

Farm Business Practices Coordinate Production With Consumer Preferences

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Consumer pressures placed on agriculture for variety, quality, and safety are affecting how the industry is organized, including the types of buying and selling arrangements within the food supply chain and the application of information technologies. Farm production is becoming more capital intensive, with emphasis placed on adding value to commodities. Product differentiation and quality control are becoming more essential at the farm level. In some agricultural industries, contract production is becoming more common as food processors and distributors attempt to gain greater control over their products and ensure market outlets. Some contract arrangements specify particular production practices, such as the use of specific genetic strains or organic farming techniques. In other types of contracts, the food processor gains greater control over farm products by providing important inputs, such as the animals, feed, and management services.

As contracts become more common, they replace traditional methods of buying and selling large supplies of homogeneous agricultural commodities. Traditionally, these products were conducive to buying and selling without prior commitments placed on producers, and with little control over the commodities by buyers. When the products were ready for sale, producers would take them to an auction market, terminal market, storage facility, or buying station and sell the products at the going market price in that region. Prices paid at these open, or spot, markets are referred to as spot prices.



As the share of farmers using the Internet continues to rise, high-tech service providers introduce tools designed specifically to help manage the business of agriculture, such as a Web-based system that enables farmers to map crop fields and develop field histories.

Credit: Digital Stock.

The extent of contracting varies widely across agricultural sectors (fig. 1). Nearly all poultry is produced under contract, but less than 15 percent of total grains are produced under contract. The changeover to contracting also varies by commodity. For example, in the broiler industry, contracting has been widely used since the 1950s and accounted for 93 percent of production by 1960. In the hog industry, increases in contracting are more recent. In grain markets, contracting represents a small, but growing, presence.

Grain Contracting Becoming More Common

As consumer preferences become more diverse, the focus in agriculture is moving from selling large supplies of homogeneous products to selling more heterogeneous products. In grain contracting, significant growth opportunities are available through product differentiation. For example, ad-

vances in traditional grain-breeding technology over the past decade have enabled growers to meet the demands of buyers and produce value-enhanced grains (VEG) with specific quality characteristics. In terms of acreage, value-enhanced corn is the largest VEG market. Types of value-enhanced corn include white corn, food-grade yellow corn, and waxy corn. White corn is used almost exclusively in human food applications for products, such as chips, tortillas, and other corn-based foods. Food-grade yellow corn is used to make chips, grits, corn flakes, beer, and other food items. Waxy corn contains a special starch used in food products, such as salad dressings, pie fillings, and

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canned puddings. Other examples of VEGs include organically grown and chemical-free grains. According to the U.S. Grains Council, about 10.5 percent of U.S. corn acreage is devoted to the value-enhanced grain market.

Because specific types of high-quality VEGs are less likely to be available on the general market, processors may enter into contracts with producers to ensure a supply of a particular type of grain. For example, Frito-Lay contracts with farmers for specific types of corn for its Fritos Corn Chips. The company tracks the processed corn through all stages of the marketing process on a bag-by-bag basis to ensure product quality. Producers may also desire contract arrangements before growing specific types of grain. Specialized grains sell at a premium above open-market prices, and producers selling these grains on the open market would risk suffering significant financial losses. For example, white corn sold on average for \$0.33 per bushel more than common yellow dent corn in 2000.

According to the U.S. Grains Council, about 60-65 percent of white corn is grown under contract and the remainder is sold on the open market. In 2001, the share of food-grade yellow corn grown under contract reached 30-35 percent, compared with less than 25 percent in previous years. About 60-70 percent of waxy corn is produced under contract.

The VEG market is expected to grow over time as some end-users increase their demands for corn

and other grains that have not been grown from genetically engineered seeds. However, demand for transgenic seeds (seeds that have been genetically engineered) is also projected to grow, by 12 percent annually for the next 4 years, primarily in the United States, Canada, Argentina, and China. Many crops grown from transgenic seeds have specific agronomic features, such as insect or herbicide resistance.

While most of the advances in grain-breeding technology have enhanced agronomic properties, the next wave of genetically modified crops may have direct benefits for consumers. For example, nutraceuticals, or farmaceuticals, are plants that are genetically engineered to provide health benefits beyond basic nutrition, such as rice enhanced with vitamin A. These crops could provide vaccines or vitamins that replace the need for injections or pills. Medications and dietary supplements may be grown as specialty crops that taste and appear like traditional foods. Depending on consumer attitudes toward biotechnology, regulatory policies regarding nutraceuticals, and development of supporting distribution infrastructure, these new crops may accelerate the growth of contracting in the grain market.

Contracting in the Meat Industry Facilitates Quality Control and Traceback Capabilities

In response to the success of branded poultry meats, several pork companies are supplying retailers with case-ready, branded meats. (Case-ready products are packaged, priced, and labeled by the processor for store display.) For example, Smithfield Foods produces Lean Generation Pork, an exceptionally lean, branded fresh pork product. Sales of Lean Generation increased ninefold over the past 4 years. Sales of all Smithfield case-ready pork items were nearly four times greater in 2000 than in 1999.

The production of case-ready, branded pork products may benefit

from greater control over breeding stock and improved hog management practices. For example, consistent genetic inputs can improve the degree of uniformity of hog size and weight that is required for standardized branded product packaging. Genetic inputs can also have an effect on specific hog quality attributes important to both fresh pork branding and pork exports to particular countries, such as Japan, the largest importer of U.S. pork. As hogs have become leaner over time, they have become more prone to stress and associated excitable behavior, which can result in more carcass bruising and pork that is tougher and less palatable after cooking. Handling methods that reduce stress in hogs and breeding practices that produce more docile hogs can improve both the taste and the quality of pork. Seaboard, a leading pork producer, uses specific genetic stock to grow hogs free from stress-related attributes for its Prairie Fresh brand.

Similarly, in the beef industry, improvements in beef quality require improved genetic stock and better cattle management. Since the 1980s, U.S. per capita beef consumption has declined, despite falling beef prices. In response to consumption decreases, the beef industry is addressing specific issues related to beef quality. A National Cattlemen's Beef Association (NCBA) survey of packers, further processors, retailers, foodservice operators, and consumers uncovered problems associated with quality of fresh beef products, such as excess fat, lack of tenderness, and inconsistency of meat cuts. According to a beef quality audit conducted by NCBA in 2000, the beef industry has two strategies for the future: (i) apply breeding and management techniques to improve marbling, weight and cut sizes, consistency, and other variables necessary for case-ready products; and (ii) help ensure delivery of predictable and uniform lots of cattle by implementing nutrition and health programs, and safe and humane handling techniques.

The success of branded poultry products has spurred several pork companies to supply retailers with case-ready, branded meats, the production of which may benefit from greater control over breeding stock and improved hog management practices.

Credit: Ken Hammond, USDA.



Food safety concerns pressure food companies to have more complete information on the sources of inputs in their products. According to the president of Smithfield Foods, retailers and foodservice operators have made food safety a major criterion for selecting meat suppliers. Hence, the ability of meat suppliers to provide more complete information about the origin of finished products has become a competitive advantage. The ability to traceback, or track an animal through the production process to locate a contaminating source, is critical to addressing food safety concerns.

The ability of processors to monitor production or control production inputs can facilitate meat quality improvements and traceback capabilities. Visual inspections of an animal do not enable processors to identify and verify the animal's genetic strain, how it was handled, whether it was fed organic grain, and other quality attributes. Consequently, meat processors may enter into contracting arrangements to gain additional control over animal production. Through contracts, processors can gain more information about the source of meat products.

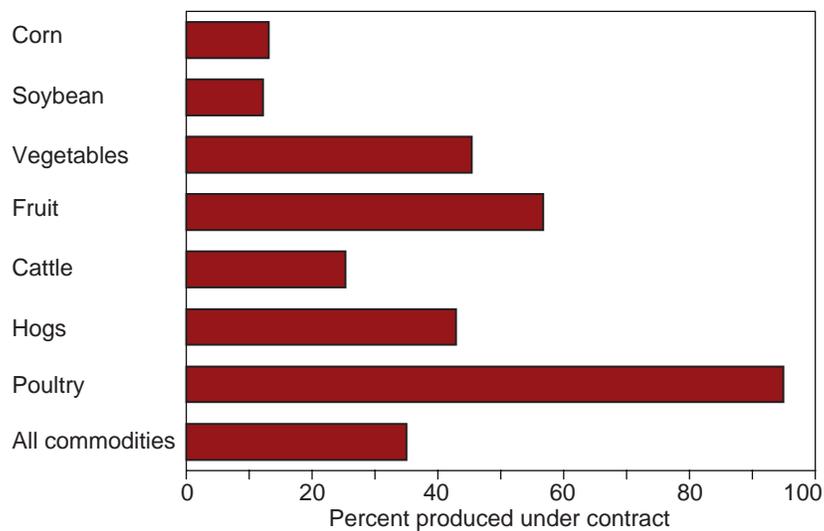
While contracting arrangements have been widely used in the poultry and egg sectors since the 1950s, increased use of contracting in the hog sector is more recent. Since the early 1990s, contracts between mostly large-scale producers and processors have become increasingly common in the hog industry (fig. 2). Contract terms typically specify that producers will deliver a certain quantity of hogs to processors at a certain date. Producers may receive a formula-based price, typically a hog price at a particular market location (for example, Iowa/Southern Minnesota), with premiums or discounts based on size and quality of the hogs. Processors also may specify that producers use certain types of inputs, such as specific genetic strains.

Other types of contracts used in the hog industry give processors more control over the quality of hogs by allowing the processors to provide key production inputs. As in similar arrangements in the poultry industry, pork processors may own the hogs and establish contracts with farmers to feed the animals to market weight. Processor-owned hogs increased in share from 6.4 percent of U.S. hog production in 1994 to 27 percent in 2001, in part reflecting Smithfield Foods' recent purchases of two

leading hog producers. Genetic strains for Smithfield's Lean Generation Pork were originally obtained through an alliance the company formed with a major hog producer, which involved contract production and joint ownership of hog operations.

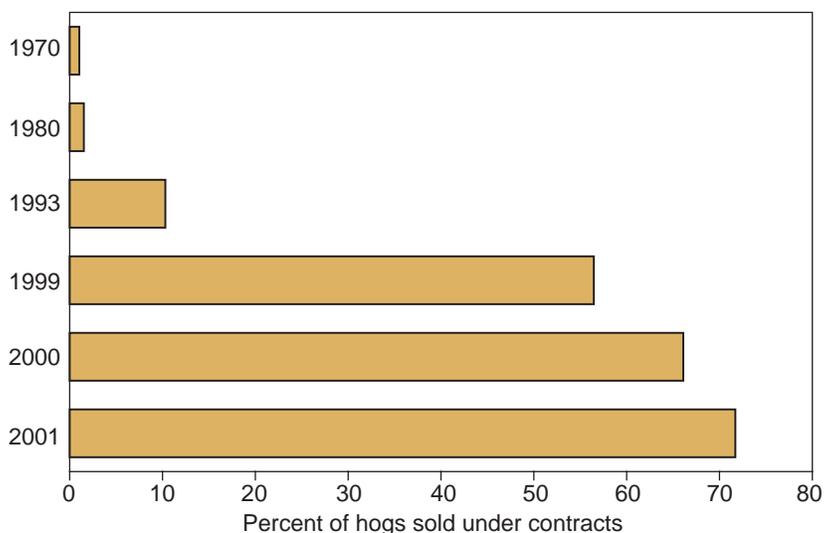
In the beef industry, some meatpackers enter into contracts with producers to obtain the volume of cattle possessing attributes necessary to meet specific customer demand. Difficulties in discerning quality attributes among live cattle

Figure 1—Most Poultry Is Produced Under Contract, 1998



Source: Perry and Banker.

Figure 2—Contract Marketing of Hogs Has Surged Since the Early 1990s



Source: Martinez; and Kelley.

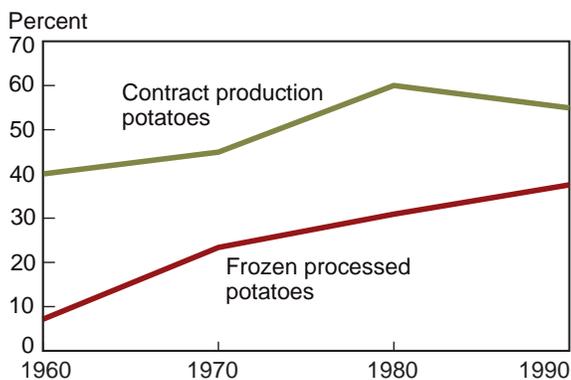
Growth of Fast Food Restaurants Increases Potato Contracting

The potato industry exemplifies the effect that changing consumer demands can have on agriculture. The fast food industry emerged in the 1950s and experienced tremendous growth in the 1960s and 1970s. From 1963 to 1991, the number of fast food restaurant establishments in the United States increased from 39,680 to 193,392, nearly a fivefold increase. The growth of this industry was instrumental in the development of the frozen potato product. By transferring peeling, cutting, and blanching of potatoes from restaurant workers to processors, fast food restaurants lowered labor costs and assured supplies of french fries of greater consistency and value.

From 1955 to 1995, frozen potatoes as a share of all fresh and processed potato production in the United States increased from 1.7 to 42.3 percent. A mass market was created that supported growth and development of quality standards. Potatoes, particularly for french fries, require more irrigation, fertilizer, and other chemicals than many other crops.

As potato processing increased, contracts between processors and producers also increased (see figure). French fry processors require an assured supply of high-quality potatoes for meeting restaurant needs. McCain Foods, the largest french fry processor in the world, produces one-third of all french fries consumed in the world and at least 40 percent more than any other company. Most of McCain's potatoes are grown by producers that enter into contracts before the year's crop is planted. Agronomists employed by McCain work with the farmers to help improve the quality and yield of their crops. ConAgra, a large diversified food processing company, also negotiates annual contracts with potato growers and provides firm commitments and stable prices to growers that have made significant capital investments.

Fast Food Industry Growth Led to Rise in Frozen Processed Potatoes and Potatoes Produced Under Contract



Source: Marion; Martinez and Reed; and U.S. Department of Agriculture.

increase the incentives for processors to establish closer relationships with producers through contracting. Cattle producers that control genetics and improve cattle management techniques also have an incentive to enter into long-term contracts to ensure premium prices for higher quality cattle. In 1999, the share of cattle bought under contracts or fed and owned by beef packers was 32 percent of the total annual slaughter of the four largest beef processors.

Contracting Becomes More Common in Fresh Produce Industry

As evidence that Americans have become more health conscious, annual fresh fruit and vegetable consumption in the United States increased by 49 pounds per person between 1986 and 1999. Rising per capita incomes have increased consumer demand for a greater variety of fresh fruits and vegetables. For example, tomato offerings, once limited to mature green and vine-ripe tomatoes, now include extended-shelf-life, grape, yellow, red baby pear, cluster, greenhouse, organic, and heirloom varieties.

Since the 1960s, more than half of all citrus fruits and processed vegetables in the United States have been produced under contract. Contracts give vegetable processors additional control over production decisions, such as growing practices and planting dates, and help ensure processors receive a regular flow of raw product with desirable traits (see box on potato contracting).

More recently, contracting arrangements have increased in the fresh fruit and vegetable industries. In joint ventures between packer/shippers and farmers, contracts enable packer/shippers to control planted acreage, planting dates, and growing practices. In many cases, packer/shippers grow their own vegetables to gain further control over quality and product flows. Volume requirements of supermarket chains and other

large fresh produce buyers, such as suppliers of branded fresh packaged salads, have created growing interest in contracting as a means of procuring the desired volume, size, variety, quality, and consistency of product.

Farmers Organize To Coordinate Production With Consumer Preferences

A rising number of farmers are using information technology to keep pace with changing consumer demands. Between 1997 and 2001, the share of farms with Internet access increased from 13 to 43 percent, and the share of farms using computers for business purposes increased from 20 to 29 percent. Furthermore, a recent USDA Economic Research Service survey shows that 15 percent of farms with Internet access have used computers to conduct e-commerce transactions.

High-tech service providers have taken notice of the increasing number of farmers with access to the Internet. Some technology-based companies have designed tools to help farmers track products through the production process. These companies often provide marketing services along with identification and data management services. For example, Farmland Industries, Inc. offers Farmland Dedicated Grains, a Web-based system that allows producers to map crop fields and develop field histories. The system also enables buyers to view the results of independent grain sample tests on the Dedicated Grains Web site. Another company, eMerge Interactive, offers a service that enables producers to market feeder cattle over the Internet and manage cattle data. Producers that use the company's Web-based data management system, CattleLog, can upload data and access reports with hand-held devices that read electronic identification tags on cattle. eMerge Interactive's cattle identification system allows for unique meat-branding opportunities through traceback functions that help determine feed-



ing regimes and other unique production methods. Recently, an alliance of 11 Kansas feedlots began using eMerge CattleLog to select feeder cattle for purchase.

Another means of coordinating farm production involves third-party verification or certification of a product's quality attributes. For example, third parties certify or verify products that will carry eco-labels before the products are sold to consumers. Eco-labels are seals or logos that indicate a food product meets a set of environmental or social standards, such as "dolphin-safe," "environmentally friendly," or fair trade certified. Starbucks currently sells fair trade certified coffee, which is grown by small-scale farmer cooperatives. Safeway recently agreed to begin selling fair trade certified coffee, which marks the product's first national distribution in supermarkets.

The American Humane Association has developed the Free Farmed program to certify that animals have been raised under humane conditions. Such certification programs may become increasingly important as the food industry makes further attempts to appeal to the social consciousness of consumers. The top three U.S. restaurant franchises, accounting for approximately 35 percent of franchised restaurant sales, place restrictions on how animals used in the companies' foods are produced. In 2000, McDonalds issued animal welfare guidelines for egg produc-

ers that supply the fast food company. McDonalds also has guidelines for cattle and hog processors that cover processing stages from delivery to slaughter. McDonalds' guidelines have apparently served as models for other restaurants and retailers, including Burger King, Wendy's, and Kroger.

USDA recently released rules for implementing organic product standards. These regulations require that all growers and handlers, except for the smallest, be certified by a State or private agency under uniform standards developed by USDA. These standards relate to production practices and substances used in producing and handling crops, livestock, and processed agricultural products.

In response to changing consumer demands for food, and to capture the value added to products by further processing, some farmers are turning to "new generation cooperatives." These cooperatives allow farmers to control food production through more than one stage of production and marketing, usually through some level of processing. In many cases, forming a cooperative allows farmers with limited capital to build and operate a processing facility. The Dakota Growers Pasta Company is a new generation cooperative formed by Upper Great Plains wheat growers to capitalize on pasta's popularity with U.S. consumers. The company owns a processing plant that processes durum wheat into flour,

pasta, and millfeed. Producers of eggs, bison, soybeans, ethanol, wine, and many other agricultural products have also formed new generation cooperatives.

In the beef industry, U.S. Premium Beef is a cooperative formed by beef producers and a processing company. The cooperative has its own beef pricing system, which provides incentives for producers to raise cattle with desirable attributes. Cattle producers own shares in the cooperative, which owns a partial share of the beef processing company. The processing company markets the beef under its own brands, including Farmland and Black Canyon Cattle Company.

Domestic demand for food products is expected to grow slowly over the next 20 years. In this situation, a food company's growth depends on lowering production costs, differentiating its products, producing higher quality products at economical prices, or expanding international trade and investments (see "U.S. Food Sector Linked to Global Consumers" elsewhere in this issue). Trends in consumer preferences and food industry pressures to compete for consumer food spending extend back to agriculture. Coordination between agricultural production and value-added processes, including processing and distribution, is key to providing consumers with products that meet their demands for quality and variety. These developments will likely require farmers to become more in-

Since the 1960s, over half of all U.S.-grown citrus fruits have been produced under contracts.

Credit: Ken Hammond, USDA.

Advances in grain-breeding technology have enabled farmers to achieve growth by producing crops, such as value-enhanced corn, with specific quality characteristics.

Credit: Digital Stock.



terdependent participants in the food supply chain, perhaps giving rise to contracting and other forms of organization in agriculture.

These developments, however, are not without controversy. Efforts to respond to consumer demand for increasingly differentiated food products through biotechnology raise ethical, food safety, and environmental issues. Contracting is also an issue of contention, especially among small farmers that may not have the output volume necessary to warrant contracts with large processors. As contracting increases and spot-market trading decreases, spot-market prices become more vulnerable to manipulation and volatility as fewer buyers and sellers account for a larger percentage of the trade. Decisions by government policymakers regarding these issues can have an important influence on the future direction and pace of efforts by farmers, processors, and distributors to coordinate farm production with increasingly discerning consumer preferences.

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