Special Article

American Meat Institute

The U.S. Pork Industry: As It Changes, Consumers Stand To Benefit

The entire U.S. pork industry—from farmer to processor to store or restaurant—is undergoing a transformation, in part because consumers want high-quality products at reasonable prices. Technological advances in production—including innovations in genetics, housing, and handling equipment—provide opportunities for hog producers to expand operations and to have more control over the quality of hogs produced.

Just 10 years ago, a third of all hogs were raised on farms that had more than 1,000 animals. Today, more than two-thirds of all hogs are produced on farms with more than 1,000. At the same time, pigs are being selectively bred to produce leaner, higher quality, and competitively priced meat.

Production for the open market is being replaced by multi-year contracts and vertically integrated operations—many pork packers and processors obtain a steady supply of high-quality hogs by entering into contractual arrangements with independent producers or by direct ownership of production facilities and breeding operations. In 1970, just 2 percent of hogs slaughtered were obtained through contracts or integrated operations. By 1993, the proportion had increased to 11 percent, and packers expect to obtain 29 percent of hogs through contracts or integrated operations in 1998.

How the hog industry is organized and how it does business affects consumers through price and product selection. Today's households want convenient food products with quality assurances, as demands on their time increase. These developments have encouraged firms to seek greater control over product quantity and quality. With time pressures and incomes rising, more food is prepared away from home and sales by restaurant chains and other prepared-food retailers have increased. Suppliers must increasingly be able to provide large quantities of consistently high-quality, uniform products on a regular schedule. For example, consumer demand for fast-food breakfast sandwiches featuring bacon and sausage, and for bacon-topped fast-food hamburgers has opened a new outlet for millions of pounds of pork products.

Health consciousness and ethnic diversity have also created new opportunities for delivering pork products. Pork producers and packers are introducing new products such as Smithfield Foods' "Lean Generation" branded line of fresh pork products. Ethnic niche markets are emerging for specialized pork products such as chorizo Mexican-style sausage for Mexican restaurants and the growing Hispanic population.

Increased Coordination Affects Quality, Packer Costs . . .

Producers use selective breeding to produce hogs with desirable characteristics such as disease resistance, high lean-to-fat ratio, and fast growth. These carefully selected hogs are fed to market weight prior to sale to packers. In the first processing stage, packers slaughter the hogs and divide 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.

New arrangements in vertical coordination of hog production and packing stages can reduce the costs of pork production. By contracting or by integrating, packers may ensure a large, stable flow of hogs into the packing plant, reducing average costs by minimizing the under- and overutilization of plant facilities.

Contracting or integrating can also reduce packer costs by improving the quality of hogs slaughtered. Quality affects processing time and labor costs as well as the quantity of high-value fresh meat cuts per hog. For example, hogs with excessive fat require more trimming and produce less salable lean meat per hog. In contrast, fewer lean hogs are needed by the packer to produce a given quantity of lean pork. A 1992 study for the National Pork Producers Council estimated that excessive fat problems cost packers $6.32 for each hog slaughtered. USDA's Economic Research Service calculated that to achieve savings of $6.32 per animal by eliminating excessive fat, each hog would need to be 19 percent leaner than the average.

Packers also incur costs from trimming and discarding damaged and unusable meat, the result of other characteristics controlled by the hog producer. 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. Pork with

these quality problems may have to be used in further processed products, like sausage, rather than as higher value fresh pork.

Quality-related 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. Long-term contracts and vertical integration can ensure consistent supplies of lean, high-quality hogs to packers.

The use of long-term contracts and vertical integration can also reduce packer costs of acquiring hogs, such as operating buying stations, paying salaried or commissioned buying agents, and transporting hogs to packing facilities. A meat processing company, for example, recently engaged a livestock exchange to manage buying stations and supply the quantity and quality of hogs specified. This added 48 cents to the cost of each hog supplied to the processing firm, not counting the costs of transportation and maintaining buying station facilities. Vertically integrated packers who produce their own hogs, and packers who enter into long-term contracts with independent producers, do not incur these additional management fees.

. . . & Retail Prices

By lowering the costs of production and increasing the quality of pork products, long-term contracting and vertical integration can affect retail prices. Changes in average prices will depend on the proportion of hogs produced through these coordinating arrangements, affecting the level of cost reductions and the degree of product quality improvements. Price changes will also depend on how highly consumers value the quality improvements.

ERS used an economic model of the U.S. pork industry to estimate the potential effects on pork prices when some producers transfer hogs 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 does not consider costs of differentiating lean pork from standard pork, such as label redesigning, or other costs such as monitoring and enforcing contracts, nor does it consider competitive pressure on prices from imports as supplies of leaner pork increase.

ERS estimated the change in retail pork prices that results from increased vertical coordination under six scenarios. The change in price 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.

According to a survey conducted by Iowa State University and University of Missouri researchers for USDA's Packers and Stockyards Program, 11 percent of hogs obtained from contracts and integration were produced under these arrangements in 1993. That percentage is expected to increase to 29 percent by 1998. The 11-percent level was adopted as a *low-proportion* scenario for this analysis, while the 29-percent level was adopted as a *high-proportion* scenario.

What is Vertical Coordination?

A food marketing system consists of several stages of production and distribution, with value added to the product at each stage. In the pork industry, these stages include *breeding*, where genetic stock is selected for hog producers; *hog production*, where a breeding herd is maintained to produce pigs that are nursed and grown to market weight; p*acking/processing*, where hogs are slaughtered and divided into wholesale pork cuts, approximately 75 percent of which is further processed; and the *retail* stage, including the operations of restaurants and grocery stores.

Vertical coordination refers to the systematic transfer of product from one stage to the next in a "vertical" direction, from production of the raw commodity to delivery of the finished product to consumers. Vertical coordination can be achieved in many ways, including open market exchange, contractual arrangements, and vertical integration.

In *open market exchange*, no commitments are made for selling the product before it is ready for sale. The finished product is taken to market and sold at the prevailing, or "spot," price. Producers, processors, and retailers rely on the market both to deliver the quantity and quality of inputs they desire and to provide an outlet for their own products.

Under *contractual arrangements*, purchasers have greater control over production compared with open market exchange, because commitments are made prior to completion of production. For example, contracts between independent hog producers and packers may specify the quantity and quality of hogs to be delivered per day, per week, or on a certain date. They may also specify the genetic strains of hogs to be delivered.

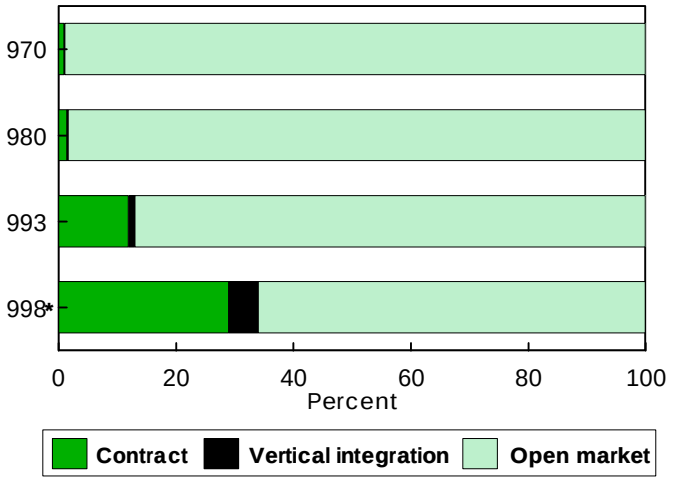
Although less common, in some contractual arrangements packers may own the hogs and contract with producers to feed and house them until ready for slaughter. Large packers and large hog producers typically use *long-term*, or *multi-year contracts*, usually 4 to 7 years.

Vertical integration refers to ownership of successive stages of production by a single firm. Products are transferred from one stage to another according to management decisions. For example, a single firm may own hog production operations and packing facilities, so the quantity and quality of hogs available for packing are under the direct control of the firm.

Methods of achieving vertical coordination can be classified based on the degree of control that firms have over production. At one end of the spectrum is open market exchange, which represents the least control over production. At the other end of the spectrum is vertical integration, which represents the most control. Contracts fall between, representing varied, intermediate degrees of control.

Special Article

Growing Share of Hogs Delivered for Processing Via Long-term Contracts or Vertical Integration



*Estimated.
Sources: Economic Research Service, and Packers and Stockyards Administration, USDA.

Economic Research Service, USDA

In this analysis, obtaining hogs through contracting or vertical integration would lead to reduced packer costs in two ways. ERS assumed long-term contracts and vertical integration between large hog producers and packers produced 19-percent leaner hogs, which would reduce packer costs by $6.32 per hog (estimates of the 1992 National Pork Producers Council study). Packers were also assumed to save an additional 48 cents per hog in acquisition costs as a result of long- term contracting or vertical integration, based on arrangements described above between a meat processing company and a livestock exchange.

The amount consumers are willing to pay for 19-percent-leaner pork is uncertain. Therefore, three alternatives were examined for both low-proportion and high-proportion production scenarios. In the first alternative, consumers place *no value* on leaner pork. In the second, consumers place a *low value* on leaner pork and are willing to pay an additional 8.2 percent of the average retail price of all pork for the leaner fresh pork products. The 8.2-percent figure was derived from a market survey by Indiana State University and North Carolina State University researchers of what consumers would pay for 10-percent-leaner pork. Under this alternative, willingness to pay for leaner pork was 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 third alternative, simulating a *high value* placed by consumers on lean pork, the willingness to pay a premium for 19-percent-leaner pork was also assumed to be 8.2 percent above the average retail price of all pork. The price premium, however, was applied to both fresh and processed pork. This expansion of the quantity of pork for which consumers would pay a premium in this scenario was intended to reflect improvements in pork quality other than leanness that could be expected from increased vertical coordination. These other quality improvements would impact processed products, as would greater availability of lean pork for some processed products, such as reduced-fat bacon.

When 11 percent of hogs are obtained by contracting and integration (low-proportion scenario), changes in average retail pork prices range from a reduction of 0.39 cent—slightly over a third of a cent—per pound to an increase of 0.08 cent per pound, depending on how consumers value leaner pork. If 29 percent of hogs are obtained through contracts and integration (high-proportion scenario), prices change by a larger amount, ranging from a reduction of 1.01 cent per pound to an increase of 0.19 cent per pound.

The largest reductions in retail price in these two examples occur when consumers place no value on leaner pork. In the low-proportion scenario (11 percent of hogs obtained through contracting and integration), retail prices fall by 0.39 cent per pound as leaner meat reduces packers' costs, whereas in the high-proportion scenario (29 percent of hogs obtained through contracting and integration), retail prices drop by 1.01 cent per pound.

When consumers place a low value on leaner pork, paying a premium only for 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 cent per pound for the low-proportion scenario and 0.7 cent per pound for the high-proportion scenario because of lower packer costs, but reductions are less than those in the no-value scenario.

When consumers place a high value on leaner pork, valuing both fresh and processed, 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. The average retail price of all pork increases 0.08 cent per pound in the low-proportion scenario and 0.19 cent per pound in the high-proportion scenario. 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 average 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.

The model results suggest that changes in methods of vertical coordination do affect average retail prices for pork. The direction and magnitude of the change depend on the extent of change in industry organization and on how highly consumers value the leaner pork that results. In each scenario, the retail price changes by less than a percent. These changes may be underestimated, however, because other pork quality attributes—such as moisture retention—and lower costs due to greater plant utilization were not included in the analysis. In addition, more accurate assessments of health benefits from consuming leaner pork may alter the 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.

Under the six scenarios, the potential benefits for consumers range from $60 to $693 million over a year from the combined effects of lower costs of pork production and improved pork quality. These benefits are calculated using an economic measure of consumer well-being that considers the quantity of pork consumed, and the difference between the higher price consumers would be willing to pay and the price actually paid.

Public Policy & Vertical Coordination

As the pork industry continues to respond to new technology and changes in consumer lifestyles, contractual arrangements and vertical integration serve an economic function that can benefit consumers. Consumers have a significant interest in changes occurring in vertical coordination in the pork industry, and in other agricultural sectors, because of potential effects on retail prices and on the availability of high-quality food products. But the public may also have concerns about such issues as the effects of the size, location, and employment patterns of pork producers and processors on rural communities, and the impacts of new organizational methods on independent producers and small family farms.

In addition, as the scale of pork production operations has increased, so have public concerns about livestock waste. Media coverage has heightened public perceptions of problems such as odor and water quality. However, under current law, water treatment and discharge on pork production facilities with more than 2,500 hogs are governed by required permits. Although smaller operations typically adhere to similar treatment systems, they are not required to have permits. Moreover, increased scale of operations typically reduces the per-unit costs of suitable waste treatment.

The disposition of animal manures on cropland has received particular attention as a result of concerns about runoff into rivers and streams. Many producers have responded to the waste management problem with a combination of measures, including nutrient management plans and conservation buffers such as filterstrips, to guard against waste-related nutrients or other contaminants entering water bodies.

Policymakers play a role in the types of vertical coordination arrangements that develop, through antitrust legislation that can directly affect organizational structure, and through policy-supported research and market information services that play an important role in the effectiveness of open-market exchange. The challenge for policymakers will be to facilitate coordination across the stages of production in the most efficient way, while at the same time discouraging anticompetitive behavior and any other impacts potentially harmful both to consumers and producers.

Steve Martinez (202) 694-5378
martinez@econ.ag.gov **AO**