

1989

New Rules, New Technologies, and the Shape of Minnesota Farming

Steven J. Taff
University of Minnesota

Follow this and additional works at: <https://digitalcommons.morris.umn.edu/jmas>



Part of the [Agriculture Commons](#), and the [Public Affairs, Public Policy and Public Administration Commons](#)

Recommended Citation

Taff, S. J. (1989). New Rules, New Technologies, and the Shape of Minnesota Farming. *Journal of the Minnesota Academy of Science*, Vol. 54 No.2, 9-12.

Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol54/iss2/4>

This Article is brought to you for free and open access by the Journals at University of Minnesota Morris Digital Well. It has been accepted for inclusion in Journal of the Minnesota Academy of Science by an authorized editor of University of Minnesota Morris Digital Well. For more information, please contact skulann@morris.umn.edu.

6. U.S.D.A., Outlook for U.S. Agricultural Exports, December 1987.
7. European Community Proposal to GATT Negotiating Committee on Agriculture, October 6, 1987.
8. FAPRI "Options for the 1985 Farm Bill," p. 23.
9. Capital Press, Salem, Oregon, April 8, 1983.
10. Wisconsin State Farmer, AgriData News Service, May 13, 1988.
11. "Churches Joint Action Strategy on Production and Trade," National Council of Churches in Christ, January, 1988.
12. Toronto Globe and Mail; September 2, 1987.

New Rules, New Technologies, and the Shape of Minnesota Farming

STEVEN J. TAFF

The future development of Minnesota agriculture will be strongly influenced by new technologies and government policies that will alter prices for farm inputs and outputs. While some farm operations will fail under most expected price regimes, a loss of farmers will probably not have a significant impact on overall farm production. However, the new technologies and government policies could shift Minnesota farming into either a more intensive (less land, higher yield) or more extensive (more land, lower yield) mode of operation. A shift either way will have important implications for Minnesotans. Ownership and residence patterns, ground water quality, habitat and soil conservation efforts, and the overall character of the landscape all will be affected differently.

If policy makers could anticipate the directions of these shifts, the state might be able to plan for the new environment or at least buffer the inevitable disruptions. But analysts have not proven very good at predicting, both because of uncertainty as to which trends are relevant and because of unforeseen events that move the trends away from historic patterns. Consequently, policy makers need to design farm programs that are individually limited in scope and as a group are flexible and responsive to changing economic conditions.

Steven J. Taff is an extension economist with the Department of Agricultural and Applied Economics at the University of Minnesota. In addition to his Ph.D. in agricultural economics, Taff holds an M.S. in urban and regional planning. At Minnesota, he specializes in the economics of agricultural and natural resource policies, with particular attention to the economic and environmental effects of land retirement programs and water quality protection efforts.

Context

The Farm Problem and Farming in Minnesota

There is little agreement about the diagnosis of America's farm problem, let alone the prescription. Some argue that farming is too big-business oriented; that it uses too many chemicals; that small farmers are left in the lurch; that too few people control too much land. Looking at the same world, others see a production system saddled with innumerable government regulations, unfair competition from other countries, and excessive environmental protection constraints.

Since 1950, Minnesota has "lost" some 88,000 farmers, while over the same period, total cropland has hardly budged from the 22 million acre level.

Most agree that there has been too much production and too little farm income. The recent consensus seems to be that Americans have overinvested in agriculture, at least for now, and that there must be a reduction in resources devoted to production in order to gain a proper balance between production and income. When economists say "too many resources," however, most people hear instead "too many farmers." Thus farm exit (farmers selling out) becomes for some a prescription for efficiency and for others an indicator of agriculture's malaise.

In fact, the "farm problem" is not chronic overproduction; rather, it is the chronic mismatch of the resources devoted to

production and the demand for agricultural products. Surfeits and deficits cycle with annoying regularity. When demand outpaces supply (as it did most recently in the 1970s), prices rise, stimulating an influx of capital into the sector as well as an expansion of the land base prepared for planting. Usually, the sector overshoots the mark and ends up in surplus. The resulting lower prices lead to calls for government subsidies and surplus reduction incentives. Prices rise as a result, and investment is stimulated once again.

Farming as an industry is relatively insignificant in both its demographic and economic impacts, but it controls the use of a major portion of the landscape. The majority of people who live in rural Minnesota are not farmers, and farmers themselves are increasingly less reliant upon farm receipts for their livelihood. Many farm families report more than half their income comes from off-farm sources. While farm products account for less than 5 percent of the state's economy, farmers are the principal decision makers on over half of Minnesota's land: some 22 million acres are cultivated each year by 80-90,000 farmers.

But production levels (measured in acres or output volume) and farm numbers are only loosely tied. Since 1950, Minnesota has "lost" some 88,000 farmers, while over the same period, total cropland has hardly budged from the 22 million acre level (Figure 1). The distribution of farm size has changed. However, there have been relative increases in the proportion of operations classified as either very large and very small, while the proportion of medium-sized farms has declined. This trend, particularly the observed increase in average commercial farm size, has been used to support claims of the imminent demise of the family farm. It is unclear, however, whether size increases result from an economic incentive to expand farm unit size, or whether increasing average size is simply a statistical artifact of a divergence in the independent trends of total cropland and number of farms.

Farm size measured in acres doesn't provide a very clear picture of the economic activity generated by different types

of farms. A turkey operation, for example, may be small in acres, but it generates a great deal of income. At the other extreme some livestock operations are large in geographic extent, but their per-acre value added is usually quite low. The other commonly employed measure of farm size is sales of farm products; farms that sell more are "larger." This measure has the drawback that it is not invariant with time, since it depends upon growing conditions, management decisions, price fluctuations, and inflation.

Whichever indicator is used, the distribution of farms sizes is still heavily skewed toward the lower end: most Minnesota farms are still small, even though most farm output comes from a relatively few larger farms.

Governing the Farm and Farming the Government

Contrary to the resource allocation argument advanced above, American farm policy has traditionally (albeit implicitly at times) defined the farm problem simply as one of recurring low farm prices that force family farmers off their land. The simple causality is reflected in the traditional solution: raise prices.

The approach has been two-fold. First, by restricting the number of acres planted, the government has tried to use scarcity to drive market prices higher. (In Minnesota, such price support programs operate in the major grain crops. The dairy price support program relies upon the government boosting demand as a buyer of last resort.) In years when consumer demand is high, price support programs are not used, because the non-intervention price is thought sufficiently high. The costs of price support programs are borne by consumers, not by taxpayers.

The second way the United States has tried to boost farm prices is to subsidize the difference between the market price and some agreed-upon higher "fair" price. In current parlance, the higher price is called the target price, and the difference between it and the market price is called the deficiency payment: the higher the market price; the lower the deficiency payment. The costs of deficiency payment programs are paid by taxpayers, not by consumers.

Left to themselves, price enhancement schemes encourage higher production than would prevail if prices were at their "natural" levels. More resources (fertilizer, tractor time, management) are invested in crop production, so per-planted-acre yields are higher, and more land is cultivated. Farmers also have the incentive to concentrate their resources on a relative handful of subsidized crops, regardless of underlying commercial demand. If unchecked, output expansion would add downward pressure on prices, defeating the purpose of the subsidies.

So, in return for government subsidies, American farmers are usually required to set aside (to idle) a portion of their established production capacity. (There are other ways to control production, such as quotas, but the only politically palatable supply management weapon in the American policy arsenal has been land idling.) Set-asides have two purposes, not unrelated. First, they reduce potential government outlays, because commodity subsidies are paid on actual production, which is now diminished by the required idling. Second, set-asides reduce the amount of production of the crop in question, which serves to push prices upward and to further reduce the government's outlays. Combined, the government subsidies and set-aside programs ideally result in price movements (and hence farm income) being buffered on the low side.

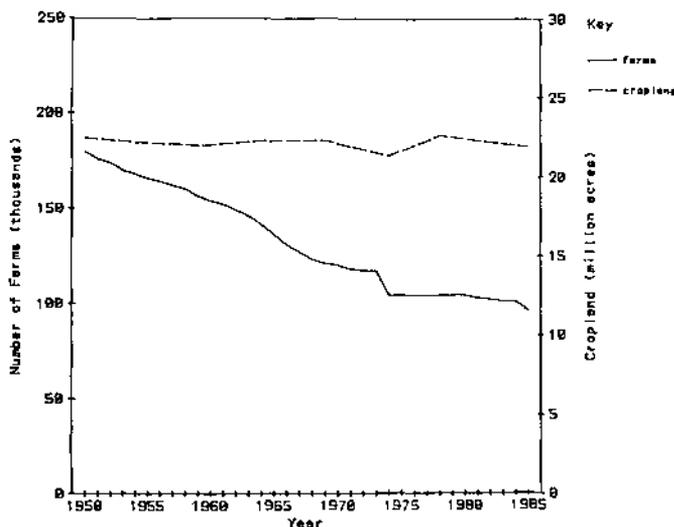


Figure 1: Minnesota farm numbers and cropland acreage: 1950-1985.

Source: *Farm Real Estate: Historical Series Data, 1950-1985*. USDA/ERS Statistical Bulletin 738, December 1985.

Census of Agriculture. U.S. Bureau of the Census. Various dates.

Changes

Technology

Stories of high yield wheat, pigs as big as elephants, and super milk cows have led some observers to predict significant shifts in the way our food production system works. Will such shifts work their way through to farm structure?

Yield enhancing technologies are hardly new to American agriculture. Since 1950, worldwide farm productivity has increased an average of 2.4 percent per year. Some of these gains can be attributed to increased use of machinery and agricultural chemicals, and some are due to new crop varieties that more efficiently process input into final product.

One might hope, then, that the past record of farm structure changes might be able to help us anticipate the results of promised upcoming technological revolutions. Unfortunately, this isn't the case. Potential yields will certainly increase, so the amount of land necessary to meet a particular level of demand could decrease. But this link is by no means certain; technology adoption is far less inevitable than it used to be. And farm production levels and farm population levels are largely unrelated, as we saw above. So even the direction of the impacts is uncertain, let alone their magnitude. The farm population will probably continue to decline, in part because of better off-farm employment opportunities, but it won't drop as much as it might in the absence of government farm subsidies. Farm size shifts will depend upon which drops faster, planted acreage or farm numbers.

A second type of agricultural technology being developed will reduce environmental damages. Tillage practices that minimize soil erosion and pesticides that don't leach into groundwater systems are two examples. This type of technological change will have little effect upon farm structure if the present regulatory environment remains unchanged. Farmers don't pay for pollution damage now, so they have no incentive to adopt pollution reducing technology unless it also costs less or enhances yields. If rules are changed, however, then environment enhancing technologies will clearly become cost reducing.

Policy

Technology rarely evolves alone; it is usually accompanied by changes in the institutional environment. Two major institutional shifts might affect the way Minnesota farmers make crop allocation and land tenure decisions. First, it seems inevitable that farmers will lose some or all of their current right to pollute. Second, it seems possible that federal farm subsidy programs will increasingly be tied to the farm unit and not to specific commodity crops.

Farmers currently select crop and production techniques on the basis of input costs (for machinery, labor, cost of capital, chemicals, seeds) and output prices (for crops and livestock). Any costs imposed on society by the farming operation are not factored into the farmer's economic calculus. In particular, off-site damages caused by soil erosion or chemical contamination of groundwater are not charged back to the farmer.

If the rules were changed so that farmers became liable for some of the public damages, then any associated clean-up or avoidance costs would be added to the costs of the input or production technique that causes the damage. The anticipated tightening of environmental regulations, such as pesticide bans to reduce groundwater pollution, will provide incentives for farmers to shift away from pollution-causing crops and practices. These shifts will have no direct effect on

farm structure if all farmers have equal access to the new technologies and if all farms are equally subject to cost-increasing regulations. If, on the other hand, only some farms (big farms or livestock farms or hilly farms) are subject to the imposition of new costs or can afford the new technologies, then the structural (and geographic) effects could be significant. For example, recent policies restricting farming practices on highly erodible land inevitably reduce the potential profits of those who happen to own the targeted land. Farmers in hilly regions are placed at a competitive disadvantage to those in flatter regions.

A second anticipated institutional change is the reduction of the present reliance upon commodity specific farm programs. The scheme currently travels under the rubric "decoupling," as in the decoupling of farm support programs from production decisions. The rationale for such proposals is that farmers should be allowed to plant whatever they want, with the decision based strictly upon market prices. When demand is high for soybeans, farmers could plant more soybeans; if the market says it wants amaranth, somebody could plant amaranth. Market prices would determine not only what is planted but also how much is planted; the government would be out of the picture as far as crop selection goes. To protect current farmers who might not survive such a policy shift, the government would make cash payments unrelated to production.

Decoupling is the centerpiece of the U.S. proposal at the ongoing International General Agreement on Tariffs and Trade (GATT) negotiations. It will also be a prominent feature of the upcoming debate over renewal of U.S. farm subsidy legislation. Its passage, at least in its "purest" forms, is by no means certain.

Prospects

Over the next decade, Minnesota farmers will be increasingly exposed to yield enhancing technological innovations, strict environmental controls, and commodity prices unbuoyed by government subsidies. This could lead to lower prices, lower land requirements, and higher production costs. Those farmers whose operations cannot thrive in the new setting will fail unless protected in some way by government action. What might be the implications of this "downsizing" of Minnesota agriculture?

One possible outcome is a more intensive farming system, consisting of those farms that can achieve sufficient efficiencies in production on a smaller land base, using high-yield technologies. The remaining "farmers" would be supported by government income transfers or by off farm employment. Average farm size would decrease, since farm numbers would remain unchanged, but nearly all production would be attributed to a relatively few large farmers.

But there is another possibility. If, as some economists argue, land values reflect most of the gains from investment in agriculture, then land values might absorb most of the recent financial losses as well, and drop faster than other input prices. If land prices fall far enough, then at some point a dollar spent on more land will return more profit than a dollar spent on more chemicals (or machines or labor). Coupled with this is the probability that stricter environmental controls will raise the effective cost of many current tillage and chemical practices. Yield enhancing technologies might not be that good a buy. All this could lead to relatively less reliance upon chemicals (in the short run) and on machines (in the longer run). To meet production needs, we would see

as much or more land in farms as we do now, but the land would be farmed less intensively.

There are two plausible futures, one in which productivity gains dominate policy protections and push Minnesota agriculture into a more intensive mode, and other in which policy restrictions dominate yield increases and shift the state into a more extensive mode of production.

In the face of possible social and economic changes, it is commonplace to call for more planning to anticipate and possibly avoid maladjustments. Unfortunately, the farm problem, the chronic mismatch of productive resources and effective demand, simply may not succumb to careful analysis, reasoned exposition, and judicious planning. Our ability to predict the course of economic and social events may never equal our desire to control adverse consequences.

The recent drought in the United States, Canada, and China underscores the point. Virtually overnight, world grain reserves plummeted. Policy attention was quickly diverted from dealing with unwanted surpluses toward encouraging production and supporting consumers, particularly those in developing countries.

A coherent national farm policy may be a will-o-the-wisp. An alternative is to instead craft a loose set of single purpose programs that stress flexibility and quick response. For example, annual set-asides provide a reasonably good mechanism to manage the ebb and flow of overproduction (but not excess capacity), but they are not very good at dealing with environmental problems caused by farming.

They should be used to control supply and nothing else. Similarly, environmental problems, which are generally long term in nature, should be dealt with by longer term programs, such as the Reinvest in Minnesota (RIM) Reserve or the federal Conservation Reserve Program.

In the event that the nexus of events leads to a more intensive agriculture in Minnesota ten years from now, one subset of ready-to-go programs must deal with the question of what we're going to do with the land (and other factors) not then needed for food production. A multi-year set-aside program and government purchase of short term cropping rights easements are two possibilities.

In the event that Minnesota agriculture becomes more extensive, another subset of programs must address the ownership and size structure desired for the expanded land base and how to ensure that cropping practices minimize soil and habitat loss. Restrictions on farm size could encourage more wide-based ownership; deed restrictions on newly farmed land could require certain environmentally beneficial cropping practices.

The future character of Minnesota agriculture is not something completely out of public control but this alternative approach, sort of a policy agnosticism, commends a certain caution in far-reaching policy prescriptions. A more modest complex of flexible programs that can be modified as events unfold may be preferable to a static framework locked into today's perceptions of tomorrow's world.