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Vertical Coordination in Pork: Implications for Food Distribution

Steve W. Martinez

Dramatic changes took place in the industry structure of the pork industry during the 1990s, changes such as new geographic patterns of production, increases in firm size, and new types of marketing practices, including new forms of vertical coordination. These new methods of vertical coordination—including contracts and vertical integration, and growth in firm size at all stages—have raised concerns about market power and impact on industry performance. These concerns are reflected in proposed federal legislation to prevent vertical mergers by large firms, some states' legislation banning packer ownership of hogs, and resolutions—presented at the 2000 National Pork Producers Council annual forum—to ban packer ownership.

Insight into these issues provides useful input for policy decisions, and the extent to which these arrangements enhance efficiency might influence the types of policies established. Policies—such as banning packer ownership of hogs—may have unintended effects if these arrangements result in efficiency gains that facilitate industry competitiveness and increases in consumer welfare, suggesting a need for policies that oversee new methods of vertical coordination rather than banning their use.

In this paper, recent structural changes in the pork sector are reviewed. To gain insight into new methods of vertical coordination in the pork sector, these developments in structure are compared to those in the poultry sector, an industry that underwent dramatic structural changes decades ago.

Changes in the Pork Industry

Structural changes in the pork industry have accelerated since the late 1980s. Increasingly, production has been reorganized. Farrow-to-finish hog operations at a single site have been the

traditional means of producing hogs; however, farms that specialize in specific stages at separate sites—including breeding/farrowing, nursery, and finishing—are becoming more important. In each stage, new technology has been applied that creates scale and size economies. Hogs on farms with more than 1,000 head represented 71 percent of the swine population in 1997; 47 percent in 1992; and 37 percent in 1987. Hogs on farms with more than 2,000 head—a category that was not published in 1987—accounted for 29 percent of hogs in 1992, compared to 55 percent in 1997.

Geographic changes in hog production have been associated with growth in the size of hog farms. The share of hog inventory accounted for by the South Atlantic and South Central regions of the United States has increased relative to that of the North Central region, which is the traditional area of hog production (Figure 1).

Processing plants have also increased in size, especially in new growth regions. In 1986, plants with capacity exceeding 1.5 million head accounted for 86 percent of slaughter in 2000, compared to 50 percent in 1986. In 1992, Smithfield Foods—the nation's largest hog producer and processor—opened the world's largest slaughter plant in North Carolina. Later, Seaboard—the third largest hog producer—opened a large slaughter plant in Guymon, Oklahoma.

At the consumer level, demographic changes have led to greater demand for convenient products and more food away-from-home consumption. An increase in the number of households where both parents work raises the value placed on leisure time and increases demand for further processed, value-added food products. Smaller households also demand more convenient products. These developments have increased the popularity of away-from-home food consumption, which now accounts for almost one-half of total food consumption. Quality assurances provided through branded products reduce the time that consumers spend sorting through generic packages. New information linking health and diet continues to influence consumer preferences, including preferences for foods low in fat and cholesterol.

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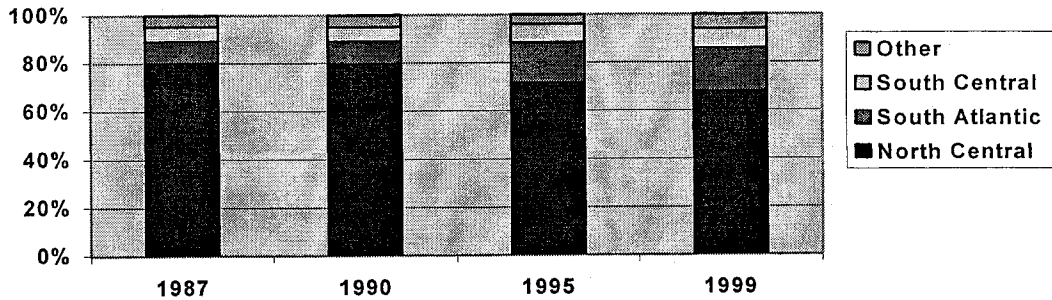


Figure 1. Percent of hog inventory by region, December 1.

Source: USDA/NASS.

These changes have been accompanied by new methods of vertical coordination, the means by which stages of the food system are synchronized. These new methods of vertical coordination include the spot market, contracting, and vertical integration. *Spot market* coordination occurs through prices that provide signals for quantity and quality adjustments. No commitments are made prior to completion of the production process.

On the other hand, *contracts* involve significant commitments before production has ended. For example, marketing contracts set the price or price formula, delivery schedule, and perhaps other terms before delivery, such as genetic specifications. Production contracts specify the production inputs to be contributed by each party. A *vertically integrated* firm owns all inputs in successive stages of the production process. As one moves from spot markets, to contracts, to vertical integration, the contractor or integrator gains more control over the production process.

In the pork industry, production contracts are established between producers or processors (contractor) and growers (small producers). Growers provide the labor and facilities for raising the hogs, and the contractor owns the hogs and provides other inputs, such as feed and medication. Growers receive a fee for their efforts, with incentives being given for efficient performance. Production contracts shift risk from grower to contractor. Growers' input price risk and output price risk is reduced because they do not pay for all inputs, and their receipts are less dependent on the vagaries of the spot market. The contractor takes on added risks by

providing key inputs and selling the hogs produced.

The contractor also controls key inputs into the production process, thereby gaining greater control over production efficiency and the quality of hogs. Because the contractor and grower share input costs, the contractor can increase in size at a faster rate. For example, instead of investing in a finishing facility and a nursery, the contractor can invest in two nurseries.

Processors use marketing contracts to purchase hogs from producers. According to packer and producer surveys, marketing contracts assure a steady supply of hogs for processing and assure a market outlet for large hog supplies. Processors can also specify production practices, such as genetics, to obtain higher-quality hogs. Investments in new and specialized assets create value in continuing relationships. Contract arrangements can help to reduce transaction costs related to safeguarding these investments, especially in new growth areas where operations may be fewer and larger.

Compared to the poultry industry, contract arrangements in the pork industry can be more complicated. In the broiler industry, processors have production contracts with growers to feed the birds to market weight. In the pork sector, producers or processors can have contracts with growers for finishing (most popular), nursing, or farrowing purposes (Figure 2). Large producers and processors can and do have both production and marketing contracts. For example, Prestage Farms—the fourth largest hog producer—produces hogs under production contracts with growers and then sells the hogs to Smithfield Foods, using marketing contracts.

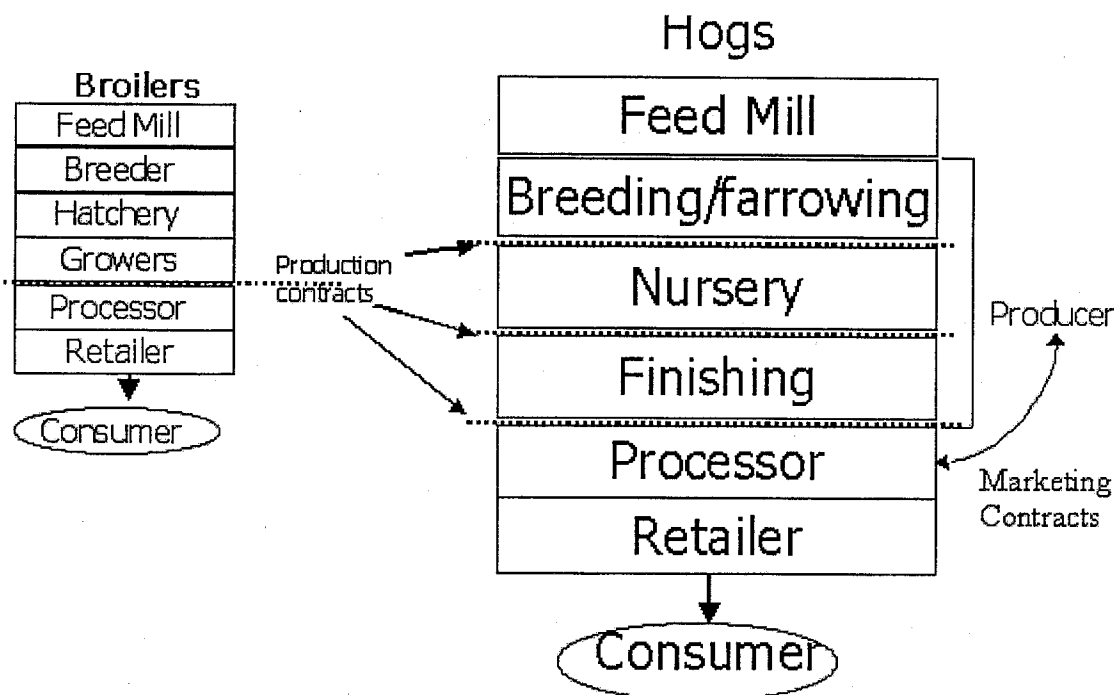


Figure 2. Hog Production Arrangements Can Be More Complicated.

Contracting arrangements have increased rapidly in the 1990s, especially in new growth regions. Production contracts account for about 30 percent of hog production (Figure 3). Marketing contracts have increased more rapidly, accounting for more than 60 percent of hogs marketed (Figure 4).

Changes in the Poultry Industry

In many ways, structural changes in the pork industry resemble changes in the poultry industry, which is highly integrated. Half a century ago, specialization and application of new technology occurred rapidly in the poultry sector. Producers began specializing in the production of chicken for meat instead of egg-laying. Housing, equipment, and feeds became more specialized—based on distinct phases of production, such as breeding, hatching egg production, hatching, and growing. Housing and equipment became more automated. By 1959, new laws requiring federal inspection of poultry meat led processors to update their facilities and equipment.

Specialization and investments in new technology led to economies of size as fewer and larger firms became more prevalent, occurring most rapidly in growing areas of production. At the same time, new methods of vertical coordination were developed, as spot markets were replaced by contracting and vertical integration.

Structural changes in the poultry sector facilitated efficiency gains (Figure 5) and the production of more value-added branded consumer products (Figure 6). Branded and further-processed products increased demand for uniform birds of high quality. The processor is more willing to associate the company's name with a consistently high-quality product because the company's reputation is on the line. Processing automation—which requires a specific, uniform size of bird—became important. Processors can control quality and uniformity through production contracts that give the processor control over key inputs, such as genetics, feed, and management.

The broiler industry appears unique in its matching of product offerings to changing consumer demands. This is reflected by a continuous upward trend in per capita consumption during the past half-century (Figure 7). A highly coordinated sector does not, by itself, suggest similar trends in consumption in other industries. Consumption habits, convenience, and perceptions based on scientific information linking diet and health are among the factors that influence consumer-purchasing behavior. In reality, meat industries compete on the basis of the characteristics of their product offerings, such as uniformity, nutrition, and convenience. New methods of coordination, however, can lead to efficiency gains and quality improvements that enable an industry to maintain market share or to slow downward trends in consumption.

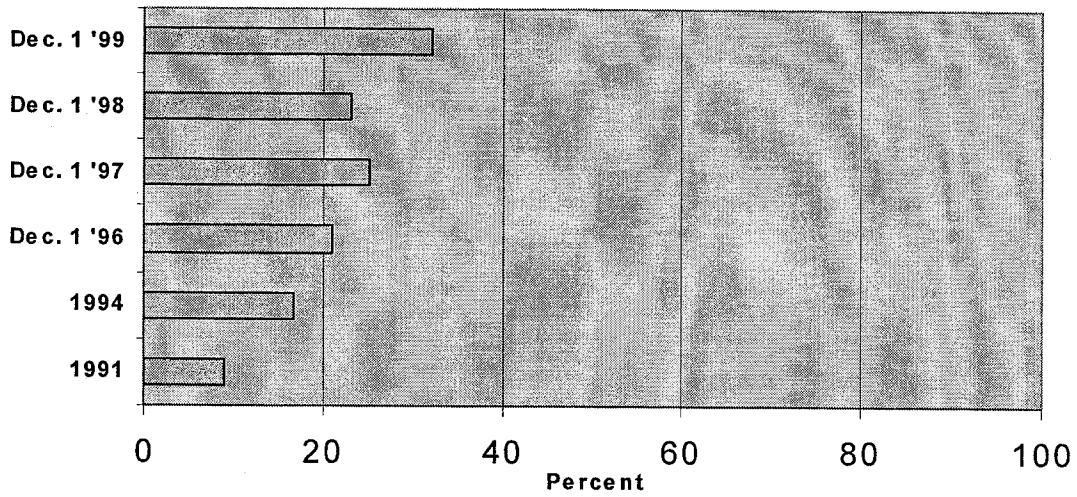


Figure 3. Share of Hogs Produced Under Production Contracts.

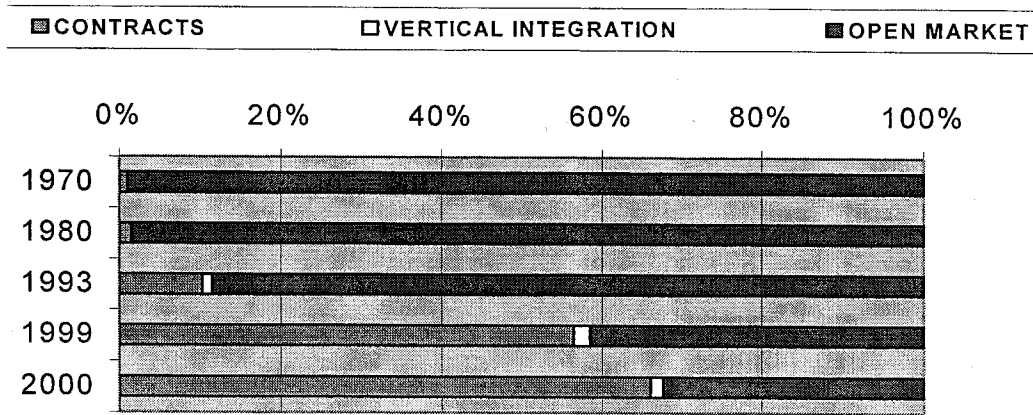


Figure 4. Share of Hogs Delivered to Processors Via Contracts and Vertical Integration.

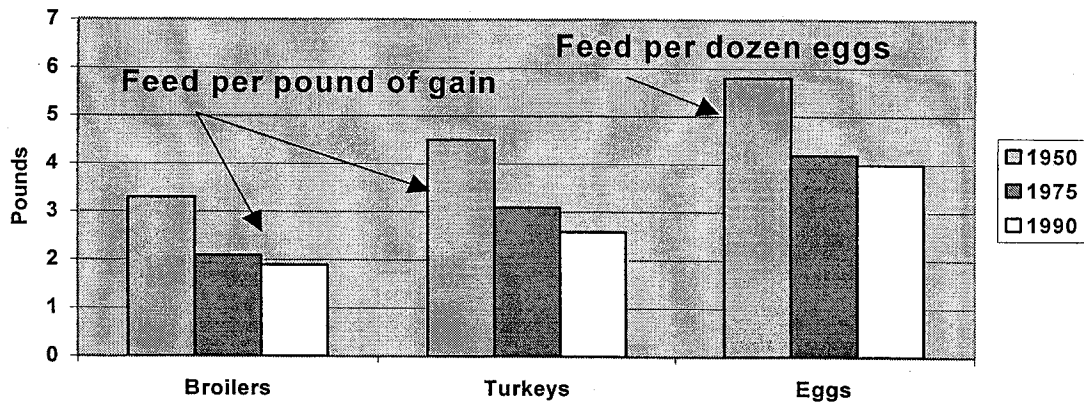


Figure 5. The Poultry Industry Experienced Substantial Gains in Production Efficiency.

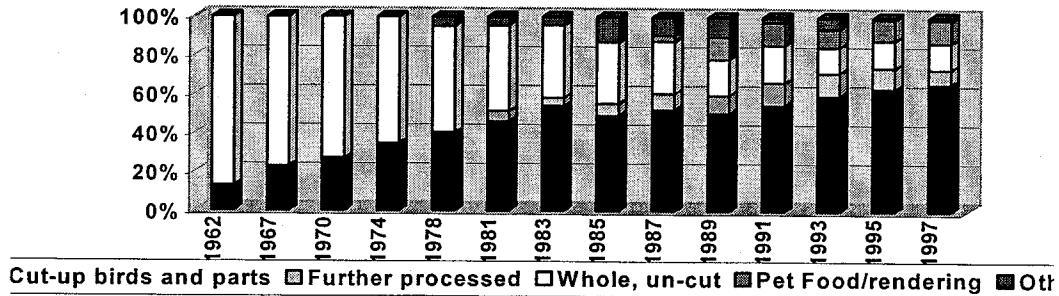


Figure 6. U.S. Processor Marketing of Broilers by Product Form.

Source: National Chicken Council.

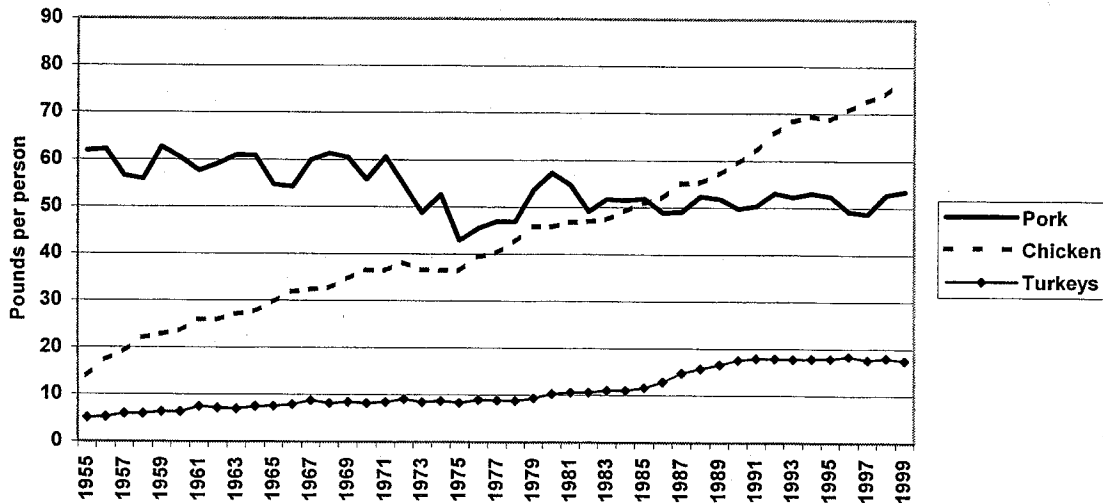


Figure 7. Per Capita Consumption, 1955-99.

Source: USDA/ERS.

Consequences for the Pork Industry

The pork industry has also experienced significant gains in production efficiency (Figure 8), and strides have been made in the production of value-added products. At the same time, retail pork prices have matched reductions in the poultry sector. Several of the leading pork integrators have introduced their own line of branded fresh pork products. For example, Hormel recently introduced its line of Always Tender pre-cooked pork products. Seaboard introduced Prairie Fresh pork, derived from Pig Improvement Company genetics that provide uniform hogs and pork with less shrink. In 2000, Smithfield Foods experienced a 139 percent increase in case-ready sales—

sales of pork that have been pre-packaged, labeled, and priced for display by retailers. Through a partnership with a leading hog producer, Smithfield acquired exclusive rights to market the National Pig Development (NPD) hog in the United States. At the time of its introduction in the early 1990s, NPD genetics provided the leanest hog in commercial production. Lean Generation pork, produced from more than 3.5 million NPD hogs (Figure 9), now accounts for 31 percent of Smithfield's production capacity.

The pork industry has also tailored supplies to customer specifications. U.S. pork exports have increased dramatically since the 1980s. Japan, the leading importer of U.S. pork (Figure 10), is very selective about the quality of its meat. Im-

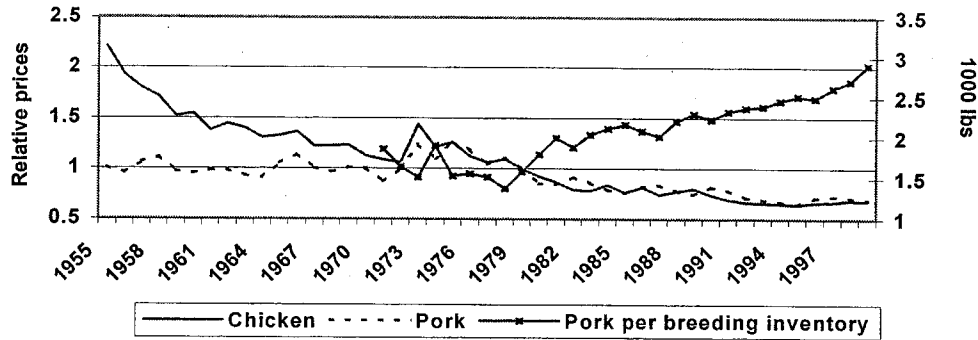


Figure 8. Deflated Retail Prices Relative to 1979 (1955–99) and pork production efficiency (1971–99).

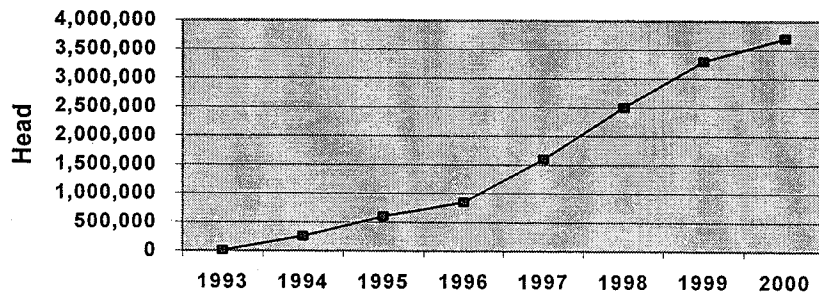
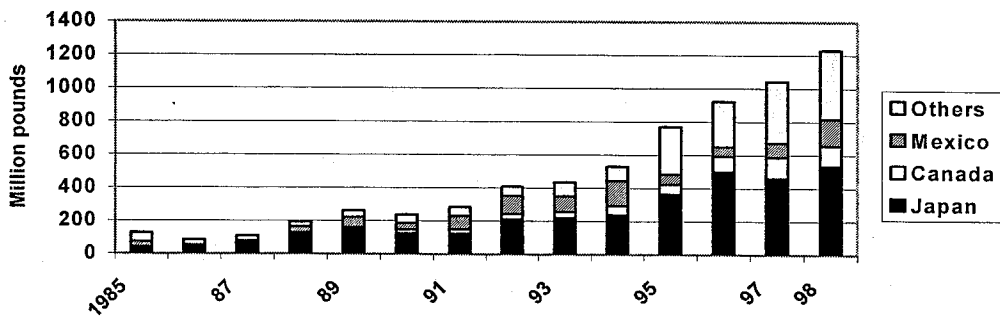


Figure 9. Smithfield's National Pig Development Hog Production Continues to Rise.



portant quality characteristics include color and tenderness, which are influenced by genetics and other production inputs.

Issues

New methods of vertical coordination bring a host of policy issues. Environmental and organizational regulations are designed to preserve competition and to protect society. They may also

limit an industry's ability to compete, both regionally and internationally. Contract arrangements and vertical integration concerns become increasingly important as consolidation leads to fewer and larger firms. Contracts tend to be used by larger firms, reducing the number of outlets for smaller producers and raising additional market power issues.

Arrangements that are not publicly disclosed raise questions about price discrimination and the

ability of small, independent producers to compete. Federal mandatory price-reporting regulations—which are currently being operationalized—have been designed to prevent this type of discrimination. Also, they may be used to limit available supplies for competitors. More far-reaching issues relate to the decline of independent family farmers. To what extent do local com-

munities and society value family farmers? Finally, as contracts become more popular, growers exchange market risks for contract risks. Contract risks include cheating on agreements and poor contract design, suggesting a possible need for new ways of examining markets and, perhaps, new types of regulations designed to deal with these new types of risks.