



Beef, Pork, and Poultry Industry Coordination

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Vertical coordination is the process of organizing, synchronizing, or orchestrating the flow of products from producers to consumers and the reverse flow of information from consumers to producers. At one end of the vertical coordination continuum, is an open market system where all coordination is accomplished by market prices. In an open-market system, market prices signal consumer preferences to producers and guides production decisions to fulfill consumer demands. At the other extreme, is vertical integration where one firm owns and controls a commodity and the products processed from it through the entire producer-to-consumer supply chain. In this case, the integrating firm decides what, how, and how much to produce and process to meet consumer demands.

Coordination changes have occurred in the beef, pork, and poultry industries in conjunction with many other structural changes in each of these industries. Changes have been more noticeable for beef and pork as these industries both followed and responded to trends that began decades ago in the poultry industry, primarily for broiler chickens. Competitive pressures from poultry caused the beef and pork industries to seek greater efficiency and improved coordination. For example, several strategic alliances have been organized in the beef industry over the past decade to improve coordination. In the pork industry, contracting between porkpacking firms and larger hog operations increased sharply, along with packers integrating into hog production, both in an effort to increase production efficiency and improve coordination.

Since many structural changes began in the poultry industry, it is common for changes in the beef and pork industries to be compared with the poultry industry. Questions are raised as to how likely coordination in the beef and pork industries will resemble poultry. This fact sheet provides a perspective on recent and likely coordination in the vertical production-marketing supply chain for each of the three industries.

Vertical Coordination Motives

Efforts to improve coordination can stem from several sources. Some may be referred to as problems or viewed as opportunities. Purely open market systems of coordination put tremendous pressure on market prices to efficiently and effectively communicate consumer preferences and then for producers to respond appropriately. Inadequacies with this process can be classified as market failures. These so-called

market failures typically present opportunities for innovation and profit. In our capitalistic economy, profit opportunities are the ultimate economic incentive for many market changes. These profit opportunities may arise in response to inefficiencies in production, processing, or distribution; large transaction costs between stages in the producer-to-consumer supply chain; the application of new technology that may reduce costs or lead to new or improved products; or demand changes in the form of changing consumer preferences.

The following industry comparisons identify factors that have led to different methods of coordination. The comparisons could be organized in several ways. Here, the comparisons are categorized into production characteristics of each industry, factors in each industry that may enhance or improve coordination, and factors in each industry that limit or impede coordination.

Production Characteristics: Beef, Pork, and Poultry

There are some basic physical and economic production characteristics of the three industries that contribute to or limit vertical coordination in each industry (Table 1).

Biological Production Cycle

The time from conception to market for beef, pork, and poultry varies widely. Time periods shown in Table 1 are approximations. Variations in the production process can alter the time periods shown. The importance of the biological process to vertical coordination is interrelated with factors discussed later. Perhaps the primary factor involves the speed with which biological changes such as genetic improvements can be made. While this factor is present both under an open market or vertically integrated system, it affects the incentives or disincentives and the ease or difficulty for increasing coordination. For example, if a firm is considering improvements in product quality stemming from genetic or biological changes, there is more incentive to vertically integrate in an industry that has a shorter biological process and in which genetic changes can be made more quickly. The shorter biological process increases the likelihood of accurately predicting expected profits, thus carrying less risk for the firms involved.

Table 1. Production characteristics in the beef, pork, and poultry industries.

Characteristics	Beef	Pork	Poultry
Biological Production Cycle	24 months	12 months	5 months
Genetic Base	Wide	Narrow	Narrow
Industry Stages	Cow-calf Stocker Feeding	Farrowing Finishing	Hatching Growing
Geographic Concentration in Production	Dispersed, varies by production stage	Midwest, Mid Atlantic, Southern Plains	Southeast
Operation Size and Specialization	Varies widely by production stage	Large and specialized	Large and specialized

Genetic Base

The genetic base for poultry is relatively narrow. Only a few breeds or genetic lines are used and they ultimately provide the vast majority of final products. Both the short biological process and more uniform animals resulting from a relatively narrow genetic base are important for managing the production process and production costs. These factors also affect managing costs in processing and getting consistent products to consumers. Overall, they contribute to enhanced coordination in the vertical market channel. Genetic changes can be made more quickly also, because from the hatching process, one hen produces many more offspring in a shorter time than either a cow or sow.

The genetic base for hogs has narrowed considerably in recent years. Today, just a few specialized firms provide the breeding stock for nearly all large hog operations. Genetic changes can be made more quickly than for cattle but not as quickly as poultry. Sow litter size has increased and one sow produces many times more offspring in a single breeding cycle than one cow. Making quicker genetic changes also affects efforts to reduce production costs and increase consistency of pork products for consumers.

In the beef industry, the genetic base is still quite wide. Some cattlemen are continuing to create new breeds, often referred to as composite breeds, created through planned crossbreeding programs. The result is further amalgamation or agglomeration of the genetic base. There are desirable genetics in every breed, but as yet, there is no easy, economical method of recognizing many of those desirable genetic traits in commercial cattle operations. The biological process is a serious deterrent to quickly changing the genetic base also, since one cow produces only one calf per year and it takes about 24 months to learn whether or not the breeding process resulted in beef with more or less desirable eating characteristics.

Industry Stages

The poultry industry has two primary production stages, hatching and growing, apart from the processing and distribution stages, which are common to all three industries (beef, pork, and poultry). The pork industry also has two primary production stages, farrowing and finishing. The beef industry is at a relative disadvantage compared with poultry or pork. The production process for cattle consists of three stages—cow-calf, stocker or growing, and feeding. This third production stage increases transaction or transfer costs for the industry. Also, each production stage has different resources and management needs and thus increases the difficulty of vertical coordination in the marketing channel. The number of production stages interacts also with where production occurs, which is discussed next.

Geographic Concentration in Production

The geographic concentration of poultry, pork, and beef production differs significantly by industry. Production location is affected by natural resource endowments of soil, water, and climate. Some types of production are most conducive to specific geographic regions than others.

Poultry production, especially broiler chicken, is concentrated in the southeastern U.S. Turkey production, a much smaller portion of the poultry industry, is more dispersed with pockets of concentrated production in several states including the mid-west and west. Hog production for years was concentrated in Iowa and surrounding Corn Belt states where corn and soybean production was concentrated. While still significant, pork production has increased sharply in North Carolina and the Mid Atlantic states as well as in Oklahoma and southern plains states. The growth areas in hog production are those that are more accepting of contract production systems, both culturally and legally, partly due to the presence of integrated poultry operations in some of those areas.

Cattle production, again, is distinctly different. A major reason is the significant land and forage base required for cattle production. Beef and dairy cattle, both of which contribute to the supply of beef, are geographically concentrated in different states. The largest cow-calf producing states are in the southern plains, far southeast, and mountain west states. Cattle stocker or growing operations are quite diverse and are concentrated in three southern plains states—Oklahoma, Texas, and Kansas. Cattle feeding has increased in geographic concentration and involves some of the same states where there are large numbers of cows and stocker operations, primarily in the plains states. However, because of the geographic dispersion combined with an added production stage, the beef industry incurs significant transactions costs moving animals from dispersed cow-calf operations to more concentrated stocker or growing areas and to still more concentrated cattle feeding areas.

Operation Size and Specialization

Poultry operations, largely as a result of contract production and vertical integration, are specialized units. They are virtually all intensely managed operations that vary in size from a single house to relatively large operations.

Hog production units have followed the poultry industry trend. Hog production operations have become more specialized, both in farrowing and finishing operations. Contract production has increased significantly as has vertical integration of hog production by large packers. The size of many hog production units has increased significantly to capture cost economies associated with larger units. Individual units range from a single farrowing or finishing unit to very large operations with several production units under the same management.

Cow-calf production is a mixture of small and large, diverse and specialized operations. A large number of cow herds are quite small, with fewer than 30 cows per operation, in part again because of the significant land and forage base required. Stocker or growing operations are larger, usually combining calves from several cow-calf operations into larger production units. Cattle feeding has moved predominantly to large, specialized units. Additionally, increased consolidation among cattle feeding companies has resulted in more feedlot capacity controlled by fewer and larger firms.

Implications for coordination are interrelated with other factors discussed above. Coordination among several large, specialized production units usually can be managed more efficiently than coordinating production from many, smaller,

diverse production operations. Specialization and larger size units in poultry are partly a cause and partly the result of enhanced coordination. Such units capitalize on more specialized management and economies of size. The pork industry has followed the poultry industry model to some degree and has trended toward increasingly larger and more specialized operations in hog production. Also, contract production and vertical integration has led to improved coordination. Tighter vertical coordination in the beef industry will occur more slowly than either for poultry or pork, due in part to the difficulty of organizing and managing smaller, highly diverse production units. Incorporated with that are the disadvantages cited above for the beef industry, i.e. the longer biological process, more diverse genetic base, an added production stage, and more geographically dispersed production.

Factors Enhancing Coordination

Other market-related characteristics of the beef, pork, and poultry industries lend themselves to improved vertical coordination. Enhanced coordination enables firms in an industry to respond more quickly and correctly to changing consumer demands, especially changing tastes and preferences. Therefore, characteristics discussed in this section relate to how firms are able to meet consumer demand at the retail and food service level and how to capitalize on profit opportunities. Market characteristics affecting vertical coordination incentives are summarized in Table 2.

Value-added Products at Retail

Greater profit opportunities exist with value-added, differentiated meat products than with commodity-type products sold in the traditional fresh form. Beginning in the 1970s, there was a concerted effort to develop more value-added poultry products. The space in the meat case for fresh, whole birds or for fresh parts declined as more value-added products appeared on the frozen food shelves. These frozen, packaged products offered more opportunities for satisfying varied consumer demands such as for different package and serving sizes for varying size families, different flavors and styles for different ethnic and religious groups, and different degrees of convenience in meal preparation.

More recently, the emphasis has shifted somewhat to providing case ready products. This entails improved packaging of fresh retail products. Case ready products have probably affected the pork and beef industry more than poultry. The move to case ready products has several sources. One

Table 2. Market characteristics in the beef, pork, and poultry industries.

Category	Beef	Pork	Poultry
Value-added Products at Retail	Low, but increasing	Moderate and increasing	High
New Product Development	Moderately increasing	Moderately increasing	Slowly increasing
Brand Marketing	Low, but increasing	Moderate	High

is its responsiveness to consumer criticism regarding leaky, sticky, fresh meat packages at retail. This amounts to both a consumer satisfaction issue and a food safety issue. Second, is the rapid expansion of Wal-Mart in food retailing and its emphasis on labor-saving handling in their stores. Case ready products come into the store ready to be price-stamped and placed in the retail meat case. Improved packaging reduces meat case waste and cleanup also, in addition to enhancing food preservation and safety. In the pork and beef industries, new processing plants specifically geared to producing case ready meat for one or a few retail supermarkets has become relatively common.

The pork industry has traditionally produced several processed, value-added products. Consider the many bacon, ham, and sausage products in the retail meat case. The remainder of the pork carcass has been marketed in fresh form as chops, roasts, and other products. Some percentage of those fresh pork products are now marketed as case ready, value-added pork products. They are still fresh pork products; so the pork industry has not created as many frozen, value-added products as the poultry industry. Pork industry efforts have focused on increased product quality and consistency in these case ready products. Some of these quality and consistency gains have been achieved from a narrower genetic base as well as from new or improved processing methods. Several versions of newer, value-added products are offered to capitalize on varying consumer tastes and preferences.

Beef is still primarily marketed in fresh form from the retail meat case. However, packaging improvements, including case ready products, has likely benefited beef more than poultry. There are still relatively few value-added beef products throughout the retail supermarket. One reason is the difficulty in differentiating products based on specific characteristics of fresh beef that have perceived or economic value to consumers yet can be controlled in production and processing. As a result, the beef industry has had more difficulty developing value-added products. However, as discussed in the next section, considerable emphasis has been placed on developing new products.

New Product Development

Discussing new product development and the above discussion of value-added products are closely related and intertwined. Some might argue the two are so closely linked they should not be discussed separately. However, an effort is made here to separate them.

Studies show that product differentiation allows firms to price products differently and receive premium prices for perceived or actual product differences from target market segments. The poultry industry capitalized on opportunities for new product development and product differentiation years ago. Thus, in Table 2, new product development is listed as slowly increasing. That description must be interpreted as meaning slowly increasing beyond the major gains achieved by the poultry industry over the past two or three decades. One of the notable gains in the past decade has been what the poultry industry has done with lower-valued chicken cuts, such as wings. The success of "hot wings," for example, attests to their success. These gains built upon earlier success with chicken nuggets, strips, and sandwiches.

The pork industry capitalized on new processing techniques and case ready technology to create several new

products. Many relate to innovations in processing and packaging as discussed under value-added products. The industry aggressively used the "Pork, the Other White Meat" advertising slogan to place more pork items on restaurant menus. Efforts continue to find new pork products that utilize lower valued pork cuts and meet consumer tastes and preferences. But clearly, pork has not achieved the degree of success poultry has experienced.

Considerable effort has been expended by the beef industry to better utilize lower valued beef primal cuts and create new consumer-accepted, retail products. These efforts have met with some success, having developed a number of precooked, case ready products. Additionally, the beef industry has attempted to create new products that might compete on restaurant menus with appetizers as well as entrees. While there remains considerable dependence on burgers in the food service sector, growth in deli-type restaurants has shifted some emphasis to various deli-style beef products.

Brand Marketing

It is similarly difficult to separate a discussion of brand marketing from the discussion of value-added products and new product development. Brand loyalty and perceived or actual product differentiation enable firms to extract premium prices at retail. Consumers pay premium prices for consistent quality or perceived quality. This provides firms with an economic incentive to develop consumer brands and brand loyalty for differentiated products.

Poultry took a major step toward brand marketing in the 1960s when brands were developed successfully for fresh poultry. That success broadened as brands were placed on new value-added products. Integrated firms that own the brands and benefit most from brand marketing success introduce most of the new retail products. Quality and consistency is enhanced by the narrow genetic base and contract production or vertically integrated production system.

Numerous brands exist for traditional processed pork products such as bacon, ham, and sausage. Some processing firms, which have introduced case ready pork products, have capitalized on processor brand recognition and brand loyalty while in other cases, supermarket store brands remain important.

Several efforts have been made to develop branded fresh beef products. Some processors have experienced limited success but there are no overwhelming, industry-changing successes. One of the most recognized "brands" of beef products is probably "Certified Angus Beef." The beef industry has relatively successfully capitalized on the consumer association of the Angus breed with beef quality and a desirable eating experience. Premium prices and loyalty for retail brands offer incentives to enhance coordination and integration. However, brand loyalty demands consistent quality and eating satisfaction. Fresh beef products in particular have not had the necessary consistency historically due to a broad genetic base and little or no control over the entire production process from selection of genetics to end-product distribution. Poultry integrators have capitalized on that production control capability and a narrower genetic base to produce, process, and distribute branded products. The same incentive for controlling production, developing new products, and targeting market segments with differentiated

products exists with pork and beef. However, to date, the degree of success is lower and the probability of success for the large investment required is smaller.

Factors Limiting Coordination

Many of the impediments to vertical coordination are interrelated with production and market characteristics. Some tend to be the opposite from economic factors that enhance coordination efforts discussed earlier. Management characteristics that limit or make vertical coordination more difficult are summarized in Table 3.

Capital

Capital requirements refer to the extent of capital needed by an individual firm in production, processing, and distribution, especially as it pertains to coordinating stages in the vertical supply chain. Capital requirements have two dimensions. First, is the absolute capital needed, and second, is the capital needed to have a sufficient volume to achieve cost economies or influence a large target market segment.

The poultry industry is predominantly organized in a manner that limits capital requirements by the integrator. Capital requirements are shared. Contract growers are required to provide part of the capital, especially for buildings and equipment, thereby reducing capital requirements by the integrating firm. Along with a shift in capital requirements, some risks associated with production are effectively shifted to contract growers as well because risks follow the investment of capital. In addition, contract terms may limit the potential profitability of contract growers, despite still being attractive to many growers.

One of the dominant forms of vertical coordination in the pork industry has followed the poultry model. Contract growers, those engaged in farrowing and finishing, provide part of the capital for buildings and equipment, and are allowed a reasonable but limited return on investment. Thus again, the capital investment is shared. With outright integration, the integrating firm provides virtually all required capital, assumes virtually all risk, but retains the potential for unlimited returns.

Vertical coordination in the beef industry has not followed a distinct model. Contract production is uncommon, though marketing contracts commonly exist between various stages.

One deterrent to outright integration is the immense capital required to integrate three production stages plus processing and distribution on a significant scale, especially when considering the land requirements for cow herd operations. One means of reducing the capital outlay required is to develop a contract-integrated, capital-sharing operation, but this has not occurred.

Risk

The absolute outlay of capital for a venture must be considered in light of the probability of success stemming from the investment. This introduces the dimension of risk and the typical tradeoff between risk and returns (profits). Higher risk ventures often have higher profit opportunities. Some risk implications were alluded to in the previous section.

Some kinds of risk are less for poultry than for pork and beef. A type of risk faced by poultry in recent years might be categorized as geopolitical or trade-related risk. When poultry exports are disrupted, normal distribution is disrupted even for tightly coordinated industries. Poultry production risk seems to have increased from animal disease outbreaks both in the U.S. and abroad. Tightly coordinated systems, with shared capital structures, a shorter biological cycle, and less dependence on commodity marketing reduce risk. Adjustments to market interruptions are somewhat easier to make, risk is shared between capital owners, and consumers have increased loyalty to brands and value-added products.

Risks in pork production are similar to poultry but with some important differences. The biological process for pork is longer, coordination systems are not as tight, and there is more dependence on marketing commodity products (unbranded fresh pork). Therefore, market adjustments are made less easily or effectively, leaving firms with a greater exposure to market price risk.

Risk in the beef industry may be the greatest for the three industries. The longer biological process, lower degree of coordination, and more dependence on commodity marketing mean slower and less effective adjustment to market interruptions. Also, the beef industry has suffered severe market interruptions the past several years from sporadic, bacteria contaminant events for beef. Then in 2003, the first known BSE (bovine spongiform encephalopathy) cases in North America created another degree of risk and market disruption, closing several trade avenues with major trading

Table 3. Management characteristics in the beef, pork, and poultry industries.

Category	Beef	Pork	Poultry
Capital	Varies by production stage	Moderate, but shared	Moderate, but shared
Risk	High	Moderate	Moderate
Control of Quantity, Quality, Consistency	Loose, but increasing	Moderate and increasing	Tight
Management Skills Needed	High	Moderate	Low

partners, which previously had benefited the beef industry over the past decade. These compounded the already, high-risk nature of the beef industry.

Control of Quantity, Quality, Consistency

Several factors come together in a discussion of controlling quantity, quality, and consistency. Quantity is tied directly to capital requirements. Quality and consistency are tied to the production characteristics discussed earlier, especially the genetic base, as well as the opportunities or difficulties in developing value-added, branded products. All relate to how tightly or loosely coordinated the industry is.

The poultry industry, being the most tightly coordinated, has demonstrated its ability to control the quantity of output in a vertical channel, while simultaneously controlling quality and consistency. Narrow genetics, fewer production stages, capital-sharing and risk-sharing contracts, tight management specifications, the linkage between product differentiation and brand loyalty, and other related factors have all contributed to poultry's success.

The pork industry has followed the poultry model, but there are differences that limit its success regarding quantity, quality, and consistency. Regulations on contract farming in some states limit development of one form of a tightly coordinated industry, unlike the case with poultry. While there remains some inconsistency in pork, the problem has diminished. How much brand loyalty has developed for fresh, value-added pork products is not yet clear. However, considerable brand loyalty exists for processed products.

Beef continues to face the biggest coordination challenges for several reasons. One of the primary impediments to improved coordination in the beef industry is the difficulty with controlling quantity, quality, and consistency. Quantity is dependent on the decisions of a large number of mostly smaller cow-calf producers geographically dispersed throughout the U.S. For any one firm to control a sufficiently large quantity from production to consumption is difficult due to large capital requirements. Research is underway to find an economical, technological test or method to predict and control end-product consistency, especially tenderness. Such a breakthrough might have a profound influence on coordination in the industry. The profit potential might be sufficient to provide the necessary incentive for organizing a more coordinated system from the cow herd to consumer. A guarantee of beef's safety to consumers and increased quality and consistency would certainly provide an incentive to develop more tightly coordinated systems in the beef industry. These include identifying the proper genetics and narrowing the genetic base, more tightly linking the stages of production, and providing more incentive for new, value-added products and brand marketing.

Management Skills Needed

The biological characteristics of poultry, pork, and beef; number of production stages; geographic concentration; and size and diversity of production units all affect the managerial skills required to manage a coordinated system. The poultry industry has found ways to manage each production stage, in part due to narrower genetics, a shorter biological process, specialized production units, and shared capital and risk. Pork has moved in this same direction but has not yet reached the same degree of tightly managed coordination on an industry-wide basis. The beef industry again is faced with attempting to effectively manage many, small, geographically dispersed cattle operations with a broad genetic base. Similarly, more managerial resources are needed at every step to effectively control the quality and consistency of end products. Therefore, the extent of vertical coordination in beef will continue to lag that of poultry and pork.

Current and Future Coordination

The poultry industry is the most tightly coordinated system among the three meat industries (beef, pork, and poultry) and involves the fewest firms responsible in large part for production-to-marketing coordination. Tighter forms of vertical coordination in the pork industry have developed rapidly since the early- to mid-1990s and have increased overall coordination. Most of the changes relate to contract production but vertical integration by selected porkpackers has played a significant role as well. The pork industry is expected to continue focusing on new product development and market penetration to hold or enhance its market share among the three meat groups.

The beef industry retains the most reliance on market prices or open market coordination while having the lowest degree of coordination via contracts or vertical integration. Tightly controlled forms of vertical coordination in the beef industry will continue to trail poultry and pork. Several factors might reverse the trend or speed the move toward more tightly coordinated systems. One is an economical breakthrough in identifying the genetics that produce beef having the eating qualities consumers desire and being able to maintain the identity of that beef from conception to consumer. Another is a breakthrough in processing or new product development to build a strong brand loyalty for value-added beef products. Lastly, there may need to be a means found to structure the industry in such a way as to share the capital requirements and risk of a more tightly coordinated industry.

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