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INDUSTRIALIZATION OF AGRICULTURE OR A REALIGNMENT OF THE FOOD AND AGRICULTURAL SYSTEM?

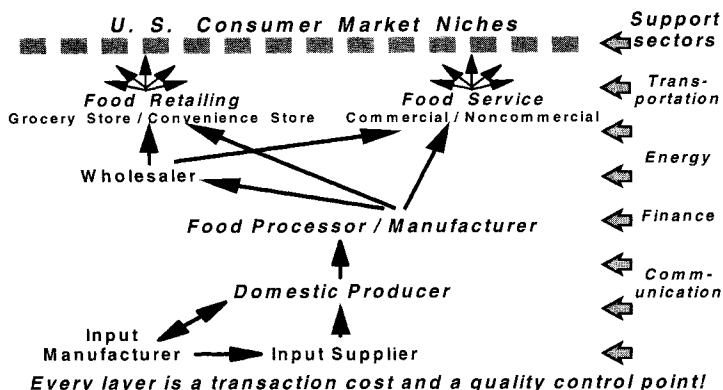
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When the topic of industrialization in agriculture comes up, I tend to come at it from a little different direction. Perhaps this is due to my background with regard to cooperatives.

I am not a big fan of the term *industrialization*, because I think it creates a mind set. As soon as an audience sees the term, their minds close up, almost immediately. Any dialogue is over. What I really like to focus on is a realignment of the food and agricultural system. In other words, I think it is very important, when talking about either business or policy, that you have a very basic understanding of what is driving this change. It is easy to look at the pork industry and conclude that it is an example of industrialization. That misses the point in terms of what is really going on in that industry. In terms of the food system, industrialization is occurring in a lot of other industries besides pork, but probably in a much more subtle way than what we are seeing in the pork industry.

The agricultural and food system is in transition. While there are many ways to depict the linkages within the system, Figure 1 provides many insights into the transitions occurring in the system. In addition to noting the different segments, the statement at the bottom of Figure 1 is crucial to appreciating the roles in the system. Every participant in the system is a transaction cost and a potential quality control loss. Equally important is to recognize how changes in the support sector industries are altering the dynamics of the exchange process within the food system.

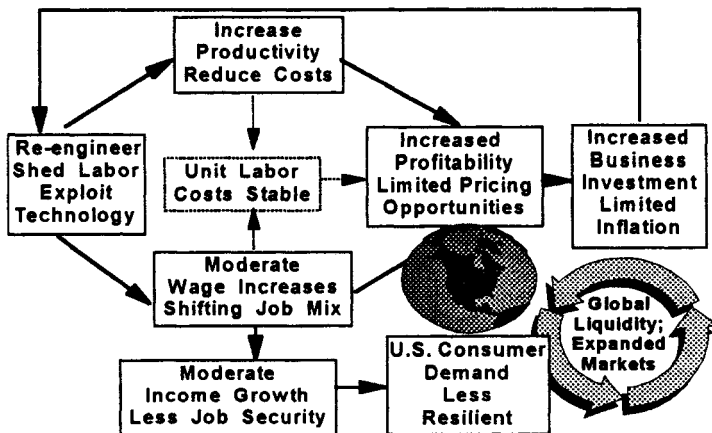
Figure 1. The U. S. Food System In Transition.



The Realignment of the Agricultural and Food System

Re-engineering Systems. I believe some of the changes in the agricultural and food system are a result of the fact that the economy, since the 1990s expansion, has been driven by re-engineering systems (Figure 2). If you analyze the 1990s expansion, you will recall that the first two or three years of the expansion were characterized as a jobless recovery. In other words, it was not generating any net additional employment. Business was downsizing, restructuring, looking at systems and taking them completely apart to restructure the whole network. I believe the restructuring process has carried over into the food system as well. Agricultural and food companies are now taking another look at where they are going to be and how they are going to position themselves.

Figure 2. The 1990 Economic Expansion.



Catalysts for Change. The realignment of the food system is a product of numerous catalysts which have emerged rapidly in an environment of re-engineering and globalization. These catalysts are:

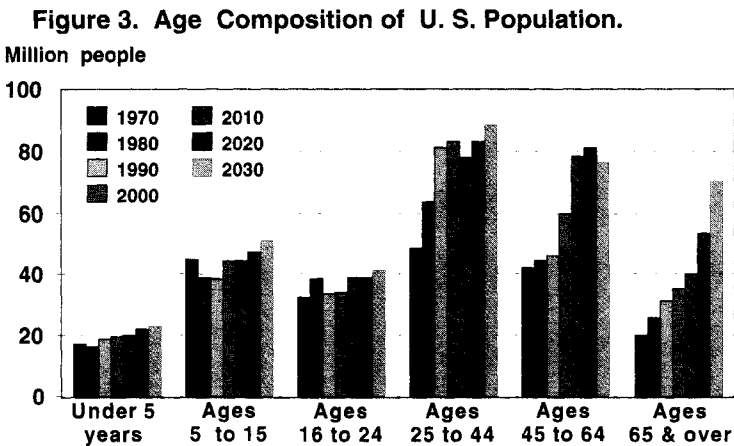
- U.S. market demographics and preferences
- Structural characteristics of industry segments
- Technology
- Government policy / regulation / deregulation
- Evolution of global market dynamics

The pace of change has accelerated as everyone seeks to reappraise what has worked in the past and realign it with the competitive prospects in a global economy. As you assess the various catalysts it is crucial to assess their interdependency. It is the unique combination of catalysts which is giving rise to the rapid restructuring.

U.S. Market Demographics and Preferences

The U.S. market will be increasingly driven by the unique consumption patterns of its consumer. Basic population growth drove consumer markets for many years. But, in the coming decades, the rate of population growth will slow (Figure 3) and the consumer will be increasingly selective in a very competitive marketplace. The new market will be shaped by a number of factors:

- Demographics—age and population growth.
- More single person households.
- More two wage-earner families.
- Smaller families.
- Increased ethnic populations.
- More concerns about health, food safety, etcetera.
- More emphasis on convenience.
- More away-from home eating.



While each of these factors warrants further discussion, let me focus on the first and last to illustrate the magnitude of the challenge.

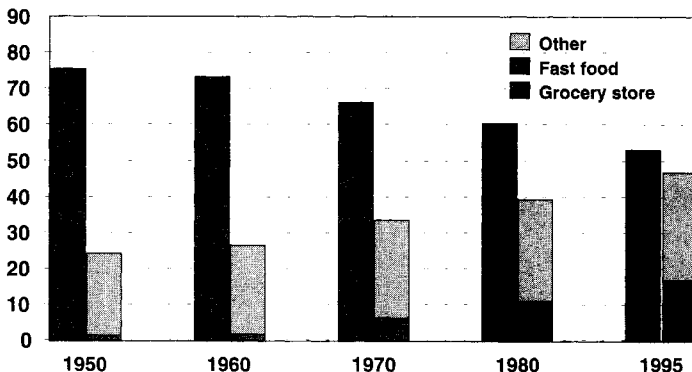
Importance of Baby Boomers. These changes have carried over into agriculture in a much more dramatic way. We are beginning to see the effects of the Baby Boomers getting into the rocking chairs. We are already beginning to see that in the financial markets. We are seeing it in just about every market you want to talk about. When we look ahead to the next 30 years, the fastest growing age groups in terms of numbers of people are over 45 or, particularly, over 65. There is not a food company out there that is not looking at it and saying, "I have to change my product mix." McDonald's is struggling heartily because there are no kids in the back of the car anymore to tell their parents to pull into McDonald's. The question for McDonald's is how do you keep the people you had when they were younger, and so forth?

The strategy works all the way back to the agricultural side. It determines the kinds of products they want, how they are going to have them delivered and where. I expect very soon that you are going to see McDonald's following the Marriott example of trying to figure out how you put a restaurant into retirement communities. How do you access that group with a different menu? The change in consumer preferences is much more dramatic than people understand at this point in time. If you look at the numbers, in 1980 we were introducing about 2,000 new food products. Today, we introduce about 15,000 new products a year. The food industry is looking for all kinds of new ways to approach the emerging market. It is a very affluent market. The Baby Boomers will probably be the most affluent folks in rocking chairs that we have ever had in this country.

Increasing Importance of Away-from-Home Consumption. Consumers spend nearly half their food dollar for away-from-home consumption (Figure 4). This changes the nature of the food they desire and the demands that this industry segment will

Figure 4. Eating Preferences Are Reshaping Food Expenditure Patterns.

Percent of total food expenditures



place on production agriculture. With the Baby Boomers increasingly dominating the consumption shifts, it is logical to expect away-from-home eating to dominate in the next millennium.

Structural Characteristics of Industry Segments

In food retailing, the grocery store chains are a dominant player, accounting for over two-thirds of all sales (Table 1). However, it is the local chains that seem to be emerging as significant players in adapting marketing strategies to limited regional areas. At the same time, the distinction between food purchased for at-home consumption and away-from-home consumption is blurring (Figure 5). Over 80 percent of supermarkets now have delicatessens which are marketing prepared food products for immediate consumption away-from-home. This trend will accelerate in coming years.

Table 1. Share of Sales of Grocery Store Chains.

Year	All Chains	Types of Chains			
		National	Regional/ Sectional	Local	Other*
----- percent -----					
1948	34.5	18.7	7.0	5.6	3.2
1958	46.7	20.9	13.2	11.1	1.5
1967	51.4	16.2	15.1	13.4	6.7
1977	58.7	15.4	21.2	14.5	7.6
1987	63.5	13.3	19.5	23.5	7.2
1994	64.7				

* Other includes chains of convenience stores and grocery stores smaller than supermarkets.

As consumer preferences move increasingly to the away-from-home market, the concentration of sales in that marketplace becomes of greater concern (Figure 6). Establishing linkages through the food system will require relationships in this market segment. Four firms have 50 percent of the restaurant sales in this country. If you do not do business with McDonald's, Kentucky Fried Chicken, Burger King or Wendy's, then you are going to have a problem in terms of your product. As these alliances are created, it raises questions about what the relevance is going to be in the open market. Will there be a viable open commodity market per se in many of these commodity areas?

Figure 5. Delicatessen Growth in Supermarkets.

Percent of supermarkets with full service deli

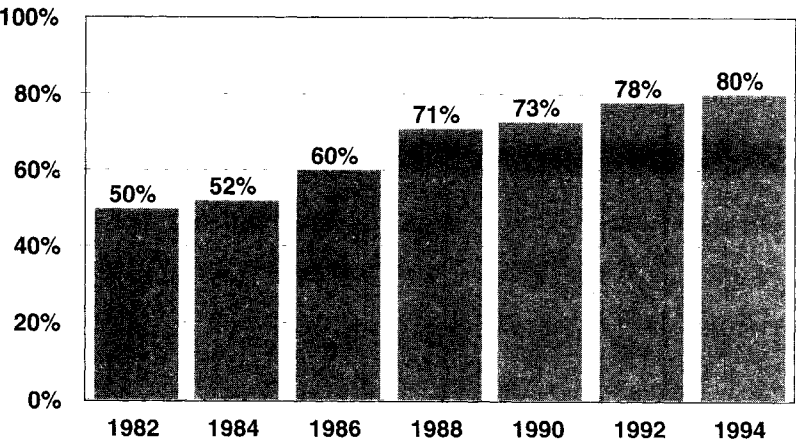


Figure 6. Restaurant Chains Market Share, 1995.

Sandwich

McDonald's*	34%	} 61%
Burger King*	17%	
Taco Bell*	10%	

The top four firms in U.S. sales accounted for 48% of total sales !*

Pizza

Pizza Hut*	48%	} 84%
Little Caesar's	18%	
Domino's	18%	

1. McDonald's
2. Pepsico, Inc.
Pizza Hut
Taco Bell
KFC

Chicken

KFC	58%	} 80%
Boston Market	11%	
Popeye's	11%	

3. Grand Metropolitan
Burger King
4. Wendy's Int'l

Structure of the Input Industries. The structures of agricultural-related industries are also undergoing a transformation to align with domestic market shifts and emerging global opportunities (Figure 7).

Figure 7. Structure of Input Industries.

- ✍ **Feed**
 - Integrated livestock consolidates industry
- ✍ **Fertilizer**
 - Consolidation has already occurred; capacity growing; global competition
- ✍ **Seed**
 - Integration of crop protectants and seed genetics will reduce number of firms to only 2 to 4 ???
- ✍ **Crop protectants**
 - Increasing service-related aspects as certification to food system gains value!

Technology

Changes in Technology. At the same time, you have a change in technology. We have the emergence of a product technology, both production technology and biotechnology, that allows the enhancement of selected product characteristics. This is a development consistent with the need to satisfy a consumer who is increasingly seeking selected traits (Figure 8). Now you can enhance those traits most desired.

Figure 8. Changing Role of Technology.

Product Technology

- ✓ Enhances productivity and/or reduces cost (traditional role)
- ✓ Enhances selected product traits or characteristics
- ✓ Creates new products (Food safety / public perception issues will have to be faced)

Information Technology

- ✓ Enhances ability to analyze, assess and communicate information to facilitate planning and coordination. Transforming data to information to decisions will be a key factor in survival!

Probably equally important and the least appreciated change is in information technology. What is happening in information technology, with computers, is the ability to coordinate systems in a much more sophisticated way than has ever before been possible. You now have the capability to link the consumer preference directly with the production agriculture. Wal-Mart can have their checkout counters link back to their dairies that provide milk. They can know exactly how much milk they need to flow through the system and have a contractual arrangement to do that. The system is beginning to get tighter and tighter. That does not mean it is integrated, but it certainly is much more effectively coordinated than ever before. That opens all kinds of possibilities in terms of structural relationships. This is not only with the away-from-home segment, but also with the grocery store, right up and down the line in terms of coordinating the system.

At the same time that all of this is going on, you have major changes in the input industries. Many of the changes are regarding biotechnology, which is changing the seed and chemical industry very dramatically. Seed agents now need to be biotechnological consultants. They are selling a whole farm system—not just seed. That is the trend in this industry. There may be very few companies involved in that. The nature of the relationship with regard to the input side is changing.

Government Policy / Regulation / Deregulation

Changing Focus of Government. Deregulation and regulation are important issues with regard to agriculture, particularly farm policy. In general, the trend in government policy is to provide less direct income support and more regulatory oversight (Figure 9). In terms of regulation, the areas of food safety, conservation and the environment will place more and more burdens on all facets of the food system. This type of regulation will reshape the location of the agricultural industry

Figure 9. Changing Focus of Government.

➤ **Declining direct income support for agriculture**

➤ **Enhanced focus on:**

**Food safety
Environment
Conservation
Market regulation**



**Increased impacts on
cost, structure and
location of food and
agriculture system !**

But ...

**Driven by non-farm constituency and
Possibly regulated outside USDA,
i.e., EPA, Food & Drug Admin., Justice**

Regulatory oversight increasingly outside USDA

in this country. It should be added that oversight will increasingly occur outside of the U.S. Department of Agriculture.

Many of the most significant changes only come into play when markets are attempting to adjust to large supplies. Since the passage of the Federal Agriculture Improvement and Reform Act (FAIR), markets have been focused on allocating small supplies. Planting flexibility and the lack of price support without acreage programs and reserves will be tested in the future (Figure 10).

Figure 10. Federal Agriculture Improvement and Reform (FAIR) Act.

- ✓ **Production Flexibility Contracts (7 years)**
Fixed payments irrespective of market prices;
payments phased out over 7 years; option to
plant any program crop or idle;
- ✓ **Maximum fixed marketing loan rates**
- ✓ **Eliminates acreage reduction authorities**
- ✓ **Suspends farmer-owned grain reserve**
- ✓ **Reduces payment limit**
- ✓ **Conservation Reserve Program reauthorized**
- ✓ **Environmental quality programs consolidated**
- ✓ **Dairy price support program eliminated in 2000**
- ✓ **Reduces support for sugar**

The most prominent examples of deregulation are in transportation, banking, telecommunications and energy (Figure 11). In the banking industry, the fundamental change of allowing banks to acquire securities firms or vice versa is changing the nature of how money flows. In this country, it is going to change the nature of how agriculture gets its money for a lot of its operations. Deregulation in the transportation side has impacts on agriculture. The consolidations occurring in the railroad industry are changing some of the economics in the grain industry.

Deregulation in electric power also has an impact. We have a number of our cooperatives who have joined together to collectively buy electric power from the power facilities. The ability to acquire power off the grid changes the dynamics. Low cost power, which is a big advantage in the Pacific Northwest, may not be such a big advantage when you start marketing that nationwide. This changes the dynamics of where agriculture is going to be positioned. The structural changes in these industries will change the business partners you will have in the future food system. The owning, leasing, sourcing and purchasing of these support services will change dramatically over the next decade.

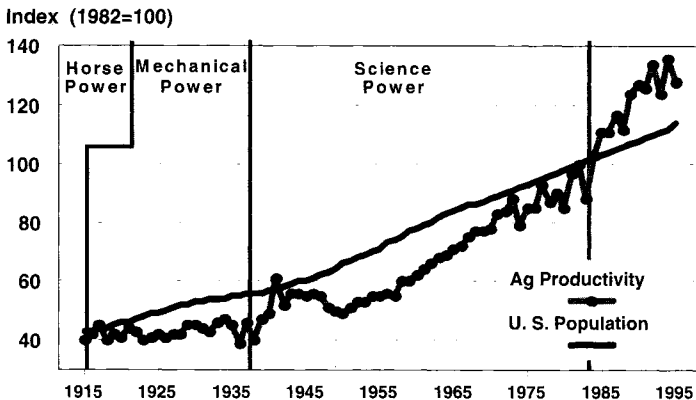
Figure 11. Deregulation Is Transforming the Structure of Major Support Industries !

- ✈ **Transportation**
 - Railroad mergers altering cost / availability
- ✈ **Financial markets**
 - Consolidation of banking / securities and evolution of mutual funds industry
- ✈ **Telecommunications**
 - Control of communication systems and linkages such as Internet, digital communication, etc.
- ✈ **Energy**
 - Electric power industry being transformed

Evolution of Global Market Dynamics

Ultimately, in the absence of supply controls, the market will determine the amount of resources that will remain in agriculture. The amount of resources required in the future will be largely determined by the growth in the export markets (Figure 12). Continued gains in agricultural productivity will increasingly outstrip U.S. population increases. The resulting production must either be exported or limited by resource removal.

Figure 12. U. S. Agricultural Productivity & Population.



The nature of the export market has also changed dramatically in terms of types of commodities. The growth in bulk commodities that dominated the market in the 1970s has now stagnated and the growth engine has become the value-added products (Figure 13). The emerging markets will not be the government-to-government bulk commodity markets that characterized the 1970s export experience. These new markets will require new product development and aggressive marketing strategies to establish a presence (Figure 14).

Figure 13. World Agricultural Exports by Type.
(More value-added and less government-to-government)

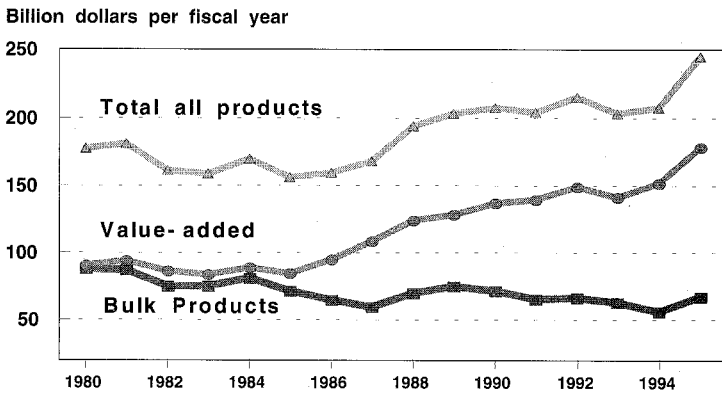
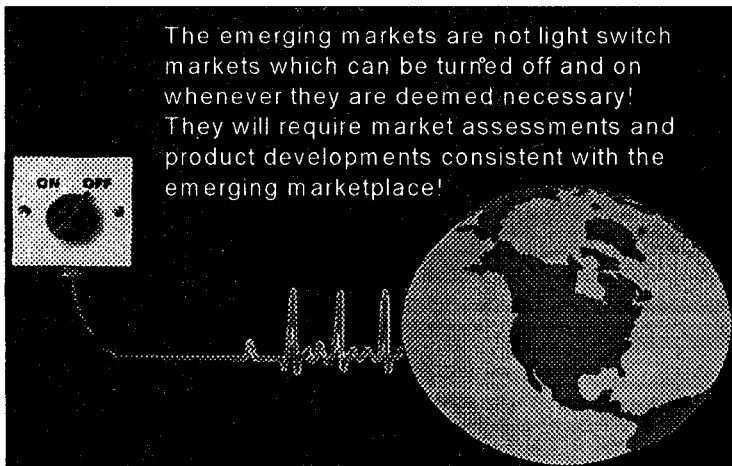


Figure 14. Emerging Markets Need New Strategies



The New Realities

Any strategy developed to face the challenges of the new emerging food system must take into account the new realities of the food system. These realities are:

- Less government support and increasing regulation in food safety and the environment will alter cost structure/location of food and agricultural activities.
- Consumers will increasingly segment into distinct market niches seeking selected product characteristics.
- Farmers will be paid for product characteristics, not commodities. Value will increasingly be added off the farm.
- An increasing share of the market will become coordinated via contracts, alliances, etcetera. Consequently, the balance of the market will become more volatile.
- Technology will be the driving force in not only what will be produced, but how and when; it will dictate organization of process from inputs to the consumer.
- Profitability in the food system will increasingly be determined by linkages between sectors rather than within sector efficiency.
- Foreign market developments will have increasingly larger impacts on pricing in the domestic marketplace even if you are not a direct exporter. The value of the international presence will increase.

The technological revolution is accelerating the integration of the food system through mergers, acquisitions, alliances and joint ventures. These relationships are being developed both horizontally and vertically, and the ability to coordinate such arrangements will facilitate positioning in the system (Figure 15).

Some industries have a long history of contracting and vertical integration (Table 2). With the decline in direct government support, many sectors will be exposed to greater price and income risk. This increasing risk will reinforce the pressures for consolidation that already exist within the rapidly changing food system structure. Changes in the hog industry may be a barometer of change.

Figure 15. U.S. Food System InTransition.

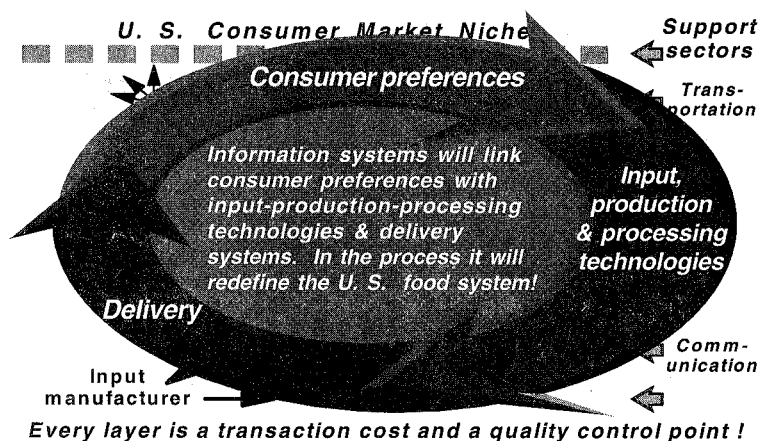


Table 2. Contracting / Integration by Commodity.

	1970	1990	
	---- percent ----		
<i>Livestock</i>			Do Consumer Preferences, Technology and Government Policies and Regulation Impact Industry Structure ?
Broilers	99	100	
Mfg. milk	26	26	
Fluid milk	95	95	
Hogs	2	21	
<i>Field crops</i>			
Food grains	3	8	
Feed grains	2	8	
Cotton	12	12	
<i>Specialty crops</i>			
Proc. vegetables	95	98	
Fresh vegetables	51	65	
Citrus	85	100	
Other fruit	40	60	

Cost comparisons of low technology and high technology pork production systems have clearly shown the economies of scale of the new larger systems (Table 3). At the same time, the displacement of existing systems will also be governed by the fact that many of their indirect costs (buildings, equipment, etcetera) are already paid off and are not a factor until replacement is required.

Table 3. Cost of Production Comparisons by Pork Production Systems.

Cost Factors	150-sow low tech	150-sow high tech	300-sow high tech	1,200-sow high tech*
----- dollars per hundredweight -----				
Total Direct	30.06	27.70	27.70	26.12
Total Feed	22.62	24.13	24.13	26.39
Total Indirect	22.55	17.25	15.26	12.17
Equipment	9.27	6.84	5.66	4.04
Buildings	3.70	2.86	2.67	2.67
Labor	5.70	4.11	3.86	2.06
Total Costs	52.61	44.95	42.96	38.29

* Marketing arrangements may provide price advantages of \$0.50 to \$1.00/cwt. to larger units!

Source: Purdue University.

A Look at the Future

The traditional model for commodity production from the food processing sector to the retail consumer (Figure 16) has now given way to significantly different structural relationships. Production is increasingly focused on product characteristics embedded in genetics (Figure 17). This allows processing to be more narrowly structured to handle the narrower range of commodity characteristics. The channels to the consumer are defined earlier in the process.

In the future, the product will be even more refined at the production level with the processing channels even more uniquely defined from raw product to selected consumer niche markets (Figure 18). The realignment will reach throughout the input industries as well. In the future, the input bundling will become increasingly important

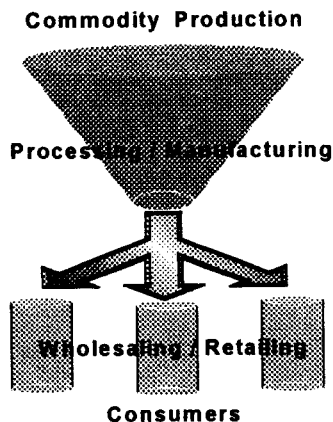
Figure 16. Traditional Structure of U.S. Food System.

Figure 17. Consumer-Dictated U.S. Food System.

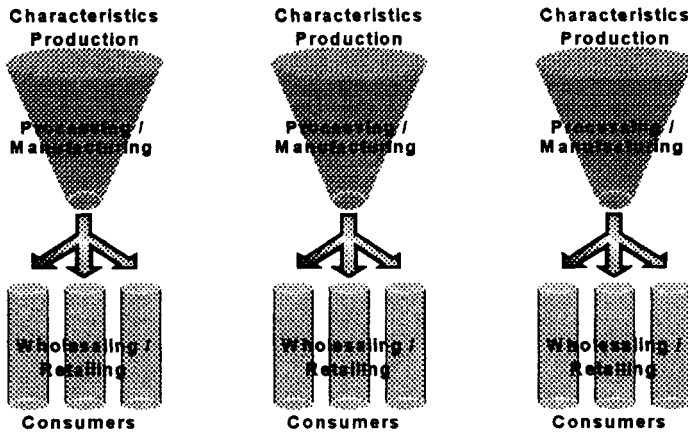
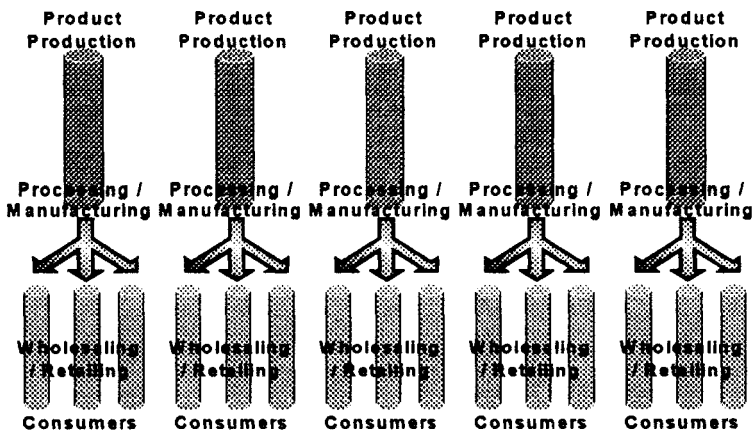


Figure 18. Consumer May Dictate Production System.

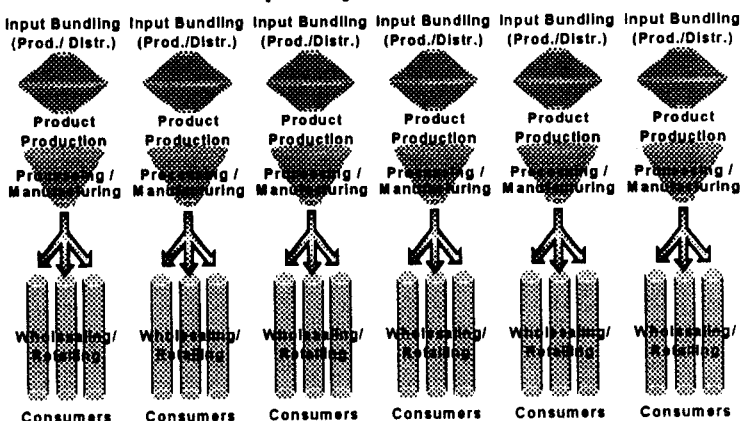


in serving very uniquely defined product channels. Bundles will need to be shaped around the product and marketing channels that are increasingly unique (Figure 19).

These events, I think, are all kind of coming together in the 1990s. While these trends may result in greater concentration, I think we are also going to create more opportunities for the niche linkages—markets that can be satisfied in local or regional areas, through smaller producers and so forth. Producers must have access to technology and have the capability to deliver the product.

In summary, I envision a future in agriculture different than today. We are going to see less government with more regulation. Consumer markets are going to

Figure 19. Consumer May Dictate Structure of Production and Input System!



get increasingly segmented in this country. We will have a very affluent market. People are going to be very selective about what they want in their products and they are going to want to trace it all the way back to the raw product side.

Consumers are going to demand certification of what has been applied to these crops right through the system—particularly when you start talking about a more elderly population with more food safety concerns. You are going to see more and more linkages all the way back—so that the deliverer of a product can assure his customers of what exactly they received. Relationships will built up and down the system. Farmers are going to be paid for characteristics, not commodities. The last thing you want to be is a producer just throwing generic commodities onto the marketplace. It is going to be a highly volatile market. Technology is not only going to drive *what* we produce, but *how* we produce it.

I think the realignment is simply a fundamental shift in what is going on in agriculture. Profitability in the food system is going to depend on who you have linkages with. It may not be good enough to be the most efficient producer of something. It may be more important that you have the best business relationship going up and down the system. I think that is one issue producers have to focus on very seriously.

Lastly, foreign market developments are going to have more and more impacts on agriculture. For instance, the meat industry is now evolving to a point where we are shipping enough meat in total that if something happens in the international market, it will back up very quickly into the domestic market. We are already exporting about 20 percent of our broilers, and we are approaching perhaps 10 percent in pork. As that dependency creates more and more opportunities, it is going to create more and more risks in the domestic side which will have to be dealt with.

Being in the international market is going to be more and more important. When the domestic economy slows down, those people that are positioned internationally and have profits flowing to them from the international market will be in a much better position to advance themselves in this food system as we go forward.