Rhode Island Policy Reporter

Issue 5 **15 May 2004**

What's for dinner?

FOOD AND RISK are subjects that periodically resurface in the news. Over the past few years we've heard about irradiated food, antibiotics in animal feed, genetically modified organisms, and much more. Most recently we've heard that a mad cow was found in a slaughterhouse in Washington state. Each of these issues appeared quickly, streaked across the media sky, and disappeared. But these are important issues, and they deserve to be raised, and raised again, until we—the people who eat food—get sound answers to basic questions of health and safety, instead of bland assurances. Here are brief looks at three of them: genetically engineered foods, mad cow disease, and disappearing farmland.

Genetically engineered food

Since 1997, US consumers have been participating in a long-term experiment on the effects of genetically-modified food. The effects in question are both effects on those who eat the food, but also on the animals and plants that grow near where the genetically-modified crops are grown. This includes other crops, as well as weeds, insects, and other animals.

The approval for these experiments came by bureaucratic fiat. No bills were passed in Congress, no votes were taken, the FDA simply decided that corn and other plants that have been genetically modified are enough like the unmodified plants that they need no special authorization. And you were denied the right to decline to participate in the experiments when the FDA refused to require genetically-modified foods ("GM" foods from here on) to be labeled as such. (They also forbade foods from being labeled "GM-free", though there are some ways around this, like using the word "organic.")

Earlier this year, the Union of Concerned Scientists published a report about contamination in the seed supply.[1] They found that most of the most popular seeds planted in the US are contaminated with seeds of GM crops. The contamination came in two forms:

- Seeds from GM crops are inadvertently included with seeds of traditional crops.
- Genes transferred from GM crops to traditional crops.

The study found that seed-handling procedures out on the farms and the agricultural warehouses are just not careful enough to avoid mingling seeds of different kinds. Basically, the problem is that if you're sorting seeds with a shovel (or a front-end loader), you spill some. And if a huge pile of GM corn seeds is in the same building as another huge pile of non-GM corn seeds, eventually they mix. So the result is that—eight years after the introduction of these seeds—there are no industrial-scale farms in America growing corn that can realistically claim not to have any GM corn on their farm. They may not plant any on purpose, but the UCS report makes it clear that they can expect around one percent of their output to be GM even so.

More specifically, the report found that somewhere between 50% and 83% of the samples of corn, soy and canola were contaminated at a low level of around 1%.

The second problem, gene transfer from GM plants to other plants, is more controversial. The UCS study was looking at contamination generally, and they didn't try to determine which was the more important source. They did infer from their results that physical mixing of seeds was a more important effect than they'd suspected, but they also found important evidence of genes "flowing" from GM crops to non-GM crops.[2]

Why should we care? Here are a few reasons.

What safety procedures? The procedures used to determine the safety of GM foods do not exist. Official FDA policy is to assume GM food is edible and not harmful, just as they do with traditional hybrids, so they do not conduct tests of food safety for these crops.

The USDA is more restrictive, and they can choose not to license field trials of GM crops, but so far they've rarely exercised the privilege. Practically speaking, the only discretion is that of the companies who develop these plants. But the UCS report implies that we may not be able to undo the effects of bad decisions. So the situation is now that a few companies have a tremendous responsibility

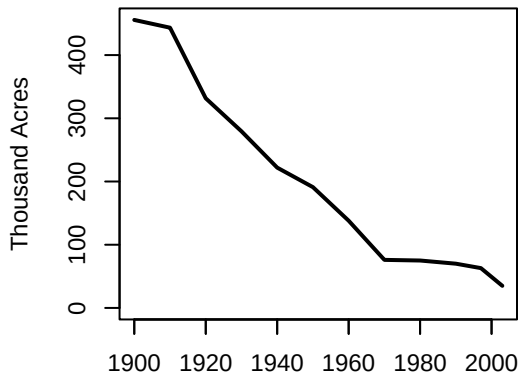


Figure 1: Rhode Island farmland (see page 5). Producing farmland has declined every year since 1850, as production has moved to flatter lands. Our land is rocky, and the soil is thin, but it's fertile, and you can farm here without irrigation, if need be. Simply put, our land is a national treasure. Why do we waste it so? (RI Planning Division)

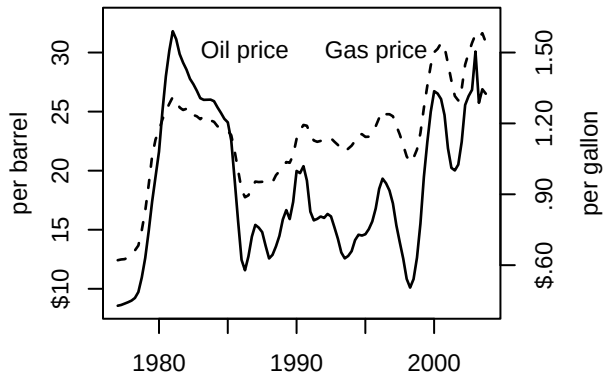
[1] *Gone to Seed: Transgenic Contaminants in the Traditional Seed Supply*, Union of Concerned Scientists, Margaret Mellon and Jane Rissler, 23 February 2004, available at *ucsusa.org*

[2] They even found evidence that soybeans had picked up genes engineered into corn, and found canola harboring soybean genes (p.27).

not to do anything bad for you, and the official policy of our government is to trust them not to do it.

Benefits are not for the eater Few of the genetic additions to food crops are added for the nutrition or health of the person who eats that food. Mostly the additions are to make the food cheaper to grow by making the plant hardier, or more resistant to bugs or weed-killer. Less expensive grocery bills are, of course, a benefit, but there is no law that says crops that are less expensive to grow translate into lower prices in the market. There are a lot of players in between the farm and the market. Savings on one end could accrue to any of them instead of the consumer, and the data show they probably do.

Gas isn't food, but the relation between oil and gas is roughly the same as the relation between corn and Doritos: lots of middlemen, lots of processing. The graph here is a record of gas and oil prices. You can see from it that cheap oil doesn't always mean cheap gas, and vice versa,[3] just like cheap corn doesn't always mean cheap food.



What's more, even these benefits aren't always what they seem. The laws of unintended consequences have come to plague GM crops, and the effects on neighboring farms, wildlife, and the soil are becoming clearer with experience.

GM crops are billed as being the answer to hunger, the next phase of the "green revolution" that will feed the world. But it doesn't always work that way. Argentina adopted GM soya resistant to weedkiller with great enthusiasm several years ago. This is Monsanto's "Roundup Ready" technology, to produce plants resistant to Roundup, their bestselling herbicide. With RR soya you can plant without plowing, and use Roundup to control the weeds. So, predictably, farmers use much more Roundup than they need to, causing havoc in neighboring areas. On some farms, so much Roundup has been applied that the soil bacteria have died, and dead plant stalks have to be brushed off the farm, because they don't rot. The soil bacteria filled a niche, too, and apparently fungi, snails and slugs have proliferated now that the niche is empty. And of course resistant weeds have appeared, and been quite successful. One of those weeds is RR soya, itself, which is contaminating other crop fields, and is hard to eradicate. All in all, soya production is up, but only because more acres have been planted. The actual yields per acre are several percent below the traditional kinds of soya, and though soil erosion is down, the soil is no longer able to fertilize itself with rotted material, so must be fertilized with chemicals.[4]

Much of Argentina's soya troubles are due to "abuse" of Roundup, and the inevitable problems of overreliance on a single crop, but the technology helped create the conditions to make a crisis.

Pharm crops Another interesting development has been the advent of "pharm" crops. These are plants engineered to produce drugs and industrial chemicals, more

[3] Data from Louisiana State University, *www.engr.lsu.edu/les/ogp1.html* Data have been smoothed slightly.

Editor's Note

This is the fifth in a series of reports about state and federal policy issues that affect life here in the Ocean State. Each report focuses on particular policy areas of interest. Future issues will examine controversial aspects of environmental policy, health care, property tax reform, and education spending. You can see earlier issues, including a dissection of the state budget, and the beginning of an analysis of the state tax system online at *whatcheer.net*.

Our goal is to be a news source that spends time looking at data instead of at press releases. In our opinion, too much attention is paid to essentially meaningless news, and the stuff that really makes a difference in people's lives regularly goes unexamined.

If you think ours is a useful addition to the policy discourse in Rhode Island, please subscribe. If you'd like to help, please contribute an item, suggest an issue topic, or did we mention buying a subscription? $35/11 issues. –TS

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[4] "Argentina's Bitter Harvest", Sue Branford, *New Scientist* vol 182, issue 2443, 17 April 2004, p. 40

cheaply and efficiently than they can be produced in a lab. Many field trials of these plants have been approved (and taken place), and many of these have been in food crops like corn. Presumably corn is appealing because the processing technology is quite advanced, but corn pollen is tiny and light, and the wind carries it for miles.

The UCS seeds report lists several compounds that have been produced in this way: anticoagulants, blood substitutes, antibodies to fight tooth decay, rabies vaccine, piglet diarrhea vaccine, ingredients used in laundry detergent and paper, among others. None have come to market yet, but all have been tested in the great outdoors.

Gene contaminants have proven surpisingly difficult to eradicate.

The USDA has already had to deal with contaminants in the food supply. The StarLink gene was approved only for animal feeds in 1997, but in 2000 it began appearing in processed foods. Though only ever planted on 350,000 acres (out of 80 million acres of corn), the StarLink gene has percolated through the system, and the USDA's efforts to eradicate it through seed buybacks have been much more difficult and expensive than expected. They haven't succeeded yet, either.

In 2002, the FDA acted when some corn engineered by ProdiGene to produce some drug (they've never said which one) appeared growing in a nearby field of soybeans in Nebraska. Before the FDA or ProdiGene could act, the corn was mixed in with 500,000 bushels of soybeans. The FDA and the state of Nebraska intervened, and ProdiGene had to buy all the soybeans and destroy them.[5] Which is all to say that serious accidents have already happened—and you've eaten some. After less than a decade of experiment, it is impossible to know whether the corn you're eating is contaminated with engineered genes. Why should anyone believe bland assurances that the risk of someday finding piglet diarrhea vaccine in your corn chips is vanishingly small?

Genetics and ignorance The biggest problem with genetic engineering is that we really don't know what we're doing. Scientists have learned a lot about genetics, but they've also learned a lot about their ignorance. The paper that reported the completion of the sequence of the human genome also said:

> In principle, the string of genetic bits holds long-sought secrets of human development, physiology and medicine. In practice, our ability to transform such information into understanding remains woefully inadequate.[6]

What they mean is that we can tell you all about the proteins made by this part of your DNA or that part, but we still haven't the slightest idea how that turns into blue eyes, or tasty corn. But we don't have to be general about this. Here's an example: you have, in your genes, genetic sequences that seem to have come from bacteria our ancestors ate. No one knows how something you eat can get into your genes, but the evidence that it has happened hundreds of times in humans is pretty compelling. This sort of thing is called "lateral gene transfer."

It turns out that plants are champions at lateral gene transfer, sometimes aided by symbiotic bacteria called "agrobacteria." These bacteria are so intimate with some plants' genes that bio-engineers use them to insert new genes into those plants. But they exist in the wild, too, where they cause plant tumors, and apparently add and subtract material from plant genes. No one knows exactly how it happens, but this may be one way that genes hop from one species to another.

Another mystery concerns the "junk" DNA. We understand the functioning of only a small fraction of DNA, a few percent in humans. The rest was once christened "junk" by scientists who were sure they knew what was going on. No one is as sure any more, and scientists routinely disavow the name. Plants have plenty of this junk, though they have much less than us. And no one knows what it does. Genetic engineers who claim understanding of the corn genome are like English speakers in a German library: they can probably find something they can read, but will you believe them when they talk knowingly about what the library contains?

The mysteries continue: no one knows why DNA is wound around chromosomes, or how a leaf cell splits into more leaf cells instead of splitting into root or stalk cells. We know very little about the ways that genes interact with an organism's external environment, and though libraries have been written on the subject of development, the process of turning a kernel of corn into a corn plant is fundamentally a wonder to people who have studied it their whole lives. (And we still haven't mentioned the ecological mysteries of soil, weed and insect communities.)

Our ignorance of genetics is so profound we owe it to ourselves and our children to walk very carefully.

In other words, our ignorance is so profound we owe it to our kids to walk very carefully in experiments on agricultural genetics. This, of course, is what we are *not* doing. The stakes are huge: imagine no more corn. The probability of that may, in fact, be quite small. But we don't know that and the people who say otherwise are—well why don't we just say they are selectively reading the current genetics literature.

[5] www.fda.gov/bbs/topics/ANSWERS/2002/ANS01174.html

[6] "Initial Sequencing and analysis of the human genome", *Nature*, vol.409, 15 February 2001, see p914

Mad for beef

In December, 2003, a cow at a slaughterhouse in Washington State tested positive for Bovine Spongiform Encephalopothy (BSE). This was the first detected case in the United States since the epidemic in England in the 1990's. You may have read about this already, but here's what we know about BSE:

- Cows get it from eating nerve tissue of infected cows, which used to appear in their feed as a protein supplement, before the USDA banned its use in 1997.
- People can get a similar disease, called variant Creutzfeld-Jacob disease (vCJD) from eating certain parts of infected cows.
- Those parts are limited to nerve tissue, and parts of the small intestine (the distal ileum if you must know), according to the USDA, which keeps a list of "specified risk materials" (SRM). The BSE agent hasn't ever been detected in muscle tissue.
- BSE is incurable and always fatal, as is vCJD, though it can take years between infection and the onset of the disease.

That's about it, aside from the fact that you may eat more nerve tissue than you suspect, in hamburger or other processed beef, or in contamination of muscle meat. Here's what we don't know about BSE:

- What on earth causes it. We know it's not a virus, and it's not bacteria. Heating the "BSE agent" doesn't kill it, nor does UV light, radiation, or disinfectants. It might be a weird virus, or something like it, or it might be a mis-folded protein (a "prion") that makes similar proteins mis-fold and become useless.
- How likely it is a cow (or person) will come down with disease after eating some of the BSE agent, whatever it is.
- Are there any other conditions that make it more or less likely that a cow (or person) will contract the disease?
- Is the BSE agent present in transmissible quantities in cattle that haven't yet shown clinical signs of the disease? That is, can you get it from an infected-but-not-yet-sick cow?

Since the discovery of the sick cow, the USDA has investigated, and determined that it was from Canada, and was $6\frac{1}{2}$ years old, which is important, because it might have contracted the disease before it became illegal to feed cows protein supplements from SRMs. But what the agency has also done is to claim that a single cow (out of 40 million slaughtered every year in the US) isn't evidence of BSE becoming a problem here, yet. They have expanded the definition of SRM, and announced that they will step up the sampling program they've been conducting for several years, but they are not planning to screen cattle. In fact, the agency has taken steps to forbid meatpackers to screen cattle, forcing them to give up their export markets, since Japan and many other countries have forbidden the import of untested US meat since last December.[7] One can almost see the sense in this, since BSE testing could become an effective marketing tool, even in the absence of real risk, but it adds to the impression that the USDA is acting in interests other than the general public's.

The official position of the USDA might be summarized as saying, We still haven't detected BSE in the US herd of cows, and that one from Canada didn't count. We're enhancing our testing to try to detect it at a higher confidence level than before, but we're not taking any steps to keep suspect beef off your table.

The official USDA position is that we still haven't detected BSE here and that cow from Canada didn't count.

Here's what the USDA is actually doing. They are planning, during the next 12 to 18 months, to test as many of the "high-risk" cows as they can. According to the USDA, these are cows that are over 30 months, cows that can't get up ("downer" cows), and cows who show symptoms of nerve disease, like shaking. The number of high-risk cows is estimated to be around 446,000 per year.

The agency won't commit to a specific number they'll test, saying instead that they will "test as many as possible." But they do say, in several documents, that testing 201,000 would allow the detection of BSE with a 95% confidence ratio, and testing 268,000 would give a 99% confidence level, leading one to believe that these numbers are more or less their targets.[8]

The statistics *sound* impressive—95% confidence level, detecting the disease if it appears in four cows out of 40 million—but here at **RIPR**, we speak math, and we know that the only way to achieve confidence levels in the 90's with sample sizes so small is to make a lot of assumptions. These are the USDA assumptions we've been able to glean from USDA public statements:

- "Many if not all" all the cases of BSE will be in the high-risk population.
- BSE cases will occur randomly in that population.
- The USDA samples will be random, too.

BSE experts know older cows are the most likely to show the disease, but they don't know if those are the only animals who can transmit it. They also know that cattle in

[7] See, for example, www.creekstonefarmspremiumbeef.com

[8] The information and quotes here and below are from the March 15 technical briefing with USDA Chief Veterinary Officer Ron DeHaven: *www.usda.gov/Newsroom/0106.04.html*.

Japan and Europe have tested positive who wouldn't be classed as high-risk by USDA standards. We also don't really know if BSE occurs randomly or in clusters, nor can we be assured that the USDA samples will be random, and there are high logistical obstacles (like the number of packing plants) that make us doubt it. In other words, we think the confidence levels for this testing regimen are vastly overstated.

The precautions are somewhat lacking, too. It's no longer legal to feed SRMs to other cows, but it is legal to feed them to chickens, and to feed chicken-coop scrapings to cows.[9] Chickens, of course, are not the tidiest eaters. Also, blood is still allowed in cattle feed. But the SRMs include both brain tissue and part of the intestine; this is a food-borne disease that affects brains. How does the BSE agent get from the intestine to the brain if not in the blood? There may be some other path, or maybe it's not infectious while afloat, but we don't know that.

[9]Researching these matters has its own special thrills, as you can see.

Calculating Risk

Risk is a two-part calculation. Only half of the equation has to do with the odds of something going wrong. The other half has to do with what is at risk. I'd risk a dollar on a 120,526,770 to one shot sometimes (those are the Powerball odds). But I wouldn't risk a hundred dollars. There have been days when I'd have risked a hundred dollars on a 10 to 1 shot. But I wouldn't risk my life on that. Or yours.

The point is that the tiniest risk is still worth avoiding if the stakes are high enough. This is a mathematically—and morally—defensible position.

The chances are very very small of something going dramatically awry by breeding corn to generate muscle relaxants, say. But the risk is still quite high because the potential consequences are huge if food corn becomes contaminated.

What's more, the evaluation of the risks is different, depending on who you are, not because people misunderstand the probabilities, but because the estimation of the stakes can differ. For example, from the public health perspective, it can make perfect sense not to test cows for BSE, but from the point of view of a person about to chow down on a burger with everything the evaluation is somewhat different. The odds are the same, but the stakes are different. The USDA has millions of lives it's responsible for. But the prospective burger-eater has just one life to worry about.

It can be perfectly rational *both* for the USDA to think that what they're doing is energetic pursuit of the public good, *and* for someone who craves a hamburger to feel that the risk is too great to eat one. It's not at all clear to us how to reconcile the two, but until we figure it out, we're looking for organic beef.

Another strategic shortcoming of the USDA plan is that with spot tests, if their assumptions are wrong—for example if younger cattle can transmit the disease—they are unlikely to learn it from their data.

From a public health perspective, it is possible, and not even that hard, to defend the USDA's actions. The disease is rare, detection is expensive,[10] prevention is easy. But humility is a virtue. The USDA is claiming knowledge they don't have, and have designed a strategy based on that illusion. If they are right, it will be an accident. If they are wrong, it will be a disaster.

Where's our farmland?

As the graph on the first page shows, RI is now down to about 35,000 acres of farms (about 5% of our land area) down from 554,000 acres (81%) in 1850. Around 1970, the decline leveled off, only to plunge again in recent years.

There have been some recent law changes to attempt to address the decline. In 1999, the state allowed towns to stop taxing land at its highest possible value, and to assess it as farmland, or open space, as the case may be. But rising taxes were only part of the story. Rising real estate prices dangle a carrot of vast profit in front of farm owners, and many find themselves unable to resist. The result is still less land in farms.

Rhode Island, like most of New England, has fairly thin and rocky soil. It isn't the best around, but we have some things that many other areas lack: rain, and proximity to large markets. It is possible to farm without industrial-scale irrigation around here, and it takes a fraction of the cost to bring the goods to market.

Irrigation always helps, of course, but the situation here is far different than it is in California's central valley, where farmers must use water imported (at your expense, but that's another argument) from hundreds of miles away, or in the Great Plains, where farms are using fossil water from the Oglalla aquifer deep underground that will not be replaced in any of our lifetimes. Farming land in California is becoming oversalted from irrigation, and the Oglalla is only getting emptier. Rising gas prices are also a problem, not just at the pump, but also at the grocery store. We may not always be able to import cheap food cheaply from those far places.

We are not predicting disaster, but we agree with Herbert Stein, the chairman of the Council of Economic Advisers under President Nixon, who once said, "Things that can't go on forever, don't." Our land is a treasure that may someday become important to us in a way it hasn't been for a long time.

Housing and farms A gentleman at DEM's Division of Agriculture suggested to us a point we'd often heard be-

[10]USDA estimates about this, however, suggest how much of their testing functions have been delegated over the past couple of decades to the meatpackers themselves, but that's a different argument.

fore: preserving land for open space and farms drives up real estate prices, and makes solving the issue of affordable housing more challenging. But this is a false claim that has only served to pit housing advocates against environmentalists in the past. The truth is that we simply choose to take up more space these days. From 1970 to 1995, Rhode Island's population increased by only 5% while developed land increased by 47%. In terms of percentages, 80% of the state was still undeveloped in 1970 while only 70% remained undeveloped by 1995. The trend has probably accelerated since then.

Housing prices are a demand-side problem. Unless we choose to develop the remaining 70% of our state (won't *that* cause prices to fall!), they can only be solved by addressing the demand side. Prices are out of control because there is too much money available to purchase housing, and there are not enough productive investments to draw the capital away. Short of providing those productive investments, we can and must establish market controls to keep the prices within reason. Land speculation should not be a money-making option in a place where people are without homes because of expense.

Tax note follow-up

A follow-up to the report about tax statistics in **RIPR** issue 4. It seems that the Tax Foundation's statistics, listing RI as the fourth highest-tax state in the country, were more bizarre than our research staff suspected. Apparently the Tax Foundation takes into account the out-of-state effects of corporate state taxes.[11] So the data for Rhode Island includes taxes we pay to the state of Delaware via corporations doing business in Rhode Island, and money that goes into the Alaska general fund as a tax on the oil pumped in that state.

None of this weakens the comments made here last month, and it only leaves us incredulous. We're not sure what point the report's authors wish us to glean from these numbers, but we are sure that, as a guide to sensible public policy in Rhode Island, they are as useful as a compilation of Red Sox batting averages. Nonetheless, the Governor has very successfully used them to freeze out any debate about what to do.

We had an opportunity to challenge the Governor's use of these statistics at one of his town meetings a couple of weeks ago. He turned to the crowd and said, "Does anyone here think this isn't a high-tax state?" The democratic impulse at work: turning judgment on matters of fact over to a majority vote.

But worse, this misunderstands the complaint. No one can call RI a tax haven without enduring justifiable ridicule. But we *can* point out that it's not the *state* taxes that are the problem, and that the state's constant shorting of local education aid only makes matters worse, by increasing local reliance on property taxes. We get cuts in the progressive income tax that we don't need, and in exchange we endure higher property taxes, whose impact is much less fair. Overlooked in most of the property-tax riots around the state is that the real issue is not the size of the burden, but its distribution. Property taxes are levied without regard to ability to pay. Income and sales taxes at least take this into consideration.

Here's a way to illustrate the situation: if the state income tax were to double, and all the new revenue could be applied to property tax relief (which admittedly would be difficult), our calculations are that around two-thirds of Rhode Island's taxpayers would see a reduction in their taxes. This is almost everyone whose income is under $100,000, and quite a few of those with income beyond that. For some—we suspect mainly seniors—the tax relief would be in the thousands of dollars. ■

[11] The Poverty Institute published a useful report on the Tax Foundation statistics. You can see it at *povertyinstitute.org*.

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