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Agriculture in Wisconsin

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Agriculture in Wisconsin

Testimony to Troubles: Farming on the Edge

By Howard C. Richards

Everything is lopsided.
I raise hogs and the railroads and banks
Take them away from me
And I get hit in the hind end.
The more hogs I raise the worse my mortgages look.
I try to sleep and I hear those mortgages gnawing
In the night like rats in a corn crib.
I want to shoot somebody but I don't know who.
We'll do something. You wait and see.
We don't have to stand the skin game
If we're free americans.

Carl Sandburg, *The People, Yes*

There tends to be too much ceremony in agriculture and not enough testimony about its major problem—the lack of profitability. That's been my observation as Wisconsin's Secretary of Agriculture, Trade and Consumer Protection over the past six months. In this introduction, I will attempt to testify to the mix of problems affecting the farm community at present. I hope this will provide a suitable umbrella for the following distinguished authors and provide a useful forum for future discussion about Wisconsin farm problems.

Economic problems

A broad range of interrelated economic problems is currently staring at farmers. Many of the problems are manifestations of agriculture's small and fragmented political voice; none the less, they are serious problems for Wisconsin family farmers. A concise list and description include:

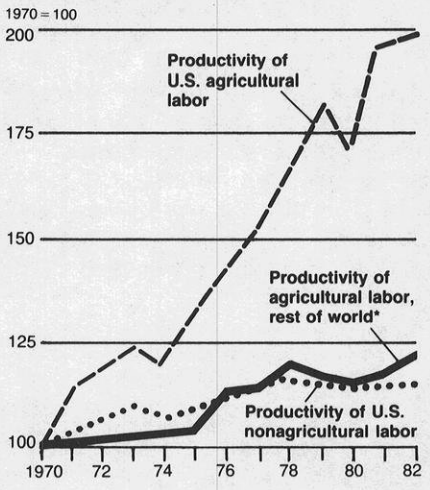
Excess Debt: Many farmers who expanded or entered farming with debt financing in the 1970s and early 1980s now find themselves with very high real interest rates and limited cash to repay the debts due to low farm prices. Farm debt in Wisconsin increased from $2.9 billion in 1978 to $6.8 billion in 1985 (excluding farm households), and in the nation debt increased from $131.9 to $198.9 billion. During the same period, interest on Wisconsin farm debt grew from $296.3 million to $703.3 million! Interest rates, both nominal and real, remain high and are higher than most nonagricultural borrowers because of perceived high loan risks. The UW-Madison's Department of Agricultural Economics estimates that in 1984 cash flow was negative on 50 percent of Wisconsin farms ("Financial Status of Wisconsin Farming, 1986"). Projections are that lenders will write off one third of the peak farm debt before agriculture stabilizes. Many farmers will leave voluntarily and involuntarily in the process, unless conditions change dramatically. Compared to other U.S. industries, farming has been and continues to be a relatively low leverage business, but in the past several years it has not had the net income to service even that modest level of debt.

Asset devaluation: Wisconsin farms have experienced on the average a 41 percent drop in value since their peak in 1981, about $7 billion in lost assets for Wisconsin farmers. A typical Wisconsin farm is about 213 acres. In other words, a "typical" farmer who, for example, had 40 percent equity in his farm in 1981 would have zero equity in 1986. The $94,000 drop in market value of his farm would be in addition to somewhat smaller drops in his machinery, livestock, and grain inventory values. Over-

all, even if he has been paying all of his expenses, it is likely to cause his lenders to be more reluctant to lend him much, particularly if they think farm asset values may drop more. For many younger farmers who may have had only 20 percent equity in 1981, they now owe about that same amount more than the farm is worth ($47,000) as they had invested as equity just five years ago. Further, they are now faced with the ugly reality that with current levels of net farm income and outlook, it may take them most of their farming career just to get back to $1 positive equity—a tremendously demoralizing situation. It is surprising more of them aren't giving up.

Excess capacity: Years of output expansion for a once increasing export demand and a demand fueled by government farm programs, have saddled agriculture with substantial (perhaps 20 percent) excess production relative to market demand at prices above cost of production. This excess capacity is a problem, not just in Wisconsin or the U.S. but worldwide. As communicated in Graph 1, the productivity of American agriculture has increased twelve times faster than in other segments of our U.S. economy or in agriculture in other countries of the world. Our farmers literally worked themselves out of a market. They did not forfeit it like some say the steel industry did by neglecting to reinvest in new technology. Neither did farmers lose their market because they overpaid labor-management as others accuse the auto industry of doing. But the effects are just as devastating, for they now face a long period when production is likely to exceed demand worldwide and hold the price of farm commodities below the full cost of production. The three agriculture embargoes implemented in the ten-year period by both political parties sent a pretty clear signal to the rest of the world that the availability of U.S. farm commodities was not reliable due to government policy, and other countries responded by capitalizing their own agricultural technology.

One Measure of a Strong Comparative Advantage: Rapid Productivity Growth of U.S. Agricultural Labor



*Data not available for 1971-74.

A paradox in the recent federal efforts to lower farm price supports to world market clearing levels is that individual farmers, using good judgment from their individual perspectives, respond to lower prices by increasing output. They can adjust this way to lower prices only until they get tired of working for very low returns or their bankers shut them off.

Lack of market control: Farmers, as primary commodity producers who lack significant market power, now receive only about 30 percent of the retail value of the commodities they produce. The marketing system claims the remaining 70 percent. And, the trend continues to shift toward processors and distributors who control and add value to food commodities as they proceed to the consumer. Although this widening of the farm-to-retail spread has been a boon to consumers and processors, it is ripping agriculture and rural communities apart. If farmers had more control over the merchandizing and pricing of their commodities, inflation could not have been broken over their backs. For comparison, it seems ironic that in 1984 the total value of all U.S. farm product sales was $142.9 billion, but premiums paid to U.S. insurance companies that year were $249 billion—75 percent more.

Profitability. The lack of profitability in agriculture is the culmination of other problems. Farmers haven't found a mechanism to control their aggregate production, so production has not been controlled to achieve optimal profit levels. Farmers, as tremendously productive as they are, have not been able to increase efficiency rapidly enough to offset the declining price levels in the last few years. In Wisconsin, farm milk prices have declined by over $1.50 per hundredweight since 1981 (including assessments for dairy programs). Current market prices for corn are $.75 per bushel less than a year ago. I estimate the average Wisconsin farmer to earn about $2.00 per hour for labor and 4 percent return on equity invested in the business in 1986. This year, federal programs will provide revenue equal to 40 to 50 percent of net farm income in 1986—with total federal farm program costs hovering at $25 to $30 billion record levels.

Understanding and accepting these problems are complicated by the rhetoric and claims that some, although few, of our full-time family farmers have little or no debt, and that a few commodity and size segments of agriculture are profitable despite low commodity prices. The recent large increase in farm accidents, family problems, farm infant deaths, alcohol abuse, and suicides demonstrate to me that farmers are not doing very well at all. I suggest much more detailed data are needed on the profitability of full-time family farmers. We need this to demonstrate to ourselves and to policy makers what the true profitability is in agriculture. The present data are too cluttered with non full-time farm (hobby farms) and mega-farm information. I believe the Wisconsin-sized family farm has lost its ability to generate a reason-

able return to equity and labor and will lose ground to southern and western regions in the future without substantial reform in how farmers assume responsibility and take action. This, of course, has to be weighed against the opinions of others who believe land devaluation is bottoming out and that export market growth will restore profitability to agriculture.

Organizational problems

Full-time farmers now comprise only about 0.7 percent of our nation's population and 0.9 percent of Wisconsin's population. This makes the farmers' political voice rather small, but the farmers' economic power is substantial.

In Wisconsin, farmers participate in at least five general farm organizations and seventy-five other farm and commodity groups, not including the cooperative organizations which also actively take positions on farm issues. Multiply this by fifty states to understand why so many voices speak for agriculture.

Within each farm organization members debate the pertinent issues; then the organization makes recommendations without conferring with similar organizations which have similar objectives. Thus policy makers receive often conflicting directives from the array of farm organizations and must sort through the alternatives. Various farm organizations, for example, recommend farm income-support programs *and* a free market orientation; support programs with acreage reduction provisions *and* for removal of controls such as quotas (or even supply management through quotas). Some recommend more outside investors in agriculture; most want fewer outside investors. Some want 100 percent of parity; some want 70 percent. Some are eager for new biotechnology; others fear it. If these organizations could reach a consensus before making the recommendations, farmers would send one clear message about what they support and demonstrate to the public the kind of policy decisions they need.

Some additional problems that need solving include:

Unpredictability of government programs. Farmers have dealt with five farm bills in five years. That makes planning practically impossible.

Overdependence on government-supplied business information. Farmers depend on a far-removed government system to provide their planning information, such as profitability and production levels. We either need to improve the federal system or construct an alternative source for more detailed business data. The methods of financial evaluation used for farming largely come from outside farming itself and create problems of understanding and confused perspective as we compare it to other segments of our economy. For example, unlike other businesses, Generally Accepted Accounting Principles (GAAP) are usually not used with farmers; instead, farm assets are valued at market rather than cost. Further, a common belief is that farmers get beneficial income tax treatment, but the reality is that farmers have less sheltered income over a ten-year period than employees of substantial organizations receiving company-sponsored health insurance, pension benefits, life insurance, and participating in an IRA on their own.

Long range planning. People in agriculture and its component parts need to coordinate their long-range business and policy planning to avoid unnecessary conflicts. People in agriculture have to take more responsibility for designing their own solutions. Farmers must learn that they are not guaranteed a profitable market for their output any more than any other business person.

Coordination and market control. Presently, so much of agriculture is controlled by those ultimately not responsible for profits of the farmer, including government, university researchers, and suppliers of technology to agriculture—all driven by different motives. Most of these are employed by very large institutions quite unlike individual farms; therefore the interests of their own institutions are placed before those of farmers.

Health risk—life style. Modern farmers are operating in America's most dangerous occupation. The health risk to farmers resulting from the increased use of chemical pesticides is relatively unknown, but several recent studies indicate it is great. Further, the suicide rate for men is 57 percent higher for farmers than nonfarmers. With so many of Wisconsin's full-time farmers working in dairying or other intensive livestock operations, lifestyle limitations are also a problem. The single family farm requires work seven days a week, with livestock chores twice a day, which prevents parents from taking trips together with children. Guilt and frustration result.

Conclusion

Agriculture will eventually again be a profitable occupation, one way or another. The extent to which medium-sized farms will be a part of the profitable structure will depend on the responsibility farmers assume themselves for problem-solving action. Family farmers must present a clearer picture of their problems and offer possible solutions. I believe we can make progress towards this end.

The current economic problems confronting agriculture are severe. Many of our farmers will leave farming. But, with some revision of our traditional organizations and institutions, I believe medium-sized farms can produce efficiently and profitably into the twenty-first century and continue providing our society with the lowest cost food in the world.

Howard C. Richards was appointed Secretary of Agriculture, Trade and Consumer Protection in April 1986 after seventeen years in banking in St. Paul. He has a B.S. and M.S. in agricultural economics from UW-Madison.

Research and Education Needs

During A Period of Transition in Wisconsin Agriculture

By Leo M. Walsh and Neal A. Jorgensen

At a time when many Wisconsin farm families are suffering serious financial and economic stress, it is understandable that some individuals and organizations are critical of institutions and programs designed to serve agriculture. These troubled times generate questions and examinations which are a healthy part of our pluralistic society and an important element in the evolution of our public institutions.

In examining agriculture's current misfortunes, however, it is appropriate to view them in their larger context. Despite our present problems, U.S. agriculture is the envy of nations around the world struggling to meet the food and fiber needs of their people. There is not a political leader in the United States who would trade our problems of food abundance for problems of food shortages. As we consider alternatives for dealing with our current problems, we need to remember how extremely efficient and productive our overall food systems have become.

Public commitment to research/education

The basis for this nation's highly successful food and fiber production includes progressive farmers, fertile lands, favorable climate, and well-developed input and marketing infrastructures. But also important in this success story was an early and consistent public commitment to agricultural research and education.

A key part of this public commitment was the Morrill Act of 120 years ago. It established the land-grant system, of which the University of Wisconsin-Madison is a part. Partially a reaction to the elitism of private eastern universities of the day, the land-grant universities were charged with investigating opportunities and practical problems in their home states.

The Hatch Act of 1887 was another important part of the public commitment to agricultural research and education. It created the nation's agricultural experiment stations and provided federal agricultural research dollars. This unique state-federal partnership continues yet today to serve the basic and applied research needs of our complex food production and distribution system.

The land-grant philosophy was given new meaning with the passage of the federal Smith-Lever Act in 1914. This act created the Cooperative Extension Service, which links the research laboratories and the farmers, agribusiness people, cooperative leaders, processors and marketers, and consumers who use the research findings. Through county extension offices the UW reaches every community in the state.

The Wisconsin Agricultural Experiment Station and the Cooperative Extension Service, along with the college's resident instruction program form the three principal elements of the College of Agricultural and Life Sciences. They are the embodiments of the land-grant system philosophy.

Studies to determine returns on public investments in agricultural research and education show annual returns consistently range from 30 to 40 percent—higher than almost any other public or private investment in the American economy. Stated differently, taxpayers get 30 to 40 cents back *each year* on every dollar they invest in agricultural research. If banks paid that interest rate on money we invested there, we'd all be more enthusiastic savers.

Nearly everyone benefits from agricultural research. Research discovers new ways for farmers to plant, till, and harvest crops more efficiently and grow livestock with fewer production inputs. New technologies remove production risks and take some of the hard work

and drudgery out of farming. Research gives industry improved ways to process, pack, store, and transport agricultural products. But the ultimate beneficiary of agricultural research is the consumer. Agricultural research helps produce abundant, safe, nutritious, and high-quality food supplies at attractive prices.

If the food story could stop here, it would have a happy ending. Unfortunately, farmers have not been well paid for their efforts in recent years, despite their high efficiency and significant contributions to the economic and social well-being of the country. Many are suffering financial stress, along with the rural communities and businesses which rely upon them for their economic health.

Agriculture and rural communities are in a period of significant transition. The UW-Madison College of Agricultural and Life Sciences is now examining this transition and is involved in a long-range planning effort which will guide program development during the next ten years. The overriding planning objective is to identify actions needed to enhance the college as a preeminent research, teaching, and extension institution in order to improve its value to agricultural producers and all of society.

This article outlines what we feel will be the major areas of emphasis for agricultural research, teaching, and extension in the next decade.

Restoring farm profitability

No issue on the college's research and education agenda has a higher priority than that of restoring profitability to our family farms. The attack on this problem must be carried out at many levels, but for our discussion here it will useful to think about macro- and micro-economic factors, as well as short- and long-term actions.

Macro-economic factors: Much of the financial distress which envelopes farm families today was brought on by macro-economic forces far beyond the control of farmers and agricultural leaders. Monetary decisions, interest rates, dollar value in international trade, federal farm policies, national debt growth, taxation policies, and a host of other factors teamed up to deal farmers a shattering economic blow. Farmers have lost substantial portions of their international markets, which at one time were taking production from two of every five U.S. crop acres. With international markets declining, surplus production ballooned and commodity prices fell. Soon land prices dropped, and farmers were left with high interest payments on land that had depreciated 30 to 50 percent in value. The farm financial storm was upon us.

Agricultural colleges cannot affect these macro-economic trends and probably are not much better at predicting them than other viewers of the political scene. But our researchers can make major contributions to society's efforts to cope with macro-economic forces by providing careful analysis of public policy proposals and their likely effects.

A major policy debate is now developing over the surplus production issue. Free market strategies, voluntary production controls, and mandatory production quotas are but a few of the approaches offered. Faculty members analyze these alternatives, and try to make predictions about possible effects of each. They also formulate new public policy approaches, but they don't advocate. Advocacy is a function of the political process and should not be performed by educational institutions.

Micro-economic factors (short-term): While macro-economic forces are largely responsible for much of agriculture's current financial trouble, it is the micro-economic factors—those things happening to individual farm units and families—which have gotten most public attention. In the short-term, research can do little to affect micro-economic factors. Those emergency measures are best carried out through Cooperative Extension Service (CES) programs.

CES in the spring of 1985 launched a highly successful effort called Strategies on Survival (SOS). Added to the on-going agricultural extension programs which regularly reached some 80 percent of Wisconsin farm units, it attempted to bring individualized analysis and counseling to those farm families at financial risk. It brought help in handling farm and family finance problems, managing family stress, exploring farm profitability alternatives, suggesting referrals to other governmental agencies, and evaluating possible off-farm income and employment options.

When SOS program results were last tabulated at the end of March 1986, agents had reached 5,198 people with 7,778 hours of face-to-face consultation. Group contacts reached 10,303 people with farm financial management information; 11,608 with farm profitability information; 4,469 with family stress information, and 2,487 with family resource information.

Micro-economic factors (long-term): In the long-term, agricultural research and extension can do much to affect micro-economic factors. When the farm financial crisis descended on Wisconsin, no state or federal agency and no UW department had a clear understanding of it. The numbers needed to make an economic analysis were not available. The Governor's Commission on Agriculture, farm lenders, and governmental agencies all called for better farm financial analysis.

Faculty members in the UW-Madison Department of Agricultural Economics have proposed a farm financial analysis program which would focus research on farm financial management. The program would enable farmers to make better farm financial decisions. It would give lenders, agribusiness people and government officials a better understanding of the overall farm economy in Wisconsin. It is a high priority item on the college's research and extension agenda.

In addition to improved farm financial data, the college needs to press ahead with research and exten-

sion programming that keeps Wisconsin farmers efficient and competitive. Because of surplus agricultural production, some people are urging that we halt research which could lead to technology development. The answer here is not to turn technology generation off, but instead to find ways to transfer new technology to our family farmers as rapidly and as prudently as possible. The quickest way to drive farm families out of existence is to retard the flow of new technology to them. Wisconsin farmers will either learn to make new technology work for them, or they will be competitively disadvantaged by it. Increased productivity is the driving force behind a proposal to establish an extension dairy profitability center. Wisconsin's dairy industry will survive as an economic force only if it can compete. The center would help ensure that it can.

Nearly all of our research efforts produce size neutral technologies. Milk testing, artificial insemination, forage testing and ration balancing, improved crop varieties, and a host of other practices reduce purchased inputs and increase profitability. They are as valuable to small- and medium-size farm operations as they are to larger operations.

Biotechnology and agricultural productivity: Most of the production research the college does is not designed to increase output. What we attempt to do is increase production efficiency, productivity, by getting the same level of output with fewer inputs. In the 1930s and 1940s, productivity was expanded greatly through farm mechanization. From this mechanization period, U.S. agriculture entered the chemical era; pesticides and fertilizers greatly increased production potential. Now, biotechnology is poised for a remarkable impact on agriculture.

Altering the basic genetic makeup of living organisms holds enormous food production promise. During the next fifteen to twenty years, we will see more and more engineered products working on farms in this country and around the world. Biotechnology will be an important element in keeping this nation's agriculture competitive.

These new biological techniques can produce growth hormones for more efficient meat animal growth and milk production. Engineered strains of corn may contain improved disease and insect resistance, along with more efficient sunlight use and improved nutritional qualities. New kinds of bacteria may devour toxic wastes, fix nitrogen for plant use, guard against cold damage, and destroy "bad" organisms. Healthier livestock can exist, protected by genetically engineered vaccines. Bioregulants can spur plant growth, increase yields, and reduce fertilizer needs. Biotechnology can also affect the way we process and market foods and aid in cures of genetically caused human illness. These advances could also lead to social and economic changes which will need careful study. People and communities may need assistance as they adapt to some of the major changes the biotechnologies promise to bring.

Reducing environmental impacts

The college has a long, proud history of soil conservation work, stretching as far back as the 1880s when Professor F. H. King wrote a bulletin on "Destructive Effects of Winds on Sandy Soils." College work also helped establish the nation's first watershed project in Coon Valley. Despite these early and continuing soil conservation efforts, the job of controlling soil erosion is far from done. In recent years, college scientists have developed conservation tillage practices and encouraged farmers to adopt them. While these practices reduce soil loss from row-cropped fields and save energy, they also are pesticide intensive.

When fossil fuels were cheap, U.S. farming practices, like home heating systems and large automobiles, were energy extravagant. Higher prices have now made us energy conscious. College researchers and extension faculty helped Wisconsin farmers adjust to more expensive fuels. Wisconsin leads in the development of naturally ventilated livestock buildings. Improved crop harvesting and drying techniques are being pioneered at Wisconsin. Heat exchangers to cool milk and heat wash water have been studied. Extensive research has been done on generating methane from animal wastes and producing alcohol from grain and crop residues.

An intensive project in manure management and use has been in progress for ten years. The project has emphasized storage and application systems not only to avoid environmental pollution, but also to lessen need for chemical fertilizers. Soil researchers have also carried out long-term research into application of municipal sewage sludge on croplands. Again, environmental impact was reduced, while farm production costs were lowered.

Integrated pest management programs have been emphasized. Although use of scouts to monitor pest damage and reduce need for pesticide applications is the best known part of the program, it really is a systems approach to insect and disease control. Plant genetic resistance, biological control, and cultural practices, including crop rotation, all play a role in reducing pest damage. Chemicals are used only when necessary, again reducing production costs and environmental harm.

The UW-Madison is a leader in water quality research, and the college has performed a major role in that effort. College and extension programs have emphasized control of nonsource point pollution from farms. Rural septic systems are a frequent pollution source. The small scale waste project showed the way to control that problem without halting home building. A variety of research and educational programs have addressed the problem of groundwater pollution from fertilizer and pesticide applications. One highly successful program monitors plant stress and weather factors to help farmers better schedule irrigation. Applying water only when needed reduces production

costs and lessens danger that fertilizer and pesticides will leach into groundwater, particularly in sandy soils.

Despite many successful efforts aimed at controlling groundwater pollution, this remains a top priority for college research. We need to understand better where chemicals come from, how they break down in soil, how they move through underground aquifers, and what their fate is once deep underground. Only long-range and comprehensive research can provide the answers we need to manage better our valuable groundwater resource.

Improved agricultural marketing

College researchers and extension faculty are extensively involved in improved agricultural marketing. They have worked with Wisconsin agricultural leaders in implementing successful milk and livestock marketing cooperatives, graded feeder cattle sales, computer auctions of lambs and hogs, and tested hay auctions. They provide processing technology to scores of meat, milk, fruit, and vegetable processing firms. In recent years, agricultural economists have studied food retailing structures and market concentration.

Despite these efforts, more attention to agricultural and food marketing is needed. Many agricultural commodities face stagnant or declining per capita consumption, synthetic food competition, emerging health and diet concerns, and changing tastes. International food competition grows more intense daily. All argue for greater marketing emphasis.

With strong urging from industry and contributions from Wisconsin dairy producers, the college has established a Center for Dairy Research which will emphasize work on dairy product and market development. This integrated research effort, supported initially with funds from the Wisconsin Milk Marketing Board, will study dairy product marketing from the genetic make-up of the cow to consumer nutritional concerns and taste preferences.

Rural and economic development

Farming exists within the context of communities, rural economies, and a larger society. The college—home of the leading department of rural sociology in the country and one of the nation's top departments of agricultural economics—is actively involved in maintaining the viability of rural communities.

In recent years, research and extension faculty have extensively studied poverty in rural Wisconsin, special problems and needs of small and part-time farm operators, property tax alternatives, and agricultural land-use preservation. A study is currently under way to determine social and economic impacts of bovine growth hormone on Wisconsin dairy farmers. A rural sociologist has studied needs of migrant workers and looked at medical care delivery systems. Others are giving attention to farm structural problems.

The college has some of the top community development extension specialists in the country. These faculty know that farm families depend increasingly on off-farm income. This means rural communities must be made attractive for business and industrial development if those job opportunities are to exist. Faculty are studying conditions that lead to community development and are working with community leaders to bring those conditions about. Extension's Small Business Development Center also plays a critical role in this rural development.

Conclusion

While other programs, projects, and individual research and extension efforts deserve mention, space permits highlighting only the college's highest program priorities. As part of a land-grant institution, we exist to generate new research knowledge and engage that knowledge in problem solving for Wisconsin people. We welcome your suggestions and inputs as we plan for and work toward a stronger agriculture and better rural Wisconsin.

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Leo M. Walsh, dean and director of the UW-Madison College of Agricultural and Life Sciences since 1979, has a Ph.D. in soil science from UW-Madison.
Neal A. Jorgensen, associate dean and director of the college since 1984, has a Ph.D. in dairy science from UW-Madison.

Agricultural Research and the Ideology of Productivity

By W. Thomas Lamm

Today's economic crisis in agriculture is usually compared to the Depression of a half-century ago. But to a significant degree, agriculture's current crisis expresses the more fundamental changes wrought by technology and the world economy, which could initiate an era more dramatically different than Wisconsin agriculture has experienced in a century. It is, therefore, an important time to determine the role that our public agriculture research system will play in these coming changes.

In 1864 Chester Hazen put up the state's first cheese factory at Ladoga, located a few miles south of Rosendale on Highway 26. Although dubbed "Hazen's Folly" by detractors, it kicked off a building boom that produced fifty more cheese factories by 1870. In 1872, the "Seven Wisemen of Wisconsin Dairying," led by W. D. Hoard, met in Watertown and chartered the Wisconsin Dairymen's Association, Wisconsin's first such statewide group. In 1885, *Hoard's Dairyman* was added as a two-page supplement to the *Jefferson County Union* (Osman, 1985).

Thus began Wisconsin's shift from an unstable, soil-eroding cash crop agriculture to a century of relatively stable, land-conserving dairy farming. Paralleling and sustaining the growth of the Wisconsin dairy industry was that of the University of Wisconsin College of Agriculture, our land-grant school with its attendant experiment stations and extension system. From the promotion of the vertical silo by F. H. King, to the Babcock butterfat test, to the isolation of vitamins by Harry Steenbock, the college directly served the practical needs of a broadly dispersed agricultural industry. In doing so, it focused on producing a healthful and bountiful food supply for an expanding population.

Unfortunately, this paramount goal of producing a bountiful food supply has become so deeply ingrained as to resemble an ideology. Rural sociologist Frederick Buttel (1985) points out what might be called the "ideology of productivity":

> There is a strong irony, for example, in asking why the land-grant system so single-mindedly pursued productivity—increasing solutions to farmers' problems during the 1950s and 1960s when the major problem that farmers faced during these decades was chronic overproduction. The land-grant system thus produced not only productivity-increasing technologies that exacerbated subsequent overproduction problems, but also, in effect, an ideological system that reassured farmers that they could produce their way out of overproduction problems.

In land-grant universities this ideology of productivity has in turn fostered an internalized research culture and reward system that has further isolated them from the mounting economic, social, and environmental problems that surround contemporary agriculture.

Outside of the land-grant system, various movements have arisen to articulate and draw attention to these problems. Environmental concerns and the industrialization of agriculture have spawned approaches that come under the banners of regenerative, sustainable, low input, and alternative agriculture. The concept of profitability has been advanced recently as an alternative to productivity, as suggested by William E. Marshall (1986), chair of the National Agricultural Research and Extension Users Advisory Board:

> A word about "productivity." Productivity is the quotient of output expressed in bushels or pounds and input expressed as acres or number of animals, etc. My economist friends argue that this indirectly reflects profitability. Why is it then that so many farmers have consistently increased their productivity while going bankrupt? We need a new word to reflect directly the financial health of our farming operations. What's wrong with the word "profitability"? What's wrong with giving county-fair blue ribbons to the most profitable farmers?

Although the UW-Madison College of Agricultural and Life Sciences, as it is now called, has taken notice of these external movements, it remains to be seen whether their broader objectives are a match for the ideology of productivity. For example, the college's strident defense of the bovine growth hormone is a good illustration of its continued confusion over what is productive and what is profitable. Marshall illustrates this point by contrasting the hormone with the potential for research into an alternative, more profitable, approach:

> Let's examine two technologies to make milk production more profitable. First is the use of bovine growth hormone to increase milk production and productivity. Professor Robert Kalter of Cornell University has studied the economics of its use in farming. A dairy farmer with 100 cows would invest $4,000 a year for the hormone and $9,000 for additional feed concentrate. At today's support prices, this $13,000 investment would return $17,000 in additional milk receipts. Therefore, the farmer's return is $4,000 on an investment of $13,000 or 30 percent. However, economics dictate that milk prices will quite likely fall with all the additional milk, and, furthermore, daily injections of the drug may require additional veterinary service. But clearly these animals are more productive; as much as 25 percent more productive.
>
> Contrast now the above example with the use of selected naturally occurring microorganisms that naturally increase the nutritional value of silage. These organisms work during the ensiling process to break down the fiber making it more available upon consumption. A farmer with 100 cows, would invest $600 for the inoculant when putting up his silage. When feeding out the silage, milk production would increase to provide more than $4,800 in increased milk receipts, a return on investment of 800 percent. The producer's initial investment is lower with a greater absolute return. It is, therefore, more scale neutral. It is more efficient by increasing milk per acre rather than milk per cow. It, therefore, provides the flexibility of lowering costs without changing total production. Profitability has increased more than production and more than productivity.
>
> I am not criticizing the fine work of our scientists in identifying and cloning the bovine growth hormone or showing its potential in a dairy operation. It is rather an example of how we have overfocused on productivity and of how we have elevated productivity from a strategy to an objective. (Marshall, 1986)

The virtual endorsement given the bovine growth hormone by the college in 1986 came at the same time that University of Wisconsin President Kenneth Shaw announced that the university cannot advocate for any particular economic institution in society, such as the family farm. On what premise does the university differentiate between endorsing technologies and endorsing institutional arrangements?

The reactive posture taken by the college in the bovine growth hormone issue is part of a larger problem: its lack of a clear research mission. In fact, the college has no specifically stated goals for its research system, no research policy statement to set priorities, and no strategic plan to carry out priorities. Given the complex array of choices and challenges facing contemporary agriculture, an undirected public research process cannot hope to maintain the college's position as the state's institutionalized intelligence on agricultural and rural problems.

The college needs to adopt some formal (yet highly resilient) planning process to allow its research system more directly to respond to the public will, to make conscious choices among infinite technological alternatives, and to pay proper attention to the impact of technologies on society.

The structure and dynamics of the college's research system are a mystery to all but a small group of public administrators and university faculty. To start the system on a more deliberate path, more people will have to find out how the current system works. One way to understand how the system works, and whether it is working correctly, is to look at how different parts of the system lie in balance with each other. In the following I examine two areas, the first being the balance between the physical and the social and economic sciences and the second, the balance between basic and applied research.

We will first focus on the balance between the physical sciences that produce technology and the social and economic sciences. The history of the land-grant university system indicates that from its inception it has always favored the physical sciences. We have long assumed that technology has freed the farmer from servitude and given us our competitive edge. We need to reconsider this assumption. A growing number of sociologists and economists claim that agriculture suffers from too much of the wrong kinds of technology. They point out that we have made only token investments in understanding the broad social and economic impacts of our technology.

Gary Rhode, secretary of agriculture, introduced us to the notion of the "technological treadmill," developed twenty years ago by Willard Cochrane, an agricultural economist at the University of Minnesota. Cochrane (1979) notes that farm technological advance in a free market situation forces the participants to run on a treadmill:

> The aggressive, innovative farmer is on a treadmill with regard to the adoption of new and improved technologies on his farm. As he rushes to adopt a new and improved technology when it first becomes available, he at first reaps a gain. But as others after him run to adopt the technology, the treadmill speeds up and grinds out an increased supply of the product. The increased supply of the product drives the price of the product down to where the early adopters and all of his fellow adopters are back in a no-profit situation.

The *Drovers Journal* (August 1, 1985) carried an update of Cochrane's work conducted by research economists with the USDA's Economic Research Service. Using an economic model, they described how early innovators profit from investments that also raise costs. By the time about half the farms have shifted from the traditional into the innovator category, profits fall below the level needed to keep farmers in the industry. When equilibrium is reached (the point at which no further change occurs), there are 12 percent fewer farms and total income is substantially lower than when change was introduced.

Technology can be a mixed blessing to the farmer, and we have made virtually no meaningful investment in understanding its impact. Our public research system should be doing far more of the kind of work that Cochrane has pioneered.

There is another reason why we need to reexamine our overreliance on technological research. Our success in solving agriculture's problems is just as dependent on well-crafted institutions as it is on well-crafted machines. Many agricultural institutions we live with today should have been relegated to the trash heap years ago, and the new ones coming off the line show all the signs of poor design and shoddy workmanship. The current whole herd buyout program is the perfect example of a hastily contrived, institutional nightmare that will not work and no one wants. Our research system could have helped us do much better. Agricultural tax shelters have dumped billions of dollars of unwanted capital into agriculture, shifted the control of significant segments of agriculture into the hands of nonfarm investors, forced overproduction, and driven down commodity prices. This tragedy has received scant attention in our agricultural research institutions. Many of the agricultural tax reforms recently enacted at the federal level are due to the work of small, private special-interest organizations.

John R. Commons is a revered but not widely known figure in Wisconsin history. As an institutional economist at the University of Wisconsin during the first third of this century, he laid the economic foundation for the Wisconsin Progressive Movement, and through his students, the economic foundation for the New Deal. Agricultural economist Kenneth H. Parsons, in reviewing the outcomes of contemporary technology-driven agricultural development policy, refers back to Commons's analysis of the balance needed for proper agricultural inquiry:

> As I try to understand the various international programs to encourage and support agricultural development, I conclude that, for the most part, they have adopted as a central emphasis that agriculture can be developed by principal reliance upon increasing man's control over physical nature—by the application of science and technology, much of it within something like a free-market context; this seems to me to be the main thrust of the programs of the World Bank and the bilateral assistance program, including U.S. AID, as well as of our great foundations. Nowhere have the comprehensive outcomes been very encouraging. And the future looks no better, until economists achieve wider terms of reference. The major inference I draw from Common's analysis on this point is that increasing man's control over physical nature can never be more half—to speak elliptically—of the basis of the development of agriculture, for programs of development must be carried out by the wills, the acts, and the hopes of man. (Parsons, 1985)

In other words, many problems of agriculture cannot be solved through the application of technology. Many of these problems are institutional; they deal with the issues of who will control technology and how its benefits and costs are to be distributed. The University of Wisconsin is nationally known as the home of the field of institutional economics. The fact that its actual practice here has languished is telling evidence of the current imbalance of our agriculture research system.

A second important place to check the agricultural research system is in the balance between basic research and applied research. Basic research is done by highly specialized researchers and produces a product of no immediate practical value. An applied researcher

has to turn it into something useful. Both kinds of researchers are important to an effective research system.

We must make a deliberate choice about the mix of research that we want. Public researchers could conduct basic research and turn all the results over to private industry, which would sell the results to farmers. Or public researchers could focus a major share of their basic and applied research on technical alternatives aimed at minimizing purchased inputs.

Unfortunately for the farmer, the balance is shifting toward the first alternative. For example, in June 1982, the White House Office of Science and Technology Policy issued a report titled "Science for Agriculture," which contained major implications for the future of public applied research. It recommended creating a national institute of agriculture. The effect of this could be to concentrate public research in a small number of major land-grant and private universities and transform smaller land-grant and agricultural colleges into scientific backwaters. (Doyle, 1985)

In early 1985, the USDA Agricultural Research Service declared that it was no longer going to release finished plant varieties. In addition, a look at the president's 1986 federal budget reveals major cuts in applied research and extension funding for universities. Finally, at the college level, departmental resources are being reallocated from applied research programs to basic research programs which attract higher levels of external funding.

This gradual elimination of applied research funding is creating a growing distance between the farmer and the university researcher, a gap willingly filled by the profit-driven private entrepreneur. If this trend continues, the only way the farmer will have any measurable access to his tax-supported agricultural research is through the filter of the large agribusiness corporation.

The family farmer and the small agribusinessperson must have a vigorous applied research program as a shield from the concentrated economic might that surrounds them. That shield has been worn too thin.

A century ago, the University of Wisconsin-Madison College of Agriculture was embroiled in controversy. Criticism over the college's inability to serve the practical needs of farmers resulted in a major movement to separate the college from the university and move it from Madison. In the decade between 1876 and 1885 the college was the topic of hot debate during the state's annual Agricultural Society convention. In November, 1884, a general farm convention was held to frame a specific proposal for the college's secession from the university. In 1885, the University Board of Regents and the Wisconsin Legislature established two institutions which ended the secession movement. These were the short course and the farmers institutes, which became two of the most successful experiments in adult education in the state's history. (Glover, 1952)

The controversy and debate of a century ago did not weaken the college of agriculture; it helped shape the college as one of the nation's premier institutions of agricultural education. Strong public institutions are those regularly subjected to constructive criticism, with their missions constantly being reexamined and redefined. Today's growing debate over the college's research mission will be an invigorating exercise if two conditions can be met. First, it must include a broad diversity of voices. Second, it must be based on a broad vision of what we want Wisconsin agriculture to become.

Forty years ago, Aldo Leopold challenged us to adopt a land ethic as the basis for our relationship with the land. I suggest that we adopt a research ethic based on our vision for Wisconsin agriculture. This research ethic would be defined by standards which would include: affordable food for the consumer, a reasonable profit for the producer, wide public access to the means of production, the revitalization of rural society, the enhancement of—not the replacement of—dignified human labor, and the long-term sustainability of land and water resources.

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Photograph by Laurence Abrams

Value of Biotechnology to the Farm Industry

By Winston J. Brill

Agriculture has always depended on applications of biological concepts (biotechnology). However, scientific discoveries during the past fifteen years have given biologists powerful new tools such as genetic engineering. The genetic engineer can isolate a single gene from any organism and can, in theory at least, introduce that gene into the chromosome of any other organism. Laboratories around the world are now introducing animal genes into bacteria, bacterial genes in animals, bacterial genes in plants, animal genes in plants, and so on. While the technology still is at an early stage of development, there is stiff worldwide competition, and fascinating and useful results appear each month in the scientific literature. In order for Wisconsin agriculture to remain competitive with the rest of the nation/world, it needs to be alert to new products and opportunities that can be based on Wisconsin's resources. Genetic engineering offers a safe technology that should decrease production costs and increase yield. New types of products will result from the application of genetic engineering. Successful farmers of the future will need to embrace this technology.

To demonstrate the value of genetic engineering, we can compare it to standard breeding, which results in progeny that are the product of random mixing of the tens of thousands of genes from each parent. The exact properties of the progeny are usually impossible to predict, the breeder has to search for the organism with the desirable properties, and then backcross to remove undesirable genes. By comparison, an animal or plant that has been genetically engineered has very predictable properties since a single known gene has been added and very little searching for the desirable variant will be required. No undesirable genes, along with the valuable gene, are unintentionally added as in the case of breeding. Therefore backcrossing is minimal in organisms modified by genetic engineering.

Animal agriculture

Through genetic engineering, new animal vaccines are al-

ready on the market, and many more are under intensive development. The precise tools from this technology achieve vaccines that are more effective and safer to use than many vaccines produced through traditional methods. Genetic engineering also is producing vaccines for diseases that previously had no satisfactory treatments.

David Dickson (this issue) discusses increasing milk production by injecting cattle with bovine growth hormone. Other hormones will shortly be tested in farm animals. One example is a hormone that may, if injected into animals, convert more fat into protein. These are examples of an animal gene (coding for a protein hormone) engineered into the chromosome of bacteria, which are then grown in fermenters (as in the brewing industry). Pounds of hormone can readily be purified from the fermentation broth. Until this technology was available, scientists could barely obtain sufficient hormone (isolated from pituitary glands in the case of growth hormone) to perform even the simplest studies.

Researchers are working intensively around the world to engineer genetically farm animals directly by adding a gene into the animal's chromosome. The gene for growth hormone has been introduced to the chromosomes of pigs, sheep, and cattle, but no increased growth rate or milk production has yet been reported. Scientists are confident that they will be able to increase growth rate in this manner since they have been successful in obtaining large mice by engineering them with human growth hormone genes. Such genetically engineered animals will transmit these traits to their progeny.

Researchers are attempting to replace the major protein in milk, casein, with a valuable protein (e.g. human insulin for treating diabetics). If such experiments are successful, the dairy cow could be "milked" for human insulin or some other valuable protein. This is pretty farfetched now, but the digital watch was similarly farfetched in the early days of the transistor. Certainly, other ideas will be developed in the future; of those, some will be practical and will be accepted.

Plant genetic engineering

Much of Wisconsin's land is used to grow crops. Research breakthroughs in recent years have given us confidence that farmers will be growing genetically engineered plants within the coming decade. Scientists already have engineered plants to be resistant to viruses, bacterial pathogens, and caterpillars. All of these achievements so far have been obtained with tobacco because it is the easiest plant to engineer genetically and is used as a laboratory model system; however, progress with tobacco is expected to be translated shortly into successes with alfalfa, corn, soybean, as well as other important crops and forest trees.

The ability to make tobacco resistant to certain caterpillars will be discussed in more detail now because it is a good example of potential benefits from genetic engineering. For more than two decades, companies have been selling a bacterium called *Bacillus thuringiensis.* This bacterium is sold as a dry powder which is eventually sprayed on forests, cabbages, and other crops. When caterpillars eat the leaves, they ingest some of the bacteria and shortly die. The bacteria contain a protein toxin (known as *B.t.* toxin) which is specific to these kinds of insects. It does no harm to other insects, to our pets, or ourselves. The specificity of killing is its attractiveness as an insecticide. We know that chemical pesticides, by comparison, are toxic to a large number of nontarget insects and other animals, including man. Because the *B.t.* toxin is nontoxic to man, it can be sprayed on the plant up to the time of harvest. In the more than twenty years of wide application, there has been no problem of insects becoming resistant to the toxin. Compare this situation to the case with chemical insecticides, where insect resistances are very common. A major disadvantage of the *B.t.* toxin, however, is that it is not very stable in sunlight and will not last for a long time on the leaf surface. Therefore, frequent applications are necessary.

The *B.t.* toxin is a protein; therefore, the *Bacillus thuringiensis* microbe has a gene that codes for this protein. Other toxins with different insect specificities are now being examined, and this collection is sure to be in the repertoire of genes that will be added to the chromosomes of our important crop plants.

Work is currently progressing to increase the nutritional quality of grains. Genetic engineers are trying to modify the protein/oil content of soybean. Food processing industries may have the plant more efficiently tailored for increased flavors or decreased processing costs. Genetic engineering is expected to produce new varieties much faster than traditional breeding. Besides the obvious benefits, this may be crucial if predicted global weather patterns change radically in the next few decades due to changes in the atmospheric ozone layer. As we begin to realize, through commercial successes, the real potential of this technology, our imaginations will be further stimulated. Will the Wisconsin farmer someday be growing alfalfa that is synthesizing, as a side product, a useful industrial protein such as an enzyme detergent or a pharmaceutical protein such as human insulin?

Simple diagnostic kits are being developed to detect microorganisms (bacteria, fungi, viruses) with great sensitivity. Farmers may someday go through their fields testing for pathogens that have not yet accumulated in sufficient numbers to cause any visible symptom. With this early-warning test, the farmer can more selectively decide the quantity and type of pesticide to prevent damage by disease.

Weeds are a perpetual problem in farming. Several groups have genetically engineered plants to be resistant to a specific herbicide. This technology will allow us to have more choices of the types of chem-

icals we apply to fields. Industries will be competing with each other to produce herbicides that will be most acceptable by the regulatory agencies, the consumers, and the farmers. Another herbicide approach involves taking advantage of microorganisms that kill target weeds. If this proves to be an accepted practice, it will certainly be environmentally desirable.

Other fascinating projects have resulted from genetically engineered microorganisms. *Rhizobium* inoculants that fertilize soybean and alfalfa, through nitrogen fixation, have been sold in the U.S. since the turn of the century. Nowadays, these microbial inoculants are not very useful because most Wisconsin soils already contain sufficient numbers of *Rhizobium* strains, and these strains usually outcompete the commercial inoculants. However, researchers are using genetic engineering to obtain *Rhizobium* strains that dramatically increase nitrogen fixation and yield by displacing the indigenous strains already in the soil. Other genetically engineered microorganisms are being developed to protect crops from early frost damage. Resistance to root-destroying pathogens and insects as well as microorganisms that will allow plants to use nitrogen and phosphorus fertilizers more efficiently are being developed by university and industrial laboratories.

Concerns

Some individuals are upset that genetic engineers are able to put foreign genes into organisms. Is the genetic engineer "playing God"? One should realize that almost all of our farm animals, pets, crop and ornamental plants are the result of man's intentional intervention. These organisms were quite different before man selected, mutated, and bred them to be more desirable. It is very possible that while breeding cattle for increased growth and/or milk, the breeders were actually selecting cattle that produce greater amounts of growth hormone. Now, through genetic engineering, the same objective can be achieved through a very specific technique.

Some are concerned about releasing genetically engineered organisms to the environment. For instance, one may worry that a difficult-to-control weed will be unintentionally produced. However, by adding one or several well-characterized genes to an alfalfa, corn, or soybean, it is highly improbable that such a weed will be formed. In fact, the chance for something unexpected is greater from traditional breeding (random mixing of tens of thousands of genes) than it is from genetic engineering. As with every technology, however, one should be alert to problems. For instance, a plant engineered to be resistant to one pathogen may become susceptible to another. These types of problems are usually picked up during the extensive field testing that has always been required before a new variety is accepted.

There is more concern about releasing genetically engineered microorganisms. Most people associate microorganisms with disease, but only a few out of the many thousands of known microorganisms are detrimental to our health or the environment. It is important to realize that thousands of different microorganisms, added in amounts of billions per acre, have been used experimentally and commercially in agriculture for the past eighty years without a health or environmental problem occurring. Scientific experience tells us that it is extremely difficult purposely to change a safe microorganism to become dangerous. What is the chance that one could unintentionally convert a safe organism into a pathogen? Adding one or several well-characterized genes to a microorganism considered to be safe will not turn that organism into an animal or plant pathogen. Pathogens cause disease not because they contain a single "pathogen" gene; instead, they contain many "pathogen" genes, all interacting with each other in very finely tuned ways. Thus by adding a known gene to a safe microorganism for use in agriculture, there is no apparent way that the genetically engineered organism can cause any serious health or environmental damage.

Conclusion

Genetic engineering is one of many techniques now at the disposal of scientists who want to improve agriculture. The farm industry in Wisconsin needs to be kept abreast of new technologies so that farmers can make decisions to keep them competitive. The University of Wisconsin is one of the world leaders in genetic engineering, and farmers should take advantage of this important resource. It is certain that biotechnology will make a major impact in agriculture and that the products will be more attractive and safe than products that we now accept and manage. Farming will become more based on biology than on chemistry. Actually, it is going "back to nature." This is an exciting time to become involved in this revolution in agriculture.

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Into your hand they are delivered . . . as I gave you the green plants, I give you everything. Genesis 9:3

NEW BIOLOGY, NEW SEEDSMEN

Restructuring the Genetic Supply Industry

By Jack R. Kloppenburg, Jr.

The last decade has witnessed remarkable advances in genetics. Molecular biologists have succeeded in cracking the gene just as physicists had cracked the atom. In doing so, they have obtained direct and unprecedentedly precise manipulative access to the building blocks of life. With the development of biotechnology—techniques such as recombinant DNA (rDNA) transfer, tissue culture, and cell fusion—we are poised on the edge of a new era of production which will use genetic information as its fundamental raw material.

The manipulation of genetic information is actually a human activity of considerable antiquity. The fermentation of beer, the making of cheese, and the breeding of plants and animals can all be considered biotechnological processes. But the new biotechnologies share a qualitative superiority over these older activities. This superiority has two principal dimensions. First, while conventional plant and animal breeding operates on whole organisms, the new technologies operate at the cellular and even the molecular level. Second, while conventional breeding relies upon sexual means to transfer genetic material, rDNA transfer and cell fusion make it possible to bypass sexual reproduction and move genes between completely unrelated organisms. At a recent National Academy of Sciences convocation on genetic engineering of plants, Harvard botanist Lawrence Bogorad asserted: "We now operationally have a kind of world gene pool . . . Darwin aside, speciation aside, we can now envision moving any gene, in principle at least, out of any organism and into any organism." Or, as 1975 Nobel laureate and M.I.T. microbiologist David Baltimore put it, "We can outdo evolution."

Outdoing evolution in plants has significant commercial promise. As the president of Agrigenetics—a company formed expressly to apply the new genetic technologies to commercial crop improvement—has observed, "The seedsman, after all, is simply selling DNA. He is annually providing farmers with small packages of genetic information." There is no question that the development of biotechnology has made selling packets of DNA to farmers a most enticing prospect, even for firms not historically associated with the seed industry.

First the seed

The motto of the American Seed Trade Association is "First, the Seed." There is much truth to this simple statement. The seed is the alpha and the omega of farming. As planting material, it is the beginning point of the crop production process, and as grain it is the culmination and product of that process. Seed is the fundamental input of agricultural production, and agricultural production is the fundamental material base of all forms of human society.

Many farmers keep a portion of their harvest to use as seed for the next year's crop. But saving this "bin-run" seed is only possible for species where hybrids are not used (wheat, soybeans, etc.). And even farmers who regularly save seed depend upon seed companies for fresh supplies when the variety they are saving runs out, or they want to try a new variety. Any farmer growing a hybrid variety, such as a hybrid corn or cabbage, must purchase seed each year since the yield of seed saved from hybrids falls off dramatically. And, of course, most home gardeners buy seed for their vegetable and flower plots rather than saving or producing their own seed.

Seed companies therefore occupy a prominent place in the yearly plans of both farmers and home gardeners. Poring over seed catalogs is a common winter pastime. The color photographs of flowers and vegetables evoke the coming spring. And the promises of the field crop catalogs engender hope that record yields from a new variety will bring prosperity in the next growing season. Names like Burpee, Joseph Harris, Ferry-Morse, and Henry Field are like old friends for the home gardener, as are such companies as Northrup King, Jacques, O's Gold, Pfister, or Funk for the farmer.

But those names no longer mean quite the same thing as they did a decade ago. Over the last ten years the seed industry has been in flux. Since 1970 an astonishing wave of mergers and acquisitions has swept virtually every American seed company of any size into the corporate folds of the world's industrial elite. Table 1 shows that Joseph Harris is now owned by Celanese, Northrup King by the pharmaceutical giant Sandoz, Jacques by Lubrizol, O's Gold by Upjohn, and Funk by Switzerland's Ciba-Geigy.

TABLE 1
Selected American Seed Companies by Parent Firm

ARCO	Occidental Petroleum
Dessert Seed Co.	Excel Seeds
Castle Seed Co.	East Texas Seed Co.
Diamond Shamrock	West Texas Seed Co.
Golden Acres Hybrid Seed	Missouri Seeds
Cargill	Moss Seed Co.
ACCO	Payne Bros. Seed Co.
Dorman	Ring Around Products
PAG	Stull Seeds
Paymaster Farms	Pfizer
Tomco Genetic Giant	Warwick Seeds
Celanese	Clemens Seed Farms
Celpril, Inc.	DeKalb AgResearch (joint venture)
Moran Seeds	Jordan Wholesale Co.
Jos. Harris Seed Co.	Ramsey Seed
Niagara Farm Seeds	Trojan Seed Co.
Ciba-Geigy	Sandoz
Columbiana Farm Seeds	Woodside Seed Growers
Funk Seeds International	Gallatin Valley Seed Co.
Germain's	Ladner Beta
Hoffman	McNair Seeds
Louisiana Seed Co.	Northrup King
Peterson-Biddick	National N-K
Shissler	Pride Seeds
Swanson Farms	Rogers Bros. Seed Co.
Lubrizol	Royal Dutch Shell
Agricultural Laboratories	Rudy Patrick
Arkansas Valley Seed	Tekseed Hybrids
Jacques Seeds	Agripro Inc.
Keystone Seed Co.	H.P. Hybrids
R.C. Young	Nickerson American
Gro-Agri	North American Plant Breeders
McCurdy Seed	Sokota Hybrid Producers Assn.
Seed Research Associates	Ferry Morse (Farm Seed Div.)
Sun Seeds	Stauffer
Taylor-Evans Seed Co.	Prairie Valley Seed Co.
V.R. Seed	Blaney Farms
Colorado Seed	Stauffer Seeds
Monsanto	Upjohn
Jacob Hartz Seed Co.	O's Gold
DeKalb Hybrid Wheat	Asgrow Seed Co.
Hybritech Seed Internat.	Associated Seeds
	Farmers Hybrid Seed Co.

A number of factors stimulated this corporate buying spree. One was the passage in 1970 of the Plant Variety Protection Act which gave patentlike protection to the developers of new plant varieties and, therefore, opened the possibility of monopoly profits from protected varieties. A second factor was the general rise in commodity prices which accompanied the world food shortages of the early 1970s. Agriculture in general looked like a growth industry, and as I have noted, the seed is the fundamental input in agriculture. Third, many of the corporations buying seed companies also have substantial agrichemical interests and were attempting to rationalize and unify their research and product lines.

Also, the emergence of the new biotechnologies since 1975 has reinforced the acquisition trend. Every parent firm listed in Table 1 has invested heavily in biotechnology. Genetic engineering of plants will be accomplished at the cellular and subcellular level. But the form in which new "engineered" crop varieties will be made available to the farmer will still be the seed. By purchasing seed companies the transnationals obtain both essential raw materials (germplasm) for their genetic engineers and the production and marketing facilities to put engineered genes into commercial circulation.

Biotechnology, seeds, and agrichemicals

This process of concentration and consolidation has by no means run its course. For example, the French conglomerate ELF Aquitaine recently purchased Dahlgren and Company, and ARCO announced last October that it had added Castle Seed Company to its list of subsidiaries.

ELF and ARCO have something in common besides capital letter acronyms. Indeed, many of the corporations which have been most active in acquiring seed companies—Ciba-Geigy, Monsanto, Sandoz, Pfizer, Lubrizol, Occidental Petroleum, Stauffer, Shell—have a great deal in common: they are all transnational corporations with petrochemical and/or pharmaceutical interests. More than this, they are major producers of agricultural chemicals. And further, they have all made major investments in the commercialization of the new biotechnologies.

The seed-chemical connection is a relationship of long standing. As early as the seventeenth century salt water was used to treat wheat seed to reduce the incidence of burnt smut disease. But it is only in the last decade that seed has come to be recognized as the ideal vehicle for the delivery of agrichemicals to the field. With the seed industry rapidly coming under the ownership of agrichemical interests, it is not surprising to find these inputs linked in proprietary packages. Funk Seed has introduced eight safener-treated sorghum varieties which can safely receive application of parent-firm Ciba-Geigy's herbicides. DeKalb-Pfizer Genetics has ten such sorghum hybrids available, and Northrup King (San-

doz) is close to commercializing herbicide-coated alfalfa seed. The costs of developing new herbicides have been rising rapidly, and safeners represent a low-cost means of extending the life of existing products and pushing them into new markets.

Biotechnology opens important new possibilities for seed/chemical packaging. In a process known as somatic embryogenesis, tissue from a seed embryo can be induced in a test tube to form millions of individual embryos which, when regenerated, are identical copies of the plant from which the original embryonic tissue was taken. These somatic embryos can be encapsulated in an aqueous, organic gel and then coated with a biodegradable polymer to make synthetic seeds. The seed capsules can be filled with fertilizers, pesticides, bacterial inoculants, and other chemicals.

With safening or encapsulation, the union of seed and chemical is mechanical. But biotechnology also introduces the possibility of making the union at the genetic level; the seed might be genetically primed to respond to, perhaps to require, the application of particular chemical compounds. The president of Asgrow Seed Company (Upjohn) notes: "The speculation that a variety could be developed that is dependent on a chemical for successful use is definitely within the realm of possibility." And Dr. Klaus Saegebarth, Du Pont's director of agrichemicals research, sees "the breadth of Du Pont's line of crop protection chemicals as literally representing a Du Pont crop management system." As Table 2 indicates, much agricultural biotechnology research, especially in private firms, is now directed to achieving herbicide resistance in a wide variety of crops.

The potential profits in herbicide resistance are considerable. Glyphosate (Monsanto's Roundup) is, at $400 million annual sales, the world's largest-selling herbicide even though it is nonselective. It is estimated that Atrazine-resistant soybeans would increase sales of that herbicide by $93 million per year, and that phenmedipham-resistant rape seed would give the developer an 80 percent share of the Western European rape seed market. The most attractive prospect for the chemical-seed corporations, however, is engineering crop resistance to new proprietary chemicals. As one executive put it, "Genetics and chemicals together make the most long-term sense."

TABLE 2

Companies and Institutions Working on Herbicide Resistance in Plants

Research By:	Under Contract To:	Resistance To:	Crop
Adv. Genetic Sci.		Experimental	Potatoes
ARCO (PCRI)	Heinz	Atrazine	Tomato
Biotechnica Intl.			Soybean
Calgene		Phenmedipham	
Calgene		Glyphosate	Cotton, Corn
Calgene	Rhone Poulenc		Sunflower
Calgene	Kemira Oy	Glyphosate	Rape
Calgene	Nestle	Atrazine	Soybean
Calgene	Campbell's	Glyphosate	Tomato
Ciba-Geigy			
DNA Plant Tech.			
Du Pont		Chlorsulfuron	Tobacco
		Sulfometuron	
International Paper			Douglas Fir
Mobay (Bayer)		Metribuzin	Soybean
Molecular Genetics	American Cyanamid	Imidizolanone	Corn
Monsanto		Glyphosate	Cotton
Phyto Dynamics		Treflan	Corn
Phytogen		Glyphosate	Cotton
Shell		Atrazine	Corn
Cornell Univ.		Triazines	Corn
Harvard Univ.		Atrazine	Soybean
Louisiana State Univ.		Glyphosate	
Michigan State Univ.		Atrazine	Soybean
Rutgers Univ.		Triazines	
Univ. of Alabama		Atrazine	
Univ. of Calif.-Davis		Sulfometuron	Sunflower
Univ. of Guelph		Atrazine	Rapeseed
USDA-ARS		Metribuzin	Soybean
U.S. Forest Service		Glyphosate	Poplar
		Hexazinone	Jack Pine

Certainly, herbicide resistance makes sense for chemical companies. It is less certain that society as a whole will enjoy net benefits. Some 420 million pounds of herbicide are already sprayed onto American croplands each year. Over thirteen weed species already show resistance to triazine herbicides. Reduction in levels of soil organic matter, degradation and contamination of groundwater, human cancers, and general impoverishment of the ecosystem have all been associated with herbicide use.

Biotechnology has been widely touted as a means of, in the words of one biotechnology company executive, "genetically displacing various capital-intensive inputs such as chemicals." Yet we find that one of the first applications of biotechnology to crop improvement—the development of herbicide-resistant plant varieties—will result in a significant increase in chemical usage. That this is so implies the need to monitor very carefully the way in which research agendas for biotechnology are being set, especially in our universities. If we can move genes from a bacterium into a tobacco plant to provide that plant with resistance to the herbicide glyphosate (as the company Calgene has succeeded in doing), might we not be able to move the genes which make a dandelion so competitive into the tobacco plant instead?

Plants and patents

The seed is the fundamental input, the irreducible core of agricultural production. And farmers have historically enjoyed much

control over the seed they plant. Seed has remained one of the few inputs which can be produced by the farmer. Saving and replanting bin-run seed is common practice for many. It is also a practice which, as a result of a recent decision by the Board of Patent Appeals approving the patenting of plants, may be severely curtailed in the near future.

The expansion of the commercial seed industry has long been constrained by the simple facts of nature; the seed is a biological organism capable of reproducing. This reproducibility makes the farmer a prime competitor of seed companies. When a new plant variety is introduced, a farmer need buy the seed only once, and then save a portion of the harvest to plant the next year. The problem of breaking this link between the farmer and the autonomous reproduction of seed is something that has long preoccupied the seed industry. Hybrids, of course, have provided a technical solution since the progeny of hybrid seed has a 15 to 40 percent lower yield than its parents. The principal *financial impact* of hybrid seed is its ability to ensure that the farmer buys seed *every* year.

It is no accident that the growth of the seed industry has been undergirded by hybrid corn. Seedcorn, 99 percent of which is hybrid, accounts for half of the U.S. seed industry's annual sales of about $6 billion. Those crops which could be hybridized followed the path of corn. Private seed firms now supply nearly the entire planting requirements of such crops as sunflower, sorghum, and sugar beet. But many crops—especially soybeans and wheat—have not been amenable to effective hybridization. The new biotechnologies are being applied to the problem of achieving hybridization in these recalcitrant crops so that the seed industry might enlarge the size of its market.

But there is a legal, as well as a technical, route to the solution to the problem of bringing the farmer into the market. This is the extension of property rights to plants by juridical fiat—by patent legislation. Efforts by private seed companies to accomplish this have a long history, and in the October 1985 decision in the case of *ex parte Hibberd*, they have finally succeeded.

As early as 1885, private breeders began calling for establishment of a system of plant patenting. With proponents arguing that "a seed is as much a mechanism as a trolley car," the American Breeders Association had a bill extending patentability to plants introduced into the 1905 session of the U.S. Congress. The bill was not reported out of committee. It was another twenty-four years before the legislation was reintroduced, but this time it succeeded, though only partially. The Plant Patent Act of 1930 did give patent rights to plants, but only to those reproduced asexually (i.e., by grafting, budding, etc.). Thus, since 1930 roses and apple trees have been patentable, but not seeds, which are the product of sexual reproduction. Seedsmen continued to push for patents on seeds. In 1970 they again met with partial success with passage of the Plant Variety Protection Act (PVPA). The PVPA gave patentlike protection to developers of new plant varieties, but differed from utility patent law in that it contained a farmer exemption clause and a research exemption clause preserving the right of farmers to replant protected seed and the right of scientists to use protected lines for research.

The emergence of biotechnology and its commercial promise intensified efforts by private industry to establish property rights to living organisms. In 1980, the U.S. Supreme Court, in the case *Chakrabarty v. Diamond*, held: "a live, human-made microorganism is patentable subject matter." The logical implication of this decision was that *all* "human-made" organisms, including plants, are patentable under the standard utility patent statute. A test of this implication has now been made. In October, the U.S. Board of Patent Appeals held in *ex parte Hibberd* that a new corn line developed by the biotechnology firm Molecular Genetics can be protected either under PVPA or under general utility patent law.

Why is this decision important to seed companies and to farmers? Because the general patent law does not contain farmer exclusion clauses as does the PVPA. Under the general patent law, purchase of a patented product brings with it the right to use the product, but not the right to make it. Applied to seed, this means that a farmer purchasing patented wheat seed would have the right to use (to grow) the seed, but not the right to make it (to save and replant). Though it will probably be tested in court, it seems likely that the farmer who saves and replants seeds of a patented plant variety will be in violation of the law.

The legal framework is now in place which may allow the seed industry to realize one of its longest-held and most cherished goals: to bring all farmers in all crops into the seed market every year. What kind of seed they plant will be a matter of no small importance.

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Bovine Growth Hormone Controversy

Creates Malice in Dairyland

By David P. Dickson

No technological advance in the history of dairy cattle research has evoked as much controversy as the current work on bovine growth hormone (bovine somatotropin). Large milk surpluses in the U.S. and worldwide have led several groups of dairy producers to question the need or desirability for developing this technology.

Lawsuits to prevent continued research with bovine growth hormone have been filed in various courts. Activists have circulated flyers, badgered legislators, and threatened to picket research herds. A gnawing fear exists that the fewer cows and fewer dairy farms needed when commercial application of bovine growth hormone becomes available will bring about the demise of the family farm. Media hype has added fuel to the heated controversy.

Fifty years ago scientists discovered that a crude extract from the pituitary glands of slaughtered dairy cows resulted in milk production increases when it was injected into lactating cows. Forty-five years elapsed before an economic means of producing commercial quantities of bovine growth hormone surfaced. Recombinant technology (gene splicing) now allows the production of highly purified bovine growth hormone in large enough quantities and at a cost low enough to make it practical for farm use. Four American pharmaceutical companies are racing to gain FDA approval to market their recombinant bovine somatotropin (BST) products.

Growth hormone and somatotropin are nearly synonymous labels for the same product. Since no changes in growth rate, weight, or height of dairy cattle have been observed in any of the research trials to date, somatotropin—"soma" from the Greek meaning "body" and "trophe" meaning "nourishment"—is preferred and logical.

Recent research reports

University and commercial research clearly demonstrates that BST substantially increases milk productivity and feed efficiency. Recent reports of at least a dozen university research trials attracted large audiences at the American Dairy Science Association meeting held in June at the University of California-Davis.

The research confirmed earlier findings of dramatic increases in milk production without negative effects on milk composition (protein, fat, lactose), body weight, or body condition. The pattern that emerged indicated increases in milk yield of 10 to 20 percent. This response is less than Cornell University's original report of a 40 percent increase when cows were injected daily beginning about eighty days after calving and continuing throughout the lactation. Over the complete lactation Cornell reported a 25 percent increase in milk production.

Not surprising to most researchers, environmental differences markedly influenced response to BST. Of special interest were the research reports from the universities of Missouri and Florida which indicated that heat stress may have a negative effect on the response cows have to BST. High temperatures and humidities during the Missouri trial limited most responses to increases in the 2 to 4 percent range. The Florida trial resulted in only a 5-1/2 percent increase in milk yield when temperatures were in the 90 degree range and humidities at 50 to 70 percent. Reports from Minnesota (33 percent increase and Pennsylvania (27 percent) may substantiate speculation that dairy farmers in the upper Midwest and the Northeast can expect greater responses than their competitors in the Southeast and Southwest.

Effect of BST on small farms

One of the major concerns in the BST controversy is the effect adoption of this new technology will have on the American—and Wisconsin—dairy industry. The main question is whether widespread use of BST will drive small- and medium-sized dairy operations (family farms) out of business. Manufacturers of the hormone—American Cyanimid, Elanco (a subsidiary of Eli Lilly), Monsanto, and Upjohn—contend the product will provide economic assistance to small farmers by reducing their costs while allowing them to produce more milk. The bottom line is increased agricultural efficiency and profitability for dairy farmers who survive.

Critics question the need for BST during a period of large milk surpluses and financial distress for many dairy farmers. They point to the potential dislocation of numerous family farms because of their inability to adopt new technologies like BST.

Reports from university agricultural economists based on the early Cornell BST findings projected decreases in cows and dairy farms of 25 to 30 percent. A survey of New York dairy farmers showed extremely high percentages indicated they planned to adopt the new technology. As additional research becomes available, however, it becomes evident that the potential impact of BST on the dairy industry has been exaggerated.

There is little question that the introduction of BST

will accelerate the trend toward fewer and larger dairy farms that has been occurring since the 1920s. Bovine somatotropin joins a long list of technological advances in dairying that have increased the efficiency of production and reduced the number of dairy producers. Some of these technologies include: artificial insemination, embryo transfer, milking machines, bulk milk tanks, Dairy Herd Improvement (DHI) record-keeping, milking parlors, pipeline milking systems, ration balancing, and disease control.

Dairying in Wisconsin has become so efficient that 41,000 dairy farmers produce 59 percent more milk today than their 135,000 1950 counterparts—and they do it with 15 percent fewer cows. The decline in numbers of farms has averaged nearly 3,000 each year since 1950. Best estimates indicate dairy farm numbers will stabilize somewhere around 20,000 to 25,000 in Wisconsin at about the end of the century. Technological advances like BST and changes in consumer purchasing patterns will have little, if any, influence on those numbers.

The major change on Wisconsin dairy farms since 1950 is the increase in herd size from sixteen milk cows to forty-five. This is due in part to new technology, but also reflects a move toward specialization. A single family farm unit in Wisconsin today raises nearly all the feed, cares for the calves and heifers, and manages the milking herd of about fifty cows. Much has been written about the advantages of large dairy units in the Southeast and Southwest. A recent article in *Science Digest* about high-tech cows on the 3200 cow Maddox Dairy in California, however, notes that sixty-five employees are required to manage the operation. That calculates to 49.2 cows per employee—not much different than the average Wisconsin dairy farmer.

Wisconsin's primary advantage over its competitors is the relatively low cost of feed, labor, and services. This is offset by the higher fixed costs of dairying in Wisconsin—land, buildings, farm machinery, and feed storage. The introduction of BST may even favor small- to medium-sized dairies because of the necessity of daily injections for all cows receiving the product and the potential advantage of more individual attention and care available on the smaller farms.

BST no cure for poor management

High adoption rates projected for BST are somewhat unrealistic given the excellent management skills that will be required for optimum response. Cows do not respond to any production enhancer, whether it is superior genetics or three-times-a-day milking, if the management is poor. BST will not be a panacea for all dairy producers.

The extra milk produced when BST is used requires that cows consume more feed. To realize optimum benefits available from BST it will be critical for the feeding management program to maximize dry matter intakes and allow cows to eat more of a balanced ration to support the higher level of milk production. Wisconsin farmers will need to determine if their current feeding programs are good enough to support 10 to 20 percent additional production and if their feed resources are adequate to provide the extra feed needed.

This represents a problem already encountered by many dairy farms that have gone to three-times-a-day milking in an effort to obtain 15 percent more milk. Detailed data on Wisconsin's three-times-a-day herds is not available, but only 3.3 percent of the 6,252 herds on official DHI testing programs last year milked three times daily. Many dairy farmers have started a three-times-a-day milking program only to abandon it when they failed to obtain the 15 percent response they expected. In terms of management skill required to increase production, BST has many similarities to milking three times daily.

Daily injections necessary

To be effective, BST must be administered as a daily injection. It has no effect when provided in the feed or applied topically to the skin. Since BST is a protein, when it is consumed by a cow or by humans, it is broken down into amino acids and inactivated in the digestive system just like any other protein. Somatotropin can be compared to insulin, another protein hormone that requires daily injections for it to function.

Comparing BST to the steroidlike hormone DES (diethylstilbesterol), which accumulates in the organs and tissues of livestock, is a poor analogy. They are completely different because DES is fat soluble and will deposit in any kind of fatty tissue. BST has totally different chemical properties from DES, is water soluble, and does not accumulate in the tissues.

Bovine somatotropin is species specific; it won't work in most other species including humans. A farmer who accidentally injected himself might get a sore finger, but nothing else would happen. Researchers in the 1950s injected bovine pituitary extract into humans in an effort to treat dwarfism, but the injections had no effect. New techniques developed in the 1960s, such as radioimmunological assays, allowed researchers to demonstrate the species specificity of growth hormones. Interestingly, BST does stimulate growth in rats, but so do monkey and human growth hormones.

BST safety

Another of the issues raised by concerned citizen groups is the safety of BST—for humans and for the cows. All scientific studies and historic data on BST indicate that milk produced by cows receiving injections of BST is safe for human consumption. The U.S. Food and Drug Administration (FDA) has determined that the milk from treated cows is safe for human use. Published studies reveal that milk from cows receiving supplemental BST is substantially the same as milk from cows not receiving BST. Since BST occurs naturally at low levels in milk and meat of

nontreated cows, it is already a part of most human diets, and there is no evidence it causes health problems.

When used at anticipated commercial dosages there have been no undesirable effects on the health or physiology of cows receiving BST. Detractors suggest that the additional stress created by high production may increase the cow's susceptibility to diseases. Humane Society spokesman Michael Fox predicts BST will promote even larger farms where there are "real problems of inhumanity to animals." No available research evidence supports those claims.

FDA will determine that BST is safe for animals before the product receives approval for marketing. Long-term trials to develop the comprehensive data required for full FDA approval are now in progress at universities across the U.S. The UW-Madison dairy science department and the U.S. Dairy Forage Research Center at Madison are currently involved in those tests.

BST costs and benefits

While actual cost of BST has not yet been pinpointed, enough is known about the product to make some estimates. Additional feed costs to obtain the maximum response from each cow will probably be between $40 and $60 per lactation. Extra time to give daily injections will increase labor costs. Since marketing details are scant, estimates of costs for syringes and needles cannot be determined. These costs may be incorporated into the cost of the BST depending on how the product is packaged.

David Walton, BST marketing manager for American Cyanamid, estimated BST will cost $30 to $50 per cow per lactation at the California Animal Nutrition Conference in March. Others have guessed the cost at 15 to 17 cents per cow per day. Product cost plus the additional feed cost weighed against the income from extra milk sold leaves a net benefit of between $150 and $200 per cow per lactation. That estimate is based on the current $11/cwt milk prices.

BST bottom line

Sometime in late 1989 or early 1990 BST will become commercially available. The dairy industries of Wisconsin, the U.S., and the world will take a giant technological step forward. Innovative dairy farmers will incorporate BST into their management programs, improve their feeding regimes, and see a positive response in farm profitability. Other dairies will try BST on a few cows and wait to see how it works. Some dairy farms will continue as they have for several decades to ignore new technology. Just as they decided artificial insemination was more hassle than using a bull or that DHI testing cost too much, they will have some reason not to use BST. Their farms will become even less competitive than they are today.

If the projections of the agricultural economists are correct and if history continues its current trend, the year 2000 will see the total number of dairy farms in the U.S. reduced by 50 percent and a decrease from eleven million to eight million cows. The increases in milk production making this happen will be the result of improved genetics, nutrition, and management (including BST). The rate will be slower without BST but no less inevitable.

Those who survive will be the businessmen and women of the dairy industry. They will keep accurate production and financial records. They will balance rations, use artificial insemination from bulls with the genetic potential for high milk production. They will adopt new technologies like BST which increase production efficiency. Increasing cow numbers to increase cash flow is not likely to be profitable in the future and is generally unhealthy for the dairy industry. Milking fewer, higher producing cows that are highly profitable will serve the best interests of all dairy farmers and the dairy industry of the future.

Dairy farmers are fortunate to have some lead time to prepare for BST. Researchers continue to probe for answers to questions about the product's long-term effects on cows. University of Wisconsin Extension (UWEX) through its county agricultural agents faces a massive educational task but a unique opportunity. Farmers will need their advice and counsel regarding the best use of the product on their individual dairies.

Wisconsin's claim to the title "America's Dairyland" is probably not in jeopardy. Wisconsin's share of the nation's milk production increased from 12.6 percent in 1950 to 17.4 percent in 1985 because there are fewer farming alternatives to dairying than in most other states. Furthermore, Wisconsin has excellent climatic and land resources plus the ability to raise most of its own forage and grain. Family farms have kept out-of-pocket labor costs low and fostered the individual care and attention to which cows respond best.

Critics have suggested Wisconsin's smaller dairy units are doomed because of their inability to utilize new technology. But BST is not a capital-intensive technology. It can allow Wisconsin dairy farmers to increase productivity without expanding costly housing. Extra labor requirements can be absorbed without hiring additional help. The intensive management and observation of BST treated cows can be provided on Wisconsin's smaller farms. Additional feed necessary for optimum response can be grown on their farms and won't require outside purchases.

The future of Wisconsin dairying depends not on new technology, but on the ability of her dairy farmers to adopt that technology and learn to manage it for maximum profitability. Those dairy families will not just survive BST; they have the potential, the management skills, and the determination to force it to succeed in America's Dairyland.

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Biotechnology for Sale

Monsanto and the Biotechnology Controversy

By Daniel Lee Kleinman

Genetic engineering has an image problem. In the mid-seventies, debate within the scientific community focused public attention on the potential dangers posed by the accidental release of genetically altered organisms from research laboratories. Headlines in the popular press like "New strains of life—or death" sounded an alarm.

More recently, scientific debate has focused on the potential hazards posed by the *deliberate* release of genetically engineered organisms intended for commercial agricultural uses. Some scientists are concerned that the impact of the introduction of genetically altered organisms into the environment is insufficiently understood. They fear that while the probability is small, such introduction may have results as disastrous as the 'natural' introduction of the chestnut blight. Between 1941 and 1953, this pathogen—not native to North America—spread through the eastern United States decimating the chestnut tree population. Others contend that genetically engineered bacteria are not likely to be any less safe than existing agricultural products and practices.

This scientific debate has spilled over into the public arena. Legislators have sponsored extensive hearings. And a groundswell of popular opposition has emerged. In Washington, D.C., through litigation in federal court, antigenetic engineering activist Jeremy Rifkin has repeatedly stalled the deliberate release of genetically altered organisms into the environment. And in Salinas, California, local opposition has forced Advanced Genetic Sciences, a small genetic engineering firm, to postpone field testing of microbes engineered to prevent frost damage to crops.

For the biotechnology industry, the stakes in the current controversy are high. The outcome may influence not only the pace of biotechnological development, but also its trajectory. Faced with public fear and the uncertainty produced by a web of uncoordinated federal regulations, industry has entered the fray. Industry representatives have spoken at public forums, attended public relations conferences, and undertaken public information campaigns.

Selling biotechnology at Monsanto

Monsanto Corporation—at the forefront in the development of biotechnology—has bet much of its future on products produced through technologies developed from the life sciences. By 1990 the total market from biotechnologically based agricultural and pharmaceutical products is expected to reach the 1.5 billion dollar mark. Monsanto wants a large share of this market. This year nearly one fourth of Monsanto's 450 million dollar research budget will be directed toward biotechnology (Crawford, 1986). Much of Monsanto's research will be carried on at its new 150 million dollar life science center, but the company's strategy for staying at the cutting edge of biotechnology research also includes maintaining cooperative relationships with university researchers. Among the most prominent of these is an eight and a half year, 62 million dollar collaborative agreement with Washington University in St. Louis.

With such a large investment in the future of biotechnology, it is not surprising that Monsanto has taken a leading role in advocating the industry's position. The company has embarked upon an ambitious public relations campaign through which it hopes to generate public support for biotechnology and foster an environment in which the industry can thrive (Freeman, 1985). The campaign has included a wide range of tactics. Company representatives have spoken to trade organizations and farm groups and testified before congressional committees. Monsanto has developed an educational pamphlet and film aimed at creating an informed and supportive public. Approximately 100,000 copies of the booklet have been printed, and over half have been distributed to universities, government agencies, and community groups. The film has been seen by about five million people.

Besides their efforts nationwide, Monsanto targeted Columbus, Ohio, and Columbia, South Carolina, for a major promotional blitz in the summer of 1985. This promotional effort involved a genetic engineering exhibition at a local mall as well as the use of two newspaper advertisements and one television ad. According to a Monsanto spokesperson, Columbia and Columbus were chosen as test sites for the campaign because they are state capitals with large universities involved in biotechnology research and because their size did not make the costs of the campaign prohibitive.

This past summer, Monsanto moved its traveling genetic engineering exhibition to the St. Louis Science Center. While the exhibit is primarily educational, Monsanto also has used it to promote biotechnology and to build awareness of Monsanto's commercial work in the field. To open the exhibition, Monsanto brought in David Kingsbury, assistant director of the National Science Foundation. Dr. Kingsbury's recent involvement in

developing new federal biotechnology regulations made him newsworthy, and, as a consequence, the city's major media covered the event. In addition, Monsanto representatives spent a week prior to the exhibition's opening making a media tour through the region surrounding St. Louis to talk about the company's involvement in biotech.

Biotechnology: a natural science?

The theme echoed throughout Monsanto's promotional materials and in the speeches of company spokespersons is that genetic engineering is a 'natural science.' Monsanto's pamphlet, "Genetic Engineering: a Natural Science," and the company's film both stress genetic engineering's continuity with nature. Each opens with colorful pictures of flowers, butterflies, and baby animals. And the text of the pamphlet repeatedly reminds the reader that DNA is "nature's language" and the work of recombinant DNA research is made possible by "nature's chemical scissors," restriction enzymes.

Monsanto's television and newspaper advertisements used in the company's 1985 campaign also stress the "naturalness" of genetic engineering. In one newspaper advertisement, a single stalk of corn is pictured growing in a parched and desolate desert. The text notes: "Biotechnology is a natural science that allows us to put nature's wonders to our use." By "transferring natural traits," runs the caption, scientists may be able to develop crops that fight off disease and to develop effective ways to treat cancer.

According to a Monsanto spokesperson, Karen Rogers, the company chose images with which they thought the public would be able to identify. Words such as "mutation" which might have negative connotations were avoided. And by employing the "natural" theme throughout their promotional materials, Monsanto intended to identify biotechnology with existing technologies and with nature itself.

The premise underlying Monsanto's campaign is that an educated public will also be a supportive public. And so an attempt has been made to avoid a narrowly focused advertising campaign which advocates a position or a product. But Monsanto's educational materials frequently blur the line between a straightforward description of genetic engineering techniques and an interpretive assessment of those techniques. By equating biotechnology with nature, Monsanto implies that like nature itself, biotechnology is safe for people and the environment. But this assumption is not without critics. While Cornell University agronomist Martin Alexander does not dispute the equation of biotechnology with nature, he argues that even naturally introduced microorganisms can be dangerous. Before a congressional panel, Dr. Alexander told legislators: "It is difficult to see why manmade genetic change would necessarily behave differently from those occuring spontaneously in nature. It, too, could proliferate. It, too, could spread. It, too, could do harm." Dr. Alexander believes that while the probability of such an outcome is small, the consequences could be enormous. He argues that we should proceed with extreme caution and establish regulatory procedures to assess the survivability, growth potential, and possible deleterious effects of genetically engineered organisms proposed for environmental release (U.S. Congress 1983).

Technology and society

Until recently debate over the development of biotechnology has been narrowly focused on the technical assessment of the human and environmental safety of genetic engineering. Believing that biotechnology is safe, proponents of the technology argue that although caution should be taken, biotechnology research and development should be permitted to proceed in a well-coordinated regulatory environment. These advocates contend that the existing regulatory environment for biotechnology research and development in which several agencies have overlapping and ill-defined roles promotes uncertainty, slowing development and weakening the position of U.S. industry in world markets. Through their promotional campaign Monsanto hopes the public generally and opinion leaders in particular will come to share this perspective.

Well aware of past scientific and technological controversies over such issues as nuclear power, Monsanto has attempted to portray biotechnology as benign. But until recently, Monsanto, like other advocates of biotechnology, has not substantially addressed the *social* ramifications of the new genetic technologies. Because the debate has focused mainly on technical questions of the safety of genetically engineered organisms, it may appear as if the direction of technological development is autonomously determined. But all technologies develop in a social environment. And choices concerning technological development are based on a wide range of interests. Apparently innocent technologies have social impacts. Some benefit and some lose.

One prominent example with broad-ranging implications for Wisconsin farmers is the controversial bovine growth hormone (bGH). Bovine growth hormone, a naturally occurring protein produced by dairy cattle, plays an important role in regulating the volume of milk production. Biotechnological techniques have made it possible to isolate the gene responsible for producing bGH and to transfer it from cow to bacteria cells. These bacteria can be reproduced on a large scale, and the growth hormone produced by the bacteria can be isolated and purified. When this microbiologically produced substance is injected into cattle, it results in a significant increase in milk production.

The Wisconsin Family Farm Defense Fund has petitioned the U.S. Food and Drug Administration,

demanding that an environmental impact study be completed before bGH is marketed. And fearing they will be adversely affected by an increase in milk production resulting from the commercialization of bGH, members of the Farmers Union Milk Marketing Cooperative voted last winter to seek ways to stop the marketing of the hormone until social and economic impact studies are completed.

According to Monsanto's educational pamphlet, bovine growth hormone will be the first product of the company's genetic engineering research. And recently, in response to critics of the hormone, Monsanto developed five factsheets. This new material, available by request, directly confronts the issues raised by critics of bGH. On the issue of the current dairy surplus in the U.S., Monsanto argues in one factsheet that bovine growth hormone is "aimed at controlling costs, not at increasing overall production" (1986b). But the *aim* and *effect* of the hormone may be different, and we must carefully address the widespread consequences of a prolonged national dairy surplus.

On the question of the returns to scale of bGH, Monsanto contends, with other bGH supporters, that the technology is scale neutral. One Monsanto factsheet states that bGH "should be a benefit to the good dairy manager, large or small" (1986a). However, analysts such as Robert J. Kalter have stated that the extensive management capabilities required to use bGH effectively vary with size of operation, and bGH therefore may be of greater benefit to large scale farms.

Recognizing that the debate over bGH has moved beyond the technical assessments of its health impacts for cows and people, Monsanto has begun publicly to address questions of the possible economic and social impacts of bGH. But a balanced assessment of the specific socioeconomic impacts of a particular product is difficult. The company's most recent material on bGH is less legitimately educational than a comprehensive set of political position papers. On hotly debated issues Monsanto's new material lays out only positions which support development and commercialization of the hormone. Where the critics are unambiguously correct, Monsanto implies that all scientific advance is inherently positive and beneficial. The company asserts flatly that whatever the problems raised by the commercialization of bGH, a proper response "does not lie in turning away from a new technology" (1986c).

Contrary to the impression one might get from Monsanto's promotional materials and, indeed, the public debate on genetic engineering more generally, technological development need not inevitably follow along a singular path. The development and potential use of all new technologies can and should be assessed on a social, not merely a technical, basis. Even should we determine that by all technical criteria bGH is safe, it is not immediately obvious that our society's scarce research dollars ought to be invested in its further development and commercialization. If bGH is to be employed after further development, we must first determine how the increase in milk production can be used in the most socially beneficial way. More importantly, we must determine what provision to make for farmers likely to be adversely affected by its adoption.

Conclusion

The debate over biotechnology has been too narrowly focused. Even critics have failed to challenge the terms of the debate. Most often discussion has been limited to technical questions of human health and safety. Unwittingly perhaps, in its public information efforts Monsanto may have reinforced the existing parameters of debate and the pervasive belief in the United States that technology is an autonomous process which inevitably develops along a singular path.

The belief that science and technology exist independently of social choices and power must be rejected. The terms of debate over the development of biotechnology must be expanded to include an evaluation of its potential social impacts. Social criteria must be used in conjunction with technical criteria to establish research agendas. And decisions over the future development of biotechnology should not be left to technical 'experts' alone. Those who might be affected by the new technology also must be formally included in the deliberations.

Monsanto is correct to assume that the development of biotechnology requires a thoroughly informed public. But in addition to the technical issues which dominate Monsanto's promotional materials, we must consider the broad social and economic impacts—negative and positive—that this revolutionary technology may portend. As Monsanto repeatedly suggests, biotechnology may hold the answers to some of the world's most pressing problems: Its medical applications may help the sick, and its agricultural applications may help feed the hungry. But such a powerful technology can have negative social impacts as well, and while acting on its promise, we must develop biotechnology with care, choosing a direction of development only after having assessed its broad and long term applications.

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The Changing

The changing structure of farming in the United States has stimulated a diverse mix of reactions and interpretations. The outward manifestations of this changing structure are quite evident: farm numbers continue to decline (although at a slower rate than in the period 1950–70); farm production, more so in some commodity lines than in others, is becoming increasingly concentrated on a relatively small number of very large farms (some 300,000 farmers, 12 percent of the U.S. total, now produce and sell about 70 percent of the total national farm output). Off-farm work is of growing importance and accounts for over 60 percent of all income of farm families. Many rural communities find it nearly impossible to maintain a functioning service center due to declining population. Not so evident is what, if anything, should be done about these ongoing structural changes.

Three approaches to structural issues

One approach to these structural issues is the laissez-faire or noninterventionist position. These structural changes result from competitive forces and benefit the consumer through more efficiently produced food and fiber. Competition will eliminate all but the efficient producer. Any interference by government or collective action by producers can only result in lower resource-use efficiency. This position would subject farming to the social Darwinism of competitive market forces while most of the rest of the economy is controlled by large-scale organizations with very substantial private economic power. The real world does not, and with current technology cannot, correspond to the theory of perfect competition. It is true that many government efforts to help farmers are misdirected and sometimes are indeed working against the family farmer. But it is also likely that current market conditions in the U.S. economy will continue to stimulate a variety of governmental programs intended to shield farmers from the full brunt of "free market" forces.

A second position suggests the need to reverse the farm consolidation process and to restore farming to the unique role it supposedly played historically as the source and bastion of moral and democratic virtue and the work ethic. The recommendation of some nonfarm romantics who espouse these views would essentially cause a return to an ill-defined "simpler technology" and impoverish farm people. Singling out farming for

Structure of Wisconsin Family Farming

By Peter Dorner

a return to a simpler era would make agriculture conform to standards quite alien to those followed in the rest of the economy. One need not embrace all the gadgetry and the materialistic nonsense which advertising presents as measures and necessities of progress, nor even all the current technology in farming, to recognize that farming is and must remain an integral part of our current economic system. Within this system farming cannot be singled out and run on principles too different from those governing the nonfarm economy.

A third position is concerned with "holding the line" and perhaps reversing some of the structural changes of the past thirty to forty years. People with this view are concerned with the problems of farm entry, as farm size and capital requirements grow ever larger; they are concerned with the socioeconomic consequences of continuing attrition in the farm population for rural towns and communities. They also doubt that major gains in efficiency can be achieved by concentrating and enlarging farm units (at least on those farms which are already among the largest, although efficiency may increase when medium- or small-scale farms are enlarged). This position also recognizes the inevitability of much of this structural transformation in farming, given the technological developments in agriculture as well as in other sectors of the economy. But it seeks to differentiate among structural changes, distinguishing those which result from technological developments and certain social and economic forces affecting the total economy from those which may be induced by certain public policies (or lack of them). Ongoing analyses of government agricultural policies reveal that many policies (price, tax, credit, etc.) in their interactions have often had an unintended negative impact on the structure of agriculture.

Thus it would seem entirely consistent with farm-production efficiency, as well as with the frequently stated policy goal of maintaining the family farm, to place restrictions on nonfarm corporations entering farming, to enforce the acreage limitation for water recipients on publicly funded irrigation projects in the West, to eliminate tax law advantages that accrue to nonfarm investors in agriculture, to limit the total amount of government price-support payments a farm can receive, to remove those aspects of credit policies that cheapen the cost of credit for large borrowers, to pursue vigorous antimonopoly policies in the farm-supply and food-processing segments of agriculture. Simultaneously, assistance to beginning farmers, small- and medium-size producers, farm workers, and rural communities could be strengthened.

While these policies may help maintain the family farm, they are not likely to reverse, in any fundamental way, the basic changes in farm structure that began over forty years ago. These changes are rooted in the machine technology developed throughout this period, in the increasing labor productivity and declining relative farm product prices, and in the rapid growth in nonfarm family incomes. They also stem from the increasing independence of farm children, who agree to "take over" the home farm only if it is large enough to provide incomes comparable to those available in nonfarm employment. Because most of the basic transformation was brought about by family farmers themselves, suggestions to reverse these basic structural changes would be resisted by family farmers.

Wisconsin family farming 1950, 1960, and 1975

Many of the conditions underlying these farm structural changes in several Wisconsin dairy areas are well illustrated by data obtained for 1950, 1960, and 1975 in farm surveys carried out in 1951, 1961, and 1976. The number of farm families interviewed totaled 262 in 1951, 189 in 1961, and 254 in 1976. Farms were selected by statistical sampling techniques in three eastern Wisconsin counties (Calumet, Manitowoc, and Sheboygan) and in three western Wisconsin counties (Barron, Pierce, and St. Croix). Although the latest data are now over ten years old, the survey period covered twenty-five years of momentous changes in farm technology and farming structures.

The changes on these farms over this twenty-five-year period were dramatic. Average acres operated per farm increased from 129 in 1950 to 195 in 1975, an increase of 50 percent; the number of cows on farms where dairying was the main enterprise increased from 16.8 to 36.5, or 117 percent, from 1950 to 1975. The average total investment increased by 551 percent; value of sales by 458 percent; operator share of net-cash farm income by 363 percent (a reflection of costs increasing faster than sales); and operator share of net-cash farm income plus other income by 427 percent. Full ownership declined from 64 percent of the sample farms in 1950 to 55 percent in 1975; part-owners increased from 15 percent to 31 percent, while renters (owning no land) decreased from 12 percent to 3 per-

cent. The remaining farms were operated as partnerships, family corporations, or other family arrangements.

An amazing constant in this period of revolutionary change was the proportion of all labor contributed by family members. In both 1950 and 1960, 95 percent of all labor input on these farms was family labor. The proportion increased slightly to 96 percent in 1975. These farms remained family farms in every sense of the word.

The overwhelming number of land purchases over those twenty-five years also were made by operating family farmers—90 percent of all purchases from 1950 to 1960 and 85 percent of all purchases from 1960 to 1975. There was, however, a significant change in terms of occupational status at the time of purchase. Before 1960, 87 percent of the purchasers were operating farmers at the time of purchase. After 1960, only 68 percent of all purchasers were farming when they purchased the land. While a portion of the remaining 32 percent farmed the land full time after the purchase, this change reflects an increase in part-time farming and in the number of families buying some land and a country home and commuting to their place of work in a nearby city or town.

Family incomes on these farms were relatively modest by standards for the entire nation. While farm family incomes did gain relative to the median income for all families during the study period, the income of the farm families, including nonfarm earnings, was still below the U.S. median in 1975.

Despite the growing costs and complexities of farming, most parents desire that one of their children take over the home farm. Before 1940, it seems that this could be accomplished without farm size expansion. The meshing of the labor supply of the two generations was somewhat simpler in those times. Labor-saving machines were not as prominent, and the parents' capacity for hard labor on the farm began to decline at about age fifty. Thus, the increased labor and strength supplied by a son or son-in-law came at an appropriate time to offset the declining physical capacity of the father.

With the increasing availability of labor-saving technology and the extended capacity of older farmers to work and manage larger enterprises, in addition to the increased participation in farm work by women (associated, at least in part, with new technology on the farm as well as in the home), this meshing of the generations became more difficult. Indeed, it required farm size expansion, at least if one of the children was to remain on the farm and eventually take over the operation.

However, an alternative to expanding the farm has become increasingly important. Off-farm employment has become more readily available to absorb some of the "excess" labor during those critical years in the family life cycle when the labor supply and the income requirements of two families must be accommodated on a farm suited to the needs of one family. This may mean that the younger generation will be part-time farmers and part-time employees in nonfarm activities, or it may be that the older generation, father and/or mother, take off-farm employment and work only part time on the farm. A variety of combinations are possible. In any event, the two generations are less dependent on the farm as the sole income source during the transition years when the farm cannot fully utilize the physical capacities nor satisfy the income aspirations of both parents and children. Thus, there is an alternative to expansion which was not available or at least not so widely available in earlier years. The survey data strongly support the hypothesis that increased off-farm earnings play a major role in the integration of two generations and the transfer of the farm within the family.

A pronounced change has also occurred in the source of funds used to get started in farming. Until 1950, personal savings were the most important source of funds for getting started in farming on one's own. During the 1950s, loans within the family were the most frequently used source of funds for new farmers. Since 1960, however, borrowing from commercial sources has become *the* single most important source of funds.

What significance do these changes have for the farm structure debate? One must introduce several precautions at this point. The results of these surveys may not accurately represent all Wisconsin farming areas. The latest data are over ten years old. Significant changes have occurred since—especially in the past five or six years in terms of falling prices and sharp declines in land values. But with all caveats considered, the changes in structure on these Wisconsin farms were basically brought about by farm families on family farms in response to changing technology, the extended capacity of older operators, income growth in the rest of the economy, the desire to keep the farm in the family, and the conditions surrounding the integration of generations during the transition years in the family life cycle. An indiscriminate policy assault on reversing the structural changes experienced in agriculture over the past forty years could damage the very family farm structure which it professes to protect. We need to be aware of the changing nature of family farming and to be cautious of proposed remedies that could result in throwing out the baby with the bathwater.

The results of these surveys are reported in my Research Bulletin R3105, February 1981, *Economic and Social Changes on Wisconsin Family Farms*, College of Agricultural and Life Sciences, University of Wisconsin-Madison. Copies can be obtained from the Agricultural Bulletin Building, 1535 Observatory Drive, Madison, WI 53706.

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Get the Corporations Out of Farming

An Interview with Wisconsin Farmer John Carr

By Michael A. Gordon

The farm crisis has forced thousands of farmers off the land, torn families apart, and shattered rural communities. Many farm families have organized around such groups as the Wisconsin Rural Development Center and the Wisconsin Farm Unity Alliance to preserve family farming, prevent soil erosion, and foster a rural life ethic. Above all, they champion a regenerative agriculture, based on diversified farming which is free from dependency on giant oil, chemical, and banking interests.

John Carr is one of the movement's new leaders who is critical of corporate domination of agriculture. Carr ran a feed mill for ten years before selling out and moving to a 170-acre dairy farm just outside Hollandale, Wisconsin, in 1978. He lives there now with his family. A few years ago, he helped start the Wisconsin Rural Development Center, and got the American Lutheran Church to set up a Rural Crisis Response Network to aid distressed farm families in southern Wisconsin. Last year, he served on Wisconsin Governor Anthony Earl's Commission on Agriculture. Soon after this interview, the Carrs sold their twenty-four cows in the government's whole-herd buyout program to give John more time for his state senate campaign.

This interview is condensed and edited from one conducted in March by Michael A. Gordon for the Wisconsin Family Farm Oral History Project. Gordon, an American social historian, works at the State Historical Society of Wisconsin.

"I practice what I preach," Carr says of his small farm operation. "I use a very low input system of agriculture. I try to deemphasize capital and emphasize labor."

GORDON: What do you mean that you try to deemphasize capital?

CARR: I believe, and have for a long time, that farming isn't big business. Farming is just wrought with risk. There are weather risks, insect risks, interest risks, market risks. And because of the tremendous risk factors, it's terribly dangerous to expect a return on too much capital. The only time in farming when you can predict return is when you have the government attached to your endeavor with their compensating income supplement programs. Without government intervention farming is a very unpredictable endeavor. So it's been my opinion that one should farm in a very labor-intensive way with as little capital invested as possible to reduce the amount of money that farm needs to generate to show you a return on your invested capital.

GORDON: Isn't that part of Reagan's argument—that we ought to figure out a way to get back to a "free market" system of agriculture?

CARR: There's nothing wrong with the free market system of agriculture. But if you're going to do that, you have to guarantee that the participants in the food-producing game compete on an even and fair field. And so that means that you have to restore the progressivity to the nation's tax system. You cannot allow corporate special interests to participate in manufacturing and creating food with special tax advantages and special tax treatment.

Tyson, the nation's largest poultry people, has become in the last five years the nation's largest commercial finisher of fat hogs. They are building 5,000 sow farrow-to-finish units for one purpose—to avoid their tax liability in their poultry operations. They've made $70.1 million from 1981 to 1984—net profit—and haven't paid one cent in income tax. In fact, because of the '81 tax reform bill, they've received $1,050,000 in cash refunds out of the treasury. And so what that does is dramatically lower their cost of production. When you measure *their* cost of production against *my* cost of production—I have a hard time finding enough to pay the bills, let alone shelter anything. But if I was able to compete with Tyson chicken on a fair tax basis—they pay their taxes and I'll pay my taxes—then I'll out-perform the socks off of 'em day in and day out.

GORDON: Is that true, though, for all of the other special interests that you're talking about in agriculture—that they are able to make [their] profits mainly because of tax advantages?

CARR: It certainly is a tremendous stimulant to their existence. I like to use the example of the center pivot irrigation corn operations of Nebraska. In the 1970s, when these tax shelters were put together and created for special interest, the government would allow an operator to bulldoze the sandhills level—a 1,640-acre circle—and they would allow that denuding of the sandhills to be written off in one year as a conservation practice.

Who went into the business? The grain cartels—Continental, Cargill, and general investors with limited partners. They would grade 1,640 acres level, get to take all of that expense in one year against their other tax liabilities, whatever their other interests might be. Then they were allowed to drill the well, put in the equipment. Through accelerated cost recovery systems, which are tax shelters created for special interests, they were able to depreciate that well and all of that equipment in a very short period—from seven to ten years.

And what's happened? Go to the sandhills today and you'll find that many of those center pivots are being abandoned and allowed to go back to the county units of government for back real estate taxes. The erosion has become a tremendous problem on these graded level areas of these sandhills, so the people in Nebraska and the federal government have decided that we must now recreate the contour of the sandhill on these abandoned lands and seed them back to natural grasses. That's costing the taxpayer about $85,000 per pivot. I can't compete against that. Those programs were created by special interests *for* special interests.

The whole thing is terribly distorted, and the government needs to get out of it. But when it does, it needs to leave behind an even playing field where we're all treated equally in the tax sense. And the small family and modest-sized family farmer will then again be allowed to create for the country its food and fiber, and they'll do an excellent job. They *did* a good job, and we'll do a good job in the future if we can ever clean up the political act.

GORDON: There are many more family-sized farmers in the United States than special interest groups. Why haven't farm communities across the nation awakened to the facts that you've just been describing?

CARR: We rural people have done a notoriously poor job of our political homework over the last fifty years. We were unaccustomed to dealing with the realities of the political world. The penetration of capital into agriculture, which began about fifty years ago, is the outgrowth of agriculture being recognized as a potential profit source to special interests.

I like to use a little illustration if I can: visualize agriculture as a conduit, or a pipe, and let your mind drift back to 1930. In 1930 we had men, mules, and manure—and land. In 1930 we were allowed to value-add to a gallon of milk *on the farm*—about 60 to 65 percent of the retail value.

Now [in] 1986, your farm is still the same conduit or pipe. We've replaced the manpower with machinery. We've replaced the manure with chemicals and fertilizers and other expensive inputs. We've replaced the mule, the men, the manure, with petroleum-oriented high costs controlled by monopoly. And so today, we are only allowed on the farm to add about 20 percent of the retail value to that gallon of milk. What we're using our farm for is nothing more than a conduit to pass through extremely expensive inputs onto the consumer. You see? And so in 1930, when I was allowed, through my sweat and labor, to add 65 percent to the value of that gallon of milk, today, because of the dramatically different input cost structure, my labor on the farm is worth only 20 percent of the value of that gallon of milk. And so I don't have enough money to pay my bills. And this is a structural problem.

Coming out the end of the conduit, you also have our food and fiber today passing into highly monopolized food-processing structures. And so, with *no* control over the price of what passes out of my farm, and with *no* control over the cost structures that are entering into my farm, my labor value has been squeezed down to 20 percent of that gallon of milk. So that's why we have to return to a more labor-intensive, less capital-intensive, more direct sale oriented system of agriculture.

GORDON: I've heard people in the Reagan administration say that input-output is not the problem. The problem is over-production. How do you deal with that?

CARR: It's a very true statement. It's one of the bitter fruits of the warped tax exempt benefits that we put in place a decade ago. Every dollar you bring into agriculture for tax sheltering creates some production. If we could return the progressivity to the tax scale and dump out of agriculture the billions of tax-sheltered dollars that are in it, production would take a *horrendous* nosedive and would begin to fall back into line.

GORDON: You [said] earlier that farmers haven't done their political homework, and yet you seem to have done yours. What led you to your view of what's wrong?

CARR: A mixture of things. It's my theology, it's my natural self, and it's my experiences. Put them all in a pot and brew them up, and you have my position.

I believe that all people are entitled to a reasonable share of the fruits of the land. I don't believe in the pure capitalistic system of economics, because it's a terribly exploitive system. It allows those who are more intelligent and more shrewd to exploit and humiliate those who are less intelligent and less shrewd. And I don't buy that theologically. I just *don't*. I think those of us who may have been blessed with a few more brain cells than our neighbor have a special obligation

to that neighbor to insure that he's *not* exploited and that he or she shares in the wealth of the land. And in the process I may have one or two more shekels than they, but not an exorbitant difference.

And so that's my theology and my experience. I worked from about 1970 to 1980 in the feed business. I [saw] how a doctor from Madison moved to our community and bought twenty-five farms from Blue Mounds to Hollandale for no other reason than to exploit the tax code. I watched him tear out all of the conservation practices that our fathers and grandfathers had put in place on the steep land of Iowa County. I watched him attempt to farm that land with monoculture agriculture—corn after corn after corn. I watched ditches develop on his farm that you couldn't drive a bulldozer through. I watched the township clean the ditches of silt along the public roads summer after summer. And I began to say that that's basically, fundamentally *wrong*. And then I watched the survivability of the common farming people collapse, and I began to say that *that's* wrong.

Then I followed the political unrest of Central America, and I began to understand that those are not political revolutions. They're land reform revolutions. People have been exploited, and all they want is forty acres upon which to raise a family, grow old and die and be buried. That's all they want from the system.

That's all we want from the system out here. And a growing core of us feel that if we don't do something about it, *we'll* be rooted off the land, forced into the city with few skills [to] live on welfare and food stamps and not know from day to day what our destiny is. That's wrong, and we're committed to do something about it.

GORDON: To what extent are you self-sufficient [on this farm]?

CARR: I grow my corn and my hay, and I love my manure. Not many years ago, the University of Wisconsin Extension was teaching that manure was a liability, that if you needed nitrogen you should be looking at anhydrous ammonia or a 28 percent solution. I never bought into that. I love a cowpie. A cowpie to me is next year's ear of corn. And I haul lots of manure.

My farm should be self-sufficient. The only elemental nutrients that should leave my farm are those represented in that ton of raw milk and the occasional slaughter animal that I sell. My soil is capable of regenerating itself at the rate of four tons per acre per year. If I control my erosion rate, the natural forces are regenerating for me sufficient elemental nutrients that I should be able to *build* my farm up and still sell my milk and meat.

I have to have good conservation practices. I can't have much erosion. And I don't. It's a sustainable agriculture that I believe in. And W.R. Grace is not going to sell me any synthetic nitrogen, because I'm going to plow down legumes, and haul my manure, and interseed some hairy vetch in the fall, which I'll turn under as a source of nitrogen in the spring, and I don't need W.R. Grace, or the Standard Oil Company's anhydrous ammonia applicator. They will take all your money.

If you have small farms that have a diversified livestock base, then you don't have to plant corn year after year on the same soil. Most years the soil is covered with timothy, alfalfa, grasses to feed cows through the winter. Of course the cows present a daily problem of manure disposal, but it's fertilizer. We simply recycle the hay through the cow back out to the field in the form of a cowpie. And we've put some barn lime on the barn floor in the process, so that's good.

We recycle elemental nutrients from the field to the barn to the field, an endless proposition. Mother Nature [gives] us sufficient new soil every year, so we really should not be buying synthetic fertilizers. It's *wrong* to buy synthetic fertilizers. We need a sustainable agriculture that's built on the natural ability of the land to sustain itself. And that's when our society and your food supply is the most stable.

GORDON: Should Americans care about the fate of family farming?

CARR: I think that urban people should care about family farms for several reasons. Family farmers will deliver to the urban populations a more healthful and nutritious supply of food than will our highly capitalized corporate counterparts. Family farmers do not look at agriculture as a bottom-line proposition as do the highly capitalized folks. Therefore, if allowed a subsistence-plus living, we're not driven to push production chemically and synthetically as aggressively as our highly capitalized counterparts do. As long as I can make a modest living, I take more pride in the quality of product I produce than the positiveness of my bottom line.

Our extension people, for example, have to stop trumpeting the merits of twenty-thousand-pound herds. There's nothing wrong with a twelve or a thirteen-thousand-pound average. It simply means that you'll generate a little less money to service debt. But if you understand that the rents and interests that the land creates should service labor and not capital, one balances out the other. It's only when you allow Harvester to sell you three blue silos, and then allow International Case to sell you hundred and fifty horse tractors with air conditioned stereo tape decks—that's when you have to have a twenty-thousand pound herd to service your debt. But if you got a fifty-, seventy-, or eighty-horse tractor, a manure spreader, you may have a cement-stave silo and you may not, you bail your hay, you pick your ear corn—my twelve thousand pound or thirteen-thousand pound herd average creates for me a very comfortable living.

Farmers must understand the native ability of their soil, their land, to produce what economists call "rents and interest," and they must not allow that rent and interest to accrue to people other than themselves. And if they can get that fixed into their mind, we'll have a very stable agriculture. We'll have a population that's well fed, and we'll all be better off. □

The Role And Future of

Migrant Farmworkers In Wisconsin Agriculture

By Doris P. Slesinger

Every year Wisconsin's population swells with transient out-of-state residents who play a vital role in agricultural production and processing of vegetables, fruits, nursery stock, and Christmas trees. This article looks at migrant workers in Wisconsin, their history, characteristics, and future outlook.

History

Migrant workers first appeared in Wisconsin around the turn of the century. At that time, sugar beet and vegetable production expanded, leading to the recruitment of European workers from low-income areas in several midwestern cities, including Sheboygan, Milwaukee, Chicago, St. Louis, and Kansas City. Most early migrants were Belgian; they were later replaced by Germans and Russians. Many of these migrants eventually bought their own farms, settled in the community, and became permanent residents of the state. In the 1920s and 1930s, the number of migrant Hispanic workers increased. Sugar beet companies actively recruited workers from the Southwest and along both sides of the Mexican border. By 1942, Wisconsin growers increased farm production to support the war effort but experienced severe labor shortages. This led to the establishment of the National Emergency Farm Labor Program (1943–47) which permitted the importation of foreign workers. Wisconsin imported male workers from Jamaica, the Bahamas, British Honduras, and Mexico. German and Italian prisoners of war were also used. In 1945 the number of foreign agricultural workers peaked at 6,700.

Following World War II, many Wisconsin farmers abandoned their agricultural pursuits for higher-paying jobs in the city. Wisconsin's production of crops requiring a large seasonal labor force did not decrease, but growers recruited more domestic migrants and fewer foreigners. About 85 percent of the migrant workers in Wisconsin during the postwar period were Texas-Mexicans. The remainder were recruited from neighboring states, from the South (mostly from Louisiana and Mississippi), and from the Chippewa, Oneida, and Menominee Indian tribes in northern Wisconsin. Wisconsin also received some foreign workers from 1951 to 1964 under the federal "Bracero Program," which was aimed at alleviating agricultural labor shortages.

Since 1955, the number of migrant workers in the state has declined due to the mechanization of planting, picking, and sorting crops, and the use of herbicides in agriculture. These industrial advances lowered labor requirements for many commodities. On the other hand, increased production of highly perishable crops—primarily vegetables for processing—created more jobs for migrant workers. These countervailing forces can be seen in Figure 1, which shows the trend in employment of migrant workers in Wisconsin from 1945 to the present.

Mechanization

Mechanization cut sharply the number of migrant workers in Wisconsin, beginning in the early 1950s with the development of mechanical harvesters for sugar beets, potatoes, and snap beans. These crops are among the less delicate fruits and vegetables grown in the state and are relatively conducive to machine handling. By the 1960s, the potato harvesting machine had virtually supplanted hand harvesting. A snap-bean harvester, adopted around 1954, helped to make Wisconsin the nation's top producer of snap beans for processing. Mechanical cherry tree shakers were also developed in the past twenty years; by 1978 almost the entire cherry crop was picked by machine. The cucumber is one vegetable for which there has not yet been a satisfactory mechanical picker devised. Although there have been attempts at mechanization since the early 1960s, and some machines have been successfully used in soils different than Wisconsin's, to date almost all cucumbers in the state are still hand picked and sorted by migrant workers.

The number of migrants working in strawberry production has also declined, but not due to mechanization. Wisconsin growers used to employ many migrant workers to harvest their crops. As labor costs increased, however, the growers did not mechanize. Instead, they eliminated the labor pool by converting their fields to "pick-your-own" op-

erations. Today, almost all strawberry operations have eliminated migrant labor and instead use local labor or are "pick-your-own" operations.

Herbicides

Increased use of herbicides in agricultural production has also contributed to the decline in use of migrant labor. Many migrants had been employed to weed intensively grown crops with a high per-acre value. Weed control was especially important in onion production, because onions compete poorly with weeds, and mint production, since the presence of weeds in mint hay diminishes the quality of mint oil. Today, herbicides have virtually displaced migrant workers in these tasks.

Field vs. cannery work

For the first half of the century migrant seasonal labor worked as field laborers. In the 1960s and 1970s, an increased number of canneries hired migrant labor, although the total number of migrants in Wisconsin declined. In 1968, for the first time, more migrants worked in food processing plants than in field work. According to Wisconsin State Employment Service data, the proportion of migrants in cannery work peaked in the early 1970s at around 60 percent, and since has hovered around 50 percent. Recent data, however, indicate that many canneries are closing or converting to freezing produce—an operation that is more easily computerized and can eventually be converted to robotics.

Labor laws

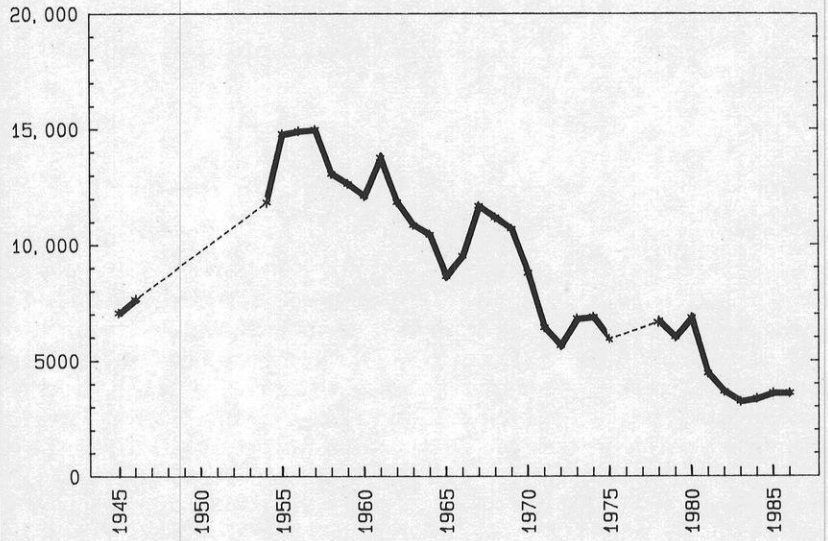
New laws designed to protect migrant workers in Wisconsin also influenced employment patterns. Wisconsin has had a series of state laws, commencing in 1951, that have increasingly required more stringent enforcement of registration, inspection, and certification of migrant camps. There has been particularly strong antipathy among employers toward a 1977 law that regulates housing, job contracts, guaranteed minimum wages, and transportation. Some employers claim to have closed their operations, or changed from hiring migrants to hiring local laborers, because of this law. They cite the continuing decline in the number of employers of migrant workers as evidence of this burden. However, there has been a consistent decline in the number of farms in Wisconsin for decades and the current economic plight of farmers has little to do with the costs associated with migrant labor. Marginal farmers have always been at risk of losing their farms, and today's economic environment may have exacerbated their tenuous situation.

The most recent regulations passed concern sanitary and health conditions. A 1986 regulation requires employers to provide the following sanitary measures for field workers: one portable toilet per twenty workers, drinking water, and water for washing hands. Although growers raised concerns about the expense of such additions, they have been pleased with the positive effects of these changes on both morale and productivity of the workers.

Current situation

In the 1986 season, an estimated 3,500 migrant workers came to Wisconsin. This indicates a sharp decline since the peak of 15,000 workers estimated to be working in Wisconsin in 1955. As shown in Figure 1, the decline in number of

Figure 1.
Estimates of Migrant Farmworkers in Wisconsin, 1945 - 1986



Sources

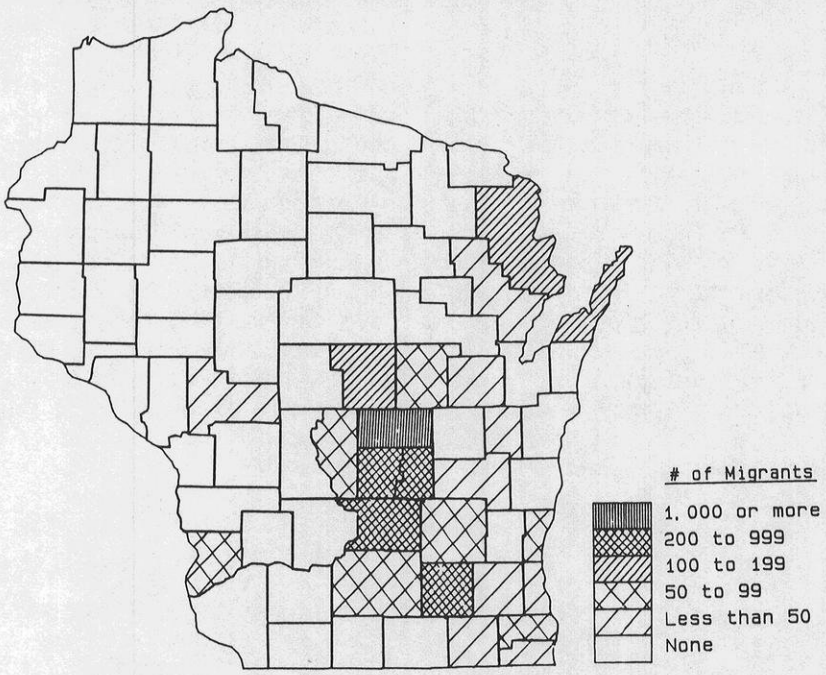
1945–1946, 1954–1962	Wisconsin State Employment Service "Fact Sheet."
1963–1967	Rauschenbush, Elizabeth Brandeis, "Wisconsin Governor's Committee on Migratory Labor Report for 1966 and 1967 with a Summary of Earlier Developments," Department of Industry, Labor and Human Relations, Madison, 1968.
1966–1975	Wisconsin State Employment Service "Fact Sheet."
1978–1986	Figures based on numbers provided by migrant camps registered with Bureau of Migrant Law Enforcement, Department of Industry, Labor and Human Relations.

Table 1. Crops on Which Migrants Work in Wisconsin, Arranged by Number of Sites in 1981

Crops	Number of Sites
Cucumber	40
Onions*	20
Peas	16
Carrots*	15
Sweet Corn	14
Cabbage	12
Potatoes*	12
Mint	11
Green Beans	8
Sod	8
Apples	6
Cauliflower	6
Beets	5
Mixed Vegetables	5
Lettuce	4
Peppers	4
Celery	3
Cherries	3
Evergreens	3
Tamarack	3
Lima Beans	2
Ornamental plants	2
Radishes	2
Soybeans	2
Wheat	2
Canned Sauces	1
Kohlrabi	1
Melons	1
Spinach	1
Strawberries	1
Tomatoes	1

* Field and cannery crops are combined.

Figure 2.
Number of Migrant Workers by County, 1986



workers proceeded at a steady pace until the early 1970s when the number of workers dropped to about 5,000. Since then, the number of workers has continued to decline, but at a slower pace. The numbers shown include only migrant workers; many bring dependent family members with them. Thus, in 1955, 15,000 migrant workers brought 5,000 dependent family members with them to Wisconsin. By 1978, the number had dropped to an estimated 4,100 workers and 2,500 dependent family members. Today, the Job Service Division of the Wisconsin Department of Industry, Labor and Human Relations estimates there are 3,500 workers and 2,000 dependents in the migrant population.

Table 1 shows crops on which the migrants work, arranged according to number of sites in the state. (Data were obtained from a telephone survey of employers in 1981. See M. Richards and D. P. Slesinger, "The Migrant Farm Worker Population in Wisconsin, 1981," Agricultural Bulletin R3257, University of Wisconsin-Madison.) Figure 2 shows the counties in which migrants work and the approximate number of workers employed in that county in 1986. Today migrants are employed in approximately twenty-five counties, but only five have over 200 workers. Waushara county continues to have the largest number of workers with approximately 1,050 workers in twenty-nine camps certified by Job Service this year.

Migrants start arriving in Wisconsin in late March for nursery work. Numbers peak in the first weeks of August, when harvesting and cannery work is at its busiest, and decline rapidly after Labor Day. A few workers stay until early December, usually packing carrots, onions, potatoes, or trimming Christmas trees.

About 90 percent of migrants come from the Rio Grande Valley in Texas, near the Mexican border. Most workers speak Spanish and English, although a number of the older workers speak only Spanish.

Some interesting information was obtained from personal interviews with migrants in a statewide random sample survey in 1978. (For more details, see D. P. Slesinger, *Health Needs of Migrant Workers*

in Wisconsin, Dept. of Rural Sociology, University of Wisconsin-Extension, Madison, 1979.) In 1978, about 60 percent of workers were males, who, on average, were older than female workers. The average age of male workers was thirty-six years compared to thirty-three years for female workers. About two thirds of the workers were married, and one third were single, divorced, or widowed. About three fourths migrated with families and/or relatives, and one fourth migrated alone. Canneries tend to hire single workers while growers tend to hire families to plant, tend, and harvest crops in the fields. Thus, counties such as Green Lake tend to have single workers living in dormitories and working in canneries, while counties such as Waushara tend to have migrant families living in camps and working in the fields. About one fourth of the workers are new to Wisconsin each year, although some migrant families have been returning to Wisconsin for over twenty-five years.

On average, migrants have not completed high school. Among workers twenty-five years and older, only 8 percent of males and 4 percent of females are high school graduates. Over 70 percent of both men and women had not reached ninth grade. Yearly income of migrants hovers around the poverty level. Although data on earned income of migrant workers are very hard to obtain, a 1978 survey found that, on average, about three fourths of the total family income was earned through migrant work. In 1977, the median family income for workers was $5,500 with almost one out of three families earning less than $4,000. Their per capita income was just under $2,000—which compares most unfavorably with the 1976 per capita income of $6,300 for Wisconsin residents. About two out of three migrant families receive some form of public assistance. This includes food stamps, unemployment compensation, and/or participation in the Women, Infant, and Children (WIC) nutrition program. In general, most migrants live close to the poverty level and receive their income in short but intensive periods of work.

What does the future hold?

The number of migrant workers employed in Wisconsin agriculture will likely continue to decline slowly. Only two major industrial activities employ workers today: hand-picking cucumbers for pickles and canning peas, green beans, corn, and mixed vegetables. The migrant work force in Wisconsin will likely decline precipitously when cucumber picking is successfully mechanized. This will happen when a mechanical picker is designed which can pick cucumbers without blowing sand in the pickles, and when plants are genetically created to produce a crop of the same sized pickles which mature at the same time so that a once-over harvesting machine will obtain uniform pickles. In addition, as frozen vegetables replace canned ones, as is the trend in the food industry, it is likely that canneries now employing migrants will use only local labor and computers to handle the freezing process. Either of these conditions would have a major impact on the number of migrants traveling to Wisconsin for agricultural work, reducing the number of out-of-state migrants to a trickle.

Doris P. Slesinger is professor of rural sociology at the University of Wisconsin-Madison. She also is co-director of the Applied Population Laboratory, Wisconsin Cooperative Extension Service.

Project Hope is Born

By Lucinda O. Morken

A project called HOPE—Help Our People Endure—was launched in Jackson County, Wisconsin, through a farm woman's efforts after she had reached the limit of her financial and emotional resources. Sandra Thompson of Taylor, Wisconsin, married her high school sweetheart, Glenn Simonson, in 1961. They began farming in their home neighborhood. After ten years of successful farming and welcoming five babies, their future looked bright.

Then disasters began. First, their barn burned and had to be replaced. Modern equipment was not cheap. Then two of their children needed special medical attention. A hired man fell from their silo and was killed. Two cows they purchased turned out to be diseased and infected the whole herd. Bills accumulated faster than their dairy income could handle them, leading them to file for bankruptcy in 1983.

Struggling to reorganize their finances, they borrowed money against Glenn's life insurance in 1984 to buy vaccine for the diseased cattle. Milk production began to pick up—and their hopes revived. Then the worst blow of all fell: Glenn was killed in a tractor accident. Sandra stayed on for a year working the farm, but the prospect of foreclosure loomed, so she moved to town.

Joining a grief group after Glenn's death led her to realize that there was also a need for a support group for farm families in financial trouble. Encouraged by Pastor Omer Nelson of Taylor, she contacted the La Crosse office of social services. There she met Paul Ranum, the area director of Lutheran Social Services, who had a similar concern. In February he had secured support through LSS's Partners in Caring Appeal, and soon the project HOPE was officially launched.

Sandra says that one of the first challenges is to get past the judgmental stage that blames farmers for mismanagement. "We are in a crisis," she says." "Let's not blame. Let's do something about it."

She brings together groups of people worried about the farm crisis. She shows a video on the sale of a particular farm, and then asks the participants to fill out a survey sheet, anonymously, that pinpoints their problems and feelings. That gives her the basis for a general discussion. People then start to talk about their frustrations, pressures, anger, fatigue, and lack of money—their milk checks do not cover their farming and living expenses.

More and more support groups are growing out of these meetings. Sandra says, "People are hungry to share, to unburden themselves. The groups work because people believe that only another farmer can really understand what they are going through."

LSS's Ranum adds, "When people are hurting, we have a responsibility to do something about it."

Century Farm

My grandfather plowed with oxen;
My father plowed with horses;
My husband plowed with tractors;
My son doesn't think it necessary
to plow at all.

Lucinda Morken

Lucinda O. Morken lives on a farm in Ettrick, Wisconsin.

Half of U.S. Farmers Face Failure

Government Options for Restructuring Agricultural Debt

By Patrick B. Doerning, Gerald J. Dittberner, and Greg Doerning

Those concerned about family farmers view with alarm their recent losses of over $200 billion in agricultural assets and their record number of bankruptcies and foreclosures. Public debate over family farm viability has a new urgency in the 1980s. Low farm income, inability to pay debts, decline in farm asset values, and involuntary termination of farm businesses have brought wide attention to the topic. Regardless of the specific focus, fundamental questions about the survival of American family farms are not likely to disappear from the political horizon.

Concern about the family farm suggests that an agricultural sector dominated by family farms may have economic efficiency and social equity implications—efficiency because, as a nation, we attempt to invest our scarce resources where they will be most productive, and equity because, as family farm producers, consumers, and taxpayers, we all are affected by the distribution of income and returns in the farm sector.

The specific causes of the agriculture collapse are open to discussion, but the current distress among farmers and farm lenders is rooted in the inflationary decade of the 1970s and in adjustments from the excesses of that period to sharply different economic conditions in the 1980s. Throughout the 1970s, farmers faced rapidly expanding exports, accelerating inflation, and low to negative real interest rates (the nominal interest rate minus the inflation rate). It became easy to borrow because of the low rates, and farmers responded by borrowing heavily to invest in new capital equipment, to adopt new production technologies, and to purchase increasingly expensive farm land. Farm debt rose an average of more than 10 percent a year. Yet land values increased even faster, providing the economic rationale as well as the security for farmers and lenders to expand and roll over debt. Debt-to-asset ratios of farms declined over the 1970s because assets rose so much relative to debt.

By the early 1980s, the factors that had given rise to expansion had reversed. Worldwide recession weakened international markets, while the value of the dollar rose rapidly against major currencies (making American products cost more to foreign buyers) and further dampened export demand. Inflation was slowed by stringent control of monetary growth. Real interest rates, which had been low to negative throughout the 1970s, jumped to unprecedented levels of 8 to 10 percent, making it significantly more expensive for farmers to borrow. Farm commodities in foreign markets were too plentiful to sustain the prices that had prevailed during the 1970s causing commodity prices (and farmers' income) to drop markedly. Land values, which depend on both current farm income and prospects for future growth, also declined (figure 1). The debt levels some farmers assumed were no longer sustainable.

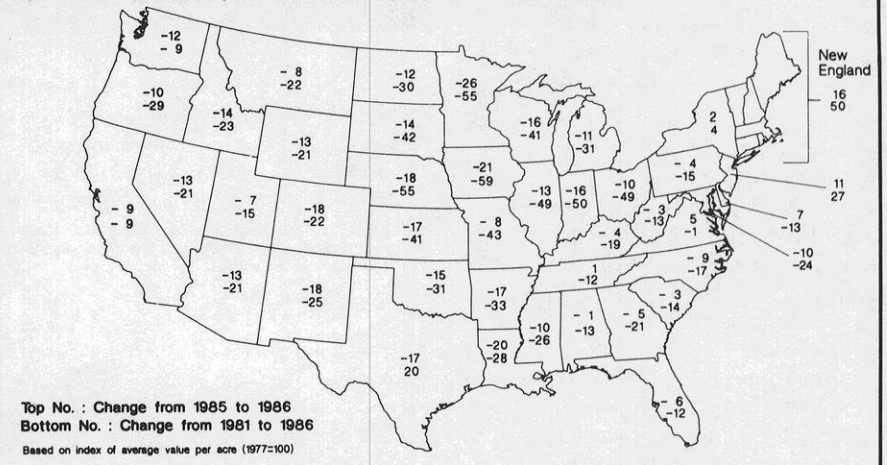


Figure 1. Percent change in average value of farm real estate per acre, based on an index value of 100 for 1977. Downturns in U. S. farm values began in the peak year of 1981, after rising dramatically since 1973. Drops in values were widespread, with decreases of 10 percent or more in 25 states. The largest decreases were in the lake state region (Wisconsin, Minnesota, and Michigan), where land values dropped 26 percent in Minnesota and 16 percent in Wisconsin. Government estimates are for a further decline of 12 percent from February 1986 (the last data used in the figure) to the end of 1986.

Farmers whose solvency depended on continuously rising land values, or who pursued an aggressive expansion strategy, were pushed toward insolvency. Moreover, even those farmers who followed more cautious financial strategies in the 1970s but who suffered from droughts like those in 1980 or 1983, or from other natural disasters, came under financial stress.

Methodology

Policy makers in Washington, D.C., are analyzing the current agriculture situation with two particular measures: earnings, as indicated by net cash income after family living (NCIFL) and calculated using the formula in figure 2, and solvency, indicated by the ratio of farm debt to farm assets.

NCIFL represents farm household earnings. These are funds available to a farm household for business expansion, further consumption, savings, or other obligations. NCIFL is a statement of operating income and cash flow and, as such, is a short run measure, since it does not take into account allowances for depreciation of capital or a return to owner-operator inputs (for example, labor, land, or machinery).

The other measure is farm solvency and is based on the debt-to-asset ratio. This ratio is one of the primary measures indicating whether or not a farm will have cash flow difficulties.

These two measures (earnings and solvency) are used to classify farm households into six categories (figure 3). These categories include two degrees of cash availability (negative or positive NCIFL) and varying degrees of solvency as indicated by debt-to-asset ratios. Each earnings-solvency class gives a perspective on the portion of farm households facing financial problems.

Our primary concern here is with those farms having negative earnings and questionable-to-weak equity positions (classes I, II, and III). Close attention is focused on class III farms because of their potential for financial problems. However, even farms without current earnings problems (class VI farms) could be hurt by declines in income if they are in a weak equity or solvency position. Past work by the Department of Agriculture (USDA) shows that some farms with very large debt-to-asset ratios generate enough cash to pay fully all their commitments. On the other hand, some farms with low debt-to-asset ratios have produced either low or negative cash incomes.

Current financial situation

What is the situation for farms in Wisconsin, Minnesota, and Michigan—the lake states? Data for the following analysis are taken from the most recent annual USDA Agriculture Information Bulletin (number 500) for calendar year 1985.

Lake state farm cash flow is presented in figure 4 according to debt-to-asset ratio. These numbers show data for all farms in the lake states.

Farm Operator Income and Cash Flow Statement

Crop and livestock sales	+	Other farm income (Net CCC loan transactions, Government payments, custom income, other farm wages, etc)	=	Gross cash income from farm operation
Gross cash income from farm operation	–	Cash operating expenses before interest payment	=	Net cash income before interest payments
Net cash income before interest payments	–	Interest and expenses	=	Net cash income after interest payments (NCOI)
Net cash income after interest payments (NCOI)	–	Estimate of debt repayment	=	Net cash income after subtracting debt repayments
Net cash income after subtracting debt repayments	+	Nonfarm income	=	Cash income available to farm household from all sources
Cash income available to farm household from all sources	–	Estimated cash family living allowance	=	Net cash income to the household after business and household expenses but before taxes, other accrued liabilities, and noncash adjustments (NCIFL)

Figure 2. Farm operator income and cash flow statement. The Net Cash Operating Income (NCOI) indicates the amount of funds generated by the farm business. The Net Cash Income after Farm Living (NCIFL) represents total farm household earnings available for business expansion, further consumption, savings, or other obligations.

Figure 3. Joint distribution of farms by earnings (NCIFL) and solvency class. Each class gives a perspective on the portion of farms facing financial difficulty and potential failure. Most vulnerable are farms with negative cash flow, especially those who have borrowed heavily and have high debt-to-asset ratios.

Joint Distribution of Farms by Earnings and Solvency Class

Solvency	No debt or very low debt relative to assets	Moderate debt/asset position	High debt/ asset or insolvent positions
Earnings			
Negative earnings:	**CLASS I** debt/asset ratios less than 0.10	**CLASS II** debt/asset ratios 0.10 to 0.40	**CLASS III** debt/asset ratios greater than 0.40
Positive earnings:	**CLASS IV** debt/asset ratios less than 0.10	**CLASS V** debt/asset ratios 0.10 to 0.40	**CLASS VI** debt/asset ratios greater than 0.40

Description	Debt-To-Asset Ratio						
	No Debt	.01–.10	.11–.40	.41–.70	.71–1.0	Over 1.0	All Farms
Number of Farms (thousands)	58	23	53	38	14	13	199
Crop and Livestock sales	28,067	61,039	72,017	84,185	98,202	82,139	62,882
+Other Farm Income	2,416	6,001	9,987	17,171	16,998	28,873	10,430
−Cash Operating Expenses (pre-interest)	19,299	49,068	56,002	68,376	75,572	81,890	50,009
−Interest Payment	195	2,392	10,429	18,729	25,133	22,635	9,975
=Net Cash Operating Income (NCOI)	10,989	15,580	15,573	14,251	14,495	6,487	13,328
−Debt Repayment	0	904	5,506	10,809	15,368	17,467	5,878
+Nonfarm Income	21,477	14,353	15,380	18,632	12,820	9,193	17,068
−Cash Family Living Allowance	15,400	15,400	15,400	15,400	15,400	15,400	15,400
=Net Cash Income to the Family (NCIFL)	17,066	13,629	10,047	6,674	−3,453	−17,187	9,118

Figure 4. Farm Operator Income and Cash Flow Statement for Lake State Farms (Wisconsin, Minnesota, and Michigan) based on the USDA's 1985 Farm Costs and Returns Survey conducted in February and March 1986 by the National Agricultural Statistics Service. For this survey, a farm was defined as an establishment that sold $1,000 worth of agricultural products or spent at least $1,000 for feed, supplies, equipment, maintenance or other inputs for the purpose of producing farm commodities in 1985. Values are averages for farms in each debt-to-asset Category

Numbers in each column represent average values for that debt-to-asset ratio. For example, in the .11–.40 range, there are about 53,000 farms. These farms have an average crop and livestock sales figure of $72,017, and so on down the column.

These data show overall average values of farm income and outflow. The net farm income for family living (NCIFL), on the bottom, shows that negative cash flows exist, on average, for lake state farms with debt-to-asset ratios of 0.71 and above. However, by examining raw data used for the averages, one finds there are farms in all ratio categories with negative cash flows. Typically, 35 to 77 percent of farms in each debt-to-asset ratio categories have negative cash flow and are vulnerable to financial instability and potential failure. Among all lake state farms, about half (98,000) face failure.

How do lake state farms compare with all U.S. farms? A comparison of the percent of farms in each debt-to-asset category is shown in figure 5. Throughout all of the U.S., 39 percent of farmers have no debt (column A), 15 percent have debt-to-asset ratios of .01 to .10, and so forth. Each farm in the nation falls into one of these categories.

Column B lists the percent of each category with negative cash flow. In

Figure 5: Percent of Farms in each debt-to-asset ratio category. Column A represents all farms in the nation regardless of whether cash flow is positive or negative. Columns B through F show the percent of farms in each category with negative cash flow. Columns B and C compare Lake State farms (Wisconsin, Minnesota, and Michigan) with those of the nation as a whole. Columns D, E, and F show the distribution on a nationwide basis for all dairy farms, all general livestock farms (beef, hogs, and sheep), and all cash grain farms. Data based on the USDA FCRS survey.

	A	B	C	D	E	F
		Percent of farms with Negative Cash Flow				
				Nationwide by farm type		
Debt-to-Asset Ratio	U.S. Farms (All)	All U.S. Farms	Lake State Farms	Dairy Farms	General Livestock Farms	Cash Grain Farms
No Debt	39	45	45	36	49	34
.01–.10	15	40	35	35	44	32
.11–.40	24	40	47	40	45	37
.41–.70	13	49	55	56	52	39
.71–1.0	5	51	57	65	56	42
Over 1.0	4	66	77	86	72	65
Overall	100	45	49	45	48	38

the debt-to-asset ratio range of .41 to .70, one finds 13 percent of all U.S. farms (column A) and, of these, 49 percent (column B) have negative cash flow.

Lake state figures, in column C, indicate that about 77 percent of lake state farms in the most delicate financial situation (debt-to-asset ratio over 1.0) have negative cash flow and are in a most vulnerable position for financial failure. Compared to the nation as a whole (column B), lake state farms (column C) show a greater percent of farms with negative cash flow in the four most vulnerable categories (debt-to-asset ratios greater than .10). Lake state farms seem to be in worse financial condition than those in the U.S. as a whole.

What is the situation for various types of farms (dairy, livestock, and cash grain, etc.)? In Wisconsin, Minnesota, and Michigan, dairy farms make up about 31 percent of all farms; general livestock (beef, hogs, and sheep) about 25 percent; and cash grain, 25 percent. Columns D, E, and F compare these farm types. These data are nationwide and represent all *dairy* farms in the nation, all *general livestock* farms in the country, and all *cash grain* farms in the U.S. For example, of all dairy farms in the U.S. (column D), 86 percent with debt-to-asset ratios over 1.0 have negative cash flow. In the four most vulnerable categories for dairy farms, and in all categories of general livestock farms, the situation is worse than that for the nation. Close examination clearly reveals that financial difficulties in the lake states are driven primarily by the difficulties of dairy and general livestock farms.

How many lake state farms are likely to fail in the near future? While the answer to this question can only be crudely approximated because of limited data availability, it is possible to make some estimates. If one assumes that the distribution of *lake state* dairy farms (over the various debt-to-asset ratios) is the same as the distribution of dairy farms for the entire *nation*, then one can calculate the number of lake state farms in each category using the percent of dairy farms in each category and the percent of each category that has negative cash flow. For example, the USDA data show that about 22 percent of all dairy farms in the nation are in the "no debt" category, and that 36 percent of these have negative cash flow (column D). Since there are about 62,000 dairy farms in the lake states (31 percent of lake state farms), one can then estimate the number of lake state dairy farms with negative cash flow (22% x 36% x 62,000 equals about 4900). Figure 6 shows estimates using this method for dairy farms, general livestock farms, cash grain farms, and all others.

Figure 6: Estimate of the Number of farms of each type in the Lake State Region (Wisconsin, Minnesota, and Michigan) Facing Failure due to Negative Cash Flow.

Debt-to-Asset Ratio	Dairy	General Livestock	Cash Grain	Other	Total Farms
No Debt	4,900	11,700	4,900	4,500	26,000
.01–.10	3,100	3,000	1,700	200	8,000
.11–.40	7,400	5,200	5,500	6,900	25,000
.41–.70	6,600	2,300	3,100	9,000	21,000
.71–1.0	3,900	800	1,500	1,800	8,000
Over 1.0	2,000	1,000	2,300	4,700	10,000
Totals	27,900	24,000	19,000	27,100	98,000

The results are dramatic, even as rough estimates. Figure 6 indicates that nearly 98,000 lake state farms face failure. This figure is about 49 percent of all lake state farms.

Alternatives for reducing farm debt

Five options were examined which deal with the current financial stress on farmers with sales over $40,000; one continues current programs, and four present specific plans to relieve the problem of farm debts. The options are:
—status quo
—loan guarantee
—interest rate buydown
—holding tank
—debt discharge
The effects of each option are shown in figure 7.

Status quo

The status quo approach assumes current federal policies and economic conditions remain unchanged. In this case annual interest and principal payment shortfalls would continue and two thirds of the commercial farm debt would not be fully serviced.

To reduce excess debt fully without government intervention, this approach would have the farm sector go through some major restructuring. Financially sound farm operators or outside investors would purchase huge amounts of assets from financially stressed farmers. It's questionable whether this approach could work. A careful look at figure 7 shows that with this option, 25 percent of farm operators would go out of business and another 23 percent would have to sell some assets to remain in business.

Federal loan guarantee

Similar to the Debt Adjustment Program that the federal government initiated in 1984, the loan guarantee alternative would be targeted to marginal farmers. To be eligible, farm operators would have to be unable to make full interest payments without a principal writedown of 10 percent. After the lender writes down the principal by 10 percent, the federal government would guarantee the remaining principal. However, few farm operators (3 percent) would qualify for this option.

Fixed interest rate buydown

The purpose of this alternative would be to pay that portion of interest that farmers are unable to pay. Lenders would be kept current on interest payments while they work with farmers to sell off assets and restructure farm business operations. Presumably, the farmer would be required to make needed long-term changes so that the subsidy would not have to be continued indefinitely.

Holding tank purchases

The purpose of a "holding tank" is to help stabilize farm asset markets, which have declined substantially during the past few years. The federal government would purchase land and other assets that stressed farmers need to sell to restructure their businesses and reduce excess debt. Farmers could have the option of leasing back those liquidated assets. To administer the holding tank, the government could set up a new agency or work through existing financial institutions. One effect of the holding tank's purchases would be to maintain asset values above levels determined by the forces of supply and demand without government intervention.

Federal discharge of debt

"Debt discharge" is an extreme means of reducing excessive farm debt. With this approach, the federal government discharges enough debt for each farm to achieve a positive cash flow. Fairness is not a consideration. The government

Figure 7. Estimated impacts on farms from alternatives available to the government for reducing excessive farm debt. Based on an analysis by Robert W. Jolly and Damona G. Doye of Iowa State University as reported in GAO report RCED-86-126BR. The alternatives are targeted to commercial farmers (those with sales of $40,000 or more) with negative cash flows who can make only partial or no interest payments. The goal of each alternative is to balance a farm's cash inflows and outflows.

Alternative	Farm Assets	Farm Debt	Operators	Cost to Government	Cost to Lenders
Status Quo	• 25% sold for restructuring ($136 billion)	• 57% liquidated ($91 billion)	• 25% go out of business (160,000 farms) • 23% sell some assets to stay in business	• Current programs plus costs for economic dislocations	• 7% of debt written off ($11 billion)
Loan Guarantee Program	• Sales unnecessary for qualified operators • Still required for other operators	• $62,000 discharged per qualified operator • Debt liquidation still required for farms not covered by the program	• 3% qualify • 25% go out of business • 20% still need to sell to stay in business	• $11 billion contingent liability	• $1.22 billion in principal written down • Writeoff of debt not covered by guarantee
Interest Rate Buydown (2.11 percent)	• Sales delayed for qualified operators • Required for other operators	• Liquidation slowed for farms reaching zero cash flow • Liquidation still required for those not reaching zero cash flow	• 35% qualify • 13% go out of business • 59% of aid goes to farms with debt to asset ratios over 70%	• $1.31 billion annual subsidy • $5,864 per farm	• $2.04 billion interest shortfall remains
Holding Tank	• 18% bought by tank and leased back to operators	• 51% of debt liquidated	• 22% sell all to holding tank • 26% sell some	• Annual cost is interest on $82 billion less rent payments on leasebacks	• 7% written off
Debt Discharge	• No sales needed, government discharges debt for farms with negative cash flow	• 42% discharged by government	• 22% get all debt discharged • 26% get some debt discharged • Operators get all assets free and clear	• $66 billion	• Lenders receive $66 billion from government

simply pays off one farmer's debt because he/she is losing money and does not pay off another's because he/she is making money.

Yet, with all these options, either about one quarter of farm operators go out of business and another quarter are forced to undergo a major financial restructuring or the cost to the government becomes prohibitive. It is quite clear that all is not well with the current farm situation and that simply letting things settle out by themselves (the "status quo") is not a viable solution. The government faces a crucial decision in setting goals for the future course of farm programs and in carefully designing a robust farm economy that is good for producers, consumers, taxpayers, and the nation as a whole.

Conclusion

This paper is an attempt to lay out an approach government analysts are using to study the financial problems. Employing this analysis framework, we have shown that about half of current farmers (and their current financial structure) are in serious difficulty and will likely fail.

Assuming the status quo option, government officials estimate the government in 1986 will pay $30 billion to the agriculture sector and that commodity prices and land values will continue to decline. It is unlikely that this level of assistance can be maintained in the current budget reduction atmosphere.

There are no easy or inexpensive ways for the country (through the federal government) to help the family farm survive the current restructuring that is occurring in agriculture. However, the government has a responsibility to rural America and the family farmer.

All of us, because farmers produce the food we eat, have an interest in how the problem is resolved. Innovative ideas, studies, and analyses should be provided to our elected officials to help them assist rural families and thus strengthen the nation.

Disclaimer The views expressed in this article are those of the authors and do not necessarily represent those of their employers.

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New Farm Law

By Robert G. Lewis

The Food Security Act of 1985—the basic new farm law—is most notable for its drastic turn away from the nation's fifty-year commitment to enhancing farmers' prices and incomes. In its place, the new law substitutes the goal of making cereal grains, cotton, and soybeans, the main American export commodities, competitive in the international market. The primary means to this end is lower market prices, achieved by sharply reduced government price supports and various export subsidies. The incomes of farmers who agree to reduce their harvests are bolstered by direct payments, which somewhat exceed the loss of income from the idle acreage.

Programs for milk and dairy products also are subjected to similar changes. They are adverse to both the short- and long-term price and income goals of Wisconsin's farmers and its dairy industry. These changes coincide with a serious competitive challenge arising from new dairy technology. According to a recent study by the Congressional Office of Technology Assessment, these will cause "a major regional shift in milk production" away from the Midwest.

The heaviest immediate blow is the law's sharp reductions in the effective price support for milk. By 1987, cumulative reductions of 15 percent since 1982 will total $2 per 100 pounds. By 1990, reductions could total $3.50, a staggering 27 percent. Adjusted for inflation, the average "real" price received in July 1986 was down a drastic one third below 1979, and by 1990 could be cut to half or less its 1979 value.

Although least significant, the new law's "dairy termination program" (DTP) aiming to reduce the milk surplus has received most public notice. The government has contracted with 13,988 dairymen to

Reverses Wisconsin Dairymen's Gains

sell all their cows—one twelfth of the national milking herd—for slaughter or export and to quit dairying for at least five years. They are being paid an average of $1,178 per cow, and will receive also their value for meat or export.

Wisconsin's dairy farmers seem determined to stay in business. Producers of only 3.2 percent of the state's 1985 milk production are "terminating," the third lowest in the country. Reductions in Alabama, Arkansas, Georgia, and Idaho, the four highest, range from 20 to 24 percent. The national average is 8.7 percent. About 38 percent of the DTP's $1,827 million cost will be collected from dairymen who continue to sell milk. Wisconsin farmers will be assessed about $275 million, more than twice as much as their "terminating" neighbors will be paid. Presumably all dairymen should benefit equitably from whatever price increases result from reducing the nation's milk surplus. But provisions of the law affecting the federal milk marketing orders contradict this logic by raising prices in other regions. The net effect is to focus the blow of prospective declines in milk prices as well as the cost of the DTP upon farmers in Wisconsin and the upper Midwest and to ease the impact in competing regions.

Federal milk marketing orders have been in effect for more than fifty years and now regulate the marketing and pricing of milk in most of the country. Their origin is traceable to the need to regulate the production, handling, and marketing of milk to protect public health. When large numbers of consumers began to buy milk instead of relying on each family's "house cow," contaminated milk was identified as the frequent carrier of diseases, including tuberculosis and brucellosis (undulant fever). Cities established milk sanitation codes and prohibited sales of milk from farms that had not been approved by their public health officers.

This gave rise to two tensions: One was the cities' concern for assurance of adequate and all-season reliability of supplies of Grade A milk. This was met by offering premium prices for Grade A milk to enough dairy farmers to ensure an ample supply, plus a safety margin. One result was more eligible milk than could be sold for fresh fluid use, especially during "flush" production seasons. The other was the scramble by milk dealers and producers to seize as much of the local market as they could get and to leave the surplus that could be sold only at the lower price in other hands.

The problem was met, but only imperfectly, by the formation of cooperatives by the approved milk producers. The co-ops contracted with the dealers to supply their milk requirements. The total proceeds from sales for fluid use at the premium Class I price and for manufacturing at the lower Class II price were then pooled, and distributed pro-rata among the members.

Because the voluntary membership co-ops only rarely controlled the entire eligible supply, milk marketing was subject to continual instability, conflict, and occasional violence in bloody milk wars. To remedy the situation, the New Deal agricultural legislation provided for federal administrators to take over the pricing and pooling functions from the cooperatives if a majority of the producers selling Grade A milk in a marketing area agreed. As good as their name, federal milk marketing orders quickly brought order. The federal government's police power now required dealers to pay uniform minimum prices according to the end-use they made of milk and pooled the returns from all milk sales among co-op members and nonmembers alike.

But advances in milk sanitation, transportation, and marketing introduced new stresses. Increasingly strict standards have raised the objective quality of Grade B milk, and most producers now have upgraded their facilities to Grade A. Huge tankers can haul milk a thousand miles from Wisconsin farms and deliver a better quality product than most of the milk produced a mile away fifty years ago. Most milk sales have been shifted from home-deliveries by local dealers to huge supermarket chains selling uniformly branded packages in many markets, some nationwide.

The constraints of technology and economics that restricted milk markets to the scale of single metropolitan areas and their nearby countrysides have been stretched all the way to the nation's borders. During the past twenty-five years, official regulation of milk marketing by both health officials and federal administrators also has advanced—not as quickly, and not as far, but advanced nevertheless—toward recognition that the modern market for milk is nationwide in scale. But now these advances have been set back seriously. Effective May 1, 1986, most of the forty-four federal milk marketing orders were amended, in accordance with the new farm law, to raise the Class I differential by varying amounts above the basic manufacturing value (Class II) price. The increase is highest—$1.03 per 100 lbs.—in the southeast Florida (Miami) market, whose farmers already received the highest milk prices in the country. Other southeastern markets received increases ranging from 67 cents to an even dollar. No markets in other regions received increases that high.

Increases were among the lowest in markets supplied by Wisconsin farmers—none at all in the Michigan Upper Peninsula order, only eight cents in the upper Midwest (Minneapolis-St. Paul), and 14 cents in the Chicago Regional. This pattern of price changes favors dairymen in the Southeast against Wisconsin's dairy farmers in a competitive

struggle to survive. The new farm law links future price support reductions to the nationwide volume of surplus milk. Thus it has become overt national policy to force some dairy farmers out of business.

Another provision of the new law authorizes market service payments to be deducted from the market order pools and to be paid to cooperatives which process reserve milk received in excess of daily sales for fresh fluid use. This would enable these co-ops to supply their cheese and butter factories with milk at a lower net cost than their competitors. This could foster the growth of cheese manufacturing in other regions at the expense of Wisconsin's major dairy industry.

The overall thrust of these changes is to turn back from the progress that has been made during the past twenty-five years in adapting national policies and regulations to the evolution of a national-scale market for milk. Wisconsin's dairy industry has a vital stake in overturning them.

It was recognized fifty and more years ago that every local milk market needs to provide for a reserve of milk to ensure an adequate supply for variable day-to-day demands and short-production seasons. So too does the present-day nationwide market, and its main reserve supply is in Wisconsin. In the present-day nationwide market, all producers who respond to the federal order's price incentive by producing Grade A milk should be assured of access to the nation's Class I market. And all should share in the federally administered marketwide pools, and receive a blend price for their milk reflecting the proportion of all milk devoted to each use classification.

Although the administrative form of the federal orders fell short of explicitly recognizing the national scale of modern milk marketing, their effect came close to it by the end of 1985. In 1960, the average price received for milk by farmers in Florida was $6.71 per 100 lbs., 93 percent higher than the average of $3.47 received by Wisconsin dairymen. By December 1985, the nearly double price advantage of Florida milk producers over Wisconsin's had been scaled down to only 33 percent—$16.20 per 100 lbs. in Florida to $12.20 in Wisconsin. A national milk order pool, by sharing the lower prices received for the nation's "reserve" milk and recognizing the cost of transportation from reserve production areas, would reduce Florida's "blended" average price only modestly below this $4.00 margin.

The prime mover in reducing the price spread between Florida and Wisconsin was the twenty-five year federal policy of resisting efforts to increase the Class I differential in milk orders. For example, in 1985 the differential in the Miami order remained the same as in the early 1960s at $3.15 per 100 lbs. This policy unified the nation's dairy farmers around the common goal of raising the price support for milk used for manufacturing—the basic price. All of the increase in producers' prices during the period has been achieved by raising this floor. Dairy farmers in Wisconsin, about 80 percent of whose milk is sold for manufacturing, have benefited.

By July 1986, the new law's contradictory price effects raised the margin of Florida's price over Wisconsin's to 41 percent. Southeastern dairy leaders spearheaded many unsuccessful efforts during the past twenty-five years to get their milk orders amended so as to achieve what they have now won from congress. They made repeated earlier efforts also to pass legislation. Wisconsin's Senator William Proxmire, and the late Representative (and former Wisconsin Governor) Vernon Thomson and Minnesota's Representative John Zwach were instrumental in thwarting them. Despite such occasional feats and Wisconsin's far greater stake in dairy policy, critics have blamed Wisconsin's elected officials for failing to match the diligence and skill of representatives from other regions in advancing their dairy farmers' interests.

In 1985, fewer than 200 producers sold milk under the Miami order. In all the seventeen orders in the entire Southeast, stretching from Georgia to the Texas Panhandle, there were only 9,965 milk producers. In contrast, there were 18,699 in the Chicago order alone, and 16,128 in the upper Midwest (Minneapolis-St. Paul) order. Most of those 34,827 dairymen were Wisconsin farmers.

The 1985 provisions will expire in 1988, but they can be retained in the orders, and once imbedded there, they will be hard to dislodge by ordinary administrative procedures.

However, the bloody nose dealt to Wisconsin's largest industry in 1985 has provoked a reaction from its political and agricultural leaders that may achieve effective countermeasures in future years. Early in 1986, a solid bipartisan bloc of Wisconsin's two senators and its representatives from farming districts introduced a bill that would mandate the establishment of a nationwide milk marketing order. This has been the primary legislative objective since its formation fifteen years ago of the Farmers Union Milk Marketing Cooperative, which now has one of the largest memberships of milk producers in Wisconsin and the region. The bill has received unusually unified support also from Wisconsin's leading general farm organizations—the Farm Bureau, Farmers Union, and National Farmers Organization.

Only a few years ago, the idea of a nationwide milk marketing order received little support, even from Wisconsin dairy leaders. But the desperate political and economic challenge that now confronts the industry may energize the nation's leading dairy state to lead the nation in dairy policy.

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"We live life forward, but understand it backward."
—Philip Raup

Decline of Farming in Wisconsin

By Herman Felstehausen

The rural condition

Permanent agriculture in Wisconsin is 150 years old. The first farms were established by Yankees and Ohio Valley pioneers. Large foreign-born populations began arriving after the Civil War. Since then Wisconsin farming has completed two historic phases: settlement and expansion. It is currently in a phase characterized by declining farm numbers and a transition to a dualistic structure. Full-time commercial producers supply the principal markets while growing numbers of part-time and supplemental-wage farmers populate the countryside and attempt to maintain rural communities and farm traditions.

Many studies refer to the decline in farming as a decrease in farm income and farm numbers. The change in numbers and financial condition, however, is the result, not the cause of the transformation now taking place. At the heart of the decline is reduced effectiveness or viability of rural institutions and policy structures needed to maintain a stable farm economy (Cochrane, 1979).

Institutional decline means: (1) farmers have failed in their attempts to balance supply and demand leaving them with numerous financial problems; (2) modernization of local support and policy institutions has fallen behind developments in production and technology; and (3) investments in land, water, and environmental programs are not meeting current requirements. Wisconsin's farm decline is associated with the overall transition taking place in American agriculture. Farming is shifting from a family-labor, community-organized production process to a capital-intensive, technologically structured activity.

The purpose of this paper is to describe the nature and effects of these transitions and to suggest alternative policies and strategies that might be followed. Comparative models from Western Europe are introduced to show that a transition in technology and farm financial structure requires parallel modifications in rural social and economic institutions.

Historical perspective

Most Wisconsin farm families descend from immigrants who came from Germany, Scandinavia, Ireland, and Poland a century ago (Holmes, 1944). Northern Europeans brought with them Old World patterns of organizing agriculture. They learned from generations of experience on the land how to integrate economic, social, and community functions to achieve stability and mutual support. They balanced land, labor, and capital inputs with social and family goals: security, education, generational succession, community services, and self-government. Rural institutions such as taxation, zoning, insurance, marketing, and banking evolved in the context of working the land. This particular blend of culture and resource use yielded what in Wisconsin is called family farm agriculture.

Settlement was based on a century-old institutional order put in place following the American revolution. Land laws were devised with abundant land in mind and seen from the beginning as a means for accumulating capital and gaining political power (Webb, 1952). The Land Ordinance of 1785, drafted by Thomas Jefferson, established the ground rules for dividing and allocating the western lands including what is now Wisconsin. A public survey divided the territory into mile-square sections; these were further quartered to form 160-acre (65 ha) parcels for rapid registration and settlement. Blocks of thirty-six sections, six miles on a side, were designated as townships.

Jefferson's goal in proposing this scheme was to do more than lay out production units. He envisioned the creation of free and independent communities where public education, self-government, and responsible citizenship would be practiced by all residents without regard to previous status. Peasants and workers would become citizens. Not only would they learn how to work and produce, they would learn to govern themselves; they would become committed to supporting the arts and sciences, conserving the land and defend-

ing their freedom. "We have an immensity of land," Jefferson (1782) wrote, and argued that it should be developed by the citizens, not the merchants and bankers.

Township blocks were supposed to form automatic centers of local government and community support. They were deliberately restricted to six miles across so that no farmer would have more than three or four miles to walk to reach the town center, the distance that can be covered in one hour on foot. Groupings of towns, when marked off, made up counties to serve as local administrative subdistricts of the state. State governments retained sovereign powers in all matters except those delegated to the federal government.

European settlers accepted without question the institutional blueprint established for them. Their interest was in obtaining land and achieving economic independence. They were content to leave government in the hands of Yankees who were more familiar with settlement traditions and could speak and write English (Conzen, 1971).

Early settlement forms of agriculture were generally viewed as successful. They resulted in an integrated system of resource ownership, family labor utilization, collective decision-making, communally arranged services, and ecologically sound field practices—all more or less harmonized at the farm and village level. This system not only yielded an abundance of products, but perhaps more important, it functioned well in maintaining viable farms and communities.

The present picture

The original system is now being replaced by a new commercial-technological form of farming. Farming is moving toward a centralized form influenced by capital markets and new technologies. Most farmers are forced to choose between part-time/specialty production or capital-intensive, large-scale organization (Schertz et.al., 1979).

The transition in Wisconsin is following the Cornbelt trend, tempered somewhat by more diverse farm types. The state's cool, moist climate and limestone ridges are well suited to forage production, making Wisconsin the country's major dairy region. During settlement wheat was the most important cash crop with more than two million acres planted in the peak year of 1878. Only corn and hay have been able to match those acreages since.

Exactly one half of the state's thirty-five million acres is in farms. The other half is forests, lakes, and urban spaces. Corn is the main crop with more than 4.2 million acres (12 percent of the state) planted each year. Corn, being a row-crop, is also the main contributor to soil erosion. Wisconsin's three highest dollar value crops in 1985 were corn, hay, and processed vegetables; in the U.S., they were soybeans, corn, and wheat.

Wisconsin and Minnesota together produce about 25 percent of the country's milk supply. Even though rural areas seem to be dominated by dairy farms, rural populations are made up of mostly nonfarm residents. There are 4.75 million people in the state making up nearly 1.7 million households of which about 450,000 are in the countryside. About 50,000 farm operators, only about 10 percent of rural households, depend primarily on farming for income.

Personal incomes in Wisconsin are about $60 billion of which net farm incomes make up only 3 percent. Gross farm income is over $5 billion with dairy production providing about $3 billion of that amount. Total Wisconsin farm debt is nearly 7 billion. Part-time farming is not as common in Wisconsin as in many other states, but it is increasing. In the U.S. as a whole there are fewer than one million operators and managers engaged primarily in farming. More than half of the nation's 2.3 million farms sold less than $20,000 in farm products in 1984 and experienced net losses from farming. They lived from their nonfarm income—nearly $20,000 per household.

Table 1. Wisconsin Farm Numbers by Production Income Categories

Farm Type	Number of Farms
Dairy farming, sale of milk and animals	39,000
Livestock and animals other than dairying	7,000
Cash grain farming, mainly corn	4,000
Vegetables and special crops	3,000
Mainly off-farm income sources	30,000
Total farms in Wisconsin 1985	83,000

Source: Projections from Wisconsin Agricultural Statistics and 1982 Census of Agriculture.

The number of farms in both Wisconsin and the U.S. increased until 1935, after which began a long decline that is still continuing. The numbers in both the state and the nation are now similar to what they were just after the Civil War.

Table 2: Growth and Decline of Farms and Farm Population: Wisconsin and U.S.

Year	Wisconsin Farm Numbers	U.S. Farm Numbers	U.S. Farm Population	Farm Population as % of U.S. Population
1860	69,000	2,004,000	—	—
1880	134,000	4,008,907	21,973,000	43.8
1900	170,000	5,737,372	29,875,000	41.9
1920	189,000	6,448,343	31,974,000	30.1
1935	200,000	6,812,350	32,161,000	25.3
1950	174,000	5,382,162	23,048,000	15.3
1960	138,000	3,963,000	15,635,000	8.7
1970	110,000	2,949,000	9,712,000	4.8
1980	93,000	2,427,830	6,051,000	2.7
1985	83,000	2,285,000	5,300,000	2.3

Sources: Wisconsin Agricultural Statistics; USDA Agricultural Statistics; Historical Statistics of the United States.

Requirements of farming

Stable and profitable farming requires more than new production technologies. Institutional change is just as important. This point is often missed in discussions about modernization. The most efficient farm structures are those in which institutional reforms keep pace with technological improvements. Increasing the rate of technical change does not exempt farmers from the need to make constant institutional changes; in fact, it adds to pressures for structural reform (Penn, 1961).

The structure of farming is like a three-legged stool. The first leg is the farmstead, farmland, and equipment (the only leg of the stool under the farmer's private control). The second, called the infrastructure, is usually defined as the physical facilities beyond the farm gate such as roads, communication media, schools, public transportation, market facilities, etc. The third leg consists of farm people and their community decision-making structures: government, community organizations, and public services. All three legs of the stool must be strong for the system to function well. Because farming is an integrated activity, there is a large public or collective role required to maintain structural balance among the broad elements of the system.

Technologically advanced farming in the United States has moved away from Jefferson's concern that production processes be integrated with community and governmental processes. In fact, the goal of technical organization is to separate production from social functions. It groups elements spatially and functionally and segregates work and workers into categories and hierarchies.

Specialized systems, based on principles of industrial organization, are not neutral when applied to farming. They require that many socially and culturally evolved procedures, so abundant in family-community agriculture, be removed. The system, in order to be competitive, must be large. Size implies an elaboration of interconnected networks of information, materials, and persons. Once the system becomes large, it cannot be coordinated by individuals or farm families, so management structures, meaning corporate forms, must be introduced.

The separation of agriculture from community is also driven by developments in nonfarm sectors. Fossil fuels and electric motors, centrally produced products, have now replaced animal power, a farmer produced product. The further result is that mixed farming is also eliminated. Transportation and refrigeration make it possible to exchange food and feed among regions; thus, diversification is no longer an advantage. Extensive communication and marketing networks penetrate whole nations and connect specialized functions internationally. Supply and demand relationships thus become global.

C. J. Galpin (1915), a Wisconsin rural sociologist, recognized the effects of these forces on farmers seventy-five years ago. In his famous study of the social anatomy of agricultural communities, he noted serious problems with the way farming was organized in Wisconsin. First, control over taxing, spending, and lending was centered in cities while farmers were both literally and figuratively located on the periphery. Second, rural institutions were mainly informal rather than formal, which was their strength when serving farmers but their failure when pitted against the political and corporate world. Third, farmers were at a disadvantage in a culture increasingly filled with manufactured items. They are used to obeying the laws of nature and often accept economic and political arrangements as if they were natural processes.

Because farmers do not participate very directly in reorganizing institutions, they are likely to think their fate is determined by natural forces. While they recognize that the farmer's stool is out of balance, they are not focused on its repair. Thus, the industrial-technological leg grows stronger while the community-institutional leg remains splintered.

Lessons from Europe

Many Wisconsin farmers believe that there are no suitable alternatives to expansion and technological specialization. This is partly because they have become detached from their European roots. They no longer think of Europe as a source of new ideas as they did when cooperatives and mutual insurance societies were organized by their grandfathers. Many think Europe is technologically backward; it does not occur to them that in the area of institutional reform, European countries have carried out many progressive rural reforms in this century.

The introduction of modern technology into Western European countries has not led to the same degree of farm concentration or economic disruption as it has in the U.S. A case in point is a Dutch agricultural adjustment study directed by the author (Felstehausen, 1965) in 1962–63. The Common Market countries, of which the Netherlands is a part, were attempting to work out a unified agricultural policy. Dutch small farm operators on sandy upland soils were in despair. Most operated only twenty to thirty acres of land, kept hogs and chickens, milked a few cows, and farmed with horses. Small-scale farmers had survived in those regions for centuries, but with French grain and livestock producers entering the Common Market, they were undercut in producing most commodities.

The above study drew all of the obvious conclusions, most of which, when viewed in retrospect, were wrong. Farm size would have to expand; half of the farm families would have to move to town, retire or retrain; all the rest would have to adopt the latest technologies. What was totally missed in these analyses was that while North America was modernizing its

production methods, Western Europe was restructuring its rural institutions. World War II was the great watershed in both cases. The U.S. suspended progressive rural reforms when the war broke out and concentrated on improving technology for increasing production. In Europe, technical developments in agriculture ground to a halt. Both workers and managers discovered that cooperation rather than technology was the key to survival.

Because of the war, most Western European countries instituted some form of land-use controls and gave special protection to farmers and agricultural resources. Since 1945, rural infrastructure has been rebuilt and improved with government help. National health insurance programs and aids to the elderly and handicapped were extended into the countryside on an equal basis with other recipients. Farmlands and farm buildings were reserved for the exclusive use of farmers. Trade policies were devised to protect national producers and preserve rural resources.

The result was that the Dutch farmers interviewed in 1963 did not pull up stakes and move to the cities. Instead, they built hog houses and chicken barns for which little land was needed; they ordered ship loads of cheap feeds from the American cornbelt and tropical countries, and without fanfare, transformed the Netherlands into Europe's most important enclosed animal feeding conglomeration. Holland's Rotterdam harbor has become the largest food and fuel handling center in the world.

The Dutch rural economy, equipped with a strong cooperative institutional base, discovered how to combine cooperative organization with modern technology. Raw materials were imported to produce finished food products more efficiently than any corporate system has yet been able to duplicate. Even small farmers on sandy soils have prospered. Of 154 farms studied in 1963, less than 10 percent have disappeared. So many animals are now fed with imported grains that the Dutch have a manure surplus which they are also compelled to process and export.

Not only were national institutions strengthened, international forms of cooperation needed to be devised too. The European Community (EC) now consists of twelve member countries which bring together populations, resources, and economic potential comparable to that of the United States. In spite of difficulties, the EC constitutes one of the most promising international inventions of this century. It has helped European farmers realize that they are part of a worldwide system of commodity production and exchange.

Take milk, for example, Wisconsin's most important agricultural product. All large milk producing regions of the world can now meet their national needs. Export markets provide only small variations in demand for absorbing surpluses. International figures are now available on milk production and supply to show how regional markets compare.

Table 3. Milk Marketed in the Main Regions of the World
(In millions of metric tons)

Country/Region	1983	1985	1988 Projection
European Community	103.8	99.1	96.1
Soviet Union	96.4	99.0	103.5
United States	62.3	61.9	62.0
Australia/N. Zealand	12.7	13.4	12.7
Canada	7.4	7.6	7.6
Japan	7.0	7.2	7.5
Total for 1985		288.2	
Estimated world total		400.0	

Source: Landbouwschap, The Hague, Netherlands, 1986.

As the U.S. tries to reduce its milk surpluses it would profit from a closer inspection of European institutional models. U.S. policy makers generally favor a straight market adjustment—eliminating producers until production falls. This is no longer the wisest policy. Economically speaking, surplus production means an overmobilization of land, labor, or capital. In this case, land and capital are allowed to escape regulation while farmers are eliminated. There is no basic economic logic to forcing more farmers out of business (Brewster, Rasmussen, and Youngberg, 1983). The number of farm operators is already so low that their further elimination cannot correct the farm problem.

Solutions

Rural prosperity requires a higher degree of producer coordination of production so that supply can be kept in line with demand. It also means that farmers themselves need to participate in regulating land, labor, and capital relationships, an institutional rather than a technological challenge.

The decline in farming probably cannot be reversed without improving the mechanisms that control output, distribute benefits, govern resource access and use, and sustain individuals and communities. The farm problem is not one of production efficiency, thus it cannot be solved by the usual technical means. Its solution hinges on finding better ways to increase institutional efficiency, a different kind of undertaking.

European agriculture, because of its similarity to U.S. farming, is the best source of alternative examples. There are four areas where these examples are particularly relevant.

(1) **Capital regulation**. The first step should involve revisions in the federal income tax codes to discourage tax-loss farming, followed by new rules regulating the farm credit system. Decisions about capital investments in agriculture should be related to plans governing how much is produced and at what cost. In

other words, supply management and capital management go together. On this subject, American farmers should consult the farmer-run agricultural councils in Europe. Many national farm organizations have federated to tackle farm policy issues.

(2) **Supply management**. Output needs to be brought into line with demand in farming just as in manufacturing and public utility management. Here it would be helpful to look at producer cooperatives in the Netherlands and the Scandinavian countries. Some cooperatives collect data on total production and demand for given commodities, then coach producers on how much to plant and produce in order to match supply with markets. Instead of using the cooperative just to pool production, it is a vehicle for planning and discipline. Government sanctions can also be added for broader effectiveness.

(3) **Land speculation limitation**. Regulations are needed to limit speculation in farmland. Every Wisconsin farmer understands that taxes and land-use controls can affect his chances for survival. Most, however, think of these as negative influences. Europe provides good examples of how stabilizing agricultural land markets favors farmers. It is in the farmer's best interest to maintain a diversity of sizes and types of farms and to maintain some farms near urban centers. Therefore, it is reasonable to permit farmer and citizen-run boards to supervise farmland sales giving bonified farm operators the first option to buy. If after a defined bidding period there are no farmer buyers, the market is opened to others. Farmland prices are, thus, stabilized.

(4) **Farmer payments**. Finally, farmers need to be given incentives to remain in rural areas. The U.S. method of maintaining farmers, if it is done, is to lend them money. The European approach is more likely to be one of supplemental wages and payments—for example, for conservation work. Farmers in Wisconsin could be hired by federal and state governments to carry out a wide range of soil, water, forestry, and farmstead improvements. If one-half million low-income farmers in the U.S. were paid up to $10,000 a year to fix up rural facilities and control erosion, it would cost the government $5 billion. That is a fraction of the $30 billion federal farm programs are expected to cost this year.

One must conclude from an examination of U.S. and Wisconsin farming that while Jefferson's institutional plan was suitable for settlement and development, a new blueprint is now required. The next generation of farmers will have to look for new institutional models. European examples could be helpful. They illustrate how rural living standards and the quality of rural resources can be maintained even when technological changes are taking place.

The old three-legged stool supported by family and community may never be restored, but a new, improved stool can be built.

The government could pay farmers a supplement for conservation work at a fraction of today's federal farm programs.

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Photograph by Laurence Abrams

View From the Farm, the Statehouse, the Capitol

By John Volk

It was pleasant that May morning in 1983 as I stared out the window of my farm home. I was sixty-seven years old, semiretired, and restless. One of my four sons was a partner in our farm operation. My grandchildren were helping him do the morning chores. They didn't need me; I wasn't sure I liked that. After all, I was healthy, able, and much too young to be put out to pasture.

The day before an idea had crossed my mind, a ridiculous idea which I immediately discarded. It came back that morning as I was eating breakfast, and this time I wanted another opinion. I knew what the answer would be. My wife and I had been married for forty-three years. After that long, one knows the answers before asking the questions. But I had to hear her say it.

"I have a notion to run for Senator Kincaid's vacated assembly seat. What do you think?" Representative Kincaid had recently won an election to become a state senator. An election would be held to fill the vacant assembly position. I took another mouth full of bran flakes and waited.

"Why don't you?" she said.

The spoon splashed milk on my face as it fell from my hand into the cereal. "Close your mouth," she said, "you look like a hungry fish." With that lengthy deliberative process completed, I entered into state politics. After an exciting seven-way primary and a relatively normal general election, I faced the reality of being in the state legislature.

Why did I have that empty feeling in the pit of my stomach? I should be elated. Would they laugh at this old farmer from up in the sticks? Would they keep me totally confused with legal terminology? Would they ignore my questions and comments?

Public responsibility was not new to me. Involvement in town, county, and school affairs had given me some insight into the workings of government. During my years as a municipal official and school board member, state government had become a convenient scapegoat for everything that didn't have simple answers. If taxes were too high, it was the fault of the state. If roads didn't get fixed or school buildings cost too much to repair, it was because the state did not provide enough financial aid. Now people would look to me for answers.

The first day started at ten o'clock and lasted until nine o'clock the next morning. Twenty-three hours of puzzlement and confusion, which I enjoyed every second of. The empty feeling I had now was because of my appetite. It was now a challenge, and I was happy to be a part of it.

The complex issues we had faced on the town board and school board were simple compared to legislative problems we encountered daily. Those local issues were magnified a thousand times by the variety of concerns that other localities had. What would have been good for my school was not necessarily good for all schools. The needs of rural townships were different than the needs of urban areas.

Most of my life had been spent in the country. We had farms and loggers and tourists and small businesses. We knew everyone within ten miles. Assaults and robberies and rapes were rare. There were a few shanty towns but no ghettos. Racial problems were confined to childish slurs that always diminished with time. Folks depended on one another and didn't expect much from the state. After all, the state was in Madison.

Now I was there as a state policy maker. My sixty-seven years of experience had not provided me the expertise to make an immediate contribution. I had to learn more: about income tax and sales tax and inheritance tax; about the operation of courts and state agencies; the poor, the handicapped, the prison system, the university system, insurance; and particularly the role of the legislature in the economy of the state.

Why the constant complaints about high taxes? How did we compare with other states? What kind of services did they provide? How did they address the problems of big business? Small business? Agriculture?

Wisconsin is called the dairy state. We are highly dependent on our rural areas for the support of schools, local government, and small-town business. The farm sector accounts for a good portion of furniture, appliance, and automobile sales. They also spend billions of dollars on tractors, trucks, and farm machinery. They build new barns and silos and pole buildings. A lot of people are working to provide those items.

Obviously the state economy largely depends on the economic stability of agriculture. The agricultural outlook was not good in 1983 and continued its downward trend in 1984. Farm groups were organizing meetings in Madison with legislators to protest high property taxes and low commodity prices. More and more farms were facing foreclosure, and every agriculture committee heard people telling their stories about hard times. They pointed to the number of farm sales and the effect of the farm economy on the small town businesses. The stories were all much the same and became expected in agriculture hearings.

As a farmer, I frequently expressed my sympathy, but it was primarily a federal problem, I said, caused by a disastrous federal farm policy. I blamed the administration in Washington, Secretary of Agriculture John Block, or congressmen and U.S. senators who didn't understand. We could do little or nothing.

And then one day a farm woman came in to tell her story. It was almost the same as the others—almost. It had an intensity and sincerity that immediately affected committee members. She started by saying that she thought elected officials failed to consider the social impact of many issues. She talked not of the family farm, but of the farm family. Not about dollars, but about devotion—devotion to a way of life, to the land they had learned to love, to one another. She spoke not of profit, but of pride—pride in their heritage, in their accomplishments and in their hard-earned possessions. She talked of planning and hardship and self-denial and dreams. And then she spoke of failure.

Not the failure that comes from ignorance or laziness or poor planning. Not the failure caused by extravagance or speculation or greed or illegal action. Not the failure caused by the personal inability to succeed, but the failure caused by costs that exceed prices, by drought and disease and crop failure—by banks that will no longer help and by a state and federal government that didn't care.

She talked about husbands who were despondent and desperate, whose primary aim in life was not to be rich and famous, but only to possess the pride of knowing that they could support their own. Of the men in their fifties and sixties with calloused hands and rugged faces, with tears in their eyes as the last shred of pride was stripped away by an auction.

She talked about children, bewildered and afraid, and wives who desperately wanted to help but no longer knew how to comfort their loved ones. And as the tears started to come, she stood up and made a simple plea, "Please, please can you help us." Then she left the room.

It seemed like a long time before the chair called the next speaker. I don't remember what he said. It didn't seem very important.

I had never felt more helpless. I suddenly realized that this was an issue about people, not simply a loss of profits and jobs. It was conveying a message that hard work and dedication were no longer the route to success. It was saying that government of the people and by the people was no longer for the people. It said no one cared.

But we did care; we wanted to help. It was not just someone else's problem. It had suddenly become everyone's problem. Certainly the U.S. Congress and John Block had to know how serious the situation was, and the least we could do was to convey our concerns to them. They had to understand that this was real. They had to be made to see the effects as we now saw them. We had to go to Washington and make sure they understood.

In February of 1985 we appeared before various committees in Washington to tell our story. It must have lost something in the retelling because our federal officials were obviously unaffected, bored, as if they had heard it all before.

We were furious. Did they think we had come to Washington for fun? Didn't they hear our plea for

help? Were these the people we had selected to represent us in congress? How could they ignore the destroyed lives, the threat to agriculture, the economic damage to our state and the nation? Was this how people felt who appeared before our committee? After all, they were directly affected. Did they think we looked bored? That we didn't care?

I tried to remember that experience every time we held a hearing. No matter how trivial it seemed to me, it was important to someone—important enough to deserve my complete attention.

We returned home feeling that help from the federal government would be steeped in the politics of regional concerns. A final farm program would be the result of maneuvering for advantage by segments of the agricultural industry. We must wait to see how effective our dairy spokesman would be.

If there was going to be any help, it had to come from state leadership and initiative. Because our options were extremely limited, the problem could only be partially addressed. We could not control supply and demand. We could do nothing about trade restrictions or import quotas. But we would do whatever was reasonably possible.

The governor agreed to call a special session to deal with agriculture problems. With few amendments, the proposals submitted by the governor were adopted. They included interest buy-downs to enable hard-pressed farmers to buy seed and fertilizer. There was financial support of a foreign trade office, assistance in product advertising, and additional help to develop new uses for dairy products. Current figures would be used for tax purposes to reflect declining real estate values. It was not enough to halt the foreclosures or to help significantly those with a high debt load. But we had made an effort.

What is the role of state government in dealing with its economic structure? Can it become actively involved in the promotion of industry without restrictive bureaucratic control?

I offer the following observations.

If we begin with the premise that it is the function of government to promote rather than to regulate, we can establish a basis for a concept of effective government involvement in its economy. Webster's dictionary defines "promote" as: "to contribute to the growth or prosperity of." Can we find a more appropriate role for state government than to "contribute to the growth or prosperity of" its people? States that regulate as little as possible and use their resources to promote their physical, educational, and economic assets extensively tend to have periods of rapid growth.

Conversely, those states with strict regulatory laws create an atmosphere of confusion and confinement that restricts new development. Too often, the money needed for growth of a business or industry is utilized to conform to regulatory state laws. The perception of state agencies that enforce without evaluation, that mandate without regard for effect discourages growth and diminishes profits. Thus, those states with strict regulatory policies find it difficult to promote development even with good promotional programs.

Obviously, some regulation is needed to curtail abuse and to assist a business or industry to function with acceptable procedures. How this is accomplished varies from state to state with federal standards as guidelines.

Developing a balance between the advantage of promotion without regulation, on one hand, and restrictive regulation on the other is an act performed by individual states. The degree of regulation is affected by the environment, type of business, location, and desire to attract industry. The balance is determined by the legislative perception of minimum safe regulation and by the perceived role of regulatory agencies.

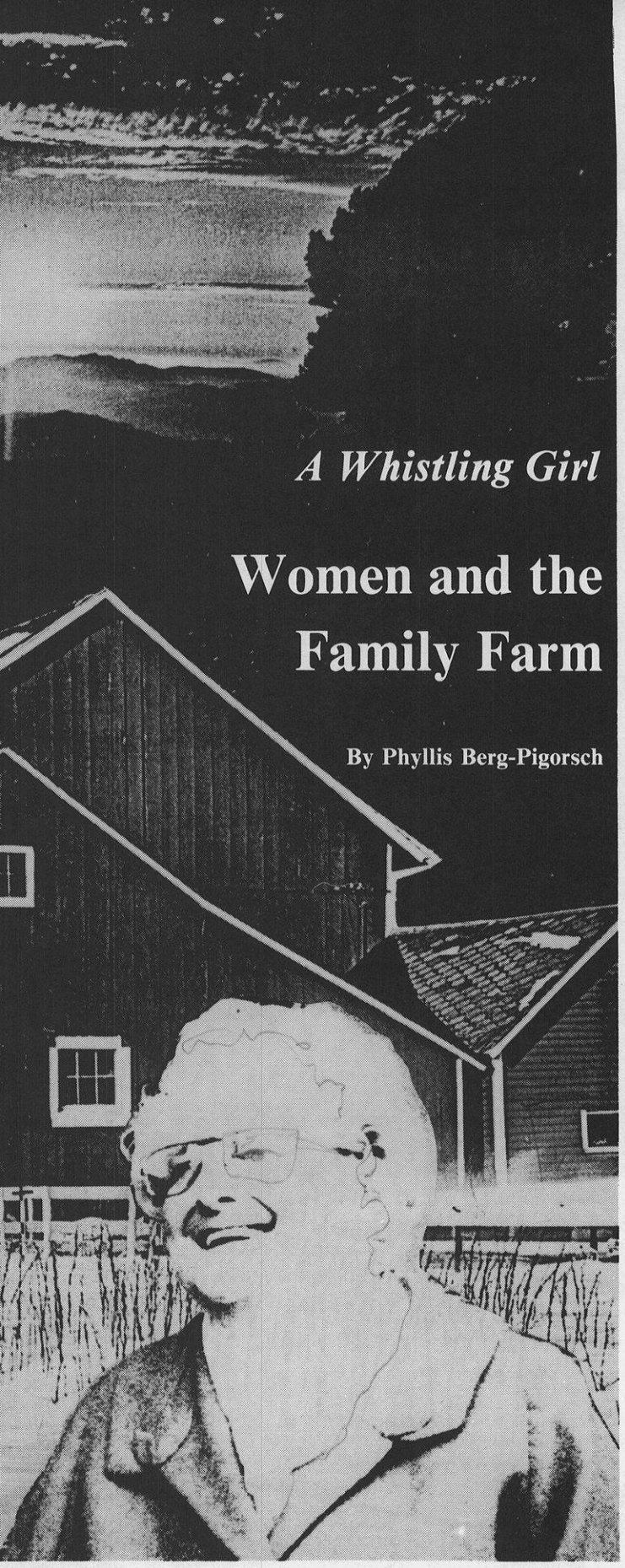
An agency that requires strict compliance without some flexibility can negatively affect the acceptance of regulation as an ordinary business expense. Thus, any long range growth policy must project an atmosphere of awareness to business concerns. That delicate mix of control with flexibility, proper use of renewable resources, adequate living standards, and quality of life is a major factor in the economic stability and steady growth of an area.

These basic concepts must be maintained even when other factors upset the economic equation. The loss of an industry or depression in a segment of the economy should be dealt with separately without major change in basic policy.

The overall tax structure of a state can be adjusted to compensate for depressed economic conditions of a major industry. Wisconsin's current high property tax, for example, has had a negative impact on an already depressed agricultural sector. The regressive nature of a tax that makes no adjustment for the ability to pay must be observed as contrary to Wisconsin's progressive tradition. A more equitable tax, based on adequate income, spending patterns, and user fees would be a significant step forward in state tax policy. It is one of many ways to "contribute to the growth or prosperity of," as the word promote suggests.

Once again, I am looking out of the window of my farm home as I reflect on my three years in the legislature. It has been a learning experience. It occurs to me that everyone should serve some time on a municipal or school board. They would be less likely to criticize. It would also be nice if they could spend at least one session in the state legislature to gain a better understanding of the many problems that complicate the lawmaking process. And maybe we would all learn something if we were in congress. No: there would be no one left to blame. A ridiculous idea just crossed my mind. I wonder what my wife would say—wasn't this where I came in?

John Volk, democrat, has represented the 36th Assembly District since 1983.



A Whistling Girl

Women and the Family Farm

By Phyllis Berg-Pigorsch

A John Deere tractor rises from behind the furrowed hill, a mythical monster of the deep, green and black, with a red headscarf fluttering in the tinted glass cab, the dragon's breath. As it goes by, with Joanne Vogel at the wheel, rich, black loam turns over obediently and uniformly beneath it.

"Love of the land" is the familiar first unction gushed by the urban media when turning a sympathetic eye to the demise of the family farm. But, surprisingly, in forty hours of taped interviews researching the production of our film "Wisconsin Farm Woman*," not one farm woman expressed a love of the land; Joanne never mentioned the land, even though she got down on her knees in it, took a fistful in her hand, and gently broke it in her palm.

Without exception, in six months of filming, we found farm women to be ingenuous subjects, relaxed in front of the camera, open, spontaneous, and as confident in their knowledge of agribusiness as experts in any skilled profession. It did seem odd, on the face of it, that in our many hours of interviews no one spoke of the land when it rose and fell around us, as commanding as a fisherman's sea. But then, no one talked about love of children either, or love of husband, or love of life.

The weather, as one would expect, was often talked about, portrayed as messiah, pariah, and boss. "We have only one boss," said Wilma Stanton, "the weather."

"I can still see my Dad," said Orabelle Fisher, "stand in the middle of the yard after a dry spell, take his hat off, lay it on his heart, and let it rain on him . . ."

So many of the older women expressed regret for having to move to town, a common practice before the 1950s when the inconveniences of country life were given over to the next generation. Some women persuaded their husbands to move back. And some, they said, actually died of heartbreak. Anne Simley, in her humorous first-person narratives on farm life, tells about going to the doctor for a mysterious illness she suspects is a virulent disease. "You got 'magination, Mrs.," says the doctor. "I got that, too?" she replies. But, no one described the malady as a pining for the land.

Animals were important. They brought baby pigs into the house and sat up with sick calves. They testified

*The documentary (now entitled simply "Farm Woman") was funded by the Wisconsin Humanities Committee and the National Endowment, and broadcast by the Wisconsin Educational Television Network in 1983.

to asking for, and getting, help from God. And they talked about work. More than anything else, they talked about work.

"Hard work never killed anybody," was often repeated.

"Makes you tired so you can sleep at night," said Emma Bergum, who milked cows by hand, again in droll understatement accompanied by a smirky grin.

The moon is still out when the barn lights come on at the Vogel farm near Valders. "If I go out to the barn, I have to take the children with me," said Joanne Vogel. "A baby is no excuse; being pregnant is no excuse. It's not because your husband would beat you if you didn't do it . . . nothing like that."

Chores are done before the sun is in the woods above the tilled land. By then Joanne is in the house making breakfast. To share the work load is only considerate, she is saying, "because I know there is a lot of it." Work is noble and heroic, she insists, as do the others; "I think it's my place to do it; that's the way I was brought up."

Work is even more than that; it's a kind of salvation: "Working makes me feel good about myself."

Adelia Portwine, now seventy-eight, grew up on land around Prairie du Chien. "We lived by superstition and we worked like boys. I fed the calves when I was six, turned the separator at seven. When my twin sisters were born, I helped deliver them. I was ten."

"It just came naturally," said Ada Hustad, in the terse, matter-of-fact phrasing of practical wisdom. "The work was right under my nose."

The work was not only right under their noses, but all around them and under their feet—like the land. Not much has changed since Ada was in her thirties, raising her family. "I always say," said Mary Jane Nelson, 1982 chairman of the women's committee of the Wisconsin Farm Bureau, " 'My head is in the clouds, but my feet are in the manure." '

Doreen Newman, 1983 Farm Woman of the Year in Colby, hobbled out to the barn each morning on crutches when she had knee surgery because "I couldn't stand lying in bed in the morning when the guys went out to do the chores."

A whistling girl and a flock of sheep are the best stock a farmer can keep. All women over forty could have recited it in unison. It refers to a common understanding that a successful farmer is successful, for the most part, due to his wife. In fifty different ways the women expressed it. "My husband always said he wouldn't farm if it weren't for me." The husbands confirmed it. "If she were gone, I don't think I could handle it," said Fred Fisher of his wife, Ilona.

It was already understood in the 1800s: Don't farm unless you're married and have, or will have, children. Hundreds of brown photographs of huge families attest to the strength of this imperative. Neither the years nor the technology have altered this fact.

"I keep all the records, I do all the registering, I'm in charge of the calves, and raising them . . ." Ilona Fisher listed her many responsibilities, proud of their clean, new facility you could see through the pines planted by Fred's grandmother. "I raise four kids, as well, keep house . . ."

Wilma Stanton looks out across the furrowed loam glistening with rivulets of January thaw and reflects on a question about women's liberation. "My mother always did what my father wanted. I saw this and I wanted to be more equal." But equality, too, means something different to farm women than to ordinary feminists.

Testifying before a hearing on legislation to reform the marital property laws, Joanne Vogel tells about their joint decision to buy farms, to expand. "We make all the decisions together. It's truly a partnership. When things go wrong, we both help. Please consider us equal."

By the same token, divorce is a calamity. Like a dry spell, or a disease in the herd, divorce can wipe out the farm enterprise. "Years ago farmers just didn't divorce," said Lillian Sinkler, Joanne Vogel's mother. "You put up with what you had to put up with."

There was yet another old adage stored in the memories of women over forty and called up frequently.

A whistling girl and a crowing hen are bound to come to some bad end. If adages are a way of teaching wisdom and prudence (a western Confucianism), this gag order was no doubt based on the desperate need for farm women to be content, do their part, lest the whole enterprise come tumbling down. Thus admonished to make no fuss, women, already so essential to the success of the farm, were directed into constructive, active decision-making.

Whether to expand has been the paramount dilemma. "When we bought our second farm in the 1940s, I said to my husband, 'You're taking a lot of jump, aren't you?' " confided Lillian Segebrecht of Stoughton.

"We bought our second farm in 1963, and our last farm in 1971," says Joanne Vogel in the film. "We've built our herd to over a hundred and worked our buttermilk average to 734 pounds per cow. It's been through breeding and management and pretty hard work." She is interrupted by a call from the yard. A cow is calving in the south pasture. We could see it from the house even though it is a quarter mile away. By the time we reach there to film, however, the calf is struggling to its feet and staggering to its mother. As we bumped along in the truck for the trip back to the house, we were impressed by the expanse of land required even for a dairy operation. It was a little kingdom, where many things can go awry.

Orabelle Fisher admitted to going to the barn, at times, to cry. The barn was the place where a whistling girl could be less than stoic. "I did what I could," said Helen Benson, "but when I got to feeling low, when supper and the chores were finished, I'd take a walk. Sometimes I'd sing and sometimes I'd bawl. But I'd always go to the barn to cry."

" I'd whistle when I went to get the cows," said Adelia Portwine, "but I'd cry in the barn. If anything went wrong," she continued, "my mother always said, 'Well, don't just sit and cry about it. You might as well laugh.' Oh, we had a lot of troubles. When you live on a farm, the best lesson you learn is to take things as they come." She hastened to add, "But, you don't dare sing before breakfast, or you'll cry before supper."

Wilma Stanton thinks life on the farm was easier for her than it is for her daughter. "Every night they, [her daughter and son-in-law] go up to bed and think, 'Will we ever get out of debt?' We never had to worry about that."

LaNell Jaquish's cream-colored house is across the road from the cream-colored barn, both nestled in a cirque of tall oaks and surrounding hills over the Wisconsin river valley.

"Nowadays, we can't afford to pay hired help because they usually expect a wage that exceeds ours. The farm wife is taking the place of a hired man. We can make a profit when the whole family is working."

"Women are unbelievable lobbyists," said Sister Thomas More of Silver Lake College near Manitowoc. "They keep at a thing. Farm women know what goes on in the marketplace because women control the demand for food and fiber. It's America's best-kept secret, these farm women's groups, ready to come out swinging."

Samples of their punches:

"People in Washington have no concept of farming in the Midwest. They think it's all big corporations or marginal farms. The family farm is still going strong."

"I don't think people in the city understand the investment we have."

"The United States Department of Agriculture doesn't always act in our favor."

"Food prices will go up without the family farm."

The crowing hen and the whistling girl. It's only natural that any woman so free and independent, feeling as good as she obviously feels about herself, would whistle. "There's a peace of mind you get out in the country, a sense of belonging, a sense of worth . . . I have my degree, my husband has a degree . . . we're here because we want to be," declares LaNell Jaquish.

"I know I feel richly blessed," said Ada Hustad.

"You have your goals on the farm," said Ilona Fisher. "You perform for yourself, not for someone else."

"If we didn't enjoy it so much we wouldn't put up with the things that are so frustrating about it," reasons Judy Shroeder.

"The reason I'm here, instead of in town, is because I do what I want to do when I want to do it," Wilma Stanton states.

Helen Langer says it eloquently in the film: "Maybe it's the independence, or maybe it's that you feel like you're doing something, and that you've done it with your own hands."

Still, no one mentioned the land. Sometimes the largest truths are revealed by omission, and sometimes by the synthesis of small details, everyday happenings, which are "right under your nose" and "come naturally."

"The wheatfields of Wisconsin," said Georgia O'Keeffe, "are wide and golden." Her paintings of land and space for which she is famous are of the southwestern United States, but her childhood recollection of Wisconsin wheatfields was that they were "pure, like snow." As we know, the great wide wheatfields vanished from Wisconsin eighty years ago. And if certain ominous signs prove correct, the family farm may vanish along with them. Georgia O'Keeffe saw the land as an image of the spiritual and physical woman. We get the same symbolism in the poem, "What It Was Was Time," by Edna Meudt, Dodgeville poet alias farm woman:

> Overnight the fall plowed fields
> took on a look of clouds:
> at horizon they meet and merge
> silvery scaled the furrows with mackerel sky.
>
> Across snowy span where moonfield
> and sunrise blend the ageless lover
> touches contours of eastern mounds
> My own quicken to pain of other days
> that foretold each new life in me.

And so, ironically, the urban media may be right about "love of the land" in lamenting the anguish of farm failings. No doubt they believe it to be a suitably mystical and churlish motive for defending an obsolete way of life, no longer productive. But there is a gap between the truth and the media's perception, it seems. Distinction between real passion and mere sentimentality is very broad, as wide as the windrows. The journalists are right in the same simplistic way that they are right about milk-comes-from-cows, pork-from-pigs, and bread-from-grain.

Somehow, after having listened to what these sturdy, pragmatic women have to say, I find it unlikely that they would waste time gazing out in rapturous nostalgia and philosophical ceremony at the land. Well, not for long, in any case.

So we can forgive the urban journalists when they lump all the rationalizations for preserving the tradition of the family enterprise under "love of the land," even though you won't catch many farm women saying it that way. They're too busy defending their way of life with hard work and political facts and figures. But then again, what would one expect from women who cry in the barn and whistle in public?

Phyllis Berg-Pigorsch is a Madison-based documentary film producer.

Dairying in California and Wisconsin

An Analysis of Divergent Farm Structures

By Jess Gilbert and Raymond Akor

Half of all the milk produced in the U.S. now comes from five states: California, Minnesota, New York, Pennsylvania, and Wisconsin. In the latter four states, most milk is produced on thousands of family dairy farms, typically with little outside hired labor and with enough land to raise most of the necessary feed. California is different. While still owned and managed by families, the relatively few California dairies are large enough to require a substantial amount of nonfamily hired labor. In addition, unlike in the traditional dairy belt, they usually purchase much of their feed and concentrate (sometimes exclusively) on the production of milk. This industrialized model of dairying is not limited to California. Both the Southwest and the Northwest, as well as Florida, also exhibit specialized, large-scale dairies.

This paper compares changes in the structure of dairy farms in the two top milk-producing states, Wisconsin and California. We attempt to answer two questions: (1) Are dairy farms in the two states becoming more alike? (2) What explains either the convergence or the continued divergence of the two dairying systems? To address these questions, we trace the trends on dairy farms in California and Wisconsin between 1950 and 1982 (the year of the latest census of agriculture). While this analysis does not provide wholly current data, it should serve to indicate the trajectories along which dairy farms in the two states are moving. This issue

is important. Some people wonder whether Wisconsin's dairy farms are destined to become like California's. It is important, moreover, to understand the various forces that determine farm structure. Public policies in particular can play a major role in shaping the structure of agriculture.

Comparison of the structure, 1950 and 1982

Together, California and Wisconsin produce nearly 30 percent of the total milk in the U.S. However, the relative importance of dairying in the total farm production of the states differs markedly. In Wisconsin, dairying accounted for half the total number of farms and two thirds of the total farm sales in 1982. While milk is the single most important farm commodity in California, that state has a much more diversified agriculture, with dairying representing only 3 and 16 percent of the total farm numbers and farm sales, respectively.

Both California and Wisconsin have witnessed significant structural changes in dairy farming since 1950. The trend has been toward increasing specialization and concentration of production in larger and fewer farms. Consequently, dairy farm numbers decreased dramatically between 1950 and 1982. In Wisconsin, dairy farms declined by 66 percent, from 116,529 in 1950 to 40,155 in 1982. The rate of decline was even greater in California, where dairy farm numbers decreased by 80 percent, from 13,466 in 1950 to 2,708 in 1982. While the number of milk cows in Wisconsin remained relatively stable between 1950 and 1982, in California there was a dramatic increase of 57 percent in the number of milk cows during the same period.

The nature of the differences in dairy farming between California and Wisconsin becomes clear when we look at Table 1. By 1950 there was already some modest difference between the two states' average herd size, with milk cows per dairy in California nearly triple that of Wisconsin. This difference has widened since 1950, leading to more polarized farm structures.

By 1982, the average herd size in California was nearly eight times that in Wisconsin. Over 80 percent of California dairies have more than 100 milk cows. Nearly 70 percent in Wisconsin have fewer than fifty cows and only 4 percent have more than 100.

Table 1 indicates further that between 1950 and 1982 California dairies had greater average acreage per farm than Wisconsin's—but only modestly. This average should be interpreted cautiously. A percent distribution by acres reveals that an overwhelming majority of the dairy farms in Wisconsin, almost 90 percent in 1982, hold 100 or more acres of land, compared to only 55 percent for California. This seemingly anomalous distribution reflects some significant differences between the two states. In Wisconsin, dairy farms have a more integrated structure, growing much of their own feed and often a cash crop in addition; they therefore require relatively larger acreages. In contrast, the tendency in California has been to specialize on milking cows. Because of this intensive production, very large herds are maintained on relatively small drylots. This is most true of southern California, a leading dairy region in the state. The overall higher average acreage in California, shown in Table 1, results from a relatively few very large dairies (with over 1,000 acres) in the San Joaquin Valley, which do grow much of their own feed.

Table 1
Selected Indicators of Dairy Farm Structure in California and Wisconsin, 1950 and 1982

Average Per Dairy Farm	1950 California	1950 Wisconsin	1982 California	1982 Wisconsin
Herd Size	44	16	343	44
Acres	161	146	335	259
Value of Land and Buildings ($)	36,740	12,579	1,165,197	272,357
Value of Farm Products Sold ($)	18,667	4,866	717,717	79,790
Selected Expenses ($)				
Feed for Livestock	6,766	786	315,439	11,650
Custom Work	505	146	19,713	1,300
Hired Labor	3,583	442	57,900	6,800

SOURCE: U.S. Bureau of the Census, *Census of Agriculture*, 1950 and 1982.

The value of land and buildings per farm indicates not only the amount of capital investment required but also the scale of farm production. Table 1 shows the degree to which farm values have appreciated over time. In absolute terms, average farm values have increased dramatically in both states between 1950 and 1982, although the rate has been greater in California. In 1950, the average value of land and buildings per dairy in California was almost three times that of Wisconsin. This gap widened so that by 1982 Wisconsin's average value was under one fourth that of California. Thus, the differential in average farm value grew, indicating the persistence of two different farm structures.

Table 1 also presents the trends in average market value of products sold. In both states but especially California, the value of dairy farm sales grew dramatically over time. Thus the average value of dairy sales in California increased absolutely by more than thirty-eight times between 1950 and 1982. This contrasts with a sixteen fold increase in Wisconsin. The difference in scale of operation becomes more vivid when we compare the average value of farm sales. In 1950 the average sales per dairy in California were nearly four times that of Wisconsin. This gap has increased since then so that by 1982, the average value

of sales on California dairies was almost nine times that of Wisconsin. This widening gap points to the persisting polarized structures of dairying in the two states.

Table 1 shows selected production expenses. The differences in feed and custom work costs were considerably greater in 1982 than in 1950. The difference in expenses for hired labor also increased, but not nearly so much. However, the most instructive aspect of these labor costs is simply their magnitude. The 1982 average was nearly $58,000 on California dairies and under $7,000 in Wisconsin. Such a difference is decisive in characterizing the two farm structures as industrialized on the one hand and family-type on the other. The assumption here is that family members provide most of the labor on family farms in contrast to hired labor on larger farms.

Another contributing factor is population growth, which skyrocketed in post-World War II southern California. This boom influenced dairying directly by offering a rapidly growing milk market and thus an incentive to increase production. The indirect effect of this urbanization was to push dairies out of Los Angeles County—for decades the leading milk producer in the nation. The L.A. dairy owners first received "urban" prices for their drylots, then reinvested the handsome profits in what they knew best: dairy facilities and milk cows. Many immediately tripled the size of their herds. This was the origin of the Chino Valley dairy area east of Los Angeles, which still today holds the largest concentration of milk cows in the world. Our point here is that Chino-style dairying, probably the major U.S. model for industrialized milk production, was made possible by urbanized land prices.

State policies in California also encouraged large-scale dairying in several ways. Most directly, the state established the Chino dairy area, among others, as an "agricultural preserve," which restricts land development for nonfarm uses. More generally, the state (as well as the federal government) subsidized irrigation projects, without which California agriculture as we know it could not exist. For example, practically all the feed bought by dairies (see below) is grown on irrigated land. Further, California dairies generally receive lower milk prices than do those elsewhere, including Wisconsin. The state government sets prices for California, unlike other states, which are included in federal milk marketing orders. California dairy farmers argue, therefore, that they have to expand faster in order to make more money. In these and other ways (e.g., agricultural research and extension), the state of California has played a major role in assisting the growth of industrial dairies. Such has not been true of Wisconsin.

Here we shall summarize how California dairy systems depart from the more widespread, integrated model of Wisconsin dairy farming. In a word, the California system is *specialized.* First, California dairies buy most of their feed. The quality and availability of feed in California is remarkable. Due to irrigation, dry climate, and specialized growers, top-quality alfalfa hay is commonplace. In addition, by-products from California's extensive acreages in cotton, fruits, and vegetables (e.g., citrus and beet pulp, almond hulls) provide good feed. Specialization is also the key to labor use on a California dairy. For a typical herd of 1,000 cows, there is a herdsman (sometimes with an assistant), three or four milkers, a feeder, a breeder, a calf manager, and relief workers. This division of labor is in stark contrast to the Wisconsin dairy farmer who performs all of the above jobs plus crop production. Specialization is also true of dairy support industries in California. Typical services include professional nutritionists, regularly visiting veterinarians, barn cleaners, hoof trimmers, and silage choppers/packers. Most important, California dairy owners are particularly progressive in adopting new specialized technologies that will increase production.

In this paper, we have focused on dairy farm trends in California and Wisconsin. We found that, far from converging, the two farm structures became more dissimilar between 1950 and 1982. To account for these differences, we briefly discussed the natural environment, urbanization, agricultural history, labor supply, ethnicity, state policies, and related aspects of the different dairying systems. These are the factors that must go into a consideration of the differences in dairy farming between California and Wisconsin. Such an analysis requires that we treat not just societywide forces but historical and regional specificities as well.

The above analysis suggests that the respective structures of dairying in California and Wisconsin have remained distinct. Both states certainly exhibit the same trends toward fewer and larger farms, higher productivity, capital-intensive technologies, and greater concentration of production. However, it would be misleading to interpret these as a tendency toward structural convergence. Case in point: While Wisconsin dairy farms have grown in size, their 1982 average of forty-four milk cows per dairy was exactly the same as that for California in 1950. Apart from this, the averages for value of land and buildings, gross farm sales, and production expenses—including hired labor—all suggest a widening of the gap between the two states. California, in other words, has grown along these and other farm-structural dimensions at a faster rate than has Wisconsin. Therefore, we conclude that the historically distinct farm structures have persisted over time rather than converged toward a single system. The following section undertakes briefly to explain such persistence.

Factors in the structural divergence

What accounts for the divergence of dairy farms in California and Wisconsin? The question is interesting because major societal forces in the U.S.

(for example, capital accumulation, rationalization, homogenization) have failed to overcome the peculiarities of the regional farming systems. The answer, then, must be sought in the distinctive character of each dairy region. We shall mention several factors that have differentially shaped dairy farming in California and Wisconsin: the natural environment, population changes, and their specific agricultural systems.

Climate is one of the most obvious differences between the two states. Severe winters in Wisconsin require heavy investment in housing for the cows as well as feed storage facilities. Such building costs divert resources that could otherwise be used for expanded milk production and increased herd sizes. California, on the other hand, enjoys a dry warm climate with relatively low housing and feed storage costs; simple open shelters suffice. Dairies there can add milk cows fairly easily; whereas in Wisconsin expensive facilities must be built first. The other relevant natural factor is topography. Much of Wisconsin is rugged, thus limiting farm size and the use of large machinery. In contrast, the major California dairy area of the San Joaquin Valley is flat for miles on end—a geographic feature that encourages large-scale cultivation, whether by dairy farmers or specialized growers. The different climatic and topographic conditions, then, function to ease herd expansion in California while optimizing dairies at a relatively small scale in Wisconsin. These natural considerations have been reinforced, especially in California, by agricultural development and population growth.

The structure of dairying in California and Wisconsin fits into the historical pattern of social organization in agriculture for each state: capitalist farms and family labor farms, respectively. The availability of cheap immigrant labor played a crucial role in developing capitalist agriculture in California (Pfeffer, 1983), including dairying. Throughout most of the twentieth century, California dairy workers came largely from Europe, specifically Holland and Portugal (the Azore Islands in particular). Portuguese milkers are still common, although Mexican dairy employees are increasingly widespread. The ready availability of comparatively cheap Mexican labor, a consequence of California agriculture as a whole, provided another incentive for the expansion of dairies. In contrast, dairy farmers in the Midwest usually limited the size of their farms to what the family could operate. Such decisions might have a cultural-ethnic base as well. German farmers, common throughout Wisconsin, often prefer "yeoman" values (for instance, keeping the farm in the family) to short-run profit maximization. Salamon (1985) contrasts this German type with the "entrepreneur," who appears more like the Dutch and Azorian dairy owners in California. In any case, the continued divergence of California and Wisconsin dairies is attributable in part to the historical development of agriculture, particularly the labor supply, in the two states.

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BOOKMARKS/WISCONSIN

W. D. HOARD: A MAN FOR HIS TIME by Loren H. Osman. Fort Atkinson, WI: W. D. Hoard and Sons Company, 1985. 451 pp.

By Rosalie Cates

W. D. Hoard was part of an energetic era when Wisconsin agricultural and industrial commerce was just being established, when scientific knowledge of farming was burgeoning, when the Progressive political movement rose. And W. D. Hoard had the energy, practical vision, political savvy, and business acumen suited to the time.

Hoard used his considerable gifts in a life-long crusade to establish a profitable dairy industry in Wisconsin, to establish a nationally prominent dairy publication, to be elected governor of Wisconsin, and to improve the quality of rural life.

Like Stephen Babcock and Dean William Henry, other agricultural giants of his time, Hoard was "a refugee of worn-out farms in the East." They saw the soil-exhausting and profitless future the state was heading for in wheat farming and worked to move Wisconsin agriculture toward dairying as a more compatible, more profitable agriculture for the state.

Hoard's crusade began in his newspaper, *The Jefferson County Union*, in which he dispensed advice on farming profitably to his rural leadership. His crusade (always closely tied with his business) jelled with the founding of *Hoard's Dairyman* in 1885.

Hoard's "gospel of the cow" crusade coincided with great strides in scientific knowledge by the likes of Stephen Babcock, F. H. King, and Robert Koch. Babcock's butterfat test and Koch's breakthroughs concerning tuberculosis, pasteurization technology, the rise of the silo to store feed, development of a mechanical cream separator all occurred in this latter part of the 1800s. Under Dean William Henry the University of Wisconsin worked hard to disseminate this and other farming science to farmers, first through "farmers' institutes" and later through the extension system. University experimental farms were also established at this time.

W. D. Hoard was there to sell it. "The genius of Hoard was in motivation, whether through his mix of haranguing and entertaining from his speaker's rostrum or his plain, effective writing in editorial columns," Osman writes.

And Hoard was an organizer, a founder, and always active member of the Wisconsin Dairyman's Association, which during his lifetime pursued both educational and political agendas in the dairy interest.

Hoard also loved and worked through fairs, whether county, state, or national. His tireless efforts went to build dairy extravaganzas at the Chicago Columbian Exposition in 1893 and at the St. Louis Louisiana Purchase Exposition in 1904. He used the events to promote Wisconsin agriculture, to encourage scientific promotion and good product quality among dairymen, and to reach consumers as well.

That Hoard reached the people, and many of them, as he wrote and spoke his way around the state, is evident in his election to governor in 1880. Osman calls it "The Office Seeking the Man," referring to the popular call for Hoard's candidacy which occurred in the press at the time. Taking office at age fifty-two Hoard pursued one of his pet causes: the banning of imitation butter spreads. But he got into political trouble by advocating that the English language be mandatory in Wisconsin schools.

Wisconsin was an immigrant state in 1889, with a full 70 percent of its population either foreign-born or the children of foreign-born parents. Classes in many parochial schools were taught in German or other native languages, perpetuating, as Hoard saw it, the cultural isolation of those who spoke no English. The Bennet Bill requiring English passed in Hoard's term of office, with his strong support. It is also credited with losing him the 1890 election at the hands of church interests which called the law interventionist.

Nevertheless Hoard was a prominent political figure throughout his life. He was allied early on with Progressive leader Robert M. La Follette, based on their shared "distrust of vested interests, machine politics, and monopolistic corporations." By 1910, however, he had fallen out irresolvably with La Follette and the

Progressive reforms, which Hoard said has run wild.

Hoard had a fine speaking reputation, and a full schedule of appearances to fit into his publishing and political careers. His speeches revolved around the gospel of dairying and what he called "Agricultural Citizenship," wherein he encouraged farmers to learn about dairying, to run profitable businesses, and to be informed participants in politics. The many examples and excerpts from Hoard's speeches are one of the chief pleasures of reading *W. D. Hoard: A Man for his Time.*

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NEW YEAR'S EVE IN WHITING, INDIANA by James Hazard. Milwaukee: Main Street Publishing, 1985. 64 pp. $6.50.

By Angela Peckenpaugh

Handsomely packaged in a glossy blue cover the color of an old Ford, this book is titled in big art deco glittery letters against a black background above a night skyline of Whiting's smoke stacks and steeples. The effect is that of a record cover for a jazz album or the neon sign over a city blues bar. This romantic upbeat presentation echoes the mood of Hazard's tribute to his boyhood factory town of the forties and fifties. He's blowing a sweet trumpet, doing some boozy reminiscing full of love. With folksy humor a la Garrison Keillor, he works up riffs on the heroes, mysteries, discoveries that have haunted him since leaving this working class hamlet.

Nearly every title of this classic poem series bears the words Whiting, Indiana. You can imagine him sharing his growing-up memories with a child as he flips through an old photo album or drives past some of the principal buildings of his old neighborhood. Alternately narrative and lyric, the poems are never in rhyme but always melodious. The approach is not documentary at all, not realistic though ample in detail. It has a tendency to cleave to the strange, to place aesthetic value on what others might find pitiful or grotesque. The day the refinery blows up, for instance, is a great day in his memory, the residents of Whiting watching the fire from bleachers, prouder than any other time of their main industry. This is a unique look back at history never to be found in the newspapers or history books. Hazard's strength is to take a child's confusion in perceiving the reason for events happening simultaneously in time and to create a new sort of metaphor, giving people and places an uncanny glamour and raison d'etre when seen through his eyes.

The men of Whiting, especially, their lives given over to whiskey, baseball, the night shift at the plant are made legendary for the quirks that see them through or do them in. What might seem raw or depressing to another in Hazard's horn is worthy of praise for its stamina, tough tenderness, or odd juxtaposition within the whole crazy mix of Catholicism, family intermingling, wartime belt tightening, and lonesome daydreaming. Reading this book, you're almost sorry if you grew up slightly privileged in a smoke-free environment. To have had a background like his would give you more fodder for these unforgettable wacky songs. Not swan songs—that's too stately. He seems to say a pigeon is a hell of a lot more gutsy than some damn peacock and therefore a bird worth crooning about. This is the prole's retort in a land led by patricians.

His relatives and neighbors are monumental for their grit, glory, and integrity. Stick around the tavern or hang out among the women around the dining room table talking about their bodies, or turn on the right old radio station, and maybe you'll understand what it was like there then. Hazard favors the crazy, the weird, happenings that kept him awake and alive back then and still do.

"Chief Don Eagle & Healing Science in Whiting, Indiana" makes a good introduction to Hazard's theme and tone. In this piece he recalls watching Don Eagle, an Indian wrestler, on the first TV on Davis Avenue one winter with his Aunt Lucy who suffered from strokes. Lucy continues to wash the floors of her kitchen and bake pies even though she's confined to a wheel chair. She admires the chief, even in defeat, and waits for a rematch when he loses. Hazard portrays her survival stance though "her voice [was] like a dented pie plate; you know, soft but metal just the same. In her wheelchair, mopping the kitchen she'd yell (the side of her face numb like after the dentist), 'Leave those footprints on the porch.' " When the chief is beaten "Lucy sat up too fast and the inside of her head sparkled like moonlight on untracked snow."

In "Negroes in Whiting, Indiana" he tells of being upstairs listening to a grown-up party downstairs where they are celebrating the home leave of his cousin Billie by playing albums by the likes of Louis Armstrong and Duke Ellington. His uncle wishes he could marry Billie Holiday. The poem interweaves a memory of attending a ball game at Comiskey Park where Sachel Page pitches his first start in the majors. Hazard and his father are the only whites in the stadium and on the bus ride home. The boy feels like he finally came downstairs to the party.

All the high points are bizarre, such as the time he took communion: "There were eyes in the roof of my mouth where the Host was stuck." In "Together in Our House in Whiting, Indiana" he remembers hearing his parents make love: "I wanted to be a man and hairy. I wanted to hear woman talk. Oh Hap—my mother would say his name, at the end. My father

would say no words but from woman deep in his huge chest would come a sigh then and they and I would fall asleep, together in our house."

To account for a suicide he says "My mother's friend became a posse against himself, like the frame up in the Ox-Bow incident. My very own Confirmation Sponsor tap danced at all the parties, told all the jokes and ended himself at the end of a rope . . . Hanging by design: Jesus, I thought, nobody's that guilty."

In one of the poems in his adult voice, "Hardening the Heart in Whiting, Indiana," Hazard suggests what may be his intention for all the poems: "O God damn this goddam life and now you weep I love you and this is all like yourself as a boy in candle light before dawn serving weekday Mass and the statue pointing to a Heart in flames and if you could say the truth to someone who could keep a secret you'd confess that all you wanted then and now out of this god damn life is to love everything and everybody on the whole steaming slag heap and never be tough at all."

The deaths of his father and grandfather are given a poignant and macho dignity. Perhaps the only failure of vision and poetry in the book is one called "A Girl from Connecticut Visited Whiting, Indiana." It seems a reductive revision of a first marriage, lacking the compassion and transfiguration the other poems afforded. Perhaps his voice gets out of pitch when dealing with later realizations. The poem quotes her judgment of Whiting and his rebuttal:

> 'How can people live in that,' she said. And [he] said, 'I did.' She said, 'You left.' . . . Years later, when we hated each other, she said there was always something frightening in me, something ugly, not lovely, not nice. She went back east. I stayed out here with the Slovaks to read their faces, to reach for the tender ghost that fluttered like a pulse in love inside the empty workshirt sleeve.

This slightly rhapsodic self-justification is perhaps the bitter side of the book's rationale. There's no need to rap a tabletop to make a reader care about Hazard's past. Most would love a kid who put his mother's makeup under his eye so it would look black as he shadow boxed before the mirror and slugged back shots of Pepsi practicing for the day he could belly up with the rest of them and throw back the real thing, then wince.

Most of the poems have the gentle self-mockery and fine craftsmanship of "Flag Etiquette in Whiting, Indiana" where "by the end the big center sag had become unmanageable—scouts and Elks duck walking underneath keeping the sag up from the ground: folks having a laugh and throwing more silver, just for the sag itself! Everybody forgetting this was the Flag, the Flag sagging on parade like something farmers have laughs about—things that hang down or out of animals' bodies."

When Hazard reads these poems aloud to jazz accompaniment, the lyrical in them is enhanced and his voice tone conveys a child's awe and delight in Whiting. You find yourself smiling inwardly at the characters and marvels of your own childhood neighborhood as the applause momentarily ends an eerie and warm anecdote and the audience comfortably anticipates the next one.

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PREPARING THE FIELDS by Susan Peterson. Peoria, IL: Spoon River Poetry Press, 1985. $4.00.

By Angela Peckenpaugh

This twenty-two poem book, with sepia illustrations of birds, flowers, rocks, trees executed by Charles Peterson, has a cover illustration of a woman wearing a homespun dress, apron, and scarf leaning over to pick a stone from the ground. The first page bears an inscription by Thomas Hardy, ". . . a field woman is a portion of the field; she has somehow lost her own margin."

Susan Peterson has grouped her pastoral poems in three sections: I. Preparing the Fields, II. Mooring Stones, and III. And It Will Be Winter. The overall effect is to make her that field woman, clearing stones to prepare for growth.

Several of the poems in the first section bear dates—March 21st, May 3, May 15. The mood is an impatience for spring, "for a fierce and frantic light," yet "the sky serves up cold stone soup."

The poem "Dry" is about the inability to write; however, it ends with a vision of Rembrandt starting "a shiny helmet with nothing better in mind."

By the poem "Queen Anne's Lace" she has become the farming field woman who writes, "Often I lose myself in fields spread with lavender, the blue of flax, and again that circle of antique lace."

In "This Day" she silently weeds [her] garden, pulling miles of tangled desire from the rock hard earth."

With the poem "Somewhere A Woman" Peterson has captured what the book's overall theme holds—the contrasting poses of woman's contentment and longing:

somewhere
a woman is full of joy
holding the first red sweet
sun-hot garden tomato
in her soft palm.
and at the same time
on the beach, alone,
a bikini-covered woman
is bitterly realizing
once again
his betrayal.

The poems in part II are more topical, less archetypal. Full of overheard conversations and indoor scenes so peopled and busy, they are not as effective as the sparer earlier ones.

The last two poems of the book recapture the power of the first emblematic metaphors. "Winter's End" has these memorable lines:

This morning at breakfast
sunshine splashed my plate,
the windows, the white of my hands
like light water at a baptism
sudden quick surprise
of beginning

And "Small Joy" ends:

my umbrella is a drum, a
bright orange slice, ribbed
and glowing, a wet dripping full moon

beating
beating

no one is alive
but me.

This has the feel of a first book. I'd expect Susan Peterson's later work to have even more of these stunning visual flashes as she learns to weed even more successfully, leaving only words as redolent with meaning and beauty as the most vibrant flowers. Still, she removed a lot of stones from the field.

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THE CREATION OF PATRIARCHY by Gerda Lerner. New York: Oxford University Press, 1986. Pp. xvi, 318. $21.95.

By Arthur G. Robson

With great boldness of thought and a style that commands attention, Mrs. Lerner shifts her historical gaze from the place of women in nineteenth and twentieth century American documents, the focus of her earlier writings, to the place of women *ab origine*, in the ancient Near East. Patriarchy, she argues, arose and grew ever more oppressive across the span from c. 3000 to c. 400 B.C. Thus women's sexual subordination intensified as patriarchy deepened across the millennia from neolithic Catal Hüyük to classical Greece, with the former representing the apex of civilized relationships, i.e. male-female egalitarianism, and the latter representing their nadir.

Although the threnody often recurs, Lerner's purpose is not simply to document the inferior position of women in distant antiquity or to affirm the inhumanity of Western treatment of women. Rather she seeks to trace androcentrism, framing her thesis to rebut the traditional argument that male dominance is universal and natural. While opposing male supremacist views of history, she constructs a model of spreading male control as history progresses. A projected second volume promises to redress the balance, to depict the rise of feminist consciousness in the Christian era. Christianity, it seems, will undo the damage she assigns to Judaism.

Lerner counters the traditional thesis of male superiority by arguing that it happened in stages and it wasn't always that way: things were okay in the Garden of Eden, i.e. hunting and gathering societies. While acknowledging that most of the evidence for these relatively egalitarian social patterns comes from twentieth-century tribes, she nonetheless imposes this grid upon the Paleolithic and Neolithic periods. This historical leap follows a critique of traditionalists such as Darwin, Freud, and E. O. Wilson who "expect [modern] women to follow the same roles and occupations that were functional and species-essential in the Neolithic" (p. 20). Fundamental to the hunting and gathering Golden Age is its egalitarian sexual division of labor with women devoting most of their adulthood to child-raising activities. "Woman in precivilized society must have been man's equal and may well have felt herself to be his superior" (p. 43).

Because Lerner posits a Garden of Eden and machinelike social retrogression thereafter, her next question must be: What caused the change? When the egalitarian social scale tips, issues of slavery, warfare, and property become entwined. Lerner elects Levi-Strauss's theory of tribal exchange of women as the leading cause of women's subordination and combines it with an inversion of Engel's doctrine so that the causal chain moves from women's domination to private property, slavery, and warfare. This theory works especially well with small clusters of slight data.

Because Lerner associates wives with slavery and slavery with war, three points are important. The conquest theory, that war is the necessary condition for the establishment of a slave society, overlooks those societies that were not conquering or imperial states. Her casual allusions to American slavery make it necessary to note that America gathered slaves commercially, seeking primarily male laborers. Although war and conquest may be major contributing factors to slavery, as conditions they lack necessity and sufficiency. While ancient husbands may have treated their wives as "slaves" in a metaphorical way, it was a literal commonplace for soldiers to fight to protect their wives. In fact one of Lerner's sources, Herodotus, explained much of ancient history and its wars as avenging insults to women. To acknowledge that the family is the basis of the state is quite different from concluding that "the king's power was secured by men as absolutely dependent on and subservient to him as their families were dependent on and subservient to them" (p. 140).

Because the topic of slavery engenders pain, Lerner allows extraneous moral, intellectual, and political values to arise. When the historical topic is Mesopotamia, we gain heat rather than enlightenment from allusions to nineteenth-century Russia and Norway, Imperial China, and twentieth-century Vietnam, Korea, and

Pakistan. Reducing complex issues of prehistory to "Who is free?" and "Who is unfree?" examines earlier thought and practice according to this historian's values, as if all ages face the same questions and arrive at the same answers.

While the slave/free dichotomy has an exciting rhetorical force, it is an exceedingly blunt tool for historical analysis. As one of Lerner's sources, M. I. Finley observes, "The concept of freedom had no existence for most of human history." While the pre-Greek world, pace Lerner, was in our terms a world without free people, so also was it a world in which chattel slavery had little part. Greece discovered and institutionalized both freedom and slavery in Western senses of those imprecise words. The components of any society define its degrees of unfreedom. Attempting to define women's freedom in prehistoric Mesopotamia becomes quite difficult since the Greek word for freedom, eleutheria, does not translate into any ancient Near Eastern language, including Hebrew. The topic requires Renaissance chiaroscuro rather than German expressionism.

One must admire Lerner for tenaciously pursuing the least tractable issues related to the psychology of slavery. Because her norm, however, is heterosexual harmony of a familiar kind, the inferences can go awry. Genesis will not support a viewing of Abram's Sarai as "worthless" in his eyes; the Greek will not support a view of Penelope's servant women as "raped" by the suitors, or of Odysseus as sexually moved by servants prior to his bedroom scene with wife Penelope, or of the Homeric slave woman, Briseis, as illegitimately expecting legal marriage with Achilles.

Because our recorded past omits half of humankind, whose story the other half distorts, Lerner tries to read the tea leaves of myth and religion as a slight redress of this imbalance. As correctives, however, they are a chancy proposition. While they may reveal psychological truths, their depiction of the mundane realm filters through exceedingly dark glass. And their psychological value often attaches to romance, how men idealized women. Confronted with these obstacles, Lerner seeks to vault over them by positing a time-lag: it took men longer to subvert women's roles in religion; not until Judaism were women excluded from religious symbol systems. Although less adventurous readers of prehistory may find the richness of Lerner's conclusions harder to discern, even conservative prehistorians are likely to find that women's symbolic exclusion begins with the first patriarchal records, and not with Judaism.

Although Lerner rightly casts Bachofen from his pedestal, she keeps an aboriginal religious Mother Goddess enthroned. On no other topic is she so tempted to *argumentum ex silentio*. Jung and Neumann's subjective archetype may have played an important role in prehistoric cults. Until we have appropriate archaeological evidence, however, and supporting written documents, the Mother Goddess remains a contemporary symbol rather than a prehistoric reality.

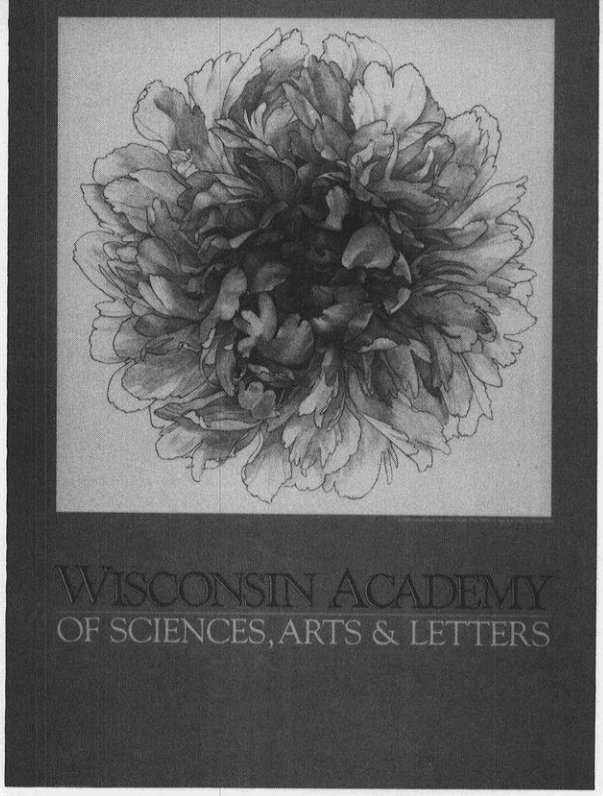
As Lerner begins her analysis of Biblical patriarchy, she refers briefly to the "only five" women in heroic and leadership roles. Although the terms are again modern, to correct an unnecessarily dire situation we can add Athaliah, who ruled over Judah for several years; Esther, who prevented Xerxes I's pogrom; and Judith, who beheaded Holofernes.

In a stereotypic reading of the creation story from the Biblical "J hand" Lerner observes, "the impressions is [sic] given strongly and repeatedly that the male shares in the divine power of naming" (p. 182). Since facts can undermine stereotypes, three facts help to redress patriarchal "impressions" of human creation in Genesis 2.22-23. "Eve" is not named in this passage. Rather, with delightful punning, female ('issa) and male ('is) sexuality gains its first definition. The relationship here between "woman" and "man" defines their equality and mutuality. While a father sometimes "shares in the divine power of naming," as a rule the mother assumes this "divine power."

Although noting that throughout history the Adam and Eve story has reinforced "profoundly patriarchal symbolic meaning" (p. 183), Lerner endorses this historical pattern and rejects feminist counters to traditional interpretations. One hardly needs to be a feminist, however, to read Genesis 1.26-27 as defining humankind, male and female, as evenly sharing divine likeness, or 2.5 'ādām, as "earthling"—asexual until 2.22—rather than as "Adam." We have reached a point in history where patriarchal convenience must yield place to textual reality. While Lerner acknowledges such readings, she prefers the standard versions, even when their symbolic potency has shaped/misshaped human history. Thus, she appears to shift ground, moving from historical revision to mirroring historical convention. For Lerner, in Genesis "procreation itself has been turned into a male act. There are no mothers involved in it" (p. 187). The Genesis mothers whom Lerner has discussed and Genesis depicted seem to have evaporated.

Lerner began sensibly with "the basic assumption that men and women built civilization jointly" (p. 36). From this search for historically legitimate, alternative readings in assessing the Old Testament she moves explicitly from history (record) to History (interpretation): "what is significant for the present is not so much what the writers intended by each of their symbolic representations as what meaning future generations extracted from them" (p. 178). With Genesis the Mother-Goddess died, and God the Father took her place. If one discounts the historic power of the earlier symbol, and assumes Lerner's reading of the latter, the weight of history becomes even more one-sided. It need not be so.

Arthur G. Robson is a professor of classics and comparative literature at Beloit College.



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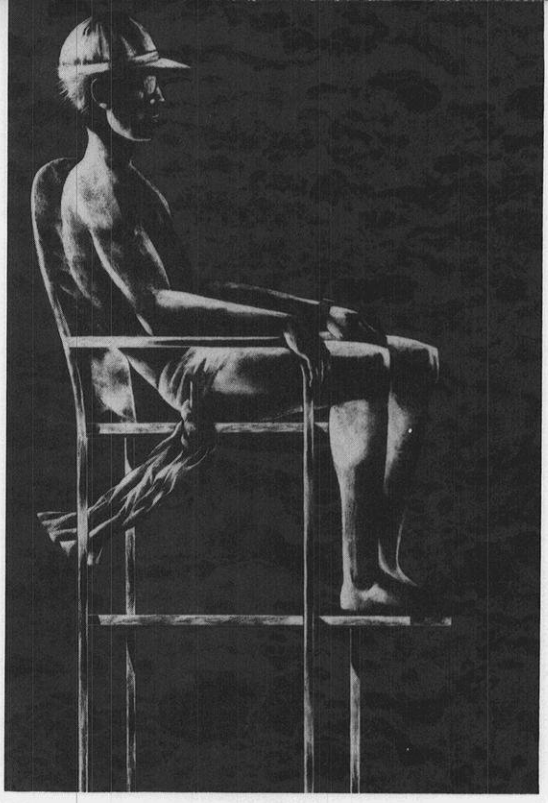

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