

Farm Business Management for the 21st Century

**The Competitive Environment:
*New Realities***



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This publication is designed to help you identify important trends in agriculture that affect your business. The agriculture of the 21st century puts pressure on farm business managers to be aware of and responsive to a number of industry trends. The information and worksheet, “The New Agriculture: Implications for My Farm Business,” in this publication will help you identify those trends that will influence your business operations.

Success in farming will continue to require that operations be efficient, but there will be a growing payoff to strategic decisions or “doing the right thing.” With the continued industrialization of farming, a clear strategy to guide the farm business becomes increasingly important. A strategy refers to the plans, ideas, and actions used to help businesses successfully complete their endeavors.

Dramatic changes are occurring in the agricultural sector today. These changes provide opportunities for some, but threats for others. Twenty-first century agriculture is likely to be characterized by:

- More global competition;
- Expansion of industrialized agriculture;
- Production of differentiated products;
- Precision (information intensive) production;
- Emergence of ecological agriculture;
- Formation of food supply chains;
- Increasing risk; and
- More diversity.

This publication discusses these drivers of 21st century agriculture. At the end of the publication you will find a worksheet, “The New Agriculture: Implications for My Farm Business,” that will help you decide how they apply to your farm business.

More Global Competition

Globalization and internationalization are not new to agriculture—since the 1970s farmers’ incomes have been heavily dependent on their success in selling products in international markets. More recently, the development of agreements such as WTO and NAFTA have been the focal point of much of the globalization discussion, with the emphasis on broader access to world markets, expanding exports of agricultural commodities, and, particularly, further processed agricultural and food products.

While expanded market access has been an important dimension of the future of global markets and international trade, the most important dimension is the interna-

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tional transfer of capital and global access to technology and to research and development. In the past, most of the private sector technology transfer and R&D activity has focused on U.S. and Western Europe. But, today, these are relatively mature markets in terms of acreage growth and expansion of livestock production capacity. Growth opportunities are likely greater outside these regions, in Canada, Mexico, South America, Eastern Europe, Asia, etc.

With the opportunities for global-oriented companies to expand their markets in these areas, one would expect substantial expansion in the technology transfer and R&D activity of these companies specifically focused on geographic regions outside the U.S. and Western Europe. The longer-run consequences are a narrowing of the gap between the productivity in these parts of the world and that of the traditional dominant production regions, as well as an increase in world-wide production capacity. This increased efficiency, productivity, and capacity in other production areas, along with the world-wide sourcing and selling strategies of global food companies, means that the U.S. and Europe will not be as dominant and will face increased competition in world markets in the future.

Expansion of Industrialized Agriculture

Industrialization of production means the movement to large-scale production units that use standardized technology and management and are linked to the processor by either formal or informal arrangements. Size and standardization are important characteristics in lowering production costs and in producing more uniform crop products and animals that fit processor specifications and that meet consumers' needs for specific product attributes and address their food safety concerns.

The current movement toward industrialized production units in the U.S. is nearly complete for some livestock species, but lagging for others. The poultry industry moved to an industrialized model from the 1940s through the 1960s. Cattle feeding moved to the industrialized model in the 1960s and 1970s. The dairy and pork industries are in the midst of a dramatic movement to the industrial model, with the current transition largely to be completed by 2010. The brood cow industry continues to be much less affected by industrialization, because technologies have yet to be found that can greatly increase the productivity of the brood cow through confinement and intensive management. Specialty crops have or are rapidly adopting industrialized production systems. The grain industry is moving more slowly to this type of agriculture, but even segments of the commodity markets are increasingly adopting a biological manufacturing approach.

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. Smaller operations can, however, remain in production for a number of years because they may have facilities that have low debt and are able to utilize family labor. Technological advances combined with continued pressures to control costs and improve quality are expected to provide incentives for further industrialization of agriculture.

Production of Differentiated Products

The transformation of crop and livestock production from commodity to differentiated product industries will be driven by: consumers' desire for highly differentiated food products; their demands for food safety and trace-back ability; continued advances in technology; and the need to minimize total costs of production, processing, and

distribution. Food systems will attempt to differentiate themselves and their products by science and/or through marketing. Ways to differentiate through science include gaining exclusive rights to genetics through patentable biotechnology discoveries; exclusive technology in processing systems; and superior food safety integrity. Marketing may include unique branding, advertising, and packaging, or an emphasis on food safety, product quality, or product attributes. Additionally, a marketing plan may include bundling a product with other food products for holistic nutritional packages or presentation of products in non-traditional formats

In the grain industries, highly extractable starch corn acreage has been growing, and crops such as edible soybeans, non-GMO soybeans, high protein wheat, and specific amino acid composition soybeans are earning premiums. In pork, differentiation on lean content is increasingly common. In the future at least two types of pork sire lines are likely to be developed for different markets. One sire line will be selected to produce extremely lean and efficient pigs, with an objective of least-cost for reasonably acceptable lean pork. Other lines destined for export and restaurant markets will be selected for high pork quality. These lines will be darker in color and contain approximately 3% intramuscular fat.

Precision Production

The management of production is expected to trend toward more micro management of each specific production site, specific room, and possibly even specific acres or animals. The shift will be driven by the influx of information about the environmental and biological factors that affect production. The motivation will be to minimize costs and enhance product quality.

Increased use of monitoring technology will greatly expand the amount of information available regarding what affects plant and animal growth and well-being. This will be made possible by innovations in sensors used in individual monitoring and control systems. In addition, greater understanding of how various growth and environmental factors interact to affect biological performance will be forthcoming. This understanding will then be incorporated into management systems that combine the optimum practices and apply them at a micro or localized level.

Precision farming in crop production includes the use of global positioning systems (GPS), yield monitors, and variable rate application technology to more precisely apply crop inputs to enhance growth, lower cost, and reduce environmental degradation. Examples in animal production include medication treatment by animal rather than by the entire group or herd; nutritional feeding to the specific genetics, sex, age, health, and consumer market for the individual animal; and continuous adjustment of the ambient environment, including such factors as temperature, humidity, air movement, and dust and gas levels within buildings, to maximize economic returns and animal comfort.

Nutrition management is expected to more closely match the nutrient supply with the needs of individual animals. This will include the matching of specific grains with individual species and perhaps specific genetics, body conformation, gender, phase of life cycle, or even the end-use for the animal. Greater emphasis also will be placed on nutrition to minimize odor and nutrient levels in manure rather than on traditional economic factors such as feed efficiency and rate of gain. For example, phase and split-sex feeding in pork production can reduce nitrogen and phosphorous excretion by 15%. An additional benefit is reduction of total costs of pork production by 4-6%

Buildings and equipment will continue to move toward larger scale to fit the industrialized model. Inside the buildings, expect enhancement of monitoring and control

systems to help detect gases, temperature, humidity, and disease organisms that could adversely affect the economic performance of animals and to correct problems when they reach critical thresholds. Further advancements can be expected in cleaning systems to maintain higher sanitation and improve conditions for workers and in animal handling systems to reduce injury to animals in movement and marketing.

Emergence of Ecological Agriculture

Proponents of ecological agriculture argue that agriculture cannot function as an isolated system (i.e., as having no exchanges of matter or energy with its environment). They argue that agriculture must consider the limits of the natural resources used to produce agricultural commodities as well as the limits of the sinks needed to dispose of the wastes from agricultural activities.

The traditional view of agricultural productivity is that production problems can most effectively be solved by bringing an external counterforce to bear on a given production problem—applying a pesticide to a pest, for example. Ecological knowledge suggests that a more effective approach might be to determine why the pest is a pest and discover how improving internal relationships in the system could solve the problem—improving predator/prey relationships, for example. Under the traditional view, the predominant paradigm for pest management has been one that mandates “therapeutic intervention,” where pest problems are solved by bringing an external force into the system to eliminate the pest. Because nature is always evolving, this approach inevitably invites a new round of pest problems that puts farmers on a treadmill. Further, this treadmill results from both chemical and biotechnological approaches because both ignore the original conditions that produced the opportunity for pest invasion.

These differences in the fundamental approach to production have significant structural implications because the therapeutic intervention method, which requires the annual purchase of “external force” inputs, tends to be more capital intensive. The natural systems approach may require initial capital outlays but moves to the establishment of self-regulatory systems.

Some practitioners (notably biointensive integrated pest management operators and organic farmers) have put these ecological principles into practice. These operators have made fundamental shifts in their management practices to apply ecological principles. In particular, they tend to use nutrient cycling instead of nutrient flows, self-regulating pest management systems instead of pesticide applications, and diverse crop/livestock systems instead of monocultures. Some practitioners have developed rather sophisticated systems of production that have significantly reduced their energy inputs, substituted management skills for purchased inputs, and, in many instances, reduced their aggregate production costs. It is possible that smaller farms may take advantage of these new management practices more rapidly because they often have more flexibility to adopt the necessary changes.

Formation of Food Systems

Much of U.S. plant and animal agriculture will be a part of industrialized food systems by the year 2020. Industrialized food systems are those that are holistic in production-processing-marketing and organized to deliver specific-attribute consumer products by development of optimized delivery systems or through differentiation by science or branding.

An increasing emphasis will be placed on managing and optimizing supply chains from genetics to end-user/consumer. This supply-chain approach will improve efficiency

through better flow scheduling and resource utilization, increased ability to manage and control quality throughout the chain, reduced risk associated with food safety and contamination, and increased ability of the crop and livestock industries to quickly respond to changes in consumer demand for food attributes.

Food safety is a major driver in the formation of chains. One way to manage food safety risk is to monitor the production/distribution process all the way from final product back through the chain to genetics. A trace-back system combined with HACCP (Hazard Analysis Critical Control Points) quality assurance procedures facilitates control of the system to minimize the chances of a food contaminant or to quickly and easily identify the sources of contamination.

A supply-chain approach will increase the interdependence among the various stages in the food chain; it will encourage strategic alliances, networks, and other linkages to improve logistics, product flow, and information flow. Some have argued that, in the not-too-distant future, competition will not occur in the form of individual firms competing with each other for market share, but in the form of supply chains competing for their share of the consumers' food expenditures.

Increasing Risk

Agricultural production has always been a risky business, but this may become increasingly so in the future. Not only will the traditional variables of price, weather, disease, etc., continue to buffet the industry, but new sources of risk may be encountered. Some food distribution channels may require particular quality characteristics that are not available in predictable quantities in open, spot markets. The risk of changing consumer preferences or a food safety scare may be a much more critical and important risk to manage than price or availability of raw materials. One reason for a contractual arrangement to source raw materials from a qualified supplier is to reduce price, availability, and food safety risks from contamination. At the same time, the contractor obtains the attributes needed in the final product. But this arrangement may reduce flexibility and introduce relationship risk—the risk that the qualified supplier arrangement is terminated.

The transformation of a segment of agriculture from a commodity to a differentiated product industry introduces at least three new risks. First, differentiated products are positioned to respond to unique market segments that value the attribute that is differentiated. Assuming this attribute is measurable (which may be a risk in itself because many food attributes, including quality, are difficult to measure), one risk is that consumers' and end-users' attitudes and willingness to pay for some attributes may change over time. For example, consumer attitudes with respect to food additives, biotechnology, and genetically modified organisms (GMOs) do not appear to be stable or predictable across cultures and across time.

Second, alternative techniques to accomplish product differentiation may develop over time, and the number of firms or individuals that can produce the differentiated product could increase. Thus, differentiated products are regularly commoditized over time, and initially higher margins are eroded as new competitors appear. This speed of commoditization is also a source of uncertainty.

Finally, differentiated products in the food market, particularly if that product is a branded product, also carry the risk as well as the reward of branding. Brand value can be quickly destroyed by defects or quality lapses, and, in the food product markets, food safety is a risk that can quickly destroy brand value.

More Diversity

Product differentiation

But increased diversity is different from more diversification. “Diversification” refers to expanding the number of activities or enterprises managed and controlled by one firm or business. “Diversity” refers to the differences among the firms and businesses that comprise the industry. In fact, the agriculture of the future may exhibit more specialization (i.e., less diversification) within a business and at the same time more diversity between businesses.

The agriculture of the past could reasonably and accurately be characterized by typical or representative farms for various geographic regions and crop or livestock enterprises. Certainly, farms were not identical in terms of the technology used, the size of the business, the financial characteristics, the ownership structure, etc., but in a particular locale and for a particular crop or livestock sector they exhibited many similarities—in fact more similarities than differences.

But, increasingly, agriculture is not characterized by similarities among firms, but by differences between firms. Not only do we now have enterprise specialization (e.g., corn/soybean farms or hog farms rather than diversified farms of the past that included corn/soybeans and hogs produced on the same farm), we are further separating production activities in livestock industries such that firms may be involved in only one phase of dairy, pork, or beef production. For example, some firms specialize in breeding, gestation, and farrowing in pork production, and separate firms specialize in finishing or the final feeding phase of pork production.

Diversity is also increasingly characterizing the types of products produced even within a segment or sector of agriculture. With increasing diversity in consumer demands and the opportunity for product differentiation at the production level, farmers are no longer just producing commodity crop and livestock products. For example, some farmers are producing highly extractable starch corn, while their neighbors are producing white corn. A further form of diversity in the farm sector is in terms of commitment to and dependency on farming as a source of family income. Many farm families combine farm employment with off-farm employment or home-based businesses, not only as a way to start farming, but also as a permanent and satisfying way of life.

There is more diversity in size of farming operation today than in the past. Even though large-scale businesses are growing rapidly as the dominant size in some parts of the livestock industries, smaller scale production units continue to be a significant part of these industries as well as of other segments of agriculture. This occurs most often in segments focused on niche markets and local customers, such as fresh fruit and vegetable production for local consumption and roadside stands.

Differences in marketing and financial strategies among firms are an important part of the new diversity in agriculture. Farmers are using various methods of raising capital, not just borrowing money and obtaining equity from their own savings. Longer-term lease arrangements for land and machinery and buildings are becoming an important part of the farm capital structure for some businesses and yet are not part of that structure for other businesses. Some farmers are using equity capital from outside investors rather than relying strictly on their own retained earnings or family sources. And different farmers use different strategies for marketing their crops. Some use cash markets, whereas others forward contract their production. Some producers sell at the farm gate, while others are in value-added cooperatives that retain ownership further down the distribution channel towards the final food consumer.

An additional dimension of diversity in agriculture is in the production technology used. Some producers are heavily dependent on purchased inputs, whereas others are more focused on holistic sustainable production systems that recycle resources and thus reduce the amount of purchased inputs. Some farmers use highly capital-intensive production systems, whereas others who have more labor than capital to contribute to their business find it much more profitable to use labor-intensive technologies and production systems.

Thus, there is increasing diversity in production technology, management practices, ways of doing business, techniques of financing and organizing the business, etc. Even though diversification is declining in production agriculture, diversity is increasing.

A Final Comment

This new agriculture profoundly changes the competitive environment in the industry. In the commodity agriculture of the past, most agribusinesses had to compete only in terms of cost. If you were a low-cost supplier and did not expand beyond the sustainable growth rate of the business, you could expect to be successful—to survive and maybe even thrive in the long run. In the new agriculture that includes differentiated products and more tightly aligned marketing/distribution systems with producers being raw material suppliers for manufacturers and food processors, competitiveness includes quality features and responsiveness or time to market as well as cost. In the agriculture of the future, successful farm businesses will need to be better, faster, and cheaper to have a sustainable competitive advantage.

This publication is part of a series on applying strategic thinking to your farm. Each publication has a unique focus, enabling you to select those topics of greatest interest to you. Other publications help build a guiding vision for your farm business (EC-720), assess the strengths and weaknesses of your business (EC-721), and assess how well your business can respond to opportunities and threats (EC-716).

Each publication contains reading materials and work exercises to help you, the farm business manager, develop, review, and, if necessary, modify your strategy for future business success. Other materials are available on-line at <www.agecon.purdue.edu/ext/farmplan>. This site contains other information about strategy as well as financial management. And for still more Purdue Extension educational materials on agricultural economics and farm business management, visit <www.agcom.purdue.edu/agcom/pubs/agecon.htm>.

The New Agriculture: Implications for My Farm Business

Five potential changes/trends/events that may affect your business in the next five years have been identified. How likely are they to occur? How will your business respond to those trends? What changes will you make in your business because of these trends? The first has been completed as an example.

Expected Change	Odds	Response
The further development of specialty grain markets	95%	This is an opportunity. To take advantage of this opportunity, I should modify planting, harvest, and storage processes in order to ensure that the identity of grain can be preserved.
More demand for product traceability/identity preservation		
An expansion of ecological agriculture practices		
The further development of closely linked supply chains		
Increased competition from foreign producers		

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