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Family Farm Inc.

Commentators as different as Dan Glickman, Willie Nelson, and Jane Smiley have recently voiced concerns that the industrialization of agriculture is consuming family farms, turning rural landscapes into industrial parks, and forcing farm-folk to become wage laborers. The data belie this concern: family farms still dominate agriculture.

by Douglas W. Allen and Dean Lueck

This fact is indisputable even though farm numbers have declined, farm size has increased, and technological changes have converted farms into capital-intensive enterprises. Much of the concern implicitly assumes that changes in farm size and capital intensity have also led to changes in organization, and it assumes that what is happening in one farm sector must be happening throughout agriculture. The 1997 Census of Agriculture shows that more than 86 percent of farms are organized as "family farms." Excluding small family-held corporations, farm corporations made up only 0.4 percent of all farms in 1997. These corporate farms controlled just 1.3 percent of all farm acreage, and generated only 9 percent of all sales receipts. By contrast, the 1992 Economic Census shows that, out-

side of the farm sector, corporations generate more than 75 percent of all receipts. Farming is unique in the modern economy because of the relative unimportance of the corporate form of business organization.

Ronald Coase and Mother Nature

Why does agriculture continue to be dominated by family-based firms? The seeds of the answer lie in a framework developed by Ronald Coase in his work on the theory of the firm. Coase examined the tradeoff between incentives arising within firms and incentives stemming from the market. Because farms operate in unique circumstances defined by nature, understanding farm organization requires relating the modern explanations of the firm to special

constraints nature places on growing food and fiber.

The main feature that distinguishes farm organization from "industrial" organization is its seasonality. Classical economist John Stuart Mill (1806-1873) said long ago that agriculture "is not susceptible of so great a division of occupations as many branches of manufactures, because its different operations cannot possibly be simultaneous. One man cannot be always ploughing, another sowing, and another reaping."

To the farmer, a "season" is a distinct period of the year during which a given activity (such as planting and harvesting) is optimally undertaken. For example, for spring wheat grown on the northern Great Plains, the month-long planting season usually begins in April, and the harvest season

**Hauling Wheat
"Bonanza" Style:**
Early capitalists
invested huge sums
trying to replicate fac-
tory production in agri-
culture.

Photo from "The Day of the
Bonanza: A History of Bonanza
Farming in the Red River Valley
of the North," Drache, Hiram M.,
North Dakota Institute for
Regional Studies, Fargo, 1964



is primarily restricted to August. Seasonality influences the number of times per year the production cycle can be completed, the number of stages in the cycle, the total number of tasks (specific jobs) in a given stage, and the length of the stages. Nature's random forces also distinguish agriculture. Random events are particularly acute in many types of farming where weather and pests may strike unexpectedly. Thus, nature plays two distinct roles in farming: it governs the predictable seasonality of activities, and it strikes unexpectedly.

The key to understanding farm organization is appreciating the role nature plays in generating the incentives that favor family farms. First, random production shocks from nature generate opportunities for hired farm workers to shirk their duties. Second, seasonality limits the potential gains from specialization and creates timing problems between stages of production.

Family Farms vs. Larger Organizations

Farm organization can vary from a single owner-operator to a public corporation with many owners and spe-

The benefit of the family farm organization is that the farmer does not cheat himself.

cialized wage labor. A "pure" family farm is the simplest case: a single farmer owns the output and controls all farm assets. Factory-style corporate agriculture is the most complicated case: many people own the farm, and labor is provided by large groups of specialized wage laborers. Partnerships are intermediate forms in which a small number of co-owners share output and capital and provide labor.

The benefits and costs of these different types of farms hinge on the tradeoff between efficient work incentives

and gains from specialization. The benefit of the family farm organization is that the farmer does not cheat himself. As the sole owner, the incentives for efficient work are perfect. The primary cost of the family farm, however, is a lack of specialization given that the farmer must engage in numerous tasks during each stage of production, and move from one stage to another throughout the year. Such a "generalist" will inevitably be less productive than an equivalent worker in a more specialized firm. Similarly, a family farmer tends to face higher per unit costs of capital because of the limited wealth of a family farm and because a family farm will use capital less intensively.

The partnership farm offers an alternative organization. The benefits of a partnership come in the form of greater productivity because of farmer specialization and lower capital costs. At the same time, adding a partner generates additional costs, in terms of decreased farmer effort because of the imperfect incentives arising from shared ownership.

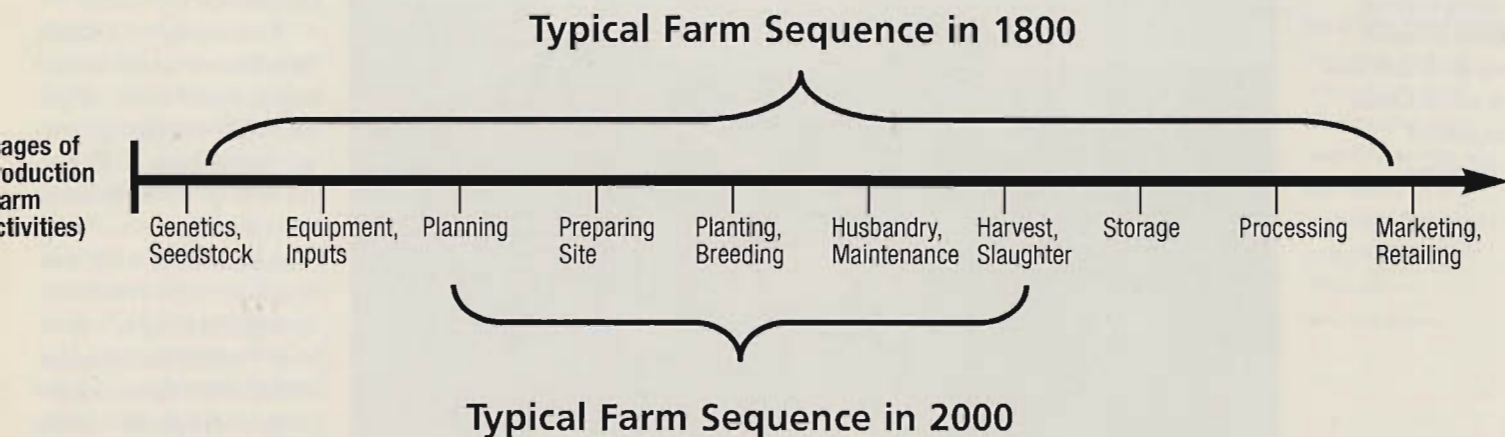
In a large factory-style corporate farm, the farm's owners share revenues as well as capital and labor costs, but they typically do not provide labor themselves. Instead, specialized wage employees provide labor. The benefits of a large factory-style corporate firm are the increased productivity of a highly specialized labor force and the lower costs of capital. The costs of this regime are the increased incentives for the hired workers to shirk because they are not owners of the farm.

Nature's Impact on Incentives and Specialization

All firms are governed by the tradeoff between work incentives and gains from specialization. This is true of farming as well, but the unique large impact of nature biases the outcome in favor of small firms. One key feature of agriculture is that it involves a living, growing product, which goes through several distinct stages of production. These stages — planting, cultivation, harvesting, and processing for plant crops; breeding, hus-

Figure 1.

The Extent of the Farm in American History



bandry, feeding, and slaughter for livestock — are largely governed by nature. In principle, there is no reason why a separate farmer could not own each stage.

The decision to keep these various stages of production within the same farm rather than offering them for sale in the market depends on the tradeoff between the gains from specialized stage production and the costs of engaging in market transactions. As with all production, an inter-stage incentive problem emerges because of timing difficulties between stages of production. This timing problem is particularly severe with farming because inventories of the intermediate goods cannot be held given the living nature of the product.

In many cases, small deviations in timing of a task can reduce crop output by relatively large amounts. For example, failure to apply pesticides or to harvest at the right time can be disastrous. Timing causes incentive problems because deviations from optimal time reduce output and because there is uncertainty about when the optimal time will occur. This makes it costly to contract across stages, and an increase in this uncertainty decreases the probability of firm-to-firm contracting between stages.

The problems associated with the timing of stage tasks are not the only incentive effects arising from seasonal forces. Factors such as the number of crop cycles, the length of production stages, and the number of tasks within a stage also influence incentives. When cycles are few, stages are short, random shocks are large, and tasks are also few, there is little to gain from organizing specialized farm labor in a complex, capital-intensive firm. These conditions not only limit the gains from specialization but also make wage labor especially costly to monitor because there is little routine and too few workers for comparison. Both of these forces make family farms more valuable than alternative types of farm organization. In those cases where production is characterized by many cycles, long stages with many tasks, and small shocks, there are gains from specialization and intensive capital that can make large factory-corporate farms the most efficient organi-

zation. Where farmers can mitigate seasonality and random shocks to output, farm organizations gravitate toward factory processes and develop the large-scale corporate forms found elsewhere in the economy.

Lesson #1: Family Farms are Ancient and Efficient

The family unit has been the dominant organization in farming since the earliest days of agriculture. Family farms were present in ancient Egypt, Israel, and Mesopotamia and among pre-Columbian American Indians. Owner-cultivated farms have also dominated in Asia, Europe, and Latin America as well as North America. Even in Africa, where land is often owned in common by tribes, farmland is customarily allotted to individual families.

In our framework, family farms are the most efficient organization for crops with many short stages, few tasks, and high susceptibility to unpredictable natural phenomena. Small grain production fits this scenario. Family farms still dominate the production of small grain crops. In 1997, for instance, 80 percent of all wheat farms (nearly a quarter of a million) were sole proprietorship family farms, and nearly all the rest were family partnerships or family corporations. Only 0.6 percent of all wheat sales were derived from non-family corporate farms.

Even the historical variation in farm organization fits this framework. In the United States, the family farm has been less common in southern agriculture than in the north. Plantation agriculture thrived because plantations used one-crop systems that required large amounts of labor on relatively small plots. Compared to grain crops, the plantation crops had a small number of long stages allowing for great gains in specialization and low cost monitoring of labor. American history is riddled with the failed factory farming experiments of ambitious entrepreneurs. From Iowa to California, and from the Dakotas to Texas, early capitalists invested huge sums trying to replicate factory production in agriculture. The great 19th Century "Bonanza" wheat farms — some exceeding 50,000 acres — of the Red River Valley dividing Minnesota

Growing families.

The family farm has resources unique to solving short-term labor needs brought about by the seasons.

Photo: Clear Window



and North Dakota were perhaps the greatest of these experiments. The Bonanzas were run by professional managers and used a large, specialized wage labor force to keep the entire production sequence from sod busting to milling flour within the firm. Even though the bonanza farms were hailed as the future of agriculture, nearly all were gone after one generation — most bought out by family farmers.

Coincident with the modern survival of family farming in the midst of rapid industrialization is the dramatic failure of collective farms in centrally planned economies. The widespread famines in China and the Soviet Union are the most notable of the routinely catastrophic outcomes. These failures are not surprising given the limited gains from specialization available in temperate grain agriculture.

Lesson #2: The Extent of the Farm Firm Has Tended to Shrink

Until the late 19th century, the family farm included virtually all stages of farm production, from “farm-making” (clearing land and raising buildings) to processing goods for retail consumption. The family had almost no contact with the market except when the farmer sold (or bartered) products directly to consumers. The main exception was selling grain to gristmills where grains could be easily stored and the mill could operate continuously.

After the early 1800s dramatic changes in technology led to the rise of separate firms that operated throughout the year and specialized in single stages of production. New technologies, such as refrigeration, limited natural forces and allowed seasonal tasks to be performed throughout the year. Overwhelmingly, the new firms engaged in production at either the beginning (handling inputs) or the end (handling products) of the agricultural production sequence. Accordingly, the family farm abandoned these stages and retained control of only the biological growth stages of production. Figure 1 shows how the

extent of a family farm has diminished over time.

Even though the family farm has relinquished some stages of production to specialized firms, family farms are sometimes linked to these large firms through vertical integration or long-term contracts. Such connections are particularly strong if timing is important. Vertical coordination occurs when farmers grow crops where precise timing is an important impediment to market transactions. Sugarcane is a good example of a crop with severe timing problems

between harvest and processing stages. Because the sugar begins to deteriorate immediately after harvest, decentralized market connections between stages are extremely

Livestock production provides the major exception to the dominance of family farming.

costly. Thus, virtually all sugarcane production is governed by vertical contracts or by vertical integration with sugar processors; in fact, the grower’s harvesting schedule is usually determined by the processor. Such vertical arrangements are rare for highly storable products such as grains.

Lesson #3: The Modern Livestock Industry is Different

Livestock production provides the major exception to the dominance of family farming. This has been especially true for broilers, feedlot cattle, and hogs. From 1969 to 1997, there was rising concentration in all livestock industries except cow-calf operations. The general trend has been to remove stock from an open environment and rear them in confinement, often in climate-controlled barns. New technologies — in confinement facilities, disease control, handling, nutrition, and transportation — have reduced seasonal forces by increasing the number of cycles per year and reduced the effects of random shocks from nature. Compared to field crops, livestock production allows for greater control over natural forces because stocks are mobile during growing stages and can often be reared indoors. This control of nature favors factory-style corporate livestock farming.

Feedlot cattle provide a striking example of factory-corporate livestock production. During the last 40 years,

the cattle feeding industry has been almost completely transformed into one dominated by large corporate firms that employ highly specialized wage labor. As of 1997 huge firms dominated the industry. Just 230 firms with an average inventory of 30,982 head accounted for over 50 percent of all fed cattle sold, and more than one-half of all cattle sold and receipts came from feedlots organized as corporations. The cow-calf industry, which supplies young feeder cattle to commercial feedlots, is very different. Firms in

this industry average only 48 head and are dominated by small, family organizations. The industry is strikingly dispersed with less than one-half of one percent of the farms having more than 500 head. A cow-calf operation is highly subject to the seasonal forces of nature. Compared to the routine, factory processes in feedlot operations, a cow-calf operation consists of relatively unpredictable short stages (such as calving) that occur only once a year and require on-the-spot decision-making.

The industrialization of poultry production began in the 1930s. Today large, factory-corporate firms produce nearly all broilers. The introduction of antibiotics and other drugs have allowed poultry to be bred, hatched, and grown in highly controlled indoor assembly line environments. At the various stages of production, broiler companies may and often do employ wage laborers who undertake specialized but routine tasks, such as cleaning, feeding, and immunizing. However, the critical "grow out" period of a chicken's life, even using modern technology, is still subject to highly random forces of disease and weather. Large firms routinely contract out growing services to small, family-based "growers." Growers feed and care for the birds until they become large enough for processing. Once chicks have matured, they are returned to the company for processing in large assembly-line facilities that employ hundreds of workers.

Implications for the Future

Should we worry about the end of family farming? Will family farms be with us in the 21st Century? No and yes. Although the organization of the industry has generally followed a transition from family firms to large, factory-style corporations, most of farming remains a family production activity. Production stages in farming tend to be short, infrequent and require few distinct tasks. This limits the benefits of specialization and makes wage labor especially costly to monitor.



Feed lots feed many.

The cattle feeding industry has been almost completely transformed into one dominated by large corporate firms, but the cow-calf industry is different.

Photo: Clear Window

Farm organization will gravitate toward factory processes only when farmers can control the seasonal and random shock effects of nature. When this occurs, farms may develop into the large-scale corporate businesses found elsewhere in the economy. Only if wheat could be grown indoors would wheat farming begin to look like greenhouse farming. Massive factory production in grains, however, seems unlikely.

To be sure, farms will continue to get larger in acreage and output and there will be fewer farm families. But this does not imply a fundamental change in firm structure. This is not a bad thing, just evidence of the invisible hand at work in the organization of an industry. ■

■ For More Information

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