



Excerpts from –

The Food Revolution:

How your diet can help save your life and the world

**By John Robbins (Author of *Diet for a New America*),
2002.**

[please print/copy on both sides of the paper if you are able]

Introduction

While this book is not based on religious teachings, a clear message comes through that relates to how we live our lives as Christians.

Eating is a moral act.

This is not an original idea. In fact, it is a modification used often by the National Catholic Rural Life Conference of Wendell Berry's phrase, ***Eating is an agricultural act.***

John Robbin's book not only convinced me that both are true, but also that we must act. We must change our diets for the sake of personal and planetary health. How we eat and structure our food system – with the myriad implications on the environment and social justice issues – is one of the supreme challenges we face in this century.

The situation is unprecedented. Never have so many people – an estimated one billion – grown fat and obese from over-consuming, while an equal number suffer debilitating hunger. Never before have so few entities – the giant retailers, seed, livestock factory, food processing and agricultural chemical corporations – controlled so much of the global food system. Never have human actions so affected the health of the global environment and all living creatures.

Can we turn things around?

Perhaps. Perhaps not. But certainly, our failure to act would dramatically compromise so much that we care about and love. So much of God's wondrous Creation is at stake. And there are many hopeful ways to improve the diet of our families and to strengthen local food economies. You can learn more about these on the Presbyterian Hunger Program's Food and Faith website at www.pcusa.org/food, on the wildly-popular [Food and Faith Blog](#) and in Frances Moore and Anna Lappé's wonderful book, *Hope's Edge*.

I offer these excerpts as fodder for understanding and fuel to inspire action. Many thanks to John Robbins, who could have chosen an ice cream fortune, but instead chose to exhaustively research and share his findings for the benefit of all.

The numbers following factual statement refer to the chapter and footnote where the source can be found. If you would like the references, please contact Andrew Kang Bartlett in the Presbyterian Hunger Program ~ abartlet@ctr.pcusa.org; 502-569-5388.

Special thanks to Deborah Calvert for her enthusiastic transcriptions!

table of contents

<u>Costs of a meaty diet</u>	4
<u>Got BS?</u>	4
<u>Animal protein and calcium loss</u>	5
What we know about dairy, calcium and bone loss	6
<u>Water per pound of beef</u>	7
<u>Biodiversity and livestock</u>	8
What we know about hamburger meat and rain forests	8
<u>Saving forests</u>	8
<u>What we know about food and global warming</u>	8
<u>Beef as petroleum by-product</u>	10
Is That So?	10
<u>The globe is warming</u>	11
Is That So?	11
<u>And warming...</u>	11
Is That So?	12
<u>Traditional vs modern livestock production</u>	13
<u>Who eats and who doesn't</u>	14
<u>World's bread basket</u>	14
<u>Food for livestock, not people</u>	15
What we know about food and land use	16
Even fish?! ~ What we know	17
<u>Genetically engineered food ~ What we know</u>	18
<u>Hype vs reality</u>	18
<u>More on GE and hunger</u>	20
<u>Unexpected results with genetic engineering</u>	20
<u>Dangers of gene splicing</u>	22
IS THAT SO?	23
<u>GMOs as allergins</u>	23
<u>Health problems from eating genetically engineered foods</u>	24
<u>Nutritional and long-term dangers</u>	24
<u>The need for labeling</u>	25

Costs of a meaty diet

“The China Health Project, a joint Sino-American undertaking, examined the health effects of changes in the Chinese diet since the economic reform of 1978 and concluded that the recent increases in breast cancer, colorectal cancer, cardiovascular disease and obesity are closely linked to increased meat consumption. Moreover, these disease changes occurred at a level of meat consumption that is only a fraction of the typical American or European intake . . . Dr. Colin Campbell of Cornell University,

who headed the China Health Project, conservatively estimates that excessive meat consumption is responsible for between \$60 and \$120 billion of health care costs each year in the United States alone. Domestic cash receipts for the meat industry totaled roughly \$100 billion in 1997. If Campbell's estimates are correct, it's possible that this industry is a net drain on the American economy.” (Brian Halweil, Worldwatch Institute) 5/41

Got BS?

I continue to be amazed at how often-dairy industry ads are off the mark. You've probably seen their ads telling us that consumption of dairy products will build stronger bones in the elderly. But in 1994, the American Journal of Epidemiology published a study of elderly women and men that found something quite different. Elderly people with the highest dairy product consumption actually had double the risk of hip fracture compared to those with the lowest consumption. 6/19

The National Dairy Council funded a study in which post-menopausal women drank three additional 8-ounces glasses of skim milk (to provide a total of 1,500 mg of calcium daily) compared to the control group of postmenopausal women. The council was not thrilled when the results, published in the American Journal of Clinical Nutrition, found that the women who drank the extra milk actually lost more calcium from their bones than the control group of women who did not drink it. 6/20

The reason is...

Animal protein and calcium loss

The calcium-losing effect of animal protein on the human body is not a matter of controversy in scientific circles. Researchers who conducted a recent survey of diet and hip fractures in 33 countries said they found “an absolutely phenomenal correlation” between the ratios of plant to animal foods. The more plant foods people eat (particularly fruits and vegetables), the stronger their bones, and fewer fractures they experience. The more animal foods people eat, on the other hand the weaker their bones and the more fracture they experience. 6/22

Similarly, in January 2001, the American journal of Clinical Nutrition published a study that reported a dramatic correlation between the ratio of animal to vegetable protein in the diet of elderly women and their rate of bone loss. In this seven-year study funded by the National Institute of Health, more than 1,000 women, ages 65 to 80, were grouped into three categories: those with a high ratio of animal to vegetable protein a middle range, and a low range. The women in the high ratio category had three times the rate of bone loss as

the women in the low group, and nearly four times the rate of hip fractures.

Might this have been due to other factors than the ratio of animal to vegetable protein? According to the study’s lead author, Deborah Sellmeyer, M.D., Director of the Bone Density Clinic at the University of California, San Francisco Medical Center, researchers found this to be true even after adjusting for age, weight, estrogen use, tobacco use, exercise, calcium intake, and total protein intake. “We adjusted for all the things that could have had an impact on the relationship of high animal protein intake to bone loss and hip fractures,” Sellmeyer said. “But we found the relationship was still there.”

I don’t believe, by the way, that dairy products cause osteoporosis. But the many studies linking intake of animal protein to bone loss, and showing a worse calcium balance with increased dairy consumption, certainly show how unfounded are ads that promote dairy products as the only path to strong bones.

WHAT WE KNOW

- Countries with the highest consumption of dairy products: Finland, Sweden, United States, and England
- Countries with the highest rates of osteoporosis: Finland, Sweden, United States, and England

- Daily calcium intake for African Americans: More than 1,000 mg
- Daily calcium intake for black South Africans: 196 mg
- Hip fracture rate for African American compared to black South Africans: 9 times greater

- Calcium intake in rural China: One-half that of people in the United States
- Bone fracture rate in Rural China: One-fifth that of people in the United States

- Foods that when eaten produce calcium loss through urinary excretion: Animal protein, salt, and coffee
- Amount of calcium lost in the urine of a woman after eating a hamburger: 28 milligrams
- Amount of calcium lost in the urine of a woman after drinking a cup of coffee: 2 milligrams 6/23-30

Water used to produce a pound of beef

Here's one way to look at it. Let's say you take a shower every single day. And let's say your showers average seven minutes long. At that rate, you'd be in the shower 49 minutes each week (seven times seven). Let's round that off, for easier math, to 50 minutes per week.

Now, let's say the flow rate through your shower head is 2 gallons per minute. At the rate of 2 gallons per minute, and 50 minutes per week, you'd be using 100 gallons of water per week in order to shower each day.

You can multiply that figure of 100 gallons times 52 (since there are 52 weeks in a year) to discover that you would use, at that rate, 5,200 gallons of water to shower every day for a year.

When you compare that figure, 5,200 gallons of water, to the amount of water the Water Education Foundation calculates is used in the production of every pound of California beef (2,464 gallons) you realize something extraordinary. In California today, you may save more water by not eating a pound of beef than you would by not showering for six entire months. Using the figures of the Soil and Water specialists at the University of California Agricultural Extension is even more dramatic. By their analysis, you'd save more water by not eating a pound of

California beef than you would by not showering for an entire year.

"In California, the single biggest consumer of water is not Los Angeles. It's not the oil and chemicals or defense industries. Nor is it the fields of grapes and tomatoes. It's irrigated pasture: grass grown in a near-desert climate for cows . . . The West's water crisis—and many of its environmental problems as well – can be summed up, implausible as this may seem, in a single word: livestock." (Marc Reisner, author, *Cadillac Desert*)

Meat produced in different parts of the country requires different amounts of water. Meat produced in the Southeast takes much less water than meat produced in other regions; you don't need to irrigate nearly as much thanks to more rain during the growing season in the southeast. Arizona and Colorado meat, on the other hand, take even more water than California.

The reason that more water is used to produce a pound of beef than a pound of pork or chicken, by the way, is that the pork and poultry industries in the United States are generally concentrated in areas where grain fields need little or no irrigation, and because pigs and chickens are more efficient at converting feed to flesh than are cattle.

Biodiversity and livestock production

What we know

- Number of species of birds in one square mile of Amazon rainforest: More than exist in all of North America.
- Life forms destroyed in the production of each fast-food hamburger made from rainforest beef: Members of 20 to 30 different plant species, 100 different insect species, and dozens of bird, mammal, and reptile species.
- Length of time before the Indonesian forest, all 280 million acres of them, would be completely gone if they were cleared to produce enough beef for Indonesians to eat as much beef, per person, as the people of the United States do: 3.5 years.
- Length of time before the Costa Rican rainforest would be completely gone if it were cleared to produce enough beef for people of Costa Rica to eat as much beef, per person, as the people of the United States eat: One year.
- What a hamburger produced by clearing forest in India would cost if the real costs were included in the price rather than subsidized: \$200. 14/7-

11

Saving forests

We need our world's forest. They are vital sources of oxygen. They moderate our climates, prevent floods, and are our best defense against soil erosion. Forests recycle and purify our water. They are home to millions of plants and animals. They provide wood for our buildings and cooking fuel for much of humanity. In their biological integrity, they are a source of beauty, inspiration, and solace.

The world's forests are being depleted as a result of several developments in addition to beef and cattle ranching agriculture and population resettlement, major power projects like dams,

hydroelectric plants, and the roads that go with them, and logging. What can we do? We can reuse paper and wood products, reduce the amount of paper and wood we use, and use recycled paper whenever possible. We can stop all use of tropical hardwoods. (To stop importing tropical hardwoods, the United States would have to reduce its consumption of timber by only 2 percent.) We can support organizations involved in rainforest conservation. And most important, we can eat less meat.

A cultural shift toward a plant-based diet would be a substantial step toward saving our remaining forests. It takes

far less agricultural land to produce a plant-based diet than to produce meat, so with this shift we could feed our species without having to clear ever more forest land for food production. Since forests absorb carbon dioxide and produce oxygen, the movement toward a plant-based diet would provide our children with more plentiful oxygen to breathe, an atmosphere with fewer

greenhouse gases, and a more stable climate.

There is still time to turn things around if we act now. Every time you choose to eat plant foods rather than meat, it's as if you were planting and tending a tree, helping to create a greener and healthier future for all generations to come.

What We Know

- Calories of fossil fuel expended to produce 1 calorie of protein from soybeans: 2
- Calories of fossil fuel expended to produce 1 calorie of protein from corn or wheat: 3
- Calories of fossil fuel expended to produce 1 calorie of protein from beef: 54
- Amount of greenhouse-warming carbon gas released by driving a typical American car, in one day: 3 kilograms
- Amount released by clearing and burning enough Costa Rican rainforest to produce beef for one hamburger: 75 kilograms 14/39-43

Beef as a petroleum by-product

Since beef requires the burning of 54 fossil fuel calories for the production of a calorie of protein, and soybeans require only two, people deriving their protein from soybeans are, in effect, consuming only 4 percent as much energy—and producing only 4 percent as much carbon dioxide—as people deriving their protein from beef.

By the same token, since corn or wheat require the burning of only 3 fossil fuel calories to produce a calories of protein, people deriving their protein from beef are, in effect, burning 18 times as much energy—and producing 18 times as much carbon dioxide—as people deriving their protein from corn or wheat.

This is not just the opinion of anti-meat activists. In 1996, the Journal of Animal Science agreed, in an article titled “Ecosystems, Sustainability, and Animal Agriculture.” The article’s authors stated that results of extensive research at the Fort Keogh Livestock and Range Reserve Laboratory at Miles City, Montana pointedly reveal the high level of dependency of the U.S. beef cattle industry on fossil fuels.” 14/44

Scientists, even those writing in animal industry journals, agree that modern meat production is responsible for a vastly disproportionate amount of carbon dioxide and other greenhouse gases. This doesn’t prevent the cattlemen, however, from denying there is a problem . . .

IS THAT SO?

“The overall energy efficiency of beef often is comparable, or even superior, to the energy efficiency of plant-source foods.”
--National Cattlemen’s Beef Association
14/45

“American feed (for livestock) takes so much energy to grow that it might as well be a petroleum byproduct.”
--Worldwatch Institute 14/46

The globe is warming

Next to carbon dioxide, the most destabilizing gas to the planet's climate is methane. Methane is actually 24 times more potent a greenhouse gas than carbon dioxide, and its concentration in the atmosphere is rising even faster. (14/47) Concentrations of atmospheric methane are now nearly triple what they were when they began rising a century ago. The primary reason is beef production.

According to the EPA, the world's livestock are responsible for 25 percent of the world's anthropogenic methane emissions (those that are based in human activity). (14/48) Once again, however, when challenged, the U.S. meat industry manages to maintain its unique perspective.

IS THAT SO?

"[It's a] myth that U.S. cattle produce large amounts of methane, a 'greenhouse' gas, thereby contributing significantly to possible global warming problems."
--National Cattlemen's Beef Association
14/49

"Livestock account for 15 percent to 20 percent of (overall) global methane emissions.'
--Worldwatch Institute 14/50

and warming...

In 1999, the Union of Concerned Scientists published a book analyzing American society and explaining how things we do in our daily lives affect the environment. Focusing on global warming, the report concluded that the two most damaging things residents of this country do to our climate are drive

vehicles that get poor gas mileage and eat beef. 14/51

Deeply implicated, the U.S. meat industry has joined with the coal and oil industries in seeking to deny the existence of what may well be the most momentous development in human history.

IS THAT SO?

“The evidence of global warming has been inconclusive at best . . . whether [there exists] a warming trend is unclear.”

--National Cattlemen’s Beef Association
14/52

“Global warming has emerged as the most serious environmental threat of the 21st century . . . Only by taking action now can we insure that future generations will not be put at risk.”

--Letter to the president from 49 Nobel Prize-winning scientists 14/53

IS THAT SO?

“It’s a myth [that] cattle production uses grain that could be used to feed the world’s hungry.”

--National Cattlemen’s Association 15/5

“In a world where an estimated one in every six people goes hungry every day, the politics of meat consumption are increasingly heated, since meat production is an inefficient use of grain—the grain is used more efficiently when consumed directly by humans. Continued growth in meat output is dependent on feeding grains to animal, creating competition for grain between affluent meat eaters and the world’s poor.”

--Worldwatch Institute 15/6

Traditional versus modern livestock production

In traditional livestock production systems, domestic animals turned grass and other things people could not eat into things people could. And still, in many parts of the world (including most of Africa), people depend on animals to convert vegetation that does not compete with human food crops into edible protein. To raise meat output, however, livestock producers in the industrialized world have adopted intensive rearing techniques that rely heavily on grains and legumes to feed their animals.

Virtually all of the pigs and poultry in industrial countries now reside in gigantic indoor facilities where their diets include grain and soybean meal. Most cattle spend their last months in feedlots where they gorge on grain and soybeans. Overall, nearly 40 percent of the world's grain is fed to livestock. And

the nations that eat the most meat dedicate the largest share of their grain to fattening livestock. In the United States, livestock now eat twice as much grain as is consumed by the country's entire human population.

The more grain that is fed to livestock, the less is left to feed people. Dr. M. E. Ensminger, former Chairman of the Department of Animal Science at Washington State University, is one of the leading figures in the U. S. beef industry. In *Animal Science*, he writes, "There can be no question that more hunger can be alleviated with a given quantity of grain by completely eliminating animals . . . It's not efficient to feed grain to animals and then to consume the livestock products." 15/7

Who eats? And who doesn't?

In nation after nation today, the world's wealthy are following in the meat-eating footsteps of the United States. Does this trend have consequences for the food security of the world's poor? As countries increase their consumption of animal products, ever more of their grain goes to animals and ever less to people, and they must import ever-increasing amounts of grain. In a world where per-capita grain production stopped rising in 1984, and has been falling ever since, how can this be sustained?

In the most populous nation in the world, China, the share of grain fed to livestock increased between 1978 and 1997 from 8 percent to 26 percent. (15/8)

In the early 1990s, China was a net exporter of grain, but today, thanks to an increasing appetite for meat, China is the world's second largest grain importer, trailing only Japan. 15/9

“As Chinese eat more grain-fed meat, the country's need for grain will continue to grow. This . . . could quickly made China the world's leading grain importer, overtaking even Japan . . . potentially disrupting world grain markets . . . meaning rising food prices for the entire world . . . China cannot import the grain it needs without driving world grain prices up, leaving the 1.3 billion people in the world who subsist on \$1 a day at risk.” (Worldwatch Institute) 15/9

The world's bread basket

Remarkably, the world's nations depend massively on one nation for grain. The United States is responsible for half of the world's grain exports, shipping grain to more than 100 countries. Yet the U.S. grain harvest is notoriously sensitive to climate conditions, including droughts. In a time of global warming and climate destabilization, the possibility of a weather-induced drop in U.S. grain harvest is all too real. (15/17)

And with the depletion of the Ogallala aquifer, experts are predicting that before long the United States will lose much, if not all, of its grain surplus. (15/18) With the world's agricultural economy devouring rapidly increasing quantities of grain for livestock production, the consequences to the world's less fortunate people could be tragic.

Food for livestock replace food for people

“Higher meat consumption among the affluent frequently creates problems for the poor, as the share of farmland devoted to feed cultivation expands, reducing production of food staples. In the economic competition for grain fields, the upper classes usually win.” (Worldwatch Institute) 15/19

Since 1960, the number of landless in Central America has multiplied fourfold. International lending agencies such as the World Bank and the Inter-American Development Bank have responded with billions of dollars in loans. But these loans have not challenged the tightly concentrated distribution of economic power, or the use of resources to benefit the wealthy at the expense of the poor. Often, the money has been lent to support livestock operations.

The hope has been that the resulting heightened beef production would be of used to feed the impoverished masses of these poor countries. But over half of Latin America's beef production is exported to the world's wealthier

countries, and what remains is too expensive for any but the wealthy to purchase. 15/20

From 1960 to 1980, beef exports from El Salvador increased more than six fold. (15/21) During that same time increasing numbers of small farmers lost their livelihood and were pushed off their land. Today, 72 percent of all Salvadoran infants are underfed. 15/22

Where does the income from the sale of beef go? Not to the poor, but to the very few who own the land. A handful of wealthy families own more than half the agricultural land in Costa Rica, grazing 2 million cattle. (15/23) In Guatemala, as is typical for Latin American countries, 3 percent of the population owns 70 percent of the agricultural land. Most of Mexico's wealth is in the hands of about 30 families, while half of the people live on less than a \$1 a day. 15/24

In country after country the demand for meat among the rich is squeezing out staple production for the poor. 15/27

WHAT WE KNOW

Number of people whose food energy needs can be met by the food produced on 2.5 acres of land: 15/54

If the land is producing cabbage:	23 people
If the land is producing potatoes:	22 people
If the land is producing rice:	19 people
If the land is producing corn:	17 people
If the land is producing wheat:	15 people
If the land is producing chicken:	2 people
If the land is producing milk:	2 people
If the land is producing eggs:	1 person
If the land is producing beef:	1 person

- Grain needed to adequately feed every one of the people on the entire planet who die of hunger and hunger-caused disease annually: 12 million tons
- Amount Americans would have to reduce their beef consumption to save 12 millions tons of grain: 10 percent

Even fish?!

WHAT WE KNOW

- Amount of fish caught per person, worldwide, sold for human consumption in 1996: 16 kilograms
- Amount of marine life that was hauled up with the fish and discarded, per person, in 1996: 200 kilograms
- Amount of world's fish caught fed to livestock: Half 15/62-64

Fish and the interdependence of nature

In order to thrive, forests need the salmon. Biologists tell us that in a single season, a bear will carry about 700 partially consumed salmon carcasses into the forest. After consuming salmon, bears (and also eagles, wolves, and ravens) defecate, spreading the salmon remnants throughout the forest, providing the trees with their primary sources of nitrogen fertilizer. There is in fact a direct correlation between the width of tree rings (measure of tree growth)

and the amount of marine carbon and nitrogen, reflecting the size of that year's salmon run.

Although grizzly bears went extinct in Oregon in 1931, hides of these animals have been preserved and studied, so we know that up to 90 percent of the nitrogen and carbon in the bears' bodies was of marine origin.

If we continue to think of fish, and indeed the whole of the natural world, as existing primarily to fulfill our immediate needs, we will pay a stupendous price for our ignorance.

Genetically engineered agriculture

WHAT WE KNOW

- Total global area planted in genetically engineered crops, 1995: Negligible
 - Total global area planted in genetically engineered crops, 1996: 4 million acres
 - Total global area planted in genetically engineered crops, 1997: 27 million acres
 - Total global area planted in genetically engineered crops, 1998: 69 million acres
 - Total global area planted in genetically engineered crops, 1999: 99 million acres
- 16/34-38

The hype versus reality

Monsanto and other proponents of biotechnology continually tell the public that genetic engineering is necessary if the world's food supply is to keep up with population growth. But even with nearly 100 million acres planted in 2000, and with genetically engineered crops covering one-quarter of all cropland in the United States, their products had yet to do a thing to reverse the spread of hunger. No commercial acreage had been planted in crops which had been engineered to produce greater yields or that had any kind of enhanced nutritional value. There was no more food available for the world's less fortunate. In fact, the vast majority of the fields were growing transgenic soybeans and corn that were destined for livestock feed. 16/39

One of the clearest independent voices in the sometimes-raucous debate about genetically modified foods is Rachel's Environment and Health Weekly, published by the Environmental Research Foundation in Annapolis, Maryland. In 1999, the journal noted,

"Neither Monsanto nor any of the other genetic engineering companies appears to be developing genetically engineered crops that might solve global food shortages. Quite the opposite. If genetically engineered crops were aimed at feeding the hungry, then Monsanto and the others would be developing seeds with certain predictable characteristics: a) ability to grow on substandard or marginal soils; b) plants able to produce more high-quality protein with increased per-acre yield, without the need for expensive

machinery, chemicals, fertilizers, or water; c) they would aim to favor small farms over larger farms; d) the seeds would be cheap and freely available without restrictive licensing; and e) they would be for crops that feed people, not meat animals. None of the genetically engineered crops now available, or in development (to the extent that these have been announced) has any of these desirable characteristics. Quite the opposite. The new genetically engineered seeds . . . produce crops largely intended as feed for meat animal, not to provide protein for people. The genetic engineering revolution has nothing to do with feeding the world's hungry." 16/40

If genetically engineered plants were designed to reverse world hunger, you would expect them to bring higher yields. But there is no evidence that they do, and in fact increasing evidence that they do just the opposite. Ed Oplinger, a professor of agronomy at the University of Wisconsin, has been conducting performance trials for soybean varieties for the past 25 years. In 1999, he compared the soybean yields in the 12 states that grew 80 percent of U.S. soybeans, and found that the yields from genetically modified soybeans were 4 percent lower than conventional varieties. 16/41

IS THAT SO?

"Biotechnology is one of tomorrow's tools in our hands today. Slowing its acceptance is a luxury our hungry world cannot afford."

--Monsanto advertisement 16/47

When other researcher compared the performance of Monsanto's transgenic soybeans (the number one genetically engineered crops in the world in terms of acreage planted) with those of conventional varieties grown under the same condition, they found nearly a 10 percent yield reduction for the genetically engineered soybeans. (16/42) And research done by the University of Nebraska in 2000 found the yields of genetically engineered soybeans plants to be 6 to 11 percent lower than conventional plants. 16/43

Similarly, delegates from 18 African countries at a meeting of the UN Food and Agriculture Organization responded to Monsanto's advertisements with a clear statement: "We . . . strongly object that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly, nor economically beneficial to us. We do not believe that such companies or gene technologies will help our farmer to produce the food that is needed. . . On the contrary . . . it will undermine our capacity to feed our selves." The representative from Ethiopia added, "We strongly resent the abuse of our poverty to sway the interest of the European public. 16/46

"Genetically engineered crops were created not because they're productive but because they're patentable. Their economic value is oriented not toward helping subsistence farmers to feed

themselves but toward feeding more livestock for the already overfed rich.”

--Amory and Hunter
Lovins, Founders of Rocky Mountain
Institute 16/48

More on GE and hunger

One thing is certain. Monsanto and the other biotechnology companies will not soon stop telling us that genetically engineered foods can alleviate world hunger. In 2000, a coalition of biotech companies began a \$50 million marketing campaign to keep fears about genetically altered foods from spreading through the United States. Bankrolling the campaign, which included \$32 million in TV and print advertising, were Monsanto, Dow Chemical, Dupont, Swiss-based Novartis, the British Zeneca, Germany's BASF, and Aventis of France. The ads, complete with soft-focus fields and smiling children, pitched “solutions that could improve our world tomorrow” and aimed to convince the public that biotech foods could help end world hunger. 16/49

Unfortunately not, according to a senior researcher from the Union of Concerned Scientist, Dr Jane Rissler. With a Ph.D. in plant pathology, four years of shaping biotechnology regulations at the EPA, and a dozen more in biotech science and policy, she is one the nation's leading authorities on the environmental risks of genetically engineered foods. Dr Rissler has been closely monitoring the trials and studies. “The observations that ‘nothing happened’ in these . . . tests do not say much,” she and her colleague Dr. Margaret Mellon (a member of the USDA Advisory Committee on Agricultural Biotechnology) write, “In many cases, adverse impacts are subtle and would almost never be registered by scanning a field . . . The field test do not provide a track record of safety, but a case of ‘don't look, don't find.’” 16/58

Unexpected results with genetic engineering

When scientists actually look, what they see can be terrifying. A few years ago, a German biotech company engineered as common soil bacterium, *klebsiella planticola*, to help break down wood chips, corn stalks, wastes from lumber business and agriculture, and to produce ethanol in the process. It seemed like a great achievement. The genetically engineered Klebsiella bacterium could help break down rotting organic material and in the process produce a fuel that could be use instead of gasoline, thus lessening the

production of greenhouse gases. And, it was assumed, the post-process waste could afterward be added to soil as an amendment, like compost. Everybody would win. With the approval of the EPA, the company field-tested the bacterium at Oregon State University.

As far as the intended goals were concerned – eliminating rotting organic waste and producing ethanol – the genetically engineered bacterium was a success. But when a doctoral student named Michael Holmes decided to add

the post-processed waste to actual living soil, something happened that no one expected. The seeds that were planted in soil mixed with the engineered Klebsiella sprouted, but then every single one of them died. 16/59

What killed them? The genetically engineered Klebsiella turned out to be highly competitive with native soil microorganisms, and to suppress activities that are crucial to soil fertility. Plants are only able to take nitrogen and other nourishment from the soil with the help of fungi called “mycorrhysal.” These fungi live in the soil and help make nutrients available to plant roots. But when the genetically engineered Klebsiella was introduced into living soil, it greatly reduced the population of mycorrhysal fungi in the soil. And without healthy mycorrhysal fungi in soils, no plants can survive. 16/60

To me, it is testimony to the amazing powers of science that researchers were able to track the mechanism by which the genetically engineered Klebsiella prevented plants from growing. There are thousands of different species of microorganisms in every teaspoon of fertile soil, and they interact in trillions of ways.

But the scientist discovered something else in these experiments, something that sent chills down their spines. They found that the genetically modified bacteria were able

to persist in the soil, raising the possibility that, had it been released, the genetically engineered Klebsiella could have become established – and virtually impossible to eradicate. 16/61

“When the data first started coming in,” says Elaine Ingham, the soil pathologist at Oregon State University who directed Michael Holmes’ research on Klebsiella, “the EPA charged that we couldn’t have performed the research correctly. They went through everything with a fine toothcomb, and they couldn’t find anything wrong with the experimental design – but they tried as hard as they could . . . If we hadn’t done this research, the Klebsiella would have passed the approval process for commercial release. 16/62

Geneticist David Suzuki understands that what took place was truly ominous. “The genetically engineered Klebsiella,” he says, “could have ended all plant life on this continent. The implications of this single case are nothing short of terrifying.” 16/63

“The biotechnology industry makes anybody who brings up such matters look hysterical,” he says. “Unfortunately, history shows us that all kinds of things—petrochemicals, CFC’s toxic dumps and nuclear power—that we thought, even insisted, were benign, tuned out to be extremely dangerous. History informs us that caution is well warranted when it comes to buying into a powerful new technology. 17/3

Dangers of gene splicing

Strohman and others point to the dangers inherent in gene-splicing techniques.

When scientists snip a bit of DNA from one organism and insert it into another, it doesn't travel alone. It can include genetic parasites, such as viruses. Genetic parasites are naturally specific to certain species. They are contained by genetic species barriers, and indeed this is one of the reasons why Nature has kept species barriers so intact and inviolate. But with genetic engineering, we are transgressing the gene-transfer barriers that normally exist. In the eyes of many scientists, this is deeply troubling, because in the past few years, there have been an increasing number of reports of new pathogens arising from the kind of horizontal (across species barriers) gene transfer that is the basis for genetic engineering.

Within the past twenty-five years, we have seen a rash of new diseases arising, including Ebola, AIDS, Hepatitis C, Lyme disease, and Hanta virus, and

no doubt we will see more emerge in coming years. There is much we don't know about these emerging diseases, but we know they take a terrifying toll on humanity. And we know that many of these new pathogens seem to stem from horizontal gene transfer. This means that have come from other species and have jumped to us.

This happens rarely in Nature, which is fortunate, because when it does, the results can be disastrous. The flu pandemic of 1918, which killed more than 22 million people worldwide, is thought to have been caused by horizontal gene transfer. AIDS is now thought to stem from a virus that originated in chimpanzees and somehow jumped to humans who ate the chips or exchanged blood with them. Mad Cow disease is now understood to be the result of horizontal transfer of an infectious protein that kills sheep.

With so much at stake, you might think that those involved would be moved to humility.

IS THAT SO?

“Those of us in industry can take comfort . . . after all, we’re the technical experts. We know we’re right. The ‘antis’ obviously don’t understand the science, and are just as obviously pushing a hidden agenda—probably to destroy capitalism.”

-- Bob Shapiro, Monsanto’s CEO 17/10

“(Genetic engineering) 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 . . . up to now, living organisms have evolved very slowly, and new forms have had plenty of time to settle in. Now whole proteins will be transposed overnight into wholly new associations, with consequences no one can foretell . . . Going ahead in this direction may be not only unwise, but also dangerous. Potentially, it could breed new animal and plant diseases, new sources of cancer, and novel epidemics.”

-- George Wald, M.D., Nobel Laureate in Medicine and Professor of Biology, Harvard University

GMOs as allergins

Today, the FDA requires allergy testing when the organism from which the gene is taken is known and common allergen. But such tests have never been required of Monsanto’s Roundup Ready soybeans, even though the genetic engineering process has incorporated genes from petunias and viruses into the soybeans, because petunias and viruses are not known allergens. Of course they aren’t; no one’s ever eaten them before. How would anyone know if they were allergic to petunias? Since soy products are widely dispersed in the American diet, it is entirely conceivable that members of the public are already

experiencing harm from transgenic foods.

At present, we can only speculate what adverse reactions might already be occurring. The lack of labeling effectively prevents any attempt to monitor the human health impact of consuming these foods.

Laura and Robin Ticciati are the authors of the 1998 book *Genetically Engineered Foods: Are They Safe? You Decide*. They ask questions like:

“What if we find out in twenty years that genetically engineered food isn’t safe

after all? What if we discover some bizarre disease in the next generation that ends up linked to the (soy or canola) oil we pour on our salads today? What if the French fries our kids devoured last week cause birth defects in our grandchildren? What if we learn that manipulating the DNA of our foods has an effect on a growing fetus after all? Or that genetically engineered foods contain some unknown allergen

that produces a reaction that just can't be cured?" 17/13

When a spokesperson for one of the largest producers of genetically engineered seeds called the Ticciatis to task, comparing them to someone who was afraid to cross the street because "what if" a car came just at that moment and hit them, they had an answer. We look both ways before stepping off the curb," they said. "Don't you?"

Health problems from eating genetically engineered foods

Does eating genetically engineered foods pose potential health risks to people? In 2001, the Los Angeles Times published an exposé revealing that Monsanto's own research had raised many questions about the safety of their Roundup Ready soybeans. (17/25) Remarkably, the FDA did not call for more testing before allowing these soybeans to flood the

marketplace. Since half the soybeans grown in the United States are now Monsanto's Roundup Ready variety, and because soy is contained in such a wide array of processed foods, tens of millions of people are unknowingly eating these experimental foods daily.

Nutritional and long-term dangers

According to Monsanto's own test, Roundup Ready soybeans contain 29 percent less of the brain nutrient choline, and 27 percent more trypsin inhibitor, a potential allergen that interferes with protein digestion, that normal soybeans.

What might be expected from consuming soybeans containing higher levels of trypsin inhibitor and lectins? At the very least, slower growth in children.

And possibly, unexpected and even dangerous allergic reactions.

Soy products are often prescribed and consumed for their phytoestrogen content, but according to the company's test, the genetically altered soybeans have lower levels of phenylalanine, an essential amino acid that affects levels of phytoestrogens. And levels of lectins, which not infrequently are allergens, are nearly double in the transgenic variety. 17/26

Dr Arpad Pusztai, senior scientist at the Rowett Research Institute in Aberdeen, Scotland, has published 270 scientific papers, and is widely known as the world's leading expert on lectins. (17/26) When he began conducting experiments in which he fed genetically engineered potatoes to rats he considers himself a "very enthusiastic supporter" of gene splicing biotechnology. However, the rats fed on genetically modified potatoes showed a variety of unexpected and disturbing changes, including smaller livers, hearts, and brains—and weak immune systems. "Feeding transgenic

potatoes to rats induce major and in most instances highly significant changes in the weights of some or most of the vital organs," he concluded.

"Particularly worrying was the partial liver atrophy . . . Immune organs, such as the spleen and thymus were also frequently affected. (17/28) Sadly, the rats' growth was impaired, and some developed tumors and showed significant shrinkage of the brain after only ten days of eating genetically modified potatoes. 17/29

The need for labeling

Currently, neither milk made with rBGH nor any other genetically engineered food product in the United States is labeled. Biologist Brian Goodwin, who has been deeply involved in this controversy, understands the consequences.

"You would never allow a new drug to be produced without a clear label, without knowing exactly where it was produced and even under what conditions, what batch it came from and so on.. Genetically modified foods ought to be put in the same category as drugs because of their potential harm. They're actually even more dangerous than drugs, because after all, we eat a lot more food during the course of our lifetime than we take drugs. Even if there are small effects, they can accumulate over years. And therefore people should have the right to say, 'I'm not going to eat genetically modified food because I have no confidence that this is going to be safe for the whole of my lifetime. 17/47

She may be right that some people don't know what a gene is, but I'll bet you most people know a reckless and self-serving industry when they see one. Certainly in England the public has risen up in protest against genetically engineered food. Even employees at Monsanto's own headquarters, apparently, are less than enamored at the prospect of ingesting their company's creations. In December 1999, a statement was posted in the cafeteria of the Monsanto Corporation's United Kingdom headquarters in High Wycombe, England, that truly gives me pause. It read as follows:

"In response to concern raised by our customers. . . we have decided to remove, as far as is practicable, genetically modified soy and maize (corn) from all food products served in our restaurant. We will continue to work with our suppliers to replace GM (genetically modified) soy and maize with non-GM ingredients. . . We have taken the above steps to ensure that you, the customer, can feel confident in the food we serve." 17/49