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As this 1869 lithograph makes clear, the American farmer, after the Civil War, began to think of himself as of a group apart: Others profited from his honest labors. Indeed, not until well after World War II did a measure of economic equality, bolstered by federal crop subsidies and off-the-farm income, come to those who produced the nation's food and fiber.

Agriculture in America

As their spokesmen like to remind city folk, America's hard-working farmers have scored some prodigious successes: relatively cheap food for consumers at home, extra grain to help the famine-stricken overseas, and, last year, \$41 billion in export revenues to help offset what the United States pays for OPEC oil and Toyotas. Productivity has grown five times faster in agriculture than in industry over the past five years. But the recent export push has exposed some long-term difficulties. Here economist Walter Ebeling explains the rise of U.S. agriculture; historian Tom Fulton and editor Peter Braestrup describe the new "farm issues"; and demographer Nick Eberstadt re-examines world hunger and America's role in alleviating it.

ROOTS

by Walter Ebeling

America's pre-eminence in world agriculture—its great amber waves of grain—does not stem only from nature's endowments. But nature has been generous. As an agricultural region, the heartland of America, more than one million square miles stretching from the Appalachians to the Rockies, is unsurpassed in size and quality elsewhere on this planet. The soil is so deep in many places that the plow seldom hits stone; thanks to the glaciers' movements over a million years, the ground is level enough for modern tillage; and there is plenty of rainfall except in the West, where irrigation is used.

There are superb patches of land elsewhere in America: California's Central Valley; Pennsylvania's Lancaster County (home of the Amish); the Georgia Piedmont; the Willamette Valley in Oregon. But the nation's greatest endowment lies between Denver, Colorado, and Columbus, Ohio, and its development has been to world agriculture what the exploitation of the Persian Gulf has been to world oil production.

No less important, from the beginning the land in America was not only fertile but also underpopulated. The few Indians who greeted the first English settlers of Jamestown in 1609 grew corn—and tobacco, which led the South to a commercial cash crop and to plantation agriculture, with indentured whites and, after 1690, large numbers of African slaves as labor.

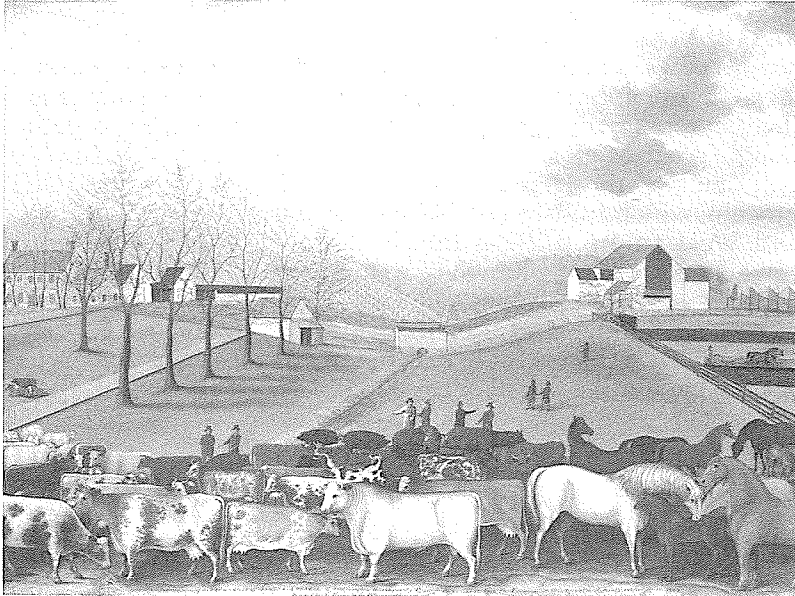
Along the rivers and coasts of New England, however, there was a different pattern. The Pilgrims, and the Puritans who came ashore on Massachusetts Bay, found forests, natural meadows, and open patches that had been cleared by the Indians and then abandoned as European small pox ravaged the native tribes. The Puritans, too, learned to plant corn and raise pumpkins and beans. But New England was settled in villages. The first farmers in Connecticut, Massachusetts, and Rhode Island often shared cattle pastures and tilled scattered individual plots outside town. In New York, Pennsylvania, Delaware, and Maryland, however, the English, Dutch, Germans, Swedes, and Scotch-Irish settled on isolated individual farmsteads. And in the southern colonies, even as the great plantations grew up on the Tidewater, the poorer Scotch-Irish latecomers settled in the Piedmont on their own homesteads.

Thus, for almost 300 years, America developed two agricultural land-use styles. In the South, plantations produced cash crops for export—tobacco, indigo, rice, and then King Cotton—dependent on slavery (and later, after the Civil War, on tenantry and sharecropping) and on large acreages. In 1770, Southern tobacco led the way in all exports from the colonies, with over \$1 million worth of it going to London.

In the North, aside from the Dutch *patroons'* holdings along the Hudson River, great estates were few. Indentured servants, immigrants bound to their employers for a fixed time in return for transatlantic passage, could and did disappear to start their own farms. Outside the slave-owning South, there was always too much land and too little labor for any group of landowners to develop into a European-style aristocracy.

Moreover, the very abundance of land led to a focus on *extensive* rather than European-style intensive agriculture. Then as later, the farmer was less concerned with how much each acre could yield at harvest time than with how many acres he

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The Cornell Farm (1936) by Edward Hicks. National Gallery of Art, Washington. Gift of Edgar William and Bernice Chrysler Garbisch.

could clear and crop. The average farmer used crude wooden plows, pulled by oxen and horses; cut his meager grain crop with a sickle; threshed with a flail. When the soil wore out, he laboriously cleared a new patch nearby or moved West. He pastured his scrawny cattle on native grasses; he enlisted his wife and children as labor and, by trial and error, figured out which crops, which vegetables, which kinds of livestock brought in from Europe would make it in the New World. Sheep were, for a time, the mainstay of New England; in 1840, New York was the country's leading wheat producer.

After the Revolution, the abundance of land, the shortage of manpower, and the fact that farmers, most of them freeholders, made up 90 percent of the white labor force gave the concept of the independent "family farm" a special power in American political thought that still endures. Thomas Jefferson expressed it in 1785:

We now have lands enough to employ an infinite number of people in their cultivation. Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country, and wedded to its liberty and interests by the most lasting bonds.

The Continental Congress had offered land grants to soldiers for wartime service, and the post-Revolutionary ordinances of 1785 and 1787 provided for the sale of public land to farmers, opened up the northern Midwest to settlement, and there banned both slavery and any laws allowing the perpetuation of great estates. Other encouragements followed. The biggest one was the Homestead Act of 1862, signed by President Lincoln, which transferred 147 million acres in the Middle West and West to 1.6 million families. Each settler could get a 160-acre section (one-fourth of a square mile) for free if he lived on it for at least five years and made certain improvements. He could also buy the land after six months for \$1.25 an acre. Inevitably, speculators profited, and many a new settler went broke or hungry; but the family farm was solidly established.

“Raise Less Corn, More Hell”

Indeed, the Homestead Act was only part of what Lincoln and his supporters created in the midst of the Civil War—a peaceful agrarian revolution. Congress voted to create the first federal department serving a special interest group, the U.S. Department of Agriculture. And the 1862 Morrill Act established the federally supported land-grant colleges, each with its own agricultural component. The Grange, the Farmers Alliance, and the Populists all worked for measures helpful to farmers. (“What you farmers need to do,” said one Populist orator in 1892, “is to raise less corn and more *Hell*.”) To the USDA and land-grant colleges were added agricultural experiment stations, the county extension agents, the Farm Credit Administration, and an array of other service agencies, all designed to promote the welfare and education of the independent farmer.

Thus, not only in Fourth-of-July rhetoric but also in law, the farmer remained something special.

Even when general social legislation was passed, most notably starting in the 1930s, farming kept its privileged status. Agriculture was exempted from Social Security, child-labor laws, minimum wages, collective bargaining rights, restraint-of-trade laws (to foster farm cooperatives), price controls, and, even in wartime, the military draft. Federal tax laws favored farmers, who also got preferred access to public lands and water. They received direct federal subsidies not given to auto makers or other manufacturers.

In short, in America, farmers gained a social status and a political power unknown to their counterparts in most other nations of the globe. Indeed, in much of today’s Third World, par-

ticularly in Latin America and Africa, the farmer is viewed with disdain by the ruling elite who live in the cities. The new bureaucrats prefer to think about steel mills, fancy cars, and an up-to-date airport near the capital city. In most communist countries, "collectivized" farmers are treated, more or less, like factory hands and behave accordingly—leaving their shifts promptly at 5:00 P.M., for example. Lester R. Brown, of Worldwatch Institute, describing lackluster Soviet farming in *Science* magazine, noted pointedly that "Marx was a city boy."

Mechanizing with Horses

Another factor has helped to shape U.S. agriculture—technological innovation, coupled with public education and quick communication. During the new Republic's first few decades, there was little innovation on the average farm in the North. Eli Whitney invented the cotton gin in 1793, helping to make cotton the South's chief cash crop. But in the North, essentially, self-sufficient farming continued until early in the 19th century. Farm families filled their own needs for clothing, tools, soap, and food. And life was not easy.

Agricultural innovation by and large came from the top down. It was fashionable for the leaders of the new nation to take an interest in agricultural promotion. George Washington experimented with mule breeding, and Thomas Jefferson tested a new moldboard plow. Improved strains of hay, including timothy and alfalfa, were imported, mostly by well-to-do farmers, who also formed the agricultural societies. The first farm journal, *Agricultural Museum*, came out in 1810. In 1819, U.S. consuls overseas were told by the Secretary of the Treasury to collect seeds, plants, and agricultural inventions from abroad and to send them home.

But the main thrust in innovation in America was to develop technology for opening up more land with less labor. Thus, in 1837, John Deere and Leonard Andress began manufacturing steel plows needed to open up the tough prairie sods of the Midwest—reducing requirements for animal power by at least one-third. Slowly the McCormick reaper, threshing machines, and mowers—all complicated, horse-powered mechanical devices—came into use. Soon after the Civil War, the average American farmer had stopped harvesting his crop by hand. Horse power or mule power made possible the westward push of the wheat belt. And by 1890, most of the potential for horse-powered machinery had been established. The transition to the gasoline tractor, first developed in 1892, took several dec-

ades. Not until 1954 did the number of tractors on all farms in America exceed the numbers of mules and horses, with the South behind the rest of the country.

After the Civil War, the Department of Agriculture, the land-grant colleges, and the county extension agents led the way in developing and encouraging higher-yielding, disease-resisting grain crops, new irrigation techniques, meatier livestock. Under the New Deal, rural electrification and agricultural credit, in particular, helped to modernize the farm sector. Private industry helped develop labor-saving machinery, chemical fertilizers, pesticides, and herbicides. The onset of World War II and Washington's demand for all-out production accelerated the growth of capital-intensive farming and higher productivity.

The results were dramatic. In 1930, it took 15 to 20 man-hours of labor to produce 100 bushels (on two and one-half acres) of corn. In 1975, it took 3½ man-hours to produce the same amount of corn—on one and one-eighth acres. The incentives for the farmer to borrow money and invest in the new technology were clear.

For most of America's history, there was an increasing demand in the growing cities and towns at home and in industrializing Europe for what the farmer could sell (if not always at prices that paid off his debts). Not until the 1890s did farm products drop below even 75 percent of all U.S. export sales. This agricultural surplus enabled the United States in its early days to buy the European factory machinery and the other finished goods that it needed to develop an industrial base.

Essential to this export growth was transportation. The Erie Canal (1825) brought wheat from the Ohio Valley and western New York State by barge to the Hudson River and then to the Atlantic coast. The federal encouragement through land grants to the railroad companies to open up the West after the Civil War—linking the West coast to the East in 1869 and adding 136,000 miles of track from 1860 to 1890—provided a major impetus to farming. Without this network, essentially farm-to-market transportation, the heartland would have been reduced to subsistence farming except along the major navigable rivers. Refrigerated freight cars, beginning with the "Tiffany" cars in 1888, enabled Westerners to ship produce to the East and ultimately allowed Florida orange growers to ship their fruit north. It made it possible to ship beef from Chicago to New York and apples from New York State to Florida.

But even as the domestic markets grew, fed by immigration and natural population increase, American farmers were increasingly at odds with the bankers, traders, middlemen, and

To attract German immigrants, the Des Moines Navigation Co. advertised "one million acres" of Iowa land between Keokuk and Des Moines, for sale in parcels on credit terms.

Für westliche Einwanderer!

Iowa Land

im Tale des
Des Moines Flusses.

Eine Million Acker

Zu verkaufen gegen Credit von der
Des Moines Navigation Compagnie.

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suppliers. Buying land and the new horse-drawn machinery led many of them into debt. They were at the mercy of market competition and of volatile changes in prices. After the Civil War, farmers began to support the Greenbackers and Populists—attacking “hard money,” high freight rates, and monopolies of all kinds.

At the same time, farmers began to become a minority. By 1880, farm workers and farmers accounted for less than half the nation’s labor force, even as a fresh influx of Scandinavian immigrants helped to thicken the settlement of the Great Plains. The farm population, all told, peaked at 32 million in 1910; the number of farms peaked at 6,454,000 ten years later. World War I brought a great boom in demand for food. When the war boom ended, the overextended farmers suffered from a slump that did not end for two decades. And a fresh exodus from the land to the cities began.

The Great Depression of the 1930s, which struck hard at all sectors of American society, was a turning point for American agriculture. Under Franklin Roosevelt’s New Deal, the federal government stepped in to prop up farm income, save the family farm, and improve soil conservation and management practices

—particularly after the harsh experience of the Dust Bowl, when black dust clouds from the parched Great Plains blew east and hovered over Washington. Acreage and marketing quotas were imposed to curb production; surpluses were purchased by the federal government; price supports were begun. “The American farmer,” FDR asserted, “living on his own land, remains our ideal of self-reliance and spiritual balance.”

Feeding Hogs in Taiwan

Debates over the costs and benefits of such efforts went on for three decades. There was no question that federal intervention, however well intentioned, favored some farmers over others. Some got no subsidies, notably livestock farmers. Growers of cotton, wheat, corn, tobacco, and rice were paid (\$709 million in 1939 alone) to keep marginal cropland out of production—and, naturally, bigger farmers with the most acreage benefited the most. After World War II, acreage controls failed to end surpluses; indeed, land couldn't be taken out of production fast enough. New high-yielding strains of corn and wheat used in conjunction with fertilizers, pesticides, and herbicides pushed output even higher. It seemed that U.S. agriculture was simply too productive for its own good. Indeed, in 1953, the U.S. Commodity Credit Corporation acquired 486 million bushels of wheat—41 percent of that year's crop, and a record.

During the 1960s, Washington began to distribute much of this surplus to the needy at home via food stamps (starting in 1964) and overseas via Public Law 480 “give-aways” to such countries as India, South Korea, Taiwan. In time, as many of these countries gained economically, their people began to demand beef and pork. Producers of cattle and hogs in West Germany or Japan or South Korea needed feed grains; the United States's surpluses began to ebb.

During the '70s, while price supports stayed in effect, federal production controls eased; there was enough demand around the world to buy up whatever feed grains the U.S. farmer could produce. In 1972, the United States found itself selling soybeans, corn, and wheat to the USSR—too much of it—and unsubsidized U.S. cattle and hog farmers found themselves paying higher feed bills as a result.

Even as the crop surpluses declined, the individual farmer, pressed by inflated costs of machinery, labor, and other materials, had to rent or buy more acreage just to stay even with the bank; the price of farm land went up as it always does in inflationary times. Many farmers found themselves, after a period of

expansion and relative cost-price stability, deeply in debt by 1975. Farm prices went up more slowly under the stagflation of the 1970s than did the cost of inputs. And while Washington now put a floor under the prices paid to some farmers and subsidized dairy farmers, beef and hog farmers and vegetable growers had no such relief. The bigger farms grew bigger and more mechanized; to survive, the smaller farmers or their wives worked off the farm. Indeed, this trend had accelerated since 1967 when, for the first time, off-farm income surpassed farm income for all people living on farms. Without that rising off-farm income, many more of America's small and medium-sized farm operators would have been forced to quit the land altogether.

Thanks to America's special history, we have a central government that has long served the farmer without seeking to "manage" him. Partly as a result of our great natural endowment, and of shifting economic forces, we have a very small, highly efficient farm sector. Four percent of the U.S. population provides food and fiber for the rest. The 510,000 largest farms, almost all of them family-operated, produce 64 percent of the total farm output. Overall, the one-billion-acre U.S. farm sector is gradually becoming more capital-intensive, more energy-intensive, more heavily in debt, and freer of surpluses (except in the dairy industry, where the average cow now produces about 12,000 pounds of milk a year—twice the level in 1954). Diversified farming, particularly combination livestock-and-grain farming, is on the wane.

Lastly, the political power of the farmer and the strength of the old congressional "farm bloc" has greatly declined. The "farm vote" is now simply too small to be decisive in most states. And, since the early 1970s, other players have gotten into the act: the nutrition lobby; exurban real estate developers; the hunger lobby; the environmentalists worried about pesticides, herbicides, and stream pollution; occupational safety inspectors; activists interested in minority rights; the State Department. No longer is Jefferson's "cultivator of the earth" considered the bulwark of the Republic, even as the recent back-to-the-country movement among city folks indicates his enduring mythic appeal.

THE NEW ISSUES: LAND, WATER, ENERGY

by Tom Fulton and Peter Braestrup

The biggest single new fact about America's agriculture is that U.S. farm exports are expected to reach a record 170 million tons this year—despite a world economic slowdown.

"At the rate exports are increasing," noted Lauren Soth, columnist and former editor of the *Des Moines Register and Tribune*, "the danger of over-exploitation of the land . . . is becoming imminent. Yet exports have been the lifeblood of American agriculture and are vital to farm prosperity."

Therein lies the dilemma.

The old surpluses are gone. One-third of the nation's 400 million acres of prime crop land are devoted to export production. We now export 60 percent of our wheat, more than half of our soybeans, nearly one-third of our corn. "Expansion of exports," observed the new U.S. Secretary of Agriculture, John Block, himself an Illinois corn and soybean farmer, "is a key to a market-oriented agricultural policy."

For the Reagan administration, as for its predecessors, there is another reason to push farm exports: Their dollar value, some \$41 billion last year, constituted a major offset to the \$80 billion the United States paid out for imported oil.*

Such pressures have begun to stir debate within farm groups and the U.S. Department of Agriculture (USDA) bureaucracy, and among academic specialists. To most Americans, living in city or suburb, the discussion may seem remote; it rarely gets into the mass media; food is something that comes ready-packaged at the A&P and seems to cost more every time one reaches the check-out counter.

But new "farm issues," aside from the perennial congressional debates over subsidies to some types of farming, most notably dairy farming, are emerging. Some minor matters get lots of media attention—scattered foreign ownership of U.S. farm land, the loss of farms to "suburban sprawl," or the im-

*The net U.S. "farm trade surplus" in 1980 was \$24 billion; the United States spent \$17 billion for imported coffee, rubber, cocoa, bananas, tea, spices, and other farm products.



James A. Parcell, the Washington Post.

In 1979, protesting high production costs, hundreds of farmers staged a "tractorcade" past the Department of Agriculture building in Washington.

portance of "corporate agribusiness" in California vegetable production and Delaware broiler output. But the major new national issues revolve mostly around the future use and sufficiency of land, water, and energy—and, to varying degrees, their seriousness stems from the pressure to produce more food for export.

Let us begin with the land itself.

"It has often been said that the thin layer of topsoil is all that stands between man and oblivion," observed Don Paarlberg, an agricultural economist. "While there is some poetic license here, there is also much truth."

What worries Paarlberg, Soth, and others is the long-term loss of topsoil from the nation's prime farm land, almost all of which is now in production.

During the long years of crop surpluses, and of federally subsidized retirement of up to 60 million acres of crop land, little heed was given to erosion of topsoil. More USDA "conservation" subsidies apparently went to farmers for liming and other production-enhancing techniques than for expensive terracing, contour farming, and the like. The new postwar technology permitted farmers to use (cheap) chemical fertilizer and no manure, to omit soil-building clover and grass from crop rotations, and to keep planting remunerative corn and soybean row crops year after year. The sudden 1970s surge of export demand

merely re-enforced the trend.

The results were dramatic.

After 40 years of federal effort and \$30 billion in outlays nominally spent to promote conservation, the USDA estimated in 1977 that soil erosion was a major problem on over 20 percent of the nation's crop land. Annual erosion rates exceeded 10 tons of topsoil per acre, twice the "tolerable" level, on 32 percent of the land in crops such as soybeans in the Southeast, and on 19 percent of acreage in crops such as corn and wheat in the Midwest.*

Even if economists question the reliability of such data—since they are not collected on a regular basis and are often subject to revision—the problem is clearly one that merits attention. In Iowa, the thickness of the rich black topsoil that the first settlers plowed during the mid-1800s, has diminished in some places from two feet to one. If such depletion continues unabated, according to federal estimates, the Midwest's yields of corn will probably decline by as much as 30 percent by the year 2030.

Why are so many U.S. farmers "mining" the soil? The farmer, it is important to remember, is in business to grow and sell a crop at the least possible short-term cost. Given the pressures of inflation and high land prices, as well as keen competition for the land, he has no incentive to do otherwise. It is easier, faster, and cheaper, on rolling land in Iowa, for example, to practice "straight row" cultivation of corn and soybeans than to follow the contours of the hillside, even though the resultant erosion is five times greater. Plowing fields in the fall eases the farmer's workload during the busy spring planting season, although it increases erosion by 10 percent.

Government price supports and the demand for U.S. corn and soybeans overseas now give the farmer every incentive to plant row crops on marginal (hilly) land, to rent more such land, and to maximize short-term benefits. In effect, the farmer has

*An annual soil loss of 10 tons per acre equals the loss of one inch of topsoil every 15 years.

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relied on fertilizer to compensate for the loss of topsoil; fertilizer use doubled in 1960–75, and yield per acre has increased.

To cut back, overall, on production of corn, soybeans, and wheat and to cultivate less intensively would raise farm prices since less food would be produced. A major attempt to curb soil erosion, and thus avert long-term penalties to society as a whole, implies either cost to the farmer or some added cost to the taxpayer or consumer. One proposed “massive” plan of conservation measures to “minimize the national sediment load” would eliminate 90 percent of crop-land erosion but would cost \$13.4 billion.

Farming in Chicago

Other proposals are far more modest. But almost no plan suggested so far fails to inflict pain on *someone*. One new approach that is gaining favor among farmers is “no-till” or “minimum tillage” cultivation, where the ground is left unplowed and largely undisturbed, herbicides kill off weeds and grass, and the next crop is seeded into the trashy residue of the previous one. This technique reduces erosion by as much as 80 percent on hilly land; it requires fewer tractor trips (hence less tractor fuel), helps retain ground moisture, and takes less of the farmer’s time. But the expanded use of herbicides alarms environmentalists. The effective use of these chemical weed killers requires sophistication and care; the threat of run-off of herbicides in water supplies frightens many local citizens.

Other conservation techniques, such as crop rotation (corn, then oats, then clover, then corn again), interseeding alfalfa with corn, or strip cropping (sod and corn), are all well known. To mandate their use is to impose a short-term financial burden on the farmer, especially the small farmer. In effect, he must interrupt or curtail production of more remunerative crops (e.g., corn). Proposals have been made by some USDA administrators to link other benefits that the farmer gets from the government, such as crop allotments or low-cost loans, to his compliance with accepted conservation measures. This stern approach, known as “cross-compliance,” has not been greeted with huzzas by Congress or by export-minded farmers.

Other land issues are more popular in the media than they are important to agriculture. Suburban rowhouses eating up fertile cornfields make vivid, even distressing, television pictures. However, in its effects on U.S. food production—as opposed to aesthetics or land “stewardship”—the continuing loss of farm land to suburban development, highways, and even

strip mining remains small. The current loss of one million acres a year equals a loss of only 0.4 percent of U.S. prime crop land.*

Around the major cities, particularly in areas like eastern Connecticut or New York City's suburbs, farming may disappear entirely just as it is about to do within the city limits of Chicago and as it has long since done in the Bronx. Since 1970, in New York's Long Island, Pennsylvania's Lancaster County, and several areas of New Jersey, local conservationists and county officials have tried to preserve farm land by buying development rights, by giving farmers special property tax relief, or by zoning land exclusively for farming. None of these efforts seems to have stopped spreading suburbanization; only high home-mortgage interest rates and higher gasoline costs for commuters seem to slow down such growth.

Draining the Ogallala

Water: From the Dakotas, Nebraska, Kansas, Oklahoma, and Texas to the West Coast, it is water and not land that is the big issue. In the most arid regions, agricultural development has meant irrigation—in the beginning through private efforts and then through the 1902 Reclamation Act, which brought federal and state subsidies for cheap water projects to make the desert bloom.

All told, irrigated acreage has doubled (to 56 million acres) since 1950. It now accounts for more than one-fourth of the nation's crops and nearly one-seventh of the nation's total prime crop land. In the East, irrigation is used to permit double cropping—rice and soybeans, for example, in the Mississippi delta. But its big impact has been in the West where the thirst for water is enormous. Arizona's citrus farmers and California's celery and lettuce growers could simply not exist without subsidized irrigation.

Washington currently spends some \$5 billion a year on management and planning of all kinds of water projects, mostly under the auspices of the U.S. Department of the Interior. Without federal subsidies, little irrigation would take place. Indeed, water projects have been pushed well beyond what pure economic feasibility would have permitted. The water subsidy for California's Wetlands project, for example, runs to \$1,540 per

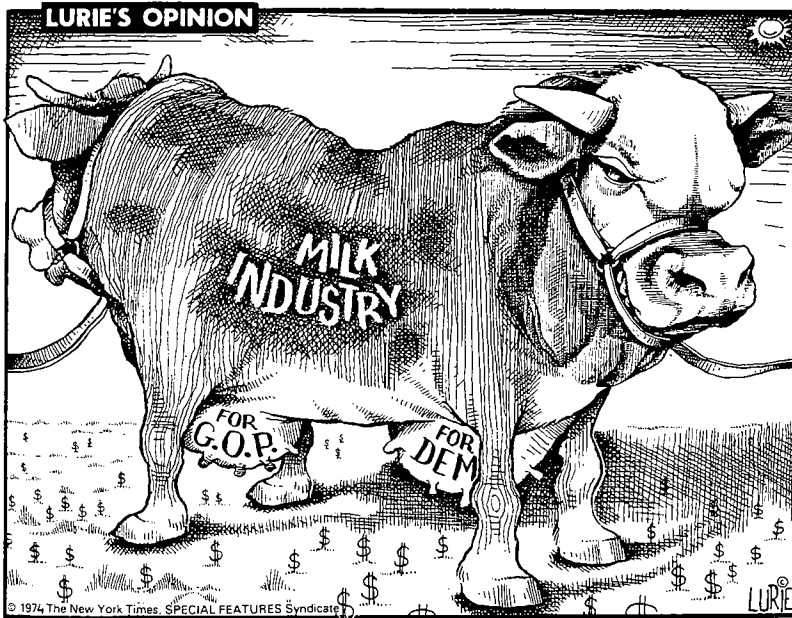
*The widespread notion that foreigners, especially oil-rich Arabs, are buying up the best U.S. crop land is also exaggerated. According to the USDA, foreign investors, mostly British or Canadian, held an interest in 1979 in about 5.2 million acres of farm, forest, and pasture—less than 0.5 percent of the total. And almost half of this acreage was timber.

acre, roughly equal to the cost of the land itself.

Taxpayers have dug into their pockets twice for these irrigation projects: first, for the direct subsidy and second, for the crop price-support programs that were required, in part, because of the surpluses swelled by production on these subsidized lands. Consumers, on the other hand, have benefited, in the short run at least, from lower food prices.

Most of the more feasible water projects have been built—the exploitation of the Colorado, the Rio Grande, and other rivers is almost complete. Farmers have begun to tap ground water. In California, since 1953, ground water has provided 40 percent of total water used. In Arizona, since 1953, ground water has provided a little less than half. Under heavy pumping, the water level is falling, but the draw-down continues. Farmers are simply drilling deeper to get their water—at extra expense. Water itself remains cheap—priced below its true cost and utility.

However, a water shortage seems to be near. On the High



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For its generosity to candidates of both parties, the dairy lobby is labeled "an equal opportunity employer" in the caption of this 1974 cartoon.

ALTERNATIVE FARMING

Long before he left office, Bob Bergland, President Carter's Secretary of Agriculture and himself a Minnesota farmer, worried aloud over the impact on conventional farming methods of "energy shortages, food safety, and environmental concerns."

He noted that "many large-scale producers as well as small farmers and gardeners are showing interest in alternative farming systems," with less reliance on petrochemicals, mechanization, and monoculture.

At Bergland's orders, a USDA study team interviewed 69 successful "organic," or "organic-conventional," farmers in 23 states, surveyed agricultural schools and county extension offices, and did other research. In mid-1980, they reported their findings.

Most of the 69 farmers owned their farms outright, hence felt less financial pressure than did others with heavily mortgaged farms. Most were veterans of "chemical-intensive" farming; they had developed their own practical "organic" crop- and livestock-raising techniques, relying heavily on soil conservation, crop rotations, and the use of manure instead of nitrogen fertilizers. Their production costs were lower, but so were their incomes. Controlling weeds and insects without chemicals was a major problem, especially for organic fruit and vegetable producers.

Even so, as energy costs rise, the USDA team predicted, mixed livestock-crop farmers may find "organic farming just as economical or even more so than chemical-intensive farming." Many "organic" methods, in fact, are already used by conventional farmers. Yet, the team observed, any general shift by America's big cash grain

Plains stretching from Nebraska to eastern New Mexico and from Colorado to the Texas Panhandle, irrigation has come from water in the eight-state Ogallala aquifer, an underground lake. In some places, its water is currently being drawn down an average of 14 times faster than it is being replaced. Net aquifer depletion in Texas runs from one to five feet per year. Given the rising costs of fuel for pumping, irrigation in some areas may prove uneconomical well before the water runs out. But the fact remains that the Ogallala aquifer is being drawn down at a rate considerably greater than it is being recharged.

All told, perhaps one-fourth of America's irrigated crop lands utilize subsoil water faster than it is being renewed. Moving water by pipeline or canal from the Mississippi to northern Texas or New Mexico would cost over \$400 per acre foot, over 10 times what farmers say they can now afford for irrigation water.

farmers to totally chemical-free farming would cause a sharp drop in U.S. food production.

To some degree, official interest in "organic" farming reflects the broader environmental crusades of the 1970s and a new back-to-the-land movement. Overall, from 1970 to 1980, the population of America's nonmetropolitan counties increased 15 percent, reversing a long exodus. Most of the rural newcomers were not farmers; but in some areas, notably New England and the upper Midwest, scores of abandoned small farms are now being reactivated by retired folk, young city couples, or "returnees," usually with outside incomes.

Coinciding with USDA studies, private groups have focused on alternatives to large-scale agriculture. They range from Control Data Corporation's Rural Venture project to Nebraska's Center for Rural Affairs, to Pennsylvania's Rodale Press, publisher of *New Farm* (circulation: 60,000). They variously urge easier credit and favorable tax policies for small farmers, especially beginners; more research on nonchemical farming methods; better marketing of crops.

As some of these groups see it, developing labor-intensive specialties—livestock, fruit, vegetables—rather than corn or soybeans may enable more small farmers to survive. For example, higher shipping costs have raised the supermarket prices of California's mass-produced vegetables in the East and Midwest; small vegetable farmers near the big cities have already begun to compete for California's old customers.

None of this is likely to change the face of American agriculture or halt the trend toward "bigness" in food processing and marketing. But energy prices—reflected in rising fertilizer, fuel, and pesticide costs—may lead both the USDA and private corporations to investigate how all farmers can produce more with less.

In Kansas and Nebraska, where the "mining" of water has become extensive, corn and other feed crops have been grown under irrigation since the 1950s to fatten beef cattle. As subsoil water supplies diminish, farmers here may shift back to dry-land wheat farming, while the Corn Belt to the east, with its ample rainfall, resumes its old role of "finishing" beef for market.

Almost every region west of the Mississippi, according to the U.S. National Water Assessment, has insufficient water from all sources for future agricultural production based on present levels of use. The federal government estimates that Western farmers' demand for water will rise only six percent from 1975 to the year 2000. But the demand for water by all other users—industry, municipalities, miners—will increase by 81 percent. And the prospects for bringing in enough extra water to satisfy

the needs of developers of oil shale or the processors of Western strip-mined coal are dim.

In the past, Washington sought to solve the problem simply by supplying water to meet agricultural demand. Now, strong resistance by both the Reagan administration and Congress to high-cost projects, whose agricultural benefits can only be marginal, has set in. Some specialists argue that the over-expansion of irrigated agriculture, fostered by federal subsidies, has to be ended for the farmers' own good. In any case, a struggle in the West between farmers and nonfarm interest groups over dwindling water supplies seems inevitable.

Rotation versus Corn-on-Corn

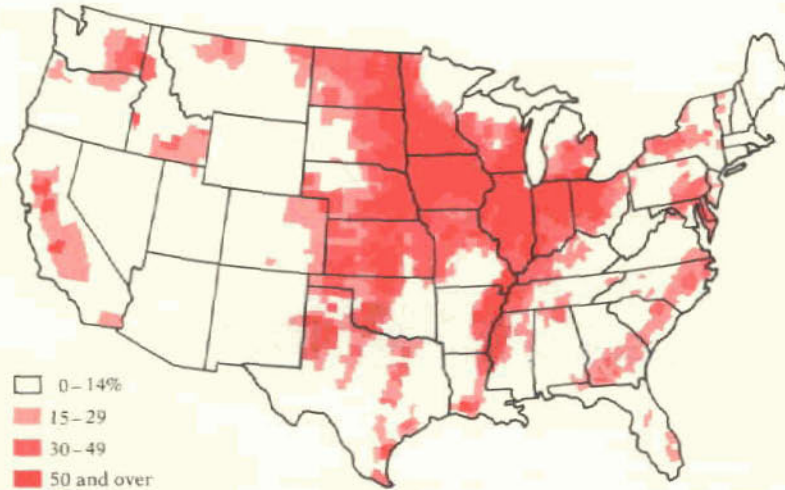
Energy: As everybody knows, U.S. agriculture is energy-intensive; total tractor horsepower has more than doubled since 1951: More field work, the field-picking and shelling of corn, the use of bigger and bigger combines, and the general trend toward labor-saving mechanization have all required more fuel. Less obviously, U.S. farmers also use sizeable amounts of fuel for irrigation pumps, for drying corn and other harvested crops, for heating animal pens and breeding cages, and for transporting crops to market. Most important, petrochemicals are used in fertilizer and insecticides.

Thus, for corn, the energy outlay per acre in "gasoline-equivalents" is: fertilizer, mostly nitrogen, 40 gallons; natural gas for drying the corn, 20 gallons; tractor fuel for tillage and cultivation, 10 gallons; herbicides and insecticides, 5 gallons. In sum, it takes about 75 gallons of gasoline-equivalents to produce and harvest one acre of corn.*

One current research effort is devoted to reducing the use of chemical fertilizer, especially nitrogen. Legumes (clover, alfalfa, vetch) add nitrogen "organically" to the soil. A test using these legumes in a crop rotation produced as much protein and cost less in terms of chemical fertilizer than did the usual "corn-on-corn" monoculture many farmers currently practice. But for a cash grain farmer, the economics are poor. He cannot sell the legumes for as much money as he could get for the corn. The dwindling numbers of mixed livestock-grain farmers, on the other hand, can use clover and alfalfa in rotation and thereby save on chemical nitrogen—livestock can eat the legumes as hay or pasture and provide manure that is returned to the soil as fertilizer.

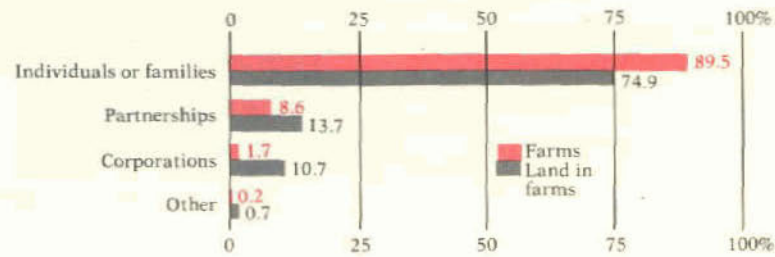
* Yet agricultural production uses only 2.6 percent of the nation's total energy.

HARVESTED CROPLAND AS A PERCENTAGE OF LAND AREA, BY COUNTY, 1974



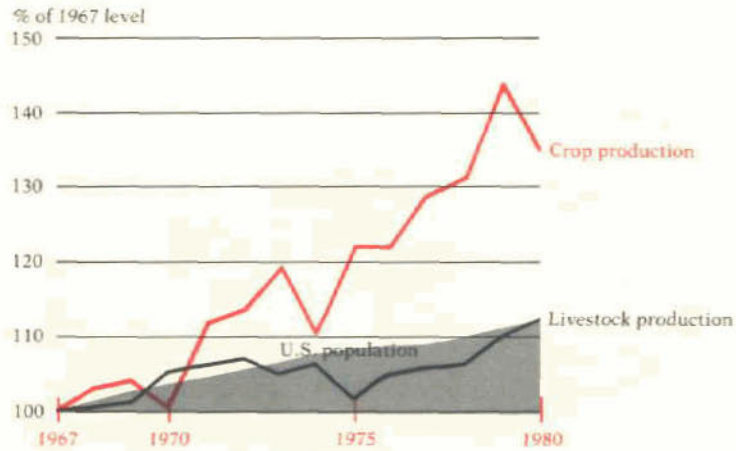
The map highlights only the nation's prime crop land—the Southeast's soybean and tobacco country, Mississippi's cotton and rice fields, the Midwest's Corn Belt, Dakota wheatlands, irrigated acreage north of the Texas Panhandle, California's fertile valleys. Including woods, pasture, and range (not shown), all land in farms adds up to one billion acres. Little of it is owned by absentee corporations; most farm corporations, like most farm partnerships (below), are family affairs. But family farms can be big: In 1978, farms (or ranches) of at least 2,000 acres accounted for only three percent of all farms but almost half of all farm acreage.

FARMS AND FARMLAND, BY TYPE OF ORGANIZATION, 1974



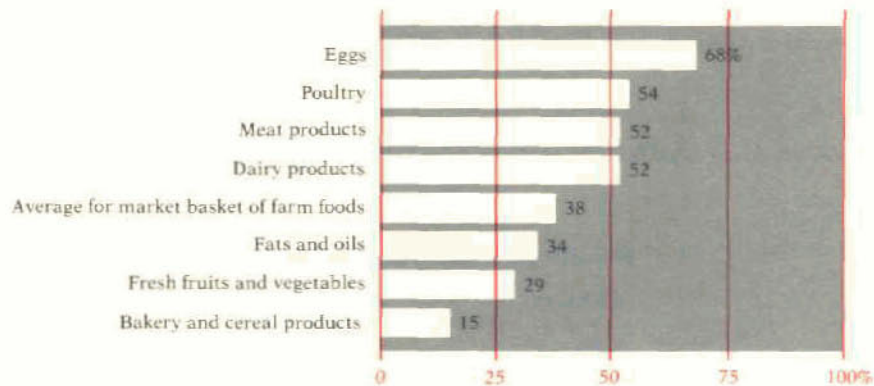
Source: U.S. Bureau of the Census.

CROP AND LIVESTOCK PRODUCTION, 1967-80



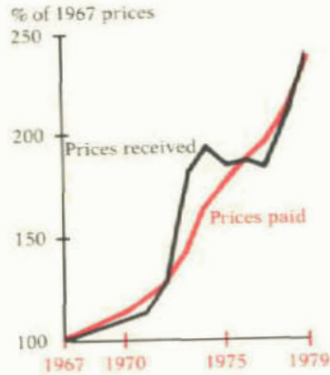
The export push since 1971 has spurred higher U.S. grain production, but droughts have hurt output; the overall trend in livestock masks ups-and-downs in the cattle business. Below: The "spread" between what farmers get for their products and what consumers pay for food has steadily grown since 1973 as the middleman's costs of labor and packaging have gone up faster than farm prices.

FARM SHARE OF RETAIL FOOD PRICES, 1979



Source: U.S. Department of Agriculture.

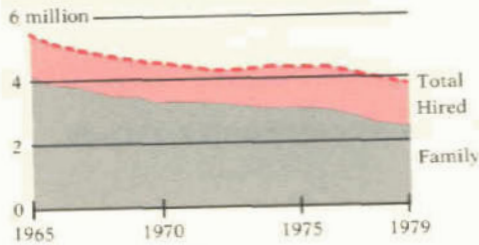
PRICES RECEIVED AND PAID BY FARMERS SINCE 1967



	1976	1977	1978	1979
	(as % of 1967 prices)			
Prices received	186%	183%	210%	241%
Crops	197	192	203	223
Livestock	177	175	216	257
Prices paid	187	196	212	240

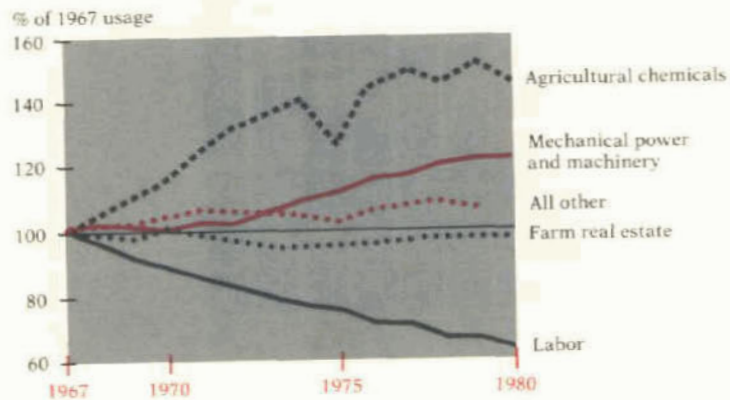
About 6.2 million Americans lived on farms in 1979. Of 3.8 million "farm workers," only 1.2 million were hired hands; migrant harvest workers totaled 212,000. Four-fifths of all farms are owned by children of farmers.

PEOPLE EMPLOYED ON FARMS



Source: U.S. Department of Agriculture.

CAPITAL-INTENSIVE FARMING: INPUTS, 1967-80

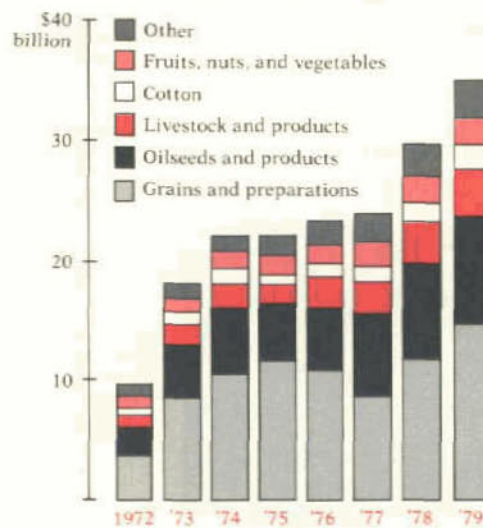


WHERE U.S. FARM EXPORTS HAVE GONE (in billions of dollars)

	1976	1977	1978	1979
Asia	\$7.6	\$8.1	\$10.5	\$12.2
Western Europe	8.1	8.6	9.5	10.3
Eastern Europe and USSR	2.5	1.7	2.9	5.0
Latin America	1.9	2.2	3.2	3.7
Canada	1.5	1.5	1.6	1.7
Africa	1.2	1.4	1.6	1.7
Other	0.1	0.1	0.1	0.1
TOTAL	23.0	23.6	29.4	34.7

Even before Jimmy Carter's 1980 partial grain embargo, Japan was the No. 1 overseas customer of U.S. farmers. Washington's 1971 decision to "float" the dollar effectively cut the price of U.S. products and helped start the current export boom.

VALUE OF U.S. FARM EXPORTS, BY COMMODITY, 1972-79



Source: U.S. Department of Agriculture.

For most farmers, nitrogen fertilizer will remain a major energy item. While fuel prices rose 207 percent from 1973 to 1980, the price of nitrogen-rich anhydrous ammonia fertilizer went up 161 percent. More efficient use of such fertilizer is likely as its cost keeps rising. But not to use any nitrogen fertilizers, as one study pointed out, would mean a significant drop in U.S. agricultural output.

As for fuel, farmers, like everyone else in America, will adjust. For some in the West, both reduced water supplies and the higher cost of fuel for pumping will cause a shift to production of more valuable crops on irrigated land, from alfalfa to corn, for example. To reduce fuel costs in the Midwest, there will be greater incentives to go to "minimum tillage" for corn or soybeans, reducing both tractor time and soil erosion. Still others will use solar heat to warm hog houses and milking parlors, or rely on windmills for part of their electricity. Livestock farmers may use bio-gas derived from hog or cow manure as practical production methods evolve.

Gasohol: Nourished by federal loan guarantees and tax breaks, the infant "gasohol" industry is designed to reduce U.S. dependence on OPEC oil. A mixture of 90 percent gasoline and 10 percent ethyl alcohol (ethanol), gasohol was pushed strongly by Jimmy Carter's administration. Last year, total output of ethanol increased 300 percent to 150 million gallons.

Various projections have been cited in Washington calling for a rapid build-up in production capacity to make enough alcohol—10 billion gallons—from all sources to "stretch" U.S. gasoline supplies by 10 percent by 1990.

Food for Fuel?

In the case of ethanol, one possible long-term problem lies in the fact that corn is now the cheapest, most practical feedstock. (Indeed, Carter's critics saw his 1980 promotion of gasohol largely as a sop to Midwest corn farmers angered by his partial embargo on U.S. grain exports to the Soviet Union.) One bushel of corn makes 2.5 gallons of ethanol; at current production levels, the effect on overall demand for corn is insignificant.

A fast build-up, however, would have a major impact. According to Purdue economist Wallace Tyner, production of, say, four billion gallons of ethanol in 1984 might possibly lead to a 30 percent increase in corn prices. Many farmers would then switch to growing corn rather than soybeans and other lower-priced crops to supply the new "ethanol market." Higher U.S. corn prices might hurt exports of the grain. Incentives to culti-

vate additional erosion-prone marginal land might increase. So would the cost of feeding hogs, cattle, and chickens—and consumer meat prices.

However, neither Tyner nor specialists in Washington expect so dramatic a future. Rather, they foresee gradual change, well below the projections of gasohol's enthusiasts in Congress.

The Reagan administration did not repudiate the Carter gasohol plan, even as it lifted the Carter grain embargo last April. But the newcomers have ruled out further loan guarantees for ethanol plants: Federal help will go for research; ethanol production capacity will be left to private enterprise, albeit with the crucial retention of a four-cents-a-gallon federal retail tax exemption (plus similar state exemptions) for gasohol. As it is, gasohol now costs the motorist slightly more at the pump than does regular gasoline. Only a major rise in the price of regular gasoline is likely to make gasohol more competitive. And some critics claim that current methods of making ethanol (including growing and processing the corn) consume more total energy than they produce.

Bigger May Not Be Better

The "Family Farm": There has been much rhetoric, particularly among environmentalists and Farm Belt politicians, about threats to the future of the "family farm." Merely defining the "family farm" or the "small farmer" has caused some difficulty. The decline in total farm numbers and the increase in the average farm's acreage usually start the discussion. But these numbers conceal as much as they reveal.

One can start at the top. A fifth (477,000 in 1974) of all farms are what the USDA calls "primary" farms: They earned more than \$40,000 in 1974 in gross sales of what they grew. In 1974, they accounted for over 78 percent of all U.S. farm output. And their operators are overwhelmingly farmers and their kinfolk, not "agribusiness corporations." Almost half of these farms are crop farms (grain, cotton, sugar, tobacco). Within this "primary" group is an elite: the 64,000 farms with over \$200,000 in sales; they account for 40 percent of farm output.

The primary farms are the big engines of U.S. *production*; their owners get over 75 percent of their revenue from crops and livestock; they own 70 percent of the farm land and rent much of the rest. They are in the best cash position to buy more. And their predominance is growing.

Four-fifths of all farms in America are in the *under-\$40,000* gross sales category. What now keeps most of these family farms

FEDERAL FARM PROGRAMS



The U.S. Department of Agriculture, with 91,232 employees and a \$48 billion budget in 1981, is no longer simply the champion of the farmer. There aren't enough farmers and farmworkers left to sustain USDA's influence in Washington by themselves. Like his predecessor, Secretary of Agriculture John Block has been bequeathed a wide range of other responsibilities (and clientele): "food assistance" to the needy overseas (\$1.6 billion); "rural development," including loans for housing, utilities, and cable TV (\$14 billion); food stamps and school lunches (\$14.8 billion); food safety and quality (\$356 million); the Forest Service and kindred operations (\$2 billion).

Indeed, the "farm programs" category now accounts for only \$9 billion, or less than a fifth of the department's program outlays.

Of this total, only \$246 million goes to help farmers pay the costs of soil conservation. Roughly \$5.4 billion is earmarked for commodity loans and payments—down from \$6.6 billion in 1979. But the total federal commodity payout is unpredictable and may vary widely from year to year, depending on weather, export demand, free market prices, and the amount of crop land ordered "set aside" by the Secretary of Agriculture. Eligible for help are producers of corn and other feed grains, wheat, upland cotton, rice, soybeans, peanuts, tobacco, wool, sugar, and dairy products.

Through a complicated array of federal crop loans, direct payments, and commodity purchases (notably of milk), the USDA, in effect, guarantees each producer of these commodities a "minimum" price, if he cannot do better on the open market. The farmer, in return, accepts varying USDA curbs on his planted acreage ("set-asides") or actual production, as Washington seeks to keep supply in line with demand. With exports running high, no set-asides have been ordered for acreage devoted in 1981 to wheat, corn, and other feedgrains. Although nominal limits have been set since 1970 on the total annual amount any single farmer may receive, according to a 1981 USDA study, they "have never proved effective" due to various unpublicized exemptions. To get these programs through Congress, outnumbered Farm Belt legislators now have to make deals with urban lawmakers—endorsing food stamps for the poor in return for U.S. payments to farmers.

Notably unprotected are ranchers and livestock farmers, among others, who face steadily increasing costs but receive prices that may drop by 25 percent from one year to the next, even as consumers complain about high meat prices at the supermarket.

going is off-farm income—factory wages, salaries, dividends, retirement benefits. From 1960 to 1974, nonfarm income per farm increased on the average about seven percent per year. The trend has given farm families a financial security not found in agriculture, which is volatile in both yield and price, and thus has averted the further depopulation of the countryside.

Indeed, one-third of America's farms sell less than \$2,500 worth of farm products a year, but in 1978, *their* owners' average family income slightly exceeded the national median of \$17,640. These may be small farmers, but, contrary to the claims of subsidy-seeking farm lobbyists, no longer are small farmers necessarily needy, low-income folk.

How big is the most "efficient" farm? Long accepted was the notion that the capital-intensive new technology, particularly mechanized equipment, made "bigness" synonymous with efficiency, and thus lower consumer food prices. Every farm is different; raising wheat in Kansas is not the same as raising cotton in Texas. Yet with bigness, it was said, came lower production costs to the farmer per bushel of wheat, per bale of cotton, per pound of beef on the hoof.

But at some point, more "efficiency" and more acreage do not march together. A 1979 USDA technical study indicated that most—90 percent—of the "economies of scale" could be captured on family farms of relatively small acreage. But achieving the last 10 percent required that farms more than double in size.

For example, an Iowa corn and soybean farmer in 1979 could reach the 90 percent efficiency level with only 300 acres, selling \$60,000 worth of crops. To attain 100 percent efficiency, the same farmer would have to work 640 acres; he would then sell \$145,000 worth of crops. (As it happened, such primary farms in Iowa averaged 401 acres and \$123,000 in gross sales.) The most powerful incentive to buying—or renting—more land may simply be the desire among farmers to increase family net income—not to become more "efficient."*

Washington helps this along. Federal subsidies to producers of corn, wheat, and other commodities are based on the national *average* costs of producing each crop. The larger, more efficient farmers *specializing* in corn or wheat have lower-than-average costs, hence the subsidies tend to provide them with a windfall gain.† Since subsidies are paid on a per-bushel basis, these

* See *A Time to Choose: Summary Report on the Structure of Agriculture*, Washington, D.C.: U.S. Department of Agriculture, 1981.

† In 1978, one percent of the farmers, those with large farms, got 29 percent of all the federal commodity program payments.

farmers, in turn, can put extra cash into buying more land. Thus, indirectly, federal crop payments have an unequal effect; like the tax laws, they tend to favor the bigger farmer and help him to acquire smaller, neighboring farms.

Land, water, energy—these elements shape the long-range problems facing American agriculture. But, like the long-range energy problems evident to specialists but ignored by politicians during the 1950s, they have received little serious attention in Congress, the media, or the White House. Any major remedies involve financial burdens on farmers, consumers, or taxpayers. Hence, they also promise political pain to elected officials. It is much easier to inveigh against high meat prices, or “corporate agribusiness,” or “federal meddling.”

Thus, few of the real issues crop up in the congressional debate over this year’s farm bill, which will guide federal policy through 1985. In essence, the current Congress, like its recent predecessors, is simply tinkering with the farmer’s “safety net”—the crop-subsidy legislation created during the Great Depression of the 1930s. Both Republicans and Democrats tend to view the new surge in exports as a boon—keeping up grain prices and reducing farmers’ need for subsidies.

However, as Lauren Soth observes, America cannot possibly “feed the world,” or continue to serve as a “ready reserve” granary (as it has for the Russians). Its best land is already under cultivation; the pressure to “mine” more land and Western water is already high. Fairly soon, the United States will have to decide whether to restrict exports and pay farmers to conserve land, or risk the long-range loss of the productivity of America’s soil. U.S. agriculture, in effect, is experiencing a bonanza that, unexamined, could ruin us all.

AMERICA AND WORLD HUNGER

by Nick Eberstadt

The success of American agriculture is a crucial factor in supplying the world's food needs. The United States exports more grain than Latin America and sub-Saharan Africa together manage to produce, and it holds about half of the world's total grain reserves. Indeed, each year American farms account for roughly half the world's exports of grain and soybeans.

Opinion polls show that the American public consistently gives more support to "combating world hunger" than to most other U.S. foreign policy goals. Americans told the pollsters that they paid more attention to the 1974 World Food Conference than to the 1974 Ford-Brezhnev arms control meeting at Vladivostok. Since 1954, the United States has followed through on this commitment with over \$30 billion in outright gifts of food or long-term loans for food purchases, besides increasing its regular food exports. And American citizens have organized or financed most of the world's efforts to reduce hunger in the poorer nations.

Yet, despite three decades of such efforts, many authorities tell us that the number of desperately hungry people in the world is increasing. Estimates by the UN's Food and Agriculture Organization (FAO) suggest that about half a billion people in the less developed countries (excluding China) now suffer from malnutrition so acute that they would probably be hospitalized in Europe or the United States. The World Bank reckons that close to three-fifths of the families in the 90 poorest non-communist nations—which would be about 1½ billion people—do not get enough food. Based on a UN report, Robert McNamara, the bank's president until this summer, has claimed that "more than 30 million children under the age of five died of starvation" in 1978 alone.¹

Is world hunger really that severe? Probably not. The estimate of 30 million starvation deaths, for example, is flatly wrong. No credible estimate of the annual number of child deaths due to all causes is higher than 17 million, and 15 million is probably the most reasonable figure. Even if hunger were

completely eliminated, perhaps more than half of these tragic deaths would still occur as a result of accidents, disease, and other causes. The figure McNamara quoted, then, is about four times too high.*

The whole debate over world hunger—and how America can help to end it—is badly distorted by the lack of reliable statistics. In their zeal, many specialists on hunger have employed faulty data and shrill, headline-catching rhetoric. The problem is serious enough already; exaggeration serves only to make it seem less manageable and more hopeless than it is.

In a 1950 *Scientific American* article, for example, the FAO's director general, Lord Boyd-Orr, made a startling assertion: "A lifetime of malnutrition and actual hunger is the lot of at least two-thirds of mankind." Unfortunately, it later became apparent that Lord Boyd-Orr had made a mistake—he had reached his conclusion by looking at the wrong column of statistics.² Although this was pointed out, it was never corrected or even officially acknowledged. During the more than three decades since that gaffe, the FAO has done little to improve its reputation for attention to accuracy. In 1974, for example, an unexplained change in methodology raised the FAO's estimate of the incidence of serious hunger from exactly 20 percent of the poor world's population to exactly 25 percent, just in time for the World Food Conference in Rome.

For its part, the World Bank measures the extent of hunger using a formula that compares individuals' caloric intakes against a fixed standard. That's how it reached its conclusion that three-fifths of the poor world lives under the shadow of "caloric deficits"—malnutrition. Upon closer inspection, however, the numbers this formula churns out prove useless. In Taiwan, for example, 48 percent of the population would seem to be malnourished; in Hong Kong, 46 percent.³ This sounds grave indeed, until one learns that the average life expectancy in both places is over 72 years—about the same as in Finland or Austria. The World Bank overlooks the fact that human food needs vary widely; many people can live quite well on much less than the bank's standard.

*Without discounting the plight of the hungry, it must be said that many of the claims about the side effects of less-than-severe malnutrition are also false. Fertility, for example, is basically unaffected by nutrition unless women are beset by real starvation. As for the somewhat condescending claim that mental ability is impaired, it has been shown that every important experiment "proving" the connection between brain damage and mild or moderate malnutrition was significantly flawed. See Rose Frisch, "Does Malnutrition Cause Permanent Mental Retardation in Human Beings?" *Psychiatrico, Neurologia, Nethochirurgia*, no. 74, 1971. On fertility, see John Bongaarts, "Does Malnutrition Affect Fecundity? A Summary of Evidence," *Science*, May, 9, 1980.

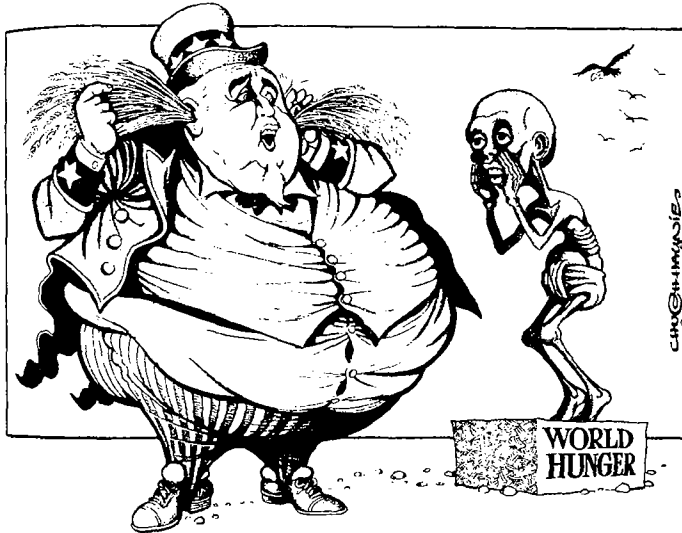
How can we get a meaningful impression of the dimensions of world hunger? We might start by looking at the results of eating patterns. Anthropometric tests, which compare weight to age or height, can tell us important things about the nutritional well-being of a population. Even this kind of data, unfortunately, can be easily misinterpreted if an American standard is used. One recent U.S. Agency for International Development (AID) study, for example, painted a sorry picture of Sri Lanka: By American height and weight standards, 42 percent of the nation's children were moderately or severely malnourished and less than 10 percent were "normal."⁴ If these researchers had bothered to measure life spans, however, they would have found that the average Sri Lankan can expect to live about 70 years.

Counting the Hungry

Another way to gauge hunger is to compare height and weight to death rates. Lincoln Chen, an American researcher at the Cholera Research Laboratory in Bangladesh, found that death rates for "normal," "mildly malnourished," and "moderately malnourished" children were all about the same. In fact, the rate for "normal" children was slightly higher than for their smaller and lighter playmates. But mortality rates were four to six times higher for "severely malnourished" children than for all other boys and girls.⁵ This certainly argues for concentrating our efforts first on the fraction of the world's population that is dangerously underfed.

How large is that fraction? According to a World Health Organization (WHO) survey a decade back, almost 10 million children under age five were "seriously malnourished" by anthropometric criteria.⁶ This number is far too low. It leaves out children over five and adults, which would double the total, and the hungry of mainland China, Indochina, and North Korea, possibly another 10 million people. The new number then has to be tripled at least: In many countries, of the total number of people who suffer from hunger in the course of a year, only

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Hugh Haynie, © 1977, Louisville Courier-Journal.
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A recurrent cartoon theme: "I'm sorry, . . . but you'll hafta speak up . . . I've got this darn wheat comin' out my ears!"

about one-third will be hungry at any single time. To correct for these factors and allow a margin for error, one would want to multiply the WHO estimate by a factor of about 10. This yields a current estimate of about 100 million desperately hungry people.*

Attending to 100 million people spread across perhaps 90 or 100 countries would be an enormous but manageable undertaking. More than two-thirds of these people are concentrated in mainland China, India, Bangladesh, Indonesia, Cambodia, Pakistan, Ethiopia, and Zaire.

There are signs, too, that the situation is improving. The figure of 100 million constitutes slightly more than 2 percent of the world's population, probably the lowest percentage threatened by serious hunger in recorded history. Moreover, life expectancy in the less developed countries (excluding China) has risen by more than a third in the last 30 years. In the same nations, the death rate for children under five years old (those most vulnerable to malnutrition) has dropped by nearly half since 1960.⁷

*Using an entirely different method, researcher Thomas Poleman has put this number at slightly under 70 million. See *Quantifying the Nutrition Situation in Developing Countries*, Cornell Agricultural Staff Paper No. 7933, 1979.

Why, we might well ask, are there even 100 million starving people in the world today? Is it possible, as some have suggested, that through extravagant consumption in the developed world and high population growth in the poor world, we are close to exceeding the planet's natural "limits to growth"? This is the Malthusian viewpoint, embraced most recently by the *Global 2000 Report to the President*, published in Washington last year. This sort of argument leads to the conclusion that every problem we now have is unsolvable.

This is certainly not true in the case of food, at least. The world's current food-grain (wheat, corn, barley, oats, sorghum, and rye) production alone would be enough to feed the planet's entire population and a billion people more, if it were evenly distributed. Food availability has been on the rise for a generation, as the growth in life expectancy suggests, and the increase is continuing. Since 1950, worldwide food production per capita has grown by about 40 percent, according to the U.S. Department of Agriculture (USDA).

In the poor regions of the world, FAO and USDA figures show that caloric intake per person has improved in each decade since 1950.⁸ Food imports and aid have helped to achieve this, but they do not explain it all. Domestic agriculture in the poor countries, though advancing at a slower pace than in the developed world, has still generated a 13 percent increase in grain production per capita (excluding China). Hunger in the Third World, then, is neither necessary nor inevitable.

"Ominous Food Deficits"?

Nor is there any measurable evidence that environmental limits will soon check the world's agricultural progress. If anything, agricultural resources are becoming *less scarce*. Soil erosion does indeed justify some concern. It is clear that poor farm management and overgrazing in Nepal, the Sahel, and elsewhere are degrading the soil. But as Rockefeller Foundation agronomists have shown, with improved cultivation and conservation practices, much badly abused land can be restored.⁹ Meanwhile, new land is always being opened up.

Between 1950 and 1980, the world's arable area grew by more than 20 percent, and at an even more rapid rate in the poor countries. In the decade ending in 1977, irrigated acreage around the world increased by more than 25 percent. Vast areas remain undeveloped. In South America, only 11 percent of the potentially arable land was being farmed; in Africa, only 22 percent, according to a 1967 UN study. If the tsetse fly, which

carries sleeping sickness, were to be controlled, an additional 1.7 billion acres in Africa could be devoted to agriculture, more than all the land now farmed in the United States.

Finally, the resources needed to exploit the land and increase productivity—fertilizer, pesticides, seed, and simple machinery—have all dropped in price (adjusted for inflation) over the past 30 years.¹⁰ Reckoning by supply and demand, then, these products seem more plentiful than ever.

Yet another school of critics worries not about scarcity but about abundance: Many development experts view the poor world's increasing reliance on foreign grain as a cause for alarm. Last year, the net grain imports of the less developed countries totaled nearly 70 million tons, up from about 20 million tons in 1960. In the otherwise sober study, *To Feed This World*, this is portrayed as a pattern of "ominous food deficits."^{*}

Putting Meat on the Table

Such criticism seems to assume that if a nation imports food, it can no longer feed itself or has lost its race against population growth. But this confuses biological need with economic demand. The two have nothing to do with each other. Taiwan's 18 million people purchase more American food than do Africa's 400 million; this is not because they are hungrier. It's because they have the money to buy luxury foods and because they feed American grain to their pigs and poultry. Conversely, the fact that Burundi and India *export* modest amounts of food does not mean that these nations have eliminated malnutrition.

It would also be a mistake to assume that food imports cripple less developed countries financially. The so-called developing market economies—the poor world minus OPEC, China, and the smaller communist states—spent less than 4 percent of their export revenue to import grain last year. For the 37 poorest nations in this group, the food-grain burden was higher, but even they could pay for their purchases with less than 10 percent of their exports.¹¹ By contrast, the oil bill for these poorest countries consumed 16 percent of their export revenue in 1977, up from 9 percent in 1960. To be sure, less developed countries face some serious financial problems, for a variety of reasons, and it would be a mistake to underestimate them. Nevertheless, it appears that the poor world, in general, could afford to finance even more "ominous" food deficits than it does now.

But why has food production in the Third World lagged be-

^{*} Sterling Wortman and Ralph W. Cummings, Jr., *To Feed This World: The Challenge and the Strategy*, Baltimore: Johns Hopkins, 1978.

hind demand? The answer has little to do with population growth, scarce resources, foreign exploitation, lack of native ability, or any of the factors usually cited by Western analysts. It can be explained in terms of a specific series of choices made by almost every regime in the poor world during the period of decolonization and national self-assertion after World War II.

Frustrating the Farmers

The nationalist leaders who came to power during this period differed remarkably in their ideologies. One need only compare Sukarno with Perón, Nehru, or Kwame Nkrumah to see this. On one point, however, they were united. They wanted to build powerful, "modern" state apparatus that would allow their nations, or at least their ruling classes, to deal on equal terms with Europeans and Americans. They would of course provide themselves with all the trappings of national power: airports, sports arenas, presidential palaces. But they would also rapidly build up an industrial base, even if that did not make economic sense.

That meant diverting scarce resources from the vast majority of the population that worked the land. Prices, taxes, investment, and credit were all skewed against the farmer to subsidize the build-up. These policies could be enormously influential. In India during the 1960s, for example, the government fixed the price of fertilizer so high that rice farmers had to produce four times as much rice as did their Japanese counterparts to buy a single kilogram. This was partly the result of New Delhi's decision to curb fertilizer imports, which were relatively inexpensive, and build up the domestic fertilizer industry. At the same time, many governments, India's included, imposed price ceilings on farm products to placate their city populations.

Predictably, the growth of agriculture in these countries was slowed. Overall economic growth was slowed too, as capital was diverted to less productive but more impressive uses in the industrial sector. Thus, there was less food—and less wealth with which to purchase food from other countries. The few developing nations that declined to follow city-oriented policies (e.g., Taiwan, South Korea, Malawi, the Ivory Coast) are all now in better economic shape than are their neighbors.

When the rulers of the less successful developing countries did turn their attention to agriculture, their policies often compounded their problems. When Burma took "the Burmese path to socialism" in 1962, for instance, it expelled the Indian money-lenders who had provided most of the crop loans to farmers (ad-



Thomas Malthus (1766–1834) was the first “limits to growth” theorist. He feared that population would pass the “limits of subsistence.” But Malthus later altered his views, worrying that birth control would slow population growth too much.

mittedly, at usurious rates). “Socialist agriculture does not need private encroachment,” it was declared. Largely as a result, the supply of rice available for export, which had once totaled 3 million tons per year, dropped to only 1.6 million tons in 1963.

Unfortunately, most of the developing countries have opted for centralized bureaucratic control of agriculture. What matters here is not so much the size of the bureaucracy—Taiwan employs 70 agricultural researchers for every 100,000 farmers, India only one—but how it operates. Taiwan’s bureaucracy is relatively large, but it is decentralized and devoted to research and farmer education rather than to regulation or management.

As a result of their choices, it may now make more economic sense for some developing nations to import food and export manufactured goods. With its state-of-the-art factories and low wages, India can produce a ton of steel at less than two-thirds of Bethlehem Steel’s cost, while it costs 40 percent more to grow a ton of wheat in the Punjab than in Kansas.

Eliminating the artificial burdens under which farmers in most Third World countries must operate would do much to increase domestic food output and speed overall economic growth. But if they achieved these goals, many of these countries would undoubtedly run up even greater food deficits, as consumers used their increased income to buy more meat and other high-quality foods (which happened in Taiwan).

If we look beyond "ominous food deficits" to the issues that underlie them, we see that the United States is in a position to reduce hunger in the poor world in some important ways. We cannot solve the problem alone. But we can use our predominance in the world grain market to organize an international grain reserve that protects the hungry against sudden crop failures and price hikes. At the same time, we can stabilize our erratic food aid policies to permit better planning among the recipient countries.

Through AID and our influence with the World Bank and the International Monetary Fund, we ought to be able to encourage freer, less city-oriented economic development. Finally, easing access to the American market would help some poor countries increase their manufactured exports, generating the income needed to pay for food imports. These are good opportunities. But we will not seize them or others that may arise if we are possessed by an overriding fear of food deficits and a feeling of hopelessness about alleviating world hunger.

NOTES

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 3. Shlomo Reutlinger and Harold Ackerman, *The Prevalences of Caloric Deficient Diets in Developing Countries*, World Bank Working Paper No. 374, January 1980.
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 5. Lincoln C. Chen et al., "Anthropometric Assessment of Energy-Protein Malnutrition and Subsequent Risk of Mortality among Preschool Aged Children," *American Journal of Clinical Nutrition*, August 1980.
 6. J. G. Bengoa, *World Health Organization Bulletin*, no. 4, 1974.
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 11. S. J. Barki and T. J. Goering, *A Perspective on the Foodgrain Situation in the Poorest Countries*, World Bank Working Paper No. 251, April 1977.
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BACKGROUND BOOKS

AGRICULTURE IN AMERICA

"The glory of the farmer," wrote Ralph Waldo Emerson, "is that in the division of labors, it is his part to create. All trade rests at last on this primitive activity. He stands close to nature; he obtains from the earth the bread and the meat. The food which was not, he causes to be. The first farmer was the first man."

Raising and selling crops and livestock has become vastly more complicated since Emerson's day.

With sympathy and precision, Mark Kramer describes the recent impact of technology, changing markets, and economic pressures on the operators of **Three Farms** (Little, Brown, 1979): a prosperous Massachusetts dairyman, an Iowa corn and hog farmer, and the corporate managers of California's long-troubled 21,000-acre Tejon Ranch.

What all had in common, Kramer found, "was their ability to apprehend a system that nowadays makes victims of its slacker participants and to operate with the canniness and vigor needed to make do in hard times."

How U.S. farming has evolved into a big business since the Jamestown colonists first learned to plant corn from the Indians makes a good story, gripping in its human details. In **The Fruited Plain** (Univ. of Calif., 1980), Walter Ebeling illuminates an encyclopedic survey of advancing farm technology and complex economics with vivid vignettes—about the settlers' westward movement, the 1930s Dust Bowl tragedy, the slow mechanization of Southern agriculture that forced millions of sharecroppers

(black and white) off the land and into the cities.

More specialized are Howard S. Russell's **A Long, Deep Furrow: Three Centuries of Farming in New England** (Univ. Press of New Eng., 1976), Lewis C. Gray's two-volume **History of Agriculture in the Southern United States to 1860** (Carnegie Inst. of Washington, 1933), and Edward and Frederick Shapsmeier's **Encyclopedia of American Agricultural History** (Greenwood, 1975).

Perhaps the best sense of the past is found in contemporary documents: early colonists' letters on the harshness of the New World; George Washington's voluminous agricultural correspondence; official texts (e.g., the 1862 Morrill Act); admonitory essays from farm journals. All of this can be found in USDA historian Wayne D. Rasmussen's many-flavored four-volume **Agriculture in the United States: A Documentary History** (Random, 1975); it is available in the bigger libraries.

A detailed USDA overview of current trends, complete with charts, comes in **Another Revolution in U.S. Farming?** (USDA, 1979) by Lyle P. Schertz et al., with separate chapters on the Northeast, Southwest, and other regions. Providing the official numbers on everything from broccoli production to the school lunch program is the USDA's annual book of **Agricultural Statistics** (Government Printing Office, 1980).

With Washington subsidizing agriculture since the early New Deal, U.S. farm policy has stirred perennial debate. Some specialists see

postwar federal controls and subsidies as having created a stable economic climate for farmers that encouraged their rapid adoption of new technology, preserved "atomistic competition," and gave America "chronic food abundance." Economists Willard C. Cochran and Mary E. Ryan make this argument in **American Farm Policy, 1948-1973** (Univ. of Minn., 1976). Stronger federal intervention may be needed in the future, they suggest, as U.S. grain exports fluctuate in the world market.

Economist Don Paarlberg, a former Eisenhower White House aide, is more skeptical in **Farm and Food Policy: Issues of the 1980s** (Univ. of Nebr., 1980). Waste aside, he suggests that, while federal subsidies helped many big farmers, they indirectly hurt smaller ones and may also have hurt America's competitive position in world markets.

Paarlberg devotes most of his wry prose to an issue-by-issue analysis of what lies ahead. He predicts that, given farmers' political myopia and declining power, agriculture will get far less preference in Congress when it comes to Western water rights, preserving farm land, new subsidies for commodities, environmental rules, and labor rights. Paarlberg believes that some issues, such as the behavior of "agribusiness," "are worth more to activists and politicians if they are unsolved than if solutions are found."

As Paarlberg notes, Washington is infested with scores of farm lobbyists, ranging from the venerable American Farm Bureau Federation to the National Farmers Union and the National Cotton Council.

These and many newer groups, including Ralph Nader's "consumerists," the "hunger lobby," and

welfare rights organizations are described in Harold D. Guither's **The Food Lobbyists: Behind the Scenes of Food and Agri-politics** (Lexington, 1980); their battles over a variety of recent issues are recounted in **The New Politics of Food** (Heath, 1978), edited by Don F. Hadwiger and William P. Brown.

Covering a broad range of subjects from soil conservation to plant genetic diversity is a useful collection of essays on **The Future of American Agriculture as a Strategic Resource**, edited by Sandra S. Batie and Robert G. Healy (Conservation Foundation, 1980). By and large, the authors are not alarmists. But economist Vernon G. Ruttan asks whether growth in U.S. farm productivity can be sustained.

As he sees it, there is a delay in translating new technology into higher crop yields. The biggest U.S. gains in this century occurred in 1950-65, long after the development of hybrid corn. Annual productivity growth has slumped since 1965. Research now underway—into improved plant species, induced twinning (in beef cattle), more effective pesticides—may not boost U.S. farm productivity by much until after the year 2000.

The apparent end of the long depopulation of rural areas is described by 22 sociologists and economists in **New Directions in Urban-Rural Migration: The Population Turnaround in Rural America** (Academic Press, 1980), edited by David R. Brown and John M. Wardwell. One reason for the turnaround: the sudden availability of jobs in the countryside as factories locate there to take advantage of lower wage rates.

Radical Agriculture, edited by Richard Merrill (Harper, 1976), is a Left critique of rural economic in-

equalities, with technology and corporations as prime targets. It is also a plea for small-scale "self-sustaining agriculture" based on organic methods. Essayist Jim Hightower indicts federally supported land-grant college researchers as handmaidens of agribusiness. He singles out the University of Florida, where a thick-skinned "hard" tomato was developed for machine harvesting, thereby eliminating the jobs of thousands of local farmworkers.

Despite mechanization, strong backs and careful hands are still needed to harvest most of the fruits and vegetables that grace the American diet. In **Hired Hands: Seasonal Farm Workers in the United States** (Rand McNally, 1978), economist Stephen H. Sosnick focuses on California; most of the hired hands there, he notes, are neither blacks nor Mexicans but young whites who go to the fields as a last resort.

When it comes to international trade, journalist Dan Morgan's **Merchants of Grain** (Viking, 1979) remains the best portrait of the secretive, but un sinister, big international corporations (e.g., Cargill, Continental) that buy, sell, and move

grain round the world.

Guarded optimism flavors Keith O. Campbell's **Food for the Future: How Agriculture Can Meet the Challenge** (Univ. of Nebr., 1979). The right application of science and technology, he contends, will increase world food production enough to feed the globe's two billion additional people expected by the year 2000. But many Third World countries must change present policies, notably to give local farmers price incentives to produce more food.

An opposing view comes from Medard Gable, in **Ho-Ping: Food for Everyone** (Anchor/Doubleday, 1979), who blames local food problems on maldistribution, Western profit-mindedness, and lack of a worldwide food management system.

In **Agricultural Development: An International Perspective** (Johns Hopkins, 1971), Yuiro Hayami and Vernon W. Ruttan analyze the differences among nations in farm productivity. They give good marks to the much-debated "Green Revolution" of the 1960s when improved seeds and technology increased crop yields even in India, one Third World country that now exports food.