VALUE CHAINS IN THE AGRICULTURAL INDUSTRIES

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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 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 opportunities that require new ideas and concepts to analyze and implement. The 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 Value Chains in the Food Production and Distribution Industries; companion series are also available on Farming in the 21st Century (Staff Paper 99-9), and Financing and Supplying Inputs to the 21st Century Producer (Staff Paper 99-11).

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

Keywords: Value chains, value decay, product differentiation, information, structural change

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Biological Product (Agricultural) End-Use Markets and Supply Strategies1

The significant changes that are occurring today in the types of products produced by agricultural producers are in part a function of changing end-use markets and the development of different strategies to supply those end-use markets. What are these changes and how will they impact the agricultural industry?

End-Use Markets

Historically, the agricultural production sector has focused on producing generic commodities for the feed, and to a lesser extent, the food market. More recently, the industrial use of agricultural products, including ethanol and other previously petroleum based products, has been expanding rapidly. Like the feed market, the industrial market has obtained most of its raw material from generic commodities.

More recently, the food and industrial end-use markets are demanding component specific rather than generic commodities. Component specific commodities are distinguished from generic commodities in that they are differentiated on one or two basic characteristics or components. These components sufficiently enhance the generation of end-use attributes such that a premium is paid for component specific commodities compared with generic commodities. But the premium is modest and if it becomes too large, generic commodities can be processed at a lower cost than paying the premium for component specific commodities to obtain the desired end-use attribute.

The third production alternative is the design and production of specific attribute raw materials for unique end-uses in the food or industrial markets. For example, for some food uses one starch source may be as good as another. But rice starch is superior to other sources of starch for baby food. Waxy maize is better for some types of starch production than typical commodity corn. A partial listing of the specific attributes that might be important depending upon end-use includes chemical composition such a starch, protein, fiber, and sugar content; nutritional value; palatability; texture and processing properties, volume and availability; freshness and timing of delivery. Such characteristics as the process used in producing and growing the raw material (i.e., chemical free or pesticide free for crops and additive free and animal welfare sensitive for livestock) and the attributes that are excluded as well as those that are included may also be of interest.

Specific attribute raw materials are characterized by a broader spectrum of the attributes noted above compared with component specific commodities, which may contain only one or two of those attributes. In this context the types of products identified form a continuum from generic to specific without definitive delineations between the three classes identified. As illustrated in Table 1, the demand for component specific commodities and specific attribute raw materials is expected to grow, whereas the use of generic commodities will probably decline.

1*Adapted from Boehlje, Michael and Lee F. Schrader. "Agriculture in the 21st Century", *Journal of Production Agriculture*, 9(3):335-340, 1996.

Table 1. End-use markets.

Types of products	End Uses		
	Feed	**Food**	**Industrial**
Generic commodity	Decline	Decline	Decline
Component specific commodity	Growth	Growth	Growth
Specific attribute raw material	—	Growth	Growth

Supply Strategies

Four fundamentally different strategies can be used to supply the end-use markets identified. The first strategy and the one most commonly used in the generic commodity markets is that of blending. The basic concept of blending is to acquire commodities with various characteristics (moisture content, foreign material content, weight per unit of volume, etc.) from various suppliers, and blend these products from different sources into a single product that meets specified commodity standards. This is the common supply strategy for the feed end-use market as well as for numerous industrial end-uses such as ethanol.

The second strategy we will call the segment, select, and sort strategy. The basic premise of this strategy is to recognize and use the variation in biologically produced raw materials by identifying various segments of the end-use markets that can efficiently use agricultural products with different characteristics. As noted earlier, higher protein wheat may have more value in certain food products, or higher starch content corn may be more valuable in some industrial markets. The approach of the segment, select, and sort strategy would be to first identify these various end-uses that could use the natural variation in agricultural products (segment), and then select, sort, and separate the product by source in such a fashion that it can be targeted to these segmented end-uses. The concept here is to exploit the variation rather than attempt to reduce the variation in biologically produced raw materials; the challenge is to find those segments that will generate value for different levels of an attribute. Low quality products may provide a unique challenge — developing a way to capture higher value from porcine stress pork (PSS) or damaged grain rather than simply in salvage markets may be a challenge with significant economic payoff.

The third strategy for supplying particular end-use markets is to acquire only raw materials that have the desired attribute. This approach is quite different than the segment, select, and sort approach in that a single or limited number of end-use markets are identified, and only those raw materials that have the specific attributes to fulfill the characteristics demanded in that end-use market are purchased or grown. Acquiring specific attribute raw materials might occur by selecting only those raw materials that meet certain attribute specifications; more commonly obtaining these raw materials occurs through contract production with genetic material and cultural practices to produce or enhance the attribute desired. Products that don't meet these contract specifications are rejected or diverted to a generic commodity or other lower value end-uses. The fundamental philosophy of this strategy is to reduce the variation of specific attributes in the raw material supplies rather than to accept and exploit that variation.

The final supply strategy is the biomash strategy. In essence, the biomash strategy involves the separation of commodities into components, and then recombining these components to supply a specific end-use market. The concept is to use processing technology including extracting and extruding techniques to manipulate generic or component specific commodities to produce the attributes desired in the end product. With significant advances in processing technology, including those that will come from biotechnology, the opportunities for using a biomash strategy to obtain specific end-use attributes may increase significantly. This is particularly of interest in highly seasoned, highly sauced snack foods and similar end-uses in the food market, and in the industrial end-use market where taste and texture attributes are not critical to consumer or end-user acceptance.