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Vertical Integration in Hogs: Its Potential for the Future

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During the 1950's concern developed about the extent and trends of vertical integration in agriculture. Much "emotionalism" has subsided, but integrated production and marketing systems for livestock and poultry continue to grow.

The form and extent of integration vary in different enterprises. An estimated 95 percent of broilers and fluid milk now reach the consumer via integrated arrangements with nonfarm businesses. Turkey and egg production are following the same path as broilers, and an increasing number of cattle and hogs are being fed under contract (see figure 1).

Recent technological developments have aroused speculation that the same type of integration which developed in the broiler industry might extend to hogs. Minnesota farmers are concerned as hogs account for over 15 percent of farm income and are sold by about 75,000 farmers in the state.

Experience from other industries indicates that vertical integration often results from scientific and technological advances which permit new patterns of production. However, each industry has its own unique characteristics. The purpose of this article is to review the technological and marketing forces encouraging (or discouraging) vertical integration in hogs.

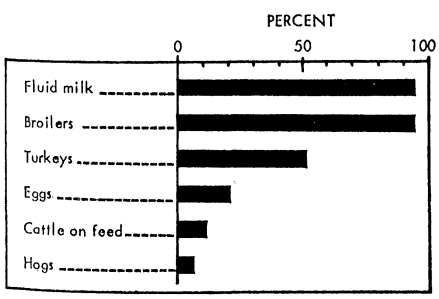

Fig. 1. Estimated output of commodities produced under integrated or contractual arrangements with nonfarm firms.

Source: Mighell, R. L. and Jones, L. A. *Vertical Coordination in Agriculture*, Agr. Econ. Rept. No. 19, USDA, ERS. February 1963, p. 65.

Technological Conditions

The forces encouraging vertical integration in hogs are closely linked to the technological developments favoring higher levels of specialization and increased size of operation. Vertical integration will not be important in hogs until the requirements for an optimum size unit exceed the managerial and capital resources available on most midwest corn-hog farms.

The incentive for integration by nonfarm firms is stronger where the rate of adopting new technology is slow or where existing producers generally lack the capacity to organize and exploit new technology that shows promise of greatly reducing costs.

Reduced labor and increased capital requirements for hogs have resulted primarily from raising hogs under confinement. Housing and mechanization have stepped up both labor and feed efficiency. Formerly, labor efficiencies gained in feed and water handling in confinement systems were lost in manure handling. Slatted floors and lagoons have substantially increased the number of hogs that can be produced per unit of labor. However, large-scale specialized units have not developed rapidly.

Large-scale hog production requires considerable capital and unique managerial skills. Managerial capacity may be the most important limitation to expansion. Under present levels of technology, large units place such great demands on management and make errors so costly that smaller units may have the advantage.

A 1956-57 study by Purdue University showed no cost savings beyond 50 sows. However, technology for highly automated units was not available at that time. In this study, field surveys and partial budgeting were used to determine the optimum level of output for hogs.

Although technology is still changing, results showed that large-scale, highly specialized hog enterprises have little or no cost advantage over existing, well managed corn-hog operations. The cost to produce 100 pounds of pork in a one-man equivalent, corn-hog operation (1,500 hogs annually) was $14.78 compared to $15.44 in a large-scale, highly specialized operation (10,000 hogs annually). Being "big" is not necessarily a prerequisite to adopting new technology and efficiency in hog production.

A limited supply of good feeder pigs at reasonable prices has limited extensive use of feeder pig contracts by integrators. A number of technical problems involved in large-scale feeder pig production still exist. The broiler industry, on the other hand, has solved enough of their technical production problems so that management can be profitably separated from labor over a wider range of output.

Market Forces Influencing Integration

The search for a market advantage by nonfarm firms supplying either production inputs (e.g., feed, equipment) or marketing services has been the strongest force for integration in hogs. The greatest pressure for integration has been among firms supplying inputs.

Expansion in the feed industry during the 1950's led to excess capacity in feed manufacturing. Integration provided a means of expanding the market in order to utilize manufacturing capacity. However, feed manufacturers have had less incentive to integrate hogs than poultry. Poultry requires a

nearly complete manufactured feed while hogs do not.

Quality and Volume Control—Vertical integration tends to develop in those commodities where existing markets do not effectively coordinate production and marketing processes. This is true where production timing is crucial and product quality tolerances are extremely narrow. To date the pork industry has been more volume than quality oriented. Then, too, multiple farrowing has helped to reduce seasonal variations in pork production.

The present market structure for hogs does not favor extensive vertical integration by processors. The large number of hog producers at the farm level virtually assures processors of getting hogs at or near the cost of production over time.

Under present market conditions, producers bear the unfavorable aspects of a fluctuating market. The cost of coordinating production and marketing through risk-sharing contracts may be higher than the costs of open market operations. However, the incentives to integrate could change if retailers start specifying exactly the kinds and qualities of pork they will accept.

Market Limitations—Per capita consumption of pork has been decreasing. Since World War II price controls were removed, per capita consumption has trended downward at the rate of 0.7 percent per year from 1947 to 1962. At the same time the deflated retail price of pork also trended downward at an average rate of 2 percent per year. There is not the kind of expanding market which encourages new firms to enter. Successful entry into hog production requires displacement of existing firms if prices are to be maintained (see figure 2).

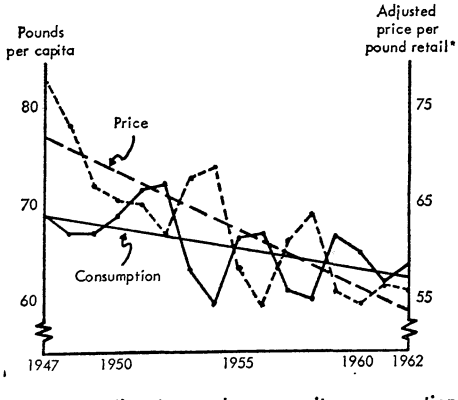

Fig. 2. Retail price and per capita consumption of pork.

* Price adjusted by Consumer Price Index (1957-59 = 100).

Potential entrants into pork production must recognize the inelastic and declining demand for pork. Even a small increase in production could seriously affect hog prices.

At the present time there is excess capacity for producing pork. Many present hog producers are likely to continue producing hogs as long as they can at least cover their variable costs. This is because of the low salvage value of their fixed assets and the lack of alternative uses for them. Hogs provide a good market for surplus family labor and farm-produced feed grains.

Even at the present levels of technology, the pork industry probably will be able to supply U. S. pork needs in 1975. Assuming per capita consumption levels off at 60 pounds, approximately 13.6 billion pounds of pork—carcass weight equivalent excluding lard—would be needed by 1975. This would take about 101 million head of hogs—a 20-percent increase over 1961 pork production.

This amount of pork could be produced with only minor adjustments in present facilities. Postwar pork production has never passed the peak reached in 1943. At the same time, efficiency will likely be stepped up significantly by 1975.

In other words, 600,000 hog farms with an average of 10 sows, each sow producing two nine pig litters, could supply 108 million hogs. The same number could be supplied by 200,000 farms with 30 sows, or 60,000 farms with 100 sows each. Currently 1.8 million U. S. farmers produce hogs.

Conclusions

Continued large numbers of hog producers tend to favor partially integrated production and marketing programs rather than formal integration in hogs. Vertical integration through direct ownership or the use of risk-sharing contracts is not likely to be important in hogs until:

1. hog production is adaptable to mass production methods,
2. disease problems are virtually eliminated,
3. greater economies result from the use of capital equipment,
4. there is much more price and production stability within the industry,
5. feed efficiency is stepped up significantly, and
6. major improvements are made in processing, distributing, and merchandising of pork.

Contract programs will continue to grow. However, hog producers of the future are expected to be more businesslike. They will enter into contracts only as long as the supplies and services rendered put them in a better position to compete in hog production.

On the other hand, the need for greater coordination in the industry may call for the revamping of existing markets. Cooperative associations have already formed various horizontal and vertical combinations for the purpose of producing and marketing high quality feeder pigs and market hogs. But the development of formal integration in hogs is not likely to be as important as was anticipated in the 1950's.

Vertical Integration in Minnesota's Turkey Industry

Turner Oyloe and Darrell F. Fienup

Rapid expansion in turkey production in Minnesota during the past decade has substantially changed the organization of the industry. The most significant changes have been: (1) larger and more specialized growers, hatcheries, and processors, and (2) increased interdependence between farm production and related nonfarm activities. This interdependence has required greater coordination of related activities, resulting in vertical integration.

This article discusses:

- Forms and extent of vertical integration in the Minnesota turkey industry.
- Why vertical integration developed.
- Future integration trends.

Data were obtained from a field survey made in the spring of 1961. Included in this survey were all known growers (147) within a radius of 20 miles of each of the following cities: Rochester, Faribault, Willmar, Aitkin, and Pelican Rapids. Seven hatcheries and three processing plants were also surveyed. This information was supplemented by other studies.

Hatchery-Grower Integration

Hatchery-grower integration has taken two forms in Minnesota: (1) totally integrated hatchery-grower operations, and (2) partially integrated breeder flock and hatchery operations.

Seventeen percent of the growers surveyed also owned hatcheries. Therefore, they were considered totally integrated. Thirty-five percent raised breeding flocks for hatcheries and were considered partially integrated. The number of integrated growers about equaled the number who were independent.

Average production of totally integrated growers was larger than that of partially integrated and independent growers. Totally integrated growers represented 17 percent of the growers but they marketed 32 percent of the turkeys.

Total integration of hatcheries and growers evolved from the desire of hatchery owners to better equate demand and supply for poults and to more fully utilize hatching capacity. The planning period for hatcheries precedes grower demand by approximately 10 months. So hatcheries have attempted to minimize uncertainties about the number of birds they can sell by raising their own surplus poults.

Seasonality of turkey production also means idle hatching capacity. This can be partly offset by raising poults in the "off season" (from July through January). Survey findings indicate that 55 percent of all totally integrated hatchery-grower flocks were started during the off season. But only 35 percent of all other growers' flocks were started during the same period.

Although hatchery operators often owned breeder flocks, they also contracted with growers to raise part of their breeder requirements. Hatcheries and growers found mutual advantages in this partially integrated arrangement. Breeder flocks require the most time during the off season of commercial production. This arrangement helped to more fully utilize the grower's time and supplement his income. Hatcheries, on the other hand, assured themselves of a continuing supply of eggs by contracting with growers.

At the same time, breeder flock owners generally purchased their poult requirements from the same hatchery. This provided the hatchery a market for at least a portion of its poult output.

Processor-Grower Integration

Total grower-processor integration was more limited. Even partial integration was limited to growers who sold their entire output of turkeys to cooperative plants. Partial grower-processor integration was more popular among the smaller growers. However, small growers accounted for only about 12 percent of the total volume of sales of all growers surveyed. Over one-half of all growers were not integrated with processors.

Because turkey processing is highly specialized, efficiency depends upon having uniform daily volume of birds. Often the number of birds available for a day's operation falls short of the plant's capacity. By growing their own birds, processors supplemented the available supply. Growing turkeys was also considered to be a profitable sideline business among totally integrated grower-processors.

Partial grower-processor integration was based primarily on cooperative patronage dividends. Cooperative patrons realized that patronage dividends depended upon the cooperative's efficiency. In order to insure the most efficient processing operations, patrons were urged to schedule deliveries of birds for processing as far ahead as possible. Programming for future deliveries was partly successful in some cooperatives. At the time of the field survey, this policy was being started by others.

Feed Manufacturer-Grower Integration

Many larger growers owned feed manufacturing facilities. These growers represented 12 percent of the number of growers but accounted for approximately 47 percent of all birds marketed.

Over 60 percent of the growers were partially integrated with feed manufacturers. Growers under contract with feed companies accounted for 41 percent of the birds marketed. Growers not integrated with feed manufacturers purchased feed from several outlets.

The chief incentive for feed manufacturers to integrate growing was to diversify their investments. While feed manufacturing was considered less risky, turkey growing helped utilize feed mill capacity. Only two feed manufacturer-growers did not sell feed to other growers.

All major feed manufacturers contracted with growers. Mutual benefits were derived. Growers received substantial credit and were assisted in their growing operations by servicemen. Feed companies reduced uncertainties about the amount of feed they could sell and expanded total sales.

The contract between grower and feed manufacturer provided the feed company with many rights in overseeing the grower's business. However, such contracts did not include provisions for sharing of profits and losses from the grower's business. Feed companies held first mortgage on the turkeys which guaranteed them payment. There were no indications that the major feed companies were in the business of raising turkeys.

Future Integration

Capital made available by feed companies will continue to play an important role in the expansion or contraction of the Minnesota turkey industry. Increased feed company investment will allow growers to expand production.

Increased production has led growers to a specialized turkey operation. Specialization allows growers to expand their businesses more rapidly in order to take advantage of lower unit costs that exist in larger scale turkey operations. By increasing capacity, growers can expect to arrive at a more efficiently sized operation.

Turkey feed is an important sector of the feed business in Minnesota, accounting for 19 percent of all feed sales in 1961. Moreover, turkey feed sales are seasonally distributed so that they complement the sale of other feeds. Larger feed firms did not indicate a desire to expand turkey feed sales any faster than sales of other feeds.

At the time of this study, some firms were attempting to integrate all four basic businesses—hatching, growing, processing, and feed manufacturing—into one operation. These firms felt that they then would achieve the highest degree of efficiency possible. This type of coordination is quite successful in the raising of broilers but will likely be slower to develop in turkeys. At the time of this study no firm had reached this goal. The success or failure of these combined operations will greatly affect the future organization and integration of the industry.

Conclusions

Over 90 percent of the growers surveyed were integrated to some extent with hatcheries, processors, and/or feed manufacturers. Larger growers were more often totally integrated than smaller growers.

Future vertical integration will partly depend upon the economies involved in coordinating the four basic functions. The speed at which future integration will take place is dependent upon growers' ability to expand year-round production. Indications are that feed manufacturers, the major source of production credit, will not increase capital available to the turkey industry in the future at the rate they did in the past.

THE OUTLOOK CORNER

S. A. Engene and Henry Hwang

Turkey production has increased in Minnesota, and the center of this production has shifted. A study of the production pattern in the past 3 decades provides information which may help to anticipate future changes.

The number of turkeys raised increased steadily up to 1961 (see table 1). Except for 1943, 1947, and 1948, the number produced each year was larger than in the preceding year.

A sharp increase occurred from 1960 to 1961—from 14.5 million birds to 19.1 million—an increase of 31 percent. Total U. S. production was up. As a result, prices dropped considerably.

The gross income from turkeys in Minnesota dropped from $57 million to $51 million. In response to this fall in price, production in 1962 dropped almost to the 1960 level. The number of turkeys raised in 1963 probably will be a little higher than last year but will be below the 1961 level.

Minnesota ranks second in the United States in the number of turkeys raised —15.1 million birds compared with 18.0 million in California in 1962. These two states accounted for 36 percent of the nation's total. The third state was Iowa with 7.8 million birds.

Minnesota also ranked next to California in pounds of turkeys raised. The difference in production was larger than in the number of birds, since California produced more heavy breeds and raised all breeds to a heavier weight. The average weight per bird in 1962 was 15.4 pounds in Minnesota and 19.5 pounds in California.

Back in 1935 the average number of turkeys per farm was less than 10. Many farmers kept a few birds, mostly for their own use. Those who raised turkeys for the market rarely had more than 500 to 2,000 birds. Moreover, raising turkeys was usually just one enterprise on a diversified farm.

In 1959 the number of farmers reporting turkeys was down to about 5 percent of the number in 1935. But the average number of birds per farm had risen to more than 6,000. There is no indication that this trend toward larger operations has reached an end.

The largest volume of turkeys in 1935 was produced in the Red River Valley and nearby counties. The top 10 counties were, in order: Otter Tail, Marshall, Polk, Morrison, Roseau, Stearns, Douglas, Clay, Norman, and Kittson. Farmers in these counties produced 34 percent of the state's total.

Production shifted southward from 1935 to 1945. By 1945 the top 10 counties were, again in order: Kandiyohi, Otter Tail, Blue Earth, Aitkin, Faribault, Meeker, Houston, Nobles, Fillmore, and Redwood. Five of these are in the state's southern tier of counties. These, together with Redwood, are in the Corn Belt. Availability of feed on the farm may have affected the location of production, since turkey production still was largely one enterprise on a diversified farm.

Turkey production has moved northward again in the last 15 years. The top 10 counties in 1959 (with production in thousands) were: Kandiyohi, 2,143; Otter Tail, 745; Aitkin, 598; Stearns, 508; Becker, 409; Anoka, 344; Crow Wing, 341; Fillmore, 309; Renville, 299; and Marshall, 291.

Farmers in these counties produced almost one-half of the turkeys in the state. Most of these counties are in the central part of the state, on the northern fringe of the Corn Belt.

Turkey production operations are large in some of these counties, averaging about 25,000 in Kandiyohi, 18,000 in Stearns, 17,000 in Anoka, and about 10,000 in three other counties.

Turkey production in Minnesota may tend to concentrate in fewer counties. Producers will enlarge their operations. The number raised in any year will be affected by the previous year's price. The number of turkeys raised may increase as population grows.

Table 1. Number of turkeys raised in Minnesota

Year	Number
	thousands
1937	1,950
1940	3,029
1945	3,979
1950	4,219
1955	8,034
1960	14,541
1961	19,131
1962	14,852

Source: *Minnesota Agricultural Statistics*, State-Federal Crop and Livestock Reporting Service.

Table 2. Number of farmers raising turkeys and number raised—Minnesota

Year	Number of farmers	Number of turkeys
		thousands
1935	40,919	396
1940	16,847	2,809
1945	4,868	2,789
1949	3,176	3,435
1954	2,629	7,055
1959	1,912	12,521

Source: U. S. Census of Agriculture.

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