

E S S A Y

THE OIL WE EAT

Following the food chain back to Iraq

By Richard Manning

The secret of great wealth with no obvious source is some forgotten crime, forgotten because it was done neatly.—Balzac

The journalist's rule says: follow the money. This rule, however, is not really axiomatic but derivative, in that money, as even our vice president will tell you, is really a way of tracking energy. We'll follow the energy.

We learn as children that there is no free lunch, that you don't get something from nothing, that what goes up must come down, and so on. The scientific version of these verities is only slightly more complex. As James Prescott Joule discovered in the nineteenth century, there is only so much energy. You can change it from motion to heat, from heat to light, but there will never be more of it and there will never be less of it. The conservation of energy is not an option, it is a fact. This is the first law of thermodynamics.

Special as we humans are, we get no exemptions from the rules. All animals eat plants or eat animals that eat plants. This is the food chain, and pulling it is the unique ability of plants to turn sunlight into stored energy in the form of carbohydrates, the basic fuel of all animals. Solar-powered photosynthesis is the only way to make this fuel. There is no alternative to plant energy, just as there is no alternative to oxygen. The results of taking away our plant energy may not be as sudden as cutting off oxygen, but they are as sure.

Scientists have a name for the total amount of plant mass created by Earth in a given year, the total budget for life. They call it the planet's "primary productivity." There have been two efforts to figure out how that productivity is spent, one by a group at Stanford University, the other an independent accounting by the biologist Stuart Pimm. Both conclude that we humans, a single species among millions, consume about 40 percent of Earth's primary productivity, 40 percent of all there is. This simple number may explain why the current extinction rate is 1,000 times that which existed before human domination of the planet. We 6 billion have simply stolen the food, the rich among us a lot more than others.

Energy cannot be created or canceled, but it can be concentrated. This is the larger and profoundly explanatory context of a national-security memo

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GRAIN IS TO THE PLANT WORLD
WHAT A BARREL OF REFINED OIL IS
TO THE HYDROCARBON WORLD:
THE MOST CONCENTRATED FORM
OF TRUE WEALTH ON THE PLANET

George Kennan wrote in 1948 as the head of a State Department planning committee, ostensibly about Asian policy but really about how the United States was to deal with its newfound role as the dominant force on Earth. "We have about 50 percent of the world's wealth but only 6.3 percent of its population," Kennan wrote. "In this situation, we cannot fail to be the object of envy and resentment. Our real task in the coming period is to devise a pattern of relationships which will permit us to maintain this position of disparity without positive detriment to our national security. To do so, we will have to dispense with all sentimentality and day-dreaming; and our attention will have to be concentrated everywhere on our immediate national objectives. We need not deceive ourselves that we can afford today the luxury of altruism and world-benefaction."

"The day is not far off," Kennan concluded, "when we are going to have to deal in straight power concepts."

If you follow the energy, eventually you will end up in a field somewhere. Humans engage in a dizzying array of artifice and industry. Nonetheless, more than two thirds of humanity's cut of primary productivity results from agriculture, two thirds of which in turn consists of three plants: rice, wheat, and corn. In the 10,000 years since humans domesticated these grains, their status has remained undiminished, most likely because they are able to store solar energy in uniquely dense, transportable bundles of carbohydrates. They are to the plant world what a barrel of refined oil is to the hydrocarbon world. Indeed, aside from hydrocarbons they are the most concentrated form of true wealth—sun energy—to be found on the planet.

As Kennan recognized, however, the maintenance of such a concentration of wealth often requires violent action. Agriculture is a recent human experiment. For most of human history, we lived by gathering or killing a broad variety of nature's offerings. Why humans might have traded this approach for the complexities of agriculture is an interesting and long-debated question, especially because the skeletal evidence clearly indicates that early farmers were more poorly nourished, more disease-ridden and deformed, than their hunter-gatherer contemporaries. Farming did not improve most lives. The evidence that best points to the answer, I think, lies in the difference between early agricultural villages and their pre-agricultural counterparts—the presence not just of grain but of granaries and, more tellingly, of just a few houses significantly larger and more ornate than all the others attached to those granaries. Agriculture was not so much about food as it was about the accumulation of wealth. It benefited some humans, and those people have been in charge ever since.

Domestication was also a radical change in the distribution of wealth *within* the plant world. Plants can spend their solar income in several ways. The dominant and prudent strategy is to allocate most of it to building roots, stem, bark—a conservative portfolio of investments that allows the plant to better gather energy and survive the downturn years. Further, by living in diverse stands (a given chunk of native prairie contains maybe 200 species of plants), these perennials provide services for one another, such as retaining water, protecting one another from wind, and fixing free nitrogen from the air to use as fertilizer. Diversity allows a system to "sponsor its own fertility," to use visionary agronomist Wes Jackson's phrase. This is the plant world's norm.

There is a very narrow group of annuals, however, that grow in patches of a single species and store almost all of their income as seed, a tight bundle of carbohydrates easily exploited by seed eaters such as ourselves. Under normal circumstances, this eggs-in-one-basket strategy is a dumb idea for a plant. But not during catastrophes such as floods, fires, and volcanic eruptions. Such catastrophes strip established plant communities and create opportunities for wind-scattered entrepreneurial seed bearers. It is no accident that no matter where agriculture sprouted on the globe, it always happened near rivers. You might assume, as many have, that this is because



the plants needed the water or nutrients. Mostly this is not true. They needed the power of flooding, which scoured landscapes and stripped out competitors. Nor is it an accident, I think, that agriculture arose independently and simultaneously around the globe just as the last ice age ended, a time of enormous upheaval when glacial melt let loose sea-size lakes to create tidal waves of erosion. It was a time of catastrophe.

Corn, rice, and wheat are especially adapted to catastrophe. It is their niche. In the natural scheme of things, a catastrophe would create a blank slate, bare soil, that was good for them. Then, under normal circumstances, succession would quickly close that niche. The annuals would colonize. Their roots would stabilize the soil, accumulate organic matter, provide cover. Eventually the catastrophic niche would close. Farming is the process of ripping that niche open again and again. It is an annual artificial catastrophe, and it requires the equivalent of three or four tons of TNT per acre for a modern American farm. Iowa's fields require the energy of 4,000 Nagasaki bombs every year.

Iowa is almost all fields now. Little prairie remains, and if you can find what Iowans call a "postage stamp" remnant of some, it most likely will abut a cornfield. This allows an observation. Walk from the prairie to the field, and you probably will step down about six feet, as if the land had been stolen from beneath you. Settlers' accounts of the prairie conquest mention a sound, a series of pops, like pistol shots, the sound of stout grass roots breaking before a moldboard plow. A robbery was in progress.

When we say the soil is rich, it is not a metaphor. It is as rich in energy as an oil well. A prairie converts that energy to flowers and roots and stems, which in turn pass back into the ground as dead organic matter. The layers of topsoil build up into a rich repository of energy, a bank. A farm field appropriates that energy, puts it into seeds we can eat. Much of the energy moves from the earth to the rings of fat around our necks and waists. And much of the energy is simply wasted, a trail of dollars billowing from the burglar's satchel.

I've already mentioned that we humans take 40 percent of the globe's primary productivity every year. You might have assumed we and our livestock eat our way through that volume, but this is not the case. Part of that total—almost a third of it—is the *potential* plant mass lost when forests are cleared for farming or when tropical rain forests are cut for grazing or when plows destroy the deep mat of prairie roots that held the whole business together, triggering erosion. The Dust Bowl was no accident of nature. A functioning grassland prairie produces more biomass each year than does even the most technologically advanced wheat field. The problem is, it's mostly a form of grass and grass roots that humans can't eat. So we replace the prairie with our own preferred grass, wheat. Never mind that we feed most of our grain to livestock, and that livestock is perfectly content to eat native grass. And never mind that there likely were more bison produced naturally on the Great Plains before farming than all of beef farming raises in the same area today. Our ancestors found it preferable to pluck the energy from the ground and when it ran out move on.

Today we do the same, only now when the vault is empty we fill it again with new energy in the form of oil-rich fertilizers. Oil is annual primary productivity stored as hydrocarbons, a trust fund of sorts, built up over many thousands of years. On average, it takes 5.5 gallons of fossil energy to restore

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a year's worth of lost fertility to an acre of eroded land—in 1997 we burned through more than 400 years' worth of ancient fossilized productivity, most of it from someplace else. Even as the earth beneath Iowa shrinks, it is being globalized.

Six thousand years before sodbusters broke up Iowa, their Caucasian blood ancestors broke up the Hungarian plain, an area just northwest of the Caucasus Mountains. Archaeologists call this tribe the LBK, short for *linearbandkeramik*, the German word that describes the distinctive pottery remnants that mark their occupation of Europe. Anthropologists call them the wheat-beef people, a name that better connects those ancients along the Danube to my fellow Montanans on the Upper Missouri River. These proto-Europeans had a full set of domesticated plants and animals, but wheat and beef dominated. All the domesticates came from an area along what is now the Iraq-Syria-Turkey border at the edges of the Zagros Mountains. This is the center of domestication for the Western world's main crops and live-

stock, ground zero of catastrophic agriculture.

Two other types of catastrophic agriculture evolved at roughly the same time, one centered on rice in what is now China and India and one centered on corn and potatoes in Central and South America. Rice, though, is tropical and its expansion depends on water, so it developed only in floodplains, estuaries, and swamps. Corn agriculture was every bit as voracious as wheat; the Aztecs could be as brutal and imperialistic as Romans or Brits, but the corn cultures collapsed with the onslaught of Spanish conquest. Corn itself simply joined the wheat-beef people's coalition. Wheat was the empire builder; its bare botanical facts dictated the motion and violence that we know as imperialism.

The wheat-beef people swept across the western European plains in less than 300 years, a conquest some archaeologists refer to as a "blitzkrieg." A different race of humans, the Cro-Magnons—hunter-gatherers, not farmers—lived on those plains at the time. Their

cave art at places such as Lascaux testifies to their sophistication and profound connection to wildlife. They probably did most of their hunting and gathering in uplands and river bottoms, places the wheat farmers didn't need, suggesting the possibility of coexistence. That's not what happened, however. Both genetic and linguistic evidence say that the farmers killed the hunters. The Basque people are probably the lone remnant descendants of Cro-Magnons, the only trace.

Hunter-gatherer archaeological sites of the period contain spear points that originally belonged to the farmers, and we can guess they weren't trade goods. One group of anthropologists concludes, "The evidence from the western extension of the LBK leaves little room for any other conclusion but that LBK-Mesolithic interactions were at best chilly and at worst hostile." The world's surviving Blackfeet, Assiniboine Sioux, Inca, and Maori probably have the best idea of the nature of these interactions.

Wheat is temperate and prefers plowed-up grasslands. The globe has a limited stock of temperate grasslands, just as it has a limited stock of all other biomes. On average, about 10 percent of all other biomes remain in something like their native state today. Only 1 percent of temperate grasslands remains undestroyed. Wheat takes what it needs.

The supply of temperate grasslands lies in what are today the United States, Canada, the South American pampas, New Zealand, Australia,



South Africa, Europe, and the Asiatic extension of the European plain into the sub-Siberian steppes. This area largely describes the First World, the developed world. Temperate grasslands make up not only the habitat of wheat and beef but also the globe's islands of Caucasians, of European surnames and languages. In 2000 the countries of the temperate grasslands, the neo-Europes, accounted for about 80 percent of all wheat exports in the world, and about 86 percent of all corn. That is to say, the neo-Europes drive the world's agriculture. The dominance does not stop with grain.

These countries, plus the mothership—Europe—accounted for three fourths of all agricultural exports of all crops in the world in 1999.

Plato wrote of his country's farmlands:

What now remains of the formerly rich land is like the skeleton of a sick man. . . . Formerly, many of the mountains were arable. The plains that were full of rich soil are now marshes. Hills that were once covered with forests and produced abundant pasture now produce only food for bees. Once the land was enriched by yearly rains, which were not lost, as they are now, by flowing from the bare land into the sea. The soil was deep, it absorbed and kept the water in loamy soil, and the water that soaked into the hills fed springs and running streams everywhere. Now the abandoned shrines at spots where formerly there were springs attest that our description of the land is true.

Plato's lament is rooted in wheat agriculture, which depleted his country's soil and subsequently caused the series of declines that pushed centers of civilization to Rome, Turkey, and western Europe. By the fifth century, though, wheat's strategy of depleting and moving on ran up against the Atlantic Ocean. Fenced-in wheat agriculture is like rice agriculture. It balances its equations with famine. In the millennium between 500 and 1500, Britain suffered a major "corrective" famine about every ten years; there were seventy-five in France during the same period. The incidence, however, dropped sharply when colonization brought an influx of new food to Europe.

The new lands had an even greater effect on the colonists themselves. Thomas Jefferson, after enduring a lecture on the rustic nature by his hosts at a dinner party in Paris, pointed out that all of the Americans present were a good head taller than all of the French. Indeed, colonists in all of the neo-Europes enjoyed greater stature and longevity, as well as a lower infant-mortality rate—all indicators of the better nutrition afforded by the onetime spend down of the accumulated capital of virgin soil.

The precolonial famines of Europe raised the question: What would happen when the planet's supply of arable land ran out? We have a clear answer. In about 1960 expansion hit its limits and the supply of unfarmed, arable lands came to an end. There was nothing left to plow. What happened was grain yields tripled.

The accepted term for this strange turn of events is the green revolution, though it would be more properly labeled the amber revolution, because it applied exclusively to grain—wheat, rice, and corn. Plant breeders tinkered with the architecture of these three grains so that they could be hypercharged with irrigation water and chemical fertilizers, especially nitrogen. This innovation meshed nicely with the increased "efficiency" of the industrialized factory-farm system. With the possible exception of the domestication of wheat, the green revolution is the worst thing that has ever happened to the planet.

For openers, it disrupted long-standing patterns of rural life worldwide, moving a lot of no-longer-needed people off the land and into the world's most severe poverty. The experience in population control in the developing world is by now clear: It is not that people make more people so much as it is that they make more poor people. In the forty-year period beginning about 1960, the world's population doubled, adding virtually the entire increase of 3 billion to the world's poorest classes, the most fecund classes.

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Discussion of these, the most poor, however, is largely irrelevant to the American situation. We say we have poor people here, but almost no one in this country lives on less than one dollar a day, the global benchmark for poverty. It marks off a class of about 1.3 billion people, the hard core of the larger group of 2 billion chronically malnourished people—that is, one third of humanity. We may forget about them, as most Americans do.

More relevant here are the methods of the green revolution, which added orders of magnitude to the devastation. By mining the iron for tractors, drilling the new oil to fuel them and to make nitrogen fertilizers, and by taking the water that rain and rivers had meant for other lands, farming had extended its boundaries, its dominion, to lands that were not farmable. At the same time, it extended its boundaries across time, tapping fossil energy, stripping past assets.

The common assumption these days is that we muster our weapons to secure oil, not food. There's a little joke in this. Ever since we ran out of arable land, food is oil. Every single calorie we eat is backed by at least a calorie of oil, more like ten. In 1940 the average farm in the United States produced 2.3 calories of food energy for every calorie of fossil energy it used. By 1974 (the last year in which anyone looked closely at this issue), that ratio was 1:1. And this understates the problem, because at the same time that there is more oil in our food there is less oil in our oil. A couple of generations ago we spent a lot less energy drilling, pumping, and distributing than we do now. In the 1940s we got about 100 barrels of oil back for every barrel of oil we spent getting it. Today each barrel invested in the process returns only ten, a calculation that no doubt fails to include the fuel burned by the Hummers and Blackhawks we use to maintain access to the oil in Iraq.

David Pimentel, an expert on food and energy at Cornell University, has estimated that if all of the world ate the way the United States eats, humanity would exhaust all known global fossil-fuel reserves in just over seven years. Pimentel has his detractors. Some have accused him of being off on other calculations by as much as 30 percent. Fine. Make it ten years.

Fertilizer makes a pretty fine bomb right off the shelf, a chemistry lesson Timothy McVeigh taught at Oklahoma City's Alfred P. Murrah Federal Building in 1995—not a small matter, in that the green revolution has made nitrogen fertilizers ubiquitous in some of the more violent and desperate corners of the world. Still, there is more to contemplate in nitrogen's less sensational chemistry.

The chemophobia of modern times excludes fear of the simple elements of chemistry's periodic table. We circulate petitions, hold hearings, launch websites, and buy and sell legislators in regard to polysyllabic organic compounds—polychlorinated biphenyls, polyvinyls, DDT, 2-4d, that sort of thing—not simple carbon or nitrogen. Not that agriculture's use of the more ornate chemistry is benign—an infant born in a rural, wheat-producing county in the United States has about twice the chance of suffering birth defects as one born in a rural place that doesn't produce wheat, an effect researchers blame on chlorophenoxy herbicides. Focusing on pesticide pollution, though, misses the worst of the pollutants. Forget the polysyllabic organics. It is nitrogen—the wellspring of fertility relied upon by every Eden-obsessed backyard gardener and suburban groundskeeper—that we should fear most.

Those who model our planet as an organism do so on the basis that the earth appears to breathe—it thrives by converting a short list of basic elements from one compound into the next, just as our own bodies cycle oxygen into carbon dioxide and plants cycle carbon dioxide into oxygen. In fact, two of the planet's most fundamental humors are oxygen and carbon dioxide. Another is nitrogen.



Nitrogen can be released from its “fixed” state as a solid in the soil by natural processes that allow it to circulate freely in the atmosphere. This also can be done artificially. Indeed, humans now contribute more nitrogen to the nitrogen cycle than the planet itself does. That is, humans have doubled the amount of nitrogen in play.

This has led to an imbalance. It is easier to create nitrogen fertilizer than it is to apply it evenly to fields. When farmers dump nitrogen on a crop, much is wasted. It runs into the water and soil, where it either reacts chemically with its surroundings to form new compounds or flows off to fertilize something else, somewhere else.

That chemical reaction, called acidification, is noxious and contributes significantly to acid rain. One of the compounds produced by acidification is nitrous oxide, which aggravates the greenhouse effect. Green growing things normally offset global warming by sucking up carbon dioxide, but nitrogen on farm fields plus methane from decomposing vegetation make every farmed acre, like every acre of Los Angeles freeway, a net contributor to global warming. Fertilization is equally worrisome. Rainfall and irrigation water inevitably washes the nitrogen from fields to creeks and streams, which flows into rivers, which floods into the ocean. This explains why the Mississippi River, which drains the nation’s Corn Belt, is an environmental catastrophe. The nitrogen fertilizes artificially large blooms of algae that in growing suck all the oxygen from the water, a condition biologists call anoxia, which means “oxygen-depleted.” Here there’s no need to calculate long-term effects, because life in such places has no long term: everything dies immediately. The Mississippi River’s heavily fertilized effluvia has

created a dead zone in the Gulf of Mexico the size of New Jersey.

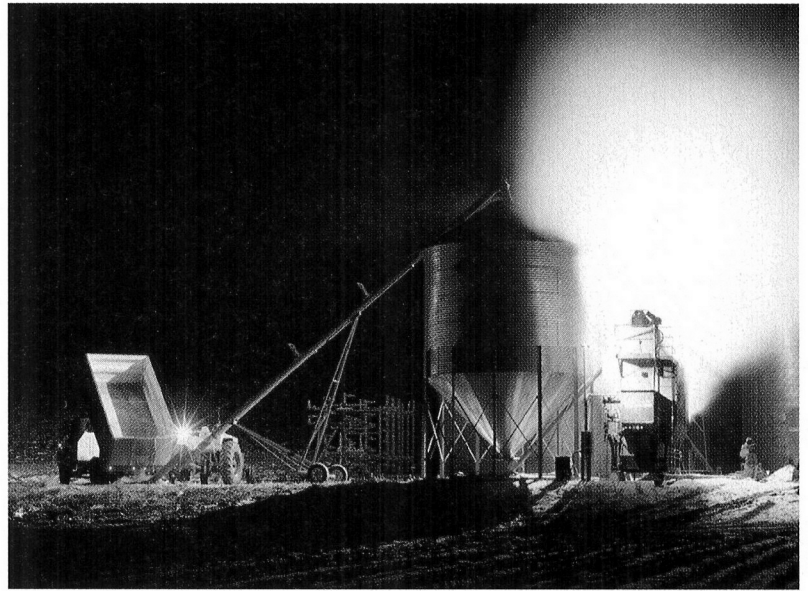
America’s biggest crop, grain corn, is completely unpalatable. It is raw material for an industry that manufactures food substitutes.

Likewise, you can’t eat unprocessed wheat. You certainly can’t eat hay. You can eat unprocessed soybeans, but mostly we don’t. These four crops cover 82 percent of American cropland. Agriculture in this country is not about food; it’s about commodities that require the outlay of still more energy to *become* food.

About two thirds of U.S. grain corn is labeled “processed,” meaning it is milled and otherwise refined for food or industrial uses. More than 45 percent of that becomes sugar, especially high-fructose corn sweeteners, the keystone ingredient in three quarters of all processed foods, especially soft drinks, the food of America’s poor and working classes. It is not a coincidence that the American pandemic of obesity tracks rather nicely with the fivefold increase in corn-syrup production since Archer Daniels Midland developed a high-fructose version of the stuff in the early seventies. Nor is it a coincidence that the plague selects the poor, who eat the most processed food.

It began with the industrialization of Victorian England. The empire was then flush with sugar from plantations in the colonies. Meantime the cities were flush with factory workers. There was no good way to feed them. And thus was born the afternoon tea break, the tea consisting primarily of warm water and sugar. If the workers were well off, they could also afford bread with heavily sugared jam—sugar-powered industrialization. There was a 500 percent increase in per capita sugar consumption in Britain between 1860 and 1890, around the time when the life expectancy of a male factory worker was

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seventeen years. By the end of the century the average Brit was getting about one sixth of his total nutrition from sugar, exactly the same percentage Americans get today—double what nutritionists recommend.

There is another energy matter to consider here, though. The grinding, milling, wetting, drying, and baking of a breakfast cereal requires about four calories of energy for every calorie of food energy it produces. A two-pound bag of breakfast cereal burns the energy of a half-gallon of gasoline in its making. All together the food-processing industry in the United States uses about ten calories of fossil-fuel energy for every calorie of food energy it produces.

That number does not include the fuel used in transporting the food from the factory to a store near you, or the fuel used by millions of people driving to thousands of super discount stores on the edge of town, where the land is cheap. It appears, however, that the corn cycle is about to come full circle. If a bipartisan coalition of farm-state lawmakers has their way—and it appears they will—we will soon buy gasoline containing twice as much fuel alcohol as it does now. Fuel alcohol already ranks second as a use for processed corn in the United States, just behind corn sweeteners. According to one set of calculations, we spend more calories of fossil-fuel energy making ethanol than we gain from it. The Department of Agriculture says the ratio is closer to a gallon and a quart of ethanol for every gallon of fossil fuel we invest. The USDA calls this a bargain, because gasohol is a “clean fuel.” This claim to cleanness is in dispute at the tailpipe level, and it certainly ignores the dead zone in the Gulf of Mexico, pesticide pollution, and the haze of global gases gathering over every farm field. Nor does this claim cover clean conscience; some still might be unsettled knowing that our SUVs’ demands for fuel compete with the poor’s demand for grain.

Green eaters, especially vegetarians, advocate eating low on the food chain, a simple matter of energy flow. Eating a carrot gives the diner all that carrot’s energy, but feeding carrots to a chicken, then eating the chicken, reduces the energy by a factor of ten. The chicken wastes some energy, stores some as feathers, bones, and other inedibles, and uses most of it just to live long enough to be eaten. As a rough rule of thumb, that factor of ten applies to each level up the food chain, which is why some fish, such as tuna, can be a horror in all of this. Tuna is a secondary predator, meaning it not only doesn’t eat plants but eats other fish that themselves eat other fish, adding a zero to the multiplier each notch up, easily a hundred times, more like a thousand times less efficient than eating a plant.

This is fine as far as it goes, but the vegetarian’s case can break down on some details. On the moral issues, vegetarians claim their habits are kinder to animals, though it is difficult to see how wiping out 99 percent of wildlife’s habitat, as farming has done in Iowa, is a kindness. In rural Michigan, for example, the potato farmers have a peculiar tactic for dealing with the predations of whitetail deer. They gut-shoot them with small-bore rifles, in hopes the deer will limp off to the woods and die where they won’t stink up the potato fields.

Animal rights aside, vegetarians can lose the edge in the energy argument by eating processed food, with its ten calories of fossil energy for every calorie of food energy produced. The question, then, is: Does eating processed food such as soy burger or soy milk cancel the *energy* benefits of vegetarianism, which is to say, can I eat my lamb chops in peace? Maybe. If I’ve done my due diligence, I will have found out that the particular lamb I am eating was both local and grass-fed, two factors that of course greatly reduce the embedded energy in a meal. I know of ranches here in Montana, for instance, where sheep eat native grass under closely controlled circumstances—no farming, no plows, no corn, no nitrogen. Assets have not been stripped. I can’t eat the grass directly. This can go on. There are little niches like this in the system. Each person’s individual charge is to find such niches.

OUR FACTORY-FARM SYSTEM IS A
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Chances are, though, any meat eater will come out on the short end of this argument, especially in the United States. Take the case of beef. Cattle are grazers, so in theory could live like the grass-fed lamb. Some cattle cultures—those of South America and Mexico, for example—have perfected wonderful cuisines based on grass-fed beef. This is not our habit in the United States, and it is simply a matter of habit. Eighty percent of the grain the United States produces goes to livestock. Seventy-eight percent of all of our beef comes from feed lots, where the cattle eat grain, mostly corn and wheat. So do most of our hogs and chickens. The cattle spend their adult lives packed shoulder to shoulder in a space not much bigger than their bodies, up to their knees in shit, being stuffed with grain and a constant stream of antibiotics to prevent the disease this sort of confinement invariably engenders. The manure is rich in nitrogen and once provided a farm's fertilizer. The feed-lots, however, are now far removed from farm fields, so it is simply not "efficient" to haul it to cornfields. It is waste. It exhales methane, a global-warming gas. It pollutes streams. It takes thirty-five calories of fossil fuel to make a calorie of beef this way; sixty-eight to make one calorie of pork.

Still, these livestock do something we can't. They convert grain's carbohydrates to high-quality protein. All well and good, except that per capita protein production in the United States is about double what an average adult needs per day. Excess cannot be stored as protein in the human body but is simply converted to fat. This is the end result of a factory-farm system that appears as a living, continental-scale monument to Rube Goldberg, a black-mass remake of the loaves-and-fishes miracle. Prairie's productivity is lost for grain, grain's productivity is lost in livestock, livestock's protein is lost to human fat—all federally subsidized for about \$15 billion a year, two thirds of which goes directly to only two crops, corn and wheat.

This explains why the energy expert David Pimentel is so worried that the rest of the world will adopt America's methods. He should be, because the rest of the world is. Mexico now feeds 45 percent of its grain to livestock, up from 5 percent in 1960. Egypt went from 3 percent to 31 percent in the same period, and China, with a sixth of the world's population, has gone from 8 percent to 26 percent. All of these places have poor people who could use the grain, but they can't afford it.

I live among elk and have learned to respect them. One moonlit night during the dead of last winter, I looked out my bedroom window to see about twenty of them grazing a plot of grass the size of a living room. Just that small patch among acres of other species of native prairie grass. Why that species and only that species of grass that night in the worst of winter when the threat to their survival was the greatest? What magic nutrient did this species alone contain? What does a wild animal know that we don't? I think we need this knowledge.

Food is politics. That being the case, I voted twice in 2002. The day after Election Day, in a truly dismal mood, I climbed the mountain behind my house and found a small herd of elk grazing native grasses in the morning sunlight. My respect for these creatures over the years has become great enough that on that morning I did not hesitate but went straight to my job, which was to rack a shell and drop one cow elk, my household's annual protein supply. I voted with my weapon of choice—an act not all that uncommon in this world, largely, I think, as a result of the way we grow food. I can see why it is catching on. Such a vote has a certain satisfying heft and finality about it. My particular bit of violence, though, is more satisfying, I think, than the rest of the globe's ordinary political mayhem. I used a rifle to opt out of an insane system. I killed, but then so did you when you bought that package of burger, even when you bought that package of tofu burger. I killed, then the rest of those elk went on, as did the grasses, the birds, the trees, the coyotes, mountain lions, and bugs, the fundamental productivity of an intact natural system, all of it went on. ■