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To the Graduate Council:

I am submitting a thesis written by William Dale Givan entitled "Tennessee Grade A Milk Producers, Present and Potential." I recommend that it be accepted for nine quarter hours credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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TENNESSEE GRADE A MILK PRODUCERS,  
PRESENT AND POTENTIAL

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A Thesis  
Presented to  
the Graduate Council of  
The University of Tennessee

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

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by  
William Dale Givan

June 1964



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## CHAPTER I

### INTRODUCTION

#### I. STATEMENT OF THE PROBLEM

The Grade A milk industry is one of the major agricultural industries in Tennessee. As such, it has experienced a rapid growth in the past decade. Grade A milk sold under Federal order increased 51 per cent between 1956 and 1963. Over the same period the number of Grade A producers decreased 16 per cent (Tables I, II, and V).<sup>\*</sup> The many changes experienced by the Tennessee Grade A dairy industry did not come about by chance. They are the results of many individual decisions made by each producer. The reasons for these decisions are varied.

These changes in the past have made the industry what it is today. The problem arises as to what the situation will be during the next decade if the present conditions continue to change. The structure of the industry today will provide the basis from which future changes will occur. Consequently, a detailed look at the present characteristics of the Grade A milk industry and its producers should enable more accurate predictions to be made about future Grade A milk production, prices,

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<sup>\*</sup>In this thesis, Grade A producers refer to any Tennessee farmer selling milk for fluid use through a Federal milk order. There is additional Grade A milk which is unregulated and for which data are not available. It is estimated that Federal order Grade A milk accounted for approximately 88 per cent of total Tennessee Grade A production in 1963.



and producer characteristics. This will help to give guides that the Grade A industry needs to help direct its policies for the future.

## II. JUSTIFICATION OF THE STUDY

The decline in the number of Grade A milk producers along with greater milk production per cow and larger size of the herds represents not only a technological advance, but a vast increase in capital investment and operating expense for the individual milk producer. Faced with the problems of a changing industry, there was a need for a classification and knowledge of the Grade A producers in the state to aid in future research, education, and extension work with the industry.

Annual census data provides some information on dairy production in the state, but did not separate Grade A from other producers. A personal interview of all producers or a sample of the producers was a possibility, but was considered too time consuming and expensive. It was felt the most efficient method of obtaining the information would be by means of a mail questionnaire.

## III. OBJECTIVES

This thesis was concerned only with Grade A milk production in Tennessee. The specific factors studied were characteristics of the Grade A dairyman in each major milk market area, the operational methods of the producer in each area, and the operational plans of the producer in each area.

By studying the data collected from these producers, much was learned about the individual, his practices and intentions, and the factors affecting these variables. This, in turn, should enable better projections to be made concerning future numbers of producers, producer characteristics, milk supply, and prices.

The purposes of this study were:

(1) To describe the changes which have taken place in the dairy industry since 1956 and indicate, if possible, the factors related to these changes.

(2) To describe the current Grade A producers and milk supply.

(3) To compare differences in characteristics of producers in various regions within the state.

(4) To project future number of producers, size of producers, and milk supply.

#### IV. METHODOLOGY

Descriptive information about the Grade A milk producers in Tennessee was obtained by a mail questionnaire to all of the 3097 producers in the state as of March 1963.

The questionnaire was mailed April 26, 1963. On May 25 an additional questionnaire was mailed to each producer who had not responded to the first mailing. On June 27 a third mailing was made to the producers who had not responded to the first two mailings. A total of 1604 questionnaires were returned from the three mailings, which was 51



per cent of the original number mailed.\* (See Appendix B.)

The design of the questionnaire enabled the data to be punched directly into IBM cards. Two different sets of cards were made from the coded information. The two decks were then compared to detect errors in punching.

In addition to mail survey data, secondary data were obtained from Federal milk order statistics and other United States Department of Agriculture data to indicate past changes in milk production patterns in the state and to aid in projections for the future.

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\*The data summarized in this report are from respondents to this questionnaire. These may not be entirely representative of the total population of Grade A producers due to the possible difference in characteristics of those who respond to a mail type questionnaire. In this case the large number responding gives more credence to the results.



## CHAPTER II

### PAST PRODUCTION AND CHARACTERISTICS OF THE TENNESSEE GRADE A MILK INDUSTRY

#### I. PRODUCTION OF MILK SINCE 1950

Changes in the amount of milk produced in Tennessee during the period 1950-1963 are presented in Table I. Included are figures for both Grade A and total production. The total amount of all milk produced has changed very little in the last 14 years. The major changes have occurred in the disposition of the milk. In 1963, the amount of milk used for farm churned butter was only 13.8 per cent of the amount used for this purpose in 1950, and the amount of milk equivalent of commercially manufactured products increased 24 per cent over the same period of time.

The total amount of milk used for fluid milk products (Grade A) for both farm and nonfarm use has varied little. What has varied is the differences of the amount of Grade A milk used on the farm and the amount sold. The amount of milk sold by producers in each Federal order market and totals for Tennessee are shown in Table II. The total amount sold increased 51 per cent during this period.

The Nashville order had the highest production (33 per cent of the total produced in the state in 1963). It was followed by Knoxville with 23, Chattanooga 18, Memphis 15, and Appalachian 11 per cent of the state's total.

TABLE I

## ESTIMATED GRADE A MILK PRODUCTION IN TENNESSEE, 1950-1963

| (1)            | (2)                                    | (3)                        | (4)                                                  | (5)                                       | (6)                                                                | (7)                                                                            |                                                                      |
|----------------|----------------------------------------|----------------------------|------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | Total Production on Farms <sup>a</sup> | Fed to Calves <sup>a</sup> | Total Milk Supply for Human Consumption <sup>b</sup> | Used for Farm Churned Butter <sup>a</sup> | Milk Equivalent of Commercially Manufactured Products <sup>c</sup> | Total Used for Fluid Milk Products (Grade A) Farm and Nonfarm Use <sup>c</sup> | Per Cent of Total Production Used for Fluid Milk and Cream (Grade A) |
| Million Pounds |                                        |                            |                                                      |                                           |                                                                    |                                                                                |                                                                      |
| 1950           | 2329                                   | 40                         | 2289                                                 | 363                                       | 970                                                                | 956                                                                            | 41.0                                                                 |
| 1951           | 2311                                   | 44                         | 2267                                                 | 344                                       | 898                                                                | 1025                                                                           | 44.4                                                                 |
| 1952           | 2294                                   | 42                         | 2252                                                 | 302                                       | 921                                                                | 1029                                                                           | 44.9                                                                 |
| 1953           | 2421                                   | 42                         | 2379                                                 | 277                                       | 1135                                                               | 967                                                                            | 39.9                                                                 |
| 1954           | 2416                                   | 43                         | 2373                                                 | 258                                       | 1096                                                               | 1019                                                                           | 42.2                                                                 |
| 1955           | 2397                                   | 41                         | 2356                                                 | 233                                       | 1072                                                               | 1051                                                                           | 43.8                                                                 |
| 1956           | 2493                                   | 42                         | 2451                                                 | 208                                       | 1168                                                               | 1075                                                                           | 43.1                                                                 |
| 1957           | 2497                                   | 42                         | 2455                                                 | 193                                       | 1208                                                               | 1054                                                                           | 42.2                                                                 |
| 1958           | 2391                                   | 38                         | 2353                                                 | 166                                       | 1137                                                               | 1050                                                                           | 43.9                                                                 |
| 1959           | 2200                                   | 33                         | 2167                                                 | 98                                        | 1092                                                               | 977                                                                            | 44.4                                                                 |
| 1960           | 2202                                   | 30                         | 2172                                                 | 75                                        | 1091                                                               | 1006                                                                           | 45.7                                                                 |
| 1961           | 2308                                   | 30                         | 2278                                                 | 70                                        | 1228                                                               | 980                                                                            | 42.5                                                                 |



TABLE I (CONTINUED)

| (1)                                          | (2)                           | (3)                                                           | (4)                                                | (5)                                                                               | (6)                                                                                           | (7)                                                                              |
|----------------------------------------------|-------------------------------|---------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Total<br>Production<br>on Farms <sup>a</sup> | Fed to<br>Calves <sup>b</sup> | Total Milk<br>Supply for<br>Human<br>Consumption <sup>b</sup> | Used for<br>Farm<br>Churned<br>Butter <sup>a</sup> | Milk<br>Equivalent<br>of<br>Commercially<br>Manufactured<br>Products <sup>c</sup> | Total Used<br>for Fluid Milk<br>Products<br>(Grade A)<br>Farm and<br>Nonfarm Use <sup>c</sup> | Per Cent of<br>Total Production<br>Used for Fluid<br>Milk and Cream<br>(Grade A) |
| Year                                         |                               |                                                               |                                                    |                                                                                   |                                                                                               |                                                                                  |
| 1962                                         | 2307                          | 2277                                                          | 60                                                 | 1233                                                                              | 984                                                                                           | 42.7                                                                             |
| 1963                                         | 2242                          | 2212                                                          | 50                                                 | 1200                                                                              | 1012                                                                                          | 45.1                                                                             |

Million Pounds

<sup>a</sup>United States Department of Agriculture, Statistical Bulletin 303, Dairy Statistics Through 1960 (Washington: Government Printing Office, 1962), pp. 31, 81; United States Department of Agriculture, Milk Production and Dairy Products, 1962 (Washington: Government Printing Office, 1963), p. 6; United States Department of Agriculture, Milk Production, Disposition, and Income (Washington: Government Printing Office, 1963), pp. 7, 11.

<sup>b</sup>Column (1) minus column (2).

<sup>c</sup>United States Department of Agriculture, Statistical Bulletin 218 Supplement for 1959 (Washington: Government Printing Office, 1960), pp. 327-332; United States Department of Agriculture, Production of Manufactured Dairy Products (Washington: Government Printing Office, 1962, 1963), 1962, p. 61; 1963, p. 61.

<sup>d</sup>Includes consumed on farm as fluid milk-cream. Column 3 - (column 4 + column 5). Columns 2-7 for 1963 are estimates based on past figures and total milk production for 1963.



TABLE II

TOTAL PRODUCER MILK SOLD TO HANDLERS ON FEDERAL ORDER MARKETS  
BY TENNESSEE GRADE A PRODUCERS, 1956-1963<sup>a</sup>

| Year | Market Area    |                    |           |         | State     |
|------|----------------|--------------------|-----------|---------|-----------|
|      | Appalachian    | Chattanooga        | Knoxville | Memphis | Nashville |
|      | Million Pounds |                    |           |         |           |
| 1956 | 63.4           | 110.5 <sup>b</sup> | 153.2     | 80.8    | 186.6     |
| 1957 | 68.0           | 121.4              | 174.5     | 99.8    | 205.9     |
| 1958 | 68.9           | 121.1              | 169.5     | 91.1    | 201.4     |
| 1959 | 75.2           | 127.3              | 176.3     | 89.1    | 213.4     |
| 1960 | 80.6           | 132.0              | 184.7     | 92.2    | 225.6     |
| 1961 | 91.0           | 145.5              | 199.4     | 104.7   | 280.0     |
| 1962 | 96.7           | 155.2              | 204.5     | 107.5   | 297.7     |
| 1963 | 94.9           | 163.9              | 207.0     | 130.3   | 300.8     |

<sup>a</sup>Total Federal order receipts are adjusted here to include only that shipped by Tennessee producers.

<sup>b</sup>Estimated year's production from four months production.

Source: Monthly reports of Milk Market Administrator of each Federal order, 1956-1963. Total milk production was given and amount in each area was determined by the per cent of producers in each area that were in Tennessee.

All the orders, with the exception of the Knoxville order, have milk coming in from other states, which increases the total amount of milk available for disposition in the state (Table III). In 1963, 29.5 per cent of the total amount of Grade A milk marketed under Federal orders in Tennessee was produced in surrounding states.

## II. PAST PRICE OF MILK

Data for 1956-1963 show a relatively steady price for milk paid to Tennessee Grade A producers (Table IV). This indicates that the supply has been keeping pace with the demand, and the amount of milk used for Class I purposes has not fluctuated a great amount (Figure 1). The average, unweighted price for 1963 was only one cent different from the average price of three markets in 1956.

There is some variation of prices between the markets. Prices in the Memphis order tend to be the highest of the group, followed closely by the Appalachian order, while prices in the Nashville order tend to be the lowest of the group over a period of time.

## III. PAST PRODUCER CHARACTERISTICS

### Number of Producers

The number of Tennessee Grade A producers selling milk under Federal order in Tennessee was 3118 in 1963, or a decrease of 18 per cent since 1957. The number of producers reached a peak in 1957 and have decreased continuously since that date (Table V). The Nashville



TABLE III

TOTAL POUNDS OF GRADE A MILK DELIVERED BY PRODUCERS REGARDLESS OF STATE OF LOCATION TO HANDLERS ON FEDERAL ORDER MARKET WITH MARKET AREA IN TENNESSEE, 1956-1963

| Year | Market Area    |                    |           |         | State     |
|------|----------------|--------------------|-----------|---------|-----------|
|      | Appalachian    | Chattanooga        | Knoxville | Memphis | Nashville |
|      | Million Pounds |                    |           |         |           |
| 1956 | 126.8          | 132.0 <sup>a</sup> | 153.2     | 202.0   | 219.5     |
| 1957 | 136.0          | 142.8              | 174.5     | 199.6   | 242.2     |
| 1958 | 137.8          | 142.5              | 169.5     | 182.2   | 246.9     |
| 1959 | 150.4          | 149.8              | 176.3     | 197.9   | 251.0     |
| 1960 | 161.2          | 155.3              | 184.7     | 217.3   | 265.3     |
| 1961 | 237.9          | 171.2              | 199.4     | 233.9   | 329.2     |
| 1962 | 243.3          | 182.6              | 204.5     | 268.6   | 350.2     |
| 1963 | 245.9          | 192.9              | 207.0     | 277.4   | 353.9     |
|      |                |                    |           |         | 833.5     |
|      |                |                    |           |         | 895.1     |
|      |                |                    |           |         | 868.9     |
|      |                |                    |           |         | 925.4     |
|      |                |                    |           |         | 983.8     |
|      |                |                    |           |         | 1,171.6   |
|      |                |                    |           |         | 1,249.2   |
|      |                |                    |           |         | 1,277.1   |

<sup>a</sup>Estimated year's production from four months production.

Source: Monthly reports of Milk Market Administrator of each Federal order, 1956-1963.

TABLE IV  
NEGOTIATED BLEND PRICES PAID TO FARMERS FOR GRADE A MILK IN TENNESSEE,  
1956-1963 (3.5% MILK)

| Years | Market Area |                   |           |         |           | Average*          |
|-------|-------------|-------------------|-----------|---------|-----------|-------------------|
|       | Appalachian | Chattanooga       | Knoxville | Memphis | Nashville |                   |
| 1956  |             | 4.73 <sup>a</sup> | 4.52      |         | 4.70      | 4.65 <sup>b</sup> |
| 1957  |             | 4.54              | 4.28      | 4.81    | 3.94      | 4.39 <sup>c</sup> |
| 1958  | 4.82        | 4.52              | 4.44      | 4.65    | 4.12      | 4.50              |
| 1959  | 4.72        | 4.56              | 4.62      | 4.65    | 4.30      | 4.57              |
| 1960  | 4.73        | 4.61              | 4.63      | 4.80    | 4.40      | 4.64              |
| 1961  | 4.60        | 4.45              | 4.58      | 4.96    | 4.38      | 4.59              |
| 1962  | 4.57        | 4.40              | 4.47      | 4.75    | 4.37      | 4.51              |
| 1963  | 4.60        | 4.57              | 4.64      | 4.82    | 4.55      | 4.64              |

\* Unweighted average for each year.

<sup>a</sup> Average for four months.

<sup>b</sup> Average of three markets.

<sup>c</sup> Average of four markets.

Source: Records of Milk Market Administrators, Knoxville, Chattanooga, Memphis, Knoxville, and Tri-State Milk Producers' Association, Bristol.

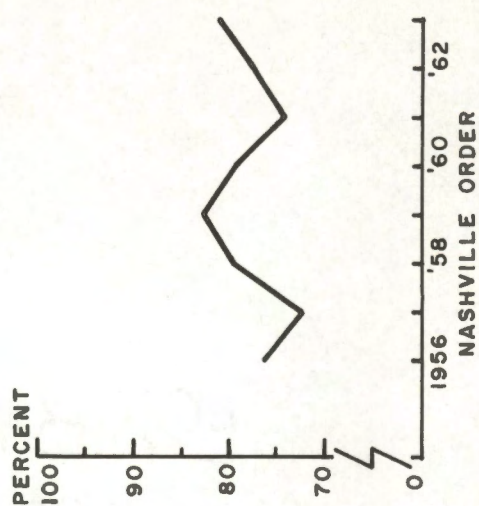
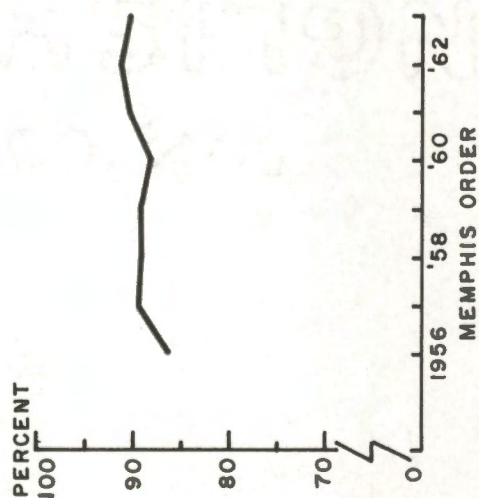
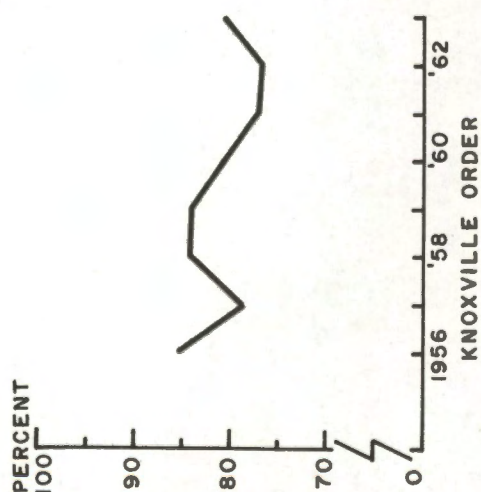
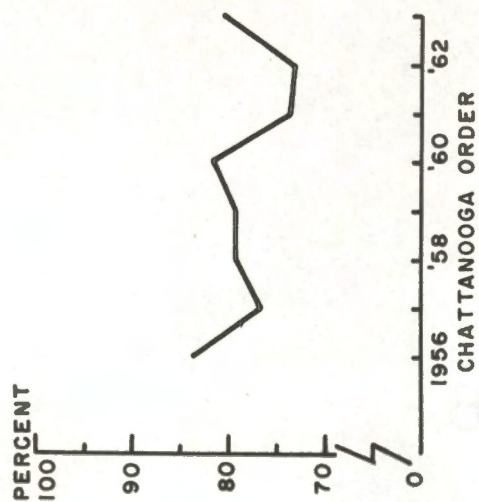
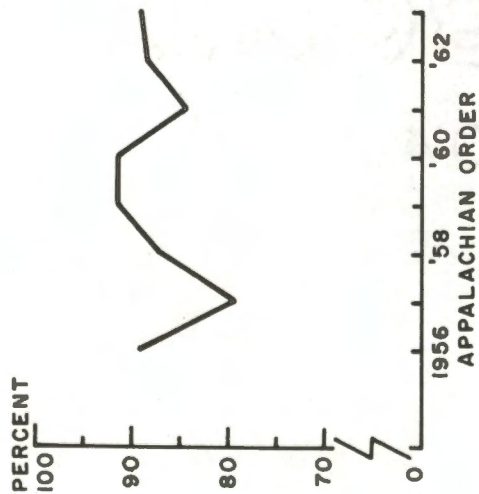
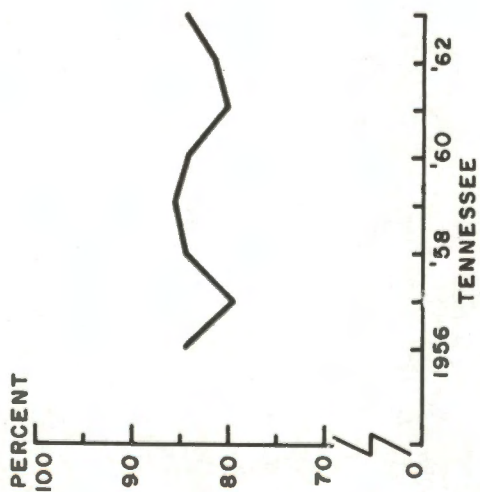


Figure 1. Per Cent of Grade A Producer Milk Used for Class I Purposes, Five Tennessee Federal Order Markets, 1956-1963.

Source: Monthly reports of Milk Market Administrator of each Federal Order, 1956-1963.



TABLE V

NUMBER OF GRADE A PRODUCERS IN TENNESSEE SHIPPING TO  
FEDERAL ORDER MARKETS IN THE STATE, 1956-1963<sup>a</sup>

| Year | Market Area |                  |           |         |           |
|------|-------------|------------------|-----------|---------|-----------|
|      | Appalachian | Chattanooga      | Knoxville | Memphis | Nashville |
| 1956 | 301         | 706 <sup>b</sup> | 968       | 473     | 1296      |
| 1957 | 336         | 682              | 1017      | 454     | 1320      |
| 1958 | 346         | 668              | 995       | 416     | 1250      |
| 1959 | 379         | 626              | 949       | 396     | 1186      |
| 1960 | 394         | 595              | 928       | 396     | 1148      |
| 1961 | 322         | 579              | 876       | 409     | 1202      |
| 1962 | 299         | 515              | 784       | 396     | 1167      |
| 1963 | 291         | 586              | 762       | 381     | 1098      |

<sup>a</sup>Average for each year except Memphis, 1962, is for month of November and Nashville, 1962, is for month of March.

<sup>b</sup>Average for four months.

Source: Monthly reports of Milk Market Administrator of each Federal order, 1956-1963.

order had the largest number of producers in the state, 1098 in 1963, and the Appalachian order had the fewest, 291 producers.

The Knoxville and Appalachian orders had the largest percentage decrease in numbers of producers. The Knoxville order decreased from 1017 producers in 1957 to 762 in 1963 for a 25 per cent decrease, and the Appalachian order decreased from 394 in 1960 to 291 in 1963 for a 26 per cent decrease. Also, the Knoxville order lost a total of 255 producers which was the largest actual decrease of any order, followed by the Nashville order, which dropped from 1320 in 1957 to 1098 in 1963, a loss of 222 producers, down 17 per cent. This was the lowest per cent decrease of all orders.

#### Size of Operations

Historical figures for Grade A producers are not available, but the total number of dairy cows on Tennessee farms and production per cow is shown in Figure 2. Milk production for all cows increased 27.5 per cent from 1950 to 1963, while the number of cows on Tennessee farms decreased 21 per cent.

The average daily production per Grade A producer is given in Table VI. For the entire state, production of milk per producer per day increased 75 per cent from 1956 to 1963. The Memphis order had the highest average production per producer, 856 pounds, and had the highest per cent increase since 1956, 81 per cent. The Appalachian order had the least per cent increase of all the orders. Production increased from 499 to 810 pounds per producer per day for a 62 per cent increase. The Nashville



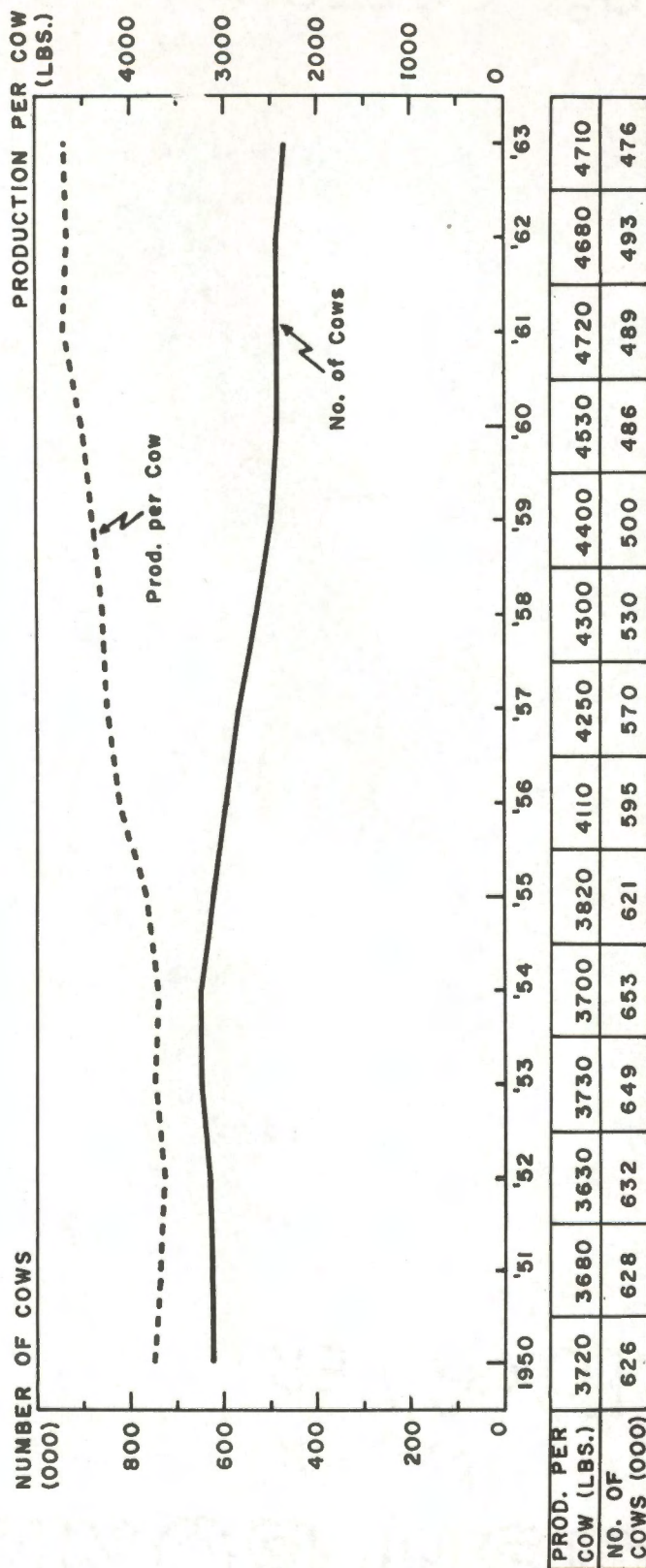


Figure 2. Total Number of Milk Cows and Estimated Production Per Cow, Tennessee, 1950-1963.

Source: United States Department of Agriculture, Statistical Bulletin 289, Milk Cows on Farms, Production Per Cow, and Total Production (Washington: Government Printing Office, 1961), p. 39; United States Department of Agriculture, Da 3 (62), Da 3 (63), Milk Production and Dairy Products (Washington: Government Printing Office, 1962, 1963), 1962, p. 6; 1963, p. 6. United States Department of Agriculture, Milk Production and Dairy Products, 1963 (Washington: Government Printing Office, February, 1964), p. 7.



TABLE VI

VOLUME OF MILK DELIVERED DAILY PER PRODUCER IN TENNESSEE FEDERAL ORDER MARKETS  
FOR ALL ORDER PRODUCERS, 1956-1963

| Year | Market Area |                  |           |         |           | Average <sup>a</sup> |
|------|-------------|------------------|-----------|---------|-----------|----------------------|
|      | Appalachian | Chattanooga      | Knoxville | Memphis | Nashville |                      |
| 1956 | 499         | 443 <sup>b</sup> | 433       | 473     | 394       | 448                  |
| 1957 | 555         | 488              | 470       | 514     | 427       | 493                  |
| 1958 | 551         | 496              | 467       | 512     | 441       | 511                  |
| 1959 | 599         | 557              | 509       | 580     | 493       | 547                  |
| 1960 | 638         | 608              | 545       | 627     | 534       | 590                  |
| 1961 | 703         | 689              | 624       | 704     | 638       | 671                  |
| 1962 | 788         | 739              | 715       | 769     | 701       | 742                  |
| 1963 | 810         | 766              | 745       | 856     | 749       | 785                  |

<sup>a</sup>Unweighted average.

<sup>b</sup>Average for four months.

Source: Monthly reports of Milk Market Administrator of each Federal order, 1956-1963.

and Knoxville orders had the lowest averages for 1963, 749 and 745 pounds per producer per day respectively, but also had the lowest averages in 1956, 394 and 433 pounds, respectively.

The distribution of producers by pounds of milk produced per day in the Knoxville order is given in Table VII. The figures for this order were used as a case study in detail. It was felt that they would show the changes in distribution of producers, as producers in all the Federal order markets in Tennessee have been changing in the same direction.

Although the total number of producers has changed little since 1952, there have been fluctuation in numbers through this time span, and the size distribution of these producers have changed greatly.

In 1952, 10 per cent of the Knoxville producers produced less than 100 pounds of milk per day, while in 1963 only 0.9 per cent of the total producers produced this amount. A large change also occurred in the 100-199 and 200-299 pound classes. The number of producers here decreased from 26.1 and 22.5 per cent to 5.1 and 10.6 per cent, respectively.

At the other end of the scale, the number of large producers was increasing. Producers in the 1000-1499 pound class increased from 2.3 per cent to 12.9 per cent; the number of producers in the 1500-1999 pound class increased from 0.3 per cent to 4.4, and the highest production class, 2000 pounds and over, increased from 0.5 per cent to 3.5 per cent of all producers.



TABLE VII  
AN EXAMPLE OF CHANGES IN SIZE OF BASE: PER CENT OF KNOXVILLE AREA  
GRADE A PRODUCERS IN EACH BASE RANGE, 1952-63<sup>a</sup>

| Years | Base Range (Pounds Milk Per Day) |         |         |         |         |         |         |         |         |         |           |           |               | Total |
|-------|----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|-----------|---------------|-------|
|       | 0-99                             | 100-199 | 200-299 | 300-399 | 400-499 | 500-599 | 600-699 | 700-799 | 800-899 | 900-999 | 1000-1499 | 1500-1999 | 2000 and Over |       |
| 1952  | 10.0                             | 26.1    | 22.5    | 13.3    | 8.7     | 5.6     | 4.4     | 2.2     | 2.5     | 1.6     | 2.3       | 0.3       | 0.5           | 100.0 |
| 1953  | 6.0                              | 21.7    | 24.4    | 15.0    | 10.1    | 7.5     | 4.4     | 2.9     | 1.8     | 1.8     | 3.8       | 0.0       | 0.5           | 100.0 |
| 1954  | 6.7                              | 18.9    | 24.9    | 15.8    | 10.2    | 7.2     | 4.3     | 3.2     | 2.1     | 2.2     | 3.4       | 0.7       | 0.4           | 100.0 |
| 1955  | 7.3                              | 21.0    | 21.3    | 17.2    | 9.2     | 7.4     | 4.8     | 3.4     | 2.3     | 2.0     | 3.1       | 0.5       | 0.5           | 100.0 |
| 1956  | 6.9                              | 20.1    | 23.2    | 16.8    | 10.3    | 7.8     | 5.0     | 2.4     | 1.5     | 1.8     | 3.2       | 0.4       | 0.6           | 100.0 |
| 1957  | 4.0                              | 14.1    | 20.5    | 20.2    | 12.7    | 8.5     | 5.3     | 3.6     | 3.0     | 2.1     | 4.6       | 0.8       | 0.6           | 100.0 |
| 1958  | 3.4                              | 13.2    | 19.3    | 20.7    | 12.3    | 8.6     | 5.7     | 4.2     | 3.7     | 1.5     | 5.7       | 1.2       | 0.5           | 100.0 |
| 1959  | 4.1                              | 15.0    | 18.1    | 18.0    | 12.7    | 8.6     | 6.0     | 4.0     | 3.5     | 2.1     | 6.0       | 1.1       | 0.8           | 100.0 |
| 1960  | 4.3                              | 13.2    | 15.4    | 14.7    | 14.6    | 9.5     | 7.6     | 4.5     | 3.4     | 2.8     | 6.6       | 2.5       | 0.9           | 100.0 |
| 1961  | 4.3                              | 12.1    | 15.2    | 14.5    | 11.9    | 10.0    | 8.9     | 5.0     | 3.8     | 3.3     | 7.0       | 2.4       | 1.6           | 100.0 |
| 1962  | 4.9                              | 6.4     | 10.9    | 13.8    | 12.2    | 10.8    | 9.8     | 5.8     | 4.2     | 4.2     | 10.5      | 3.6       | 2.9           | 100.0 |
| 1963  | 0.9                              | 5.1     | 10.6    | 12.3    | 13.3    | 10.3    | 8.6     | 8.6     | 5.5     | 4.0     | 12.9      | 4.4       | 3.5           | 100.0 |

<sup>a</sup>Actual figures are available in Appendix.

Source: Records of Knoxville Milk Market Administrator's Office, 1952-1963.

All of the classes above the 300-399 pound class had an increase in percentage of producers, while all the classes below this size had a decrease in percentage of producers.





## CHAPTER III

### CHARACTERISTICS OF THE TENNESSEE GRADE A INDUSTRY, 1963

#### I. LOCATION OF THE SUPPLY

The number of regulated Grade A milk producers in each county is shown in Figure 3. Grade A producers were found in 82 of the 95 counties in Tennessee. The five counties with the largest numbers were McMinn, Rutherford, Williamson, Knox, and Bradley with 195, 156, 152, 137 and 127 producers, respectively. Twenty-two of the counties had less than 10 producers. Fifty-three per cent of the total number of producers were in the milksheds of the three principal metropolitan areas of the eastern section of the state, 12 per cent were in the western section, and 35 per cent were in the central portion of the state (Table V).

The use of in-state milk varied greatly by market. The Appalachian order received about 35 per cent of its milk from Tennessee producers. The Memphis Federal order received approximately 40 per cent of its milk from within Tennessee. The Nashville and Chattanooga orders each received approximately 85 per cent of their milk from within Tennessee, while the Knoxville order obtained all of its milk from within the state (Tables II and III).

#### II. AGE OF OPERATOR

The average age of the Tennessee Grade A producer was 47.1 years. Less than 1 per cent of the producers were under 25, while at the other

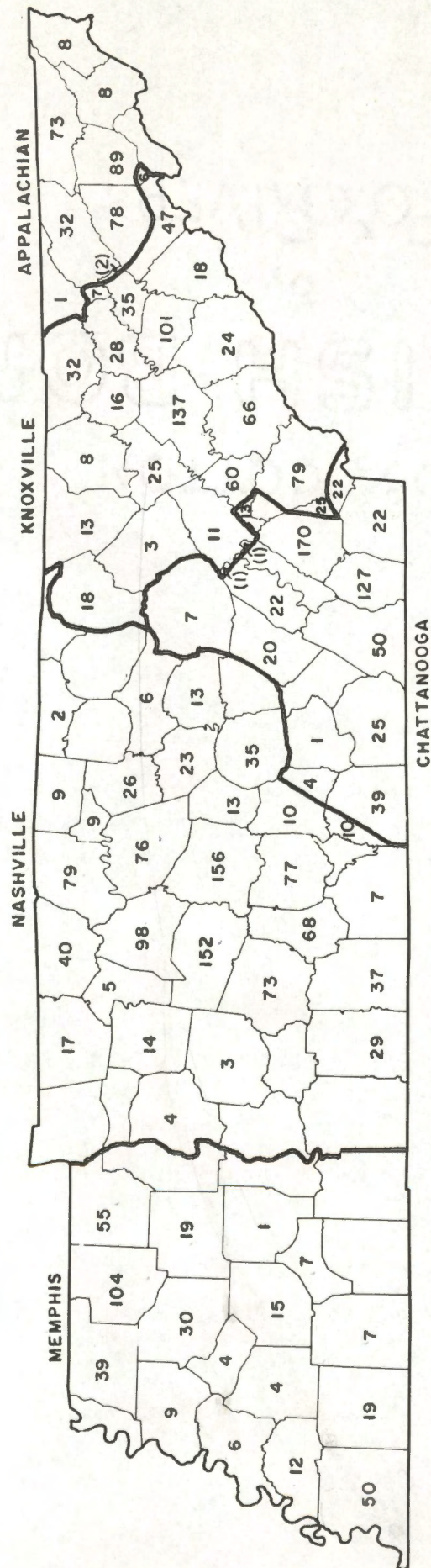


Figure 3. Number of Tennessee Grade A Producers by Counties, March 1963.

Source: Milk Market Administrators' office records.



end of the scale about 6 per cent were 65 years of age or older. Almost 60 per cent of the producers were between 35 and 54 years of age (Table VIII).

The average age of producers in each Federal order varied little. The youngest group averaged 45.8 years of age. This was in the Appalachian order, while the Memphis order had the group with the oldest average age, 49.5 years.

### III. SIZE OF DAIRY FARM

The average Grade A dairy farm in Tennessee had 100.6 acres of cropland, 103.1 acres of pasture, and 46.2 acres of other types of land, for a total of 249.9 acres (Table IX). This ranged from an average size of 217.5 acres in the Knoxville order to 274.0 acres per farm in the Memphis order.

There appeared to be a relationship between farm size and herd size. The Memphis, Nashville, and Chattanooga orders had larger than average size farms (Table IX), and also had a larger than average size herd (Table X). The other two orders showed consistency by having both smaller than average size farms and size of herds per farm.

The percentage of different types of land composing these farms were relatively equal with a few minor exceptions. The farms in the Memphis order tended to have a higher percentage of cropland and lower percentage of pasture, and the farms in the Nashville order tended to

TABLE VIII  
NUMBER OF GRADE A PRODUCERS IN EACH AGE GROUP, BY MARKET AREA, 1963

| Age Group       | Market Area    |             |      |                |             |       |                |             |      |                |             |                         |
|-----------------|----------------|-------------|------|----------------|-------------|-------|----------------|-------------|------|----------------|-------------|-------------------------|
|                 | Appalachian    |             |      | Chattanooga    |             |       | Knoxville      |             |      | Memphis        |             |                         |
|                 | Pro-<br>ducers | Per<br>Cent |      | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |      | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Under 25        | 3              | 1.8         | 3    | 1.0            | 2           | 0.5   | 1              | 0.5         | 4    | 0.8            | 13          | 0.8                     |
| 25 - 34         | 21             | 12.9        | 21   | 7.3            | 54          | 13.0  | 25             | 11.5        | 59   | 11.6           | 180         | 11.3                    |
| 35 - 44         | 51             | 31.3        | 80   | 28.0           | 103         | 24.7  | 57             | 26.3        | 157  | 30.9           | 448         | 28.2                    |
| 45 - 54         | 48             | 29.4        | 90   | 31.5           | 131         | 31.5  | 69             | 31.8        | 159  | 31.3           | 497         | 31.2                    |
| 55 - 64         | 23             | 14.1        | 58   | 20.3           | 92          | 22.1  | 53             | 24.4        | 90   | 17.7           | 316         | 19.9                    |
| 65 and over     | 12             | 7.4         | 22   | 7.7            | 28          | 6.7   | 5              | 2.3         | 33   | 6.5            | 100         | 6.3                     |
| No age<br>given | 5              | 3.1         | 12   | 4.2            | 6           | 1.5   | 7              | 3.2         | 6    | 1.2            | 36          | 2.3                     |
| Average age     | 45.8           |             | 48.1 |                | 48.7        |       | 49.5           |             | 46.6 |                | 47.1        |                         |
| Total           | 163            | 100.0       | 286  | 100.0          | 416         | 100.0 | 217            | 100.0       | 508  | 100.0          | 1590        | 100.0                   |



TABLE IX  
AVERAGE NUMBER ACRES PER FARM, BY MARKET AREA, 1963

| Type Land | Market Area              |             |           |         | State     |
|-----------|--------------------------|-------------|-----------|---------|-----------|
|           | Appalachian              | Chattanooga | Knoxville | Memphis | Nashville |
|           | Number of acres per farm |             |           |         |           |
| Cropland  | 89.6                     | 102.7       | 91.4      | 129.6   | 98.1      |
| Pasture   | 95.1                     | 87.2        | 85.4      | 97.5    | 131.5     |
| Other     | 45.4                     | 62.5        | 40.7      | 46.9    | 41.6      |
| Total     | 230.1                    | 252.4       | 217.5     | 274.0   | 271.2     |

have a lower percentage of cropland and a higher percentage of pasture than farms in the other orders. Farms in the Chattanooga order had a slightly higher percentage of land classified as "other," and a lower percentage of land in pasture than the average for the state.

#### IV. SIZE OF HERD

The average Grade A herd in Tennessee in 1963 consisted of 41 milking and dry cows, excluding heifers. Producers in the Memphis order had an average of 44 cows per herd, followed by the producers of the Chattanooga order with 42, the Nashville order with 41, and the Appalachian order with 40 cows per herd. Producers in the Knoxville order had the smallest average size herd, 38 cows.

The average amount of Grade A milk sold per producer in Tennessee in 1963 was 289,603 pounds. The producers in two orders had higher averages. They were in the Appalachian and Memphis orders with 334,155 and 341,995 pounds, respectively (Table X).

The relatively low production per producer in the Nashville and Chattanooga orders can be explained by the average production per cow in each order below the average for the state, making them rank low in total production for the year, even though they had relatively large herds. The average production per cow in the Appalachian order was the highest average of all the orders, 8,354 pounds.\* Even though the average size

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\*Production per cow is obtained by dividing total deliveries by cow numbers. The figure obtained is actual deliveries per cow and is an understatement of production by the amount of milk used for home consumption.



TABLE X

AVERAGE HERD SIZE, ESTIMATED PRODUCTION PER FARM AND PER COW  
IN TENNESSEE GRADE A MARKETS, 1963

| Market Area | (1)<br>Herd<br>Size <sup>a</sup> | (2)<br>Producers <sup>b</sup> | (3)<br>Cows <sup>c</sup> | (4)<br>Total Producer<br>Deliveries <sup>d</sup> | (5)<br>Deliveries            |        | (6)<br>Per Cow <sup>f</sup> |
|-------------|----------------------------------|-------------------------------|--------------------------|--------------------------------------------------|------------------------------|--------|-----------------------------|
|             |                                  |                               |                          |                                                  | Per<br>Producer <sup>e</sup> | Pounds |                             |
|             | Number Cows                      | Number                        | Number                   | Pounds                                           | Pounds                       | Pounds |                             |
| Appalachian | 40                               | 384                           | 11,360                   | 94,900,000                                       | 334,155                      | 8,354  |                             |
| Chattanooga | 42                               | 580                           | 24,360                   | 163,900,000                                      | 282,586                      | 6,728  |                             |
| Knoxville   | 38                               | 761                           | 28,918                   | 207,000,000                                      | 272,010                      | 7,158  |                             |
| Memphis     | 44                               | 381                           | 16,764                   | 130,300,000                                      | 341,995                      | 7,774  |                             |
| Nashville   | 41                               | 1,071                         | 43,911                   | 300,800,000                                      | 280,859                      | 6,850  |                             |
| State       | 41                               | 3,097                         | 125,313                  | 896,900,000                                      | 289,603                      | 7,157  |                             |

<sup>a</sup>Mail questionnaire of Spring 1963.

<sup>b</sup>Five milk market administrators' office records.

<sup>c</sup>Column 1 times column 2.

<sup>d</sup>January 1964 Market Summary of each milk market administrator.

<sup>e</sup>Column 4 ÷ column 2.

<sup>f</sup>Column 4 ÷ column 3.

herds in this order were small, the farmers here ranked second in total pounds of milk sold per year.

The average production per cow in the Memphis order ranked second, but the large size herds made the producers here have the highest amount of milk sold annually per producer.

Producers in the Knoxville order had the smallest average size herd, 38 cows, and the third highest average production per cow, placing them with the lowest total production per year for each producer.

The distribution of Tennessee Grade A herds by herd size in 1963 is shown in Table XI. Over 50 per cent of the herds consisted of from 20 to 39 cows, and approximately 92 per cent of the herd consisted of from 20 to 75 cows. Only 3 per cent of all herds consisted of over 100 cows.

The distribution among each of the orders was almost the same as the distribution for the entire state. The Memphis order tended to have a slightly higher percentage of producers with herds of 100 cows or more, while the Knoxville and Nashville order tended to have less than average of these large size producers.

Distribution of Grade A producers by amount of milk produced, March 1963, is shown in Table XII. Fifty-four per cent of the producers sold between 10,000 and 30,000 pounds of milk, and 85 per cent sold less than 40,000 pounds.

TABLE XI

NUMBER OF GRADE A PRODUCERS IN EACH HERD SIZE CLASS, BY MARKET AREA, 1963

| Size Herd    | Market Area    |             |  |                |             |  |                |             |  |                |             |                         |
|--------------|----------------|-------------|--|----------------|-------------|--|----------------|-------------|--|----------------|-------------|-------------------------|
|              | Appalachian    |             |  | Chattanooga    |             |  | Knoxville      |             |  | Memphis        |             |                         |
|              | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 0 - 19       | 12             | 7.4         |  | 21             | 7.3         |  | 50             | 12.0        |  | 19             | 8.7         | 135                     |
| 20 - 29      | 48             | 29.4        |  | 69             | 24.1        |  | 113            | 27.2        |  | 54             | 24.9        | 402                     |
| 30 - 39      | 47             | 28.8        |  | 60             | 21.0        |  | 99             | 23.8        |  | 42             | 19.4        | 405                     |
| 40 - 49      | 20             | 12.3        |  | 43             | 15.0        |  | 67             | 16.1        |  | 29             | 13.4        | 241                     |
| 50 - 74      | 26             | 16.0        |  | 75             | 26.2        |  | 63             | 15.2        |  | 53             | 24.4        | 296                     |
| 75 - 99      | 4              | 2.4         |  | 7              | 2.5         |  | 13             | 3.1         |  | 9              | 4.1         | 60                      |
| 100 and over | 6              | 3.7         |  | 11             | 3.9         |  | 11             | 2.6         |  | 11             | 5.1         | 51                      |
| Total        | 163            | 100.0       |  | 286            | 100.0       |  | 416            | 100.0       |  | 217            | 100.0       | 1590                    |



TABLE XII

POUNDS MILK PRODUCED, MARCH 1963, BY GRADE A PRODUCERS, BY MARKET AREA

| Pounds Milk     | Market Area    |             |  |                |             |  |                |             |  |                |             |                         |
|-----------------|----------------|-------------|--|----------------|-------------|--|----------------|-------------|--|----------------|-------------|-------------------------|
|                 | Appalachian    |             |  | Chattanooga    |             |  | Knoxville      |             |  | Memphis        |             |                         |
|                 | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 0 - 4900        | 12             | 7.4         |  | 33             | 11.5        |  | 46             | 11.0        |  | 21             | 9.7         | 165                     |
| 5000 - 9900     | 10             | 6.1         |  | 36             | 12.3        |  | 44             | 10.6        |  | 10             | 4.6         | 143                     |
| 10,000 - 19,900 | 59             | 36.2        |  | 89             | 31.1        |  | 128            | 30.8        |  | 63             | 29.0        | 502                     |
| 20,000 - 29,000 | 37             | 22.7        |  | 59             | 20.6        |  | 101            | 24.3        |  | 47             | 21.7        | 362                     |
| 30,000 - 39,900 | 20             | 12.3        |  | 32             | 11.2        |  | 41             | 9.9         |  | 32             | 14.8        | 181                     |
| 40,000 - 49,900 | 9              | 5.5         |  | 18             | 6.3         |  | 23             | 5.5         |  | 19             | 8.7         | 108                     |
| 50,000 - 59,900 | 7              | 4.3         |  | 3              | 1.1         |  | 13             | 3.1         |  | 9              | 4.1         | 41                      |
| 60,000 and over | 9              | 5.5         |  | 16             | 5.6         |  | 20             | 4.8         |  | 16             | 7.4         | 88                      |
| Total           | 163            | 100.0       |  | 286            | 100.0       |  | 416            | 100.0       |  | 217            | 100.0       | 1590                    |

## V. BREED OF CATTLE

Fifty-five per cent of the dairy cows on farms of producers reporting were Holsteins, 27 per cent were Jerseys, 12 per cent were Guernseys, and 6 per cent were other breeds. The Holstein breed composed nearly 70 per cent of all cattle of producers responding in the Appalachian and Memphis orders, but only approximately 37 per cent of all cattle in the Chattanooga order. The Jersey breed was found more frequently in the Chattanooga order. Here it composed 45 per cent of all cattle, while in the Appalachian order it composed only 9 per cent. (See Figure 4.)

Perhaps the best way to look at the importance of each breed is to classify farms by dominant breed. The number of each breed of cattle in each herd was counted and one breed was declared dominant if it composed at least 75 per cent of that herd. If no one breed composed 75 per cent, that herd was declared as being mixed with no one breed being dominant. For all size herds taken together, 44 per cent of the herds had no dominant breed, but were classified as mixed (Table XIII). The smaller size herds (0-19, 20-29, and 30-39 cows) had a higher than average per cent of this type of breed mixing. The Holstein breed was dominant in 37 per cent of all herds, with the herds with more than 40 cows having a higher than average per cent of this breed. The Jersey breed was dominant in 13 per cent of all herds, being relatively equally distributed in all size herds, while the Guernsey breed was dominant in only 4 per cent of all herds.



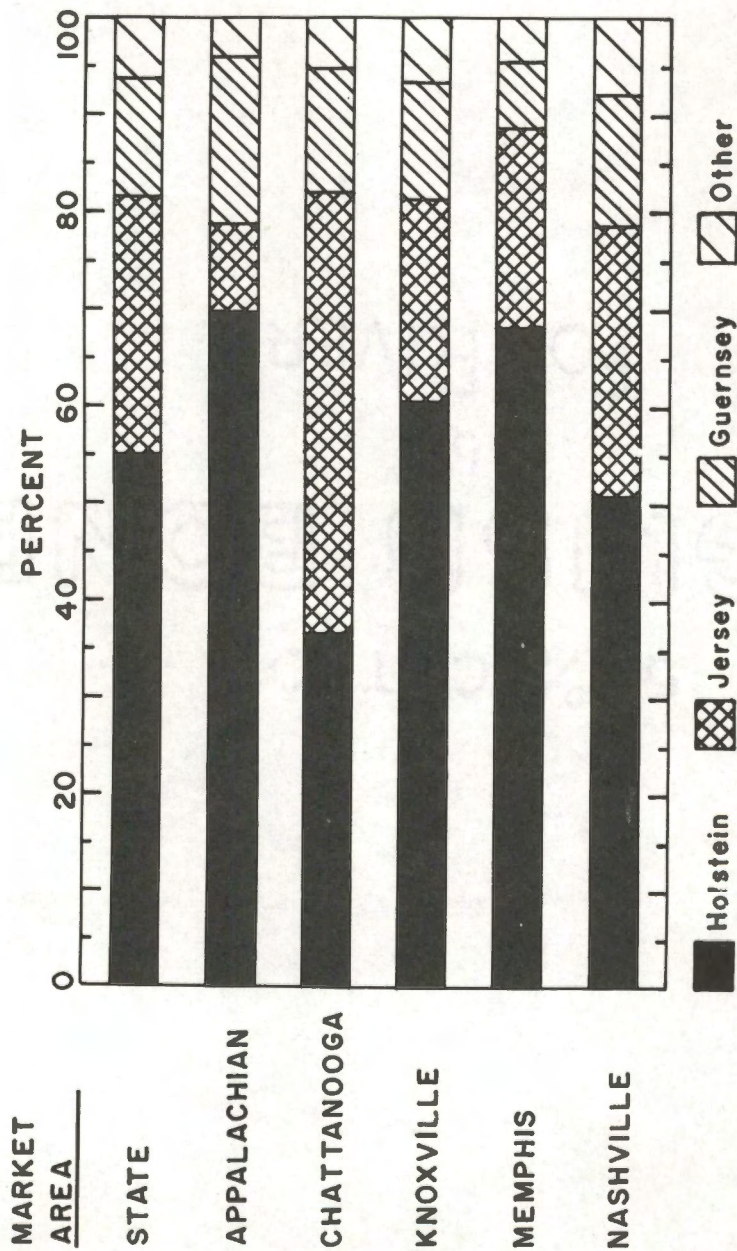


Figure 4. Composition of Milk Cows on Farms of Grade A Producers in Tennessee, March 1963.



TABLE XIII

DOMINANT BREED OF CATTLE IN TENNESSEE GRADE A HERDS BY HERD SIZE, 1963

| Dominant Breed <sup>a</sup> | Herd Size (Number of Cows) |       |            |       |            |       |            |       |            |       |            |       |
|-----------------------------|----------------------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|
|                             | 0 - 19                     |       | 20 - 29    |       | 30 - 39    |       | 40 - 49    |       | 50 - 74    |       | 75 - 99    |       |
|                             | Herds Cent                 | Per   | Herds Cent | Per   | Herds Cent | Per   | Herds Cent | Per   | Herds Cent | Per   | Herds Cent | Per   |
| Holstein                    | 41                         | 30.4  | 134        | 33.3  | 141        | 34.8  | 104        | 43.2  | 132        | 44.6  | 28         | 46.7  |
| Jersey                      | 19                         | 14.1  | 48         | 11.9  | 43         | 10.6  | 38         | 15.8  | 38         | 12.8  | 7          | 11.7  |
| Guernsey                    | 4                          | 3.0   | 15         | 3.7   | 17         | 4.2   | 7          | 2.9   | 11         | 3.8   | 5          | 8.3   |
| Other                       | 0                          | 0.0   | 9          | 2.2   | 9          | 2.2   | 7          | 2.9   | 3          | 1.0   | 0          | 0.0   |
| Mixed                       | 66                         | 48.8  | 195        | 48.5  | 194        | 47.9  | 85         | 35.2  | 112        | 37.8  | 20         | 33.3  |
| No breed given              | 5                          | 3.7   | 1          | 0.4   | 1          | 0.3   | 0          | 0.0   | 0          | 0.0   | 0          | 0.0   |
| Total                       | 135                        | 100.0 | 402        | 100.0 | 405        | 100.0 | 241        | 100.0 | 296        | 100.0 | 60         | 100.0 |
|                             |                            |       |            |       |            |       |            |       |            |       | 51         | 100.0 |
|                             |                            |       |            |       |            |       |            |       |            |       | 1590       | 100.0 |

<sup>a</sup>Seventy-five per cent of a single breed in a herd is dominant.



## VI. PROPORTION OF FARM INCOME FROM DAIRYING

Slightly over 75 per cent of the producers had a source of farm income other than dairying (Table XIV). Dairying tended to be the major source of income, as the sale of milk comprised at least 70 per cent of the farm income of approximately 75 per cent of the producers.

The Chattanooga order had the highest per cent of producers receiving all their farm income from dairying, 38 per cent, and the Appalachian order with 11 per cent of its producers in this class was the lowest of all the orders. The order with the highest per cent of its producers receiving less than 50 per cent of their income from dairying was the Memphis order.

Producers in the Chattanooga, Knoxville, and Nashville orders tended to have a higher per cent of producers with the sale of dairy products making up a high per cent of their farm income, indicating a greater emphasis being placed on the dairy enterprise. It was also shown in Table X that the producers in the Chattanooga and Nashville orders had a larger than average herd size.

The source of farm income other than the sale of dairy products found most frequently, with the exception of the Memphis order, was the sale of tobacco (Table XV). Approximately 80 per cent of the producers in the Appalachian order and 69 per cent of the Knoxville producers raised tobacco. Only 7 per cent of the Memphis order producers raised tobacco, but 45 per cent of them raised cotton.



PER CENT OF GRADE A PRODUCERS' FARM INCOME FROM DAIRYING, BY MARKET AREA, 1963

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TABLE XV

OTHER SOURCES OF FARM INCOME FOR GRADE A PRODUCERS, BY MARKET AREA, 1963

| Source of Income               | Market Area    |             |     |                |             |      |                |             |     |                |             |                         |
|--------------------------------|----------------|-------------|-----|----------------|-------------|------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                                | Appalachian    |             |     | Chattanooga    |             |      | Knoxville      |             |     | Memphis        |             |                         |
|                                | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent |      | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Tobacco                        | 129            | 79.1        | 107 | 37.4           | 287         | 69.0 | 15             | 6.9         | 238 | 46.8           | 776         | 48.8                    |
| Beef cattle                    | 41             | 25.2        | 34  | 11.9           | 40          | 9.6  | 25             | 11.5        | 96  | 18.9           | 236         | 14.8                    |
| Hogs                           | 4              | 2.5         | 14  | 4.9            | 27          | 6.5  | 42             | 19.4        | 104 | 20.5           | 191         | 12.0                    |
| Poultry                        | 6              | 3.7         | 13  | 4.5            | 9           | 2.2  | 0              | 0           | 20  | 3.5            | 48          | 3.0                     |
| Wheat                          | 6              | 3.7         | 8   | 2.8            | 9           | 2.2  | 8              | 3.7         | 23  | 4.5            | 54          | 3.4                     |
| Cotton                         | 1              | 0.6         | 6   | 2.1            | 0           | 0    | 98             | 45.2        | 136 | 26.8           | 241         | 15.2                    |
| Other crops                    | 10             | 6.1         | 13  | 4.5            | 26          | 6.3  | 62             | 28.6        | 73  | 14.4           | 184         | 11.6                    |
| Other livestock                | 8              | 4.9         | 6   | 2.1            | 1           | 0.2  | 3              | 1.4         | 39  | 7.7            | 57          | 3.6                     |
| All other sources              | 12             | 7.4         | 29  | 10.1           | 18          | 4.3  | 13             | 6.0         | 45  | 8.9            | 117         | 7.4                     |
| Number of producers responding | 163            |             | 286 |                | 416         |      | 217            |             | 508 |                | 1590        |                         |



The sale of beef cattle was an important income source of producers in the Appalachian order, while the sale of hogs was predominant in the Memphis and Nashville orders. A source of income classified as other crops was found in a relatively high per cent of the Memphis order producers.

Although a large per cent of the producers had sources of farm income other than dairying, 86 per cent of all producers worked less than 50 hours a year off the farm (Table XVI). This would tend to indicate that most producers operated their farms on a full-time basis.

Eighty-eight per cent of the producers in the Chattanooga order worked less than 50 days a year off the farm, which was the highest per cent in this class of all orders. Approximately 3 per cent of all producers worked from 100 to 200 days off the farm each year, while approximately 8 per cent worked over 200 days a year off the farm.

Thus, dairy farming tended to be a full-time operation under the conditions present in Tennessee during the year of 1963 with the relatively large size herds and acreage under individual management.

This point is further made when considering the number of full-time workers needed to operate a Grade A dairy farm. Approximately 65 per cent of all farms required more than 1 full-time worker to carry on its operation (Table XVII). Farms requiring 2 full-time workers was the largest group, comprising 40 per cent of all farms. Nearly 16 per cent of all farms required 3 full-time workers and approximately 6 per cent of all farms required 4 full-time workers.

TABLE XVI  
DAYS WORKED OFF FARM PER YEAR PER PRODUCER, BY MARKET AREA, 1962

| Days Worked<br>Off Farm<br>Per Year | Market Area    |             |     |                |             |       |                |             |     |                |             |                         |
|-------------------------------------|----------------|-------------|-----|----------------|-------------|-------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                                     | Appalachian    |             |     | Chattanooga    |             |       | Knoxville      |             |     | Memphis        |             |                         |
|                                     | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 0 - 49                              | 138            | 84.6        | 252 | 88.1           | 353         | 84.9  | 193            | 88.9        | 429 | 84.5           | 1365        | 85.9                    |
| 50 - 99                             | 4              | 2.5         | 3   | 1.1            | 9           | 2.2   | 8              | 3.7         | 14  | 2.7            | 38          | 2.4                     |
| 100 - 149                           | 1              | 0.6         | 4   | 1.4            | 5           | 1.2   | 2              | 0.9         | 7   | 1.4            | 19          | 1.2                     |
| 150 - 199                           | 1              | 0.6         | 6   | 2.1            | 11          | 2.6   | 5              | 2.3         | 11  | 2.2            | 34          | 2.1                     |
| 200 - 249                           | 4              | 2.5         | 4   | 1.4            | 7           | 1.7   | 1              | 0.5         | 4   | 0.8            | 20          | 1.3                     |
| 250 - 299                           | 8              | 4.9         | 9   | 3.1            | 14          | 3.3   | 1              | 0.5         | 21  | 4.1            | 53          | 3.3                     |
| 300 and over                        | 7              | 4.3         | 8   | 2.8            | 17          | 4.1   | 7              | 3.2         | 22  | 4.3            | 61          | 3.8                     |
| Total                               | 163            | 100.0       | 286 | 100.0          | 416         | 100.0 | 217            | 100.0       | 508 | 100.0          | 1590        | 100.0                   |



TABLE XVII

DISTRIBUTION OF TENNESSEE GRADE A FARMS BY NUMBER OF FULL-TIME WORKERS REQUIRED TO OPERATE FARM, BY MARKET AREA, 1963

| Number of Full-Time Workers | Market Area |          |             |          |           |          |         |          |           |          |       |          |
|-----------------------------|-------------|----------|-------------|----------|-----------|----------|---------|----------|-----------|----------|-------|----------|
|                             | Appalachian |          | Chattanooga |          | Knoxville |          | Memphis |          | Nashville |          | State |          |
|                             | Farms       | Per Cent | Farms       | Per Cent | Farms     | Per Cent | Farms   | Per Cent | Farms     | Per Cent | Farms | Per Cent |
| One                         | 38          | 25.8     | 101         | 35.7     | 141       | 34.5     | 57      | 30.8     | 189       | 37.9     | 526   | 34.5     |
| Two                         | 60          | 40.8     | 116         | 41.0     | 148       | 36.2     | 69      | 37.3     | 211       | 42.3     | 604   | 39.7     |
| Three                       | 26          | 17.7     | 43          | 15.2     | 84        | 20.5     | 27      | 14.6     | 59        | 11.8     | 239   | 15.7     |
| Four                        | 14          | 9.5      | 14          | 4.9      | 21        | 5.1      | 15      | 8.1      | 23        | 4.6      | 87    | 5.7      |
| Five                        | 6           | 4.1      | 6           | 2.1      | 8         | 2.0      | 5       | 2.7      | 9         | 1.8      | 34    | 2.2      |
| Six                         | 2           | 1.4      | 2           | 0.7      | 2         | 0.5      | 8       | 4.3      | 3         | 0.6      | 17    | 1.1      |
| Seven                       | 0           | 0        | 1           | 0.4      | 3         | 0.7      | 3       | 1.6      | 4         | 0.8      | 11    | 0.7      |
| Eight                       | 0           | 0        | 0           | 0        | 0         | 0        | 1       | 0.6      | 0         | 0        | 1     | 0.1      |
| Nine                        | 1           | 0.7      | 0           | 0        | 2         | 0.5      | 0       | 0        | 1         | 0.2      | 4     | 0.3      |
| Total                       | 147         | 100.0    | 283         | 100.0    | 409       | 100.0    | 185     | 100.0    | 499       | 100.0    | 1523  | 100.0    |

## VII. OWNERSHIP OF FARMS

Slightly over 60 per cent of all Grade A milk producers owned all of their farm land, while almost 5 per cent rented all of their land for farming (Table XVIII). The Appalachian and Nashville orders had the highest percentages of producers owning all of their farm land, 69.6 and 67.2 per cent, respectively. Only 46.7 per cent of the producers in the Memphis order owned all of their farm land.

Twenty-two per cent of the producers in the Memphis order rented one-half of their land, and 10 per cent rented all of their land. Both of these percentages are approximately twice the average for the entire state. Only 3 per cent of all producers rented three-fourths of their farm land, further indicating that the predominate practice is for the producer to own a large proportion of his farm land.



TABLE XVIII

TYPE OF FARM OWNERSHIP OF TENNESSEE GRADE A PRODUCERS, BY MARKET AREA, 1963

| Type of<br>Ownership          | Market Area    |             |  |                |             |  |                |             |  |                |             |                         |
|-------------------------------|----------------|-------------|--|----------------|-------------|--|----------------|-------------|--|----------------|-------------|-------------------------|
|                               | Appalachian    |             |  | Chattanooga    |             |  | Knoxville      |             |  | Memphis        |             |                         |
|                               | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Own all land                  | 103            | 69.6        |  | 181            | 65.6        |  | 224            | 59.3        |  | 93             | 46.7        | 923                     |
| Rent $\frac{1}{4}$ of land    | 26             | 17.6        |  | 64             | 23.2        |  | 90             | 23.8        |  | 37             | 18.6        | 281                     |
| Rent $\frac{1}{2}$ of land    | 10             | 6.7         |  | 20             | 7.2         |  | 42             | 11.1        |  | 43             | 21.6        | 162                     |
| Rent $\frac{3}{4}$ of<br>land | 5              | 3.4         |  | 8              | 2.9         |  | 10             | 2.6         |  | 7              | 3.5         | 44                      |
| Rent all land                 | 4              | 2.7         |  | 3              | 1.1         |  | 12             | 3.2         |  | 19             | 9.6         | 70                      |
| Total                         | 148            | 100.0       |  | 276            | 100.0       |  | 378            | 100.0       |  | 199            | 100.0       | 1480                    |
|                               |                |             |  |                |             |  |                |             |  |                |             | 100.0                   |

## CHAPTER IV

### OPERATIONAL METHODS OF TENNESSEE GRADE A PRODUCERS, 1963

#### I. SOURCE OF REPLACEMENT CATTLE

Where Tennessee producers obtain their replacements will affect quality and future ability of the herds to produce. Approximately 80 per cent of all Grade A producers purchased 25 per cent or less of all their replacement cattle in 1963 (Table XIX). Fifty-six per cent of all producers raised all their replacements, while only 6 per cent of the producers bought all of their replacements. Sixty-two per cent of the Chattanooga order producers raised all of their replacements, while only 45 per cent of the Memphis order producers raised all of theirs, which were the highest and lowest percentages, respectively, in this category.

Eight per cent of the Memphis order producers bought all of their replacements, while only 3.8 per cent of the Chattanooga order producers bought all of theirs, which again are the highest and lowest percentages, respectively, in this class.

#### II. SOURCES OF FEEDS

It is usual for farmers to purchase concentrate feeds and raise bulky feeds where resources for both are limited. To note the extent of self-sufficiency in feed for dairy animals, producers were asked to state the sources of their feeds. Approximately 70 per cent of all



TABLE XIX

PURCHASES OF REPLACEMENT CATTLE BOUGHT BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Per Cent of<br>Replacements<br>Bought <sup>a</sup> | Market Area    |             |      |                |             |       |                |             |     |                |             |                         |
|----------------------------------------------------|----------------|-------------|------|----------------|-------------|-------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                                                    | Appalachian    |             |      | Chattanooga    |             |       | Knoxville      |             |     | Memphis        |             |                         |
|                                                    | Pro-<br>ducers | Per<br>Cent |      | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 0                                                  | 91             | 59.1        | 1964 | 61.9           | 211         | 53.5  | 93             | 44.9        | 289 | 59.6           | 847         | 56.4                    |
| 25                                                 | 34             | 22.1        | 56   | 21.1           | 109         | 27.7  | 59             | 28.8        | 115 | 23.7           | 373         | 24.8                    |
| 50                                                 | 12             | 7.8         | 21   | 7.9            | 32          | 8.1   | 30             | 14.6        | 36  | 7.4            | 131         | 8.7                     |
| 75                                                 | 7              | 4.5         | 14   | 5.3            | 14          | 3.6   | 7              | 3.4         | 18  | 3.7            | 60          | 4.0                     |
| 100                                                | 10             | 6.5         | 10   | 3.8            | 28          | 7.1   | 17             | 8.3         | 27  | 5.6            | 92          | 6.1                     |
| Total                                              | 154            | 100.0       | 265  | 100.0          | 394         | 100.0 | 205            | 100.0       | 485 | 100.0          | 1503        | 100.0                   |

<sup>a</sup>Producers were asked to check the percentage which most nearly represented their replacement policy.

producers raised all of the hay they used, and 17 per cent bought 25 per cent of their hay (Table XX). Sixty-two per cent of the producers in the Memphis order raised all of their hay, which was the lowest per cent of any order. In the Appalachian order almost 80 per cent of the producers raised all of their hay, and 0.6 per cent of them bought all of theirs, which were the highest and lowest percentages in these two categories. Producers in the Appalachian, Chattanooga, and Knoxville orders all raised more of their hay than did producers of the other two orders. For all producers, 4.5 per cent bought all of their hay.

The spring of 1963 was before the serious drought conditions developed later in the year, and was normal in terms of fall 1962 pasture and winter feeding. The present purchase patterns are perhaps changed due to the drought of the fall of 1963, which caused farmers to begin an earlier feeding of cattle.

Feed grains used by producers tended to come more from outside the farms than did hay. Forty-one per cent of all producers bought all of their feed grains, while only 11 per cent raised all of theirs (Table XXI). This means that at least 89 per cent of the producers bought some portion of the grains fed.

Nineteen per cent of the Memphis order producers raised all of their feed grains, and 29 per cent of this group bought all, which were the highest and lowest percentages, respectively, indicating that this group of producers had a tendency to raise more of this type of feed. They may have done so because they had larger than average farms,



TABLE XX

PURCHASES OF HAY BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Per Cent<br>of Hay<br>Purchased | Market Area    |             |             |                |             |             |                |             |             |                |             |             |
|---------------------------------|----------------|-------------|-------------|----------------|-------------|-------------|----------------|-------------|-------------|----------------|-------------|-------------|
|                                 | Appalachian    |             |             | Chattanooga    |             |             | Knoxville      |             |             | Memphis        |             |             |
|                                 | Pro-<br>ducers | Per<br>Cent | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Per<br>Cent |
| 0                               | 124            | 79.5        | 201         | 73.1           | 289         | 72.6        | 128            | 62.1        | 335         | 67.1           | 1077        | 70.2        |
| 25                              | 27             | 17.3        | 53          | 19.3           | 75          | 18.8        | 31             | 15.1        | 70          | 14.1           | 256         | 16.7        |
| 50                              | 2              | 1.3         | 11          | 4.0            | 22          | 5.5         | 24             | 11.6        | 35          | 7.0            | 94          | 6.1         |
| 75                              | 2              | 1.3         | 3           | 1.1            | 5           | 1.3         | 9              | 4.4         | 19          | 3.8            | 38          | 2.5         |
| 100                             | 1              | 0.6         | 7           | 2.5            | 7           | 1.8         | 14             | 6.8         | 40          | 8.0            | 69          | 4.5         |
| Total                           | 156            | 100.0       | 275         | 100.0          | 398         | 100.0       | 206            | 100.0       | 499         | 100.0          | 1534        | 100.0       |

TABLE XXI

PURCHASES OF FEED GRAINS BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Per Cent<br>of Feed<br>Grains<br>Purchased | Market Area    |             |  |                |             |  |                |             |  |                |             |                         |
|--------------------------------------------|----------------|-------------|--|----------------|-------------|--|----------------|-------------|--|----------------|-------------|-------------------------|
|                                            | Appalachian    |             |  | Chattanooga    |             |  | Knoxville      |             |  | Memphis        |             |                         |
|                                            | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 100                                        | 62             | 38.7        |  | 110            | 39.7        |  | 197            | 48.2        |  | 61             | 29.1        | 212                     |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 42.5                    |
| 75                                         | 23             | 14.4        |  | 36             | 13.0        |  | 62             | 15.2        |  | 22             | 10.5        | 87                      |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 17.4                    |
| 50                                         | 26             | 16.3        |  | 48             | 17.3        |  | 72             | 17.8        |  | 53             | 25.2        | 72                      |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 14.4                    |
| 25                                         | 32             | 20.0        |  | 55             | 19.9        |  | 54             | 13.2        |  | 35             | 16.7        | 69                      |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 13.9                    |
| 0                                          | 17             | 10.6        |  | 28             | 10.1        |  | 23             | 5.6         |  | 39             | 18.6        | 59                      |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 11.8                    |
| Total                                      | 160            | 100.0       |  | 277            | 100.0       |  | 409            | 100.0       |  | 210            | 100.0       | 499                     |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 100.0                   |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 1555                    |
|                                            |                |             |  |                |             |  |                |             |  |                |             | 100.0                   |



and had a high proportion of land available to raise feed.

The Knoxville order producers bought a greater proportion of their feed grains. Producers in the other three orders varied little in their procurement of grain for feed.

Purchases of silage were practically non-existent in the state. Ninety-eight per cent of the producers raised all of their silage. This was consistent in all orders.

### III. TYPES OF SILAGE STORAGE

Dairy specialists have long advocated feeding silage to dairy animals.<sup>1</sup> To note the adoption of this practice and mechanics of handling silage, producers were asked the type of silo used on their farm.

For all producers, the types of silage storage used were relatively equally distributed. Forty-one per cent of the producers had only upright silos, 36 per cent had only trench silos, 12 per cent had both type silos, while 11 per cent had no facilities for storing silage (Table XXII). Only 14 per cent of the Memphis order producers had upright silos, but 76 per cent of this group had trench silos. The high per cent of trench silos in this order can possibly be attributed to the fact that equipment for handling silage in upright silos has only recently been accepted in Tennessee, and the soil in this area has few rock formations

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<sup>1</sup>Lynn Copeland, Good Feeding Makes More Milk (Knoxville: Agricultural Extension Service, University of Tennessee, November 1961), pp. 9-10.

TABLE XXII

TYPES OF SILAGE STORAGE USED BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Type of<br>Silage<br>Storage | Market Area    |             |     |                |             |       |                |             |     |                |             |                         |
|------------------------------|----------------|-------------|-----|----------------|-------------|-------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                              | Appalachian    |             |     | Chattanooga    |             |       | Knoxville      |             |     | Memphis        |             |                         |
|                              | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Upright silo<br>only         | 51             | 35.9        | 91  | 41.3           | 155         | 47.3  | 28             | 14.4        | 195 | 50.5           | 520         | 40.9                    |
| Trench silo<br>only          | 58             | 40.9        | 73  | 33.2           | 89          | 27.1  | 148            | 75.9        | 91  | 23.6           | 459         | 36.1                    |
| Both                         | 25             | 17.6        | 34  | 15.5           | 34          | 10.4  | 12             | 6.1         | 42  | 10.9           | 147         | 11.6                    |
| None                         | 8              | 5.6         | 22  | 10.0           | 50          | 15.2  | 7              | 3.6         | 58  | 15.0           | 145         | 11.4                    |
| Total                        | 142            | 100.0       | 220 | 100.0          | 328         | 100.0 | 195            | 100.0       | 386 | 100.0          | 1271        | 100.0                   |



which allowed for easy excavation of a trench silo. Of the Nashville order producers, slightly over 50 per cent had only upright silos, while only 24 per cent had trench silos.

Approximately 18 per cent of the Appalachian order producers had both types of silage storage, which was the highest per cent having both types, while only 6 per cent of the Memphis order producers had both types, which was the lowest per cent. The Knoxville order had the highest per cent of producers having no facilities for silage storage, 15 per cent, compared with the lowest of 3.6 per cent of the Memphis order producers.

#### IV. MECHANISM OF GRAIN FEEDING SYSTEMS

As an indicator of the degree of mechanization on dairy farms, producers were asked to state their method of handling grains. Grade A producers in the state indicated a tendency toward mechanization of their grain feeding systems. While only 6 per cent of all producers had their grain feeding systems fully mechanized, 63 per cent had a partial degree of mechanization (Table XXIII). This means approximately two-thirds of all producers had systems that are partly or fully mechanized for this job, and that one-third of all producers still feed grain entirely by hand.

The Memphis order producers had the highest per cent of producers feeding grain entirely by hand, 72 per cent, and also the highest per cent of producers having fully mechanized grain feeding systems, 8 per cent.

TABLE XXIII

DEGREE OF MECHANIZATION OF GRAIN FEEDING SYSTEMS USED BY GRADE A  
PRODUCERS, BY MARKET AREA, 1963

| Type of<br>Grain<br>Feeding<br>System | Market Area    |             |     |                |             |       |                |             |     |                |             |                         |
|---------------------------------------|----------------|-------------|-----|----------------|-------------|-------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                                       | Appalachian    |             |     | Chattanooga    |             |       | Knoxville      |             |     | Memphis        |             |                         |
|                                       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Fed completely<br>by hand             | 43             | 27.1        | 101 | 37.0           | 66          | 16.5  | 150            | 71.8        | 114 | 23.5           | 474         | 31.1                    |
| Partly<br>mechanized                  | 109            | 68.5        | 155 | 56.8           | 315         | 79.0  | 41             | 19.6        | 344 | 70.9           | 964         | 63.2                    |
| Fully<br>mechanized                   | 7              | 4.4         | 17  | 6.2            | 18          | 4.5   | 17             | 8.1         | 27  | 5.6            | 86          | 5.6                     |
| Other                                 | 0              | 0           | 0   | 0              | 0           | 0     | 1              | 0.5         | 0   | 0              | 1           | 0.1                     |
| Total                                 | 159            | 100.0       | 273 | 100.0          | 399         | 100.0 | 209            | 100.0       | 485 | 100.0          | 1525        | 100.0                   |



The Knoxville order had the lowest per cent of producers feeding grain entirely by hand, and the highest per cent of producers that had partially mechanized systems, 16 and 79 per cent, respectively.

#### V. USE OF ARTIFICIAL INSEMINATION

One of the factors contributing to increased output per cow is the use of good bulls available through artificial insemination. At the time of the survey, approximately one-third of all producers in the state had their herds serviced entirely by artificial insemination, but approximately one-third of all producers did not use this practice (Table XXIV). Another one-third of all producers made use of artificial insemination, having from one-fourth to three-fourths of their herds serviced by this method. The extent of this practice was relatively consistent in all orders with the exception of the Appalachian order, where slightly over 50 per cent of the producers had all of their herds serviced by artificial insemination, and only 17 per cent of the producers in this order did not use artificial insemination. This can possibly be attributed to the fact that this order is small, geographically, the herds here are smaller than other orders, and the presence of a well organized artificial breeders association.

The distribution of producers using artificial insemination was not nearly as equal when classified according to herd size. Here the trend seemed to be toward a greater practice of this method in the smaller herds. Here, in the smaller herds, artificial insemination is

TABLE XXIV  
USE OF ARTIFICIAL INSEMINATION BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Per Cent of Herd<br>Serviced by<br>Artificial<br>Insemination | Market Area    |             |  |                |             |  |                |             |  |                |             |                         |
|---------------------------------------------------------------|----------------|-------------|--|----------------|-------------|--|----------------|-------------|--|----------------|-------------|-------------------------|
|                                                               | Appalachian    |             |  | Chattanooga    |             |  | Knoxville      |             |  | Memphis        |             |                         |
|                                                               | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent |  | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| 100                                                           | 85             | 52.5        |  | 89             | 32.0        |  | 155            | 37.7        |  | 67             | 31.8        | 538                     |
| 75                                                            | 12             | 7.4         |  | 37             | 13.3        |  | 37             | 9.0         |  | 27             | 12.8        | 163                     |
| 50                                                            | 15             | 9.2         |  | 15             | 5.4         |  | 45             | 11.0        |  | 24             | 11.4        | 136                     |
| 25                                                            | 22             | 13.6        |  | 37             | 13.3        |  | 45             | 11.0        |  | 25             | 11.8        | 217                     |
| 0                                                             | 28             | 17.3        |  | 100            | 36.0        |  | 129            | 31.3        |  | 68             | 32.2        | 509                     |
| Total                                                         | 162            | 100.0       |  | 278            | 100.0       |  | 411            | 100.0       |  | 211            | 100.0       | 1563                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 538                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 163                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 136                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 217                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 509                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 1563                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 34.4                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 10.4                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 8.7                     |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 13.9                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 32.6                    |
|                                                               |                |             |  |                |             |  |                |             |  |                |             | 100.0                   |



economical from the standpoint of saving from bull maintenance and the ability to obtain good bulls. Larger herd non-use can possibly be attributed to the fact that a large producer might consider it costs less to maintain his own bull rather than use artificial insemination.

At least 40 per cent of all of the producers with less than 30 cows per herd had their entire herds serviced by artificial insemination, while less than 20 per cent of all the producers with more than 75 cows per herd had the entire herd serviced by this method (Table XXV).

Thirty-two per cent of all producers used no artificial insemination at all. This was consistent in all size classes with the exception of the 75-99 cow herd, where 47 per cent of the producers in this size classification did not practice the use of artificial insemination.

The per cent of producers having one-fourth and three-fourths of their herds serviced by artificial insemination was higher in the large size herds than in the smaller size herds. This might be attributed to, in some instances, a large producer using a bull for the majority of his cows, and using artificial insemination for a few of his high-producing cows.

Herds with more than 40 cows had a higher percentage of producers having one-fourth or three-fourths of their herds serviced by this method than was the state average.

The extent of use of artificial insemination in herds of each dominant breed of all producers is shown in Table XXVI. A herd was

TABLE XXV

USE OF ARTIFICIAL INSEMINATION BY GRADE A PRODUCERS, BY HERD SIZE, 1963

| Per Cent<br>of Herd<br>Serviced by<br>Artificial<br>Insemination | Herd Size (Number of Cows) |             |                |             |                |             |                |             |                |             |                |             |
|------------------------------------------------------------------|----------------------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                                                                  | 0 - 19                     |             | 20 - 29        |             | 30 - 39        |             | 40 - 49        |             | 50 - 74        |             | 75 - 99        |             |
|                                                                  | Pro-<br>ducers             | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |
| 100                                                              | 59                         | 45.8        | 161            | 41.3        | 142            | 35.1        | 82             | 34.5        | 73             | 25.0        | 11             | 18.6        |
| 75                                                               | 7                          | 5.4         | 35             | 9.0         | 37             | 9.2         | 26             | 10.9        | 40             | 13.7        | 9              | 15.2        |
| 50                                                               | 7                          | 5.4         | 34             | 8.7         | 38             | 9.4         | 23             | 9.7         | 25             | 8.5         | 3              | 5.1         |
| 25                                                               | 13                         | 10.1        | 44             | 11.3        | 56             | 13.9        | 36             | 15.1        | 51             | 17.5        | 8              | 13.9        |
| 0                                                                | 43                         | 33.3        | 116            | 29.7        | 131            | 32.4        | 71             | 29.8        | 103            | 35.3        | 28             | 47.2        |
| Total                                                            | 129                        | 100.0       | 390            | 100.0       | 404            | 100.0       | 238            | 100.0       | 292            | 100.0       | 59             | 100.0       |
|                                                                  |                            |             |                |             |                |             |                |             |                |             | 51             | 100.0       |
|                                                                  |                            |             |                |             |                |             |                |             |                |             | 1563           | 100.0       |





considered to consist of one dominant breed if at least 75 per cent of the herd was composed of one breed. Herds with dominant breeds, Holstein, Jersey, and Guernsey, tended to have approximately the same percentages of their herds serviced by artificial insemination as were the averages for the entire state. A classification was made for all herds which had no one dominant breed. The herds in this category also had almost the same percentages of herds using different amounts of artificial insemination as were the state averages.

A classification was made for all herds that consisted of a dominant breed other than the three dairy breeds previously listed. This consisted of 28 herds. Only 14 per cent of this group had all of their herds serviced by artificial insemination, and 50 per cent of these herds used no artificial insemination at all.

Twenty-eight per cent of these herds had one-fourth of their cows serviced by this method, which means that almost 80 per cent of this group had 25 per cent or less of their herds serviced by artificial insemination.

## VI. TYPES OF MILKERS

Fifty-two per cent of all producers used a bucket-type milker and 47 per cent of all producers used a pipeline milker, which means that only 1 per cent of all producers milked their cows by hand (Table XXVII). The Memphis order had the highest per cent of producers using pipeline milkers, and the lowest per cent of producers using bucket-type milkers,



TABLE XXVII  
TYPE OF MILKER USED BY GRADE A PRODUCERS, BY MARKET AREA, 1963

| Type Milker  | Market Area |          |     |             |          |       |            |          |     |            |          |       |
|--------------|-------------|----------|-----|-------------|----------|-------|------------|----------|-----|------------|----------|-------|
|              | Appalachian |          |     | Chattanooga |          |       | Knoxville  |          |     | Memphis    |          |       |
|              | Pro-ducers  | Per Cent |     | Pro-ducers  | Per Cent |       | Pro-ducers | Per Cent |     | Pro-ducers | Per Cent |       |
| Pipeline     | 60          | 37.7     | 122 | 43.4        | 180      | 43.4  | 132        | 62.0     | 250 | 49.2       | 744      | 47.2  |
| Bucket type  | 98          | 61.7     | 158 | 56.2        | 232      | 55.9  | 79         | 37.1     | 250 | 49.2       | 817      | 51.8  |
| Milk by hand | 1           | 0.6      | 1   | 0.4         | 3        | 0.7   | 2          | 0.9      | 8   | 1.6        | 15       | 1.0   |
| Total        | 159         | 100.0    | 281 | 100.0       | 415      | 100.0 | 213        | 100.0    | 508 | 100.0      | 1576     | 100.0 |

62 and 37 per cent, respectfully. At the other extreme, the Appalachian order had the highest per cent of producers using bucket-type milkers and the lowest per cent of producers using pipeline milkers, 62 and 38 per cent, respectively.

There was a definite practice for the larger producers to use pipeline milkers and for the smaller producers to use bucket-type milkers. The per cent of producers using pipeline milkers with herds of more than 40 cows was higher than the state average. The per cent of producers using bucket-type milkers with herds of less than 40 cows was higher than the state average (Table XXVIII). Almost 80 per cent of the producers with more than 100 cows per herd used pipeline milkers, while only 14 per cent of the producers with 0-19 cows per herd used this type of milker. This means that, as Tennessee Grade A herds increase in size, new equipment will be needed in order to handle the additional cows. This, of course, will mean an increased need for more capital, which will mean an even greater investment for the Grade A producer.





TABLE XXVIII

TYPE MILKER USED BY GRADE A PRODUCERS, BY SIZE OF HERD, 1963

| Type<br>Milker  | Herd Size      |             |                |             |                |             |                |             |                |             |                |             |                |             |                |             | State |  |
|-----------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|-------|--|
|                 | 0 - 19         |             | 20 - 29        |             | 30 - 39        |             | 40 - 49        |             | 50 - 74        |             | 75 - 100       |             | 100 & over     |             | Pro-<br>ducers | Per<br>Cent |       |  |
|                 | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |                |             |       |  |
| Pipeline        | 18             | 13.7        | 137            | 34.2        | 179            | 44.5        | 137            | 57.6        | 194            | 65.8        | 39             | 66.1        | 40             | 78.4        | 744            | 47.2        |       |  |
| Bucket<br>type  | 110            | 84.0        | 257            | 64.3        | 220            | 54.7        | 100            | 42.0        | 100            | 33.9        | 20             | 33.9        | 10             | 19.6        | 817            | 51.8        |       |  |
| Milk by<br>hand | 3              | 2.3         | 6              | 1.5         | 3              | 0.8         | 1              | 0.4         | 1              | 0.3         | 0              | 0           | 1              | 2.0         | 15             | 1.0         |       |  |
| Total           | 131            | 100.0       | 400            | 100.0       | 402            | 100.0       | 238            | 100.0       | 295            | 100.0       | 59             | 100.0       | 51             | 100.0       | 1576           | 100.0       |       |  |

## CHAPTER V

### OPERATIONAL PLANS OF TENNESSEE GRADE A PRODUCERS

#### I. REASONS FOR PAST EXPANSION, 1962 OVER 1961

In order to have a better understanding of the future plans of the Grade A producers, it was felt that the reasons for past expansion practices of the producers should be studied. Survey results showed that approximately 44 per cent of the producers expanded their herds to some extent in 1962 over the size of operation they had the previous year (Table XXIX). The reason most frequently given by producers for expanding was to utilize their bulk tanks to capacity. This reason was given by 58 per cent of the producers who expanded. It was given most frequently by the Memphis order producers, 68 per cent, perhaps because the producers in this order have only recently begun converting their operations to bulk tanks. At the other extreme, only 44 per cent of the Appalachian producers gave this reason for expanding.

Expansion to more fully utilize existing labor was next in importance, and was given by 46 per cent of the producers who expanded.

The next three reasons given, in order of frequency, were all given by almost the same number of farmers. They were: need for more income, possibility of market quotas, and the acquisition of more land, which made expansion profitable. Expansion because of a need for more income was given as a reason by a small proportion of the farmers in



TABLE XXIX

REASONS GIVEN FOR EXPANDING, BY MARKET AREA, 1961-1962

| Reason for Expanding                    | Market Area |          |     |             |          |      |            |          |     |            |          |                  |
|-----------------------------------------|-------------|----------|-----|-------------|----------|------|------------|----------|-----|------------|----------|------------------|
|                                         | Appalachian |          |     | Chattanooga |          |      | Knoxville  |          |     | Memphis    |          |                  |
|                                         | Pro-ducers  | Per Cent |     | Pro-ducers  | Per Cent |      | Pro-ducers | Per Cent |     | Pro-ducers | Per Cent | State Pro-ducers |
| To utilize bulk tanks to capacity       | 29          | 44.6     | 60  | 53.2        | 103      | 59.9 | 78         | 67.8     | 133 | 59.4       | 403      | 58.3             |
| To use labor more fully                 | 25          | 38.5     | 52  | 45.2        | 82       | 47.7 | 52         | 45.3     | 105 | 46.9       | 316      | 45.7             |
| Need for income                         | 8           | 12.3     | 30  | 26.1        | 39       | 22.7 | 16         | 13.9     | 63  | 28.1       | 156      | 22.3             |
| Possibility of market quotas            | 13          | 20.0     | 26  | 22.6        | 36       | 20.9 | 26         | 22.6     | 41  | 18.3       | 142      | 20.5             |
| Acquired additional land                | 17          | 26.1     | 23  | 20.0        | 42       | 24.4 | 20         | 17.4     | 34  | 15.2       | 136      | 19.7             |
| New building space                      | 11          | 16.9     | 18  | 15.6        | 24       | 13.9 | 17         | 14.8     | 38  | 17.0       | 108      | 15.6             |
| Unused building space                   | 8           | 12.3     | 14  | 12.2        | 20       | 17.4 | 1          | 0.9      | 19  | 8.5        | 62       | 9.0              |
| All other                               | 13          | 20.0     | 9   | 7.8         | 0        | 0    | 22         | 19.1     | 18  | 8.0        | 62       | 9.0              |
| Number producers and per cent expanding | 65          | 40.1     | 115 | 40.6        | 172      | 41.4 | 115        | 54.2     | 224 | 44.3       | 691      | 43.8             |

the Appalachian and Memphis orders. This might have been because the farms in the Appalachian order were smaller than average, while in the Memphis order they were larger than an average state Grade A farm. In each case, the need for more income was not as pressing as some other reasons for expansion that were previously listed.

Expansion because of the possibility of market quotas was equally distributed in all orders. The Appalachian order had the highest per cent of producers expanding because they acquired additional land. The farms in this order, on the average, were the smallest of any order, and acquisition of land by small farmers may have created a capital problem and, in turn, a need for more income.

The reasons given for expansion were broken down into the per cent given by each age group. The 25-34 age group had the highest per cent of producers expanding their operations, followed closely by the 35-44 age group (Table XXX). As expected, the older producers showed a lesser tendency to expand.

In general, expanding to utilize bulk tank to capacity was more prevalent in the older age groups, while expanding to use labor more fully was listed more frequently by the younger producers. The younger producers also listed more frequently than older producers the acquisition of additional land as the reason for expanding.

Reasons given for expansion were also broken down by size of herd. Here, the producers with larger herds showed a greater tendency to expand their operations. Over one-half of the herds with more than 75 cows had been increased since 1961 (Table XXXI).



TABLE XXX

REASONS GIVEN FOR EXPANDING, BY AGE GROUP, 1961-1962

| Reason for<br>Expanding                                 | Age Group      |             |                |             |                |             |                |             |                |             |                |             |                |             |
|---------------------------------------------------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                                                         | Under 25       |             | 25 - 34        |             | 35 - 44        |             | 45 - 54        |             | 55 - 64        |             | 65 and Over    |             | Total          |             |
|                                                         | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |
| To utilize<br>bulk tank to<br>capacity                  | 3              | 75.0        | 53             | 55.2        | 122            | 54.0        | 121            | 61.4        | 78             | 62.9        | 18             | 62.1        | 395            | 58.4        |
| To use labor<br>more fully                              | 2              | 50.0        | 48             | 50.0        | 105            | 46.5        | 94             | 47.7        | 50             | 40.3        | 10             | 34.5        | 309            | 45.7        |
| Need for more<br>income                                 | 2              | 50.0        | 20             | 20.8        | 53             | 23.4        | 42             | 21.3        | 29             | 23.4        | 9              | 31.0        | 155            | 22.9        |
| Possibility of<br>market quotas                         | 1              | 25.0        | 21             | 21.9        | 52             | 23.0        | 30             | 15.2        | 28             | 22.6        | 7              | 24.1        | 139            | 20.6        |
| Acquired addi-<br>tional land                           | 1              | 25.0        | 26             | 27.1        | 44             | 19.5        | 39             | 19.8        | 23             | 18.5        | 2              | 6.9         | 135            | 20.0        |
| New building<br>space                                   | 2              | 50.0        | 19             | 19.8        | 23             | 10.2        | 28             | 14.2        | 25             | 20.2        | 6              | 20.7        | 103            | 15.2        |
| Unused build-<br>ing space                              | 1              | 25.0        | 9              | 9.4         | 18             | 8.0         | 19             | 9.6         | 13             | 10.5        | 1              | 3.4         | 61             | 9.0         |
| All other                                               | 0              | 0           | 10             | 10.4        | 23             | 10.2        | 16             | 8.1         | 6              | 4.8         | 4              | 13.8        | 59             | 8.7         |
| Number of pro-<br>ducers and per<br>cent expand-<br>ing | 4              | 30.8        | 96             | 53.9        | 226            | 50.9        | 197            | 39.7        | 124            | 39.4        | 29             | 29.0        | 676            | 43.8        |

TABLE XXXI

REASONS GIVEN FOR EXPANDING, BY SIZE OF HERD, 1961-1962

| Reason for<br>Expanding                                 | Herd Size (Number of Cows) |                    |                     |                    |                     |                    |                     |                    |                     |                    |                     |                    |                     |                    |                     |                    |
|---------------------------------------------------------|----------------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
|                                                         | 0 - 19                     |                    | 20 - 29             |                    | 30 - 39             |                    | 40 - 49             |                    | 50 - 74             |                    | 75 - 100            |                    | 100 & Over          |                    | Total               |                    |
|                                                         | Pro-<br>ducers Cent        | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent | Pro-<br>ducers Cent | Per<br>ducers Cent |
| To utilize<br>bulk tank<br>to capacity                  | 22                         | 59.5               | 80                  | 59.3               | 113                 | 62.4               | 73                  | 58.4               | 83                  | 57.6               | 18                  | 52.9               | 14                  | 40.0               | 403                 | 58.3               |
| To use labor<br>more fully                              | 14                         | 37.8               | 47                  | 34.8               | 70                  | 38.7               | 62                  | 34.2               | 77                  | 53.5               | 23                  | 67.6               | 23                  | 65.7               | 316                 | 45.7               |
| Need for more<br>income                                 | 7                          | 18.9               | 27                  | 20.0               | 42                  | 23.2               | 31                  | 24.8               | 33                  | 22.9               | 8                   | 23.5               | 8                   | 22.9               | 156                 | 22.6               |
| Possibility of<br>market quotas                         | 1                          | 2.7                | 21                  | 15.6               | 42                  | 23.2               | 26                  | 20.8               | 34                  | 23.6               | 7                   | 20.6               | 11                  | 31.4               | 142                 | 20.5               |
| Acquired addi-<br>tional land                           | 7                          | 18.9               | 21                  | 15.6               | 35                  | 19.3               | 31                  | 24.8               | 27                  | 18.7               | 8                   | 23.5               | 7                   | 20.0               | 136                 | 19.7               |
| New building<br>space                                   | 6                          | 16.2               | 10                  | 7.4                | 29                  | 16.0               | 18                  | 14.4               | 30                  | 20.8               | 7                   | 20.6               | 8                   | 22.9               | 108                 | 15.6               |
| Unused build-<br>ing space                              | 5                          | 13.5               | 10                  | 7.4                | 23                  | 12.7               | 11                  | 8.8                | 9                   | 6.2                | 3                   | 8.8                | 1                   | 2.9                | 62                  | 9.0                |
| All other                                               | 6                          | 16.2               | 13                  | 9.6                | 13                  | 7.2                | 7                   | 5.6                | 14                  | 9.7                | 4                   | 11.8               | 5                   | 14.3               | 62                  | 9.0                |
| Number of pro-<br>ducers and<br>per cent ex-<br>panding | 37                         | 28.5               | 135                 | 33.7               | 181                 | 44.9               | 125                 | 52.3               | 144                 | 48.8               | 34                  | 57.6               | 35                  | 68.6               | 691                 | 43.8               |



The larger producers, especially those with more than 50 cows per herd, expanded to utilize their labor supply more fully, indicating that more cows were needed to utilize fully the large labor force on these large-size farms. This reason was not listed as frequently by the smaller producers, indicating that the labor situation on the smaller size farms was not as critical a factor.

A larger percentage of Grade A producers having less than 75 cows expanded to utilize their bulk tanks to capacity than did those having 75 and over. The larger producers listed the possibility of market quotas more frequently as a reason for expanding. This may possibly be because these producers felt they had more of an investment at stake and wanted a larger quota, should one be applied, to provide more income to help protect their large investment.

The smaller producers may have felt less committed to the dairy industry and had less incentive to expand as the result of possible market quotas. This can also be shown by the fact that a higher per cent of the larger producers listed a need for more income as a reason for expansion than did the smaller producers.

Expansion because of unused building space was practically nonexistent in herds of over 100 cows. In general, the smaller herds gave this reason more frequently than was the state average.

## II. REASONS FOR NOT EXPANDING 1962 OVER 1961

In order to better understand the movement of the Grade A milk industry, producers who did not expand in 1962 (over the previous year)



were asked why they chose not to increase their size of operation. Approximately 56 per cent of all producers did not expand during this time span (Table XXXII). The order that had the highest per cent of producers expanding, and consequently the least per cent of producers not expanding, was the Memphis order.

(The reason given most frequently for not expanding was a lower price for milk.) This reason was given most frequently in the Chattanooga order and least frequently in the Nashville order. The farm price of Grade A milk has actually remained relatively stable since 1956 as was shown in Table IV. It is possible that what the producers were referring to in this case is the relatively stable price of milk associated with the much-talked-about rising cost of milk production.

The next most frequently given reason for not expanding was a shortage of labor on the farm.

Thirty per cent of the producers not expanding listed lack of land as a major limiting factor. This per cent was nearly the same in all orders. Higher labor costs was listed by 22 per cent of the producers not expanding as a limiting factor. This reason was given by a high per cent of the producers in the Chattanooga order, and by a low per cent of the Memphis order producers.

Reasons given by producers for not expanding were broken down into the per cent given by each age group. (The reason most frequently given, lower price for milk) was given by almost an equal per cent of the producers in each age group (Table XXXIII). Higher cost of labor



TABLE XXXII

REASONS GIVEN FOR NOT EXPANDING, BY MARKET AREA, 1961-1962

| Reason for Not Expanding                       | Market Area |          |     |             |          |      |            |          |     |            |          |                  |
|------------------------------------------------|-------------|----------|-----|-------------|----------|------|------------|----------|-----|------------|----------|------------------|
|                                                | Appalachian |          |     | Chattanooga |          |      | Knoxville  |          |     | Memphis    |          |                  |
|                                                | Pro-ducers  | Per Cent |     | Pro-ducers  | Per Cent |      | Pro-ducers | Per Cent |     | Pro-ducers | Per Cent | State Pro-ducers |
| Lower price for milk                           | 38          | 39.2     | 70  | 41.7        | 84       | 34.6 | 33         | 34.0     | 83  | 29.4       | 308      | 34.7             |
| Shortage of labor                              | 27          | 27.8     | 57  | 33.9        | 85       | 35.0 | 22         | 22.7     | 97  | 34.4       | 288      | 32.5             |
| Lack of land                                   | 32          | 33.0     | 56  | 33.3        | 78       | 32.1 | 28         | 28.9     | 79  | 28.0       | 273      | 30.8             |
| Higher labor cost                              | 19          | 19.6     | 48  | 28.6        | 59       | 24.3 | 13         | 13.4     | 58  | 20.6       | 197      | 22.2             |
| Limited building space                         | 23          | 23.7     | 21  | 12.5        | 43       | 17.7 | 10         | 10.3     | 49  | 17.4       | 146      | 16.5             |
| Lack of capital or money finances              | 6           | 6.2      | 5   | 3.0         | 22       | 9.0  | 6          | 6.2      | 63  | 22.3       | 102      | 11.5             |
| Bulk tank used to capacity                     | 10          | 10.3     | 8   | 4.8         | 10       | 4.1  | 3          | 3.1      | 39  | 13.8       | 70       | 7.9              |
| Other                                          | 18          | 18.6     | 35  | 20.8        | 39       | 16.0 | 27         | 27.8     | 21  | 7.4        | 140      | 15.8             |
| Number of producers and per cent not expanding | 97          | 59.9     | 168 | 59.4        | 243      | 58.6 | 97         | 45.8     | 282 | 55.7       | 887      | 56.2             |

TABLE XXXIII

REASONS GIVEN FOR NOT EXPANDING, BY AGE GROUP, 1961-1962

| Reason for Not<br>Expanding                          | Age Group      |             |                |             |                |             |                |             |                |             |                |             |
|------------------------------------------------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                                                      | Under 25       |             | 25 - 34        |             | 35 - 44        |             | 45 - 54        |             | 55 - 64        |             | 65 and Over    |             |
|                                                      | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |
| Lower price for<br>milk                              | 3              | 33.3        | 30             | 36.6        | 75             | 34.4        | 102            | 34.1        | 66             | 34.5        | 27             | 38.0        |
| Shortage of labor                                    | 1              | 11.1        | 24             | 29.3        | 60             | 27.5        | 99             | 33.1        | 66             | 34.5        | 33             | 46.5        |
| Lack of land                                         | 2              | 22.2        | 27             | 32.9        | 76             | 34.9        | 98             | 32.8        | 52             | 27.2        | 12             | 16.9        |
| Higher labor cost                                    | 3              | 33.3        | 20             | 24.4        | 48             | 22.0        | 64             | 21.4        | 41             | 21.5        | 17             | 23.9        |
| Limited building<br>space                            | 0              | 0.0         | 19             | 23.2        | 35             | 16.0        | 50             | 16.7        | 29             | 15.2        | 11             | 15.5        |
| Lack of capital or<br>money finances                 | 1              | 11.1        | 10             | 12.2        | 29             | 13.3        | 41             | 13.7        | 14             | 7.3         | 5              | 7.0         |
| Bulk tank used to<br>capacity                        | 1              | 11.1        | 11             | 13.4        | 25             | 11.5        | 13             | 4.3         | 11             | 5.8         | 9              | 12.7        |
| Other                                                | 2              | 22.2        | 13             | 15.8        | 34             | 15.6        | 42             | 14.0        | 36             | 18.8        | 9              | 12.7        |
| Number of producers<br>and per cent not<br>expanding | 9              | 69.2        | 82             | 46.1        | 218            | 49.1        | 299            | 60.3        | 191            | 60.6        | 71             | 71.0        |
|                                                      |                |             |                |             |                |             |                |             |                |             |                | 56.2        |



was also given by nearly an equal per cent of each age group, but shortage of labor was given by a greater per cent of the older producers, especially producers over 65 years of age.

(Lack of land as a reason for not expanding was given mostly by the producers between the ages of 25 and 54, perhaps indicating that the younger and older producers have other problems more pressing than availability of land, such as a shortage of labor.)

The reasons given for not expanding were also broken down by size of herds to determine if herd size played a role in determining why producers did not expand. The reason of lower price of milk was given more often by producers with herds of 40 cows or more than of those with herds of less than that number (Table XXXIV). The reason, shortage of labor, was given by 20 to 40 per cent of the owners in all groups except those having 75-100 cows, of which less than 10 per cent gave this reason.

Lack of land as a reason for not expanding was given most by producers with herds of less than 50 cows, indicating that these producers have only enough land to support their present size operation.

The smaller producers thus seemed to be troubled more with labor problems and a shortage of land, while the larger producers seemed to be more concerned with the price of milk which, in reality, appears to be more of a rising cost and steady income problem.

### III. ABILITY OF PRODUCERS TO EXPAND

In order to have a better understanding of the future of the Grade A industry, each producer was asked if he thought he had facilities

TABLE XXXIV

REASONS GIVEN FOR NOT EXPANDING, BY SIZE OF HERD, 1961-1962

| Reason<br>for Not<br>Expanding                            | Herd Size (Number of Cows) |             |                |             |                |             |                |             |                |             |                |             |                |             |                |             | Total |  |
|-----------------------------------------------------------|----------------------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|-------|--|
|                                                           | 0 - 19                     |             | 20 - 29        |             | 30 - 39        |             | 40 - 49        |             | 50 - 74        |             | 75 - 100       |             | 100 & Over     |             |                |             |       |  |
|                                                           | Pro-<br>ducers             | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |       |  |
| Lower price<br>for milk                                   | 23                         | 24.7        | 81             | 30.4        | 72             | 32.4        | 40             | 35.1        | 69             | 45.7        | 13             | 52.0        | 10             | 62.5        | 308            | 34.7        |       |  |
| Shortage of<br>labor                                      | 23                         | 24.7        | 89             | 33.4        | 89             | 40.1        | 35             | 30.7        | 46             | 30.5        | 3              | 8.6         | 3              | 18.7        | 288            | 32.5        |       |  |
| Lack of land                                              | 37                         | 39.8        | 77             | 28.9        | 74             | 33.3        | 39             | 34.2        | 38             | 25.2        | 4              | 16.0        | 4              | 25.0        | 273            | 30.8        |       |  |
| Higher labor<br>costs                                     | 18                         | 19.3        | 53             | 19.9        | 51             | 23.0        | 25             | 21.9        | 39             | 25.8        | 6              | 24.0        | 5              | 31.2        | 197            | 22.2        |       |  |
| Limited build-<br>ing space                               | 12                         | 12.9        | 39             | 14.7        | 39             | 17.6        | 29             | 25.4        | 21             | 13.9        | 1              | 4.0         | 5              | 31.2        | 146            | 16.5        |       |  |
| Lack of capital<br>or money                               | 19                         | 20.4        | 28             | 10.5        | 26             | 11.7        | 11             | 9.6         | 16             | 10.6        | 2              | 8.0         | 0              | 0           | 102            | 11.5        |       |  |
| Bulk tank used<br>to capacity                             | 2                          | 2.2         | 20             | 7.5         | 16             | 7.2         | 12             | 10.5        | 14             | 9.3         | 3              | 8.6         | 3              | 18.7        | 70             | 7.9         |       |  |
| Other producers                                           | 15                         | 16.1        | 42             | 15.8        | 25             | 11.3        | 22             | 19.3        | 27             | 17.9        | 7              | 28.0        | 2              | 12.5        | 140            | 15.8        |       |  |
| Number of pro-<br>ducers and<br>per cent not<br>expanding | 93                         | 71.5        | 266            | 66.3        | 222            | 55.1        | 114            | 47.7        | 151            | 51.2        | 25             | 42.4        | 16             | 31.4        | 887            | 56.2        |       |  |



available to expand the size of his operation. Thirty-seven per cent of those responding felt that they could not increase the herd size with their present facilities (Table XXXV). This means that 63 per cent of the producers felt that they had existing facilities that would enable them to expand the size of their operation. About 60 per cent of the producers in each order felt they had the facilities to expand with the exception of those in the Memphis order. Here, only 23 per cent of the producers felt they did not have present facilities for expansion, while 77 per cent felt they could handle more cows with existing facilities.

#### IV. INTENTIONS OF PRODUCERS TO EXPAND

The intentions of producers to expand was felt to be as important to understand more fully the future of the Grade A dairy industry as was the ability of the producers to expand. They were asked if they planned to expand the size of their dairy operation during the next two years, or in this case, by 1965. Fifty-six per cent of those responding expressed an intention to expand (Table XXXVI). The Memphis order had the highest per cent of producers expressing an intention to expand, 73 per cent, while the rest of the orders were only slightly below the state average. In all orders, at least 50 per cent of the producers expressed an intention to expand the size of their operations.

The intentions of all producers were classified by age groups (Table XXXVII). A very low per cent of producers over 55 years of age

TABLE XXXV

GRADE A PRODUCERS ABILITY TO EXPAND, BY MARKET AREA, 1963

|                                                       | Market Area    |             |     |                |             |       |                |             |     |                |             |                         |
|-------------------------------------------------------|----------------|-------------|-----|----------------|-------------|-------|----------------|-------------|-----|----------------|-------------|-------------------------|
|                                                       | Appalachian    |             |     | Chattanooga    |             |       | Knoxville      |             |     | Memphis        |             |                         |
|                                                       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent |       | Pro-<br>ducers | Per<br>Cent |     | Pro-<br>ducers | Per<br>Cent | State<br>Pro-<br>ducers |
| Producers that felt they were operating at capacity   | 66             | 40.7        | 101 | 35.6           | 173         | 41.6  | 48             | 22.7        | 201 | 39.7           | 589         | 37.3                    |
| Producers that felt they had the facilities to expand | 96             | 59.3        | 183 | 64.4           | 243         | 58.4  | 163            | 77.3        | 305 | 60.3           | 990         | 62.7                    |
| Total                                                 | 162            | 100.0       | 284 | 100.0          | 416         | 100.0 | 211            | 100.0       | 506 | 100.0          | 1579        | 100.0                   |



TABLE XXXVI  
INTENTIONS OF GRADE A PRODUCERS TO EXPAND BY 1965, BY MARKET AREA

|                                            | Market Area    |             |                |             |                |             |                |             |                |             |                |             |
|--------------------------------------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                                            | Appalachian    |             | Chattanooga    |             | Knoxville      |             | Memphis        |             | Nashville      |             | State          |             |
|                                            | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent | Pro-<br>ducers | Per<br>Cent |
| Producers that<br>plan to expand           | 83             | 53.6        | 149            | 54.4        | 202            | 49.8        | 149            | 72.7        | 270            | 54.7        | 853            | 55.6        |
| Producers that<br>do not plan<br>to expand | 72             | 46.4        | 125            | 45.6        | 204            | 50.2        | 56             | 27.3        | 224            | 45.3        | 681            | 44.4        |
| Total                                      | 155            | 100.0       | 274            | 100.0       | 406            | 100.0       | 205            | 100.0       | 494            | 100.0       | 1534           | 100.0       |

TABLE XXXVII

INTENTIONS OF GRADE A PRODUCERS TO EXPAND BY 1965, BY AGE GROUP

|                                      |             | Age Group              |             |                        |             |                        |             |                        |             |                        |             |                        |             | Total                  |             |
|--------------------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|
| Under 25                             |             | 25 - 34                |             | 35 - 44                |             | 45 - 54                |             | 55 - 64                |             | 65 and Over            |             |                        |             |                        |             |
| Pro-<br>ducers<br>Cent               | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent |
| 9                                    | 69.2        | 120                    | 68.6        | 272                    | 62.2        | 261                    | 54.3        | 136                    | 45.5        | 41                     | 42.3        | 839                    | 55.9        |                        |             |
| Producers that plan to expand        |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |
| 4                                    | 30.8        | 55                     | 31.4        | 165                    | 37.8        | 220                    | 45.7        | 163                    | 54.5        | 56                     | 57.7        | 663                    | 44.1        |                        |             |
| Producers that do not plan to expand |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |
| 13                                   | 100.0       | 175                    | 100.0       | 437                    | 100.0       | 481                    | 100.0       | 299                    | 100.0       | 97                     | 100.0       | 1502                   | 100.0       |                        |             |
| Total                                |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |                        |             |



were planning to expand, while many of the younger producers expressed intentions of doing so. Sixty-nine per cent of the producers under 35 years of age showed intentions to expand. Without exception, the younger the producers, the greater was the intent for the producers to expand their operations.

The smaller producers and the very large producers showed a greater tendency toward future expansion than did the other producers (Table XXXVIII). Producers with less than 20 cows had the greatest tendency to expand. Sixty-three per cent of the producers with less than 20 cows planned to expand their operations, and 61 per cent of the very large producers, those with more than 100 cows per herd, planned to expand operations. The producers with 50-74 cows per herd had the lowest per cent of producers planning to expand, 45 per cent. The smaller and larger producers, thus, seemed to have more facilities to expand, or planned to add facilities in order to handle more cows than did the other producers.

#### V. PRESSURES AFFECTING EXPANSION PATTERNS

After looking at the past expansion practices and intentions of Grade A producers, a study of the forces causing these expansion patterns is in order to understand better the past practices and the projected trends of the industry. Certainly these movements have been a result of choice, and not chance.

In recent years, there has been an expansion of industrial development, which has brought an expansion of off-farm job opportunities. This

TABLE XXXVIII

INTENTION OF GRADE A PRODUCERS TO EXPAND BY 1965, BY SIZE OF HERD

|                                               |     | Herd Size (Number of Cows) |             |                        |             |                        |             |                        |             |                        |             |                        |             | Total                  |             |
|-----------------------------------------------|-----|----------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|
|                                               |     | 0 - 19                     |             | 20 - 29                |             | 30 - 39                |             | 40 - 49                |             | 50 - 74                |             | 75 - 99                |             | 100 & Over             |             |
|                                               |     | Pro-<br>ducers<br>Cent     | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent | Pro-<br>ducers<br>Cent | Per<br>Cent |
| Producers<br>that plan<br>to expand           | 80  | 63.0                       | 237         | 60.6                   | 214         | 55.0                   | 132         | 55.9                   | 129         | 45.1                   | 31          | 55.4                   | 30          | 61.2                   | 853         |
| Producers<br>that do not<br>plan to<br>expand | 47  | 37.0                       | 154         | 39.4                   | 175         | 45.0                   | 104         | 44.1                   | 157         | 54.9                   | 25          | 44.6                   | 19          | 38.8                   | 681         |
| Total                                         | 127 | 100.0                      | 391         | 100.0                  | 389         | 100.0                  | 236         | 100.0                  | 286         | 100.0                  | 56          | 100.0                  | 49          | 100.0                  | 1534        |



has drained off a large number of farmers, releasing farm land to other operators. As a result, the land per farm has been increasing while the farm labor force has been decreasing.<sup>1</sup>

Faced with this situation, the dairy farmer was forced to adopt expensive labor-saving equipment. During the decade of the fifties, there was a 245 per cent increase in the number of farms reporting pick-up hay balers, a 426 per cent increase in the number of farms with corn pickers, and a 68 per cent increase in the number of farms with milking machines.<sup>2</sup>

The introduction of bulk milk tanks on dairy farms has been one of the major improvements in handling milk. To many persons, the greatest benefit derived from bulk tanks has been the elimination of the backbreaking labor of handling full ten-gallon milk cans. Used together with a pipeline milker, the bulk tank makes possible the cooling and storing of milk without touching it from the time it leaves the cow until it is picked up at the farm.<sup>3</sup>

Bulk tanks have rapidly become the rule rather than the exception on the Tennessee Grade A dairy farm. In January 1961, one of the

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<sup>1</sup>S. W. Atkins, Changing Size Farms in Tennessee (Knoxville: The University of Tennessee, August 1959), p. 8.

<sup>2</sup>Stanton P. Parry and Donna G. Greiner, Changes in the Structure of the Tennessee Dairy Industry (Knoxville: The University of Tennessee, August 1962), p. 10.

<sup>3</sup>Anthony Coletti, Handbook for Dairymen (Ames: Iowa State University Press, 1963), p. 253.

Federal order markets in Tennessee had all of its producers using bulk tanks as a standard practice. By May 1963, all of the remaining four orders had switched entirely to bulk tanks.<sup>4</sup>

All of these new technologies require substantial capital investments. This means that the average producer today has a large equipment investment. In order to make more efficient use of the additional capital, many farmers have had to enlarge the size of their operations. Many producers added cows so that bulk tanks could be used more efficiently, while some farmers expanded acreage to use other equipment more efficiently.<sup>5</sup>

One of the apparent reasons causing producers to expand in 1962 over 1961 was the possibility of market quotas being applied to milk production. The Food and Agriculture Act of 1962 that was presented to Congress would have provided rigid supply quotas. The section of the Act relating to dairying was set up as a supply management program with price supports close to 90 per cent of parity if the dairymen voted in a referendum to accept these quotas.<sup>6</sup>

After the total national demand for milk had been determined, each producer would have been given a guide as to his marketing quota.

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<sup>4</sup>Monthly reports of milk market administrator of each Federal order, 1961-1963.

<sup>5</sup>Atkins, op. cit., p. 9.

<sup>6</sup>United States Department of Agriculture, The Proposed Food and Agriculture Act of 1962 (Washington: Government Printing Office, February 1962), p. 25.



Each producer's total sales base would have been his sales of milk or farm-separated cream for the previous calendar year.<sup>7</sup> Faced with this possibility, many producers increased their production, hoping to get a larger quota, should such controls be put into practice. These mandatory controls were never put into practice because Congress refused to consider seriously this part of the farm bill.<sup>8</sup>

It is felt that the possibility of market quotas and the increase of capital required by the Grade A producer have been major forces influencing the expansion of the size of operation of these producers. These forces are the result of the ever-changing economy and the desire of producers to carry on their operations with highest possible efficiency.

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<sup>7</sup>Ibid., p. 26.

<sup>8</sup>News item in the Wall Street Journal, April 5, 1963.

## CHAPTER VI

### ESTIMATED PROJECTION OF THE TENNESSEE GRADE A DAIRY INDUSTRY

#### I. ASSUMPTIONS

When any type of projection is made, there are many variables to be considered. Of particular importance are the independent variables and an estimate of how these variables will behave in the future.

In attempting to project a supply and demand situation, two major factors to consider are population and economic growth. There were approximately 3,694,000 people in Tennessee in July 1963, and assuming a growth rate similar to that of the past several years, there will be approximately 4,225,000 in 1970.<sup>1</sup> Since 1956, per capita disposable income has increased 23 per cent.<sup>2</sup> A continued rise is expected through 1970 at a growth rate about the same as that of the past 5 years.<sup>3</sup>

Another important variable is the per capita consumption of milk. Per capita consumption of fluid milk and cream in the United

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<sup>1</sup>Statement by Ormond Corry, Bureau of Business Research, University of Tennessee, Knoxville, personal interview.

<sup>2</sup>United States Department of Commerce, Statistical Abstracts of the United States (Washington: Government Printing Office, 1963), p. 324.

<sup>3</sup>Rex F. Daly, "A Profile of Agriculture Projected to 1968" (paper read at the 41st Annual Agricultural Outlook Conference, Washington, D. C., November 19, 1963).



States was 311 pounds in 1962 and is expected to decline by approximately 20 pounds by 1970.<sup>4</sup>

Further assumptions are: (1) no major wars will occur which would cause a sudden acceleration of the economy or demand for dairy products, (2) the growth of technological development will continue at near present rates, and (3) current levels and methods of dairy price supports will continue through 1970. The projections to follow should be interpreted with these assumptions in mind.

## II. DEMAND PROSPECTS

(The three variables that have the most effect on demand for fluid milk and cream are size of population, per capita disposable income, and consumer preferences.) There were no data available on per capita milk consumption in Tennessee; therefore, data for Tennessee were derived from United States aggregate statistics.

The per capita consumption of fluid milk and cream in the United States in 1962 was 311 pounds.<sup>5</sup> The per capita income for the United States was \$2366 and for Tennessee was \$1702.<sup>6</sup> Past studies have shown the income elasticity of milk to be approximately 0.16.<sup>7</sup> Using these

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<sup>4</sup>United States Department of Agriculture, Dairy Situation (Washington: Government Printing Office, November 1963), p. 40.

<sup>5</sup>Ibid.

<sup>6</sup>United States Department of Commerce, Survey of Current Business (Washington: Government Printing Office, August 1963), p. 9.

<sup>7</sup>G. E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply (University Park: Pennsylvania State University, August 1961), p. 17.

data, and the formula for income elasticity, the per capita consumption of fluid milk and cream in Tennessee in 1962 was estimated to be 297 pounds.\*

Projections indicate that this figure will be down to 278 pounds by 1970.\*\*

An estimate of the total demand for fluid milk and cream in Tennessee by 1970 can be made by multiplying the estimated 1970 Tennessee population by the estimated 1970 per capita consumption. Using this method of projection, the total demand for fluid milk and cream in 1970 is estimated to be 1,174,550,000 pounds. This is 31 per cent greater than the amount of fluid milk and cream marketed by Tennessee producers in 1963 under Federal order, and 16 per cent greater than the total amount of fluid milk and cream used in Tennessee for both farm and non-farm use in 1963. This demand estimate includes all fluid milk and cream used. The amount consumed under Federal order will be less than this estimate, since, as noted earlier, not all fluid milk in Tennessee

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\*  $E_I = \frac{\Delta Q}{\Delta I}$  where  $E_I$  = income elasticity,  $\Delta I$  = per cent change in income,  $\Delta Q$  = per cent change in quantity bought. Substituting in the equation,  $0.16 = \frac{\Delta Q}{.28}$ ,  $\Delta Q$  becomes 0.0488. With the 28 per cent difference in income between the United States and Tennessee, the estimated per capita consumption of fluid milk and cream was 297 pounds.

\*\*The per capita consumption of fluid milk and cream in 1968 is estimated, in Dairy Situation, November 1963, p. 41, to be 292 pounds. If past trends continue, this figure will be approximately 290 pounds by 1970. The per capita consumption of fluid milk and cream in Tennessee, in 1962, was 95.8 per cent of that of the United States. If this trend and percentage holds stable, the per capita consumption of fluid milk and cream in Tennessee will be 4.2 per cent less than 290, or 278 pounds.



is sold under Federal order. Some is used for human consumption on the farm where it is produced, and some is sold to buyers that are not regulated by a Federal order. In 1963, an estimated 88 per cent of Tennessee Grade A milk was regulated by a Federal order.

### III. SUPPLY PROSPECTS

The total amount of fluid milk and cream used for both farm and nonfarm use has varied little during the past 8 years, as was shown in Table I, page 6. Fluid milk sold through Federal order has increased every year since 1958 and, in 1963, amounted to 896.9 million pounds (Table II, page 8).

In developing the outlook for supply of milk for the next several years, the balance between increasing milk production per cow and the decreasing number of cows must be maintained. Technological developments in dairy farming have made larger herds necessary. This has been a definite trend the past several years, and with continuing economic and technological growth, this trend will likely continue.

There are two factors that appear to have the greatest effect on the productivity of milk per cow. They are the inherent productive capacity of the dairy cow, and the amount and quality of feed consumed. While it is difficult to measure these two factors directly, the amount of concentrates fed per cow is available historically as an indicator of the amount and quality of feed consumed. The best available measure for inherent productive capacity is the percentage of cows serviced

yearly by artificial insemination. Using past data for these two factors, an equation was solved in an attempt to predict the quantity of milk produced per cow. It contains the variables Y which is the amount of milk produced per cow per year in Tennessee,  $X_1$  which is the amount of concentrates fed per cow per year in Tennessee, and  $X_2$  which is the percentage of cows bred artificially in the South Central Region. The equation obtained from the data is:

$$Y = 1764.1 + 1.535X_1 + 2.39X_2^*$$

The value for  $R^2$  was calculated to be 0.96 which shows the proportion of variation in Y explained by association with  $X_1$ 's for the data used in the study.\*\*

The production per cow in Tennessee in 1970 is estimated by projecting the variables  $X_1$  and  $X_2$  and using the previous regression equation.\*\*\*

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\*Data for these three variables for 1956-1963 were taken from various issues of United States Department of Agriculture monthly publication, Milk Production. All figures pertain to all cows in Tennessee, except the variable  $X_2$ , which is the figure for South Central United States. The equation was solved by means of the Doolittle method. Using the identical data, an  $R^2$  of 0.96 was obtained by solving the equation:

$$R^2 = \frac{b_1 \sum x_1y + b_2 \sum x_2y}{\sum y^2}$$

\*\*Ibid.

\*\*\*The projections of concentrates fed per cow and per cent of cows artificially bred is shown in Appendix E. The data were plotted for these variables for 1956-1963, a trend line established, and projected to 1970. These estimates were substituted for  $X_1$  and  $X_2$  in the equation to get the projected value for Y. The value of  $X_2$  used is slightly lower than the projected value, for it was felt that the limited capacity of the cow would make this figure slightly lower than was the projected figure.



$$Y = 1764.1 + 1.535(2500) + 2.39(33) = 5680.5$$

This estimate is shown with past production per cow in Figure 5. Although exact production per cow in Tennessee Grade A herds is not available on an annual basis, it is recognized that cows in Grade A herds have a higher annual production than do all other cows. This was shown from data obtained at two different survey dates when milk produced per cow in Tennessee Grade A herds was estimated to be 5120 pounds in 1958, and 7157 pounds in 1963.\* This is expected to increase to approximately 9100 pounds by 1970.\*\*

The number of producers in the industry has decreased since 1957 (Table V, page 13). The rate at which producers leave in the future depends on the availability and attractiveness of other economic opportunities, both on and off the farm. The ability or willingness of dairy

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\*The figure for 1958 was obtained by dividing total 1958 producer deliveries to the five markets by estimated number of cows as obtained by a survey of the markets in 1958 (see Tennessee Bulletin 318, September 1960, p. 32). The figure for 1963 was obtained from Table X of this thesis.

\*\*Tennessee DHIA herds are composed of selected Grade A herds, and production in these herds is used as a lead indicator of production per cow in all Tennessee Grade A herds. The estimated production per cow of all Grade A herds in Tennessee in 1958 was 68 per cent of the production per cow on DHIA test. In 1963 the estimated production per cow in all Grade A herds was 75 per cent of the average of all cows on DHIA test. The production per cow on DHIA test for 1970 was projected by a trend line extended from past data. The production per cow for all Grade A herds in 1970 was taken as a percentage of the projected average per cow on DHIA test, which was estimated to be 75 per cent. This figure was used because it was felt the DHIA would continue to keep this higher level of production.



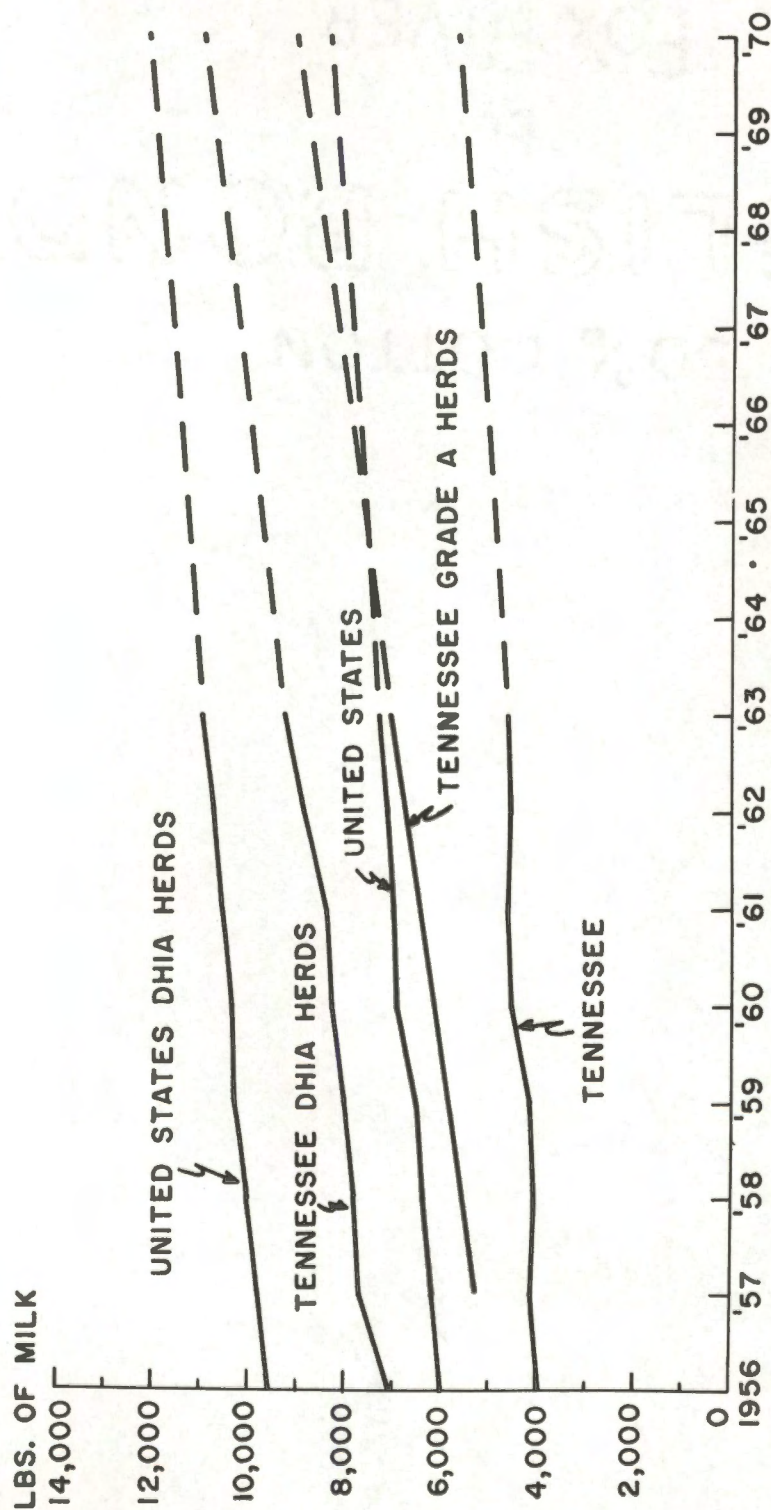


Figure 5. Milk Production Per Cow and Projections to 1970.

Source: United States Department of Agriculture, Milk Production (Washington: Government Printing Office, 1956-1963), Monthly Issues; Tennessee D-1A data from Professor V. D. Parsons, Knoxville, University of Tennessee.



farmers to take advantage of more remunerative alternatives is another influence.<sup>8</sup> Due to the uncertainty of these variables, a projection of the number of producers is not attempted; however, it is reasonable to assume that a further reduction in number of producers can be expected if past patterns of economic adjustment and technological growth continue.

Total Grade A milk sold under Federal order in Tennessee has increased since 1958 (Table II, page 9). The program of Federal milk orders has expanded rapidly in the United States and Tennessee. Total milk supplied under Federal order is expected to increase to approximately 1,500,000,000 pounds annually by 1970, and will account for approximately 88 per cent of Tennessee Grade A milk (see Appendix E). There are currently no populous areas of Tennessee receiving deliveries of unregulated milk. Thus, even without territorial expansion, and with no direct or indirect measures taken to control production, the volume of milk supplied under this program is expected to increase.

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<sup>8</sup>United States Department of Agriculture, Dairy Situation (Washington: Government Printing Office, November 1963), p. 42.

## CHAPTER VII

### SUMMARY

Total milk production in Tennessee has remained relatively stable since 1950. The amount of milk sold as Grade A under Federal order has increased since 1958 yet has been produced by a continually decreasing number of producers with larger individual herds. In the spring of 1963, there were 3097 producers in Tennessee selling milk under Federal milk orders. This accounted for over 85 per cent of all Grade A milk sold in the state. The average Grade A producer responding was 47 years old, farmed about 250 acres of land, and had 41 mature cows in his herd, with each cow producing an average of 7,157 pounds of milk annually. The largest size farms and herds were found in the Memphis milkshed, while the smallest ones were found in the Knoxville milkshed. Predominantly Jersey herds were found most frequently in the Chattanooga order, while the Holstein predominated in herds in other sections of the state and was the dominant breed in herds of all sizes.

Eighty-six per cent of the producers worked less than 50 days per year off the farm, but slightly over three-fourths of all producers had a source of farm income in addition to dairying. Slightly over one-half of the producers raised all of their replacement heifers, while 6 per cent bought all of their replacements. Sixty-two per cent of all producers owned all of their land and raised most of their hay and silage. Nearly one-half the producers bought all of their feed grains.



Full mechanization of feeding was practically non-existent, but partial mechanization was found on nearly two-thirds of all farms. One per cent of the producers milked entirely by hand. Pipeline milkers were found most frequently in the larger herds.

The use of artificial insemination for all cows was reported by approximately one-third of the producers and was most prevalent in the smaller herds; however, in almost one-third of the herds no cows were serviced by artificial insemination. Thus, there is ample opportunity to expand use of artificial insemination for improvement of present herds.

There has been a definite trend in recent years for existing producers to increase the size of their operation due to economic and technological changes. Almost one-half of the producers increased their herd size in 1962 over 1961. The reason most frequently given for expanding herd size was to utilize their bulk tanks to capacity, which is a result of improved technology and a necessity to sell more milk to pay for the tank. Expansion was most prevalent in herds of the younger producers and for those producers with large herds. Shortage of labor and lower prices for milk were the main reasons given by producers for not expanding during this period.

Nearly two-thirds of all producers felt that they had available capacity to expand. Fifty-five per cent of the entire group sampled planned to expand their size of operation by 1965. Expansion intentions were indicated mostly by the younger and smaller producers.

An increase in economic pressures is expected to make survival in the industry more difficult for the smaller producers, thus forcing them

to expand or drop out. Even though per capita consumption of fluid milk is expected to drop, the constantly expanding population should provide an increased demand for fluid milk during the next several years. There are indications that this demand will continue to be met by Tennessee Grade A producers. This is expected to be accomplished by a steady increase in production per cow and the larger size of operation of fewer producers.





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## APPENDIXES



## APPENDIX A

### CHOICE OF A QUESTIONNAIRE FOR THE TENNESSEE

#### GRADE A MILK PRODUCERS SURVEY, 1963

The questionnaire for this study was designed with two purposes in mind. First, it was set up to obtain the information needed to be able to classify the Grade A producers in Tennessee in a form similar to the North Carolina study. This was to facilitate regional comparison as requested by the Southern Regional Dairy Marketing Technical Committee. Some of the same questions used in the North Carolina study of 1962 were included, while many were not used, as it was felt they were not applicable to this particular study. Other questions were added in order to obtain information relevant to the study in Tennessee.

Secondly, the questionnaire was designed for simplicity of use and to facilitate return. The questions were designed to be read in a minimum of time and answered with a minimum of writing.

To assure return, the questionnaire was constructed with a half-page cover letter and a page-and-a-half questionnaire. The other sides contained the producer's name and address and the postpaid return address to the University of Tennessee. This enabled the farmer to be able to read and fill out the questionnaire, fold it with the return address on the outside, and mail it with a minimum of time and confusion.



## SCHEDULE OF QUESTIONS ASKED ON MAIL QUESTIONNAIRE, SPRING 1963

1. County \_\_\_\_\_.
2. Age: Under 25 ☐ ; 25-34 ☐ ; 35-44 ☐ ; 45-54 ☐ ; 55-64 ☐ ;  
65 or over ☐.
3. Number of cows you milked this morning \_\_\_\_\_.
4. Number of dry cows in your herd \_\_\_\_\_.
5. Total pounds of milk sold in March of this year \_\_\_\_\_.
6. Of your total herd (milking and dry), how many cows are  
(1) Holsteins \_\_\_\_\_? (2) Jerseys \_\_\_\_\_? (3) Guernseys \_\_\_\_\_?  
(4) Other breeds \_\_\_\_\_?  
(specify breed and number)
7. Do you feel that you are presently milking all the cows that your facilities will handle?  
(a) Yes ☐ No ☐  
(b) If "no", how many do you feel that you can handle? \_\_\_\_\_.
8. Did you increase your size of herd this past year (1962 over 1961)?  
Yes ☐ No ☐  
(a) If "yes", what influenced you to expand? (check as many as apply)  
☐ Acquired additional land; ☐ Unused building space;  
☐ New building space; ☐ To utilize bulk tank to capacity;  
☐ To use labor more fully; ☐ Possibility of market quotas;  
☐ Other \_\_\_\_\_  
(specify)  
(b) If "no", what kept you from expanding? (check as many as apply)  
☐ Lack of land; ☐ Limited building space;  
☐ Shortage of labor; ☐ Lower price for milk;  
☐ Higher labor costs; ☐ Bulk tank used to capacity;  
☐ Other \_\_\_\_\_  
(specify)
9. Do you plan to enlarge your herd by the end of 1964? Yes ☐ No ☐  
(a) If "yes", by how many cows? \_\_\_\_\_ (Number of cows to be added)

10. Approximately what per cent of your income from farming comes from the sale of milk? \_\_\_\_\_ (per cent)
11. Do you have other sources of farm income? Yes ☐ No ☐  
If "yes", from what other sources? (1) \_\_\_\_\_;  
(2) \_\_\_\_\_; (3) \_\_\_\_\_.
12. Do you work off the farm? Yes ☐ No ☐  
(a) If "yes", approximately how many days last year? \_\_\_\_\_ (days)
13. How much cropland do you farm? \_\_\_\_\_ (acres)  
(b) How much pasture? \_\_\_\_\_ (acres)  
(c) Other land? \_\_\_\_\_ (acres)
14. How many full time workers (including yourself) operate your farming program? \_\_\_\_\_
15. In addition, how much seasonal or part time labor did you hire last year? \_\_\_\_\_ (days)

## CHECK THE ANSWER THAT MOST NEARLY APPLIES

16. Do you buy ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of your replacements?
17. Do you buy ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of your feed grains?
18. Do you buy ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of your hay?
19. Do you buy ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of your silage?
20. Do you RENT ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of your land?
21. What per cent of your herd was serviced by artificial insemination in 1962? ☐ none; ☐ 1/4; ☐ 1/2; ☐ 3/4; ☐ all of the herd.
22. Is your silage storage ☐ upright silo; ☐ trench silo; ☐ both?
23. Is your grain feeding system: ☐ fully mechanized; ☐ partly mechanized; ☐ done completely by hand?
24. Do you have a: ☐ pipeline milker; ☐ bucket type milker;  
☐ milk by hand?
25. Type of central milking unit: ☐ stanchion barn with a capacity of \_\_\_\_\_ cows; ☐ milking parlor with capacity of \_\_\_\_\_ cows;  
☐ Other \_\_\_\_\_  
(specify)



## APPENDIX B

### RESPONSE OF TENNESSEE GRADE A MILK PRODUCERS TO MAIL QUESTIONNAIRE, 1963

#### I. MAILING DATES OF QUESTIONNAIRE

The list of Grade A producers in Tennessee selling milk under Federal order was obtained from the records of the Milk Market Administrators of the five Federal orders in the state. The total number from this source was 3097. Some of the producers operated more than one farm, but only one questionnaire was sent to each producer.

The date of the first mailing was April 26, 1963. Table XXXIX indicates the number of questionnaires returned each day after the first mailing and each successive mailing. When it was noted that only limited further response could be expected from the first mailing, a second mailing was made on May 25 to producers who had not responded to the first mailing. A third mailing was made on June 27 to the producers who had not responded to either the first or second mailings. Only the information from questionnaires received prior to August 1 was used, but a tabulation was kept on the number returning after this date in order to get a complete evaluation of the response to the mail questionnaire.

TABLE XXXIX

RESPONSE OF TENNESSEE GRADE A PRODUCERS TO MAIL QUESTIONNAIRE, 1963, BY DAYS;  
FIRST, SECOND, AND THIRD MAILING<sup>a</sup>

| Mailing           | Date  |    |    |    |    |    |   |   |   |   |   |   |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |    | Total |
|-------------------|-------|----|----|----|----|----|---|---|---|---|---|---|----|----|------|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|
| First:            |       |    |    |    |    |    |   |   |   |   |   |   |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Day of Week       | April |    |    |    |    |    |   |   |   |   |   |   |    |    | May  |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Number re-        | 27    | 28 | 29 | 30 | 1  | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | 11   | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |       |
| turned            | S     | S  | M  | T  | W  | T  | F | S | S | M | T | W | T  | F  | S    | S  | M  | T  | W  | T  | F  |    |    |    |    |    |    |    | 666   |
| Second:           |       |    |    |    |    |    |   |   |   |   |   |   |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Day of week       | May   |    |    |    |    |    |   |   |   |   |   |   |    |    | June |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Number re-        | 26    | 27 | 28 | 29 | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7  | 8  | 9    | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |       |
| turned            | S     | M  | T  | W  | T  | F  | S | S | M | T | W | T | F  | S  | S    | M  | T  | W  | T  | F  | S  |    |    |    |    |    |    |    |       |
| Third:            |       |    |    |    |    |    |   |   |   |   |   |   |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Day of Week       | June  |    |    |    |    |    |   |   |   |   |   |   |    |    | July |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| Number re-        | 28    | 29 | 30 | 1  | 2  | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12   | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |       |
| turned            | F     | S  | S  | M  | T  | W  | T | F | S | S | M | T | W  | T  | F    | S  | S  | M  | T  | W  | T  |    |    |    |    |    |    |    | 265   |
| No date of return |       |    |    |    |    |    |   |   |   |   |   |   |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |    | 44    |

<sup>a</sup>Mail response here is for questionnaires which have data adequate for processing with the exception of questionnaires after 7-31-63.



## II. RESPONSE TO MAIL QUESTIONNAIRE, BY MAILING

On April 26, 3097 questionnaires were mailed to the Grade A producers in Tennessee. A total of 667, or 21.5 per cent, were returned by May 24. The order with the highest per cent response was the Appalachian order with 26.1 per cent, while the Chattanooga order had the lowest response of 18.1 per cent (Table XL).

On May 25, the date of the second mailing, 2429 questionnaires were mailed, and 626, or 25.8 per cent, were returned by June 26. This was a higher per cent response than the first mailing, but from a smaller number of questionnaires. The Memphis order had the highest per cent response for this mailing with 30.2 per cent, while the Chattanooga order had the lowest response with 20.3 per cent.

The third mailing consisted of 1800 questionnaires being mailed June 27, and by July 31, 267, or 14.8 per cent, had been returned. Here, the Appalachian order had the highest response with 18.2 per cent, and the Nashville order had the lowest response with 13.4 per cent. There were 44 questionnaires that did not have a date of return postmarked; therefore, these were not included in any of the three mailings but were included in the total response.

Between April 26, the date of the first mailing, and July 31, the last date that returned questionnaires were processed, a total of 1598 questionnaires were received from Grade A producers. After July 31, six more questionnaires were received, to run the total received to 1604, or 51.8 per cent of the 3097 originally sent out. Of this total, 1590 had

TABLE XL

RESPONSE OF TENNESSEE GRADE A PRODUCERS TO MAIL QUESTIONNAIRE, 1963, BY MARKET AREA;  
FIRST, SECOND, AND THIRD MAILING

| Market Area | Mailing     |                      |               |             |                      |               |             |                      |               |                             |                      |      |
|-------------|-------------|----------------------|---------------|-------------|----------------------|---------------|-------------|----------------------|---------------|-----------------------------|----------------------|------|
|             | First       |                      |               | Second      |                      |               | Third       |                      |               | Total<br>Number<br>Returned | Per Cent<br>Returned |      |
|             | Number      |                      | Re-<br>turned | Number      |                      | Re-<br>turned | Number      |                      | Re-<br>turned |                             |                      |      |
|             | Sent<br>Out | Per Cent<br>Returned |               | Sent<br>Out | Per Cent<br>Returned |               | Sent<br>Out | Per Cent<br>Returned |               |                             |                      |      |
| Appalachian | 284         | 74                   | 26.1          | 210         | 62                   | 29.5          | 148         | 27                   | 18.2          | 0                           | 163                  | 57.4 |
| Chattanooga | 580         | 105                  | 18.1          | 475         | 120 <sup>a</sup>     | 20.3          | 353         | 52                   | 14.7          | 15                          | 292                  | 50.3 |
| Knoxville   | 761         | 179                  | 23.5          | 581         | 163                  | 28.0          | 418         | 61                   | 14.6          | 15                          | 418                  | 54.9 |
| Memphis     | 381         | 93 <sup>b</sup>      | 24.4          | 288         | 87 <sup>c</sup>      | 30.2          | 201         | 36                   | 17.9          | 3                           | 219                  | 57.5 |
| Nashville   | 1091        | 216                  | 19.8          | 875         | 194 <sup>d</sup>     | 22.2          | 680         | 91 <sup>e</sup>      | 13.4          | 11                          | 512                  | 46.9 |
| Total       | 3097        | 667                  | 21.5          | 2429        | 626                  | 25.8          | 1800        | 267                  | 14.8          | 44                          | 1604                 | 51.8 |

<sup>a</sup>Includes three returned from producers who had sold farm.

<sup>b</sup>Includes one returned from out-of-state producer.

<sup>c</sup>Includes one returned from institutional farm.

<sup>d</sup>Includes one returned from out-of-state producer.

<sup>e</sup>Includes one returned from producer who had sold farm and one with insufficient information.



data which were sufficient to allow the information to be used in the summary report.

Of the five market areas, the Memphis order had the highest per cent total response, 57.5 per cent, while the Nashville order had the lowest, 46.9 per cent.

Approximately 30 days elapsed between each mailing. Slightly over 70 per cent of the total response to each mailing was received within 9 days after the questionnaires were mailed to the producers, and 90 per cent of the response to each mailing was received within 16 days after mailing.

The entire response to the first mailing resulted in 21 per cent of the producers responding, and the first and second mailings, combined, resulted in a 42 per cent response of all producers. Thus, had there been a time limit involved, the time lapse between mailings could have been shortened, or the third mailing eliminated without sacrificing a large quantity of returned questionnaires.

There was little difference in accuracy of answers for each mailing, as is shown in Table XLI.

### III. RESPONSE BY AGE GROUPS

Approximately 61 per cent of the 1590 Grade A producers in the sample were between the ages of 35 and 54 (Figure 6). Sixty-two per cent of the farmers responding to the first mailing were in the 35-54 age group, as were 58 per cent of the second group and 65 per cent of the third group.

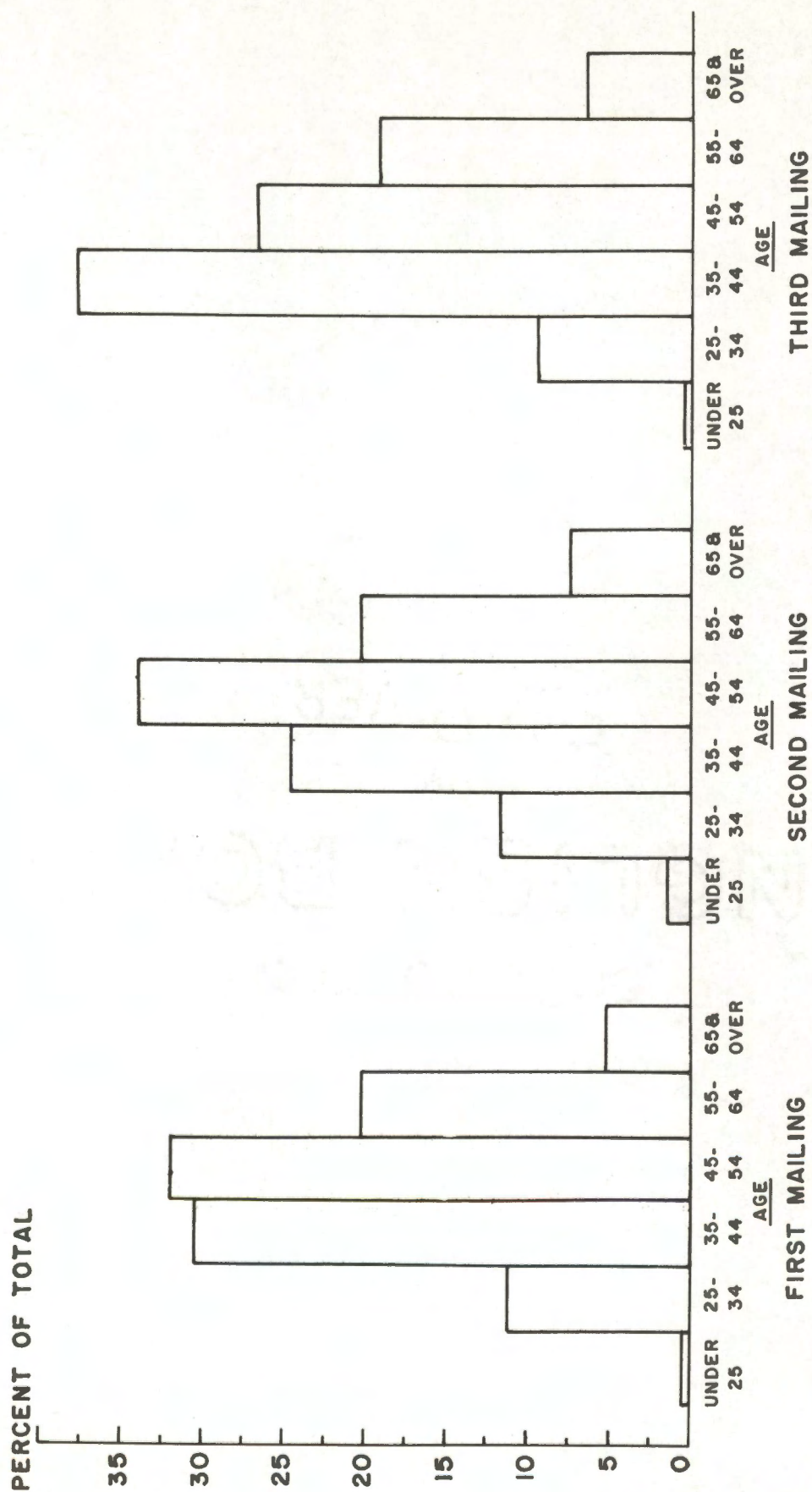


Figure 6. Frequency of Response of Tennessee Grade A Producers to Mail Questionnaire, 1963, by Age Group; First, Second, and Third Mailing.



Producers in the age group 25-34 comprised 11.6 per cent of the total sample, while producers in the 55-64 age group comprised 20.3 per cent of the total number responding. Producers in both of these age groups had a relatively equal percentage distribution in each mailing.

#### IV. RESPONSE BY SIZE OF HERD OWNER

Producers having 30-39 cows in their herds composed 25.5 per cent of those responding. Twenty-five per cent of the producers had 20-29 cows in their herds, and, together, producers in these two classes composed 50.5 per cent of the producers in the sample. These two groups composed 49.4 per cent of the respondents to the first mailing, 50.2 per cent of the second mailing, and 52.1 per cent of the third mailing.

Producers with 50-74 cows in their herds composed 18.6 per cent of the sample and were relatively equally distributed, by percentage, in each mailing.

Other size classes tend to be distributed throughout the three mailings in a distribution similar to the total distribution (Figure 7).

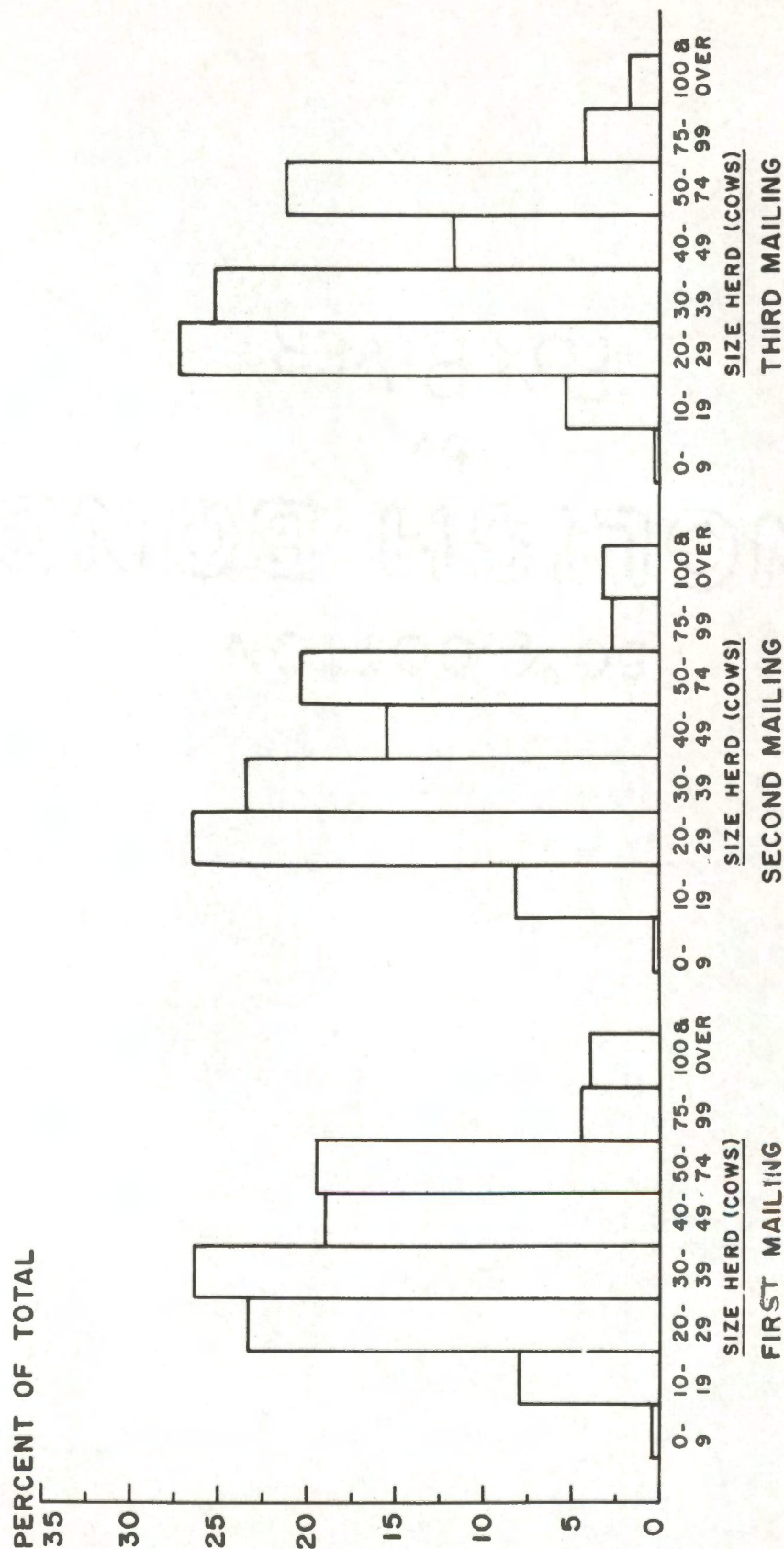


Figure 7. Frequency of Response of Tennessee Grade A Producers to Mail Questionnaire, 1963, by Size of Herd; First, Second, and Third Mailing.



## APPENDIX C

### ACCURACY OF RESPONSE OF QUESTIONNAIRES MAILED TO TENNESSEE GRADE A PRODUCERS, 1963

Since the data used in this study was taken from mail questionnaires, a method was set up to help determine how much reliability could be placed on the information received by this method. It was decided to select the answers to one of the questions that could be checked for accuracy. Question 5 was chosen because it was the only question that could be checked with a minimum of labor and expenditures. This question asked the producer for the total pounds of milk sold in March 1963.

A simple random sample of 25 questionnaires from each mailing were selected from the Knoxville order. The total pounds of milk reported produced by each of the producers in the sub-sample was compared with the actual amount of milk sold by these same producers. This actual figure was obtained from the records of the Knoxville Milk Market Administrator.

For the first mailing, the average amount of milk sold per farm from reported data was 100.7 per cent of the actual average. For the second mailing, the average amount of milk reported sold per farm was 99.8 per cent of the actual amount sold. For the third mailing, the reported average amount of milk sold was 102.6 per cent of the actual average. Overall, the reported average amount of milk sold per farm was 100.9 per cent of the actual amount sold.

TABLE XLI

A COMPARISON OF POUNDS OF MILK SOLD PER FARM AS REPORTED BY SAMPLED FARMERS IN EACH MAILING WITH ACTUAL POUNDS OF MILK SOLD PER FARM, MARCH 1963, KNOXVILLE AREA

| Mailing                         | Average Pounds<br>of Milk Sold<br>Per Farm as<br>Reported on<br>Questionnaire | Average Pounds<br>of Milk Sold<br>Per Farm as<br>Reported by<br>Milk Market<br>Administrator | Reported Milk<br>Produced<br>Expressed as<br>a Per Cent of<br>Actual Milk<br>Produced |
|---------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| First                           | 27,503                                                                        | 27,301                                                                                       | 100.7                                                                                 |
| Second                          | 32,024                                                                        | 32,091                                                                                       | 99.8                                                                                  |
| Third                           | 23,855                                                                        | 23,245                                                                                       | 102.6                                                                                 |
| Average for all<br>Sample Farms | 27,798 <sup>a</sup>                                                           | 27,549 <sup>a</sup>                                                                          | 100.9                                                                                 |

<sup>a</sup>The difference between the two averages was not significantly different from zero at the 5 per cent level using the test

$$t = \frac{\bar{X}_D - u_D}{S_D / \sqrt{N - 1}} \quad .^1$$

<sup>1</sup>Hubert M. Blalock, Social Statistics (New York: McGraw-Hill Book Company, 1960), p. 181.



## APPENDIX D

### COST OF OBTAINING DATA

One of the advantages of a mail-type questionnaire is a low cost per schedule completed. To help future researchers in data collection, direct costs connected with this survey are listed in Table XLII.

TABLE XLII

DIRECT COSTS INCURRED IN OBTAINING DATA FOR TENNESSEE  
GRADE A MILK PRODUCERS STUDY, 1963

| Item                                                       | Cost     |
|------------------------------------------------------------|----------|
| Printing of questionnaires                                 | \$140.00 |
| Postage to mail questionnaires                             |          |
| First mailing                                              | 154.85   |
| Second mailing                                             | 121.45   |
| Third mailing                                              | 90.00    |
| Return postage for questionnaires                          |          |
| First mailing                                              | 46.69    |
| Second mailing                                             | 43.82    |
| Third mailing                                              | 18.69    |
| Return postage for questionnaires with no date of postmark | 3.08     |
| Return postage for questionnaires not used in analysis     | .98      |
| Total                                                      | 610.56   |
| Average cost per questionnaire returned                    | .384     |



# APPENDIX E

## TABLE XLIII

AN EXAMPLE OF CHANGE IN SIZE OF BASE, KNOXVILLE AREA GRADE A MILK PRODUCERS, 1952-1963

| Year | Base Range (Pounds Milk Per Day) |         |         |         |         |         |         |         |         |         |           |           |               | 2000 and Over |  | Total |
|------|----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|-----------|---------------|---------------|--|-------|
|      | 0-99                             | 100-199 | 200-299 | 300-399 | 400-499 | 500-599 | 600-699 | 700-799 | 800-899 | 900-999 | 1000-1499 | 1500-1999 | 2000 and Over |               |  |       |
| 1952 | 64                               | 167     | 144     | 85      | 56      | 36      | 28      | 14      | 16      | 10      | 15        | 2         | 3             | 3             |  | 640   |
| 1953 | 39                               | 142     | 159     | 98      | 66      | 50      | 29      | 19      | 12      | 12      | 25        | 0         | 3             | 3             |  | 654   |
| 1954 | 48                               | 137     | 180     | 114     | 74      | 52      | 31      | 23      | 15      | 16      | 25        | 5         | 3             | 3             |  | 723   |
| 1955 | 61                               | 176     | 179     | 144     | 77      | 62      | 41      | 29      | 19      | 17      | 26        | 4         | 4             | 4             |  | 839   |
| 1956 | 62                               | 190     | 219     | 158     | 97      | 73      | 47      | 23      | 14      | 17      | 30        | 4         | 6             | 6             |  | 940   |
| 1957 | 41                               | 144     | 208     | 205     | 129     | 87      | 54      | 37      | 31      | 22      | 47        | 8         | 6             | 6             |  | 1019  |
| 1958 | 35                               | 135     | 196     | 210     | 126     | 88      | 58      | 43      | 38      | 15      | 58        | 12        | 5             | 5             |  | 1019  |
| 1959 | 39                               | 144     | 174     | 173     | 122     | 83      | 58      | 38      | 34      | 20      | 58        | 10        | 8             | 8             |  | 961   |
| 1960 | 41                               | 125     | 147     | 140     | 139     | 90      | 72      | 43      | 32      | 27      | 63        | 24        | 9             | 9             |  | 952   |
| 1961 | 40                               | 111     | 140     | 133     | 110     | 92      | 82      | 46      | 35      | 30      | 64        | 22        | 15            | 15            |  | 920   |
| 1962 | 41                               | 54      | 92      | 116     | 103     | 91      | 82      | 48      | 35      | 35      | 88        | 30        | 25            | 25            |  | 840   |
| 1963 | 7                                | 40      | 82      | 96      | 103     | 80      | 67      | 67      | 43      | 31      | 100       | 34        | 27            | 27            |  | 777   |

Source: Records of Knoxville Milk Market Administrator's Office, 1952-1963.

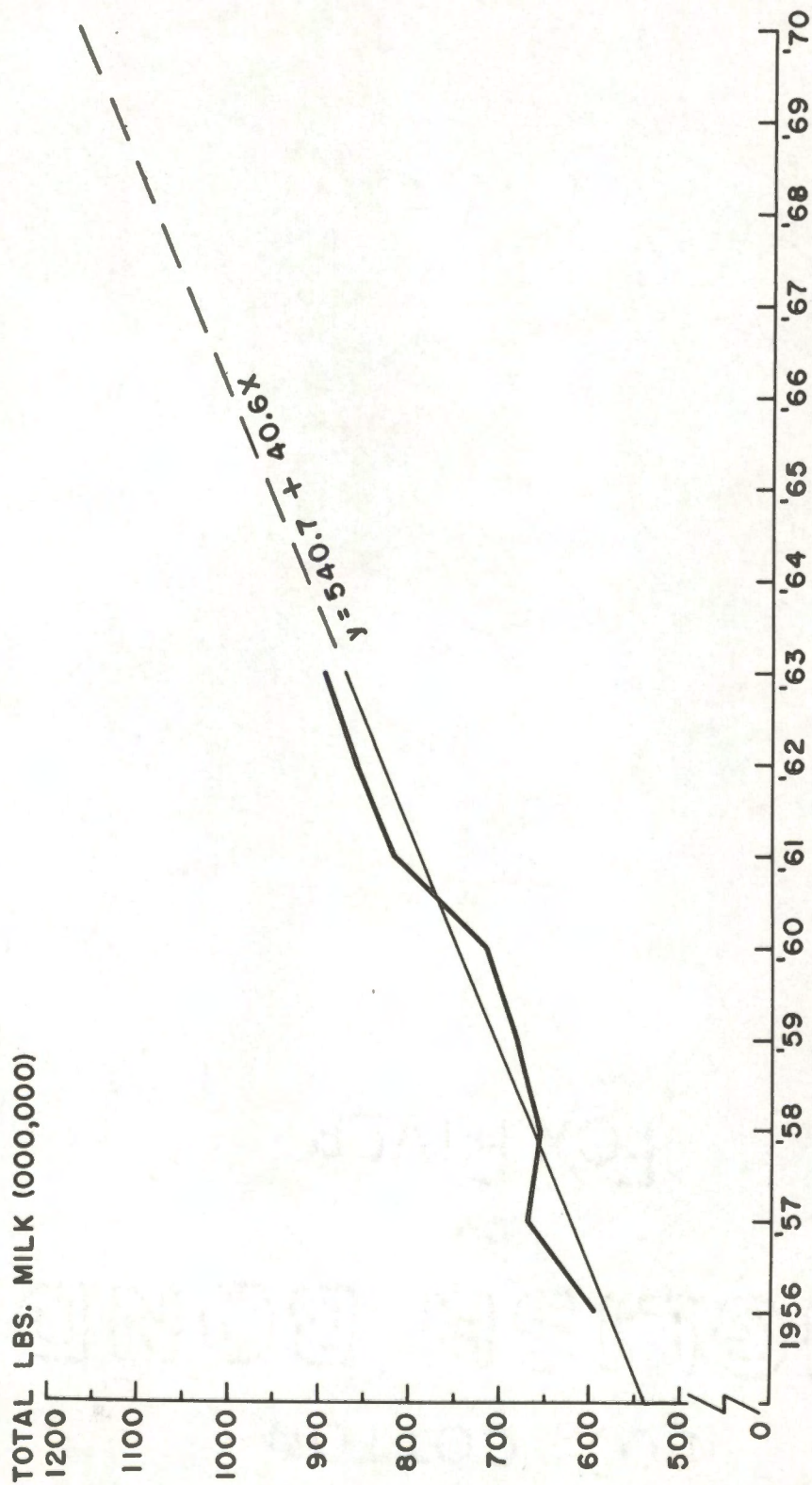


Figure 8. Total Milk Marketed Under Federal Order in Tennessee, 1956-1963, and Projection to 1970.

Source: Monthly Reports of Milk Market Administrator of each Federal order, 1956-1963.



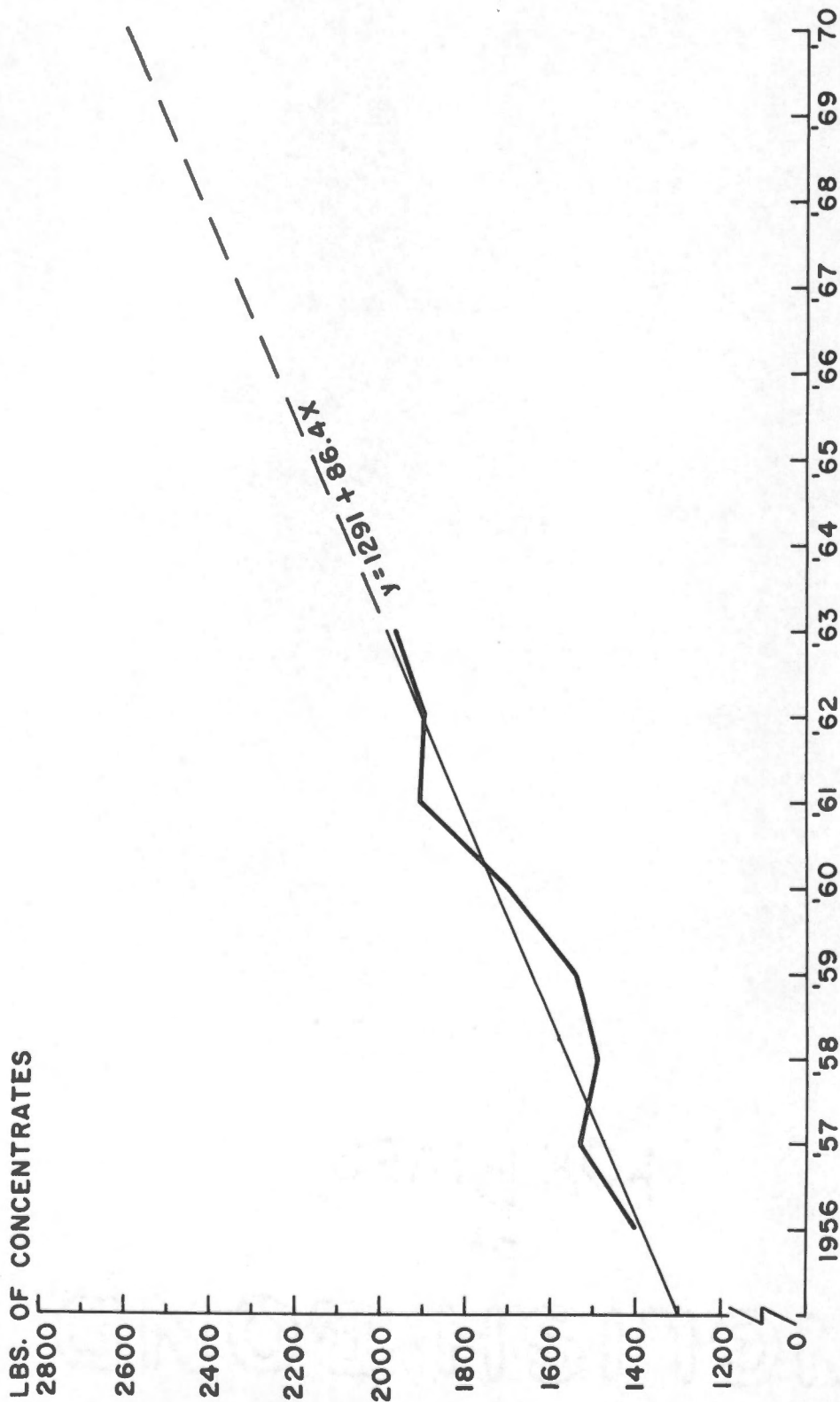


Figure 9. Pounds of Concentrates Fed Per Milk Cow, Tennessee, 1956-1963, and Projection to 1970.

Source: United States Department of Agriculture, Milk Production (Washington: Government Printing Office, 1956-1963), Monthly Issues.

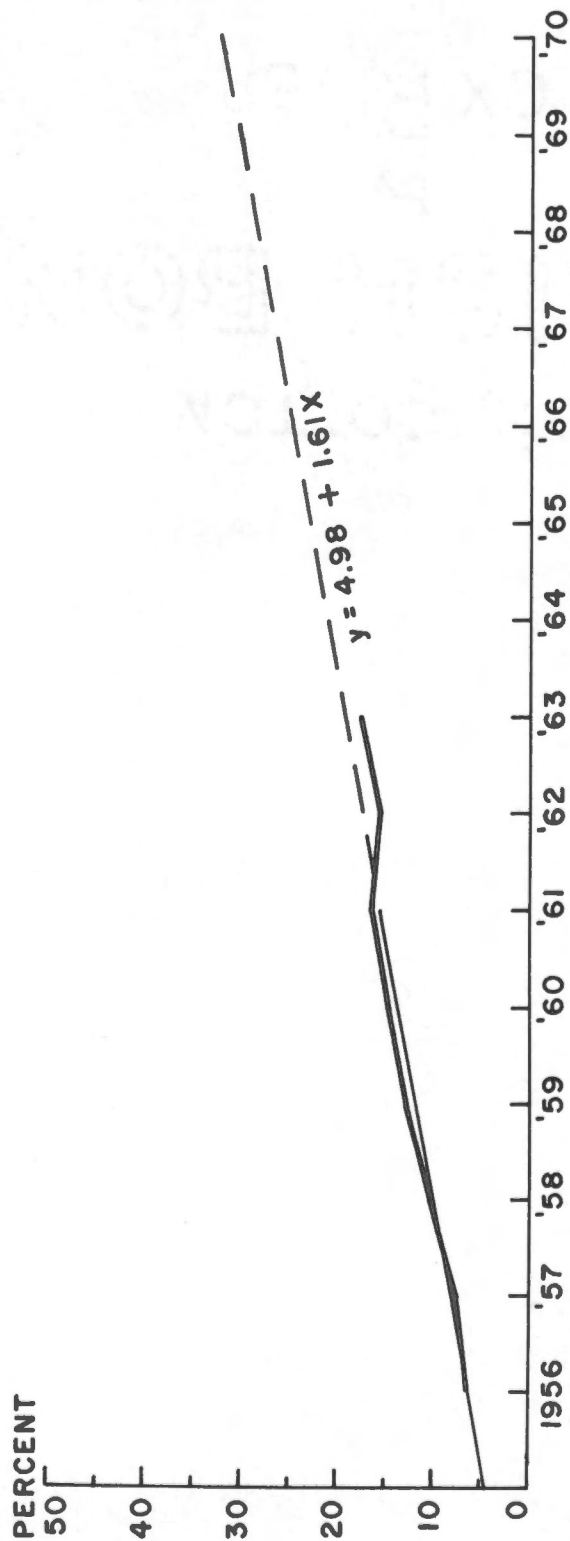


Figure 10. Per Cent of Milk Cows Bred Artificially, South Central United States, 1956-1963, and Projection to 1970.

Source: United States Department of Agriculture, Milk Production (Washington: Government Printing Office, 1956-1963), Monthly Issues.