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Changing Pork Business Affects Pork Prices and Quality

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Consumers want high-quality products at reasonable prices. The American pork industry has heard this message loud and clear. Pigs are being selectively bred to produce leaner, higher quality, and competitively priced meat. The entire industry from the farmer to the processor to the grocery store or eating place is undergoing a transformation.

Just 10 years ago, a third of all hogs were found on farms that had more than 1,000 hogs. Today, more than two-thirds of all hogs are produced on farms with more than 1,000 pigs. Many pork packers and processors obtain a steady supply of high-quality hogs by entering into contractual arrangements or by owning production facilities and breeding operations.

In the hog industry, production for the open market is being replaced by long-term contracts and vertical integration. In 1970, 2 percent of hogs slaughtered were obtained through contracts and integrated operations. By 1993, this percentage had increased to 11 percent, and packers expect 29 percent of hogs will be obtained through con-

tracts and integrated operations in 1998.

How the hog industry is organized and how it does business affects consumers' pocketbooks and product selection. Changing methods of acquiring hogs by packers can reduce packing costs and improve the quality of pork products, which affect retail prices and the quantity of pork consumed. We used an economic model of the U.S. pork industry to estimate potential retail price changes that result from new ways of transferring hogs from producers to packers. Under the assumptions of our model, coordinating hog production and processing operations results in 19-percent leaner products. The corresponding production efficiencies and changes in consumer demand result in retail prices of pork falling as much as 1 cent per pound. But the direction and size of price changes depend on the proportion of hogs that are affected by new methods of acquiring hogs, and the value that consumers place on higher quality pork.

Consumer Preferences Encourage Changes in Pork Industry

Gaining greater control over quantity and quality has become very important in the highly competitive U.S. food sector. Households want high-quality, safe, and

convenient foods with desirable nutritional qualities. To meet this demand, pork companies are introducing new products, such as Smithfield Foods' *Lean Generation* brand-name line of lean, fresh pork products and Farmland Foods' line of "moisture enhanced" fresh pork. Moisture-enhanced pork, like a deep-basted turkey, does not dry out or toughen if over-cooked. Also, a more ethnically diverse U.S. population is creating niche marketing opportunities for new pork products. For example, the chorizo Mexican-style sausage is being marketed to the growing Hispanic population and eating places that serve Mexican food.

Likewise, more food consumed away from home suggests that suppliers must be able to provide large quantities of consistently high-quality, uniform products to restaurants on a regular schedule. For example, McDonald's requires millions of pounds of high-quality, uniformly sized bacon for its many bacon-topped hamburgers, such as the recently introduced Arch Deluxe sandwich.

Changing Business Arrangements Provide More Control

Technological advances in hog production—such as innovations in genetics, housing, and handling

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equipment—allow firms to expand hog farms and to gain more control over quality. Producers use selective breeding to produce hogs with desirable characteristics—disease resistance, high lean-to-fat ratio, fast growth, and others. These carefully selected hogs are fed to market weight prior to sale to packers. In the first processing stage, packers slaughter the hogs and cut the meat into wholesale pork cuts. Three-fourths of pork is further processed into sausage, hot dogs, bacon, and other products. Finally, pork products are sold to retailers and eating places.

In the hog industry, methods of vertical coordination are changing. Vertical coordination refers to systematic arrangements for product transfer among different stages of production. This can be achieved in many ways, including open-market exchange, vertical integration, and contractual arrangements.

- In open-market exchange, producers make no commitments to sell their hogs before they are ready for slaughter. The grown hog is sold at the prevailing, or “spot,” price.
- When a firm vertically integrates, it brings under its ownership two or more successive stages of production, and thus has greater control over production. For example, a processor that buys or builds hog production facilities is vertically integrating, so hog production and processing is now conducted by a single firm. Smithfield Foods, a leading pork processor, obtains about 11 percent of the hogs that it slaughters from farms that Smithfield Foods owns or leases. Packers acquiring hogs from their own facilities may directly control hog quality through genetic selection and management techniques used in production.

- Contractual arrangements give buyers less control over production than integration, but greater control than market exchange. When firms enter into contracts they make commitments, such as delivery times and product quality, before production has been completed. Long-term contracts, usually 4 to 7 years, are typically used by large packers and large hog producers. These contracts specify that an independent hog producer deliver to the packer a certain quality and quantity of hogs on or near a specific date. Packers that obtain hogs through long-term contracts can specify genetic strains of hogs to be delivered. Although less common, packers may own the hogs and establish contracts with producers to feed and house the hogs.

Vertical Integration and Contracting Increases Quality...

In the hog industry, long-term contracts and vertical integration are replacing production for the open market. For example, Smithfield Foods emphasizes the importance of long-term contracts and vertical integration for obtaining consistent supplies of lean, high-quality hogs. The company touts its National Pig Development (NPD) program as an excellent demonstration of the effects of a highly coordinated operation. Through a partnership with Carroll's Foods, a major North Carolina hog producer, Smithfield Foods has long-term contracts with Carroll's Foods and its affiliates to raise hogs. This arrangement, referred to as Smithfield-Carroll's, acquired from the National Pig Development Company, a British firm, the exclusive franchise rights to develop and market the NPD breed of hog in the United States. This breed is said to provide the

leanest hog in U.S. commercial production and one of the leanest meats of any kind. Nutritional studies by the Sarah W. Stedman Center for Nutritional Studies at Duke University Medical Center in 1996 indicated that NPD pork was 34 percent to 61 percent leaner than non-NPD pork, depending on the cut.

... And Reduces Costs

The cost of producing pork includes the cost of raising hogs and the cost of marketing services to convert hogs into retail pork products (table 1). Marketing services include the slaughtering and processing of hogs, and the wholesaling and retailing of pork.

Changes in vertical coordination can affect pork production costs in a number of ways. First, by contracting or integrating, packers may obtain a large, stable flow of hogs into the packing plant. This reduces average costs by eliminating variations in the flow of hogs into the packing plant and reducing the under- or overutilization of plant facilities.

Second, changes in vertical coordination can affect the quality of hogs slaughtered, which may lower packing costs. Hogs with excessive fat lead to higher packer costs because more trimming of excess fat is required. Moreover, lean hogs provide a larger amount of salable lean meat, and thereby reduce the number of hogs needed by the packer to produce a given quantity of pork. A 1992 study for the National Pork Producers Council estimated that a leaner hog could reduce packer costs by \$6.32 for each hog slaughtered (table 2). These packer savings are controlled by the hog producer through the choice of genetic stock. ERS calculations indicate that the hog associated with these cost savings would be 19 percent leaner than the average.

Table 1
Marketing Costs Account for 68 Percent of Retail Pork Prices

Item	Value, cost, price
<i>Cents per pound</i>	
Farm value	62.9
Marketing costs:	135.1
Slaughtering and processing	32.5
Intercity transportation	3.5
Warehousing and store delivery	9.1
Cutting and merchandising	90.0
Retail price	198.0

Source: Howard Elitzak. *Food Cost Review*, 1995, AER-729. USDA's Economic Research Service, April 1996.

Table 2
Leaner Hogs Save Packer Costs

Packer defect	Reduction in costs ¹
<i>Dollars per head</i>	
Backfat thickness	2.80
Degree of ham and butt trimming	1.87
Excessive seam fat	.63
Bellies too fat or too thin	.14
Weight problems	.88
Total packer costs	6.32

Note: ¹ERS calculations indicate that the hog associated with these cost savings would be 19 percent leaner than the average. Source: National Pork Producers Council. *Pork Chain Quality Audit*, David Meeker and Steve Sonka, eds., Progress Report prepared for the National Pork Producers Council. Des Moines, IA: National Pork Producers Council in cooperation with the National Pork Board, April 6, 1994.

Packers also incur costs because of trimming damaged areas and discarding damaged and unusable areas. Packers and consumers do not want pale, soft pork that has low water-holding capacity. When hogs are stressed by loading and handling, their meat can have an unattractive appearance to consumers and can be less juicy after cooking. These quality problems may cause pork cuts generally suited for fresh pork to be utilized in further processed products, like sausage.

These packer costs are controlled by the hog producer through the choice of genetic stock and through proper management, such as reducing the incidence of improperly injected medication and rough handling of hogs.

The use of long-term contracts and hog ownership by the packer may reduce packers' costs of acquiring hogs, including: operating buying stations (facilities for buying and loading hogs for shipment to packing plants), paying salaried or commissioned buying agents, and transporting hogs to packing facilities.

Recently, Thorn Apple Valley, a meat processing company, entered into an agreement with the Michigan Livestock Exchange to manage Thorn Apple Valley's buying stations, and supply the quantity and quality of hogs specified. The cost to Thorn Apple Valley of acquiring hogs in this way was \$0.48 per hog (not including transportation or the cost of operating buying stations), plus the cost of the hogs. Packers raising their own hogs or using long-term contracts do not incur this buying station management fee.

Some industry observers argue that packers use contracts or integrate to exercise market power in the pork market and maximize profits by raising the price of their marketing services. Although this is one possible motive for contracting or vertically integrating, strong evidence of this type of behavior in the pork industry does not exist. These arrangements help packers to obtain a steady supply of uniform, high-quality hogs, which lowers costs and improves the quality of pork products.

Retail Prices Reflect Both Production Costs and Food Quality

By lowering the costs of production and increasing the quality, changes in vertical coordination affect retail prices. Changes in retail prices depend on the percentage of hogs affected by changes in vertical coordination, the size of the cost reductions, the degree of quality improvement in pork, and how consumers value the quality improvement.

We used an economic model of the U.S. pork industry to examine the potential effects on pork prices when some hogs are transferred to packers through contracts and vertical integration instead of through the open market. The model allows for simultaneous shifts in supply

and demand, and corresponding adjustments in quantities and prices. The model assumed that there are no costs of differentiating lean pork from standard pork, such as label redesigning. Also, other costs, such as monitoring and enforcing contracts, are assumed to be negligible.

We examined six scenarios to reflect differences in the percentage of hogs obtained through contracts and integration, and different values placed on leaner pork by consumers. For each scenario, we estimated the change in retail pork prices that results from increased coordination.

According to survey information, 11 percent of hogs were obtained from contracts and integration in 1993. This represents the “low-proportion” scenario. The percentage of hogs obtained through contracts and integration is expected to increase to 29 percent by 1998, which represents the “high-proportion” scenario.

In this analysis, those hogs obtained through contracting or vertical integration lead to reduced packer costs in two ways. First, these hogs were assumed to be 19 percent leaner, which results in reduced packer costs of \$6.32 per hog due to handling a leaner hog. Second, packers save \$0.48 per animal in hog acquisition costs by contracting or vertically integrating.

The amount that consumers are willing to pay for 19-percent leaner pork is uncertain. Therefore, three alternatives are examined for both the low-proportion and high-proportion scenarios. In the “no-value” alternative, consumers place no value on leaner pork. In the “low-value” alternative, consumers are willing to pay an additional 8.2 percent of the retail pork price for the leaner fresh pork products. This is derived from a market survey conducted by researchers at Indiana State University and North Carolina State University regarding con-

sumers’ willingness to pay for 10-percent leaner pork produced using a growth hormone. In the “low-value” alternative, willingness to pay for leaner pork is assumed to apply only to fresh pork, because processors can adjust the fat content of processed pork products without relying on changes in hog production.

In the “high-value” alternative, the willingness to pay for leaner pork is also assumed to be 8.2 percent over the retail price. However, under the high-value alternative, the price premium applies to both fresh and processed pork to reflect improvements in pork quality besides leanness which would affect processed products. Also, some processed products, such as reduced-fat bacon, do depend on the leanness of the hogs.

The change in the retail price of pork under each scenario depends on the proportion of hogs obtained by packers through long-term contracts and integration and the value placed on leaner pork by consumers.

- When 11 percent of hogs are obtained by contracting and integration in the low-proportion scenario, price changes range from a reduction of 0.39¢ per pound to an increase of 0.08¢ per pound, depending on how consumers value leaner pork (fig.1).
- If 29 percent of hogs are obtained through contracts and integration, as under the high-proportion scenario, prices change by a larger amount, ranging from a reduction of 1.01¢ per pound to an increase of 0.19¢ per pound.

The largest reductions in retail price in these two examples occur when consumers place no value on leaner pork (no-value scenario). In the low-proportion scenario, retail prices fall by 0.39¢ per pound, whereas in the high-proportion scenario retail prices drop by 1.01¢ per pound.

Under the low-value scenarios, where consumers value leaner fresh pork, the reduction in the retail price resulting from lower packer costs is partially offset by consumers’ willingness to pay a higher price for leaner fresh pork. Prices still fall by 0.27¢ per pound (low proportion) and 0.7¢ per pound (high proportion) because of lower packer costs, but reductions are less than those in the no-value scenario.

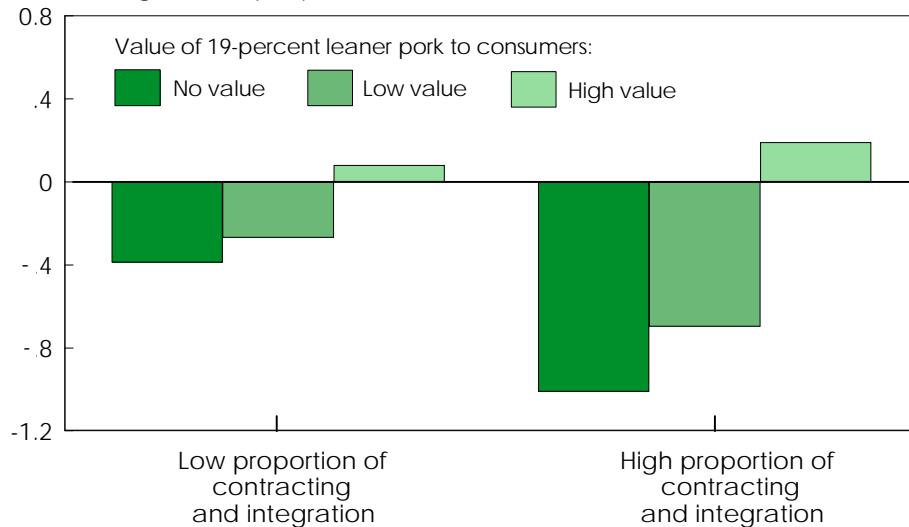
In the high-value scenarios, where consumers value leaner fresh and processed pork, the retail price increases because consumers’ willingness to pay a higher price for leaner pork more than offsets price reductions due to lower packer costs. Consumers demand more pork at the current price because it is leaner, so the price increases induce retailers to provide more pork. Without the higher price, consumers would not get the quantities of leaner pork that they demand. So, although the retail price is higher, consumers benefit because there is a larger quantity of higher quality pork. Without the reduction in packer costs, however, prices would increase even more.

These price changes may be underestimated, because other quality attributes besides leanness and possible lower costs resulting from greater plant utilization were not included. In addition, more accurate assessments of health benefits from consuming leaner pork may also lead to larger changes in the retail price. For example, new information that supports or confirms the health benefits of lower fat diets may cause consumers to pay more than the 8.2-percent price premium assumed in this analysis.

Consumers have a significant interest in changes occurring in vertical coordination in the hog industry because of its potential effects on food costs and quality. These changes are reflected in retail prices

Figure 1
**Increased Coordination of Hog Production and Packing
 Affects Retail Prices**

Price change, cents per pound



and quantities purchased. Consumers have clearly benefited two ways from increased vertical coordination in the pork industry—lower prices and higher quality pork.

Under the six scenarios, the potential “benefits” for consumers range from \$60 million to \$693 million over a 1-year period from the combined effects of lower costs of pork production and improved pork quality. These benefits are calculated based on an economic measure of consumer wellbeing. The measure of wellbeing represents the quantity of pork consumed multiplied by the difference between the higher price that consumers would be willing to pay for a product and the price actually paid.

Price and product quality are not the only factors affected by vertical coordination in the pork industry. Contracts and vertical integration, as methods of vertical coordination, tend to be used by larger operations. Fewer, larger firms generate both positive and negative issues. Issues include product safety, environmental impacts on neighboring communities spawned by livestock waste, and rural development issues generated by the facilities’ size, location, and employment.

Policymakers play a role in the types of vertical coordination arrangements that develop, through antitrust legislation that can directly affect organizational structure, and through publicly supported research

and market information services that play an important role in the effectiveness of open-market exchange. The challenge for policymakers is to facilitate coordination across stages of production in the most efficient way, while discouraging anticompetitive behavior that is harmful to consumers and other groups.

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