuously transformed the Earth’s surface and atmosphere. They invented all life’s essential, miniaturized chemical systems. Their ancient biotechnology led to fermentation, photosynthesis, oxygen breathing, and the removal of atmospheric nitrogen into protein molecules. It also led to worldwide crises of bacterial population expansion, starvation, and pollution long before the dawn of larger forms of life.

Bacteria survived these crises because of special abilities that eukaryotes lack and that add whole new dimensions to the dynamics of evolution. First, bacteria routinely transfer their genes to bacteria very different from themselves. The “recipient” bacterium can use the visiting, accessory DNA (the cell’s genetic material) to perform functions that its own genes cannot mandate. Bacteria can exchange genes quickly and reversibly, in part because they live in densely populated communities. Consequently, unlike other life, all the world’s bacteria have access to a single gene pool and hence to the metabolic wizardry of the entire bacterial kingdom. (This extreme genetic fluidity makes the concept of *species* of bacteria questionable.) The result is a worldwide system of communicating, gene-exchanging bacteria that render the planet fertile and inhabitable for the four larger eukaryotic life forms: protoctists such as algae and water molds; fungi such as yeast and mushrooms; plants and animals. Bacteria also have a remarkable capacity to combine their bodies with other organisms, forming alliances that may become permanent. Fully 10 percent of our own dry weight consists of bacteria, some of which,

**The hindgut of our only termite in Massachusetts, *Reticulitermes flavipes*, is full of protoctists (large) & bacteria (small) like these. Together, via community action, the microbes digest the wood the termite has ingested. The termite tissue (parts of 5 cells) at the top of the drawing (and the microbes) are from the intestine of *Pterotermes occidentis*, a Sonoran desert termite.**

like those microorganisms in our intestines that produce vitamin B<sub>12</sub>, we cannot live without. Mitochondria live inside our cells but reproduce at different times with different methods from the rest of the host cell. They are descendants of ancient, oxygen-using bacteria. Either engulfed as prey or invading as parasites, these bacteria then took up residence inside foreign cells, forming an uneasy alliance that provided waste disposal and oxygen-derived energy in return for food and shelter. Without active mitochondria, the plant or animal cell cannot respire oxygen and therefore dies.

Symbiogenesis, the merging of bacteria and other organisms into new collectives, is a major source of evolutionary change on Earth. The results of the earlier mergers were protoctists, our most recent, most important — and most ignored — microbial ancestors. Protoctists invented our kind of digestion, movement, visual, and other sensory systems. They innovated speciation, cannibalism, genes organized into chromosomes, and the ability to make hard parts (like teeth and skeletons). These complex microscopic beings and their large descendants like seaweeds and slime molds even evolved the first male, female, and other genders. Our kind of cell-fusing animal sexuality that involved penetration of a large egg by a small sperm first appeared in protoctist ancestors. Protoctists began as symbiotic complexes, forming communities, if you will, of differently capable bacteria.

A generation of researchers has discovered that bacteria not only are the building blocks of life, they also occupy and are indispensable to every other living being on Earth. Without them, we would have

no air to breathe, no nitrogen in our food, no soil on which to grow crops. Without microbes, life’s essential processes would quickly grind to a halt, and Earth would be as barren as Venus and Mars. Far from leaving microorganisms behind on an evolutionary ladder, we are both surrounded by them and composed of them. The new knowledge of biology, moreover, alters our view of evolution as a chronic, bloody competition among individuals and species. Life did not take over the globe by combat, but by networking. Life forms multiplied and grew more complex by coopting others, not just by killing them.

Only today have we begun to appreciate the fact that bacteria are normal and necessary for the human body and that health is not so much a matter of destroying microorganisms as it is of restoring appropriate relations between older ecosystems and the extant microbial communities that are ourselves.

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# Pasteurizing Cider at Jaswell Farm

by Jack Kittredge

Providence, Rhode Island, like many small New England cities, is still less than an hour from farm country. A belt of farm stands, pick-your-owns and orchards circle the outer edges of the city. Especially popular in the fall — the season of pumpkins and cider — many of these host tours by school classes during the week and families out for a drive on the weekends. One of the most prominent of these farms is Jaswell Farm, in Smithfield, a half-hour northwest of Providence.

Jaswell Farm has been in the same family for one hundred years this year. Chris Jaswell, in his twenties, is the fourth generation on the farm and has taken over operating the cider press from his father, Richard. His great grandparents had a truck garden and a few cows on the land at the turn of the last century. They bartered, cut wood, and got by. Their son, Richard's father, was a deaf mute. He married another deaf mute, and they raised Richard by signing to him.

"He struggled all his life", recalls Richard. "He just barely kept the farm going. He took me out of school when I turned 16 - I didn't even finish the year. I thought it was great, but then I found out after that wasn't the thing to do. We sold vegetables wholesale and had a farm stand. But I couldn't make a living. I worked in the winter to supplement. We had taken our apples to other cider mills previously. Then one of my neighbors decided to get a bigger machine and asked me if I was interested in his press. I said: 'Yes, I am!' So in 1971 we put up a small building and I figured the cider would supplement the farm stand and get us to the Thanksgiving period."



photo by Jack Kittredge

**Apples to be made into cider at Jaswell's are first inspected on this conveyor, then are washed and ride up the elevator into the chopper in the right foreground. The resulting slurry is piped to the press.**

That worked pretty well. By 1978 the press was too small, so Jaswell bought a new one and went to making cider 10 months a year. He got rid of all his windfalls, culls and B grade apples that way. With juice, he figures, you can get your money back on a box of apples!

Richard was determined that both his kids. Chris and Aly, would have the opportunity that he did not - to go to college. He would have loved to have them come back and take over the operation, he says, but figured the job market was too good out there. But after graduating from Bryant College Chris came back and said he wanted to work on the farm, making cider. Then a couple of years later Aly graduated, came back, and said she wanted to start a bakery to supplement the farm stand. So Richard put up a new building, moved the press operation into that and turned the old press room into a bakery.

"To survive in this business," Richard stresses, "this is what you have to do. You have to have cash - taxes, insurance, college for your kids. There's no money in wholesaling. Before we got involved with cider it was 90% wholesale. We do 90% retail sales now. It kind of snowballed. The retail end got bigger and bigger, we added more and more, and were able to sell even more. Weekends are fantastic out here. A thousand people? Not a problem. On one weekend we picked 3700 pounds of pumpkins. We just cut them and the people went out into the field and brought them in. We just weighed them."

To expand the farmstand, Richard converted his packing shed. He put up barnboard on the walls and tiles on the cement floor. He put a canopy out front. He took down a barn and made lots of parking area for school buses. They get between four and five thousand kids a year visiting now. They take them out to the orchard, show them how to pick apples, take them back in and give them cider.

"We usually run 4 tours a day", Richard estimates, "for about 4 weeks. They come from all over - Providence, Warwick, Coventry, Pawtucket, Lincoln, Scituate, Woonsocket, North Kingston. Once these kids are here, you'd be surprised how many come back with their dads and moms. The biggest part of this business is personality. Fifty percent of your business is product, the other half is personality - you remember their names, get along with them. You get that homey atmosphere."

The farm has about twenty acres in apples, which is approximately 1200 trees. They are a mixture of varieties, red delicious, golden delicious, empires, cortlands, macintoshes — you name it. Virtually all of the trees were planted by Richard, many when he was a young man. About 60 to 70% of the apples go for fresh sale, many through a pick-your-own operation, and the rest — the smaller ones and the windfalls — go for pressing. Richard says that the people selling the pasteurizer told him not to use windfalls. He told them that was not feasible, however. He presses for other orchards and knows they use windfalls, too.

The cider operation starts in September and goes until December or January. Jaswell can store his apples in a large cold storage area that opens directly into the farmstand. After they run out, he buys in apples from Australia and New Zealand.

The press itself is rated for 75 gallons per squeeze. The apples enter the cider operation in 800 pound (20 bushel) bins. A forklift places them on a sorting/washing/grinding machine that slowly tilts the bin and empties the apples onto a sorting conveyor. Any apple that isn't up to quality is sidetracked here. After the sorting, the apples go into a hopper where they all get washed and brushes scrub them clean. Then they go into an elevator where they get washed again on the way to the grinder. Falling into the grinder they are chopped into an apple slurry which is then piped overhead to the press.

The pressman sets up a form, covers it with a cloth, sprays apple slurry onto the cloth until it is several inches thick, then folds the cloth up around it and places another form on top of that. Once a dozen or more forms are placed and filled and the 800 pounds of apples are formed up, the whole stack is rolled onto the press and squeezed. The resulting cider runs into a vat and is pumped into a 275 gallon holding tank. Once that is full the load is pasteurized, cooled and pumped into a 500 gallon tank from which the cider is drawn off into plastic jugs.

Jaswell Farm, like many operations just like it, had made a quality, healthy product for years. Then suddenly people began reading about a new and virulent strain of E. Coli bacteria. Like other strains, it seemed to be associated with raw foods which had come into contact with manure or feces. But this was far more dangerous. People got sick, went on dialysis, into comas, even died.



photo by Jack Kittredge

**Apple slurry comes from the chopper through the pipe visible over the press. Here one set of forms holding the slurry is being squeezed into cider while another set is being filled.**

“There was a big flap”, Richard recalls. “I had 2 or 3 nice wholesale accounts. They said: ‘Are you going to pasteurize, Dick?’ Then there were all the school tours. We do 200 kids per day all fall. A lot of parents wouldn’t sign the permission slip because of all the scares about E Coli. Or the kids could come out but not have any cider. Then the teachers got worried. ‘Is the cider pasteurized?’ they want to know. ‘If not, I don’t want to give it to the children.’

“We talked about pasteurizing,” he continues. “The problem was you had to put a warning label on your cider. You had to say this product is unsafe, it is not pasteurized, it can cause sickness and/or death in the elderly. That had to be on the bottom of your label and you had to have a placard where you sell the cider, too, telling people the same thing. That curtailed the business. It cut it right back. A lot of people would come with kids and look at it. They wouldn’t say anything, just walk away.

“I said, ‘All right, let’s go with the pasteurization’. The old timers would still prefer raw cider, but not parents. One elderly guy came out and when I said it was pasteurized, he called it garbage. I said: ‘Come here.’ I gave him two cups of cider and asked him which was raw. He couldn’t tell. He liked them both. Finally, he picked one. He said: ‘This is raw!’ I said: ‘They both are pasteurized!’ He said: ‘I didn’t expect it to taste that good!’”

The Jaswell machine is a micro flash pasteurizer (MFP). It keeps the cider at 162 degrees for 8 seconds, then a diverter valve opens and the cider is pumped out, rapidly exchanging its heat with cold cider coming into the machine. Some early cider pasteurizers were based on dairy pasteurizers. But milk has to get to 180 degrees, which will burn cider a little.

Now, with the pasteurizer, Jaswell has picked up more cider accounts. He feels like it’s the goose that laid the golden egg. They are the only farm to pasteurize in Rhode Island and it’s getting to the point now that they actually need the production to meet existing demand! The consumers all want pasteurized cider.

“I drank unpasteurized cider all my life,” says Chris Jaswell. “But since we put this pasteurizer in, I haven’t had any. I think if you put them side by side you’d have a hard time telling the difference. When we considered buying the machine I said ‘There’s no way you’re going to tell me they taste the same. The government’s not going to force me to do anything!’ But after it went in, I couldn’t tell the difference. There was a one year money-back guarantee on the machine. The year has come and gone.”

Since the Jaswells purchased their pasteurizer, an ultra-violet machine has been approved. A thin film of cider falls over ultraviolet light. That sterilization process gives you the 5 log reduction required (there are 5 main pathogens of concern to public health authorities). Ultraviolet sterilization, however, doesn’t have the production that pasteurization does. UV is sold at 180 gallons an hour, but the thickness of the cider really determines how fast it can work. An orchardist the Jaswells knew just bought an UV system and they’re doing about 80 gallons an hour, as opposed to the Jaswells’ rated 264 gallons an hour. An ozone system also exists, but has not yet received all the approvals necessary for commercial production.

The Jaswells’ complete pasteurizer setup, brand new, cost them about \$25,000. So far, they’re the only operating pasteurizer in the state and feel that it has been a good investment. A side benefit of pasteurization is to extend the shelf life of the product from perhaps 2 weeks to a month or a month and a half. Their cider is not canned in jars, so bacteria will grow there ultimately. But they figure that their cider never hangs around long enough to be a risk anyway.

Richard admits that a lot of his customers inquire whether his apples are organic. He is clear with them from the beginning that they are not — his apples are sprayed with pesticides as he feels necessary. Organic, he feels, is too big a jump for him to make.

“It’s not something I think I want to get into”, he confides. “You just can’t do it with apples. It’s a whole different operation altogether. If we didn’t use something our apples would be all full of worms, bite marks. It wouldn’t work at all. There are some pesticides you can use which aren’t classified as pesticides — several different materials. Some of the bigger farms even have bug sucking machines. But it’s another operation and we don’t need that. I don’t know if organic is as popular now as it was 5 years ago. People come here and complain about their corn being wormy. I ask if they spray. ‘We don’t want to use pesticides’ they say. I say: ‘Well, everything here has been sprayed.’ ‘Yeah’, they say, ‘but it looks so much better than mine.’”



photo by Jack Kittredge

**Chris Jaswell adjusts his farmstand’s new \$25,000 cider pasteurizer. The machine was made necessary by increasing concern about microbial contamination of raw food products.**

# Foodborne Illness

By Jack Kittredge

Federal agencies like the FDA and the USDA are fond of saying that the United States has the safest food supply in the world. Yet, according to figures released this Fall by the Centers for Disease Control and Prevention, 76 million Americans a year are sickened by foodborne illness. Of these, 325,000 are hospitalized and 5,000 die. To many, this does not sound like a demonstration of safety at all! Food in the US and much of the developed world has been linked to numerous outbreaks of serious and fatal illnesses.

- Meat processed at a Sara Lee plant in N. Zeeland, Michigan, was linked to a listeria outbreak in hot dogs, investigators have found. The incident sickened 70 people and claimed 16 lives.
- An outbreak of salmonella linked to contaminated alfalfa sprouts sickened at least 19 people in six Wisconsin counties early this fall, authorities say. It was not clear whether the source of the problem was infected seed, water, or handling.
- Last spring in Kearney, Nebraska, state health authorities traced an outbreak of *E. coli* O157:H7 to contaminated lettuce in the salad bar at the Golden Corral restaurant. At least eighteen people were made sick.
- Nippy's, an Australian maker of fruit juices, issued a recall for its fresh juices last March after finding samples of a rare salmonella strain, which infected 127 people, in the juice.
- Eighteen people in Finland developed listeriosis last winter, four of whom died from the disease. Their infection was traced to consumption of butter produced by a small dairy.
- Milk from a farm in northern Cumbria, England, apparently infected 38 people with *E. coli* O157 last winter. Twenty-seven of the victims were hospitalized.
- Five children were poisoned this fall by *E. coli* O157:H7 after drinking apple cider from a local orchard in Porter, Oklahoma. One is in critical condition.
- In November, eleven people in Denmark were hospitalized and two killed by eating meat from pigs infected by a severe, drug-resistant strain of salmonella

The US Government Accounting Office (GAO) in 1996 warned that the risk of foodborne diseases has been rising. The report estimates the current overall annual cost of such diseases to the economy as \$5.6 billion, if you only count direct medical expenses, or \$22 billion, if you include lost productivity. The GAO analysis of the causes points directly at the increasingly industrialized and global food system. As probable causes they list:

- the crowding of ever larger numbers of animals in confinement systems and feed lots;
- the rise of suppressed immune systems among the population (although they give no suggestions as to why immune systems should suddenly be suppressed);
- the appearance of new, highly virulent, or newly antibiotic resistant pathogens, such as *Campylobacter*, *Listeria* and *E. coli* O157:H7; and
- the spread of meat-associated bacterial contaminants to apple cider, lettuce, tomatoes, melons, alfalfa sprouts and orange juice.

## The Current System for Protecting Food

Ensuring the safety of food is carried out by a system that can be confusing for its complexity and diversity. Regulatory authority is divided among federal, state, and local governments.

**Food and Drug Administration (FDA)** — The FDA is charged with ensuring the safety and wholesomeness of all foods sold in interstate commerce except meat, poultry and eggs, which are under the jurisdiction of U.S. Department of Agriculture (USDA). The agency also inspects food-processing plants, imported products and feed mills, regulates radiation-emitting products, enforces pesticide tolerances established by Environmental Protection Agency (EPA), monitors all seafood brought into interstate commerce, and is responsible for monitoring the feeds eaten by animals and the safety of the food produced from animals.

**Centers for Disease Control and Prevention (CDC)** — The CDC is devoted to preventing unnecessary disease, disability and premature death. It investigates outbreaks of foodborne illness and surveys and studies various environmental and chronic health problems.

**National Institutes of Health (NIH)** — The NIH conducts and supports research to uncover new knowledge that will lead to improved public health.

**U.S. Department of Agriculture (USDA)** — The USDA's Food Safety and Inspection Service (FSIS) monitors domestic and imported meat and poultry products and certain egg products for bacterial contamination and for residues of pesticides, drugs and other chemicals.

The FSIS National Residue Program ensures that pesticide residue in meat, poultry and eggs do not exceed tolerances set by EPA. The USDA's Agricultural Marketing Service (AMS) performs food quality services such as commodity standardization, inspection and grading services. The USDA's Federal Grain Inspection Service (FGIS) inspects corn, sorghum and rice for aflatoxin, as well as the quality of domestic and exported grain, rice and related commodities.

**Environmental Protection Agency (EPA)** — The EPA regulates the development, distribution, promotion, handling, storage, use and disposal of pesticides used in growing foods. The EPA sets tolerances or limits for the amount of pesticide residues that lawfully may remain in or on foods marketed in the United States.

**Federal Trade Commission (FTC)** — The FTC protects the public against unfair deceptive or fraudulent practices in credit marketing and other areas such as the labeling and advertising of food.

Several agencies are responsible for food safety on the state level. They include boards of health, departments of human/ social services, state universities and environmental and sanitation agencies. The laws and standards they enforce generally coincide with either federal laws or uniform model codes such as those created by the Association of Food and Drug Officials.

## Who Regulates Where?

- On the farm, food is regulated by state agencies supported principally by the EPA which acts to ensure that pesticides are approved for safe use, by the FDA, which oversees use of drugs and feed in milk- and food-producing animals, and by APHIS, which is concerned with food-animal disease control. Federal responsibility also covers production and harvesting activities that discharge wastewater to surface and ground waters, and solid waste to land, all of which could contaminate growing conditions and processing water.

- Food being transported in interstate commerce is subject to federal and state regulation, although that area has received little attention in the past. USDA's FSIS and HHS's FDA have jointly published an Advanced Notice of Proposed Rulemaking (ANPR) on whether regulations are needed to govern the handling of meat, poultry, seafood, eggs, and other foods susceptible to harmful bacteria during transportation.

- The import of food from foreign countries is overseen by FSIS for meat, poultry, and most egg products and FDA for all other foods. If an imported food is suspect, it can be tested for contamination and its entry into the United States denied.

- Restaurants, supermarkets, and institutional food services (such as schools and hospitals) are generally regulated by states and local health authorities, and FDA publishes the Food Code, which consists of model recommendations for safeguarding public health when food is offered to the consumer.

- National standards for drinking water are set by EPA, and enforced generally by local public water authorities; FDA establishes complementary standards for bottled water.

- Surveillance of foodborne illness is primarily the responsibility of state and local health departments and the CDC, which seek to identify cases of illness, determine their source, and control outbreaks. FDA or FSIS are called in when a link to a regulated food is suspected.

## What Causes Foodborne Illness?

Foodborne illness generally refers to illnesses caused by microorganisms consumed by eating any type of food. "Food poisoning," usually means distress caused by exposure to the microbes, bacteria and pathogens that cause foodborne illness. Its effects can range from relatively minor discomfort to more serious symptoms and manifestations such as fever, diarrhea, vomiting, dehydration and even death.

The average person carries more than 150 kinds of bacteria in and on the surface of the body. They spread easily and rapidly, requiring just food, moisture, a favorable temperature and time to multiply. Animal protein foods—meat, eggs, poultry and fish—are common hosts of foodborne bacteria. However, bacteria can be readily spread from a non-food item—such as a knife, crate, cutting board, or human hands—to food.

Contaminants causing foodborne illness can originate within the food (meat or fish), on the food (egg shell or produce), from unsafe water, or from human or animal feces. Favorite bacteria hiding places include sponges, dish towels, aprons, cutting boards, sinks, counter tops and wooden utensils.

There are five basic categories of foodborne illness agents or contaminants:

**Bacteria** — Some bacteria are beneficial and are even used in food processing (such as yogurt); others combat disease. Bacteria account for more than two-thirds of all outbreaks of foodborne illness in the United States.

**Viruses** — Viruses are too small to be seen with any ordinary microscope, and they grow or reproduce only in living cells. They are often found in untreated water, especially that which has not undergone sanitation treatment. In addition, viruses from human feces on inadequately washed hands can be a source of foodborne disease.

**Parasites** — Food and water can carry such parasites as tapeworms, roundworms and certain species of protozoa.

**Food toxins** — Toxins, such as scombrototoxin and ciguatoxin, are formed by microorganisms in food when stored at improper temperatures.

**Unknown** — Most foodborne illnesses are classified as “unknown,” because frequently laboratory analysis is not conducted to verify the specific agent or cause.

Symptoms of foodborne illness include severe abdominal cramps, diarrhea (often bloody), nausea, vomiting, dry mouth, double vision, difficulty swallowing and flu-like symptoms (fever, chills, headache, and backache). Symptoms may appear from 6 hours up to ten days after exposure. Since foodborne illness can potentially cause severe illness or death, people who suspect they have become sick from food should seek treatment. If you call or visit your doctor, be prepared to recount all the foods you have consumed over the past week or more.

#### Other Sources of Foodborne Illness

##### Nitrite

Nitrite is a food additive that has been used for centuries to preserve meats, fish and poultry. Because nitrite safeguards cured meats against the most deadly foodborne disease known to man, botulism, its use is supported by the public health community. In the late 1970s, however, a potential cancer risk was discovered from a digestive reaction-product of nitrite called nitrosamines. In response, the meat industry significantly lowered levels of added nitrite thereby reducing any risk of nitrosamine production.

##### Mycotoxins

Mycotoxins are a category of naturally-occurring substances that may result from fungal growth on agricultural products either in the field or during harvest and storage. The fungi may produce mycotoxins as a defense mechanism, or the chemicals may simply be a by-product of fungal metabolism. In high amounts, some mycotoxins have been found to promote cancer in laboratory animals. Examples of common mycotoxins are aflatoxin, fumonisin and ochratoxin.

- Aflatoxin is produced by a fungus causing preharvest contamination on corn, cotton, peanuts and tree nuts. Aflatoxin levels increase slightly in

drought years. It can be associated with improper storage of food commodities, primarily corn.

- Fumonisin is a byproduct of mold that is found naturally in corn and broken kernels of corn. It may be found in very low levels in some milled corn products such as snack foods, corn grits, corn bran cereals, and in even lower levels in popcorn.
- Ochratoxin may be found naturally on wheat, barley, oats, coffee beans, and some foods of plant origin and animal derived food products (some meats, and dried fish).

##### Over-Cooking

As if to compound the difficulties for anyone trying to avoid foodborne illness by thorough cooking, a 1998 study published in the Journal of the National Cancer Institute found that women who eat beef and bacon cooked until it is very well done have a four times greater risk of developing breast cancer than those who eat it medium or rare. Scientists theorize that the connection may be compounds called heterocyclic amines which have been linked to cancer and are known to be produced by overcooking meat.

##### Preventing Foodborne Illness

Most foodborne illness can be prevented through some simple food purchasing, handling and storage steps:

##### Eat Locally

- Grow your own organic food, or purchase it from someone locally so you can be sure of freshness.
- Talk to whoever raises your food and find out about how it was raised, how it was harvested, how long and under what conditions it was kept until you got it.
- Make sure that you understand who performed any intermediate steps before your food got to you — slaughterhouse, processor, etc.

##### Chill

- Refrigerate or freeze perishables, ready-to-eat foods and leftovers within two hours of purchasing or preparation. Make sure the refrigerator is set no higher than 40½F and the freezer is set at 0½F.
- Freeze fresh meat, poultry or fish immediately if you can't use it within a few days.
- Put packages of raw meat, poultry or fish in a shallow pan before refrigerating so their juices

won't drip onto other food.

- If a package is too large, divide the contents into smaller portions, and wrap and freeze what you don't plan to cook right away.

##### Clean

- Wash fresh fruit and vegetables well before preparing them.
- Wash your hands with hot soapy water before and after preparing food. Be sure to wash your hands after using the bathroom, changing diapers and playing with pets.
- Wash kitchen towels often in the hot-cycle of your washing machine; avoid sponges or put them in the dishwasher daily to kill bacteria.
- Wash your cutting boards, dishes, utensils and counter tops with hot soapy water after preparing each food item and before you go on to the next food item.

##### Separate

- Cut vegetables or salad ingredients first, then raw meat and poultry.
- Keep raw meat, poultry, eggs and seafood and their juices away from ready-to-eat foods.
- Never place cooked food on a plate that previously held raw meat, poultry, eggs or seafood unless the plate has been thoroughly cleaned between uses.
- Thoroughly wash or discard anything used to soak up meat and poultry juices.

##### Cook

- Thaw food in the refrigerator, not on the kitchen counter; marinate in the refrigerator.
- Use a clean meat thermometer to measure the internal temperature of cooked foods to make sure meat, poultry, casseroles and other foods are cooked all the way through.
- Cook ground beef, including meatloaf, to at least 160½F. At this temperature there is usually no pink left in the middle. Cook ground chicken and ground turkey to at least 165½F.
- Cook beef, veal and lamb roasts and steaks to an internal temperature of at least 145½F, which is slightly pink in the center. Pork chops, roasts and ribs should be cooked to at least 160½F.
- Cook whole poultry to at least 180½F.
- Cook fish until it is opaque and flakes easily with a fork.
- Cook eggs until both the yolk and white are firm.
- Reheat sauces, marinades, soups and gravy to a rolling boil. Heat other leftovers thoroughly to at least 165½F.

##### Serve

- Use clean dishes and utensils to serve food, not those used in preparation.
- Never leave perishable food out of the refrigerator for more than two hours; depending upon the outside temperature, if food is left out at a picnic or in a hot car it may only remain safe for 30 minutes.

##### Reuse

- Divide large amounts of leftovers into small, shallow containers for quick cooling in the refrigerator.
- Remove stuffing from meats and poultry and refrigerate it in a separate container.
- Don't eat cooked or perishable foods that have been kept in the refrigerator for too long (2-3 days is safe). Never taste food that looks or smells strange to see if you can still use it.
- *When in doubt, throw it out.*

# Dioxin in Food

by Jack Kittredge

Dioxin is a colorless, odorless solid organic compound containing carbon, hydrogen, oxygen and chlorine. The term dioxin often is used to refer to a broad family of chemicals, including furans and PCBs, which differ from one another by the location and number of chlorine atoms on the molecule. To date, the U.S. Environmental Protection Agency has identified 75 dioxins, as well as 135 furans and 209 PCBs, many with dioxin-like toxicity. The most widely studied form of true dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin, abbreviated as 2,3,7,8-TCDD. A mixture of dioxin-like chemicals is rated in terms of toxicity equivalents, (or TEQ for short). TEQ is the amount of TCDD that would produce a similar amount of toxicity to that amount of dioxin-like chemicals.

Dioxins can result from natural processes, such as volcanic eruptions and forest fires, but are mainly by-products of a wide range of industrial processes, including smelting, bleaching of paper pulp and the manufacturing of some herbicides and pesticides. Solid waste incinerators are the worst sources of dioxin release into the environment, due to incomplete combustion.

These compounds belong to a special group of dangerous chemicals known as persistent organic pollutants (POPs). Once dioxins have entered the environment or body, they are there to stay due to their uncanny ability to dissolve in fats and their rock-solid chemical stability. Their half-life in the body is, on average, seven years. In the environment, dioxins tend to bio-accumulate in the food chain. The higher in the food chain one goes, the higher is the concentration of dioxins.

## Dioxin and the Environment

Dioxins are found throughout the world in practically all media, including air, soil, water, sediment, and food, especially dairy products, meat, fish and shellfish. Exposure to dioxin can come through working in industries where dioxin is a byproduct, industrial accidents, through food and human breast milk and in drinking water. Overall, skin contact or breathing represent very small sources of dioxin exposure.

Dangerous dioxin contamination has been part of our world only since the turn of the century—tests for dioxin in lake sediments and tissues of ancient humans show much lower levels of dioxin than seen in current generations. It entered our environment in significant amounts with industrial expansion and the post-

World War II explosion of the chlorine and petrochemical industries. Since then, however, dioxins have spread throughout the world. They can be found now from penguins in Antarctica to rains that fall in South East Asia to the milk of a nursing mother in Germany.

Extensive stores of waste industrial oils with high levels of dioxins exist throughout the world. Long term storage of this material may result in dioxin release into the environment and the contamination of human and animal food supplies. Dioxins are not easily disposed of without contamination of the environment and human populations. Incineration is the best available disposal method, although other methods are being investigated. The process requires high temperatures, over 850° C. For destruction of large amounts of contaminated material, even higher temperatures -1000° C or more - are required.

## Dioxin and Human Health

TCDD was extensively studied for health effects because of its presence as a contaminant in some batches of the herbicide “Agent Orange” used during the Vietnam War. Unfortunately, we have learned from that experience that these compounds are among the most potent man-made toxicants ever studied. These compounds can produce a variety of effects at levels hundreds or thousands of times lower than most chemicals of environmental interest. The amount of dioxin required to disrupt normal development could be as low as one part in a trillion — the equivalent of a single drop of liquid placed in the center car of a 10-kilometer long cargo train. Indeed, public health expert Dr. Richard Clapp has testified that there is no safe level of exposure to dioxin.

How does dioxin do so much damage once it gets into the body? Apparently dioxins “mimic” or “block” estrogen and progesterone, natural hormones which instruct the body on how it should develop. They attach to cell receptors that are designed for regulatory hormones and enzymes. The result — normal cell function (including that of DNA) — runs amok.

The wide spectrum of health consequences now believed related to dioxins include cancers, reproductive and developmental effects such as birth defects and learning disabilities, immune deficiency, endocrine disruption including diabetes mellitus, altered testosterone and thyroid hormone levels, neurological damage including cognitive and behavioral alterations in offspring of dioxin-exposed mothers, liver damage, elevation of blood lipids which constitute a risk factor for cardiovascular disease, and skin damage.

There is a growing body of disturbing research indicating that dioxin-like chemicals may be seriously impacting male reproductive systems. A recent study in the British Medical Journal concludes that men in western countries today have sperm counts less than half as high as their grandfathers had at the same age. In addition, the occurrence of cancer in the testicles has increased 3-fold to 4-fold during the past 40 years; and various birth defects of the male reproductive system have increased 2-fold to 4-fold during the same period. There is also a growing body of evidence showing that male exposures to toxins can produce defective children.

The American Public Health Association (APHA) has expressed concern that nursing infants are ingesting quantities of dioxins that are far in excess of acceptable amounts, and that infants may be far more sensitive to their toxic effects. Because breast milk contains high levels of fat, in just six months of breast feeding, a baby in the United States will, on average, consume the EPA’s maximum lifetime dose of dioxin

## Dioxin and Food

Human exposure to dioxin is primarily from food intake. Dioxin can enter the food supply through a number of different routes. In fish, the primary route of exposure is through water. Plants and animals are exposed to dioxin primarily through particulate in the air. Airborne particles of dioxin settle on forage or feed, which is then eaten by animals.

Once released into the environment, dioxin is persistent because natural bacteria cannot effectively break it down. Dioxin particles that settle on fruits and vegetables as a result of airborne exposure are removed by washing; dioxin does not become systemic in the plant or food source. But dioxin has a high affinity for fatty substances and if an animal eats the plant, the dioxin concentrates and begins to accumulate in the fatty tissues. Theoretically, the longer the life span of an animal, the higher potential accumulation of dioxin in its adipose tissue.

From ice cream and fish to Kentucky Fried Chicken and McDonald’s Big Mac, many food samples collected from across the United States contained amounts of dioxin that well exceed government regulations, according to a World Health Organization study. While vegetables and fruits also contained trace amounts of these chemicals, their dose was significantly less than high fat foods.

Although any country can be affected, most dioxin contamination cases have been reported in industrialized countries. Several years ago milk from European cows was contaminated with dioxin and had to be destroyed. The source of the contamination was traced to imported Brazilian citrus pulp that had been mixed with industrial waste and sold for animal feed. A more recent case of dioxin contamination of food occurred in the southern part of the United States of

America in 1997. Chickens, eggs, and catfish were contaminated with dioxin when a contaminated ingredient (bentonite clay) was used in the manufacture of animal feed.

A major scandal erupted in Belgium this spring when high levels of dioxins were reported in many foods. Chicken, pork, beef, eggs, and products made from them all had to be withdrawn from the market and destroyed. The scandal broke when a television station reported that fat laced with dioxin was used to make poultry feed. Apparently 175,000 pounds of the contaminated feed had been distributed to poultry, beef and pig farms early in the year. An estimated 140 cattle farms, 500 pig farms and 416 poultry farms were linked to the contaminated fat. Initial tests showed dioxin levels in some chickens were 1,000 times the accepted limit. Belgium's health and farm ministers resigned when it became clear they knew about the dioxin for a month before making it public.

Because dioxin accumulates in fatty tissue, trimming fat from meat, consuming low-fat dairy products, and eating more fruits and vegetables may eventually decrease the body burden of dioxin compounds. The ability of consumers, however, to mitigate their own exposure is limited. Most people expect the government to monitor the safety of the food supply and to take action to protect public health.

#### Regulating Dioxin

Even if a government had the political will to clean up dioxin emissions, the task is not simple. The analysis of dioxins requires sophisticated methods that are available only in a limited number of laboratories around the world. About 100 laboratories are able to analyze dioxins in environmental samples (e.g. ashes, soil, or water) and in food. But only about 20 laboratories in the world are able to reliably measure dioxins in biological materials (e.g. human blood or mother's milk). These are mostly in industrialized countries. Costs vary according to the type of sample, but range from US \$1,200 for the analysis of a single biological sample to US \$10,000 or more for the comprehensive assessment of release from a waste incinerator.

In 1994 the U. S. Environmental Protection Agency (EPA), in the light of considerable research about serious health problems associated with dioxin, undertook a reassessment of the chemical. They concluded that: "Based on all of the data reviewed in this reassessment and scientific inference, a picture emerges of TCDD and related compounds as potent toxicants in animals with the potential to produce a spectrum of effects. Some of these effects may be occurring in humans at very low levels and some may be resulting in adverse impacts on human health."

The EPA's decision-makers try to keep the public's exposure to chemicals at least 100 times below the levels known to cause harm to people or animals. Their evaluation with dioxin, however,

is that some members of the general population already have dioxin body burden levels in the range associated with health problems and that many other people have dioxin levels that exceed the 100 times safety factor.

In light of the seriousness of the threat, the American Public Health Association has urged the EPA to:

- Decrease the new production of dioxins and dioxin-like compounds at the source through pollution prevention and strict controls on emissions;
- Aim for as close to a zero emission standard as possible, since there is little to no apparent margin of safety;
- Expand efforts to monitor the human population for body burdens of dioxins, particularly high-risk populations such as nursing infants, veterans and immigrants potentially exposed in Vietnam, and dioxin-exposed workers;
- Step up efforts to monitor the environment, especially the food supply, for dioxins and related compounds; and
- Continue to increase efforts to understand the public health consequences of dioxin exposure, particularly among high-risk populations, through further clinical, toxicological and epidemiologic studies.

In addition, the World Health Organization, in collaboration with the Food and Agriculture Organization (FAO)

through the joint FAO/WHO Codex Alimentarius Commission, is considering the establishment of guideline levels for dioxins in foods. The United Nations Environmental Programme (UNEP) is providing risk assessments of persistent organic pollutants, including dioxins. A number of international bodies are currently meeting to reduce the production of dioxins during incineration and manufacturing processes.

# Irradiation

by Jack Kittredge

Food irradiation is the process of exposing food to nuclear radiation. This energy travels through the food killing bacteria. The process also is referred to as "cold pasteurization" because bacteria are destroyed without the use of heat or raising the temperature of the food. Food irradiation is designed to reduce the risk of foodborne illness and prolong a food's shelf life.

Food irradiation plants are small nuclear facilities containing cobalt 60, a radioactive isotope, submerged 25 feet deep in a pool of water. The water absorbs the radioactive energy — it glows "cobalt blue" — and allows workers to stand inside the chamber without becoming contaminated. A small fence surrounds the pool and the two large submerged racks of "pencils," tightly sealed metal rods that contain the radioactive cobalt 60

The bulk of the space is an enormous warehouse, piled high with sealed boxes of culture dishes, test tubes, beakers, cosmetic powders, the liners that go inside cafeteria milk-dispensers and cartons for liquid eggs, all awaiting their turn in the irradiator. From here pallets of food move into the irradiation chamber. Once inside, a rack of cobalt-60 is elevated from the pool, bombarding the food with 300,000 RADS of radiation, which is the equivalent of 3 million chest X-rays. Afterward, the irradiated food is moved to a storage area.

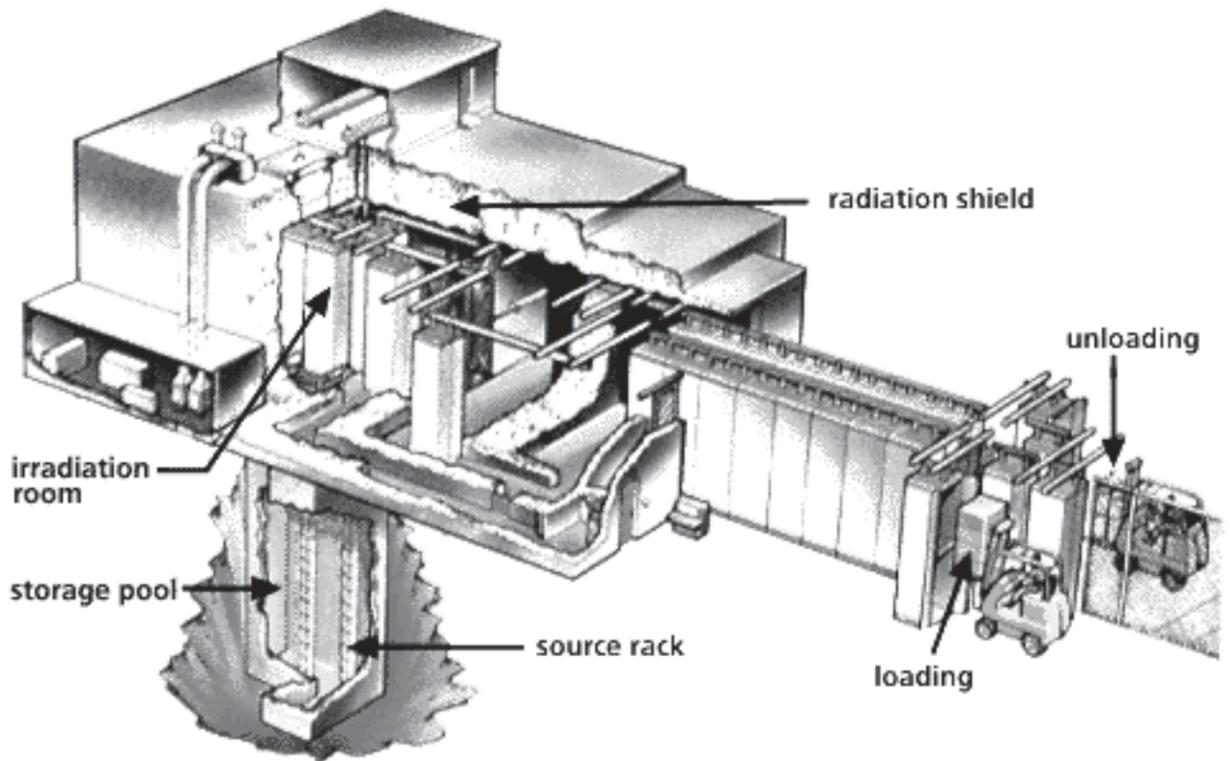
The radiation is mostly in the form of gamma rays, which are the short, high-energy waves at the upper end of the electromagnetic spectrum. At high intensity, they disrupt DNA molecules and prevent cell division. Radiation preferentially kills rapidly dividing cells (which is why it is used against multiplying cancer cells). In food, it stops disease-causing organisms because they are living and reproducing, as opposed to the rest of the food, which is dead.

## History of Irradiation

Scientists began food irradiation research in the early 1950's as part of the "ATOMS FOR PEACE" program which looked for ways to get rid of nuclear waste. The main push was made by the International Atomic Energy Agency and the Atomic Energy Commission. Later the Department of Energy (DOE), which wanted to get rid of the radioactive waste Cesium 137, paid companies to take it. Those companies lobbied congress to use it to irradiate food. Cobalt 60 is currently the radioactive source for food irradiation, but the DOE hopes that with the proposed expansion of food irradiation, Cobalt 60, which is in limited supply, will run out and Cesium 137 will again be used.

The U.S. Food and Drug Administration (FDA) approved the irradiation of wheat in 1963, and potatoes in 1964. Spices, which are the most commonly irradiated foods, gained FDA approval in 1983. More recently, the FDA has approved the use of irradiation for pork (1985), poultry (1992), and refrigerated or frozen uncooked red meat in December, 1997.

Most Americans probably don't realize that many products they use are currently being irradiated. For decades hospitals have used irradiation to sterilize medical devices—everything from baby bottle nipples to pacemakers and bone replacements. About half of all disposable medical devices are radiation sterilized, as well as consumer items that range from many cosmetics to some tampons and toys. Some plastic bandages are irradiated, as are the body bags used by police and the military. Many food packages are likewise sterilized to ensure that



the packaging doesn't contaminate the product inside: Isomedix, one of the radiation companies, irradiates the little plastic containers that hold the cream you get with your coffee at diners, as well as milk and juice cartons, shrink wrap, even wine corks.

## Irradiation and Food

In America, irradiation's only popular use on food has been to eliminate insect infestation and contamination in spices. According to the American Spice Trade Association approximately 65 million pounds of spices were irradiated in North America in 1995. That's only a small percentage of the spices consumed in this country, and pretty much all of them were used as ingredients in processed foods — irradiated ingredients don't have to be listed as such.

Proponents hope that consumers may slowly be coming to support irradiation. In 1994, a Food Marketing Institute survey showed that 36 percent of consumers said they would be very or somewhat likely to buy irradiated foods if they were available. In 1997, that percentage jumped to 60 — in part because people are concerned enough about microbial contamination of their food that they're willing to look at alternatives. The FDA, American Medical Association, and World Health Organization all agree that irradiated food products are safe to consume. Thirty-five other countries around the world have also approved the use of irradiation on food.

Many opponents of irradiation, however, believe it damages the quality of food. Demonstrable changes occur in taste, odor, color, and texture. Irradiated fats tend to become rancid. Even at low doses, some irradiated foods lose 20% of sensitive vitamins such as C, E, K, and B complex. Because irradiation breaks down the food's cell walls, accelerated vitamin losses occur during storage. Irradiated foods which are stored for long periods may lose 70-80% of their vitamin content.

Ionizing radiation knocks electrons out of atoms and can create free radicals. These free radicals react with food components, creating new radiolytic products, some of which are toxic (benzene, formaldehyde, lipid peroxides) and some of which may be unique to irradiated foods.

Studies have shown that irradiating microorganisms like E. coli and salmonella may give rise to even more dangerous, radiation-resistant strains of bacteria. Radiation-resistant strains of bacteria have been developed under laboratory conditions and researchers found that one particular bacteria can survive a radiation dose five times what the FDA will allow for beef. Scientists exposed this bacteria to 10 and 15 kilograys of radiation for several hours, enough radiation to kill a person several thousand times over. The bacteria survived.

Studies of animals fed irradiated foods have shown increased tumors, reproductive failures and kidney damage. Chromosomal abnormalities occurred in children from India who were fed irradiated wheat. Short term tests were done on dogs using irradiated beef; the dogs ended up with enlarged spleens and swollen lymph nodes. Other studies, including those done under contract for the U.S. Government indicate the possibility of immunotoxicity, kidney disease, cardiac thrombus, testicular damage and fibroplasia.

## Irradiation and the Environment

Also of concern are the issues of security (nuclear waste is lethal), waste disposal, engineering safety, transport of radioactive material, production of new isotopes, and handling — in some cases by poorly trained personnel.

Privatizing nuclear material at the national scale necessary for widespread food irradiation (hundreds of facilities) is a recipe for accidental leaks of radioactivity, worker exposure and abandoned Superfund sites. Georgia taxpayers already paid \$47 million to clean up a spill in an irradiation facility. In New Jersey, radioactive water was poured into drains which emptied into the public sewer system. One of the materials used to irradiate foods is radioactive for hundreds of years. Most communities do not want the increased risks of hosting irradiation facilities and the periodic transportation of radioactive materials to and from irradiators.

## Do We Need Irradiated Foods?

Proponents of irradiation argue that with the spread of virulent new microbes in the food supply, such "cold pasteurization" can be used to sanitize food as well as prolong storage and shelf life. Opponents feel that the cure may be worse than the disease. We don't need a proliferation of nuclear facilities across the American countryside, nor the inevitable accidents — resulting in radiation exposure — in our communities. Just like in agriculture and medicine, the proper approach is to take measures to prevent the problem in the first place.

During the last 12 years, for example, the Dept. of Agriculture has cut over 12,000 meat inspectors, and at the same time increased the speed at which is processed. In some processing plants, inspectors are supposed to inspect beef carcasses at the rate of 5 per minute, or chicken carcasses at a rate of 90 per minute! It's an impossible task. Does it make sense to speed up the production line to the point that safe food inspections are impossible, and then spend billions to sterilize the resulting contaminated meat?

Ending feedlot agriculture, cleaning up slaughter houses, slowing down meat processing lines,

stopping the feeding of antibiotics and rendered animal protein, and increasing the number of federal meat inspectors can prevent contamination at the start of the process — assuring consumers a healthy and radiation-free food supply.

#### Labeling

The consumer movement originally achieved a major victory on the issue of labeling irradiated foods. Standards for the labeling of foodstuffs are set by the Codex Alimentarius, a body of the United Nations. Codex has a special committee that deals with food labeling and the original proposals to the committee from the proponents of irradiation were that a flower-like symbol should be used on any food that had been irradiated. Consumer representatives objected strongly to this proposal because the symbol would convey little or nothing to the vast majority of consumers and the connotations of the symbol were clearly meant to convey a positive image of the treatment.

As a result of consumer representations, Codex introduced a standard that requires any food that has been irradiated to carry the word 'irradiated' (or the equivalent word in the national language) in a prominent position on the food label. Currently consumers will know if a food has been irradiated if it bears the international radura symbol (green petals in a broken circle) and the written statement: "treated by irradiation" or "treated with radiation."

Following the 1997 Hudson Foods recall of 25 million pounds of E. coli-contaminated beef, however, the food industry settled on irradiation as the high-tech "silver bullet" for their contamination problems. Claiming the bold labeling of irradiated foods rendered them unmarketable, the American Meat Institute, the Food Marketing Institute, and the United Fresh Fruit and Vegetable Association demanded change. The FDA Modernization Act was



signed into law in 1997 reducing the labeling requirement for irradiation to that "no more prominent than required for the declaration of ingredients" and ordering the FDA to consider eliminating all labeling requirements for irradiation. Within weeks the FDA approved the irradiation of beef. It is currently considering the elimination of labeling altogether. Their proposal can be viewed at [www.fda.gov/ohrms/dockets/98fr/021799a.txt](http://www.fda.gov/ohrms/dockets/98fr/021799a.txt)

Organic processing standards prohibit irradiation of food, so should the FDA eliminate specific labels for irradiation, consumers wishing to buy food free of irradiation will have to look for that which is certified organic.

# 10 Reasons Why Organic Food is

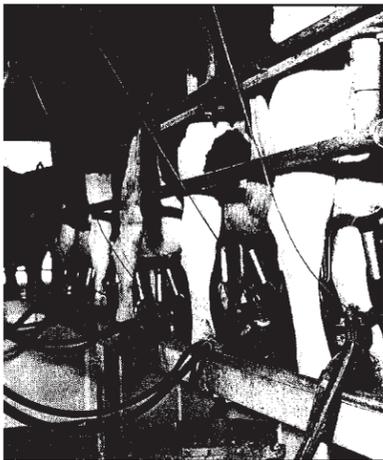
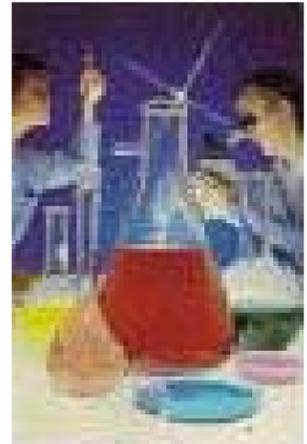


## Healthy Soil & Water

Organic standards require a program of soil building, which protects against soil erosion and water pollution. A healthy soil promotes vigorous soil life that, in turn, breaks down minerals and makes a complex meal of nutrients available to growing plants. Synthetic fertilizers deliver the three primary nutrients needed for plant growth, but leave out the diverse micronutrients that lead to plant vigor and health.

## No Genetic Engineering

Organic standards prohibit use of genetically modified organisms (GMOs) for seed or stock. The US government has allowed, even encouraged, the development and release of many GMOs into our environment and food system. Until compulsory GMO labeling is adopted in this country, buying certified organic is your best guarantee of no genetic engineering in your food.



## No Growth Hormones

Organic standards prohibit the use of growth hormones. US government regulations permit hormone use in conventional livestock operations to increase the size or rate of gain of animals raised for meat, or to stimulate production of animal products like milk.

## No Sludge

Organic standards prohibit the use of sewage sludge as a fertilizer, instead relying on use of composted manure, crop residues, green manures, cover crops, and rock powders to provide needed nutrients to plants. US government regulations permit sludge to be used on conventional farms despite concerns about contamination by high levels of heavy minerals, dioxins and other chemicals from industrial and commercial sources.



## Open Space

Organic standards prohibit confinement or feedlot style livestock operations. Organically raised animals generally must be allowed access to range or pasture. This promotes animal health and contributes as well to maintaining large areas of open land in otherwise developing communities.

# Safer for You and Your Community

## No Antibiotics

Organic standards prohibit routine use of antibiotics in livestock operations. US government regulations permit conventional animals to be routinely fed subtherapeutic levels of antibiotics to promote growth and prevent disease from their overcrowded conditions. Antibiotics may only be administered to an organic animal when the animal is sick and needs treatment. Such animals may then no longer be marketed as organic.



## No Irradiation

Organic standards prohibit the use of ionizing radiation to preserve food. US government regulations allow irradiation of both produce and meat. Irradiation proponents argue that it extends shelf life and kills microbes, which may spoil food and cause human illness. Opponents argue that it also kills the enzymes, vitamins, and healthfulness of food. They suggest cleaning up the feedlots and industrial food processing operations as an alternative way of protecting the public from disease.



## No Pesticides

Organic standards prohibit the use of synthetic pesticides, exposure to which has been linked with a number of serious human diseases. US government regulations allow such pesticides, although setting limits for application rates in the field and residue levels on food.



## Humane Conditions

Organic standards require that animals be treated humanely. This is spelled out in specific detail in the form of housing requirements for space, ventilation, and manure accumulation, as well as access to appropriate pasture or range, health care, food and water, treatment of the young, etc. The organic approach is based on the belief that agriculture must produce thriving plant and animal products to ensure a healthy cycle of life.



## No Animal Cannibalism

Organic standards require that animals be fed appropriately and prohibit practices such as feeding animal products from rendering plants. US government regulations allow rendered animal products to be fed to cattle, sheep and other herbivores as a protein supplement. This practice has been associated with outbreaks of "Mad Cow Disease" in Europe.

# Antibiotics and Hormones in Meat

by Jack Kittredge

## Antibiotics in Feed

Antibiotics are now routinely added, in small amounts, to the feed of livestock, poultry and fish raised for human consumption. This practice has become widespread since industrial models of animal raising have become dominant. Animals are no longer raised on pasture, given plenty of exercise and fresh air, and bedded in a clean, dry manner. Large scale animal confinement conditions now are the norm. These are overcrowded, dirty and stress the animals' health and immune systems.

The managers of these animal rearing systems believe that by administering antibiotics on a sub-therapeutic level they will be keeping animals away from disease and that they will be healthier and gain weight faster, as their own immune systems will not have to waste any energy in fighting disease. Studies have proven them right. Their gain, however, is short lived even for them, and very expensive for the rest of us.

When antibiotics are constantly added to feeds on a therapeutic or sub therapeutic level, microorganisms have a way of rebelling. Those able to call upon genes which let them metabolize or otherwise survive the antibiotic rapidly replace those that succumb.

In an environment that may contain 100 strains of microorganisms — a bathroom sink, an animal feed lot or a daycare center with an outbreak of diarrhea — an antibiotic may kill 99 of them. It's the single resistant pathogen that's left without competition: It multiplies and dominates the environment.



Very soon you have mostly microbes with an in-bred resistance and the antibiotic is no longer effective. This, alone, makes the practice shortsighted - if not uneconomical - for the operators of the livestock operation.

But a far worse result occurs. Now you have food animals carrying diseases for which our cures are suddenly ineffective. In some cases, although not nearly as often as pharmaceutical companies would have you believe, antibiotics are vital to saving human life. If their usefulness is expended to create cheaper meat, they will not be around for the emergency life-or-death case. It seems a poor bargain to destroy a rare and invaluable tool by dulling it in everyday use.

In addition, untreated manure from poultry, livestock and fish will contain antibiotics, as well as many antibiotic resistant disease-causing bacterial strains. If this manure is then disposed of in our soil and water, it not only will spread the same diseases we are trying to avoid, it will also kill off many beneficial organisms which are part of the network of life sustaining us.

Ed Mather, deputy director of the National Food Safety and Toxicology Center at Michigan State University, says that the old system of throwing ever-more specific antibiotics at new strains of pathogens no longer works: "There is a global realization that throwing new antibiotics at the rapidly developing strains of emerging pathogens as we have done so well for over 45 years isn't working. There is inadequate scientific understanding about how new resistant strains of microorganisms share their unique characteristics, how they migrate through our food systems and how they move through our global food supply. We are losing the race to keep a fence around bad bugs."

### Salmonella and Fluroquinolones

An example of losing this race is the recent outbreak of a severe strain of salmonella (DT104) in Denmark. Meat from pigs infected with the microbe hospitalized 11 people and killed two. The episode is especially worrisome to doctors because the bacteria is already resistant to five antibiotics and now appears to be unaffected by fluoroquinolones, a class of antibiotics considered one of the most powerful weapons against salmonella and other disease-causing intestinal bacteria. If the bacteria invade the bloodstream, which occurs in 3 to 10 percent of cases, the disease can be fatal.

"Fluroquinolones become a drug of last resort for some of these infections," said Dr. Stuart Levy,

director of the Center for Adaptation Genetics and Drug Resistance at Tufts University. "If we're beginning to lose these drugs, where do we go from here?"

Fluroquinolones were used in Denmark to treat some illnesses in pigs, and Danish researchers studying the outbreak suggested that this use may have fostered the growth of the resistant bacteria that then entered the food supply. Giving fluoroquinolones to pigs is not permitted in the United States, but the drugs are used to treat cows and are given in drinking water to entire flocks of tens of thousands of chickens or turkeys if any bird appears ill.

### Enterococci and Vancomycin

Another example of the spread of antibiotic resistance is reported in a recent issue of the *New England Journal of Medicine*. Medical researchers report that they have found vancomycin-resistant enterococci (VRE) in chicken feed. Dr. Glen Morris of the University of Maryland in Baltimore said the discovery raised fears that it could be passed on to humans.

"The identification of a highly resistant enterococcal strain in feed raises disturbing questions about the potential for penetration of VRE strains into farms and food animal populations in the US and subsequent risk of transfer into human populations," he said.

Vancomycin, like fluoroquinolones, is in the last line of resistance to "superbugs" which have built up a resistance to conventional drugs. Enterococci is a common source of infection in hospitals.

### EU Bans Four Antibiotics in Feed

Last December the European Union banned four antibiotics from animal feed because of potential risks to human and animal health. Drug companies Pfizer (US) and Rhone Poulenc (French) — which are makers of yield-boosting drugs and stand to lose millions of dollars if their products are banned from the animal feed market — responded angrily, arguing the ban had no scientific justification, would make meat more expensive, damage the environment and distort competition. Consumer groups have petitioned the EU to ban all prophylactic use of antibiotics in feed. The EU is currently considering such petitions.

Organic standards prohibit routine use of antibiotics in animals. Any animal needing antibiotics for a diagnosed disease must be taken out of the organic

stream.

#### Hormones Injected into Meat

Six growth hormones are currently in use in beef in the United States: 17 $\beta$ -oestradiol, progesterone, testosterone, zeranol, trenbolone and melengestrol acetate (MGA). The first three are produced naturally by livestock as well as humans. The last three are synthetically made and are not found physiologically in animals or humans. These hormones are implanted in beef by injecting them in pellet form under the back side (top) of the ear flap of the animal. Most US beef (90% of all feed lot cattle according to the Cattlemen's Beef Association) is now hormone-implanted. Sheep may also be implanted, but hormones are not currently administered to swine.

Hormones are used by livestock producers as part of the overall industrial speed-up of animal production which has occurred in America during the last generation. Hormones essentially speed up the process of development of the animal, increasing the rate of weight gain and improving the efficiency of feed use. As a result of their use, livestock gain weight faster on less feed and can be slaughtered sooner, with lower production costs. Industry experts estimate that hormone use can add to industry profits by approximately \$80 per animal.

Critics of hormone use in beef production argue that these hormones are not metabolized by the time the animal is slaughtered and are present in the final meat eaten by the consumer. There is considerable evidence that growth hormones can be cancer-causing in humans. Studies show that lab rats fed dosages of these hormones have developed cancer, and at least three of the most commonly used beef hormones appear on state and federal lists as "known" carcinogens.

#### European Panel Calls Beef Hormone a Carcinogen

On May 3, The European Union's Scientific Committee on Veterinary Measures, consisting of European and US-based endocrinologists, toxicologists, and other scientists issued a 139-page report affirming that the hormone 17 $\beta$ -oestradiol "has to be considered as a complete carcinogen." The EU panel stated moreover that all of the banned hormones "may cause a variety of health problems including cancer, developmental problems, harm to immune systems and brain disease... Even exposure to small levels of residues in meat and meat products carries risks..." For the other five hormones, however, the available data do not enable a quantitative estimate of the risk. The adverse effects of the hormones, the panel concluded unanimously, can be attributed to either the parent compound or the metabolites.

The European Union has refused to import hormone injected meat for human health reasons. Dr. Samuel Epstein, of the University of Illinois, organizer of an anti-cancer coalition, told the Los Angeles Times "The question we ought to be asking is not why Europe won't buy our hormone-treated meat, but why we allow beef from hormone-treated cattle to be sold to American and Canadian consumers." As the Cancer Prevention Coalition pointed out last year:

\* Confidential industry reports to the FDA, obtained under the Freedom of Information Act, reveal high residues of sex hormones in American beef.

\* Following implants in cattle of Synovex-S, a combination of estradiol and progesterone, estradiol levels in meat increased up to 20-fold over what is considered normal. Based on conservative estimates, the amount of estradiol in two hamburgers eaten by an eight-year-old boy could

increase his hormone levels by 10%.

\* Much higher hormone levels are found in meat products following illegal implantation in cattle muscle tissue, which is commonplace in US feed lots. A random survey of 32 large feed lots found that as many as half of the cattle had visible "misplaced implants" in muscle, rather than under ear skin.

\* Lifelong exposure to high residues of natural and synthetic sex hormones in meat products poses serious risks of breast and reproductive cancers, which have sharply increased in the US since 1950. Hormone residues are also suspected to be causal factors in premature sexual development in young girls.

#### US Calls Cancer Danger "Unsubstantiated"

The US Food and Drug Administration (FDA) and US Department of Agriculture (USDA) insist that beef hormones are totally safe, and that consequently hormone-tainted beef need not be labeled. The USDA claims beef hormone residues pose no danger, but then admits they don't test for residues — except on rare occasions. As a result, few eaters of American beef know they're likely getting an extra dose of hormones and estrogen with their burgers or steaks. The World Trade Organization has taken the American position and ruled that the European ban is a prohibited protectionist measure in violation of free trade. United States Secretary of Agriculture Dan Glickman condemned the EU scientific panel's "unsubstantiated arguments" and warned that the US would go ahead and impose trade sanctions on the EU.

The EU scientific report prompted the European Commission, the body which has banned hormone-injected beef from the US, to rule out lifting the ban. Europe's acting Farm Commissioner Franz Fischler has vowed to challenge the threat at the World Trade Organization: "...there is new scientific evidence available...both sides must realize there are serious concerns and we have a new basis for discussion." Fischler also ruled out allowing US beef into EU markets under a strict labeling scheme as a potential compromise. "If there is clear risk to human health then labeling cannot be considered," he said.

In organic meat production, of course, producers are prohibited from using growth hormones in cattle or any other animals.

#### Bovine Growth Hormone

Insulin-like growth factor (IGF-1) is a powerful naturally-occurring growth hormone found in the blood of humans. Dairy cows injected with genetically-engineered bovine growth hormone (rBGH) give milk containing elevated levels of IGF-1, and the IGF-1 in milk can pass into the blood stream of milk consumers. Cows' IGF-1 is chemically identical to that in humans. Ingested IGF-1 would ordinarily be broken down in the stomach, but the presence of casein in milk prevents such breakdown.

rBGH is injected into cows to extend by several weeks their period of lactation, and thus to force them to produce more milk, although US dairy cows already produce an excess of milk. The U.S. government spends more than \$200 million each year purchasing surplus milk.

Because rBGH injections can cause numerous ill effects in cows, veterinarians in Germany have refused to administer it to cows on grounds that it violates their professional code of ethics, which forbids intentional harm to animals. U.S. veterinarians have not taken a similar stand.

A study by a scientist at the University of Illinois in

Chicago in 1996 suggested that IGF-1 from rBGH-treated cows may well promote cancer of the breast and of the colon in humans who drink such milk. It pulled no punches: "In short, with the active complicity of the FDA, the entire nation is currently being subjected to an experiment involving large-scale adulteration of an age-old dietary staple by a poorly characterized and unlabeled biotechnology product.

A study of U.S. women published May 9 of this year in the British medical journal LANCET found a 7-fold increased risk of breast cancer among premenopausal women younger than age 51 with the highest levels of IGF-1 in their blood. A study published in SCIENCE in January, 1998, found a 4-fold increase in risk of prostate cancer among men with the highest levels of IGF-1 in their blood. IGF-1 levels are now being artificially increased in much of the cows' milk being sold throughout the U.S. These new cancer studies raise serious questions about the wisdom of allowing IGF-1 levels to be raised in milk.

It will be difficult for the U.S. Food and Drug Administration (FDA) to acknowledge that milk from rBGH-treated cows might be implicated in common cancers. Historically, FDA has maintained a very close relationship with Monsanto, the chemical company that spent a billion dollars developing rBGH. FDA approved rBGH for cows in 1993 and issued regulations that made it appear to be illegal to label and thus distinguish between milk which is rBGH-produced or rBGH-free. Some of the FDA officials who approved rBGH and who established the regulations discouraging labeling had previously worked for Monsanto.

Eleven separate surveys have shown that Americans strongly prefer to have rBGH-treated milk labeled as such. rBGH is prohibited under organic milk production standards.

# Genetic Engineering for Lunch?

by Jack Kittredge

The proponents of the biotech revolution into which we are rapidly moving suggest it will bring an idyllic future. "Biotechnology enables researchers," says prime corporate sponsor Monsanto Co., "to develop improved crop plants, such as crops naturally protected from diseases and insects. Biotechnology also provides new ways to treat human disease, to manufacture chemical products and to eliminate wastes." An editorial in USA Today is even more effusive. According to the newspaper, biotechnology is: "increasing food yields, reducing the need for pesticides and herbicides by up to 40 percent on some crops, and it is making crops that are frost-, flood- and drought resistant."

Some advocates claim the technology will increase the vitamin content of food crops, create fruits which deliver vaccines and medicines in Third World countries, grow polyester fibers and other plastics, combat cancer, grow replacement organs for accident victims, and feed the world. Not since the nineteen-fifties and the selling of Atomic Power have such claims been made for future health and wellbeing resulting from a new technology.

## How Does Genetic Engineering Work?

What sort of endeavor is this, which makes such far-flung claims? Ever since the basic structure of DNA was unraveled by Watson and Crick in 1953, scientists have been delving into the nucleus of cells to try to better understand how they function. While much progress has been made in mapping the genetic code of organisms, the amount we do not know still dwarfs what we do. Techniques have been developed to extract a gene containing desirable genetic code and insert it into a strand of DNA, primarily using enzymes for the actual cutting and pasting, and either viruses (the Cauliflower Mosaic Virus is a common vector) or 'gene guns' as intermediaries to get the gene past the new cell's defenses and into the nucleus.

But while the mechanics of moving genes around have been brought somewhat under control, the selection of what genes to use and where to put them is still largely a matter of trial and error. Genes basically encode for proteins, so changing the location of a gene will change when and how certain proteins are made. To an extent, researchers know which proteins are responsible for which traits, but more complex interactions between several proteins are not well understood.

In addition to the gene itself, which codes for the protein enabling the desired trait, a complex package of genes that control the crucial gene must be added to the target cell. These include an antibiotic resistance marker to test whether the process works (if the sample survives the antibiotic, the gene package arrived safely), a barrier penetration gene, a virus gene called a promoter, needed to switch on the crucial gene, an enhancer gene to allow expression of the desired gene, and a termination gene to punctuate the process in the genetic code.

Much of the actual work involves many, many trial gene insertions. The results of these are tested for desirable characteristics. In virtually every case the result is not viable or not an improvement in the area desired. But, very rarely, researchers find what they think they are looking for.

Perhaps the situation is best summed up by Roberto Verloza, an engineer, who writes: "Blasting plasmid-coated microparticles into cells to improve plant characteristics is like putting several screws, nuts, bolts, springs, etc. into a shotgun cartridge, then blasting them into a running engine to stop an occasional vibration in the engine. Perhaps, after several million attempts, the vibration actually stops and they'd be proud of their work. As a real engineer, I refuse to call that



Indian farmers burn Bt cotton in "Operation: Cremate Monsanto."

engineering. That plant genomes can take such treatment and survive is a testament not to the precision of the genetic engineer, but to the resilience of living organisms to abuse."

## What Has Genetic Engineering Created?

An example of successful genetic engineering (GE) was Asgrow Seed Company's virus-resistant squash. In 1986 Asgrow's Hector Quemada and Cornell University's Dennis Gonsalves began inserting genes from two viruses known to devastate squash into the DNA of normal squash. After 4 years of trials they came up with a squash that produces coat proteins for the viruses, which effectively makes it resistant to those viruses.

But, you ask, how many seeds must you sell, and for how much, to pay for such research? The number is pretty large. But then, so has been the market for "improved" plants. Last year some 50 million acres of genetically modified crops were grown in the US, making their way into 30,000 food products on store shelves. Some of the major foods currently carrying genetically engineered ingredients are Coca-Cola (corn syrup and/or Aspartame), Fritos (corn), Green Giant Harvest Burgers (soy), McDonald's French fries (potatoes), Nestle's chocolate (soy), Kara corn syrup (corn), NutraSweet (Aspartame), Kraft salad dressings (canola oil), Fleishmann's margarine (soy), Similac infant formula (soy), and Land O'Lakes and Cabot Creamery butter (rBGH).

The reason so many food products now contain GE ingredients is that both soybeans and corn have been modified to be resistant to Monsanto's popular herbicide Roundup (glyphosate). Thus farmers can use more herbicide, have less weed pressure, and get a better crop. An estimated 55% of all US soybean acreage, and 35% of corn acreage, is planted to GE crops this year. Since virtually every processed food uses something from one of these two crops, most are now likely to be genetically modified to some degree.

Another successful product line for the genetic engineers is that incorporating genes from the soil bacterium *Bacillus thuringiensis* (Bt). As most organic farmers know, Bt naturally produces a toxin which is deadly to certain insects. A number of Bt toxins exist, one for moths and butterflies, one for mosquitos, one for beetles, etc. Several biotech companies have modified the seeds of crops preyed upon by certain insects with the Bt gene for the toxin appropriate to that predator.

Monsanto recently announced that it would not commercialize another highly publicized GE product — Terminator seeds. Those are seeds which contain a gene which turns off the plant's natural ability to produce fertile seeds of its own. Unless treated with a proprietary chemical bought from Monsanto, the crop would produce sterile seed. While the idea of sterility being engineered into seeds strikes most people as demonic, the beauty of the idea for the seed companies is that the crop can be harvested and sold, but the farmer will not be able to save seed for next year. Instead he or she will have to come back to the company for seed again and again. Meanwhile, the company can grow out its own stock of seed by treating its crop with the necessary chemical to overrule sterility.

## Why Are People Concerned about Genetic Engineering?

Most people are concerned about genetic engineering because the technology itself is so poorly understood. Since foreign genes enter the host DNA haphazardly and disrupt the region into which they wedge, they can broadly and adversely affect cellular function. Also, the promoters attached to the foreign genes can induce an altered expression of adjacent native genes. Lastly, an unregulated production of foreign proteins can disturb complex biochemical feedback loops.

For all these reasons the new organism can have quite unexpected effects. Some of the possibilities that worry critics include:

- Perhaps dangerous toxins could be created, as when GE production of the nutritional supplement tryptophan by a Japanese firm in 1988 resulted in an unexplained toxin responsible for 37 deaths and the permanent disablement of 1500 people.
- Perhaps the new crop could simply have gained an economic advantage at the expense of a nutritional one, as when "Roundup Ready" soy was found to be deficient in protein and phytoestrogens.
- Perhaps unexpected allergic reactions will result, as when soy allergies rose an incredible 50% among Britons in 1998. GE soy includes foreign proteins from a virus, a soil bacterium, a petunia, and a Brazil nut, among others.
- Perhaps viruses, which because of their protein coats have always been species-specific but are now being used "naked" to carry genes into cells, could mutate or combine into "super viruses" like HIV.
- Perhaps GE foods will carry the potential to encourage cancers in humans, as both recombinant

Bovine Growth Hormone in milk and lectin-spliced GE potatoes are reported, in medical journals, to do.

- Perhaps the antibiotic resistance passed on as a useful “marker” during trials could spread and destroy the effectiveness of medicines in human life-and-death situations (like typhoid, pneumonia and infections in AIDS patients), as the United Kingdom Ministry of Agriculture fears could happen for eight powerful antibiotics because of antibiotic resistance in genetically engineered corn.
- Perhaps the pollen from GE crops could be lethal to species of wildlife, as has proven the case with pollen from Bt engineered corn and Monarch butterflies, or
- Perhaps the genes introduced into a species by GE could outcross into the wild, incorporating themselves into every close relative of major crop plants, reducing our reservoir of wild plants and the new vigor they bring to natural breeding.

As Nobel Prize-winning biologist George Wald warned more than 20 years ago: “Recombinant DNA technology faces our society with problems unprecedented not only in the history of science, but of life on the Earth. It places in human hands the capacity to redesign living organisms, the products of some three billion years of evolution. Such intervention must not be confused with previous intrusions upon the natural order of living organisms; animal and plant breeding, for example, or the artificial introduction of mutations, as with X-rays. All such earlier procedures worked within single or closely related species. The nub of the new technology is to move genes back and forth, not only across species lines, but across any boundaries that now divide living organisms. The results will be essentially new organisms, self-perpetuating and hence permanent. Once created, they cannot be recalled.”

### Isn't the Government Regulating Genetic Engineering?

The agency responsible for regulating GE crops in this country is the US Department of Agriculture (except for those crops regulated by the Environmental Protection Agency — crops which are engineered to release pesticides such as Bt.) Out of dozens of applications by seed companies for approval of GE organisms, the USDA has never rejected a single one. Scientists who have studied the approvals say the department frequently relied on unsupported claims and shoddy studies by the seed companies.

An example is Asgrow's virus-resistant squash. From the start, critics were worried about the possibility that the squash could breed with wild squash and create a “superweed” that would proliferate in a way comparable to kudzu vine in the South or zebra mussels in the Great Lakes. The critical question was whether viruses kept the population of wild squash, which produce inedible gourds, in check. If they did, then allowing a virus-resistant squash to cross with them would be the height of irresponsibility. Asgrow determined that viruses were not an important restraint on wild squashes by conducting laboratory tests on 14 plants from 9 sites. None had the virus.

Experts say the study proved nothing. Dr. Norman C. Ellstrand, an evolutionary biologist at the University of California at Riverside, asks: “What if we asked if the most important disease controlling human population size — malaria — was in fact an important disease? If you took 14 random individuals from around the world, the chances of picking one who has malaria would be relatively low, making the chance of getting a misleading result really high.”

The Food and Drug Administration (FDA) is responsible for regulating foods, including those created by GE. But the agency has taken the position that foods created by genetic engineering are substantially equivalent to natural foods. They require no safety testing for GE foods. In one case, after reports surfaced that Bovine Growth Hormone (approved by the FDA in 1993) might be dangerous to both cows and humans, FDA scientist Dr. Richard Burroughs began an investigation of the drug. He was fired.

“I was told that I was slowing down the approval process,” Burroughs said. “It used to be that we had a review process at the FDA. Now we have an approval process. I don't think the FDA is doing good, honest reviews anymore. They've become an extension of the drug industry.”

When it came to testing GE foods, the government “just gave up” says Philip Regal, University of Minnesota ecology professor and expert in the field. “The technological problems of testing were too difficult. A whole range of GMOs [genetically modified organisms] were coming in and they had no way to test for them. The expense would be astronomical. The general idea was, ‘We'll just have to risk it. If the people want progress they're going to have to be guinea pigs.’”

### How Is Genetic Engineering Received Around the World?

Apparently other countries are not as easy on genetic engineering as the U.S. In January of this year Canada rejected Monsanto's request for approval of Bovine Growth Hormone after an 8-year review. The process became particularly damaging to Monsanto when Canadian health officials claimed the corporation had tried to bribe them. The fight is not over yet, however. Monsanto is appealing to the World Trade Organization's Codex Alimentarius to declare BGH safe and Canada's ban an unfair trade practice. So far, 90% of WTO appeals have been successful, so stay tuned for more!

New Zealand has decided to require foods including GE elements to be labeled. Some will be labeled as early as April of 2000, and all must be labeled by the start of 2001. The measure will add to the cost of food, opponents argue. The Grocery Marketers Association there says testing costs will add 4 to 6% to the cost of food.

The European Commission has agreed to new rules requiring compulsory labeling when at least one ingredient of a food contains more than one percent of a GE material. The 1% figure acknowledges that some contamination of food is inevitable during shipping and processing. British consumer groups are opposing the 1% figure as too lenient, and public opinion there, as well as food companies, seem to be agreeing on a 0.1% limit. The Soil Association, Friends of the Earth and Greenpeace all want the level put at 0.01% — the current limit for detection.

Europe has also acted against growing GE crops. France suspended authorization for Novartis to grow GE corn, the United Kingdom and Denmark have imposed moratoria on GE growing, and Greece has declared a total freeze on all GE growing — either experimental or commercial. In Ireland, Great Britain, France and India, farmer-led uprisings have burned and destroyed Monsanto's test plots. In India, Monsanto is growing GE plants in green houses constructed of bullet-proof plastic!

A few headlines during the last four months serve to illustrate the state of agitation around the world over GE food: “GE Debate Heats Up in Mexico” (October 12), “Global Consumer Pressure Keeps Australia from Producing GE Crops” (October 14), “Japan's Largest Soybean Company Bans GE Soybeans” (September 1), “Opposition to GE Crops Mounts in Latin America” (September 7), “Analyst for Deutsche Bank — World's Largest — Predict That the Public and Investors Will Reject Agricultural Biotechnology” (August 21).

### How About the Climate for GE at Home?

But it is really in the US that genetic engineering will live or die. Over 2/3 of the world's acreage planted to GE crops is in this country. But while consumers in Europe and Japan are up in arms over the technology, the major food companies using it here report almost no consumer calls or complaints. Some food companies, however, are betting on rising concern. Worthington Foods has sworn off

GE soy in its Morningstar Farms veggie burgers. Ben and Jerries is buying non-GE soy flour for the brownies in its products. Hain Foods in putting non-GE labels on its organic snacks.

Polls are also indicating a reservoir of distrust of GE among Americans. A January, 1999, *Time Magazine* poll found 81% of respondents believe in labeling GE foods, and 58% said they would not buy such foods if labeled. Monsanto is worried enough that they hired Stan Greenberg, pollster and political advisor to President Bill Clinton, British Prime Minister Tony Blair and German Chancellor Gerhard Schroeder. Greenberg was not reassuring. In a leaked internal memo he said: “That [anti-biotechnology] sentiment, expressed by the elites, is strongly reflected in the general public. In the focus groups, biotechnology companies were seen to be willing to risk great human danger in order to make profits.”

Investors and corporate managers are not unaware of the growing risks of backing biotechnology in food. Switzerland's Novartis, the world's number two pharmaceutical company, is considering “a number of options” for its troubled agribusiness division after a drop in sales and a layoff of over 1100 workers. This decision comes just a month after Britain's AstraZeneca warned it might sell off its agrichemical business, which has been the target of high profile demonstrations by environmentalists. Even Monsanto has seen its share price drop over 40% in the last year.

### Where Does the Issue Stand Today?

As the heat in the genetic engineering kitchen increases, it is unclear who will get out first. Major buyers — Gerber and Heinz baby foods, Archer Daniels Midland — are discriminating between GE and non-GE soy and corn. Eco-guerrillas are sabotaging field tests in California, Minnesota and New England. Congress is discussing a labeling law. Greenpeace, sensing victory on banning modification of GE human food in Europe, is expanding the struggle to challenge GE of animal feeds in a “mopping up” campaign.

Almost no US corn has been exported to Europe for the past two years because of consumer resistance to “commingled” GE and non-GE commodities. Brazil, with its ban on GE crops, has become a Mecca for buyers and is exporting record-breaking amounts of soy. Australian exports of canola oil to Japan have surged because the US and Canada refuse to differentiate between GE and non-GE sources. On the Japanese futures market the price of 1998 US soybeans has been declining rapidly (because of commingling) and traders expect most farmers and grain elevators to start separating out GE from non-GE grains.

The battle over genetic engineering is, in a way, a proxy for an even larger struggle. Ever since the Nixon-engineered Soviet grain purchase in the early 1970s, US agricultural productivity has become a major guarantor of US world power. With the expansion in Canadian, Australian, Latin American and European agriculture over the last generation, our hegemony is no longer assured. But, should these nations have to purchase their seed from us, US policy interests can continue to drive hard bargains around the world.

Genetic engineering is emerging as a major issue in American political life. So far no serious candidate has opposed it, but Pat Buchanan is appealing to the populist base on the issue with his “damn-the-WTO” talk. The FDA, rattled by how badly it has read public opinion, is holding hearings on reevaluating its position on genetic engineering. The first two took place in Chicago (November 18) and Washington, D.C. (November 30). A third will take place December 13 in Oakland, California. Popular participation is urgently invited. In the meantime, since organic certification organizations prohibit GE seeds and organisms, the only current non-GE label you can trust is the certified organic one.

# 13 Myths About Genetic Engineering

*The following was prepared by Consumers for Education about Genetic Engineering.*

**Myth No. 1** - Genetic engineering (GE) is not new. It is just the same as speeded-up selective breeding.

**FACT:** Genetic engineering (GE) and conventional breeding are worlds apart. Breeding does not manipulate genes; it involves crossing of selected parents of the same or closely related species. In contrast, GE involves extracting selected genes from one organism (e.g. animals, plants, insects, bacteria) and/or viruses, or synthesising copies, and artificially inserting them into another completely different organism eg. food crops). GE usually employs virus genes to smuggle in and promote the inserted genes, and antibiotic resistance genes to act as markers. All these inserted genes are present in every cell of the plant.

**Myth No. 2** - Genetic engineering is precise.

**FACT:** The function of only a small proportion of the DNA in a higher organism is known. Modern genetics has shown that genes do not operate in isolation. Rather they interact in a complicated way, changing their behaviour in response to influences from other genes. Although a gene can be cut out precisely from the DNA of an organism, its insertion into the DNA of another organism is entirely random. This results in the disruption of the order of the genes on the chromosome and may result in random and unexpected changes in the functioning of the cells.

Richard Lewontin, Professor of Genetics at Harvard University, has said of GE: 'We have such a miserably poor understanding of how the organism develops from its DNA that I would be surprised if we don't get one rude shock after another.'

**Myth No. 3** - GE foods vary from non-GE foods only in the characteristic that has been modified.

**FACT:** The random insertion of foreign genes into the genetic material may cause unexpected changes in the functioning of other genes. Existing molecules may be manufactured in incorrect quantities, at the wrong times, or new molecules may be produced. GE foods and food products may therefore contain unexpected toxins or allergenic molecules that could harm our health or that of our offspring.

**Myth No.4** - GE food is extensively tested and the GE food at present on our supermarket shelves is perfectly safe to eat.

**FACT:** No GE food testing is done in America. We rely almost entirely on the testing carried out by the GE biotechnology companies that have spent billions of dollars developing the food and intend to make a profit selling it to us. There are serious doubts about the adequacy of the testing and the validity of the conclusions drawn from the results. Independent long-term testing is required before we can be sure that GE food is safe to eat. Another health concern is the possible acceleration of the development of bacterial resistance to antibiotics due to the use of antibiotic resistance genes in the production of GE foods.

**Myth No. 5** - Genetically engineered food has improved nutritional value.

**FACT:** No GE food produced to date has been shown to be more nutritious than non-GE food. Most GE crops are only designed to be resistant to specific herbicides, to produce their own insecticides or to have an increased shelf life.

**Myth No.6** - One can always choose not to eat GE food.

**FACT:** At present most foods on American supermarket shelves containing GE ingredients are not labelled, so there is no way of knowing whether we are eating them. GE products are likely to be found in foods containing the following ingredients: Soya flour and oil (in many common foods including breads, sausages, etc.) Lecithin (in chocolate, ice cream etc.) Canola oil Corn (maize) extracts.

**Myth No. 7** - Farmers will benefit from growing GE crops.

**FACT:** Seeds of genetically engineered crops are more expensive than those of conventional crops. Farmers in the UK and USA report that yields are generally no better, the crops are less reliable and overall have not improved profitability. Non-GE crops now receive a premium and as more countries reject GE foods, the opportunities to sell GE produce overseas are diminishing. Because of risks associated with GE crops, insurance companies in the USA and UK are now reluctant to insure them. Farmers growing GE crops have to sign binding contracts with the biotechnology producers. These commit them to using only the herbicides produced by that company and prohibit them from the traditional practice of saving seed for the next season. Most third world farmers certainly will not benefit.

**Myth No.8** - GE crops will reduce the use of herbicides and pesticides.

**FACT:** Crops engineered to be resistant to specific herbicides may encourage more liberal use of those herbicides. This has been anticipated by one manufacturer, who has applied to ANZFA (Australia New Zealand Food Authority) to have the allowable residue of the herbicide glyphosate (Roundup) in foods sold in New Zealand increased by 200 times. In areas of the USA where crops engineered to produce their own insecticide are grown, pesticide use has not decreased.

**Myth No. 9** - There is no evidence that GE crops are harmful to the environment.

**FACT:** Insects, birds and the wind carry genetically altered pollen and seeds into neighbouring fields and far beyond. Cross-pollination occurs between GE crops and non-GE crops and their wild relatives. In this way resistance to weed killer, for example, might be transmitted to weeds making them more difficult to control. There is evidence that crops engineered to produce their own insecticide can kill beneficial insects.

**Myth No. 10** - GE crops will save the world from famine.

**FACT:** A major cause of famine is the unequal global distribution of food. Food mountains exist in much of the western world and food is regularly dumped. Poor people have limited ability to buy either GE or non-GE food. There is no evidence that GE crops produce higher yields than conventional crops or that GE products will be cheaper.

**Myth No. 11** - You can trust the scientists that GE food is good for you and the world.

**FACT:** The money for scientific research on GE here and overseas comes from either the biotechnology companies or the government. Both are committed to the promises of biotechnology. This means that even when scientists have concerns about the safety or commercial application of the technology, it is often hard for them to risk their careers by being openly critical. One respected scientist in the UK who spoke up about his experimental results showing damaging effects of feeding rats on a type of genetically engineered potato was immediately fired from his job.

**Myth No. 12** - You can't stop progress.

**FACT:** No of course we can't; and why would we want to? Progress implies change for the better. Change for the worse is regression. We must be sure that GE products have benefits for the consumer and are safe if they are to be introduced into our foods. We must not commit ourselves to a dubious technology that cannot be reversed.

**Myth No. 13** - There are more important things to worry about than GE foods.

**FACT:** Many scientists don't think so. For example Joseph Rotblat, the British physicist who won a 1995 Nobel Prize says: "My worry is that other advances in science may result in other means of mass destruction, maybe more readily available even than nuclear weapons. Genetic engineering is quite a possible area, because of these dreadful developments that are taking place there."

# Mad-Cow Disease

by Jack Kittredge

The recent British epidemic of mad-cow disease, which has resulted in twenty-seven human deaths so far, has also led to the slaughter of 3.7 million cattle and the destruction of England's cattle industry. Although the outbreak now appears to have been contained, the experience has also shaken the foundations of European faith in safe food.

As those who followed the unfolding of the epidemic will recall, mad-cow disease is one in a category of progressive neurological disorders called transmissible spongiform encephalopathies (TSE). The fatal human nervous-system disorder Creutzfeldt-Jakob disease, or CJD, is also among these, and the panic in Britain began when a new variant of this gruesome affliction was discovered in association with mad-cow disease. Many things about TSE in general, and the relationship between mad-cow disease and CJD in particular, remain unclear. But we do know that TSE is 100 percent fatal, and in human beings takes up to thirty years to manifest symptoms.

The disease was first observed in Great Britain in April, 1985, and was specifically diagnosed in 1986. By June, 1990, there were some 14,000 confirmed cases out of an estimated population of 10 million cattle in Great Britain. Since 1986, more than 173,000 cases of BSE in cattle have been identified in Britain, involving more than 50% of the dairy herds in the UK. From a high of 1000 cases a week in 1993, less than 100 cases are now being reported per week.

The outbreak seems to have its roots back in the early 1980s in England when the rendering process (by which livestock carcasses are converted to various products, including protein supplements for livestock feed) was changed. Previously, a solvent extraction step had been used to extract fats (tallow); this step was stopped when the price of the petroleum-based solvents used to extract fats went up. In addition, to save money as fuel prices rose, rendering plants lowered the temperatures in their vats. The infectious agent of mad-cow disease can survive boiling and many disinfectants, but is readily destroyed by extremely high temperature (such as in an autoclave), by oxidizing agents, or by solvents. Once the temperature was reduced and solvents were left out of the rendering process, the agent survived and went on to infect livestock feed.

Epidemiologists believe that the bovine agent mutated from the agent for scrapie, a disease affecting sheep brains. It is thought that the scrapie agent jumped species and moved into cattle when sheep offal (the leftover parts of butchered animals) was included in protein supplements fed to cattle. After cattle started to die, infected cattle carcasses and offal were included in the same protein supplements, which only amplified the epidemic.

Protein supplements containing sheep and cattle offal were banned in the UK in 1988, but it was not until 1991-1992 that the ban was strictly enforced. Given the long incubation period of mad-cow disease, the number of new cases per week continued to rise until late 1993.

On March 21, 1996, the British government announced 10 cases of a new variant of CJD in people not otherwise considered at high risk. It was the age-distribution of these 10 cases (average age 27 vs. 63 for sporadic CJD cases), plus some alleged pathologic changes in their brains, that led the British expert committee to declare this a new variety of CJD. No one knows how many deaths will ultimately result from this British outbreak, but some experts are predicting hundreds of thousands of people may die in the decades ahead due to the long and invisible incubation period of this brain-destroying illness.

### The Transmissible Spongiform Encephalopathies

Scrapie, which has been present in sheep in the United Kingdom for at least 200 years, was long thought to be a purely genetic disease. But by the mid-1930s French researchers had shown that it is infectious. The disease got a foothold in the United States in 1947 when an outbreak, traced to an import of purebred Suffolk sheep, was reported in Michigan.

In its natural form, CJD was first described in the 1920s by the German physicians Hans Gerhard Creutzfeldt and Alfons Jakob. Symptoms vary, but they may include loss of coordination, personality changes, mania, and dementia; death is inevitable. About nine people a year in 10 million contract CJD “spontaneously” — that is, by a means unknown — and one in 10 million does so through inheritance. CJD has been contracted through the transplant of infected tissues, such as corneas, through contaminated surgical instruments, or through the injection of growth hormones derived from CJD-infected pituitary extracts. Though it has not been shown to be transmissible in blood outside the laboratory, dread of the disease is such that more than \$100 million worth of blood products have been destroyed for fear of CJD contamination. In the United States about 250 cases occur each year.

Our knowledge of CJD goes back to earlier studies of kuru, the so-called “headhunter disease” seen in Papua New Guinea, where people became infected after eating the brains of enemies and preparing their dead relatives for burial. Kuru studies were instructive since they showed for the first time that a slowly progressive neurological disease of humans can be infectious. For this discovery Carleton Gajdusek was awarded the Nobel Prize.

Two recent medical studies, one from Yale Medical Center and the other from the Department of Neurology at the Veterans Affairs Medical Center in Pittsburgh, suggest that up to 7 percent of people diagnosed with Alzheimer’s disease actually suffered CJD. This is possible because when an elderly person displays signs of dementia, Alzheimer’s is an obvious diagnosis. Brain biopsies are rarely performed, and neurologists who can easily spot CJD often are not consulted.

Recently, as the power of molecular biology has been applied to these diseases, it has become clear that each (scrapie, mad-cow disease, kuru and CJD), are spongiform encephalopathies, characterized by sponge-like holes in the brain, caused by a heretofore unknown agent.

#### Prions

The British mathematician J. S. Griffith proposed the idea that proteins could be infectious in a paper published in 1967 in *Nature*. He said that proteins might self-replicate much the way crystals do, by building up around a central seed crystal. The idea that proteins could replicate without the aid of genetic material, or the nucleic acids that make up that material, was startling. Even simple microbes require nucleic acids to direct their growth. Griffith’s theory that a protein in and of itself could control life defies basic Darwinian principles and was largely ignored.

Recently, however, as interest has increased in spongiform encephalopathies, Stanley Prusiner of the University of California, San Francisco, began studying proteins again. Last year Prusiner was awarded the Nobel Prize in medicine for discovering rogue proteins, called prions (pronounced pre-ions), which he has suggested are the causative agents of spongiform encephalopathies.

Prions are abnormal variants of proteins that occur normally in cells, such as human brain cells, and contain no nucleic acid (DNA or RNA). Amazingly, when they enter the body these abnormal proteins are able to convert their normal counterparts into more of the abnormal forms. The difference between the normal and abnormal proteins lies in the way they fold, which allows prions to resist normal protease degradation and build up aggregates in the brain.

Prions are very hard to destroy. While some loss of infectivity occurs at temperatures above 100°C, cooking for 30 to 60 minutes at more than 130°C is needed for inactivation. Prions also remain infective after exposed to sterilizing levels of radiation, formalin, extremes of acidity, non-polar organic solvents, burying for years, and passing through filters 20 times smaller than those used to remove bacteria.

#### Cow Speed-Up

Fifty years ago a good milking cow gave 35 pounds of milk a day. Today, that cow would be sold for hamburger and franks. Top milkers now give up to a hundred and thirty pounds of milk a day. This 4 times increase in productivity has been accompanied by concentration in the dairy industry. From 1987 to 1996 the number of milk-cow operations in the United States dropped by 44 percent, and the number of cows by 11 percent, while milk production increased by eight percent. Breeding, hormones, and drugs have made America’s dairy cows veritable milk machines — hungry machines. They are fed top grade alfalfa and large quantities of high protein supplements.

Protein supplements can be made from almost any organic material, including corn and soybeans. They may also contain rendered animal by-products. Currently, animal by-products sell for about the same price as soybeans on the commodity markets. Since animal products deliver more protein per ounce than vegetable products do, it’s no surprise that many farmers have turned to animal-based food supplements.

#### Animal-based Supplements

Swift and Company, the Chicago meatpacker, was the first to mass-produce rendered protein and fat as animal feed, at the turn of the century. But the use of such feed skyrocketed in Britain during the Second World War, since it was difficult to import vegetable feeds. Cows were fed as much as four pounds of rendered protein a day. In the United States soybeans and other vegetable proteins were plentiful so the use of rendered animal protein as feed has been slower to become popular.

A generation later, when the energy crisis hit, the rendering industry sought to save costs by processing material at lower temperatures and with smaller amounts of petroleum-based solvents. It came up with a vacuum system to allow boiling carcass remains at lower temperatures. The vacuum system, though effective for rendering, unfortunately does not destroy all bacteria, viruses or, for that matter, prions.

#### Infection Spreads at the Slaughter House

Strains of TSE have been found in sheep, goats, elk, mule deer, white-tailed deer, mink, and cats, as well as cattle. In sheep and goats TSE is called scrapie, while mad-cow disease is more properly called bovine spongiform encephalopathy, or BSE. All transmissible spongiform encephalopathies attack and destroy the nervous system of the host organism. No one knows precisely how a TSE prion infects an organism, but once it takes hold, it is unstoppable. What is clear is that ingesting nerve tissue of an infected animal spreads the disease.

Each year, according to the USDA’s Food Safety and Inspection Service, which is charged with regulating the meat industry, about a million cow brains are sold for consumption in the United States, and others are exported. Generally these are whole brains taken from cows slaughtered in the kosher manner — that is, their throats are cut while they are still conscious. Most cows in the United States, though, are shot in the head with a stun gun before having their throats cut, a process perhaps more humane but also, at least when a pneumatic stun gun that injects air is used, more likely to contaminate other parts of the carcass with brain.

In addition, no regulations mandate that spinal cords be removed before carcasses are processed, although some plants are said to follow this procedure nonetheless. Unless spinal cords are removed, “mechanically deboned” meats, which are found in products

such as hamburger and bologna, can be contaminated with bits of central-nervous-system tissue when the spinal columns are mechanically plucked and squeezed to get off the last bits of flesh. The USDA has not imposed a ban on spinal column and brain tissue being sold for food, or used in the rendering process, because to do so would be very expensive and basically unenforceable.

Although no one is tracking how many cows “go down” in the United States each year (that is, become too lame or too ill to stand on their feet), a common estimate is 100,000. Downed cows are by law not admitted into the human food supply without first being cleared by a veterinarian, but most enter the food chain through the rendering process. How many of these went down because of spongiform?

#### Spread of Spongiform in the United States

When the British epidemic hit the front pages the U.S. government reacted emphatically. The Food and Drug Administration, the Centers for Disease Control and Prevention, and the United States Department of Agriculture immediately reassured us that there was no sign of the disease in this country. Yet most of the conditions thought to have led to the epidemic in Britain also existed here. Despite official protestations to the contrary, and despite regulatory changes recently implemented, some of them still do.

The New York Times, USA Today, and CNN television have recently reported on an emerging epidemic of mad-deer disease and mad-elk disease (technically called Chronic Wasting Disease or CWD) in the Rocky Mountain area of the US. Seven percent of mule tail deer and 1.5% of elk in areas of Colorado and Wyoming been diagnosed as having mad deer/elk disease (in comparison 1-2% of cattle had mad-cow disease in England at the height of the epidemic there). Also, the highly-publicized death in March of Doug McEwen, a 30 year-old deer hunter in Utah from CJD — and reports of deaths of several other young deer hunters with CJD across the country — has unnerved hunters and wildlife officials.

Over the past several years Colorado state wildlife officials have warned deer and elk hunters to send them the heads of animals that they’ve killed in order that they may be tested for CWD. But meanwhile several million Americans — especially hunters and their families — continue to eat venison and elk on a regular basis and thousands of sport hunting and “road kill” deer and elk are routinely rendered into animal and pet feed. Scientists warn that mad-deer/elk disease is likely to spread into cattle and sheep because the prion proteins in these mammals are so similar. Captive elk have already infected wild deer, apparently from fence line contact.

Although the FDA passed a so-called “mammal-to-mammal animal feed ban” in 1997, the regulation is filled with loopholes, and, according to farmers and ag experts, is not being enforced. The rule exempts swine, horses, blood, gelatin and milk from the feed ban, and the FDA has allotted the equivalent of only seventeen full-time inspectors to 14,000 facilities involved in feed production and rendering. The skeptics argue, too, that there is no way to prove that the species barrier cannot be surmounted, and the current rules allow even animals known to be infected with TSE to be fed to pigs and chickens, which can in turn be fed to us. Or they may be fed to cattle and sheep.

#### Is Organic Meat Safer?

Although rare, some BSE cases have appeared on British organic farms where the cattle have not been fed feed containing animal protein. Investigators have established that, in these cases, the cows had been exposed to and eaten poultry manure imported onto the farm for compost. Since Britain allowed poultry to be fed on meat and bone meal until 1996, the poultry droppings contained undigested infected feed.

Organic farms generally require 100% organic feed, which excludes feed supplemented with animal protein from rendering plants. While the possibility exists of infection from wild animals, organically fed (especially range-fed) cattle are raised in a manner inconsistent with contamination by spongiform.

# Safe Processing at Cheshire Garden

by Jack Kittredge

The very southwestern corner of New Hampshire is a strange place for a farm. Powerful geological forces thousands of years ago gave the region high quality gravel and fine beach sand. The price, however, was the soil.

Imagine a huge glacier, 1500 feet thick, forcing its way down the Connecticut Valley. It has the effect of a mammoth bulldozer — scraping the bedrock clean as a pavement, lifting everything, mixing, carrying and dropping it miles away. Boulders the size of a house end up perched in absurd places. Then a melt occurs. For a long time a tremendous torrent washes through the valley, carrying silt, sand and gravel before it. Depending on the shape of the riverbed and the resulting eddies and currents in the water, gravel and sand get dropped on one side, silt settles out on the other. Where New Hampshire and Vermont meet Massachusetts, New Hampshire got the gravel and Vermont got the soil.

But it was here that Ralph Legrande moved onto a small farm in 1981, planting a garden and supporting himself with carpentry work. Slowly, he became a contractor. Patti Powers joined him in 1986, after having farmed in Leyden, Massachusetts for 9 years. Although still working at the University of Massachusetts, she dreamed of becoming a fulltime farmer.

Legrande's land had once been a gravel pit from which thousands of yards of bank run gravel had been excavated. The only way crops could grow in such a location, he decided, was to construct terraces on the steep slopes and then build up soil on the terraces, into which they could plant.

Ralph takes a very philosophical attitude about growing on gravel: "It's not all bad. It makes a great base and it's very workable. You can carve things into the gravel and they stay there. At least we can grow stuff on sloping land by terracing it. If we had clay or loam, it would all wash downhill."

In order to make the terraces, he rototilled back and forth in the gravel until enough stones were tossed out to make a slight depression. Then he and Patti filled the area in with peat moss until it formed a slight hump. Then they worked in bone meal and compost, and planted. With drip irrigation just at the roots, the weeds between the rows had neither food nor water to grow on.

The couple brings in 40 yards of Mass Natural compost every other year to keep the fertility in their beds sustained. The perennials get compost as the beds are redone, and the annuals get as much possible every year based on a modified no-till system. The rows are tilled and fortified but the adjacent sod is left to keep moisture trapped in and provide a nice area for beneficials.

In dry years, growing in an old gravel pit can be challenging. In 1999 the couple's pond and shallow well went dry, and their new \$7000 drilled well gave them only two or three gallons a minute. Fortunately, all their irrigation is by drip lines, so just a small amount of moisture weeps into the root zone of crops.

The couple has a couple of acres in production out of ten acres altogether. All the work is done by hand as the land is too steep for any kind of machines other than a Trotbilt rototiller.

Raspberries are Patti's passion. She harvested about 600 pints of summer bearers in the drought year of 1999, down from almost twice that in 1998. Taylor is her summer variety, and she has Rubies, Summits and Heritage which all bear in the fall. Other crops include Habañero and regular peppers, tomatoes, basil, blueberries, damson plums, and garlic.



photo by Jack Kittredge

## Ralph and Patti display some of their vinegars in their new commercial kitchen.

Patti and Ralph have developed a business processing these crops into mustards, herbal and fruit vinegars, berry salsas, pizza toppings, and fruit sauces. They use primarily their own crops, except for buying in mustard seed, mustard flour, and organic wine vinegar. They sell primarily at farmers markets in Brookline, Newton and Cambridge, Massachusetts, plus through a small mail order catalog. Patti had gotten experience making processed products years earlier.

"I made vinegars when I had the farm in Leyden," she recalls. "That was a more conventional organic farm and I made the vinegars to round out products at the stand. Here I decided to make the vinegars the main attraction. Now I don't even bring vegetables to the markets."

The couple pride themselves on having top-of-the-line products, certified organic and hand processed in small batches in an on-farm commercial kitchen. Even at high end prices, however, Patti has trouble earning a decent wage. For her herbal vinegars she carefully selects each sprig or clove for insect bites or flaws of any kind. Then she places each in the bottle with special homemade tools before adding the organic wine vinegar. Each bottle is a beautiful, as well as tasty, experience.

"Vinegars used to be our main thing but they just can't be anymore" Patti recognizes. No matter what I do I can't make more than 50 bottles in one day. The mustards we can do in less time, though we're still doing just 8 jars to a batch. That's a place that we can grow. The preserves, because we insist on it, have twice as much fruit as sugar. I can't see getting any bigger on that. I just can't compete with people who are using less fruit and selling jams at \$3.95 when I need to get \$4.95 or \$5.95."

The components they have to buy aren't cheap, either. Patti uses an organic wine vinegar, which is very expensive compared with conventional distilled vinegar, which can be bought for a dollar a gallon. The organic mustard flour Ralph uses is four times the price of regular mustard flour.

"We want to be a high end producer," Ralph stresses, "we want to let people know we're the real thing - we grow this stuff, process it under strict conditions, and deliver it direct to you. There are only a few things like that out there. We both hoped we could do food for the masses. But our products have to be high end because they're organic, they're hand made, and they need to sustain us."

"I really like the business the way it is now," Patti agrees. "Maybe a little bigger. But there are a lot of people who have specialty food businesses who no longer have contact with the food. They just run computers. They buy everything and have co-packers in a food factory make the product and slap the label on."

Patti and Ralph's whole house is devoted to the business. Empty bottles, labels, products in all stages of preparation are stored in the basement. UPS comes every day to pick up during the season, easing storage problems a bit. Even so, Ralph plans the build a two car garage next to the house to hold everything, so they won't have to lug it all into the basement and then upstairs again when they need it.

Even though they raise most of their own product, Ralph figures that the business nets only about 30% of what it takes in. Insurance takes a bite - they carry product liability, market liability, and trademark liability policies. Packaging and boxes are expensive, as are bottles and jars when bought in relatively small lots. Supplies like organic wine vinegar and organic mustard seed aren't cheap. They put 15,000 miles on their cars yearly just driving to the Boston markets each week, and of course improvements like the commercial kitchen in which they work must be factored in.

Even though the couple can live cheaply and Ralph keeps the cars running with 210,000 miles on them, fixes the lawn mower and the computer, and builds additions, the business barely supports them. Ralph figures if they could get to a \$100,000 gross income, they could be comfortable. But some of the products are facing stiff price competition now.

"I started doing vinegars in 1980," Patti recalls, "and grew and grew and grew. Then around 5 years ago it seemed like everybody in the world started doing vinegars. And some weren't doing a good job. A lot of people bought bad vinegars. Newspaper articles would tout making your own vinegars with raspberry extract or herbal flavorings — not the real thing!"

Sales of vinegar are still relatively flat, and have been surpassed by the mustards. As for the preserves, it depends upon the fruit supply. In 1999, for instance, Patti's strawberries were down 40% and there will be less preserves made. But overall, the problem is not selling product. Rather, it is making it. By staying with small daily batches, careful, personal attention to detail, and wanting to do everything themselves, the couple are not able to take advantage of any economies of scale.

Patti does all the planting, hoeing, and weeding. Ralph runs the equipment and maintains it. Patti makes vinegars only in the summer, during the 2 1/2 months or so when the herbs are fresh. Ralph makes the mustards in the spring downtime, out of ingredients which have been frozen. They make the preserves, salsa and pizza sauce together.

Two things seem crucial to the success of Cheshire Garden, according to Patti — taste and organic certification.

“The key is taste,” she glows. “When we do a market we have all our products - 5 mustards, 4 preserves, the vinegars. They can sample, smell, see the difference. For years I didn’t do tastes and just said: ‘Please ask for a sample if you would like one.’ No one would ask. But putting samples out there for people to taste makes all the difference. The products just fly out now. You can taste how well it is made.”

Patti cites the example of one woman, a lawyer from Houston, who bought one jar of raspberry sauce from them while visiting at the Cambridge market: “She ordered 14 gift boxes from our Christmas catalog, and her boyfriend ordered another 20. So one customer results in 35 gift boxes sent to Texas. But going to markets and shows generates those catalog sales, so we have to keep that up.

“Being certified has been a huge help for us,” she adds. “I’ve been selling at farmers markets since 1981 and I’ve always been organic. It was annoying to me to be next to a salesman from Vermont who was just hired to do the market. I’d have my tomatoes and he would his. He’d talk about how his tomatoes are organic and they weren’t.”

“The most important display at our markets,” confirms Ralph, “is our two big New Hampshire certified organic signs with the farm number on them. A lot of people want to know exactly what that means. I tell them that if they don’t believe us they can go back to the certifying agency and talk to them. They will tell you what we did to make sure our products are organic. The people who come to our stand have a high level of involvement in their food and a high level of interest in what’s going on. We talk with them about genetically modified organisms, terminator seeds and other hot issues in food policy. Not just pesticides and chemical fertilizers, like it used to be.”

Ralph and Patti voluntarily put in a commercial kitchen 4 years ago. Patti says she did it because of the dogs and cats! She used to use her regular kitchen to make 3000 bottles of vinegar in June, July and August. Every day she’d throw the dogs outside and vacuum the kitchen, mop the floor, wipe down the countertops and bleach the sinks before getting started. It took a good hour and a half!

The kitchen is about 12 by 16 feet in size. Because Ralph built it himself, it cost about \$20,000 in materials. Otherwise, it would have been a \$50,000 investment. Adding the square footage to the house would be about \$10,000 of the \$50,000, he says. It’s the stuff that doesn’t show that is very expensive — getting in the necessary plumbing and electrical fittings, venting the hood, tiling the floor. The infrastructure is the expensive part.

“All the plumbing,” Ralph explains, “is double trapped — trapped on the main 3” line and also each individual fixture is trapped. That prevents backventing of sewer gas. Every circuit is ground fault interrupted. The hot water heater is extra high temperature. The floor is tiled with curbing and drains for ease of cleaning. You have the triple bay sink for washing, rinsing and sterilizing with bleach and hydrogen peroxide in the third bay. There’s the separate sink for food prep, the mop sink in the utility room, the exhaust system for the stove, the self-closing door with seals to the rest of the house, the high temp pressurized dish washer, the screens... there’s a litany of small things that you have to do. They all make sense, though.”



photo by Jack Kittredge

**Cheshire Garden blended Italian herbal vinegar (sweet basil, summer savory, oregano and garlic), freshly capped, sits on a counter in the commercial kitchen Patti and Ralph installed.**

The couple doesn’t have a lot of processing equipment. They just have the stove and the necessary cleaning and sterilizing equipment for the food and jars, doing their work by hand in a clean environment. They wear smocks and hats and shoes when working in the kitchen.

The state approves and licenses the kitchen. They require that the water be tested every year, checking for bacteria, nitrates, and several other factors. The same criteria apply to the Cheshire Garden water supply as if Patti and Ralph wanted to bottle and sell their water! (Ralph had already built the house with an oversized septic system, so they weren’t required to have that upgraded. Once you get beyond a certain volume of production, Ralph says, you need separate facilities and a nutritional analysis on your label. Right now the couple is exempt from having to have a nutritional analysis because they don’t produce more than 10,000 of any single item.

Both Patti and Ralph are firmly in favor of high food safety standards, rigorously enforced. “I’m pretty much a dyed in the wool consumer advocate,” Patti admits. “The people who are buying things deserve to know you are making them as safely as possible. When I started both the vinegars and the mustards I consulted a food technologist at UMass. He gave me formulas for acidity that I had to be within, to what degree to heat a vinegar, etc. In New Hampshire last year they made it mandatory that you have your products tested by a third party lab. You had to give them your recipes and processing information. The lab gave us a readout on pH (we were way within the margins.

“I also took the Hazardous Analysis Critical Control Points course at UMass,” she continues, “where you learn about any process and how bacteria can enter it. You learn to identify these points and act to prevent contamination. A lot of people who do jams and just boil them for a minute can get into trouble. We water bath can even the fruit sauces, though other people say you don’t have to do that — the sugar preserves it. But we have a low sugar recipe and want to be absolutely safe.”

“Maintaining a sterile environment during production,” Ralph agrees, “is ultimately best for the product. If the government is requiring special treatments to maintain safety you have to play by the rules. There are people who make mustards and add white flours or eggs to stretch their yields. Those could be sources of problems, but an unadulterated mustard has a very long shelf life. Plus our products have a lot of vinegar, garlic and chili peppers in them. They all have anti-bacterial properties.”

In addition to meeting the requirements of New Hampshire, the couple also must meet local health

board requirements in their farmers market towns. For ten years they have had to send a copy of their kitchen certification to the Newton Board of Health (along with a \$50 fee) in order to sell products there. Ralph and Patti also have to keep batch numbers and accurate records of their production. (For them a batch is one day’s production.) The sources of ingredients for every batch is recorded.

“There’s no way,” Ralph stresses, “that we can make something and not have it come back to us if there is a problem with it. There’s no way to pass the buck. The accountability exists right on the label. If someone gets sick, they come right to us. Being in control of our destiny is something we’ve tried to maintain. Everything we sell is something we produce. Everything we sell is us! That’s why we’re careful with everything we do.”

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# What's Happening To Animal Foods and the Land and People Who Make Them And Eat Them

by Karl North  
Northland Sheep Dairy

Evidence has accumulated rapidly in recent decades that much of our industrial way of food production cannot be sustained, for it destroys both the environment necessary to human health and quality of life, and the natural resource base which that food production is dependent upon. Our main agricultural export is not a commodity like grain, but topsoil. Modern farming practices produce short-run abundance but long-run damage to essential agroecosystem processes: to water and mineral cycles, to energy sources and flows, and to the eco-community dynamics that requires a critical mass of interacting species.

My first concern is to review the forces shaping our food system, to provide a framework for understanding the stream of troubling news stories that suggest a crisis brewing in it. Outstanding among these forces, in my mind, are a powerful and sophisticated thought control industry, an oligarchic political economy masquerading as a democracy, a knowledge business addicted to reductionist science, and an unrestrained laissez-faire economic system.

## Propaganda for Hire

The manufacture of consent is expensive. Who can afford its purchase? Ninety percent of the wealth in this country is now in the hands of 10% of the people. *Effective* "free speech" is in an important sense not free at all, but expensive. Has modern society fallen into a trap where an elite minority can perpetuate its interests indefinitely? What hope have our little counterspins against the constant dripfeed of soothing propaganda that parries every unsettling revelation? Will a self-destructive system, by the sheer weight of its failures, eventually provoke the public understanding needed to change it? Industrial agriculture is causing irreversible losses to the biological resource base civilization needs in order to survive. If we are to use information fruitfully we cannot be naive about the disinformation power now concentrated in few hands.

## The Political System

Understanding is not yet effective political action. The unprecedented global concentration of power is daunting and will demand imaginative political strategies. Even the Atlantic Monthly, ordinarily a cautious critic, suggested how coopted representative government has become, in an article that distinguished the "permanent government," which is not elected, from the "provisional government," which is:

"The permanent government, a secular oligarchy... comprises the Fortune 500 companies and their attendant lobbyists, the big media and entertainment syndicates, the civil and military services, the larger research universities and law firms. It is this government that hires the country's politicians and sets the terms and conditions under which the country's citizens can exercise their right — God-given but increasingly expensive — to life, liberty, and the pursuit of happiness. Obedient to the rule of men, not laws, the permanent government oversees the production of wealth, builds cities, manufactures goods, raises capital, fixes prices, shapes the landscape, and reserves the right to assume debt, poison rivers [*and food*], cheat the customers, receive the gifts of federal subsidy, and speak to the American people in the language of low motive and base emotion."

"The provisional government is the spiritual democracy that comes and goes on the trend of a political season and oversees the production of pageants...."

## The Classical Scientific Paradigm

The holy grail of science up to now has been its predictive power. But to achieve that predictive power scientists have had to follow a method that *reduces* their focus to a few variables: add genes A to Cow B and get higher milk yield C, or add heat A to raw milk B and get rid of tuberculosis C. This reductionist science works fine in a controlled laboratory, but when we practice  $A+B=C$  in the complex systems that make up the real world there are *always* many more outcomes than C, a lot of which, we are finding, eventually cause worse problems than the one the scientist solved.

Two examples: Thanks to reductionist science, sheep farmers have the chemical technology to deliver a knockout blow to the intestinal parasites that plague

lambs, but well apart from the largely unresearched effects of those chemicals on our food, a short term focus allows the scientist to disregard the fact that routine use eventually builds resistance and renders the technology useless. Similarly, the narrow focus on maximum milk yield in the modern Holstein has produced a now classic constellation of negative outcomes on at least three levels: animal health, ecosystem health, and food quality, and promises a repeat performance when applied to the dairy ewe. Thus the ripple effect in all directions of a single change in the relationship of two components of systems as complex as agroecosystems demonstrates the fundamental limitation of classical science alone to grasp their dynamics.

Our world is a complex system of elements within wholes within wholes. Some of the components are inert, some alive, some themselves whole complex systems, and some are communities of whole systems. It follows that what we must pay attention to, as we operate in this world, is less the seemingly discrete elements and more their interdependency, their relationships, or, in a word, their role in the *whole*. In general, it has been the assumption of the classical scientific paradigm that if we manage the parts right, the whole will come right. Evidence that this is not the case is now coming from every quarter, yet our systems of knowledge and management are still structured around this assumption.

## The Unbridled Laissez-Faire Economy: A Moral Loose Canon

Probably even more important than the nature of our science has been the nature of the economic system we have allowed to develop, especially in the United States. When Monsanto developed the Terminator gene, with which it intended to gain control over the bulk of the world seed market, critics called that diabolical; but to Monsanto, Terminator is just devilishly good business.

Such predatory behavior is perfectly normal and in fact necessary for long term business survival in an economic system which the French long ago dubbed *laissez-faire*, or 'anything goes', perhaps because at the time it contrasted starkly with their catholic notions of social order. Early predictions that unrestrained market economies contain an inherent drive toward monopoly have come true, and in the agricultural sector this effectively reduces most farmers to serfs at the mercy of farm commodity markets dominated by huge corporations. Since the amoral nature of our chosen economic system is such that it mainly rewards short term gain, and considers only local, immediate costs, it allows us to pass on heavy ecological and social costs of our economic behavior to future generations and other remote peoples. It allows, eventually even forces most farmers, if their farms are to remain profitable within this economic system, to practice intergenerational tyranny.

How has this state of affairs affected livestock farming, and directly or indirectly, the food we eat? Many of the impacts ripple out in all directions from the industrial-style animal feeding factories into which the meat industry has concentrated, under the influence of the unbridled market economy and reductionist research establishment previously described. The dairy industry is less concentrated, but only at the milk production level. Even there, dairy farms milking thousands of cows in one location are becoming common. The accompanying diagram begins to show lines of impact; the reader's homework assignment is to discover many more circles and arrows. A more extensive map would show an outer circle of human health consequences and cumulative effects of their interaction. For example, monopoly control of meat packing = huge plants using economy of scale, unsanitary and dangerous working conditions, and ill-paid and therefore unhealthy workers = meat contamination from several sources spread over huge lots of product.

### The Incubators of Unsafe Food from Livestock

Given adequate capital input, monopoly control of grain markets makes concentrate feeding in large scale, dense conditions a most lucrative form of meat and milk production. Animals pumped full of concentrates have constant diarrhea. The resulting excremental quagmire and crowded habitat is an ideal incubator of disease, which the feeders control with antibiotics and other medicines. They mix these medications routinely with feed, not just to stop disease, but as a preventive and growth promoter as well. Routine use breeds superbugs resistant to available medicines. Dirty animals carry bugs to huge distant processors. Hormones injected to increase meat and milk yield add another health threat to the consumer. Routine use of slaughterhouse waste as animal feed adds yet another health threat. Finally, concentrate feeding degrades the nutritional value of the products themselves.

This industrialized, confinement system of livestock production is a logical consequence of an economy that allows profit at whatever cost to society. It uses the kind of powerful, quick-fix, let-the-chips-fall technology at which reductionist science excels. This technology is symptomatic not of scientific progress but of scientific failure at the level of production system design. This system is the point of origin of a multitude of food safety problems that ripple outward into the food system, often crisscrossing and compounding as they go. The rest of this article will pursue these malignant ripples, describing their damage, the political reactions of consumers to date, and the remedies already in practice among farmers designing healthier livestock systems.

### The Contaminants

The four major food poisoning bugs - salmonella, E.coli, campylobacter and enterococci - are directly linked to overuse of antibiotics in agriculture. according to a recent report in the Canadian Medical Association Journal. Livestock are given anywhere from 100 to 1,000 times the amount of antibiotics as the human population. Routine lacing of animal feed with antibiotics, only 10% of which is to treat infectious disease, creates mutations of these bacteria that are resistant to all classes of antibiotics now in use. The real problem for humans is that scientists have developed no new class of antibiotics in the last 20 years. The US government has legislated no solution despite successful models of livestock production in organic farming needing only rare, emergency antibiotic use and no entry of treated animals or their milk into the food system.

The heavy concentrate diet imposed on livestock in industrial systems is another incubator of superbugs. Recent research from Cornell shows that these nearly 100% grain-based diets cause ruminants to manufacture the acid-tolerant strains of E. coli that are dangerous to humans and are showing up in the food system. Known as E. Coli O157:H7, they are dangerous because, unlike ordinary E. coli, they can survive the acidity of the human stomach and cause intestinal illness that is sometimes fatal. E. coli contamination is responsible for more than 20,000 infections and 200 deaths each year in the United States.

Feedlot agriculture generates a third threat to human health by the practice of feeding offal, or slaughterhouse waste, back to livestock. Transmissible Spongiform Encephalopathies (TSEs), a family of 'mad cow' type diseases, mutate when they cross from one animal species to another, as in the animal cannibalism practiced in the feedlots. The mutation is now thought to have made animal variants of the disease infectious to humans. In Britain 33 young people have died of a TSE, and Europe has banned the feeding practice that they think spread the disease.

In the United States at least two deer hunters have caught the fatal disease, and the disease is as widespread among western deer and elk populations as it was in British cattle at the height of the epidemic there. Sales to game farms have spread the disease from the Western herds across the country, and into adjacent wild populations by fence line contact. Venison and elk consumers are potentially at risk. And plenty of deer offal gets into the factory farm feed pipeline along with offal from domestic species. The fact that few people in the United States have developed the disease may be deceptive since it has a virtually invisible incubation period that can last decades. Here in the U.S.A. the dangerous practice of 'animal cannibalism' continues unabated - with government approval. Although the FDA passed a so-called "mammal-to-mammal animal feed ban" in 1997, the regulation is filled with loopholes, and, according to farmers and agricultural experts, is not being enforced.

Factory style livestock production thus creates new strains of pathogens immune to our normal built-in defenses, weakens and eventually destroys the ability of antibiotics to cure these diseases, and maximizes their

spread via large-scale feedlot and processing plants serving a far-flung market. An assembly line for food becomes an assembly line for disease, through no diabolical scheme, only the normal evolution of a for-profit-only economy.

### The Transmission Belt

Pathogens generated by livestock production factories can infect us by various routes: the beef, pork, lamb and chicken people eat, from farm crops and food fish and shellfish that suck in surface water contaminated with livestock manure escaping from the giant factories, and even from family cats and dogs who eat contaminated pet food.

The very scale of feedlots, meat processing plants, and their far-flung markets insures widespread contamination. Hamburger, a food mass-marketed to children, is one of the most effective carriers. Monopoly power in the meat industry (four corporations - IBP, Conagra, Cargill, and Smithfield - account for about 80% of the cattle and hogs slaughtered in the country) insulates it from effective regulation, both of sanitation, and of working conditions and compensation, which affect sanitation. Meat packing is now the most dangerous job in the United States. Meat packers suffer injuries in the workplace at about ten times the national average, and poultry processing has an injury and illness incidence nearly twice that of coal mining and construction, reported Acres USA in 1998.

The meat packing industry has become the new employer of cheap Third World labor in the form of illegal aliens in huge plants located in the rural Midwest, far from former strongholds of organized labor in the industry, like Chicago. This allows the monopolies to keep average meatpacking wages at the same level, adjusted for inflation, that they were 20 years ago and \$4/hour lower than today's average manufacturing wage, according to Nation magazine.

Responding to complaints from the Midwestern locals about the influx of illegal immigrants in their communities, the Clinton administration as part of its 'ethnic cleansing' program to rid the country of illegals plans to turn them into virtual indentured servants via 'guestworker' contracts. Unlike the indentured servitude that gave many Europeans the chance to emigrate to colonial America, this plan dumps workers back in their native lands at the end of the contracts. Meanwhile, illegal or not, the packing house workers are severely exploited, and their poverty and lack of health care adds to the contamination of the product.

The upshot of this transmission belt of contamination is a regular string of meat recalls. But to giant corporations, recalls of bad food and FDA fines are part of the acceptable cost of doing business. Sara Lee, which makes everything from hotdogs to handbags, made \$319 million in profits in a recent quarter despite the \$76 million it cost them to recall 15 million pounds of meat suspected of contamination with potentially deadly bacteria.

### The Built-In Hazards: Hormones & Nutritional Loss

External food contamination comes and goes, but industrially produced meat and dairy foods also contain internal defects: they are not good food.

### Bovine Growth Hormone

After years of attempted cover-up in the United States, news of the health risks in dairy foods due to recombinant Bovine Growth Hormone (rBGH) injected into milk cows spread to a wider public when Canadian scientists went public this year with a report on the hormone. First commissioned by the Canadian government, then suppressed because of findings critical of rBGH use, the report confirmed that:

- Rats injected with rBGH exhibited cysts of the thyroid, elevated antibody levels, and inflammation of the prostate - all strong warning signals that the hormone need more investigation.
- Contrary to Monsanto's claims, Monsanto's own study shows that the hormone is absorbed into the bloodstream. The company's claim that rBGH could not be absorbed had been the linchpin in their case, which led to US government approval of the transgenic hormone.

The Canadian report confirmed warnings by other scientists that:

- Significantly higher levels (400-500% or more) of a potent chemical hormone, Insulin-Like Growth Factor (IGF-1), in the milk and dairy products of injected cows, could pose serious hazards for human breast, prostate, and colon cancer.
- Cows forced by hormonal injection to give abnormal milk yields develop more mastitis and other health problems, which will likely lead to more antibiotics in milk. A Consumers Union test of milk samples in the New York metropolitan area detected the presence of 52 different antibacterials.

Subsequently the government of Canada banned rBGH in early 1999. The European Union has had a ban in place since 1994. Although rBGH continues to be injected into 4-5% of all US dairy cows, no other industrialized country has legalized its use. Even the GATT Codex Alimentarius, a United Nations food standards body, has refused to certify that rBGH is safe. The controversy has exposed corporate lies and bribery, and collusion with Monsanto to suppress critical research data by 'food safety' agencies in two governments.

### Other Growth Hormones

Factory farming has made the implantation of growth hormones into meat animals a standard practice, and in fact necessary to get the animals up to market weight before they succumb to the unhealthy conditions of that production system. Ninety percent of all feedlot beef is hormone implanted, according to the Cattlemen's Beef Association. The practice continues to be legal despite studies in which lab rats fed the hormones developed cancer, and despite the fact that at least three of the most commonly used beef implants appear on state and federal lists as "known" carcinogens.

A recent 139-page official European Union report reconfirmed opposition to the practice in Europe, which has banned imports of hormone implanted US and Canadian beef since 1989. The EU's Scientific Committee on Veterinary Measures, consisting of European and US-based endocrinologists, toxicologists, and other scientists, told the Associated Press that the commonly implanted hormone 17 beta-oestradiol "has to be considered as a complete carcinogen." The EU panel stated moreover that all of the banned hormones "may cause a variety of health problems including cancer, developmental problems, harm to immune systems and brain disease... Even exposure to small levels of residues in meat and meat products carries risks..."

The law requires that growth hormones, which are planted under the skin, go in the ear to avoid large concentrations in commercial meat cuts. But illegal implantation in muscle tissue is commonplace in US feedlots, causing meat to have much higher hormone levels than even the legal ear implants. A random survey of 32 large feed lots found that as many as half of the cattle had visible "misplaced implants" in muscle, rather than under ear skin.

### Nutritional Loss

Meat and dairy products from animals nourished entirely on their own grazing intake contain cancer-resisting nutrients and other qualities that help the human body defend against the degenerative diseases that have overtaken modern civilization. For millennia before modern times, the human body could depend on the presence of these nutrients in meat and milk. But new research shows that one of these, CLA (conjugated linoleic acid), a food component that builds cancer resistance, suppresses pathogens like listeria in milk, and fends off heart disease by aiding lipid metabolism, is 5 times lower in factory-farmed meat and dairy products than in their pasture-grown counterparts. In addition, Vitamins A and D and the "Price Factor" - a fat soluble catalyst that encourages optimum assimilation of vitamins and minerals - are greatly diminished when dairy animals are fed soy or cottonseed meal, which are standard factory farm feeds. These vitamins concentrate in the fat; the yellow color of meat fat and butter from pasture-fed animals indicates their presence. Most commercial butter is yellow only because of yellow dye; the color is put back in, but not the vitamins.

Then there is the question of pasteurization. According to the Campaign for Real Milk: "The practice of heating milk to kill germs was instituted in the 20s to combat TB, infant diarrhea and other diseases caused by dirty production methods. But times have changed and modern stainless steel tanks, milking machines, refrigerated trucks and inspection methods make pasteurization absolutely unnecessary for public protection.... Pasteurization destroys enzymes, diminishes vitamin content, denatures fragile milk proteins, alters vitamin B12, destroys vitamin B6, kills beneficial bacteria, promotes pathogens and is associated with allergies, increased tooth decay, colic in infants, growth problems in children, osteoporosis, arthritis, heart disease and cancer."

The Campaign's arguments are energized and underpinned in part by the work of Sally Fallon, who is perhaps the most visible current critic of the nutrition establishment's myths. Her arguments, like those presented here, often rest on an exposé of the damage industrial animal production and processing methods have done to what would otherwise be health-giving food. Pasteurization and its twin irradiation, are typical of the use of reductionist science to solve food problems in

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isolation from the badly designed production systems that are the root cause. Apart from the damage these technologies do to the food itself, they kill off beneficial bacteria that might otherwise keep pathogens out, and create a bacterial void, which nature, abhorring a vacuum, aggressively seeks to fill, often with pathogens.

**Alternatives to Feedlot Agriculture**

The negative impacts on food safety ripple out from feedlot agriculture well beyond their animal food products. This production system has spawned a massive grain monoculture - 70% of US grain production goes into animals - whose pesticidal crutch has put carcinogens, endocrine disrupters, and bioaccumulative toxins into water we drink and fish we eat. Manure from factory animal farming adds potentially lethal *Cryptosporidia*, *Giardia*, and *Pfiesteria*, - "the cell from hell", killing billions of fish and harming humans in the water - to the super-E.coli it brings to contaminate water supplies and fisheries. Farms have now replaced factories as the biggest polluters of America's waterways.

Almost every week seems to bring news of a new threat to safe food. The mass media, and government agencies responsible for ensuring the health of our food system advocate superficial remedies like heavy washing and peeling, cooking it to death, pasteurization and irradiation.

# Food Safety

by Mark Dunau

**Irradiated Food**

Irradiated food is food that is processed through a multi-million dollar nuclear facility and exposed to nuclear material, either cobalt 60 or cesium 137. The standard dose of radiation (gamma rays) is equivalent to 4,000,000 chest x-rays. The food does not become radioactive, but it does change. Vitamins and enzymes are destroyed and new chemicals are produced in the food, including benzene, a known carcinogen, and formaldehyde, a possible carcinogen. There are no long term studies of the effects on people of an irradiated food diet.

The purpose of irradiating food is to make potentially unsanitary food safe by killing the bacteria in the food. The industry term for irradiating food is "cold pasteurization". Irradiation, however, does not kill all bacteria in food: the strong survive. If these bacteria behave anything like the mutants selected by antibiotics over the last 50 years, the effects could be unfortunate for Americans. (80,000 Americans die a year of diseases acquired in hospitals, more than the combined total of auto accident deaths and murder.)

The force behind the push for this technology is not concern for public health, but corporate greed. Seventy-five percent of the U.S. beef supply is now controlled by three corporations. As agriculture has become increasingly dominated by union busting agribusiness and union busting meat packers, the nation's food supply has grown more tainted by unsanitary and unsafe environments that breed and spread bacterial disease through fecal contamination. The beef and poultry industries in particular are trying to cope not only with old bacterial pathogens, but the development of new and more virulent bacterial strains (*salmonella enteritidis*, *campylobacter*, *E. coli O157:H7*). These pathogens have spread, multiplied and become a threat to public health through factory processing and the industrialization of livestock and poultry farms. At the same time, the number of USDA meat inspectors has been reduced to 7,000 from their 1980 level of 20,000. Rather than improve the environment and working conditions that breed and spread disease, corporations and the federal government have chosen to replace sanitation with a new technology.

In 1999, the Federal government approved the irradiation of beef (the irradiation of poultry, vegetables, fruits, grains, and spices had been previously approved). Now, the FDA is asking for public comment concerning whether changes are needed in the labeling requirements of irradiated food. The FDA is considering dropping its requirement that retail packages of irradiated food be prominently labeled both with the logo for irradiation and a statement of fact, "treated with irradiation". The prominent labeling of irradiated food would be replaced with a listing of irradiation in the ingredients (FDA considers irradiation a food additive).

tion, that actually remove nutrition along with toxins. Or they point the finger of blame at time-tested agricultural practices like manure fertilization and composting, and so indirectly implicate the growing community of farmers for whom such practices are key to a more sustainable agriculture. But finger pointing and technological fixes evade the root of the problem.

It has become obvious that the problem with factory animal farming is the system: we need to redesign the whole. A number of principles of sustainable design emerge from our organic farming experience, and from other efforts around the world:

- Use holistic, site-specific designs
- Capture inter-species synergies
- Use current solar gain
- Respect nature's cycles
- Design to appropriate scale

Applied to animal agriculture they suggest a radically different vision livestock on farms:

- Animals, as potentially the most efficient carbon recyclers available, will be central to self-sufficient, sustainable fertilization systems on most farms. These systems, using modern, intensive pasture management and manure processing, will virtually eliminate chemical fertilization, its handmaiden - chemical pest control, and their poisoning of foods and ecosystems.

**Sewage Sludge**

Sewage sludge is what is left in a sewage treatment plant after sewage has been treated and released as clean water. It is a mixture of human and industrial waste. The industry term for sewage sludge is "biosolid".

Fifty percent of the American population lives within 50 miles of an ocean. In the 1980's, urban America was appalled to see its own defecation wash back on itself, spoiling American beaches. Federal legislation was enacted to outlaw dumping of sewage sludge into the ocean, and in 1992 the practice was banned from American shores by the Ocean Dumping Act.

Unfortunately, the federal government's alternative to dumping sewage sludge into the oceans has been to spread it on American farmlands. This was accomplished not by making sewage sludge non-toxic, but by EPA redefining what was safe for agricultural use. The amount of heavy metals allowed in sewage sludge was increased in 1993 several hundred percent: 267 pounds of lead, 37 pounds of arsenic, 35 pounds of cadmium and 15 pounds of mercury may be applied per acre of agricultural land. What was once defined as toxic waste by the EPA has been redefined as fertilizer in order for municipalities to have an inexpensive means to dispose of sewage sludge.

The U.S. standards for sewage sludge are the most permissive in the industrial world. Of the tens of thousands of synthetic chemicals in sewage sludge, including PCB's and dioxin, EPA has no restrictions on the type or amount of synthetic chemicals in sewage sludge.

Currently, 50% of urban America's sewage sludge is spread over rural America's farmland. Sewage sludge is most often spread on agricultural land by agribusiness. Informed family farmers are resistant to using this cheap source of nitrogen because they see more than profit in the soil; they see their families' futures.

The most lucid and scientific criticism of EPA's sewage sludge standards is Cornell Waste Management Institute's study, *The Case For Caution*. The authors describe EPA's standards for sewage sludge as non-conservative and not adequately protective. For instance, while EPA allows for the application of 35 pounds of cadmium per acre, Cornell Waste Management Institute recommends less than 2. Cornell Cooperative Extension, known as a moderate voice in agriculture, has adopted all of Cornell Waste Management Institute's recommendations. The *Case For Caution* can be obtained at [www.cfe.cornell.edu/wmi/](http://www.cfe.cornell.edu/wmi/)

In the long run, industrial and household toxins should be prohibited from entering the municipal waste stream. When industrial toxins are allowed to enter a municipal sewage treatment plant, it is the tax payer that must pay for their disposal. Industry, not municipalities, should pay for the safe disposal of industrial waste.

**Synthetic Chemicals and Cancer**

Since the publication of Rachel Carson's *Silent Spring* in 1962, Americans have been aware of the association of cancer with pesticide and herbicide use in agriculture. DDT, dieldrin, aldrin and several other synthetic chemicals have been banned from agricultural use in the United States because of these synthetic chemicals' carcinogenic qualities.

- Animal nutrition will be grass-based, 100% in ruminants and their close cousins, with grain feeding drastically reduced in poultry and hogs. Pasture-grown animal foods will regain nutrition, avoid toxic contamination, and taste better. Animal breeding will reflect the new dietary reality. And huge acreages now devoted to feed grain monocropping will return to permanent pasture, drastically reducing erosion and chemical pollution.
- In addition to food and fertilizer production, animals will serve multiple functions: traction, transport, composting, pest control, etc.
- Small scale, geographically dispersed farms where animals stay clean and healthy on pasture will eliminate manure pollution of waterways, meat and milk contamination from pathogens and antibiotics, and by shortening the pipeline from farmer to consumer, make pasteurization and dangerous chemical meat preservatives unnecessary.

We can create this new animal-integrated, animal-friendly agriculture that makes the crisis in food safety disappear, and loosens the corporate stranglehold on dairy and livestock farmers in the process; all it takes is the political will. In livestock and its associated grain industry, monopoly capital has achieved virtually complete, vertically integrated control sooner than in any other sector of agriculture. As the food crisis deepens, the struggle for a healthy new system will have to confront this monopoly power. It will be difficult.

In 1996, Congress unanimously passed the Food Quality and Protection Act (FQPA). This Act overturned the 1958 Delaney Clause, which strictly forbade the presence of any cancer-causing pesticides and food additives in processed foods. The FQPA legalizes carcinogens in food, but limits them to levels that are determined to be "safe".

Congress replaced the Delaney Clause with the FQPA because the Delaney Clause was being ignored. When the Delaney Clause was passed, scientists could only test for synthetic chemical residues in parts per million. Now, scientists can test for synthetic chemical residues in parts per trillion. A strict interpretation of Delaney would have required EPA to prohibit the use of dozens of different pesticides not because of new understanding, but because of improved testing.

Until passage of the FQPA, the National Research Council estimated that only 10% of the pesticides in common use had been adequately assessed for hazards. The FQPA requires the EPA to speed up its review of pesticides and herbicides already registered for agricultural use. The EPA is to determine what crops are to receive "safe" application and what the "safe" residue tolerances will be. The FQPA also requires the EPA to concern itself with the vulnerability of infants and children when setting residue standards. Pesticides are to be screened not only as carcinogens, but as endocrine disrupters. (Endocrine disrupters are synthetic chemicals that imitate the bodies hormonal system, consequently, disrupting the bodies chemical communication system. The average American male's sperm count is 50% of what it was 60 years ago. The likely cause is endocrine disrupters.)

By fall of 1999, EPA is to begin releasing its first review under the FQPA of many synthetic pesticides and herbicides. Several pesticides are likely to lose their registration (banning these chemicals from agricultural use in the USA) and the uses of several more will be more restrictive.

The American Farm Bureau Federation, numbering over 4 million members and a very effective lobby, is publicly and privately protesting that the EPA is being intolerant and that their definition of "safe" is too restrictive. The American Farm Bureau Federation is making the case that the American food supply itself is threatened by an overzealous EPA because many conventional farmers will lose pesticides on which they depend. According to the AFBF, the EPA seems intent on implementing the FQPA with a standard of safety that Congress never intended. Most consumer and environmental advocate groups do not agree with this AFBF position.

EPA's definition of "safe" residue levels of pesticides will be based on the risk assessment models it uses to implement the FQPA. These models have many forms, and some models will be more protective than others. For instance, a risk assessment model that accepts one death in ten thousand from a lifetime of exposure to a pesticide residue is one hundred times less cautious than a risk assessment model that accepts one death in a million.

The threat of cancer from synthetic chemicals is far broader than those just used as pesticides and herbicides in conventional agriculture. There are now over 70,000 synthetic chemicals in the environment that did not exist when the Constitution was ratified. Studies now associate high rates of cancer with exposure to a wide range of

synthetic chemicals—from cosmetics to construction materials.

In the United States, 4 in 10 women and 5 in 10 men will develop cancer in their lifetime. Most Americans believe that the rising incidence of cancer correlates with rising life expectancies. This is not true. Childhood cancers, once rare, are now common in the United States. The leading cause of death in the United States for Americans between 35 and 64 is cancer. The rate of cancer in the industrialized world is four times higher than in the non-industrialized world.

### Genetically Modified Organisms

Genetically modified organisms, GMOs, are organisms that have acquired genes and traits through laboratory insertion of genes into their chromosomes, rather than through breeding. GMOs do not have “new” genes, rather they usually have genes from different species, orders or kingdoms that could not have been acquired naturally; i.e., a variety of strawberry has a gene inserted into its chromosomes from a flounder to make it less susceptible to frost damage.

Over the last decade, the use of genetically engineered organisms has grown exponentially in both medical and agricultural markets. Medical products from GMOs include insulin and antibiotics. In American supermarkets, about 50% of packaged food now carries an ingredient from a GMO (many of these ingredients are derived from genetically engineered corn and soybeans).

The most controversial use of GMOs are as foods and agricultural crops. Unlike drugs, where GMOs are confined to laboratories, genetically engineered crops cover tens of millions of acres in the United States and around the world. Unlike drugs, which are reviewed for safety by the Food and Drug Administration, GMO foods are almost never tested for risks to health. GMO foods may be derived from genetically engineered crops or from genetically modified bacteria that are used to process foods. For instance, 60% of all hard cheeses in the United States are processed with an enzyme produced by a GMO. The risks to health of GMO foods include allergic reactions, toxicity and carcinogens. A previously safe food supplement, L-tryptophan, was genetically engineered and this “engineering” resulted in the deaths of dozens of people and serious illness in thousands before the genetically engineered form was pulled from the market.

The FDA does not regulate or require labeling of genetically engineered foods because it has determined that GMO crops or foods are not essentially different from crops or foods derived from standard breeding. The fact that these organisms contain genes that could not be acquired through breeding or that these genes are spliced, promoted and “turned on” in the host chromosomes by the insertion of bacteria and virus is not considered relevant by the FDA. Genes acquired through biotechnology are not considered “additives” and therefore products that contain these genes are not subject to FDA regulation, testing or labeling, as mandated by federal law for food additives.

Recombinant bovine growth hormone, rBGH, is a rare case of the FDA reviewing the safety of a genetically engineered food product. rBGH is a genetically engineered copy of a hormone in cows. It is injected into dairy cows by farmers to increase milk production an additional 10 to 15 percent.

Monsanto produces rBGH and markets it under the brand name Posilac®. Before granting approval to Monsanto to market rBGH, the FDA required Monsanto to test rBGH for safety. The FDA reviewed Monsanto’s tests and found no health risks to people (though many risks to cows) and approved the marketing of rBGH.

The FDA’s review of rBGH appears tainted because several former employees of Monsanto joined FDA and worked on FDA’s review of rBGH. Subsequently, some of these people returned to Monsanto.

Japan, the European Union, and Canada have all reviewed Monsanto’s testing of rBGH and denied approval of its use. Most disturbing to the scientists of these nations is the fact that rBGH promotes not only the production of milk, but the production of IGF-1 (Insulin-like Growth Factor). Elevated levels of IGF-1 are known to increase the risk of breast, colon, and prostate cancer.

Currently, about 30% of the milk produced in the United States is produced by cows treated with rBGH. The FDA does not require the labeling of rBGH milk because it does not consider rBGH a food additive.

The Environmental Protection Agency has taken the same position as the FDA; genetically engineered crops are essentially the same as crops derived from standard

breeding and, therefore, usually not subject to EPA regulation. Seventy million acres (about 100,000 square miles) of GMO crops have already been planted in the United States without any testing of how these crops will affect the environment through the dispersal of their “foreign” genes into related wild species.

Bt crops are an example of how FDA and EPA have abrogated their responsibility to protect the public and the environment. *Bacillus thuringiensis*, Bt, is a common soil bacteria that has been selectively used for decades by organic farmers as a foliar spray to fight certain insect pests in their larval stage. The Bt bacteria produce a toxin that is harmless to people and most organisms, but is deadly to a few insects in their larval stage by destroying their intestinal tracts after ingestion.

Now Monsanto, Novartis and several other corporations are marketing Bt corn, Bt potatoes and Bt cotton. These genetically engineered crops have the gene responsible for producing Bt toxin inserted into them. Unlike Bt that was selectively used as a foliar spray, Bt crops contain Bt toxin in every cell of the plant for the entire life of the plant. The exposure to the environment of Bt toxin, consequently, is several thousand times, if not millions, of what it was in the past. Currently, Bt crops account for one third of the GMO crops planted worldwide.

Bt crops have been touted as environmentally friendly because they do not require synthetic pesticides. Unfortunately, research by its corporate producers indicates that the wide exposure to the environment of Bt will result in quick adaptation by insects and that Bt crops and sprays are likely to be useless in less than a decade. Monsanto’s promise that it will replace Bt with another genetically engineered product is no promise to organic farmers whose certification requires that they do not use GMOs.

The huge increase in the environment of Bt toxin from Bt crops has other deleterious effects. Bt crops have been shown to be detrimental to beneficial insects, including lacewings and ladybugs. Soil bacteria have also been shown to suffer from the large increase in Bt toxin. Given the fact that the human gut, like the soil, is dependent on the health of billions of bacteria, the potential impact on human health from exposure to Bt potatoes is frightening. Without any testing, the FDA is allowing people to be exposed to foods containing thousands of times more Bt toxin than the human intestinal tract has ever processed before. Without labeling, there is no telling how long it will take FDA to discover if Bt crops are a source of gastrointestinal illness.

One would hope in a democratic society that the informed consumer would be allowed to decide in the marketplace the future of biotechnology. GMO food, however, is not labeled. This is not a protection to the consumer, but a protection for the corporate producer afraid of the public using its buying power to shape the market. According to a New York Times survey, over 90% of Americans would not eat genetically engineered food if given the choice.

In Vermont, the state legislature passed a law requiring the labeling of milk produced by cows treated with rBGH. The International Dairy Food Association, widely perceived to be backed by Monsanto, brought a lawsuit against the state of Vermont alleging that this labeling law infringed on dairies’ freedom of speech insofar as it forced dairies to speak when they wished to remain silent. A US District Court ruled in favor of Vermont, but the Second Circuit Court of Appeals overturned this ruling. Deciding in favor of International Dairy Food Association, the Second Circuit ruled that manufacturers’ right to free speech was more important than the consumers’ right to know because rBGH was not considered an additive by the FDA. Vermont’s attorney general declined to appeal this case to the US Supreme Court. The Vermont legislature fell back on a voluntary labeling law which allows dairies that do not use rBGH to prominently display this fact.

It is a revolutionary state of affairs when corporate America and government respond to consumer choice by prohibiting the labeling that makes choice possible. Limiting the public’s access to information in order to guide markets should not be a role of government.

In the last decade, the world’s largest chemical companies, including Monsanto, Dupont, Dow Chemical, Novartis, Rhone-Poulenc, have bought the world’s largest seed companies. The shared promise of these new seed/chemical companies is that GMOs are the way to feed the world’s expanding population. The federal government has seconded this opinion and pushed biotechnology hard and fast on the American people and foreign nations. Bioengineered crops, however, have very little genetic diversity. This lack of diversity makes them more susceptible to crop failure than standard varieties of crops. Rather than insuring the world’s food supply, GMOs seem to put it at greater risk.

To date, there is no demonstration of higher productivity of GMOs, only higher profits to seed/chemical companies. Seventy percent of GMO seeds are engineered to be herbicide tolerant. Seed/chemical companies sell GMO seeds that are modified so that the crops are tolerant to a patented herbicide that only a single seed/chemical company produces. GMO herbicide resistant crops, unlike standard varieties, are bioengineered to be tolerant to herbicides throughout the growing season. Farmers buy GMO seeds that are tied to herbicides not for higher productivity, but to lower the labor and mechanical costs associated with cultivation. In 1999, it is projected that half the soybeans planted in the USA will be Monsanto’s Roundup Ready®, genetically engineered to be resistant to Monsanto’s herbicide, Roundup®.

A few seed/chemical companies have gained tremendous power over the American farmer and the American food supply. This power has been enhanced by new interpretations of patent law that have made it possible to own the genes of life and to gain patent protections. Farmers, consequently, must sign contracts with seed/chemical companies not to save GMO seeds from their harvests; thus, forfeiting what was once considered a farmer’s birthright, the power to save seeds for next season’s planting.

### Corporate Government

“I see in the near future a crisis approaching that unnerves me and causes me to tremble for the safety of my country. As a result of the war, corporations have been enthroned and an era of corruption in high places will follow, and the money power of the country will endeavor to prolong its reign... until all wealth is aggregated in a few hands, and the Republic is destroyed. I feel at this moment more anxiety for the safety of my country than ever before, even in the midst of the war.”  
Abraham Lincoln, 1864

Note a few corporate/government biographies copied from *The Agribusiness Examiner*, Issue #27:

- Linda J. Fisher . . . former Assistant Administrator of the United States Environmental Protection Agency’s Office of Pollution Prevention, Pesticides, and Toxic Substances, now Vice President of Government and Public Affairs for Monsanto Corporation.
- Marcia Hale . . . former assistant to the President of the United States and director for intergovernmental affairs, now Director of International Government Affairs for Monsanto Corporation.
- Michael (Mickey) Kantor. . . former Secretary of the United States Department of Commerce and former Trade Representative of the United States, now member of the board of directors of Monsanto Corporation.
- Josh King . . . former director of production for White House events, now director of global communication in the Washington, D.C. office of Monsanto Corporation.
- Terry Medley . . . former administrator of the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA), former chair and vice-chair of the USDA Biotechnology Council, former member of the FDA food advisory committee, and now Director of Regulatory and External Affairs of Dupont Corporation’s Agricultural Enterprise.
- Margaret Miller . . . former chemical laboratory supervisor for Monsanto, now Deputy Director of Human Food Safety and Consultative Services, New Animal Drug Evaluation Office, Center for Veterinary Medicine in FDA.
- William D. Ruckelshaus . . . former chief administrator of the EPA, now (and for the past 13 years) a member of the board of directors of Monsanto Corporation.
- Michael Taylor . . . former legal advisor to the FDA’s Bureau of Medical Devices and Bureau of Foods, later executive assistant to the Commissioner of the FDA, still later a partner at the law firm of King & Spaulding where he supervised a nine-lawyer group whose clients included Monsanto Agricultural Company, still later Deputy Commissioner for Policy at FDA where he drafted the policy that GMOs are not food additives, and now again with the law firm of King & Spaulding.
- Lidia Watrud . . . former microbial biotechnology researcher at Monsanto Corporation, now with the United States Environmental Protection Agency Environmental Effects Laboratory, Western Ecology Division.

Margaret Miller, Michael Taylor, and Suzanne Sechen (an FDA “primary reviewer for all rBGH and other dairy drug production applications”) were the subjects of a U.S. General Accounting Office (GAO) investigation for their role in FDA’s approval of Posilac®. The GAO Office found “no conflicting financial interests with respect to the drug’s approval” and only “one minor deviation from now superseded FDA regulations”.

*This article was written by Mark Dunau for the Green Party of New York State food safety web page, [www.greens.org/ny/food-safety](http://www.greens.org/ny/food-safety)*

# Bacteria as Promoters of Planetary Health

by Peter Young

Most people in today's world have very little awareness of the role that bacteria play in the promotion of life on this planet. We know: Bacteria produce the science experiments in the fridge. A handshake can pass germs in cold season: better wash 'em—with anti-bacterial soap! Don't drink that unpasteurized apple cider: it might have E.coli. Salmonella? Botulism? Streptococci? Maybe Americans have eased up a little since the intense germ paranoia of the 1950's and 1960's, but to the average Joe or Jane the bacterial world is still a pretty scary, dangerous place.

It's easy to see why. It is a world that lives around us all the time that we never see. (It wasn't even seen under a microscope until some 300 years ago.) So we rely a lot on the experts to provide us with our sense of what this world is like. With another type of organism that you might have around your house, like a cat, for example, you might rely on the experts to tell you something about your cat, but at the end of the day, you still get to experience your cat. It's just not the same with germs.

Since before the time of Louis Pasteur (1822-1895) the experts have mostly been focused on "problem" bacteria, rather than a general study of the bacterial world. Farmers will be familiar with the academic specialty known as "economic entomology" which is basically the study of insects that are problems to crops. Behind both of these fields of inquiry is the human impulse to take the shortest route to the greatest human good. I don't mean to sound critical of the experts; they were and are saving human lives. It's just that in the case of bacteria, their unbalanced orientation to the subject has had a disproportionate influence on the general public's perception of it.

Like most readers of this paper, I, in my life as a farmer, have been fortunate to be exposed to another view of the bacterial world. Farmers work with one of the greatest reservoirs of bacteria on the planet, the soil, and we know that the more we can honor and augment that complex, interdependent environment the better our produce will be. That's one reason we use compost, which is basically a bacteria factory. We are aware that another hugely complex association of bacteria allows the cow to digest cellulose, hence she can eat grass. And we know that we can preserve and enhance the qualities of fruits, vegetables and dairy foods through the process of bacterial fermentation. I may not know the names of the specific strains of bacteria I work with, but I am aware on a daily basis that the health of my farm, my animals, my family and myself depends heavily on the benevolent activities of the bacterial world. Since the sixties, some of this thinking has infiltrated the population in general; at least many Americans of today are aware of the "good" bacteria in a food like yogurt.

What I have just described is an approximation of how far my thinking about the world of bacteria had evolved before my recent exposure to a remarkable book that has radically changed and deepened my understanding of the subject. It is called [A New Bacteriology](#) by Sorin Sonea and Maurice Panisset of the University of Montreal. Though the book

was first published in 1980, I have only recently become aware of it by way of two members of an informal study group I have been part of.

I don't think I can do full justice to this remarkable little book (140 pages) in the space I have here, but I want to try because I think the information is important.

One of its key points is: because we studied and classified plants and animals (referred to here as *eukaryotes*) before we could even see bacteria (*prokaryotes*) we incorrectly applied principles that held true among the former to the latter once we started to study them.

Chiefly, we ascribed the notion of *species*, taken from the plant and animal world, to the newly discovered bacterial world. By definition, a species is the largest set of a group of organisms that can successfully interbreed. A buttercup squash can't share genetic information with an acorn squash, or a cabbage, or a rabbit. Humans cannot share genetic material with gorillas or chimps or cucumbers (at least not successfully.) The pool of genetic material available to the human species is contained by all of the individual members of our species. With the exception of modern gene-splicing techniques, there is no way for us to broaden our genetic pool to material contained by other species.

So, when we started to discover and identify bacterial strains (Sonia and Panisset are careful *not* to use the word *species*), we assumed that they existed under the same laws of species differentiation that the plant and animal kingdom did. Although Pasteur did not sign on to the effort, his contemporaries began to classify bacterial strains as species according to the Linnean system used for plants and animals. Though there had apparently been a minority of researchers like Pasteur who questioned such classification based on observations of the uniqueness of bacteria, the classifiers didn't run into much trouble until 1928, when Frederick Griffith first demonstrated the intercellular exchange of genes among bacteria. (He documented that pneumococci of one strain could pick up new genetic properties from contact with dead pneumococci of another strain.) Since then, it has been revealed repeatedly that bacteria from one strain can actually exchange genes with other strains, often quite rapidly.

The authors describe various methods of how this works in great detail. Here's how I understand it. Ninety-four to ninety-nine % of the genetic material in a bacterial cell is permanently stored in a large DNA molecule called the large replicon. This gives the strain its characteristic type, shape, and size. But 1-6% of the genes in a bacterium are smaller DNA molecules, called plasmids or prophages, that float freely in the cell's fluid, separate from the large replicon. It is these genes which can be exchanged directly for genes from almost any other strain of bacteria. And it is these genes that control the capabilities of the organism: its ability to produce a certain enzyme, or even resist a new antibiotic. The phenomenon suggests a cooperative element in the relationships between and within strains of bacteria.

The implications of this are huge, which the authors flesh out carefully and convincingly. They claim that all bacteria on the planet function like a single superorganism, unified by the fact that they are all descendants of the first living cell and that they are able to freely exchange the large pool of genetic information they embody. Sonia and Panisset liken the global population of bacteria to a super-computer that monitors conditions around the planet, and acts to correct imbalances that threaten its existence.

It was difficult for me to imagine such a benign, coordinated effort on the part of bacteria until I read the section on evolution. Somehow, 3 1/2 billion years ago, the first cell came into being in a toxic, oxygenless world, inhospitable to all life but itself. It reproduced and spread around the planet, and its offspring developed a wide range of abilities to assimilate energy and nutrients from their environment. About 2 1/2 billion years ago the first photosynthetic bacteria evolved, and they were able to create the first oxygen in the atmosphere from the synthesis of sunlight, carbon dioxide, and water, which in turn paved the way for the creation of the ozone layer that protects the earth from ultraviolet rays. At this point in evolution (c. 1 1/2 billion years ago) the earth was now habitable to higher multi-celled plants and animals. As evolution continued, bacteria worked with the newcomers to make the most inhospitable corners of the earth livable. They created progressively greater soil fertility to allow progressively more complex life forms to evolve. They found a whole new habitat in the digestive tracts of the animals they helped to create, and in so doing, helped the animals to digest their food better. The book summarizes this well:

*"Bacteria use the resources of the global bacterial gene pool as a central information source, and the extensive exchanges of genes that take place are amplified and directed by continual selection among the cells. Thus the bacterial world functions as a vast communications network to promote life in all possible niches of the planet by establishing associations of different types and genetic permutations whenever conditions are favorable. Bacteria thus seem to maintain the life-promoting stability of the chemical features surrounding the living world."* (p.9)

I have always believed in the wisdom of Nature, and after reading this book, I have a much greater sense of how that wisdom may be expressed by the bacterial world.

So how does this new perspective change how we might understand a "problem" bacterial strain like E. coli 157? Eradication makes no sense. Even if it were possible to eliminate the whole strain, new strains would pick up the faculties of 157 from the planetary gene pool to continue the work of 157. An interesting article published in *Science*, September 11, 1998, which escaped the attention of most major media, sheds some light on the subject. Scientists at Cornell studied E. coli production in the manure of cows fed different diets. Cows fed high grain diets produced huge numbers of acid resistant E. coli like 157, but cows fed pasture and hay produced none. E. coli 157 is not a problem of not enough sanitation, pasteurization or irradiation. It is nature's way of telling us that we are breaking a natural law; we are upsetting a balance that the bacterial world considers important. In this case I think the law is something like: Cows weren't meant to be fed grain (or at least a lot of grain.) This makes sense in view of the fact that cows, as ruminants, evolved eating grass, not grain, and the only reasons that we have been feeding them grain are industrial ones.

The Gaia hypothesis states that our planet is actually one complex, self-regulating, living organism. [A New Microbiology](#) showed me how bacteria could be that organism's major agent of coordination and regulation. This insight should help me to better honor the role of bacteria in my life, and to better interpret their messages. I hope this crash course has given you some insight too, and that it will motivate some readers to seek out and read the book.

[A New Bacteriology](#), Sonea, Sorin and Panisset, Maurice, Jones and Bartlett Pubs. Inc., Boston, 1983

# Book Reviews

## **Spoiled: Why Our Food is Making Us Sick and What We Can Do about It**

by Nichols Fox

published by Penguin Books, 375 Hudson St, New York, NY 10014

434 pages, paperback, \$14.95

reviewed by Jack Kittredge

Fox has written a compelling book on the new threat to public health posed by foodborne diseases, particularly *Salmonella enteritidis*, *Campylobacter jejuni*, *Escherichia coli* O157:H7, *Listeria monocytogenes* and bovine spongiform encephalopathy (BSE). As a journalist, she puts a human face on this issue by showing us both the individuals and families laid waste by these new strains of pathogens, and the medical sleuths of the Centers for Disease Control and Prevention (CDC) whose responsibility it is to isolate an outbreak before it becomes a disaster.

This morning, as I was preparing to review this book, I heard that over 2 million pounds of hotdogs had just been recalled because of contamination with listeria. It is hard to even imagine such a recall a generation ago. In the good old days of the CDC a number of people in a community would come down with the same severe symptoms — diarrhea, vomiting, abdominal pain — at the same time. Their cases would be checked out and soon it would be discovered that they had all attended the same wedding and eaten potato salad, or tried the lemon meringue pie at the same restaurant the previous night. The food production and preparation chain would be traced back to the contamination incident — letting the salad sit out too long at room temperature, using dirty eggs in the undercooked meringue — or the contaminated ingredient, and appropriate measures to prevent further illness would be taken.

Now, however, we are part of a mass food system. Animals are raised in vast herds or flocks, overcrowded, overstressed, and without proper sanitation. They are routinely administered antibiotics to keep down infection and speed up growth, and are transported, slaughtered, and processed in high speed, automated fashion. If there is a contamination incident — spillage of feces into a carcass during evisceration, knife not sanitized after being dropped onto floor — it has the potential to affect thousands or even millions of pounds of food. That food will be sent to thousands of locations, each reshipping to hundreds more, where it will be purchased or eaten by multitudes. Even noticing an incident of food poisoning in such a system takes incredible luck. Most cases will simply be diagnosed as influenza and become background noise in the medical system. It takes an unexplained death or serious illness, often of a child, before authorities begin looking for foodborne illness.

Add to that the fact that our production system has selected for hard-to-fight pathogens. Routine administration of antibiotics to animals selects for microbes which have developed a resistance to antibiotics. Thus a bad stomach ache can turn into a life-threatening infection when the prescribed treatments are found not to work. The microbes, themselves, also become more adapted to our food system. Salmonella used to infect eggs through a crack in the shell or during food preparation. Today's variant, however, has learned to infect chicks and incorporate itself into their ovary ducts, so that an egg laid by the chick later will harbor the salmonella bacterium lurking inside an intact shell.

The work of the salmonella is made easier by the fact that many benign bacteria, which used to compete with salmonella and keep its numbers down, have been wiped out by regular use of antibiotics.

Poultry, in part because of their highly standardized raising and slaughtering conditions, has become, as Time Magazine put it "one of the most dangerous items in the American home". Over half the birds tested by the USDA at one processing plant were infected with human pathogens. Former USDA microbiologist Gerald Kueter, speaking about processed chicken parts, said the "final product is no different than if you stuck it in the toilet and ate it."

Fox continually lays the blame for the dangerous condition of our food supply at the industrial method used to produce it. She stresses that organic and free-range methods do not create conditions where large numbers of animals are likely to become infected. Although manures are actively used in organic systems, they are treated like a valuable resource rather than a waste product. Overcrowding is not usually an issue, nor is refeeding of processed animal proteins.

She also takes to task the regulatory authorities, particularly in the USDA, who try to serve a dual function: ensuring food safety while promoting domestic agriculture. This conflict often finds one part of the agency assuring the public that a product is safe at the same time that another is imposing tougher restrictions because the product is making people sick.

What advice does Nichols Fox have for the consumer? One way is to use more selectivity when choosing our food. She cites the "dragon housewives" she saw in France who examined every cut of meat carefully, sniffing and prodding and handing back to the butcher indignantly if they felt it was inferior. That, of course, is difficult if your meat is all shrink-wrapped. She also advocates buying free-range and organically produced meats, reasoning that animals subject to less stress and overcrowding and unnatural production pressures will be healthier.

As for food preparation, hygiene and cooking are all important. She is particularly concerned about contamination from uncooked meat and suggests keeping separate cutting boards for meat and vegetables which will be eaten raw, washing your hands after handling meat, and making sure any products which raw meat touches — utensils, counter tops, etc. — are cleaned before using them for vegetables. Cooking should bring the interior of meat to 160 degrees or until you see steam rising from it. If you think all this is too difficult, she agrees — Fox stopped eating meat herself for this reason.

With regard to produce, she suggests several washings and scrubbing with a brush if possible, and refrigeration. She advises readers to avoid hors d'oeuvre trays and salad bars in restaurants, and other areas where foods have been left out at room temperature. Items pickled or marinated in vinegar are okay, as an acid environment effectively kills most bacteria.

Her closing statement on this matter is one to which most NOFA members would subscribe, I think: "We simply have to put aside the complacency and absolute trust most of us place in food providers and take responsibility for the safety of our food back into our own hands... We should try to move incrementally closer to food production by cutting back on imported foods, buying locally, and getting to know growers whenever possible. When food producers and consumers are directly linked, it is natural to expect that more care will be taken in handling and processing."

## **Sharing the Harvest: A Guide to Community-Supported Agriculture**

by Elizabeth Henderson with Robyn Van En

published by Chelsea Green Publishing Co., P. O. Box 428, White River Junction, VT 05001

254 pages, paperback, \$24.95

reviewed by Jack Kittredge

If you every wanted a single book to give to someone who wanted to know what CSAs are all about, this is it. Initially Robyn's project, Liz agreed to finish this guide after Robyn's untimely death. Mixing her own observations with interesting historical facts, quotes from writers and thinkers, and stories, photos, and documents from scores of CSAs across the country, she has come up with a winner.

After starting off with a discussion of the world food system and the importance of reconnecting to a local food supply, we quickly get to the basics of creating a CSA. Deciding to form one, finding a farmer, getting land, building a core group, providing for adequate labor, determining the level of participation by members, making financial decisions, dealing with legalities, seeking certification (or not) and communicating with the community are all discussed with dozens of examples, photos, sample documents and relevant quotes from CSAs around the country.

The food itself — growing it, procuring what you can't grow from other local farms, harvesting it, deciding how much to allocate to a share and distributing it are next. Again, Liz uses examples from CSAs all over the nation and reprints share lists, feedback forms, art and poems that CSAs have inspired. Lots of photographs give faces and reality to her words.

The final section shows examples of the many dimensions through which CSAs are moving. Multi-farm operations, community development groups,

religious and educational organizations are all finding their own reasons to get involved in CSAs. Liz even deals up front with the evanescent nature of this form of farming, giving stories of CSAs which quit (the farmer burned out or found a better job, core group people moved away, share prices were unrealistically low, the farmer had no experience producing for market.)

As a compendium of news from the CSA front, *Sharing the Harvest* can't be beat. The quotes, pictures, documents and stories of real people around the nation conducting business this way and serving the 100,000+ families who now are active in CSAs make clear that this is both a rapidly growing and a dynamic movement. Perhaps Liz' birth analogy says it best: "Starting a Community Supported Agriculture project is a little like having a baby — you unleash biological and social forces that may take you in directions you never expected."

Get a copy and leave it out in your bathroom or on the kitchen table when you do your breakdown. Watch your shareholders walk a little prouder after thumbing through it.

### Sustainable Vegetable Production From Start-Up to Market

by Vernon P. Grubinger

published by the Natural Resource, Agriculture, and Engineering Service (NRAES)  
152 Riley-Robb Hall, Ithaca, NY 14853-5701 (607) 255-7654

280 pages, paperback, \$42.00

reviewed by Jack Kittredge

Anyone active in NOFA for long knows of Vern Grubinger. One of the most organically supportive of the region's cooperative extension personnel, Vern has given many workshops at the NOFA Summer Conference and written several articles in these august pages. Now he has an excellent book on all aspects of vegetable production to his credit,

joining his previous videos on marketing and weed control machinery.

I say all aspects of vegetable production because Vern wants to cover it all. He begins with a no-nonsense discussion of sustainable, integrated pest/crop management, and organic systems — to make sure we are getting our terms straight. Then he talks about getting the resources you need together: clarity about your personal and enterprise goals, appropriate experience, suitable land, and adequate equipment. He also covers business management and marketing. Only in chapter 5 does he begin to talk about farming. These chapters cover soil fertility, composting, crop rotation, cover crops, tillage and field preparation, seeds and seedlings, irrigation, harvest and storage, season extension, IPM, and insect, disease, weed and wildlife management. He concludes with a series of grower profiles which feature a number of notable farmers in our region — organic and not — specializing in crops like asparagus, broccoli, carrots, eggplant, garlic, green beans, kale and collards, leeks, lettuce, muskmelons, parsnips, potatoes, pumpkins, rutabagas, spinach, sweet corn, and field and greenhouse tomatoes.

The book is a clear and thorough discussion of most aspects of vegetable farming in the Northeast. Obviously one book attempting to cover such a broad topic cannot go into very great detail on specifics, but I was impressed with the amount of hard information Grubinger was able to pack into his chapters. He uses his 91 illustrations, 36 sidebars and 20 tables effectively so that just when you want more specifics, lo and behold, there's the table with the information you were wondering about.

In the past I've had to juggle several books to find hard information on crop yields, nutrient content of various fertility sources, or exactly how the working end of various tillage equipment does the job. In all these cases, Vern is there with the goods. His discussion of the pros and cons of marketing options — wholesale, retail, and the various options within each of those — is clear and to the point.

Reading *Sustainable Vegetable Production From Start-Up to Market* is an excellent way to get an understanding of what is involved in vegetable farming in the Northeast. I can't think of a better present to give to someone who is considering such a career move. I have only two complaints about it. First, it badly needs an index. A book that is attempting to reach beginners in an area (and does such a thorough job of it) should be an easy reference work for someone who encounters a term — CSA, for example, or cation exchange — and wants to look it up.

Second, this book is priced out of the very market that needs it! A \$42 price tag for a 280 page book is going to limit buyers to extension agents, university bookstores, and institutions. Of course that is who NRAES primarily serves, so perhaps this is understandable. But it's a shame that such a fine book can't be more easily available. So if you can't afford a copy, at least get your library or NOFA chapter to buy one so the folks who need it can look at one.

### Genetically Engineered Food: Changing the Nature of Nature

by Martin Teitel and Kimberly Wilson

published by Park Street Press, One Park Street, Rochester, VT 05767

144 pages, paperback, \$12.95

reviewed by Jack Kittredge

The authors are the directors of the Council for Responsible Genetics in Boston. This is a competent book for bringing the average person up to speed on Genetic Engineering, but it is written from a position highly critical of the field. There is almost no discussion of the actual process of creating a

modified organism, and little speculation about what a truly conscientious molecular biologist might do in the field.

The criticisms are all there, and they are on target: the nature of agribusiness today, the failure of the flavr savr tomato, the short-sighted success of the Bt crops, the wildly successful family of Roundup Ready crops, the terminator fiasco, use of Bovine Growth Hormone in dairy production, and the problems with allergens, gene jumping, antibiotic resistance, and monopoly control of life forms. Nutritional questions, labeling issues, the regulatory (more like non-regulatory) scene, food disparagement laws, the struggle between international corporations and local farmers for control of agriculture, the religious implications of playing God, and the science-fiction future we face if biotech becomes accepted are all touched upon. The book even ends with a plea to buy organic and save seeds.

But somehow I cannot escape the feeling that this book was rushed to market because of the current strong interest in the topic. It does an adequate job of covering the subject, but nowhere do I find the signs of thoughtful design: clarifying illustrations, well chosen charts and graphs, detailed explanations of the scientific issue involved. It reads like a series of separate articles pasted together, and has the sort of 'newspaper feature story' tone which is breezy and talks down. I would have preferred a more thorough discussion of how we can deal with a runaway technology that is in the pocket of a few corporations. Given the incredible potential of this technology, what are our options?

### Cider: Hard and Sweet

by Ben Watson

published by The Countryman Press, PO Box 748, Woodstock, VT 05091 (802) 457-4826

232 pages, hardcover, \$19.95

reviewed by Jack Kittredge

After reading Logsdon's vigorous defense of hard alcohol, Ben Watson seems almost like a dandy! This is a very civilized book, quoting the likes of Henry David Thoreau, Nathaniel Hawthorne, and Pindar in praise of the apple.

The book is organized with a history of cider at the beginning. Apples, of course, originated in Central Asia but traveled early throughout Eurasia, furthered by the fact that the major caravan route of early times, the Silk Road, went through their home. Evidence is found for the fruit in Turkey in 6500 BC, and Italy around 2000 BC. The earliest cider was probably that produced when a firm apple is frozen and then thawed in the sun. Thoreau was familiar with apples in this condition and very fond of them: "All apples are good in this state, and your jaws are the cider-press."

It is also hard to imagine, Watson speculates, that prehistoric people would not have discovered fermentation and hard cider. It would be hard for them not to, it is such a natural and omnipresent

phenomenon. Julius Caesar discovered Celts fermenting apple cider in Britain in 55 BC. In the Dark Ages monks preserved the skills necessary for making good cider (as well as the best varieties of apples and the knowledge of grafting) until the rise of Islamic Moorish culture, which can be thanked for developing a number of high-tannin apples which make the richest ciders.

Charlemagne encouraged cider makers to improve their art, and a sizable cider industry grew up in Normandy. The Norman invasion in 1066 reinvigorated the art in Britain, and by 1300 seventy-four of the eighty parishes in West Sussex were paying their church tithes in cider. The drink lost some popularity in the early 16<sup>th</sup> century when hops - which greatly improve the flavor and keeping quality of ale - were introduced from Flanders. Nevertheless, England's West Country had ideal soils and climate for apple production, and over the centuries farsighted lords established large orchards and developed apple varieties well adapted for cider.

A few varieties of small wild apples are native to America, but the first cultivated ones were planted in Boston in 1623. Apples well suited the soils and climate in America, and also suited the homestead life as a reliable producer of a large quantity of fruit, which could be used for eating, cooking, drying, storage or cider. Johnny (Appleseed) Chapman helped the fruit along with his extensive frontier nursery in the Susquehanna Valley.

Cider was popular in the colonies. One estimate has it that before the revolution we consumed roughly 35 gallons per person (man, woman and child) each year. One in ten farms had a functioning cider press. Because so many apple trees were propagated by seed, and apples do not breed true by seed, soon there were a flourishing number of varieties never before seen. Local cider mills developed unique ciders, which could command far higher prices than the cheap farmyard stuff.

But the urbanization of America after the Civil War, and the fact that cider did not ship and store well, led to a decline in demand. The temperance movement also cut into cider's popularity, although it normally ferments out to only an inoffensive 6% alcohol. In the middle part of this century cider was definitely in decline, and only recently has there been a renewed interest in hard cider.

Watson covers apple varieties, making cider, cider evaluation and ramping up the alcohol content as well as history in this book. But the largest section is devoted to homemade hard cider, which is of most interest these days (although the growing demand for pasteurization will undoubtedly put a crimp in this!)

As any home brewer knows, a fruit juice will naturally ferment. It contains millions of microbes, some of which love to turn sugars into alcohol. These are anaerobic critters, and work best in the absence of oxygen. So to make a hard cider you simply put cider in a container covered with a towel. After a week or so it will begin to bubble and froth. Clean up the mess every day, but otherwise ignore it until the bubbling subsides. Now you need to siphon

the cider off the lees (sediment and dead yeast cells at the bottom of the jug) into another jug and fit it with an air lock which lets carbon dioxide escape from the jug but prevents air from entering. So long as this is done, your cider will continue to quietly ferment but not continue on into vinegar, which it would do if the critters needing oxygen in it were activated. After a while even this slow fermentation stops and it is time to siphon again, and bottle. If you want to make sparkling or effervescent cider, let the secondary fermentation take place in a sealed bottle, where the carbon dioxide will build up under pressure in solution rather than escape out the air lock. As soon as the bottle is opened, the pressure is lowered and the gas comes out of solution as bubbles.

This is a nice little book to get as a gift for someone who is into apples and cider. The history part is great. The rest is fine, but you can get it elsewhere. There are a few artsy illustrations, but nothing very useful to the homesteader interested in practical knowledge.

### Good Spirits: A New Look at Ol' Demon Alcohol

by Gene Logsdon

published by Chelsea Green Publishing Co., P. O. Box 428, White River Junction, VT 05001  
205 pages, hardcover, \$24.95

reviewed by Jack Kittredge

This time around Contrary Farmer Gene Logsdon, at his politically incorrect best, comes to the defense of that current pariah, alcohol. While not a friend of drunkenness, Gene is up front about his enjoyment of a fine whiskey. He sniffs at contemporary hypocrisy on the subject and refers doubters to the long tradition of human enjoyment of spirits.

Despite never having read about it in our elementary school texts, he instructs us, alcohol is intertwined with American history. The 'Triangle of Trade' which imported slaves to our shores exported rum to Africa. Our second president, John Adams, owned several of these rum distilleries. (In fact it was rum, Logsdon says, in the form of colonial refusal to accept the taxes imposed by the Molasses Act, which led to the American Revolution.) Of course Adams never made it to Mount Rushmore. But Gene can cite more illustrious figures from our past. George Washington, apparently, ran a distillery at Mount Vernon — in the last year of his life, 1799, he netted over one thousand dollars in liquor sales (that would be roughly \$150,000 today). Even honest Abe Lincoln ran an Illinois saloon in 1833.

Ben Franklin, ever one to look human frailties honestly in the eye, has this to say about alcohol: "Tis true drink does not improve our faculties, but it enables us to use them and therefore I conclude that much study and experience and a little liquor are of absolute necessity for some tempers in order to make them accomplished orators. [Some people] discover an excellent judgment when inspired with a glass or two of claret, but pass for fools among those...who never saw them the better for drink."

Logsdon cites research to the effect that moderate drinkers surpass both teetotalers and heavy drinkers on tests of cognitive skills, and are less prone to stress, high blood pressure, heart attack, cerebral thrombosis, rheumatoid arthritis, late-onset diabetes, vascular dementia, Alzheimer's disease, postmenopausal osteoporosis and gallstones. He even suggests, ironically, that current nutritionists are more likely to agree on the healthfulness of moderate alcohol consumption than on ingesting dairy products!

But *Good Spirits* is not so much a celebration of alcohol as an appeal for the government to get out of the business of regulating and taxing it. From frontier days, when corn whiskey was the most practical way to preserve a harvest, to today, when farms can produce fuel ethanol from crop residues,

fermentation has been a practical way of adding value to farm crops.

Take the example of apples. The juice from a bushel can be fermented into two and a half gallons of hard cider, or be distilled into a half-gallon of apple brandy. In either case the resulting pomace can be fed to animals and result in milk, meat, and manure, or be composted and directly produce a high-quality fertilizer while giving off heat for various farm tasks.

Only a very foolish government would deny its agricultural producers the right to make use of this natural process, says Gene. But that is exactly what current US policy does. Although the laws have been eased somewhat with regard to home production of wine and beer, they require licensure and payment of heavy fees and taxes before any such product can be sold, and they flatly prohibit home distillation.

Logsdon makes a convincing case that easing America's puritanical and hypocritical laws regarding alcohol could reinvigorate our family farms. He does this in an entertaining fashion by citing a number of stories of farmers he knew (including his father-in-law) who saved the family farm by a little moonlighting with moonshine. He also makes a practical contribution to this cause by detailing specific recipes and designs for stills that have stood the test of time. This would have been greatly aided, however, by the inclusion of some drawings showing the working parts and making clearer the differences between, say, a simple stove-top still using a pressure cooker as a condenser, and one with a reflux column.

As Gene himself says about his mission in *Good Spirits*, "Remember, all this innocent and simple, home-centered work, leading to pleasurable and economical drinking after long and interesting experience, is illegal. But it is not illegal to read about it."

## NOFA-NY's 18th Annual Conference

# Planting Seeds for the Future: Taking Charge of our Seed Supply

## Skills, ideas, and connections for creating a regional seed supply

January 29-30, 2000

Darrens Communications Center  
Rensselaer Polytechnic Institute  
Troy, New York

Contact our conference coordinator for a complete brochure and registration information. Tammy Hinman, RR#1, Box 232, Hamilton, NY 13346. (315) 824-2864. Email: [thinman@dreamscape.com](mailto:thinman@dreamscape.com)

Due to our new location we will be able to have vendors and organizations at the event. If you are interested, please contact our conference coordinator Tammy Hinman. Phone (315) 824-2864. Email: [thinman@dreamscape.com](mailto:thinman@dreamscape.com)

### Introduction

Our hopes to create a sustainable, regional food supply cannot succeed unless we can control the types of plants we grow. We are more dependent than ever before on seed produced by a shrinking number of seed companies with profit motives dictating catalog offerings. The ecological threat posed by genetically engineered plants includes the adulteration of our principal food stocks, which have been nurtured and selected over centuries.

NOFA-NY's annual conference is dedicated to bringing together people in the Northeast to begin the task of creating our own seed supply. There are many excellent people who have been working with this vision in mind, as you will see from the list of presenters. And there are many others we hope will attend as exhibitors and supporters. The ideas, energy and knowledge are within our diverse ranks. We need to get to know each other better, connect with like-minded folks and make this important goal a reality.

Gardeners, seed savers, farmers, seed coops, seed exchanges and seed preservation groups, working together, can produce commercial quantities of seed. The people, the expertise and the energy are here. We can accomplish this task if people work on whatever their particular plant interest happens to be. We don't need a new organization but, rather, coordination. Using the incredible number of open-pollinated varieties that are our heritage, we can choose a future that includes them. We can breed our own seed varieties for disease resistance. Our regionally adapted seed can provide us with crops that grow better here than anywhere else. We can work with and support seed companies that supply us with the seed we need. And we can assist seed companies anxious to work with growers, researchers, gardeners and seed preservation groups. We need to

- Preserve the right to save and grow seeds of our choice.
- Fight for labeling laws that let us choose what we eat.
- Support seed companies that sell open-pollinated seeds.
- Learn how to grow and multiply seed.
- Buy locally-grown organic foods.
- Learn how to become seed breeders in our own backyards.
- Share the seed we grow and what we learn through seed exchanges, seed coops and seed companies providing us with excellent, regionally adapted, organic seed.
- Support all our regional agricultural businesses.
- Become even better organic gardeners and farmers.

### Conference Summary

Our Keynote Speaker is Will Bonsall, Farmer & Curator for Seed Savers Exchange. He will address how we can Work Together to Create a Regional, Sustainable Seed Supply.

There will be 30 WORKSHOPS, a Saturday Evening Debate on Biotechnology, and a Kids Conference.

### A SAMPLE OF WORKSHOP TOPICS

All Workshop Topics, full conference schedule, bios of each presenter and registration form available from our conference coordinator and available at our website.

#### • Plant Breeding Techniques

Seed Selection, Hybridization, Mutagenesis, Genetic Engineering - what they are, how they work, what they provide in the way of plant material. Selection, the oldest method of plant breeding, may sound fairly simple, but the ramifications can be profound. Hybrids have increased the yields in corn in particular. Newer techniques, like mutagenesis, will be explained. Lastly, genetic engineering will be demystified. Dr. Margaret Smith, Cornell University.

#### • Slaughtering and Meatpacking in NYS Today

An overview of the USDA Hazard Analysis Critical Control Point (HACCP) new inspection system for food will be presented. Existing and pending innovations in meat processing infrastructure and NY State and New England organic meat labeling requirements will be discussed. Martin Broccoli, SUNY Cobleskill. Jim McLaughlin, Pastured Poultry Assoc. South Central New York and USDA RC. Judith Kleinburg, NE Pastured Poultry Assoc.

#### • Boyd Soybean/Plant Breeding on the Farm

Klaas and Mary-Howell Martens developed this food-grade soybean for tofu or tempeh making. Klaas and Mary-Howell Martens farm, Yates County, NY.

#### • Hardest Cultivars Available for Fruit Production in the Colder Climes of the Northeast

It's not easy to know what will grow best in Zone 5, Zone 4 or Zone 3 or to know if the fruits of your labors will be sweet. Bill MacKenty, Potsdam, NY.

#### • The Basics of Organic Gardening and Farming

Soil components, organic content, biological diversity, rotations and ecological principles will be explained to familiarize participants with the major aspects of organic gardening and farming. Elizabeth Henderson, Newark, NY.

#### • Mentoring, Management and Marketing for Small-Scale Processing Start-Ups, Part I & II.

These two concurrent workshops are for people interested in starting virtually any type of small-scale processing business, including production of jams, dairy products, and baked goods. For details on these special workshops, call Alison Clarke at 716-394-0864. Workshop presenters are Adele and Jim Hayes, Karen Kerney, Amanda Hewitt and Alison Clarke.

#### • Garlic Seed

Selecting and saving garlic can give a grower a tremendous advantage in the production of garlic. David Stern, Rose, NY.

#### • Breeding Plants for Disease and Pest Resistance

During the twentieth century, plant breeders have preferred working with vertical resistance, which has many advantages but which requires expensive research institutes and teams of specialized scientists. The ephemeral nature of vertical resistance has greatly encouraged the use of crop protection chemicals. Farmers have employed horizontal resistance since the dawn of agriculture. We require a new approach to plant breeding in which hundreds of amateur breeder clubs, worldwide, provide effective competition for institutional and corporate plant breeding. These clubs could provide unlimited numbers of new varieties that need little or no crop protection chemicals.

Dr. Raoul Robinson is a retired Canadian agricultural botanist who has worked mostly in the Third World. Robinson has specialized in breeding crops for durable resistance to their pests and diseases with a view to reducing or eliminating pesticides. He has written a book on this topic and is promoting the idea of plant breeding clubs.

#### • Heritage Rare Breeds Instead of Feedlot Breeds

We will discuss the advantages of raising heritage breeds over animals bred to fit into an industrial agricultural system. Tom Gardner, N.E. Heritage Breeds Conservancy.

#### • Flower and Herb Seed Saving Techniques

Hancock Shaker Village has a seed saving program, sells seed in their gift shop and conducts an education program on heirloom seeds and seed saving techniques in area schools. Meredith Kennard, Hancock Shaker Village, Pittsfield, MA.

#### • Mentoring, Management and Marketing for Small-Scale Processing Start-Ups, Part II

#### • Farmer Cooperative Genome Project

This project is administered by Oregon Tilth and seeks to assemble a farmer owned seed company working with the United States' repository of seeds (the National Plant Germplasm System) and other seed resources. The NPGS now contains about 450,000 varieties of plants out of the world's estimated two million plants. Some of the seed and plant resources are well described, while others are not. For example, some have simply been assigned a number and there is no additional information about the plant. The value of a particular variety, whether it's a duplicate accession, whether it has potential as a commercial crop or what any of its attributes might be, is simply unknown. Once a plant is in the system and described or characterized, the plant is locked into the public domain. The more heirloom seeds that are in the repository and characterized, the more plant material that remains available to the public. Volunteers work with the plants of their choice. The project is open to anyone who can grow a plant. JJ Haapala is the Project Director, a farmer, seed producer and editor of Oregon Tilth's newsletter, In Good Tilth.

#### • Diversifying Your Operation with Chinese Medicinal Plants

Although the market for Chinese medicinal botanicals has not yet developed, this workshop will provide an update on research and current events that indicate such opportunities five to ten years ahead. Participants will receive information on cultivation requirements, where to obtain seeds, and how to keep up with this rapidly developing field. Jean Giblette, High Falls Gardens, Columbia Co. NY.

#### • Potatoes: Special Problems with Saving the Seeds of Clones

In this workshop, the difficulties that arise when saving clones will be explored, along with strategies for developing one's own stock of seed potatoes. Will Bonsall curates the huge potato collection for Seed Savers Exchange.

#### • Wholesale Marketing Panel

Establishing wholesale accounts at larger stores continue to be problematic for farmers. We will hear from the buyers. Gayle Anderson, Produce Manager at the Honest Weight Food Coop, Albany, NY. Price Chopper's produce division staff.

#### • Small-Scale Multiplication of Vegetable Seed

The techniques for seed production used at the USDA's Geneva Plant Introduction Station are comparable to what a home gardener or small-scale farmer would use to produce and save seed. David Sharman is the Farm Manager for the USDA Agricultural Research Service, Plant Genetic Resources Unit, in Geneva, NY.

#### • Heirloom Seeds

The Garden State Heirloom Seed Society has been in operation for a few decades and is especially proud of their gardeners, who trial hundreds of varieties every year. Joe Cavanaugh, New Jersey. Lawrence Davis Hollander, the Eastern Native Seed Conservancy, Massachusetts.

#### • Raising Livestock on a Diversified Organic Farm Selling to Retail Stores

This workshop will discuss the thinking needed to incorporate the right livestock into your farm operation. How much time does a meat production component add to operations? What are the equipment and facilities needed? What regulations and inspection requirements apply? Alton Earnhart, farmer, Columbia Co. NY. Larry Decker, Inspector for NYS Ag Mkts. Division of Food Safety Inspection's Upstate District.

#### • Biennials - Advanced Seed Saving Techniques

Biennials are neglected in comparison with annuals, yet these crops, including kale, carrots, and cabbage, are important food crops for the Northeast. This workshop will focus on the special problems involved with biennial species and with outcrossing. Will Bonsall, Industry Maine.

#### • Operating a Farm-based Seed Coop - 20 Years of Experience

Butterbrooke Farm Seed Co-op began operation in 1979. The nonprofit network of organic growers and seed savers provides its members with chemically untreated, open-pollinated vegetable and flower seeds, including named heirlooms and short-maturity varieties. Tom Butterworth, Connecticut.

#### • Working with Farmers and Gardeners to Build a Sustainable Regional Seed Industry

If we are to truly succeed in creating an alternative agricultural system, we must have alternative sources of seed. Currently, the seed industry is controlled by a handful of behemoth multinational life science conglomerate/clusters. This workshop will explore strategies for building a sustainable regional seed industry which can support our alternative farms and even provide an additional value-added product for some of the farms. The workshop will explore some of the economics of seed growing and ways to work together for our mutual benefit. CR Lawn, Fedco Seeds, Maine.

#### • Growing and Conditioning Certified Organic Cover Crop Seed

In the winter of 1998, John Myer built a seed processing facility on his farm. The equipment and procedures for growing cover crop seed will be discussed. John Myer, Seneca Co. NY.

#### • USDA National Plant Germplasm System

What it is and how it works and how farmers and gardeners can access the system. The federal system has advantages and limitations, which will also be explored. Dr. Larry Robertson, Vegetable Crops Curator, USDA-Agricultural Research Service, Plant Genetic Resources Unit in Geneva, NY.

#### • Breeding, Adaptation and Germplasm Preservation in Cucurbits

Cucurbits or vine crops include a broad range of food crops of worldwide importance. Most economically important cucurbit species are bee pollinated and therefore highly outcrossed. For breeding purposes it is usually necessary to use controlled pollination techniques or isolation to develop uniform strains. Dr. Brent Loy, Professor of Plant Biology Genetics, University of New Hampshire at Durham.

#### • Horses & Sustainable Energy on the Farm

Energy use on most organic farms is equivalent to that on conventional farms, which means it's high. Mike Scannell will discuss how he uses his team of Belgian draft horses to do nearly half the farm work on his 200 acre farm in Columbia County.

#### • Starting and Running a Farm-Based Seed Company

High Mowing Organic Seed Farm in Wolcott, Vermont, produces all the seed it sells. We will discuss start-up, equipment needs for seed processing and distribution, and other aspects of a small seed business. Tom Stearns, High Mowing owner and operator.

#### • How to Explain Genetic Engineering to your Neighbor

This presentation will focus on presenting the how of genetic engineering in terms that you can use to explain it to your not-necessarily-a-scientist neighbor. Laurie Freeman, Biology Professor, Fulton-Montgomery Community College, NY.

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**Vickie Smith\***, NHDA, Bureau of Markets, Caller Box 2042, Concord, NH 03301 (603) 271-3685  
**Rick Estes,** 145 Mountain Rd., Concord, NH 03301 (603) 224-4469  
**Emily Brown Rosen,** 33 Titus Mill Road, Pennington, NJ 08534 (609) 737-6848  
 Elizabeth Henderson, 2218 Welcher Rd., Newark, NY 14513 (315) 331-9029 [ehendrsn@redsuspenders.com](mailto:ehendrsn@redsuspenders.com)  
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**Pat Kane,** 26 Towpath Rd., Binghamton, NY 13904 (607) 724-9851  
**Dan Lawton,** RI Division of Agriculture, 235 Promenade St., Providence, RI 02908 (401) 222-2781, ext. 4516, [dlawton@dem.state.ri.us](mailto:dlawton@dem.state.ri.us)  
**Polly Hutchison,** Casey Farm, 2325 Boston Neck Rd., Saunderstown, RI 02874 (401) 295-1030  
**Enid Wonnacott,** 1561 Sherman Hollow Rd., Huntington, VT 05462 (802) 434-4435  
**Tim Sanford,** RR1, Box 224A South Royalton, VT (802) 763-7981

# Calendar

**Tuesday, December 14 - Thursday, December 16, 1999** - 1999 New England Vegetable and Berry Growers Conference, Sturbridge, MA *for more info:* (802) 257-7967

**Tuesday, December 14** - RI/NOFA workshop: IPM in the Greenhouse - Part I, North Kingstown, RI *for more info:* (401) 274-4547

**Tuesday, January 11, 2000** - RI/NOFA workshop: IPM in the Greenhouse - Part II, North Kingstown, RI *for more info:* (401) 274-4547

**Friday, January 14 - Sunday, January 16, 2000** - 3 Day Advanced Organic Vegetable Farming Workshop, Saratoga 4-H Training Center, Saratoga, NY *for more info:* 518-427-6537

**Thursday, January 27, 2000** - Connecticut Herb Assoc. meeting, Newington, CT *for more info:* 860-749-0839

**Saturday, January 29 - Sunday, January 30, 2000** - NOFA-NY's 18th Annual Conference Planting Seeds for the Future: Taking Charge of our Seed Supply, Troy, New York *for more info:* (315) 824-2864

**Saturday, February 5, 2000** - NOFA/MA annual winter conference, Barre, MA *for more info:* 978-928-4707

**Tuesday, February 8** - RI/NOFA workshop: State-of-the-Art Biocontrol, North Kingstown, RI *for more info:* (401) 274-4547

**Tuesday, February 8 - Thursday, February 10, 2000** - NY State Vegetable Conference, Liverpool, NY *for more info:* 607-539-7648

**Saturday, February 19, 2000** - NOFA-VT Annual Winter Conference, keynote: Shepherd Ogden. For more info: 802-434-4122

**Thursday, February 24, 2000** - Connecticut Herb Assoc. meeting, Newington, CT *for more info:* 860-749-0839

**Monday, March 27 - Wednesday, March 29, 2000** - International Conference on Biointensive Agriculture, Davis, CA *for more info:* 530-757-8753

## NOFA Membership

You may join NOFA by joining one of the seven state chapters. Contact the person listed below for your state. Dues, which help pay for the important work of the organization, vary from chapter to chapter. Unless noted, membership includes a subscription to The Natural Farmer.

Give a NOFA Membership! Send dues for a friend or relative to his or her state chapter and give a membership in one of the most active grassroots organizations in the state.

Connecticut: Individual or Household: \$35, Business/Institution: \$50, Supporting: \$100, Student (full time, supply name of institution) \$20

**Johan van Achterberg,** 359 Silver Hill Rd., Easton, CT 06612-1134, (203) 261-2156 (home), [vanachj@concentric.net](mailto:vanachj@concentric.net)

Massachusetts: Individual: \$30, Family: \$40, Low income: \$20, Supporting: \$100

**Julie Rawson,** 411 Sheldon Road, Barre, MA 01005, (978) 355-2853

New Hampshire: Individual: \$25, Family: \$35, Supporting: \$100  
 c/o White Farm, 150 Clinton Street, Concord, NH 03301

New Jersey: Individual: \$35, family/organizational: \$50, Business/Organization: \$100, Low Income: \$15\* \*does not include a subscription to The Natural Farmer  
 33 Titus Mill Road, Pennington, NJ 08534, (609) 737-6848

New York: Student and Senior (over 65): \$15, Student and Senior Family (2 adults): \$20, Individual: \$25, Farm Listing: \$30, 2 adult family: \$30 (each additional adult, \$5), Business: \$35, Patron: \$100, Corporate Sponsor: \$500, Lifetime: \$1000  
**Ammie Chickering,** P O Box 21, South Butler, NY 13154, (315) 365-2299

Rhode Island: Student/Senior: \$15, Individual: \$25, Family: \$35, Business: \$55

**Lee Gross,** P. O. Box 29174, Providence, RI 02909-9998 [288 Dudley St., Providence 02907] (401) 274-4547, fax: (401) 273-5712

Vermont: Individual \$25, Family/Business: \$35, Sponsor: \$75  
**Kirsten Novak Bower,** NOFA/VT, PO Box 697, Richmond, VT 05477, (802) 434-4122

## Winter 1999-2000



photo by Jack Kittredge

**Patti Powers, in her new commercial kitchen, puts decorative foil covers on bottles of herbal vinegar she has made for sale. She and her husband Ralph Legrande make specialty condiments for their company, Cheshire Garden.**  
News, features and articles about organic growing in the Northeast, plus a Special Supplement on

# Food Safety