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Farm Policy in an Industrialized Agriculture

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The structural changes that will impact agriculture over the next decade will be profound. The economic benefits of the dual dimensions of industrialization of agriculture—implementation of a manufacturing approach to the food and industrial product production and distribution chain, and negotiated coordination among the stages in that chain—are expected to result in a much more industrialized agricultural sector. The implications of this industrialization process for agricultural markets and market policy, and agricultural policy in general, are critical. The focal point of this discussion is the set of public policy options that might be considered to shape the future structure of the agricultural sector.

Key Words: concentration, contract production, industrialization, policy, vertical alignment

The U.S. agricultural industry is in the midst of major structural change—changes in product characteristics, in worldwide production and consumption, in technology, in size of operation, in geographic location. And the pace of change is increasing. Production is changing from an industry dominated by family-based, small-scale, relatively independent firms to one of larger firms that are more tightly aligned across the production and distribution chain. The industry is becoming more industrialized, more specialized, more integrated, and more managerially intense (Boehlje, 1999). Our purpose here is to describe the industrialization process, to raise critical policy issues concerning the efficiency and effectiveness of agricultural markets, and to suggest some alternative policy responses to this dramatic restructuring of agriculture.

Industrialization of Agriculture

Industrialization of agriculture means the movement to larger scale production units that use standardized technology/management and are linked to the processor by either formal or informal arrangements. Size and standardization are important

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characteristics in lowering production costs and in producing products that fit processor specifications and meet consumers' needs for specific product attributes, as well as food safety concerns. Smaller operations not associated with an industrialized system will have increasing difficulty gaining the economies of size and the access to technology required to be competitive, except perhaps in niche markets. Access to input and product markets will be especially critical.

For example, industrialized pork production is now the norm for most expanding firms in the industry (Drabenstott, 1994). The manufacturing approach to pork production and distribution contributes to quality control as well as cost control. In many cases, this industrialized model of production and distribution will foster much larger scale firms; in 1988, approximately 5% of total pork production was concentrated in the hands of the 40 largest firms, whereas the 50 largest firms in 1999 are expected to produce approximately 50% of the total U.S. pork output (Freese, 1998). Technological advances, combined with continued pressures to control assets and improve quality, are expected to provide incentives for further industrialization of the industry.

There will be a number of ways in which industrialized food systems are organized and owned. These alternatives will likely include alliances of formerly independent companies, producer-owned cooperatives, and total vertical integration. Consolidation has and will occur in input supply companies (for example, the Monsanto acquisition of Holden Seeds and DeKalb Genetics, as well as many others) and product procurement and processing (for example, Cargill's acquisition of Continental Grain). Systems will be formed by combining input industries, producers, processors, distributors, and even retailers. Firms will likely find it necessary to be part of a food system and to specialize their services and skills in a narrow function.

Industrialized agriculture is characterized by: (*a*) adoption of manufacturing processes in production as well as processing; (*b*) a systems or food supply chain approach to production and distribution; (*c*) negotiated coordination replacing market coordination of the system; (*d*) a more important role for information, knowledge, and other soft assets (in contrast to hard assets of machinery, equipment, and facilities) in reducing cost and increasing responsiveness; and (*e*) increasing consolidation at all levels, raising issues of market power and control (Boehlje, Hofing, and Schroeder, 1999).

Market Policy Issues

This restructuring of agriculture raises a number of public policy issues relative to the effectiveness and efficiency of agricultural markets. We discuss only three of these issues here: (*a*) competitiveness of product and input markets, (*b*) supply chains and market performance, and (*c*) privatization of intellectual property and innovation.

Competitiveness of Product and Input Markets

How will the structural changes that are occurring impact the competitiveness of and strategic positioning in the agricultural product and input markets? The development of tighter linkages and formation of food supply chains may have an impact on market access in both the input and product markets. And the development of larger scale firms could result in sufficient concentration to enable these firms to exercise oligopolistic if not monopoly power in negotiating prices or terms of trade. How will the structural changes in agriculture impact access to *product* markets? What are the implications for producers, consumers, and competitive markets? How will the structural changes impact access to *input* markets? More specifically, is concentration in the poultry, pork, and beef industries and their associated product and input markets sufficiently high to warrant antitrust intervention? What are the consequences of such intervention (or of not intervening) in terms of incentives to innovate, efficiency, externalities, and distribution of returns and risks?

Some would argue that the basic nature of competition has changed in recent years, and in particular the definition of the market is vastly different today in terms of the product/service domain, the geographic domain, and the definition of a firm as an entity. With respect to the product domain, particularly in the service market, the increasing importance of information as a resource and the ability to use the same customer information in a wide array of service industries (for example, retailing and financial services) has resulted in the integration of many service industries. Worldwide sourcing and selling has changed the geographic boundaries of markets from regional or national to global. And some are suggesting that as more industries develop increasingly more tightly aligned supply or value chains from raw material supplier to end-user, competition in the future will not be between firms but among chains.

Supply Chains and Market Performance

The industrialization of agriculture is likely to significantly impact the effectiveness of markets in providing accurate messages to consumers and suppliers in the food chain concerning prices, quantities, and qualities of products and attributes. With the formation of more tightly aligned food supply chains, it can be argued that messaging is much more precise, timely, and generally more accurate for participants in the chain than might be provided by market forms of coordination. Critical assumptions of this argument are that product attributes are accurately measurable, and that consumer demand for attributes is predictable. A recent study of this phenomenon in the pork industry provides support for this hypothesis, but much additional work in this and other industries is needed (Cloutier, 1998).

What about the risk faced by those who are not part of the tightly aligned supply chain—i.e., are not qualified suppliers? Is there more volatility in the prices they receive because of thin markets? Do they have access to a market or are they closed

out because only qualified suppliers can participate? Because of the thinness of these markets, are they not only subject to more volatility, but also to more potential for manipulation? Do the prices and other information conveyed by these thin markets provide accurate messages to consumers and suppliers concerning quantities, qualities, cost, and value? If the commodity markets become the "salvage" market for products that do not meet specifications in the qualified supplier system, do they then become frequently oversupplied with the prospects of more downside price volatility than upside potential? If those who cannot participate in the qualified supplier systems can only sell in commodity markets, and these markets take on the characteristics of a salvage market, do the participants incur more of the risk of more tightly aligned chains that are part of the industrialization without the potential of receiving any of the rewards? If markets become sufficiently concentrated that only one or possibly two qualified supplier arrangements are available in a particular locale, how can participants be assured that their share of the risk and rewards of participation is equitable?

The fundamental issues of access to information, transaction transparency, equitable sharing of risk and rewards by nonparticipants as well as participants in tightly aligned supply chains, and the risk associated with market access are all important market risk and performance issues that are part of the industrialization of agriculture.

Privatization of Intellectual Property and Innovation

What role does intellectual property rights law play in encouraging more tightly aligned supply chains and monopoly or oligopoly power? How does the privatization of research and development and information markets impact the rate of innovation? The distribution of the benefits of innovations? Access to markets? The competitive rivalry in markets? How important are property rights and rent-seeking behavior in encouraging firm growth? In encouraging new innovation? In stimulating economic growth?

With the heightened importance of information as a source of strategic competitive advantage, the potential increases for information-based competition between production/marketing systems. Such competition is particularly likely if information within a more tightly aligned supply chain is superior to that of a less tightly aligned, market-coordinated production/distribution system. Similarly, the opportunity to protect information in the form of genetic manipulation or biotechnology with patent or copyright law offers another platform for information-based competition. In such settings, the issue of market power exploitation within a chain or in competitive positioning relative to other chains is likely to arise.

The role of the public sector in making information a public good that is broadly available to all potential users, and the more general issue of intellectual property rights, becomes critical with the formation of more tightly aligned supply chains in agriculture. The intellectual property rights debate has historically focused more on research and development and new innovations protectable under patent or

copyright law. Particularly in production agriculture, the public sector has played a major role in the research and development activity, and thus provided broad access to new technology and ideas. In this context, part of the public purpose was developing and disseminating new ideas in a broad fashion so that a wide spectrum of users benefited. This received public support when agricultural production included many millions of small family-managed units. What has changed the rationale for public support of agricultural technology? If concentration of input or product subsectors of agriculture now allows the recapture of development expenditure and attractive profits that were not possible under the old structure of many truly independent small farm units, does this not now raise new questions about the nature of these markets and public involvement?

As more and more of the research and development effort, and thus new innovations, comes from private-sector firms rather than the public sector, and as more of the information dissemination system becomes privatized, individual firms have more potential to capture value at the expense of end-users. They have the potential to restrict access to new ideas and information to particular users, thus favoring some producers and excluding others from the ideas, technology, or information necessary for them to be competitive. The concepts of intellectual property rights, including patent and copyright law as applied to agriculture, were developed in an era of domestic markets and national firms; a relatively large public-sector research, development, and information dissemination system; and a limited role of information as a critical resource. These concepts should be reevaluated in the current context of global markets and multinational business firms; the shrinking role of the public sector in research, development, and disseminating information; and the increasing importance of information compared to other resources as a source of strategic competitive advantage.

Regulation of Structure

What is the appropriate public policy response to the profound structural changes in the industry? Regulation of structure, and the market consequences of these changes in structure, is a very contentious public policy issue (Paarlberg et al., 1999). The dimensions of this issue are far-reaching and complex, including the implementation of antitrust policy to an increasingly concentrated and integrated food industry; the regulation of the ownership of farm land, livestock facilities, and other resources used in production agriculture; state and/or federal legislation and regulations on the appropriate form of business organization (corporate farming, contract production, limited partnerships, etc.) and limits on those who are appropriate participants in such business arrangements; contract protection provisions which specify the rules and the protections available to various contracting parties; and even local county and township zoning regulations which influence the ability of individual producers to construct new livestock facilities or implement various farming practices.

Concerns about market power and concentration in the agricultural industry might result in increased scrutiny under antitrust laws and regulations, although the current posture of limited enforcement under these rules makes that unlikely. More likely, state legislators, concerned about the future of family farmers and threat of corporate farming, may constrain forms of coordination arrangements such as contract farming or integrated ownership of various stages of agricultural production. Note, however, that such limitations are more likely to influence the geographic location of various activities in the food production and distribution chain, rather than the method of coordination, unless such legislation is national in scope. Iowa's prohibitions merely encourage activity elsewhere.

Production Sector Structure Questions

In attempting to regulate the structure of agriculture, particularly as it relates to the production sector, some critical questions should be answered. Some examples are:

1. Are there ways to protect market access for independent producers, other than restricting vertical integration or vertical linkages? One way might be to require processors to purchase some minimum percentage of their daily kill on the cash-spot market.

2. Is the important question whether the alternatives available to a producer are cash-spot markets or contract (or other vertical alliance) alternatives, or is it the number of alternatives available and the market power of each? In other words, is there really any fundamental difference between a producer choosing among two or three packers to sell to, or signing a contract with one of two or three contractors? One obvious difference is that the choice of packers is made every week or two, while the choice of contractors is only made once a year or once every few years, depending on the length of the contract.

3. Is it more desirable for cooperatives to engage in contracting with producers or to vertically integrate than other corporations or large privately held firms? Who should have the potential benefit of market power and monopoly profits? One apparent concern with allowing existing cooperatives to contract or integrate is that they might use equity capital built up from independent producer members' contributions to help other contractee producers start or expand, such that they compete with the independents. Would it be more desirable to encourage new cooperatives to form, which would take advantage of economies of size, but using only contractee capital? If there are efficiency advantages of larger operations, would it be more desirable for groups of farmers to own and operate the operations than others? Do farmers "wear whiter hats" than others, in some sense?

4. Many producers are concerned about risk, and contract production and other strategic alliances are methods to manage risk. What other strategies might producers adopt to manage risk? Marketing contracts, futures and options trading, and contracts that simply guarantee access to a slaughter facility are possibilities.

These are questions that are being asked, and they are important. However, it may be more appropriate to focus now on the broader policy issue of balancing public and private interests under structural change.

Expanding the Policy Options

Several broad policy options are available to deal with the structural change that is occurring in the agricultural industry. One option would be to do nothing—to let the changes take their course within the state and federal laws already in existence. A second option is, as suggested earlier, to prohibit various types of activity that are deemed socially undesirable. This option precludes institutional innovations that may have significant economic and social costs and benefits in favor of the status quo. Such a policy might not only be difficult to implement, it might eliminate opportunities to develop a more efficient and responsive food production and distribution system.

A third option is to impose new "rules of the game" that would level the "playing field" or maybe even give some participants an advantage; or define the relative "rights" of various parties in contracting, ownership, and other negotiated linkages, where the potential for unfair treatment or exploitation is a concern. Prompt payment and custodial account provisions under current legislation for livestock buyers and grain merchandisers are examples. The essence of this policy approach is to develop an institutional structure surrounding vertical supply chains (not unlike the institutional structure surrounding markets) that responds to the public policy concerns. Such a structure might include open access to information on prices and terms of trade of all transactions, whether they be within a vertically aligned chain or not. It might include redefining antitrust legislation to acknowledge concerns about market power related to position in a vertical chain as well as market concentration and size. It might include provisions to minimize opportunistic behavior and exploitation by mandating compensation if, for example, contractual obligations in a vertical chain are not fulfilled. Another policy response would be to alter the power potential in negotiation between producers and others in vertical chains by increasing producer bargaining rights. And new arrangements and institutional structures for more equitable sharing of risk and rewards in vertical alliances as an alternative to fixed price contracts might be mandated or encouraged, including various forms of profit and loss sharing arrangements. Providing educational programs, legal advice, and mediation or negotiation services to help parties evaluate and resolve contractual or other business linkage conflicts might also be appropriate.

The fundamental principle here is to develop a new institutional structure to surround vertical systems of economic activity to eliminate the potential of power or exploitation so as to accomplish the same goal as that to be achieved by the current institutional structure in a market environment. Putting such a new institutional structure in place may only occur if those gaining power under structural change see a less attractive alternative likely.

A Final Comment

The structural changes that will impact agriculture over the next decade will be profound. The economic benefits of the dual dimensions of industrialization of agriculture—implementation of a manufacturing approach to the food and industrial product production and distribution chain, and negotiated coordination among the stages in that chain—are expected to dominate the economic and social cost, resulting in a rapid movement of the livestock sectors (particularly pork) followed chronologically by the grain sectors to an industrial model of production and distribution. The implications of this industrialization process for agricultural markets and market policy, and agricultural policy in general, are profound.

In essence, the underlying policy questions can be stated simply. First, should public policy limit or shape the industrialization of agriculture so that the end result is more compatible with what is perceived by some to be a more acceptable structure of the industry? And second, if industrialization of the agricultural sector does occur, what are the implications for appropriate public policy concerning market and nonmarket mechanisms that will be used to coordinate the food production and distribution system?

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