

FARMING IN THE 21ST CENTURY

by

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Staff Paper # 99-9

August 31, 1999

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Purdue University

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Preface

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 seems to be 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. And the input supply and product processing sectors are becoming more consolidated, more concentrated, more integrated.

Agriculture in the 21st century is likely to be characterized by: 1) adoption of manufacturing processes in production as well as processing, 2) a systems or food supply chain approach to production and distribution, 3) negotiated coordination replacing market coordination of the system, 4) a more important role for information, knowledge and other soft assets (in contrast to hard assets of machinery, equipment, facilities) in reducing cost and increasing responsiveness, and 5) increasing consolidation at all levels raising issues of market power and control.

These profound changes in the agricultural industry present new challenges and new opportunities that require new ideas and concepts to analyze and implement. They require new learning and thinking. Some of those new ideas and concepts are presented here, not as empirically verified truths, but as “thoughts” to stimulate different and better thinking. They have been developed based on observations, analysis and discussions with numerous managers and colleagues in agribusinesses in North America and Europe. This series focuses on Farming in the 21st Century; companion series are also available on Financing and Supplying Inputs to the 21st Century Producer (Staff Paper 99-11), and Value Chains in the Food Production and Distribution Industries (Staff Paper 99-10).

Our purpose in sharing these “thoughts” is to invite discussion, dialogue, disagreement — in general to encourage others to develop better “thoughts”.

Keywords: qualified supplier, biological manufacturing, strategic risk, process control, economies of size, franchise grower

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Treadmills in Agricultural Production

Change has been a constant part of farming for decades -- new technologies including new machines, new chemicals, new genetics, new feed ingredients, etc. have been continuously introduced into the market at an ever-increasing pace. In fact, some have described the technological changes in agriculture as a treadmill -- you have to adopt new technology just to keep up. But as farming transitions from a commodity to a differentiated product industry, farmers will be faced with additional continuous changes and an additional treadmill -- the differentiated product treadmill. What are these treadmills and how will they impact farm decision-making in the future?

The Technology Treadmill

Technological advances have been a critical source of productivity and efficiency gains in farming, and farmers that are earlier adopters of the right technology have typically been financially successful. Technological progress implies change, and continuous change can be characterized as the technology treadmill. This notion of the technology treadmill actually accelerates the adoption of agricultural technology. As a new technology is introduced, the first few farmers to adopt the practice gain doubly. They increase the volume of their product and, in addition, gain revenue at market prices largely dependent upon the volume of production from the old technology. Thus, there is tremendous incentive to be the early adopter. Subsequently, as more and more farmers adopt the practice, the supply of commodities increases and this drives down the price. This forces the remaining farmers to adopt the new technology to increase their production to compensate for the lower prices. Thus, over time, market forces drive farmers to adopt new technology if they are to stay in farming. The keys to success in technology adoption in this treadmill environment are to continually scan for new technology options, to be early in the adoption process and to be right! You probably don't want to be first in technology adoption, but a close second -- maybe an optimal adopter.

The Product Treadmill

The transformation of production agriculture from a commodity industry to one that produces differentiated products results in an additional treadmill for farmers. This treadmill occurs because although differentiated products have the potential to generate higher profit margins because of the value created by the differentiating attribute, this value typically declines over time. Value decay is a result of numerous forces including,

Substitution in the form of products that are already in the market, or from the development of new products and services over time. For example, the value of high oil corn is significantly dependent upon its ability to compete with fat in feed ration formulation, recent declines in fat prices have resulted in substitution of animal fats for high oil corn in feed rations.

Replacement by new products that make old products less valuable. For example new genetics in pork production produces leaner meat with less fat and thus replaces traditional genetic lines.

Commodization which occurs as increasing numbers of producers enter the market over time, increasing output which results in lower prices and thus value decay. The speed with which a product moves through this commodization process depends to a significant degree on the ability to maintain uniqueness and protect differentiated characteristics from being replicated.

To maintain the higher profit margins that are associated with differentiated product production, farmers must continuously replace those differentiated products that have declining value with new products that have higher profit potential. Thus, another treadmill -- a product treadmill that involves constantly assessing new dimensions for differentiation and adding value. The key to success in differentiated product choices in this treadmill environment are not only the constant scan for new alternatives, but an understanding of the causes of value creation and decay, an estimate of the rate of decay for the old product and the rate of creation for the new, and a set of value chain relationships and a distribution channel that will provide access and incentives to bring new products to market.

So the new agriculture involves continuous and constant change in both choice of technology and choice of differentiated product. This environment of continuous change will provide both new challenges and new opportunities for tomorrow's farmers.