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Minnesota AGRICULTURAL ECONOMIST



The Location of Turkey Production: The Sixties and Seventies

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The turkey industry has experienced considerable change during this decade. One change in particular has been the shift in production location, a change that may not be completed until well into the next decade.

The shift has been accompanied by a rapid increase in output during most of the decade. Output increased from 1.5 billion pounds in 1960 to 2.3 billion pounds in 1967, a gain of 57 percent. Output was reduced in 1968 to 2.0 billion pounds as a result of low prices. Production should increase slightly to 2.1 billion pounds in 1969.

Production is concentrated in eight major producing areas scattered across the country. These areas account for more than 80 percent of annual turkey output, and it is these areas that have experienced the change in relative importance (table 1).

The location of production began to shift from its established pattern in 1964. Two minor producing areas in the South, Arkansas-Missouri and North and South Carolina-Georgia, began to expand output rapidly and began to account for a major proportion of the increase in output and an increasing share of U.S. production. In 1963, the two produced 241 million pounds, 14 percent of the total. Four years later, they produced 576 mil-

lion pounds, almost one quarter of total production. In 1968, production was 536 million pounds, 27 percent of total output.

The Upper Midwest (Minnesota, Iowa, Wisconsin, and North and South Dakota) accounted for almost one third of total production in 1960 and now accounts for slightly less than one quarter. In 1968, production was only 31 million pounds more than in 1960, although it was higher in the intermediate years. But the area is the only one that hasn't exceeded the high level achieved in 1961, 581 million pounds. The slow increase in output in the Upper Midwest is in sharp contrast to rapid expansion during the previous decade.

California was the second largest producing area in 1960 with 281 million pounds or 19 percent of the total. During the first 9 years of this decade the state averaged 317 million pounds, but it is declining in relative importance. The state should produce about 15 percent of the nation's output at the end of the decade and be the third largest producing area.

Arkansas-Missouri produced 122 million pounds in 1960 or slightly more than 8 percent of total output. This area has more than tripled its production, 386 million pounds in 1967, and has become the second major producing area.

A close fourth in 1960 was Indiana-Ohio, producing 111 million pounds. Expansion has been slow, with production averaging 139 million pounds annually. The area has slipped to sixth in importance.

(Continued on page 2)

Table 1. Turkey output by major producing areas, 1960-68

| Areas | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| million pounds, liveweight | | | | | | | | | |
| Upper Midwest* | 454 | 581 | 474 | 493 | 514 | 533 | 533 | 565 | 481 |
| Calif. | 281 | 342 | 349 | 291 | 305 | 300 | 332 | 371 | 283 |
| Ark.-Mo. | 122 | 161 | 122 | 157 | 202 | 234 | 318 | 386 | 315 |
| Ind.-Ohio | 111 | 137 | 123 | 139 | 149 | 142 | 150 | 162 | 139 |
| Colo.-Utah | 86 | 116 | 104 | 108 | 96 | 102 | 119 | 142 | 123 |
| Tex. | 74 | 91 | 80 | 91 | 96 | 104 | 126 | 157 | 144 |
| N.C.-S.C.-Ga. | 55 | 82 | 70 | 84 | 117 | 127 | 162 | 190 | 222 |
| Va. | 50 | 58 | 49 | 59 | 65 | 71 | 82 | 78 | 66 |
| Total | 1,233 | 1,568 | 1,371 | 1,422 | 1,544 | 1,613 | 1,822 | 2,051 | 1,773 |
| U.S. | 1,489 | 1,871 | 1,626 | 1,686 | 1,826 | 1,915 | 2,123 | 2,343 | 2,011 |

* Upper Midwest: Minnesota, Iowa, Wisconsin, and North and South Dakota.
Source: USDA, SRS, Turkey Production, Disposition, and Gross Income.

What Has Happened to Turkey Prices?

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During the last 17 years the price received by turkey producers has declined from 37.5 cents in 1951 to 19.5 cents in 1967. During this period, prices fluctuated around the trend, resulting in unstable income to turkey producers (see the table). Instability hurt some marginal producers and forced them out of turkey production.

Prices are determined by supply and demand forces. Producers have little control over demand, but they can influence the quantities supplied in the market. But it seems that turkey producers as a group have not learned from their past experience. Receiving favorable prices one year leads them to increase production the following year. Marketing the large production drives turkey prices downward. The low turkey prices induce a cutback in production the following year, which in turn results in higher turkey prices. This pattern is known as the cobweb phenomenon. The accompanying figure provides evidence of a cobweb phenomenon in the turkey industry. The farm price is measured along the vertical axis, and per capita production of turkey is measured along the horizontal axis. (These prices were adjusted for changes in the level of all farm prices.) Arrows indicate the direction of change. For instance, the price received by turkey producers in 1951 was 30 cents. This price induced 6.75 pounds of production per capita in 1952. In turn, this increase in supply resulted in the lower price of 28.2 cents in 1952. Producers reacted to the decline in turkey prices and curtailed production to 6.34 pounds per capita in 1953. The reduced supply resulted in a higher price of 32.1 cents in 1953.

There is regularity in the clockwise rotation in the figure to indicate an underlying cobweb relationship, although the pattern spirals downward and to the right. Irregularities in this spiral pattern are caused by outside forces. For example, the period 1957-59 was a transition period with production increases in spite of low prices. Availability of turkey feed at lower prices was one reason for this expansion. New cost reducing developments in feeding technology and improved turkey breeds also were responsible for it. The cobweb pattern was repeated in the sixties but around a lower price level. The longrun downward trend in turkey prices was due primarily to increased efficiency in turkey production.

Changes in turkey consumption are partly responsible for the expansion of turkey production in the 1965-67 period.

(Continued on page 3)

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Turkey production (continued)

The remaining four areas each produced substantially less than 100 million pounds in 1960. By 1969, three eastern seaboard states, North and South Carolina and Georgia, quadrupled production from 55 to 220 million pounds a year. This is the only area that didn't cut back in 1968, and it now ranks fourth in importance with 11 percent of total production. Texas has doubled its production, producing 144 million pounds in 1968 or 7 percent of total production. Colorado-Utah has increased production about 50 percent to 123 million pounds in 1968 or 6 percent of the total. Virginia increased production almost continuously between 1960 and 1966 but has been declining since. In 1968 the state produced 3 percent of the total.

Historically, turkey shipments have been from the surplus producing Western areas to the deficit North and South Atlantic regions. In 1960, the Upper Midwest and California areas accounted for 77 percent of the surplus in the eight major producing areas. Arkansas-Missouri, Colorado-Utah, and Virginia produced the balance, and the remaining three areas had minor deficits. Using 1967 population estimates and a constant average per capita consumption, only Indiana-Ohio had a moderate deficit. The Upper Midwest remained the largest surplus producing area with 39 percent of the total, but California and the Upper Midwest together accounted for only 52 percent of the surplus. Arkansas-Missouri had another 30 percent and Colorado-Utah had 10 percent of the surplus. Texas and North and South Carolina-Georgia shifted from deficit to slightly surplus and Virginia increased its surplus slightly.

The changing production pattern of turkeys has had a significant effect on the surplus-deficit position of the regions. The historical deficit in the Southeastern United States has been largely eliminated. Production and consumption were very close to equal in 1968 in the South Atlantic states as a result of expanding production in the Carolinas and Georgia. Although the deficit in the four East-South Central states has increased, it is now offset by production increases in the West-South Central states (table 2).

The industrialized Northeastern and East-North Central states have continued to increase their deficits. Between 1960 and 1967, the deficit increased by a third in the North Atlantic region and doubled in the East-North Central region. But the deficit in the North Atlantic region is still more than double that in the East-North Central region.

The next decade will bring a continuation of some of the trends that began during the current decade. The South Atlantic states are expected to become a major surplus producing area for several reasons:

■ The turkey industry has borrowed many of the concepts that were pio-

Table 2. Deficit-surplus position of producing areas and regions of the United States in million pounds of liveweight, 1960 and 1967

| | Producing areas | | | Regions* | |
|-------------------------|-----------------|------|----------------|----------|------|
| | 1960 | 1967 | | 1960 | 1967 |
| Upper Midwest | +359 | +425 | N.Atl. | -308 | -405 |
| Calif. | +150 | +144 | ENC | -84 | -168 |
| Ark.-Mo. | +71 | +308 | WNC | +384 | +541 |
| Ind.-Ohio | -8 | -21 | S.Atl. | -90 | -50 |
| Colo.-Utah | +64 | +106 | ESC | -82 | -127 |
| Tex. | -6 | +28 | WSC | 0 | +128 |
| N.C.-S.C.-Ga. | -36 | +46 | Mount. | +37 | +59 |
| Va. | +17 | +26 | Pac. | +142 | +120 |

* NAtl.: New England, N.Y., N.J., Pa.; ENC: Ohio, Ind., Mich., Ill.; WNC: Minn., Wis., Iowa, N. Dak., S. Dak., Mo., Nebr., Kans.; SAtl.: Del., Md., D.C., Va., W. Va., N.C., S.C., Ga., Fla.; ESC: Ala., Miss., Tenn., Ky.; WSC: Ark., La., Okla., Tex.; Mount: Mont., Idaho, Wyo., N.Mex., Ariz., Utah, Nev.; Pac: Wash., Ore., Calif., Alas., Hawaii.

neered by the region's important broiler and egg industries. Consequently the growth of the industry is based on modern technology and organizational concepts that are giving the industry a short-run competitive edge.

■ The region has a labor advantage that has proved to be very important to the expansion of the rest of the poultry industry. However, continued industrialization in this region could severely reduce the importance of this advantage in the next decade.

■ Major reductions in transportation rates on feed grains and a land use shift from cotton to feed grains and soybeans have improved the region's competitive position in terms of feed costs.

■ The climatic conditions in the South enable year-round ranging of birds, which reduces the seasonality problems that plague the industry in the North.

The reasons for expansion in the Southeast also apply to the West-South Central states. One difference is that the region, particularly Arkansas, has a more favorable labor advantage. Although the region is one of the major surplus producers of turkey, longrun prospects are that production will continue to increase at a higher rate than the national average.

California is one area that is expected to experience an absolute decline in production. The Western states have several liabilities, particularly high labor costs. In addition, protein feeds have to be shipped to the coast from the Midwest and much of the surplus turkey has to be shipped east to be marketed. Both involve high transportation costs and seriously impair California's ability to compete east of the Rocky Mountains. California should remain a major producer but only to supply its own needs and the deficit in nearby states.

Colorado-Utah has been expanding turkey production at a much higher rate than population growth in the Mountain region. With a large surplus, some of which has to be shipped into the Northeastern states, and with its need to import some feeds, this area is not likely to continue expanding very rapidly, if at all,

in the next decade. However, the area is expected to remain a surplus producer because of certain unique characteristics of its industry.

The deficit in Indiana-Ohio probably will continue to increase, although production will remain large. But increased industrialization and other agricultural alternatives for resource use will prevent major expansion in the foreseeable future.

The Upper Midwest has an important comparative advantage in feed grains. Unfortunately, this advantage alone has not been sufficient to offset other disadvantages. Production has been declining in Iowa and Wisconsin and is expected to continue. Minnesota, the largest producing state, has been increasing production and should continue. But the industry, established in the last decade, faces adjustment problems to eliminate obsolescence and outdated practices. In addition, a large number of profitable agricultural and nonagricultural resource use alternatives exist that could prevent retention or addition of resources in the industry.

The Upper Midwest should be able to retain its position as a major producer of turkeys and should experience some absolute gains in production, but the area's proportion of total output will continue to decline for a few more years.

The Northeastern quarter of the United States will continue to have an increasing deficit. This area will be the primary market for the surplus production of other regions, especially the Upper Midwest and the three Southeastern seaboard states. Whether one or the other can gain a competitive edge in this market will be determined in the next decade. ■

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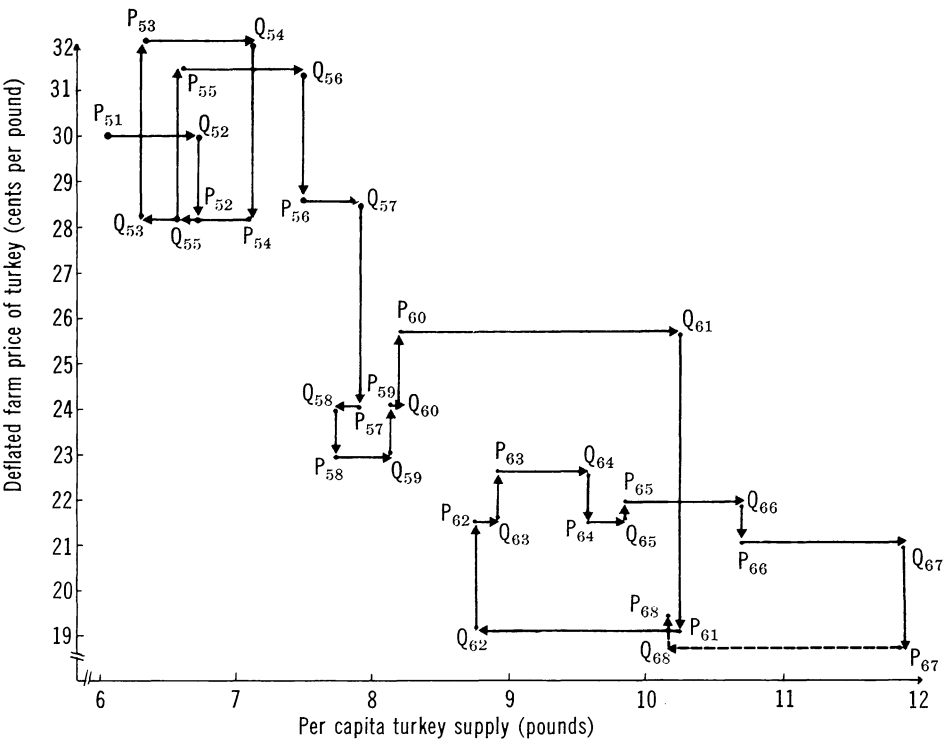
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Turkey prices (continued)

Increased use of turkey in convenience food items such as rolls and pies and increased use of smoked and cut-up turkey in addition to its traditional role as a festive meat helped to create the irregular price and output pattern of recent years. Even with the low prices of 1966, farmers produced more turkey in 1967. The larger production resulted in even lower prices in 1967.

Will turkey prices and production follow the cobweb pattern in the future? Probably so. Preliminary information on prices and production for 1968 support this view. (See the dotted lines in the figure.) Production in 1968 was about 86 percent of 1967 production, and producers received higher prices (1-3 cents above 1967 price).

But the cobweb pattern indicates a substantial increase in output for 1969 and lower turkey prices. Individual producers and producer groups should take notice of this possible outcome in their production plans for 1969. Producers have lost an estimated \$50 million in income over the last 15 years because of this cobweb pattern.¹ Damping down or elimination of these price spirals would do much to reduce income uncertainty in the turkey industry.



Relation of turkey production and farm prices, 1951-68.

Measures To Dampen Price Spirals

As a group, turkey producers could dampen (or eliminate) price fluctuations by adopting programs to regulate turkey supplies. The effectiveness of such programs depends on the degree of regulation and supply limitation. Descriptions of possible control measures follow.

1. Contracts and voluntary action. One of the most effective methods of controlling supply is through contractual arrangements between producers and handlers. The role of such arrangements in limiting supply depends on the percentage of total production furnished by contracts. But these agreements can be effective if producers cooperate completely enough to control production. Prices usually are agreed upon before birds are raised, so market risks to producers are reduced. Turkey producers could employ this measure because of the relatively small number of producers involved. First, however, increased national coordination to regulate production must be gained. Contracting is one method of integration and is considered a stabilizing influence as long as the integrator serves as a coordinating and control center.

Past experience in the turkey industry suggests that voluntary agreements are not workable and in many cases result in

Prices and production of turkey in the United States, 1951-68

| Year | Price per pound (liveweight) | | Production | |
|------|------------------------------|-----------|----------------|------------|
| | Actual | Adjusted* | Total | Per capita |
| | cents per pound | | million pounds | pounds |
| 1951 | 37.5 | 30.0 | 950 | 6.08 |
| 1952 | 33.6 | 28.2 | 1,049 | 6.75 |
| 1953 | 33.7 | 32.1 | 1,008 | 6.34 |
| 1954 | 28.8 | 28.2 | 1,161 | 7.15 |
| 1955 | 30.2 | 31.5 | 1,091 | 6.59 |
| 1956 | 27.2 | 28.6 | 1,274 | 7.49 |
| 1957 | 23.4 | 24.1 | 1,356 | 7.94 |
| 1958 | 23.9 | 23.0 | 1,356 | 7.74 |
| 1959 | 23.9 | 24.1 | 1,433 | 8.13 |
| 1960 | 25.4 | 25.7 | 1,491 | 8.18 |
| 1961 | 18.9 | 19.1 | 1,878 | 10.25 |
| 1962 | 21.6 | 21.4 | 1,630 | 8.73 |
| 1963 | 22.3 | 22.3 | 1,673 | 8.85 |
| 1964 | 21.0 | 21.4 | 1,824 | 9.50 |
| 1965 | 22.2 | 21.8 | 1,901 | 9.78 |
| 1966 | 23.0 | 20.9 | 2,097 | 10.65 |
| 1967 | 19.5 | 18.6 | 2,351 | 11.81 |
| 1968 | 20.5 | 19.2 | 2,019 | 10.10 |

* Deflated by price received by farmers index (1957-59 = 100) to account for changes in the general price level.

Source: USDA, Poultry and Egg Situation.

further overproduction. Many producers will not cut back on a voluntary basis when they think other producers are going to cut back. The ultimate result is that a majority expand rather than cut back.

2. Market orders. Market orders are not effective in the turkey industry because of the lack of secondary uses for turkey meat and the difficulty of administering an order. The market order is workable by diverting supplies from primary to secondary uses. It has been effective in the dairy industry because

milk can be diverted from its primary use as fluid to secondary uses in manufacturing dairy products. Traditionally, market orders have not restricted entry.

3. Market quotas. Such programs generally are administered by the U.S. Department of Agriculture, which can enforce them by licensing producers. Part of a program's effectiveness depends on limiting entry of additional producers. Market quotas can be utilized through input and output control.

¹ Demand and supply functions were estimated for three periods: 1951-56, 1957-60, and 1961-65. The two functions were solved to determine the equilibrium prices and quantities. Income for each year was estimated and compared with actual income. Some years showed gains and others loss by eliminating the cobweb phenomenon. The net gain was then obtained.

Input Control

Controlling the number of eggs set for hatching would decrease poult numbers at the hatchery level. But such a program is likely to result in higher poult prices because it reduces supply without affecting demand. Egg prices would be bid up until all pure profits from raising turkeys would be eliminated. This would create an incentive for growers to raise their own poults, which might result in production inefficiency through use of inefficient producing strains and breeds of birds.

Controlling breeder numbers would limit breeder numbers, number of eggs available for hatching, and number of poults. A designated number of poults would be allotted to each existing owner of breeding stock.

A yearly quota regulating the number of poults could be allotted to present producers. This program would freeze a production pattern in the hands of those presently in business. However, quotas can be negotiable.

Output Control

In this program, pounds of meat or number of meat birds would be allotted to producers. Such a program requires complete control over supply. Producers may produce heavier birds if the quota is in number of meat birds, although consumer tastes would hold back this tendency.

Previous experience with the turkey industry indicates the reluctance of turkey producers to adopt market quotas and orders. For example, they turned down the proposed nationwide marketing order for turkeys in the 1962 referendum. Marketing orders were discussed by turkey producers in 1968 after the industry had suffered its worst season the previous year. In general, however, turkey producers were against the program. Therefore, the turkey industry requires more effective coordination and organization among turkey producers to adjust production voluntarily to market requirements. Secondly, coordination within the whole industry from producers, processors, handlers, and retailers is necessary to stimulate demand for turkey meat and to seek new uses for turkeys. ■

Turkeys in Minnesota

M. A. Soliman and C. R. Burbee

Minnesota frequently has ranked first in number of turkeys raised annually. In 1968, more than 16 million birds were raised, compared with about 4 million in 1950, about a four fold increase (see the accompanying table). During this period, number of turkeys raised in the United States more than doubled, increasing from 44.4 million in 1950 to 106.4 million in 1968. Minnesota's share of total turkeys raised increased from 9.5 percent in 1950 to 15.4 percent in 1968.

Equally important has been the shift toward raising light breed turkeys. The table indicates that Minnesota's share of total light breeds raised in the United States increased from 14.5 percent in 1950 to 47.5 percent in 1968. Number of heavy breeds raised in the state increased gradually until it peaked in 1965 and has decreased since. In actual figures, 3.4 million heavy breeds were raised in 1953, 13.6 million were raised in 1965, and 10.0 million were raised in 1968.

Minnesota cash farm income from turkeys rose rapidly during the previous

decade. It has tended to stabilize in the sixties in excess of \$50 million annually. Income has not increased with increasing output, because price has been proportionately lower.

Traditionally, the farm price for Minnesota turkey is below the national average. Since turkey output is far greater than required by local markets, a wider marketing margin is essential to cover the transportation costs for shipping turkey to the deficit markets in the East.

Income from turkeys has been representing an increasing share of farm income from poultry in Minnesota. Poultry farm income has been declining continuously for over 15 years in response to rapidly declining production of table eggs and egg prices. In 1967, farm income from turkeys contributed slightly over half the state's income from poultry. Turkey probably will continue to be the main source of poultry farm income in Minnesota. ■

Turkey raised by type of breed in United States and Minnesota

| Year | All breeds | | | Heavy breeds | | | Light breeds | | |
|----------|------------------|--------|-------------|------------------|--------|-------------|------------------|-------|-------------|
| | U.S. | Minn. | Minn. share | U.S. | Minn. | Minn. share | U.S. | Minn. | Minn. share |
| | ... thousand ... | | per cent | ... thousand ... | | per cent | ... thousand ... | | per cent |
| 1950 ... | 44,393 | 4,219 | 9.5 | ... | ... | ... | ... | ... | ... |
| 1953 ... | 59,822 | 5,808 | 9.7 | 43,382 | 3,427 | 7.9 | 16,440 | 2,381 | 14.5 |
| 1955 ... | 65,659 | 8,034 | 12.2 | 48,827 | 5,391 | 11.0 | 16,832 | 2,643 | 15.7 |
| 1958 ... | 79,552 | 10,539 | 13.2 | 67,204 | 9,313 | 13.9 | 12,348 | 1,226 | 9.9 |
| 1960 ... | 84,772 | 14,275 | 16.8 | 74,138 | 12,807 | 17.3 | 10,320 | 1,468 | 14.2 |
| 1963 ... | 94,063 | 14,737 | 15.7 | 84,247 | 13,469 | 16.0 | 9,816 | 1,268 | 12.9 |
| 1965 ... | 105,914 | 15,567 | 14.7 | 93,589 | 13,642 | 14.6 | 12,325 | 1,925 | 15.6 |
| 1966 ... | 115,507 | 16,439 | 14.2 | 99,619 | 11,165 | 11.2 | 15,888 | 5,274 | 33.2 |
| 1967 ... | 126,577 | 17,740 | 14.0 | 110,180 | 11,952 | 10.8 | 16,397 | 5,788 | 35.2 |
| 1968 ... | 106,419 | 16,349 | 15.4 | 93,140 | 10,040 | 10.8 | 13,279 | 6,309 | 47.5 |

Source: USDA, Statistical Reporting Service, Turkey Production, Disposition, and Gross Income.

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