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Vertical Integration Comparison: Beef, Pork, and Poultry

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Abstract: Will the beef and pork subsectors integrate vertically as completely as poultry?

This paper compares several aspects of the three subsectors. Pork will continue vertically integrating similar to poultry. Beef is the least vertically integrated to date and has the most barriers to overcome to vertically integrate further.

Vertical Integration Comparison: Beef, Pork, and Poultry

There has been much discussion regarding the vertical structure and evolutionary changes in the beef and pork subsectors. Frequently those changes are compared with the poultry subsector. The growth of contract integration and mega-sized hog production units which resemble poultry operations have raised questions regarding whether or not the pork subsector will integrate vertically as completely as the poultry subsector has. Declining beef demand, packer concentration, packer-controlled supplies, and the advent of strategic alliances in the beef subsector have raised questions whether or not vertical integration in the beef subsector is desirable or possible and whether vertical integration is an answer to its many problems.

This paper compares several structural aspects of the beef, pork, and poultry subsectors. The intent is to provide a broad perspective on structural differences and the likelihood of continued structural differences between the three subsectors.

A comparison of vertical integration in the beef, pork, and poultry subsectors is necessarily an apples to oranges comparison. Integration in poultry vastly exceeds that of pork and beef. Therefore, in many cases, what is observed about poultry is the *result* of integration. In the early 1950s, vertical integration was recommended if the poultry subsector was to expand and remain profitable (Baum 1951).

Vertical Integration Definition and Motives

Vertical integration involves participation of one firm in two adjacent stages in the vertical marketing channel from producers to consumers (Carlton and Perloff 1994).

Coase (1937) made the distinction between coordination internally within the firm or externally via market prices. Mighell and Jones (1963) included vertical integration as one type of vertical coordination, along with market prices. There are two primary types of vertical integration: contract integration and ownership integration. Contract integration involves a firm at one production-processing-distribution stage contracting with one or more firms at an adjacent stage for specific services and/or products. Both parties may own some but not all of the necessary resources (Blaich 1960). Numerous variations of contract integration have existed for decades (Roy 1963). Ownership integration differs in that the integrating firm owns most/all key resources in both adjacent production-processing-distribution stages.

Vertical integration motives can be identified in several ways (Carlton and Perloff 1994; Torgeson 1983), and include: (1) decrease transaction costs; (2) decrease risk and uncertainty; (3) assure input or output supplies; (4) correct market failures; (5) counter market power at an adjacent stage; (6) create or extend market power; and (7) avoid government restrictions, regulations or taxes. In essence, vertical integration occurs when perceived benefits from vertically integrating exceed expected costs.

Production Characteristics: Beef, Pork, and Poultry

Biological Production Cycle and Genetic Base

The conception to market period for beef, pork, and poultry varies widely (Table 1). The importance of the biological process to vertical integration involves the speed biological changes such as genetic improvements can be made, which affects the incentives and disincentives for vertically integrating.

The genetic base for poultry is relatively narrow. Only a few breeds or genetic lines, i.e., fewer than ten, are used and they ultimately provide the vast majority of final products. Genetic changes can be made quickly in poultry because of the shorter biological process and because from the hatching process, one hen produces many more offspring in a short time than for either a cow or sow.

The genetic base for hogs has narrowed considerably in recent years. There has been rapid growth in specialized firms that provide breeding stock for larger hog operations. This narrowing of the genetic base results from a combination of factors. One is the move toward value-based marketing and pricing of hogs. Another is the shorter biological process for hogs compared with cattle. Genetic changes can be made more quickly and through larger litters can influence more offspring in a single breeding cycle than with cattle.

In the beef subsector, we observe a contrary trend. Rather than the genetic base narrowing, it is widening. Cattlemen are attempting to create new breeds, some of which are called composite breeds created through consistent, planned crossbreeding programs. However, a 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. As a result, making significant product quality improvements based on genetic changes is slow and a disincentive to vertical integration.

Technology can impact the speed of genetic changes. Artificial insemination and embryo transfers can speed the process somewhat for pork and beef. However, costs are too high for large-scale use, especially for beef, and higher costs reduce the incentive to

vertically integrate.

Subsector Stages, Geographic Concentration, and Operation Size and Specialization

The poultry subsector has two primary production stages. Fewer production stages contribute to the ease of managing a vertically integrated production process and reduce transaction costs between subsector stages. Poultry production is geographically concentrated in the southeastern U.S. Poultry operations, largely as a result of integration, are specialized units. While operation size varies, many are relatively large, intensely managed operations.

The pork subsector also has two primary production stages. Two decades ago, most hog operations were integrated farrowing-finishing operations. There has been a trend toward larger, more specialized farrowing and finishing operations in recent years, especially in vertically integrated firms. This results from capitalizing on economies of size and improved management in specialized operations. Hog production has traditionally been geographically concentrated in Iowa and surrounding corn belt states. However, pork production has increased sharply in North Carolina and mid-Atlantic states as well as in Oklahoma and southern plains states. Thus, the geographic concentration in pork production has broadened somewhat. The growth areas in hog production are those areas which are more accepting of vertically integrated systems, culturally and legally, partly due to the presence of integrated poultry operations in those areas.

Cattle production is again distinctly different than poultry or pork production. The production process for cattle consists of a third production stage, one more than for poultry or pork. That additional production stage increases the transactions costs for the

subsector. Each stage also has different resources and management needs and thus increases the difficulty in managing a vertically integrated beef production unit. Beef has a significant land and forage requirement. Cattle stocker operations are diverse and frequently not concentrated in the same geographic regions as cow-calf production. Cattle feeding has increased in geographic concentration and involves some of the same states where there are numerous stocker operations. However, because of the geographic dispersion combined with an added production stage, the beef subsector incurs significant transactions costs moving animals from geographically dispersed cow-calf operations, to more geographically-concentrated stocker areas and to still more geographically-concentrated cattle feeding areas. A large number of cow herds are small, with less than 30 cows per operation. Stocker operations are larger, usually combining calves from several cow-calf operations into a larger production unit. Cattle feeding has experienced greater consolidation of feeding capacity in fewer, but larger firms.

Implications for integration are interrelated with other factors discussed above. A large, specialized production unit can be managed more efficiently than many, smaller, diverse production operations. Specialization and larger size units in poultry are partly the result of integration. Such units capitalize on more specialized management and economies of size. Assuming the poultry model can be applied to pork, then the trend toward increasingly larger and more specialized operations in hog production will lead to further integration. Vertical integration in the beef subsector will occur more slowly than for either 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 subsector, i.e. longer biological process, diverse genetic base, an added production stage, and more geographically dispersed production.

Vertical Integration Incentives

Value-Added Products, New Product Development, and Brand Marketing

Greater profit opportunities exist with value-added, differentiated, branded meat products than with commodity-type products sold in the traditional fresh form. Studies show that product differentiation allows firms to price products differently and receive premium prices for perceived or actual product differences. Brand loyalty and perceived or actual product differentiation enables firms to extract premium prices. Consumers pay a premium for consistent quality or perceived quality. Therefore, firms have an economic incentive to vertically integrate and to develop consumer brands and brand loyalty for differentiated products.

The poultry subsector, led by vertically integrated firms, has capitalized on opportunities new product development and product differentiation offer (Table 2). During the past twenty years, we have seen numerous new, frozen poultry entrees in retail supermarkets. The space in the meat case for fresh, whole birds or for fresh parts has declined as more products have appeared on the frozen food shelves. These frozen, packaged products offer more opportunities to satisfy a wide range of consumer tastes and demands, targeting to different size families, different ethnic and religious backgrounds, different degrees of convenience, and different tastes. Nearly every national fast-food firm has introduced some type of chicken nugget or strip product and one or more chicken sandwiches. 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. Most of the new products at retail are introduced by integrated firms which own the brands and benefit most from brand marketing success.

The pork subsector has traditionally sold several processed, value-added, branded products, i.e. bacon, hams, and sausages. Still, a relatively high percentage of the pork carcass was marketed in fresh form as chops, roasts, and other products. That percentage has not changed markedly over the past couple decades. However, as more consistency is achieved from a narrower genetic base, there is more incentive to develop new, value-added products which can capitalize on different consumer tastes and preferences.

Aggressive advertising new product development have made inroads into the mix of pork products offered at retail and in restaurants. Branded, case ready pork products are appearing in retail meat cases, with cooking and serving instructions on the package.

Beef is primarily marketed in fresh form from the retail meat case, more as a commodity than as differentiated products. There are few identifiable characteristics of fresh products that can be used as a basis for product differentiation. As a result, there is little economic incentive to vertically integrate, develop value-added products, and use product differentiation as a profit opportunity. There have been attempts at case ready beef products at retail with limited success. There have been attempts to offer new burgers, such as McDonald's "Arch Deluxe", but with limited success. A modified burger sandwich, while technically called a new product, may only increase purchases of the new burger at the expense of competing burgers, rather than increasing beef demand or sales in total. Truly new beef products which take the pressure off burgers, steaks, and roasts are

rare. Similarly, there are few brands for fresh beef. “Certified Angus Beef” has developed some brand loyalty and is an indicator of high quality beef products. Some retail supermarkets offer store brands of beef but few processors put their brands on consumer beef products.

Brands are an incentive to integrate, but brand loyalty demands consistency. Fresh beef products in particular do not have the necessary consistency 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. Consequently, the incentive for controlling production, developing new products, and targeting market segments with differentiated products exists with poultry. The same incentive may be present with pork and beef but as yet the probability of success is too low for the needed investment.

Vertical Integration Disincentives

Capital and Risk

Capital requirements refer to the extent of capital needed by an individual firm to vertically integrate production, processing, and distribution. Capital requirements differ markedly between ownership integration and contract integration.

The poultry subsector is predominantly organized in a manner that limits capital requirements by the integrator (Table 3). Contract growers are required to provide part of the capital, 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 (Harris and Massey 1968). On the other end, contract terms are written to provide contract growers a reasonable return on investment but significant returns above that accrue to the integrating firm.

Vertical integration in the pork subsector has some characteristics to the poultry model. Contract growers, i.e., those engaged in farrowing and finishing, provide part of the capital, are allowed a reasonable but limited return on investment. The integrating firm provides the remainder of the capital, assumes the remainder of the risk, but retains the potential for unlimited returns.

Little vertical integration has occurred in the beef subsector. One deterrent is the immense capital required to fully vertically integrate. One means of reducing the capital outlay required is to develop a contract-integrated operation. However, to date, no clear method of contractual integration has arisen in beef.

Control of Quantity, Quality, Consistency

Several factors come together in a discussion of controlling quantity, quality, and consistency. The poultry subsector has demonstrated the ability to control the quantity of output in a vertically integrated firm, while simultaneously controlling quality and consistency. Narrow genetics, only two production stages, capital-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 subsector shares similarities with the poultry model, but there are differences which limit the extent or success of vertical integration. Regulations on

contract farming in some states interfere with developing a vertically integrated. Less consistency in pork, due to more genetic variation, remains a problem but is diminishing. Not having brand loyalty for fresh products may be a limitation, yet considerable brand loyalty exists for processed products. Time may be is the largest factor. Integration in the pork subsector simply trails poultry by nearly two decades.

Perhaps the biggest impediment to vertical integration in the beef subsector is the difficulty with controlling quality and consistency. Measuring quality is even a problem (Schroeder et al. 1997). Control over a sufficient quantity is difficult in terms of capital needs. However, if an economical, technological breakthrough were found to predict and control end-product consistency, a means would likely be found to share the capital requirements in response to higher potential profits. Increased consistency would enable 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, size and diversity of production units all affect the managerial skills required to manage a vertically integrated firm. The poultry subsector has found ways to manage each production stage. Pork is headed in the same direction. However, managerial skills needed to manage production from many, small, geographically dispersed cattle operations through stocker and feeding stages is immense. Therefore, vertical integration in beef will continue to lag that of pork and poultry.

Current and Future Integration

The poultry subsector is highly vertically integrated and vertical integration in the pork subsector has increased dramatically in the past five years. Narrowing the genetic base will continue to offer opportunities for more consistent pork products and provide an incentive for vertically integrated firms to control quality and consistency.

The beef subsector has the lowest degree of vertical integration to date and the most barriers to overcome to further vertically integrate. A breakthrough is needed in identifying the genetics which produce beef having the eating quality consumers desire. Also, a contractual mechanism must be developed to shift or share the capital requirements and risk in a completely vertically integrated firm.

Table 1. Production Characteristics, Beef, Pork, and Poultry.

Characteristics	Beef	Pork	Poultry
Biological Cycle	24 months	12 months	5 months
Genetic Base	Wide and widening	Moderately wide but narrowing	Narrow
Subsector Stages	Cow-calf Stocker Feeding	Farrowing Finishing	Hatching Growing
Geographic Concentration in Production	Dispersed throughout the U.S.	Midwest, Mid Atlantic, Southwest	Southeast
Operation Size and Specialization	Varies by production stage	Increasing in size and specialized specialization	Large and

Table 2. Vertical Integration Incentives, Beef, Pork, and Poultry.

Category	Beef	Pork	Poultry
Value-Added Products at Retail	Low	Moderate	High
New Product Development	Slow	Moderately aggressive	Very aggressive
Brand Marketing	Low	Moderate	High

Table 3. Vertical Integration Disincentives, Beef, Pork, and Poultry.

Category	Beef	Pork	Poultry
Capital and Risk	High	Moderate but some shared	Low and shared
Control of Quantity, Quality, Consistency	Loose	Increasing	Tight
Management Skills Needed	High	Declining	Low

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