THE DEVELOPMENT OF THE DAIRY INDUSTRY

IN BELMONT COUNTY, OHIO

A Thesis

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts

By

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Approved by:

[Signature]

Advisor

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PREFACE

The objective of this study is to examine the factors that have influenced the development of the dairy industry in one county of eastern Ohio and to explore the possibility of a change in the type of agriculture practiced being imminent.

Agriculture no longer plays a dominant role in the total economy of Belmont County, the area of study. Manufacturing and bituminous coal mining in Belmont County each had payrolls substantially greater than the value of all farm products sold in 1954, the last year having complete census data in all areas. Manufacturing provided employment for 4,256 persons in 1954 with a payroll amounting to $14,096,000.¹ Bituminous coal mining provided employment for 2,886 persons in that year with wages and salary payments amounting to $12,177,000.²

The value of all farm products sold amounted to $4,052,946 in 1954, with 3,679 family and/or hired workers engaged in agriculture.³


Dairy products accounted for 56 per cent of the estimated cash receipts from sales of agricultural products, classing Belmont County as a "dairy" county. Poultry provided the next most important source of cash receipts by accounting for 15 per cent of the total.4

The agriculture practiced in this hill county of eastern Ohio has changed substantially since the time of settlement. Competition from more naturally favored regions has been mainly responsible for the change that occurred as subsistence agriculture gave way to commercial farming.

The generally thin soils and rolling to steep topography have limited the eastern Ohio farmers' choice of reaction to competition. The dairy industry dating from the late 1920's represents the latest agricultural reaction or adjustment.

Belmont County was chosen as an area of study for several reasons, including the fact that it is the writer's home county and, therefore, an area of special interest. Other types of agriculture have been carried on within the county in connection with dairying, and to the exclusion of commercial dairying, providing contrasts in the general pattern of human activity. A strictly dairy breed of animal, the Jersey, was introduced at a relatively

4 Marvin G. Smith and Harry Greenbaum, Estimated Cash Receipts by Ohio Farmers from the Sale of Agricultural Products and from Government Payments, By Counties, 1954, Department of Agricultural Economics and Rural Sociology, The Ohio State University and Ohio Agricultural Experiment Station, Mimeographed Bulletin Number AE 259 (Columbus, Ohio, 1955), p. 10.
early date and provided a base for the development of the dairy
industry in this and adjoining counties. This county was first among
the surrounding highland counties to engage in the production of
fluid and manufactured milk for metropolitan markets and has continued
to rank above the average of the other hill counties in dairy
production.

In recent years trends that may alter the type of dairying
practiced in the county have become evident. Among these are a
decline in the number of farms producing milk, an increase in beef
cattle numbers, a constant "squeeze" between cost of production and
price received, and increasing competitive pressure from milk
produced in other areas of Ohio and the Lake States dairy region.

The nature of the land itself limits the number of agricultural
alternatives. The yields of grain crops are generally below the
level considered profitable due to low fertility and stony soil,
with the danger of erosion on the sloping fields presenting an
additional hazard to the growing of intertilled crops. Studies
conducted by the United States Department of Agriculture seem to
indicate that beef, sheep, and hog production as a main source of
farm income have only limited possibilities. Large scale poultry
operations appear in a more favorable light, as does the production
of small fruits and vegetables. An increase in industrialization
in the Ohio River Valley and an increased urban population, should
such occur, might direct marginal dairy operations into these lines
of production. The permissive and limiting features of the county
appear to indicate that perhaps efficient large scale dairy operations may replace the relatively small scale dairy operations of the present.
ACKNOWLEDGEMENTS

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Professor Lawrence A. Hoffman has been most helpful in offering encouragement, advice and constructive criticisms in his capacity as adviser. Professor Guy-Harold Smith, Chairman of the Geography Department, provided invaluable advice in editing the study; Professors S. Earl Brown, Henry L. Hunker and Alfred J. Wright of the Department of Geography gave freely of their advice, time, and provided very useful research data.

The assistance of Mr. George A. Taylor of the Dairymen's Co-operative Sales Association, Pittsburgh, Pennsylvania, is gratefully acknowledged. Without Mr. Taylor's assistance most of the statistics on the Pittsburgh Milk Market would have been unobtainable.

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I. HABITAT

The following section is designed to provide a general background that includes both permissive and limiting physical factors affecting the agriculture of the county and the importance of mineral and forest resources.

Situation.

Belmont County lies within the Wheeling-Steubenville metropolitan area and within eighty miles of the heart of the Pittsburgh metropolitan area (Figure 1). The population of the metropolitan areas was 2,567,328 in 1952.\(^1\) Excluding the rural farm population of both areas, over two million consumers of dairy products live within the market area served by the dairy industry of the county. Manufactured milk products from the county are within overnight delivery time of the market provided by the population complex along the eastern seaboard of the United States. Accessibility provides a freight rate advantage over manufactured milk products from the Mid-West and Lake state condenseries, as well as on fluid milk from the same areas.

The situation of the county may well be the most important factor in a continuance of the dairy industry.

Figure 1. The Situation of Belmont County with respect to the urban industrial areas of the Ohio valley which provide the market for dairy products.
Weather and Climate.

Weather and climate are important permissive features of any locality. On the whole, the weather and climate of Belmont County are conducive to agriculture, with the most common detrimental feature being the heavy downpour type of precipitation which accompanies summer thunderstorms and aids erosion. Probably the most noticeable feature of the weather in this part of the country is its variability. The prevailing westerlies bring a succession of "highs" and "lows" across Ohio and these in turn cause periods of change in the day-to-day weather. Local disturbances cause a good part of the warm season precipitation, usually in form of thunderstorms and accompanying downpours. Occasionally these disturbances give rise to high winds of a tornadic variety causing the most destructive weather feature of the area. Hail storms may also cause damage but these rarely occur.

Annual precipitation for the forty-two years prior to 1931 at the Demos station amounted to 40.49 inches; for the period from 1931 to 1949, 41.80 inches, giving an annual precipitation for the entire period of 41.14 inches. Records at the Barnesville station for the period 1939-1952 list annual precipitation as 40.93 inches.²


Belmont County had only one weather station located at Demos, east of Barnesville on the uplands, with records prior to 1931. This station was closed in June, 1949 and the Barnesville station,
Average warm season precipitation (April to September inclusive) amounts to 22 inches. Annual temperature at the Demos station over a fifty-nine year period was 51.2°F; mean maximum temperature over a fifty-one year period was 61.15°F and the mean minimum was 41.5°F. (For graphic representation of the above statistics see Figures 2 through 4). The highest recorded temperature at Demos was 106°F, the lowest recorded temperature was minus 26°F, giving a range between extremes of 134°F.

Temperatures along the Ohio River average slightly higher than at stations on the uplands such as Demos and have a longer period between killing frosts. The average length of the growing season at Demos over a forty-one year period of record was 172 days. The average length of the growing season at Clarington, a Monroe County station located on the Ohio River, fifteen miles south of Demos, was 178 days over the same period of record.

with a much shorter period of record, became the only station in the county. The most recent Climatic Summary of the United States Supplement from 1931 through 1952 lists statistics from both stations. The difference in period of record affects the results obtained; for this reason statistics from both stations are included.


4 Climatic Summary of the United States-Supplement 1931 through 1952, p. 42.

5 Ibid., p. 43.

Figure 2. The relatively even distribution of precipitation along with moderate winter and summer temperatures are conducive to pasture and hay production.
Figure 3. The summer maximum is within the limits suited for bluegrass growth.
Figure 4. The relatively moderate minimum temperatures allow a longer period of grazing and reduces the danger of grasses "freezing" out.
Snowfall amounts to 24.2 inches annually and occurs in all months except June, July, August, and September; however, very small quantities fall in May and October.\(^7\) The relatively mild winters and accompanying light snowfall seldom interfere with farm-to-market milk movements and require less in the way of protection for animals.

The amount of precipitation that occurs during the warm season is conducive to pasture and hay crops, important attributes for a region engaged in dairying. Climate alone cannot produce adequate pasture and hay; certain of the soils in the county are more responsive than others to the favorable climatic conditions.

Soils.

Reference has been made to some of the limiting features of the soils of the county, the low natural fertility, thinness, and frequency of rock fragments. Other features of a permissive nature are present and deserve mention.

The soils of the county are developed from the interbedded sandstone, shales, and limestone bed rocks and belong to the Brown soil group tending in general toward the Podsoils. Natural vegetation consisted of hard wood forest, largely oak and hickory with some beech and maple, a situation not conducive to the accumulation of humus or high soil fertility.

\(^7\) Climatic Summary of the United States—Supplement, 1931 through 1952, p. 41.
The southwestern part of the County, classed according to soil types, is the Muskingum, Keene-Wellston area (Area 1 in Figure 5). Muskingum soils are developed on acid, interbedded sandstone, siltstone and shale on the steeper slopes of the area. The soil is generally light in color, does not retain moisture well, and is shallow and only moderately productive. Organic content is low and their shallowness makes them stony. The nature of the soil and the danger of erosion on the steep slopes cause much of the land having this soil type to be used for pasture, meadows or wood lots. Where conservation practices are followed and lime and fertilizer applied, these soils will produce good crops of hay and sustain adequate pasture. The Keene soils are developed from acid clay shale on the more rolling upland surfaces. Their moisture holding capacity ranges from fair to good and they are low in organic matter. Acid reaction is medium to strong in these light brown soils and productivity is moderately low. General cropping is the most frequent use, but careful management is necessary for sustained yields. Wellston soils are developed from acid, interbedded sandstone, siltstone and shale on the gentle slopes and rounded ridge tops of the area. Moisture holding capacity is described as good, but the organic matter content is low. Most of these soils are planted to general farm crops or used as pasture land. Lime, fertilizer,
Figure 5. Distribution of Soil Areas in Belmont County. (After Know Ohio's Soil Regions, Ohio Department of Natural Resources).
control of erosion, and addition of organic matter are needed to sustain productivity on these soils.\textsuperscript{9}

The central and northern portions of the county are classed as the Westmoreland-Muskingum soil area (Area 2 in Figure 5). The Westmoreland soils are developed on interbedded layers of sandstone, shale and limestone, with the influence of the limestone being the distinguishing feature.

These soils occur on rolling to steep upland surfaces, are well drained, slightly acid and classed as moderately productive. Grayish-brown in color, these soils are moderately high in natural fertility and organic matter and are well adapted to the production of legumes and grasses. The ability of the Westmoreland soil to support blue grass pasture gave rise to the term "pasture belt" meaning the area of eastern Ohio noted for its excellent pasture and number of cattle kept on the farms.\textsuperscript{10}

The eastern part of the county has soils classed as the Muskingum, Westmoreland, Meigs, (steep phase) area (Area 3 in Figure 5). The topography of the area nearer the Ohio River is more hilly and has a greater amount of land in steep slopes. The parent materials are generally the same but the steep slopes have prevented the

\textsuperscript{9} G. Kenneth Dotson and T. R. Smith, Our Ohio Soils, Ohio Department of Natural Resources, Division of Lands and Soil (Columbus, Ohio, 1958), pp. 53-57.

\textsuperscript{10} J. H. Sitterley, R. H. Baker and J. I. Falconer, Major Land Use Problem Areas and Land Utilization in Ohio, Department of Rural Sociology, The Ohio State University and The Ohio Agricultural Experiment Station, Mimeographed Bulletin Number 79 (Columbus, Ohio, 1935), p. 9.
formation of well developed soil profiles. The soils are thin and stony and much of the area should be in forests or permanent pasture.

The soils of Area 4 in Figure 5 are classed as the Huntington-Wheeling soils. These soils occupy the first bottoms and first terraces along the Ohio River and the first bottoms in the valley of Stillwater Creek in the northwest. The Huntington-Wheeling soils are the most fertile in the county and are developed on sandstone, shale, and limestone materials transported from the uplands. Ranging in color from light to medium brown, these soils are easily tilled and have good moisture-holding capabilities. Land use on these soils depends on locality, those near the river are used for the production of vegetables, while those in the northeast produce excellent pasture and general farm crops. With the addition of lime and fertilizers these soils produce yields above average. The chief danger to crops is flooding.

Area 5 in the south-central part of the county has soils classed as Weigs-Muskingum. These soils are developed from a mixture of sandstone and red acid shale and are low in organic content, lime, and natural fertility. Permeability is low and an erosive condition easily develops, resulting in small slips and irregular surfaces on sloping land. Usually planted to general crops, these soils require careful management, addition of lime and fertilizer, and careful erosion control.11

11 Dotson and Smith, op. cit., pp. 52-56.
The following table, adapted from Our Ohio Soils, page 53 through 57, illustrates the soil profiles of the important soil groups in the county.

Muskingum Series - (Uncultivated and Uneroded Profile).

Depth in Inches.

0-8 Surface Soil  - Black leaf mold to two or three inches, grayish-brown silt loam, medium to strong acidity.

8-18 Subsoil      - Yellow-brown loam strongly acid. (This horizon is often poorly developed or entirely absent.)

18 Substratum     - Yellow-brown silt or sandy loam, sandstone fragments, bedrock.

Keene Series - (Cultivated Profile).

Depth in Inches.

0-11 Surface Soil - Friable silt loam, medium to strong acidity, light brown in color.

11-30 Subsoil     - Strongly acid, pale yellow mottled plastic clay.

30 Substratum     - Partly weathered acid clay shale, mottled gray, light gray and yellow in color.

Wellston Series - (Cultivated Profile).

Depth in Inches.

0-9 Surface Soil  - Yellowish-gray, friable, strongly acid silt loam.

9-36 Subsoil      - Light yellow-brown, strongly to very strongly acid, silt clay loam.

36 Substratum     - Interbedded sandstone, shale, and silt stone.
Westmoreland Series - (Cultivated Profile).

Depth in Inches.

0-10 Surface Soil - Slightly, silty clay loam, gray brown in color.

10-29 Subsoil - Yellow-brown to olive-brown, silty clay, to clay, slightly acid to neutral.

29 Substratum - Interbedded sandstone, shale, limestone.

Huntington Series - (Cultivated Profile).

Depth in Inches.

0-11 Surface Soil - Light to medium brown, friable, nearly neutral, silt loam.

11 Substratum - Brown, neutral, silt loam, ranging from light to heavy and grading into layers of silts and sands.

Wheeling Series - (Cultivated Profile).

Depth in Inches.

0-10 Surface Soil - Friable silt loam, medium acidity, dark brown in color.

10-58 Subsoil - Heavy silt loam, grading into fine sandy loam, strong acidity.

58 Substratum - Non calcareous stratified sand and gravel.

The Meigs soils, not listed in table, are much like the Muskingum soils except that they vary in color as a result of red and greenish shales that occur in some places and color the soils. Sloping fields may have a mottled appearance while more level fields
may have a yellowish surface soil and streaks or bands of red in
the subsoil.\(^{12}\)

The strong point of the county's soil is the ability of the
Westmoreland and Muskingum soils to produce pasture and hay. The
amount of land in slope in eastern Ohio makes the practice of grow-
ing grass, either as hay or pasture, desirable. Intertilled crops,
such as tobacco, have been grown on a relatively large scale in
the southwestern part of the county. The results of this type
tillage and repeated cropping are evident in the damage done by
erosion.

Erosion.

The Muskingum soils of the southwestern part of the county,
the old tobacco area, have been badly eroded. These soils were of
only moderate fertility to begin with so that with continued cropping
and the removal of organic matter, a highly erosible condition de-
veloped. Mis-management of the land was also a factor in the re-
sulting erosion, for sloping fields were used for row crops allowing
serious loss of top soil by sheet wash and gullying. Some land
so used deteriorated to the point where continued cropping was
unprofitable because of low yields and this land eventually reverted
to permanent pasture. Where permanent pasture land of this type

\(^{12}\) S. W. Phillips, Soil Survey of Belmont County, Ohio, United
States Department of Agriculture, Bureau of Chemistry and Soils,
Number 17, 1927 Series (Washington, D.C.: Government Printing Office,
1930), p. 5.
was further neglected, poverty grass and broom sedge became the
dominant type of vegetation allowing sheet wash to continue and
gullying to occur. Where these conditions were allowed to continue
land abandonment often resulted. Another type of mis-management
was the pasturing and occasional burning of wood lots. In these
instances leaf litter was destroyed and sheet wash soon followed,
thus allowing even forested areas to suffer from some erosion.\footnote{G. W. Conrey, J. S. Cutler and A. H. Paschall, \textit{Soil Erosion}
in \textit{Ohio}, \textit{Ohio Agricultural Experiment Station Bulletin 309} (Wooster,
Ohio, 1937), pp. 3-14.}
Erosion continues to be a difficulty encountered in agriculture
practiced on the Muskingum and similar soils. Data obtained from
the United States Soil Conservation Service Survey now in progress
lists erosion as a problem of the Muskingum soil in each of the land
capability classes.

Erosion has not damaged the Westmoreland soils as badly as
the Muskingum soils. The influence of limestone in the parent
material and the resulting ability to produce blue grass aids
natural fertility and vegetation cover. The ability to produce
blue grass also caused a larger portion of the land to be in pasture
with sufficient cover to prevent sheet wash. Erosion of sloping
fields in cultivated crops is hindered to a degree by the granular
nature of the soil; the heavier texture of the subsoil, on the other
hand, reduces permeability and increases run-off. Where sheet
wash does occur, gullying soon follows due to the fine texture
of the subsoil. Mis-management such as over grazing and allowing
cattle on the land too early in the spring has and does contribute to erosion. The above mentioned soil survey lists erosion as a continuing problem of the Westmoreland soils.

Education in soil conservation practices, increased use of fertilizers and lime, and increased use of grass silage have served to reduce the dangers of soil erosion, however, the amount of land in slope and the characteristics of the soil make erosion a continuing problem in the county so long as row crops are grown. An examination of the land forms of the area clarifies the dangers of the erosion problem and illustrates one of the more limiting physical factors.

Landforms.

Belmont County lies within the unglaciated Allegheny Plateau. (Figure 6). The resulting landforms are the work of running water and lack the rounded contours and depositional features of the glaciated portions of the Plateau. Most of the Plateau surface within the county has been dissected by relatively short streams, with steep gradients, flowing into the Ohio River (Figure 7). The valleys thus developed tend to be narrow, steep sided, and winding, with only small flood plains, so that most of the agricultural activity takes place on the rolling to steep uplands between streams. Figure 8 presents the drainage pattern and the primary

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Figure 6. Physiographic Regions of Ohio. (Ohio Division of Geological Survey.)
Figure 7. Landforms of Belmont and surrounding counties. Most of the agriculture takes place on the more level areas between streams rather than in the stream valleys. (Ohio Division of Geological Survey.)
Figure 8. Primary Functions of Small Towns in Belmont County.
functions of the small towns and villages of the county. Most of the upland towns are connected with agriculture while those in valleys are connected with mining or the industries along the Ohio River.

Elevations range from 650 feet in the deeper stream valleys to 1300 feet on the uplands with a few of the higher ridges and knobs reaching elevations of 1350 to 1400 feet. Local relief between 200 and 400 feet is common. The character of the upland surface varies from place to place, with the southeast tending toward more rugged topography than do the central and western portions of the county (Figures 9 through 11). The use of contour strips emphasizes the danger of erosion. The rolling to steep topography is perhaps the most limiting physical feature.

Figures 9 through 11 also give an indication that there are forest resources in Belmont County. Forests appear prominent from observations made along the highways of the county and from aerial photographs. Yet their addition to farm income is comparatively slight. The broken nature of the terrain is a handicap in utilizing the resources of farm woodlands as in other areas of agriculture.

Forest Resources.

The value of all timber cut on land classified as farm land in the county amounted to $34,522 in 1954.  

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Figure 9. Contour Strips southwestern Belmont County. This picture presents a view along one of the upland surfaces in the southwestern part of the county. The use of contour strips minimizes the dangers of erosion on this rolling terrain. (Soil Conservation Service.)
Figure 10. Aerial view of Central Belmont County. The rolling nature of the topography is again demonstrated by the use of contour strips. The silos of the farmstead in the background indicate dairy farm. (John P. Feisley, Soil Conservation Service.)
Figure 11. Aerial view of eastern Belmont County.

The rough, wooded, terrain is representative of the eastern and southeastern portions of the county where short streams flowing into the Ohio River have dissected the Plateau surface to a greater extent than in the central or western parts of the county. (John P. Feisley, Soil Conservation Service.)
provided by an operation of this value is negligible on a county wide basis. Originally all forest, approximately 30 per cent of the county was classed as forest land by the Central States Forest Experiment Station in 1954. Oak and hickory forest is the pre-dominant variety, making up 63.1 per cent of the forest types in east-central Ohio.\textsuperscript{16} The grade of most of this timber is low quality saw-logs, although the potential is present to grow first quality hardwood lumber. Fifty-five per cent of the board-foot volume of east-central Ohio is in trees large enough to produce first and second grade saw-logs, yet only 18 per cent of the volume is in grade 1 and 2 logs.

Lack of accessibility has been a factor in the practice of cutting only the best timber and depending on low quality trees to produce the next crop. Additional damage has been done by fires.\textsuperscript{17} Poor market possibilities and small income from wood lots have not encouraged careful management, with the tendency being to pasture woodlands, thus allowing the animals to damage or destroy the young trees.\textsuperscript{18}

Lack of a market and the length of time required for a return on investment would seem to exclude forestry from a dominant role

\textsuperscript{16} Forest Statistics for the Hill Country of Ohio, Central States Forest Experiment Station, Forest Survey Release Number 17 (Columbus, Ohio, 1954), pp. 27-29.

\textsuperscript{17} Ibid., pp. 4-5.

\textsuperscript{18} Interview with County Agent of Belmont County, June 6, 1959.
in the county's economy, although forests may well be the best use of some of the more sloping land.

Mineral Resources.

Mention of resources would not be complete without recognizing the effect of bituminous coal mining in Belmont County. With the exception of the strip mining areas along the northern and northwestern margins of the county, the chief effect of mining on dairying is that it provides a means of livelihood for consumers of dairy products. The mining industry employed 2,608 production, clerical, and supervisory personnel, who earned $14,492,712.00 in salaries and wages in 1957. The county led the state in 1957 in numbers of mine workers employed and wages and salaries payed.

In the northern and northwestern sections of county agriculture is carried on beside stripping operations (Figure 12). The effect of strip mining on dairying is to reduce the land area available for farming. Reclaimed strip mine land is seldom suitable for dairy operations due to the difficulties encountered in moving animals over the rough, broken, terrain to adequate pasture. The shift from pasture to pasture is necessary because the reclaimed land supports fewer animals per acre and suitable water supplies are more difficult to obtain once the land has been stripped. The

Figure 12. Aerial view of strip mining in northern Belmont County.

Agriculture is carried on adjacent to stripping operations in this part of the county. Note the high vertical walls, steep-sided spoil banks and water-filled cuts. Many of these water bodies are unusable due to acid seepages from unremoved coal seams. How much time will elapse before the stripped area returns to a level of production comparable to the areas not stripped is problematical. (John P. Feisley, Soil Conservation Service.)
barn-to-pasture movement of animals, performed daily, is difficult in some cases. Vertical cliffs occur frequently and this too adds to the disadvantages of using reclaimed land for dairying. The total area affected by stripping operations up to 1957 amounted to 6,114 acres, of which 3,365 acres had been reclaimed.\textsuperscript{20}

The dip of the rock strata toward the southeast has limited the extent of stripping of operations by causing the overburden above the coal seams to become too thick for removal by the present type of machinery. Production by surface mining methods accounted for 1,969,089 tons or 26 per cent of a total production of 7,573,861 tons in 1957\textsuperscript{21} indicating the relative importance of strip mining in the county (Figures 13 and 14).

Should the demand for coal increase, and larger stripping machines be built, the remainder of the county might also be exploited in this manner, for the entire area is underlain with three to four coal seams.

The only other mineral exploiting industries in the county are two small limestone quarries and a shale mine whose production and employment are very small in comparison to the coal mining industry.

\textsuperscript{20} Ibid., p. 18.

\textsuperscript{21} Ibid., p. 22.
### Table: Percent Distribution of Ohio Coal Produced by Stripping and Underground Methods, by County of Origin, 1800-1955.

<table>
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<th>County</th>
<th>Stripped</th>
<th>Deep</th>
<th>Total</th>
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<tr>
<td>Belmont</td>
<td>0.96</td>
<td>21.01</td>
<td>21.97</td>
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<td>Jefferson</td>
<td>2.89</td>
<td>10.57</td>
<td>13.46</td>
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<tr>
<td>Athens</td>
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<td>10.06</td>
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<td>8.03</td>
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<td>6.14</td>
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<td>Tuscarawas</td>
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<td>4.86</td>
</tr>
<tr>
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<td>3.87</td>
<td>3.94</td>
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<td>Jackson</td>
<td>0.20</td>
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<td>3.20</td>
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<tr>
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<tr>
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<tr>
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<td>0.76</td>
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<tr>
<td>Meigs</td>
<td>0.13</td>
<td>2.31</td>
<td>2.44</td>
</tr>
<tr>
<td>Noble</td>
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<tr>
<td>All other</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>15.66</td>
<td>84.34</td>
<td>100.00</td>
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</table>

Figure 13. Note the relatively small part of total production by strip mining methods. (Ohio Department of Industrial Relations.)
PERCENT DISTRIBUTION OF OHIO COAL PRODUCED BY STRIPPING METHODS, BY COUNTY OF ORIGIN, 1914-1955.

<table>
<thead>
<tr>
<th>County</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Harrison</td>
<td>28.95</td>
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<tr>
<td>Jefferson</td>
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<tr>
<td>Perry</td>
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<td>Belmont</td>
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<td>Stark</td>
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<td>Huron</td>
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<td>Jackson</td>
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<td>Vinton</td>
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<tr>
<td>Athens</td>
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<tr>
<td>All other</td>
<td>5.08</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Figure 14: Note the decrease in rank held by Belmont County when production by stripping method is compared among Ohio counties. (Ohio Department of Industrial Relations.)
Water Supplies.

Reference has been made to the need for having adequate water in pasture fields. Of equal importance are the demands made on the water supply by the operations of a dairy barn.

Ground water supplies vary considerably from place to place in the county. The water supply of the western part of the county, underlain with rocks of Pennsylvanian age, is generally better than that of the remainder of the county, which is underlain with Permian age rocks (Figure 15). Where sandstone beds serve as aquifers local supplies are generally adequate to good, but where extensive shale beds are the aquifers, local supplies are generally inadequate and water shortages result in dry summers.

Before the development of mechanical cooling devices, water from springs or wells was used to cool milk prior to shipment to the dairy plant or creamery. This practice, depending on the size of the dairy operation, required considerable amounts of water during the warm season. Technological advancements such as the milk cooler have greatly reduced the amount of water used as a coolant. On the other hand, innovations such as individual drinking cups for each dairy animal in the barn have placed new demands on water supplies as have the gradually rising standards of sanitation. Human demands on the water supply have also increased as running water and accompanying features such as bathrooms have been added to farm homes.
Figure 15. Water supplies are generally more adequate in the areas of Belmont County having Pennsylvanian age rocks than in the portions of the county having bed rocks of Permian age.
In recent years farm ponds have been built adjacent to many barns as an addition to the water supply and as a source of fire protection. The water supply of the area may be classed as a minor limiting factor.

Summary.

In general, the permissive physical factors of the county outweigh those of a limiting nature. The situation of Belmont County with respect to markets for dairy products is good. Climate is favorable and most of the soils are responsive in the production of pasture and hay, given good management. Their fertility in other types of production is less than is desirable. The rolling to steep topography and the dangers of soil erosion are the more limiting features but again given careful management, these factors can be overcome as have water deficiencies in most cases. Much remains to be done in the area of integrating farm wood lots with the dairy operation so the maximum benefits accrue to both. The fact that forest resources are available is a desirable feature of the county. Strip mining as yet affects a relatively small part of the county; what happens in the future remains to be seen. The limitations imposed by reclaimed strip mine land would appear to place any increase in stripped area as a limiting factor.

The permissive features of the habitat have allowed other types of agriculture to be practiced. The following section relates the evolution of land use from the time of settlement through the development of the dairy industry.
II. EVOLUTION OF THE LAND USE PATTERN

Viewed in a historical frame of reference, the dairy industry of Belmont County is comparatively young. The permissive factors of the habitat, situation, climate and soils have supported other types of farming for varying periods of time. The limiting factors, rugged topography, erosion and low natural soil fertility, have taken their toll and exerted an influence on the type of farming that could be followed. What could be called historical happenstance has also been an important factor in the evolution of the land-use pattern. The following section presents the evolution of agriculture in Belmont County.

Indian Land Use.

The hill country of Ohio was apparently more of a hunting ground for the Indians than an area of permanent settlement. The older tribes of Ohio had been broken up and partially destroyed by the stronger tribes from the East and from the South by the time the white man arrived west of the Appalachians. Consequently the Indian population of the hill country of eastern Ohio is thought to have fluctuated seasonally, with the period of greatest numbers coming in the fall months or the hunting season. Numbers were
lowest during the summer months when the tribes stayed near the
villages in the central and northern parts of the State. Remnants
of the older tribes had permanent homes in the hill country but
their numbers were few and the early white settlers in Belmont County
apparently traded with them without incident. Indian agriculture
consisted of clearing a plot of land, varying in size depending on
the size of the village, and growing corn as the main crop along
with beans, peas and squash, until the land was exhausted. A
new plot of land was then cleared and used in the same manner.
The total effect of the Indian occupancy was slight due to the
sparse population, with the trails used by the Indians that later
became the roads of the white man being the chief bequest.

Settlement.

The first white settlers in Belmont County were "squatters"
who moved into the eastern part of the county along the Ohio river
during the Revolutionary War. These people were mainly interested
in trading with the Indians, but they did clear land and establish
a settled, agricultural life. The Indians were not happy with the
land occupying tendencies of their new neighbors and made complaints
to the colonial government which sent troops to dispossess the "squatters". Little was accomplished by these attempts for the "squatters"

1 W. A. Lloyd, J. I. Falconer and C. E. Thorne, The Agriculture
of Ohio, Ohio Agricultural Experiment Station Bulletin 326 (Wooster,
Ohio, 1918), pp. 18-23.
returned to their homes as soon as the troops left the area. So well established did these people feel that a John Emerson issued an invitation to the settlers west of the Ohio to elect delegates to a constitutional convention in 1785. With the organization of the Northwest Territory in 1787 settlement was authorized and encouraged.2

Prior to the opening of eastern Ohio for settlement, a tract of land, including Belmont County, had been surveyed using the rectangular system of survey newly adopted by the Ordinance of 1785.

Lines parallel to the western boundary of Pennsylvania and six miles apart were surveyed forming seven ranges of townships from which the term "Seven Ranges" was later derived. The survey was completed in 1786 and from the field reports of the surveyors the first specific information on the area was obtained.3

Settlement soon followed, with the pioneers coming from several eastern states. One main route of travel for immigrants to eastern Ohio was by way of the Potomac valley, then across the Allegheny Mountains to the Monongahela head waters and down this river valley to Pittsburgh. A western cutoff, which later became a part of the National Road led from the Monongahela to the Ohio at Wheeling. Settlers from Maryland, the Shenandoah Valley of Virginia, Delaware

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2 Ibid., p. 24.

and eastern Pennsylvania usually came by this route. The Wilderness Road, which ran from Virginia to Kentucky by way of the Cumberland Gap provided a route for settlers from Virginia, the Carolinas and Georgia into Ohio.\textsuperscript{4} The Pultney Road, which followed the ridge tops from near Bellaire on the Ohio to Barnesville and beyond was the first main route in the county. Zanes Trace, opened shortly after 1796, was another means of access to the interior of the county.

Among the first settlers were several families of Quakers who moved to Ohio from Georgia, Virginia and the Carolinas because they disapproved of the practice of slavery in their home states.

The new settlers brought with them the type of agriculture they had practiced in their previous homes. John Price, formerly of Calvert County, Maryland, planted the first commercial tobacco crop in Ohio near Barnesville in western Belmont County in 1818. The crop was shipped east to Baltimore, Maryland, by horses and wagon and brought a price high enough to encourage a larger acreage being planted the following year.\textsuperscript{5} Within the next few years the eastern Ohio tobacco industry was begun and was to continue for nearly a century. The tobacco grown in eastern Ohio was a flue-cured, export type similar to the Maryland export variety. Baltimore continued to be the market place and western Europe, for the most part, the

\textsuperscript{4} Lloyd, Falconer, and Thorne, \textit{op. cit.}, pp. 33-34.

purchasing area. Only small amounts of this type (70) were used in domestic manufacture, with plug chewing tobacco and locally manufactured cigars called "stogies" being the chief products. By 1825 "considerable" amounts of tobacco were being produced in eastern Ohio.6

The building of the National Road, which reached Wheeling in 1818, hastened settlement and supplied an outlet for crops produced in the county. In addition, a type of service industry later grew up along the National Road, with farms for eight or ten miles on either side specializing in grain crops for sale to immigrants going west and later to drovers of cattle going east. Large areas of pasture land were also available for pasturing droves of animals.7 The availability of pasture was an important factor in establishing the keeping of livestock in the central and eastern parts of the county. Merino and Saxony sheep appeared early in the county, with Merinos later to increase greatly in number as eastern Ohio became the fine-wool center of the nation.

Types of Agriculture.

The general types of agriculture became established during the following years. The Muskingum soils of the western part of the county were utilized for tobacco production to a greater extent


7 Ibid., p. 74.
than were the Westmoreland soils, largely because a better colored and higher priced leaf resulted. Tobacco was not grown to the complete exclusion of all other crops for livestock, including sheep, were kept and required feed. The pasture available and the fertility of the Westmoreland soils provided a base for the keeping of livestock and grain production, especially wheat. Until around 1890 wool, tobacco, and wheat were the leading sources of farm income in eastern Ohio.  

Cattle raising played a prominent role in the economy of Belmont County. Prior to the opening of railroads traversing the state, the situation of eastern Ohio provided two alternatives for the sale of cattle. Cattle could be driven east to the New York, Philadelphia or Baltimore markets, and sold as grass fed beef, or perhaps sold to farmers near these markets for further fattening, or they could be sold to drovers returning from the east to the corn growing counties further west, who would fatten the cattle on corn before starting the overland drive to the east. The opening of through rail lines in the late 1850's ended the movement of cattle to the corn growing counties before their final shipment east for sale. The ease with which cattle could now move east to market brought about an increase in cow numbers in all parts of the state except the corn growing region near the Scioto River.

The type of cattle kept were multi-purpose, many of them the

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8 Ibid., p. 235.
9 Ibid., p. 242.
Shorthorn or Durham breed, which were heavy enough for beef and at the same time produced sufficient milk for the farm families uses, including the making of butter.

Agriculture in eastern Ohio prospered from the coming of rail transportation until better land further west began to produce competitive crops and animals. Competition was first felt by the beef and grain growing farms and a slow decline in this type of agriculture set in during the 1870's and 1880's. At the same time dairy types became more prominent with the Jersey line being introduced in 1867. 10 L. P. Bailey of near Barnesville became interested in the Jersey breed and engaged in a profitable business of importing Jersey cattle from the eastern states and re-selling them throughout Belmont and adjoining counties. In time Belmont County was to claim the name of "the home of the Jersey cow."

Increasing industrialization and population growth in the Ohio Valley and increased population in the upland towns and villages away from the river created a growing demand for milk and dairy products. Fluid milk was supplied to the centers of population by farms within the distance covered easily by horse drawn wagons or from farms situated near the rail line. Less accessible farms further away from the populated areas and the rail line had fewer strictly dairy animals and produced butter which was usually sold to "hucksters," as the traveling butter and egg buyers were called, or small amounts

10 Information supplied by Mrs. Lester Bailey of Tacoma, Ohio.
of cream, which required less refrigeration than fluid milk and was moved to the rail line for shipment or also sold to the "hucksters." Tobacco production declined after 1880 and these farms apparently began to slowly add more cattle, for by 1895 co-operative creameries were being organized along the rail line in the western part of the county.\textsuperscript{11} The co-operative ventures seldom prospered and most eventually dissolved because of low profits and mis-management. By 1900 an individual had purchased two of the creameries and in 1903 incorporated the company that was to become the largest milk handler in the county.\textsuperscript{12} The farms producing milk for these enterprises were located near the creameries due to the lack of all weather roads greatly hindering the movement of milk and other farm products.

The raising of Merino sheep, as an additional enterprise on many farms, provided another source of farm income.

The Merino sheep were brought to eastern Ohio shortly after the time of settlement. Originally kept as a subsistence animal for their wool, they later became important as commercial fine wool producers for the national market. The following incident is an interesting side light on the value of the early pure bred animals and on land values; one pure bred Merino ram was sold in 1811 for

\textsuperscript{11} Sheppard, \textit{op. cit.}, pp. 292-294.

\textsuperscript{12} \textit{Ibid.}, p. 293.
1,600 acres of land. Wool, like tobacco, was a commodity that could be stored until the roads were good and also had a value high enough to pay the expenses of transportation to eastern markets. These were attractive features of wool production and the pasture and hay of eastern Ohio were capable of providing feed for sheep, so that the industry developed. Ohio was important as a wool producing state until after 1900 when wool from the "range" states west of the Mississippi began to appear in quantity on the eastern markets. The fine wool sheep continued to be important in the agriculture of Belmont County until the 1920's. Few farms apparently depended entirely on wool production, but rather kept sheep as an additional source of income that required relatively few man hours. This was especially attractive to the tobacco growers who were involved in an intensive type of farming.

The keeping of poultry was traditionally the domain of the farm wife. The previously mentioned "hucksters" were an early outlet for this farm commodity in areas away from the centers of population and this continued until World War II. Cash receipts from poultry were usually the second ranking source of income from 1927 until 1940 averaging approximately 15 per cent of total cash receipts. Nearly every farm kept poultry and some large poultry

14 P. P. Wallrabenstein and J. I. Falconer, The Estimated Gross Cash Income from the Sale of Agricultural Products from Ohio Farms by Counties, Department of Rural Economics, The Ohio State University and The Ohio Agricultural Experiment Station (Mimeographed Bulletins) (Columbus, Ohio), published yearly for the period cited.
operations developed. Situation was once again a factor, for the buyers of poultry and eggs had marketing facilities in Pittsburgh and Wheeling.

Fruit production had also been important on the farms along the ridge tops in the central part of the county. Peak production was reached in 1899 when 195,558 apple trees and 118,471 peach trees were reported by the census.\footnote{S. W. Phillips, Soil Survey of Belmont County, Ohio, United States Department of Agriculture, Bureau of Chemistry and Soils, Number 17, 1927 Series (Washington, D.C.: Government Printing Office, 1931), p. 18.} Production declined after this year, but in terms of income fruit rivaled sheep in importance during the late 1920's and 1930's.\footnote{Wallrabenstein and Falconer, op. cit.} Fruit production, during its peak years, was usually carried on as part of a general farm pattern rather than as a speciality. As diseases began to reduce the number of fruit trees, orchard production tended to become more specialized and became the main type of endeavor on the farms that continued in this line.

These then, general livestock, tobacco, and dairying near population centers or transport routes, were the main types of agriculture prior to World War I. The war brought a general upsurge in agriculture but this was short lived. The decade following the war was to see changes occur that paved the way for the coming of dairying as the main type of farming.
Decline of Tobacco and Sheep Industry.

The tobacco grown in eastern Ohio was always considered an export type of low quality and only small amounts were used in domestic manufacture, chiefly in plug chewing tobacco and low priced cigars. Small quantities were also used in blending some types of pipe tobacco. The eastern Ohio tobacco was considered unsuitable for use in most cigarettes and did not share in the increased demand for this product after World War I.

Acreage planted and production of tobacco had been increased due to high prices received during the war. In the period immediately after the close of hostilities demand declined relatively slowly, but as the productivity of the warring nations was restored, the effects of economic nationalism caused further declines in demand.

Numerous causes are given for the upsurge of economic nationalism in the importing countries. Among the foremost were the desire for self-sufficiency and the desire to promote further colonial production begun during the war. In addition, fear of social upheaval caused some countries to subsidize agriculture in an attempt to build a peasantry that would resist revolutionary ideas.\(^{17}\)

Government monopolies and preferential import duties for tobacco from colonies or dependencies served to limit imports while

governmental and private subsidies encouraged domestic production. The net effect of these measures was the exclusion of some American export tobacco. While the exclusion was not complete it was especially damaging to the eastern Ohio tobacco industry because so much of this production was exported. The price of tobacco fluctuated during the 1920's with any increase in price being met with increased production to the point where the price was forced down. By the late 1920's the price had become too low for profitable production and displacement by foreign domestic production had apparently reached the point where it controlled the market. Tobacco production in eastern Ohio declined rapidly and by 1933 the industry was practically dead. The number of cattle kept by tobacco growers had been increasing as roads were improved during the 1920's. Improved roads thus allowed small trucks to make weekly pick-ups of cream at the more accessible farms for transhipment from collecting points, usually on the rail lines, to markets at Wheeling, Pittsburgh, and other centers of population in Ohio. With tobacco no longer requiring intensive labor and a means available for selling cream, most of the tobacco farms became general farms, with an emphasis on cream production as the most reliable source of income. Some of the more progressive farmers with locations on the improved roads shifted to fluid milk production.

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During approximately the same period of time, 1920-1933, the Merino sheep were being replaced by a mutton type, or mixed with a mutton type or abandoned, as was the case in the southwestern portion of the county. Competition in domestic production from the "range" states west of the Mississippi was being felt as was competition from Australia, South Africa and South America in the world market. The freight rate advantage, due to eastern Ohio's situation, helped greatly in meeting domestic competition, but two other factors, attacks by dogs and disease, swung the balance toward abandonment in the southwest section of the county and reduced numbers greatly throughout the county. Census figures show a decline in numbers from 44,748 sheep in 1920 to 29,500 in 1930.\textsuperscript{19}

Opinions expressed by former sheep owners in the southwestern part of the county indicated that "paper skin" disease, now thought to have been caused by worms, and the resulting short wool clip were as limiting a factor as the dog problem. The total number of sheep killed or injured by dogs, in Ohio in 1928, amounted to 55,794. The inclusion of sheep injured does not make the figure given entirely misleading for animals that were injured were slow to recover normal eating habits, often produced a short wool clip, and often lost a high percentage of the next year's lamb crop. The mutton type breeds, such as the Shropshire, which were introduced,

\textsuperscript{19} J. I. Falconer, \textit{Twenty Years of Ohio Agriculture: 1910-1930}, Ohio Agricultural Experiment Station Bulletin 526 (Wooster, Ohio, 1933), p. 70.
contracted the same disease and proved only partially successful in the southwest. Better results were obtained over the remainder of the county and sheep made over 5 per cent of the estimated gross cash income from the sale of agricultural products in Belmont County during the 1930's.20

The decline of tobacco and sheep production, especially in the southwestern parts of the county, and the improvement of means of farm to dairy transportation and marketing facilities for dairy products, brought about the beginning of full time dairying at appreciable distances from the rail line.

Improved means of transport in form of hard surfaced roads between centers of population and improvement in the reliability and cost of operation of the motor truck served to shift the bulk of milk transport from rail to truck. This shift, as it occurred in northeastern Ohio, had an effect on the marketing of dairy products from Belmont County.

Inclusion Within The Pittsburgh Milk Shed.

Prior to about 1900 the milk supply for the Pittsburgh metropolitan area had come, for the most part, from within Pennsylvania. After this date northeastern Ohio began to supply increasing amounts of milk to the Pittsburgh area. From 1910 to 1920 the rate of population increase in northeastern Ohio exceeded that of the

20 Wallrabenstein and Falconer, op. cit.
Pittsburgh district, with Akron and Cleveland being the center of population experiencing the most noticeable increases. The population of Pittsburgh increased from 533,905 in 1910 to 594,277 in 1920, whereas the population of Akron increased from 69,067 in 1910 to 208,435 in 1920; Cleveland's population grew from 560,663 in 1910 to 796,840 in 1920, an increase of 236,178. 21

An enterprising truck line began soliciting for the transportation of milk from Trumbull and Ashtabula counties, part of the Pittsburgh milk shed, to Cleveland in 1925. Within two years a sizeable business was built up, with most of the new shippers coming from what had been an area which shipped milk to the Pittsburgh market. Some cooling plants in the area owned by Pittsburgh dealers, were purchased by Cleveland dealers, with the largest of these transactions involving 750 producers. 22 Both Cleveland and Akron continued to add territory to their milk sheds so that the Pittsburgh milk shed was extended southwestward to include Belmont County. This move was perhaps in the nature of an insurance policy, to add to the Pittsburgh market for the future needs, but to producers in western Belmont County it provided another outlet for fluid milk, which was trucked to Pittsburgh beginning in 1927. The Depression years practically stopped this movement for the price received from the

dealers did not adequately cover the cost of shipment. Much of the
milk from farms approved for fluid milk sales by the Pittsburgh
Health Department was used for manufacturing purposes at the condensery
in Barnesville during the time when the movement to Pittsburgh was
virtually halted. 23

The organization of the dairy farmers in the county by the
Dairymen's Co-operative Sales Association, a producer co-operative
active in Ohio, Pennsylvania, and West Virginia, was also a factor
in milk from Belmont County entering the Pittsburgh market. The
co-operative, organized in 1932, replaced the Dairymen's Co-operative
Sales Company which had been active in the Pittsburgh market since
1917. The Co-operative arranges for the sale of, and bargains
for, the price received for members milk sold to milk dealers.
The Co-operative provided the needed contacts in the Pittsburgh
market so that Belmont County milk could be sold there readily.
The Co-operative also performed the same duties for Belmont County
producers supplying milk for the industrial cities in the Ohio
Valley.

The dairy farmers of the County were now provided with four
markets for their products, the Pittsburgh and Wheeling fluid milk
markets for those who could pass the sanitary inspection, the
condensery in Barnesville for milk for manufacture, and the various

23 C. G. McBride and T. K. Cowden, Sources of Market Milk and
Butterfat in Ohio, The Ohio Agricultural Experiment Station Bulletin
truck routes and receiving stations for cream. The first three markets were to continue but the production of cream was drastically affected by the demand for fluid and manufactured milk products brought about by World War II. The outlets for dairy products and improving means of transportation, better roads and better trucks, and the farmers' attempt to produce more to offset the low prices of the Depression served to increase production between 1930 and 1940.

Increase in Production.

The number of cows kept for milk increased from 13,390 in 1930 to 16,403 in 1940.\(^{24}\) Cream production increased from 436,184 pounds in 1930 to 556,127 pounds in 1940,\(^{25}\) and whole milk sold increased from 3,668,250 gallons in 1929 to 4,239,676 gallons in 1939.\(^{26}\)

By the end of the 1930's dairying was providing 55 per cent of the total gross income from the sale of agricultural products.\(^{27}\)

As can be seen from the figures for cream production, not all farms had converted to fluid milk production. These were the farms

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\(^{24}\) *Let's Look At Our County and State: Belmont County, College of Agriculture, The Ohio State University and The Ohio Agricultural Extension Service* (Columbus, Ohio, 1957), p. 28.


\(^{26}\) *Statistical Data of Belmont County Agriculture, Agricultural Extension Service, Department of Rural Sociology, The Ohio State University* (Columbus, Ohio, 1947), p. 13.

\(^{27}\) Wallrabenstein and Falconer, *op cit.*, 1940, p. 6.
organized by the manufacturing plants and dairy companies to meet the demand brought about by World War II.

Effect of World War II.

World War II brought about a greatly increased demand for dairy products. Increased incomes of consumers, shortages of some foods and rationing, served to increase civilian demand. Purchases by the Federal Government for the Armed Forces and supplies purchased under the Lend-Lease Act increased greatly. Government purchases and export use that had amounted to less than one per cent of total national production before the War made up about one-sixth of the total demand for milk produced in 1944.28

In Belmont County this increased demand resulted in the conversion of many of the cream producers to the production of milk for manufacturing purposes. The higher prices for fluid milk, caused by the increased demand and the organizing activities of the field representatives of the dairy companies, along with slightly relaxed sanitary requirements, were the factors responsible for the changes in number of cream producers. The number of cream producers declined from 898 in 1940 to 411 in 1950; production of cream declined from 556,127 pounds in 1940 to 219,589 pounds in 1950, establishing a trend that has continued to the present. The production

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of whole milk increased from approximately 36,500,000 pounds in 1940 to 54,248,424 pounds in 1950, an increase of 49 per cent. The number of milk producers selling whole milk increased from 989 in 1940 to 1145 in 1950.\(^{29}\) Most of the increase occurred during the period 1940-1945 when demand was greatest.\(^{30}\) The number of cows kept for milk declined from 16,403 in 1940 to 15,204 in 1950,\(^{31}\) the peak year for whole milk production. The decline in cow numbers with an increase in production marks the beginning of a trend toward increased production per cow and fewer cows that has also continued to the present.

National Trends Since World War II.

The demand for dairy products continued high after the close of World War II with most of the dairy products produced being sold at good prices through 1947. The period of reconstruction, especially in the war torn countries of Western Europe provided a substantial portion of the demand for manufactured milk products. By 1949 the supply of dairy products had begun to exceed demand and government

\(^{29}\) Let's Look at Our County and State, p. 29.

\(^{30}\) E. F. Baumer and R. H. Pollock, Shifts in Milk and Cream Production in Ohio, Ohio Agricultural Experiment Station, Research Circular 24 (Wooster, Ohio, 1954), Figure 8, p. 12.

\(^{31}\) Let's Look at Our County and State, p. 29.
purchases made in an effort to support prices, amounted to the equivalent of about 2½ billion pounds of whole milk; government purchases exceeded this amount by 1 billion pounds the following year.\textsuperscript{32}

The Korean War again increased demand as more dairy products were used by the Armed Forces, but this was short lived. By late 1952 supply was again exceeding demand and in 1953 government purchases of excess production amounted to approximately 10 billion pounds, or about 8 per cent of United States production. The following year Federal purchases amounted to 7½ per cent of total production; 1955 showed a closing of the gap between demand and supply for governmental purchases amounted to approximately 3.7 per cent of total production.\textsuperscript{33} Since 1955 supply has continued to exceed demand at prevailing prices and the volume of dairy products bought under authorization of the Price Support Program have ranged between 3.4 billion and 6.8 billion pounds per year.\textsuperscript{34}

The general excess of dairy products has been a factor in the decline in numbers of dairy farms and in milk cow numbers, a national trend which began in 1944. Increased production per cow


\textsuperscript{33} Ibid., pp. 8-9.

largely due to better animals, and better feeding has, on the other hand, served to increase total milk production.

The national trends are a reflection of local conditions. The following section presents the changes which have occurred in Belmont County in the post war period.

Changes Within the County.

The number of farms reporting whole milk sold declined from 1145 in 1950 to 909 in 1955; the amount of whole milk sold declined from 54,248,424 pounds in 1950 to 52,032,325 pounds in 1955, whereas the number of milk cows declined from 15,204 in 1950 to 13,343 in 1955. During the period from 1940 to 1955 milk production per cow increased from 3,917 pounds in 1940 to 5,250 pounds in 1955. The relatively small decline in whole milk production compared to the 13 per cent decline in milk cow numbers is an additional illustration of the increase in production per cow. Information obtained from the condensery at Barnesville and from the Federal Milk Market Administrator at Wheeling indicates that the number of producers has continued to decline since 1955 and that production per cow has continued to increase. Opinions expressed by officials of the condensery indicate the probability of a continued decline in cow numbers.

35 Let's Look at Our County and State, p. 29.
The increased demand and high prices during World War II and the sizeable government purchases of dairy products served to attract farmers into whole milk production. When demand began to decline an adjustment set in that still continues. This can be seen by the changes that have occurred in the numbers of producers and in cow numbers since World War II. Factors other than decreased demand have also exerted an influence, with technological innovation being among the foremost. Advance in technology have been felt in two areas, the increase in competition, with milk produced in other areas entering the markets for Belmont County milk, and in the scale of dairy farming considered profitable. These factors are examined in the following section on markets.

In examining the evolution of the land use pattern the effects of competition are plainly visible. The type of agriculture that is successful in eastern Ohio must combine the best features of the habitat. The types of agriculture engaged in before dairying apparently were not suitable combinations. The soils and topography would not allow grain growing on a competitive basis when more fertile areas further west began production. The erosion problem and low natural fertility hindered tobacco production and damaged the land. The type of tobacco grown was a limiting factor in itself, but, given the physical conditions, the success of another type would have been problematical. The types of agriculture utilizing the grazing possibilities of the county fared the best,
but these too gave way before competition from the "range" states, an area more suited to this type of activity.

The effect of the county's situation became apparent with improvement of means of transport, a factor easily overlooked in light of the present ease of movement. Improved roads and improved motor trucks placed the farms of Belmont County in close connection with markets and gave the dairy industry its start as a major type of farming. Improved means of transport in the form of the insulated tank trailer has increased the area of milk movement and served to increase competition.

How well the dairy industry of Belmont County can meet competition will be examined in the following chapter.
III. THE MARKETS FOR WHOLE MILK

Reference has been made to the three main markets for fluid milk produced in Belmont County, the Pittsburgh and Wheeling fluid milk markets and the manufacturing plant at Barnesville. The fluid milk markets have not operated in the same manner and have exerted differing influences on the dairy industry. The market for manufacture-grade milk differs from the fluid milk markets in several respects and exerts different influences.

The Pittsburgh Market.

The Pittsburgh market is the most distant market and is examined first. Estimates supplied by the Dairymen’s Co-operative Sales Association\(^1\) indicate that Belmont County supplies between one and two per cent of the milk in the Pittsburgh market. Milk destined for the Pittsburgh market is picked up at the farms in ten gallon cans and delivered by truck to the condensery in Barnesville where it is chilled and standardized before shipment to Pittsburgh in tank trailers. The condensery in this case charges the producers’ co-operative a fee for the services rendered. Chilling to around 40° F. is necessary to insure the sanitary quality of the milk when it is delivered to the dealer in Pittsburgh. The milk is standardized

\(^1\) Hereafter referred to as the Co-operative.
or mixed with cream or skim milk to give the fat content desired by the individual dealers. Processing and transportation charges amount to about $.35 per hundred pounds on milk moving to Pittsburgh. The delivery time from Barnesville to Pittsburgh is approximately 3½ hours, illustrating again the fortunate situation of Belmont County.

Mention has been made of the fact that the inclusion of Belmont County with the Pittsburgh milk shed was in the nature of an insurance policy for that metropolitan area. Milk from Belmont County is considered as a stand-by supply for the Pittsburgh metropolitan area and only a part of the total grade-A milk trucked to the condensery in Barnesville moves on to Pittsburgh for sale as fluid milk, ice cream, ice cream mix, and cottage cheese. The remainder is manufactured at the Barnesville condensery, however, the price received for this milk is above the price of manufactured milk and is comparable to the price of grade-A milk. Until 1957 the price difference was made up by equalization payments made to the farmers by the Co-operative. Since that time the price paid for this milk has been the Pittsburgh price less processing and trucking charges. These pricing methods have been used to insure an adequate supply of milk for the Pittsburgh market at all times and to prevent the movement of this milk to the Wheeling market causing an excess of that market.²

² Information supplied by the Dairymen's Co-operative Sales Association, July 20, 1959.
The following table presents the estimated disposition of Belmont County grade-A milk moved to the Barnesville condensery for the period 1950-1956.

**TABLE 1**

**ESTIMATED DISPOSITION OF BELMONT COUNTY GRADE-A MILK**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Receipts at Barnesville (pounds)</th>
<th>Forwarded to Pittsburgh as Class I and Class II (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Class I</td>
</tr>
<tr>
<td>1950</td>
<td>17,727,554</td>
<td>8,142,114</td>
</tr>
<tr>
<td>1951</td>
<td>18,594,138</td>
<td>10,633,330</td>
</tr>
<tr>
<td>1952</td>
<td>19,394,888</td>
<td>11,733,330</td>
</tr>
<tr>
<td>1953</td>
<td>21,070,060</td>
<td>9,066,660</td>
</tr>
<tr>
<td>1954</td>
<td>19,728,238</td>
<td>7,332,000</td>
</tr>
<tr>
<td>1955</td>
<td>17,482,972</td>
<td>7,600,000</td>
</tr>
<tr>
<td>1956</td>
<td>16,756,560</td>
<td>7,682,280</td>
</tr>
</tbody>
</table>

Source: Compiled from statistics supplied by the Dairymen's Co-operative Sales Association. Statistics beyond 1956 are unavailable due to a change in the method of keeping records.

The above table indicates that not all of the milk forwarded to Pittsburgh receives the highest or Class I price. This is due to the milk dealers selling a variety of dairy products in addition to fluid milk and thus requiring milk for a less valuable product for which a lesser price is paid.

The amount of milk that can be used as Class I has been a source of complaint by farmers in all milk markets since the milk-excess problem developed. The amount of milk sold as Class I has
been less on the Pittsburgh market than on the Wheeling market due mainly to the Pittsburgh market having a greater amount of excess milk. Until 1957 the price paid for milk not forwarded to Pittsburgh from Barnesville was comparable to the average or "blend" price of Class I and II milk on the Wheeling market. Since 1957 a Pittsburgh blend price has been paid for this milk. The position held by the producers of grade-A milk for the Pittsburgh market is not as precarious as it might seem. Most milk markets have a stand-by supply of milk and an outlet for excess production. A situation such as this enables the Co-operative to regulate the flow of milk to the major market. During periods of increased demand more milk moves to Pittsburgh; during periods of excess production the outlet provided by the manufacturing plant helps the Co-operative to dispose of fluid milk. Being able to furnish the amount of milk required by dealers at all times also places the Co-operative in strong bargaining position and helps to resist competition from other suppliers, such as other co-operatives. The advantages of having the stand-by supply out-weighs the disadvantage of having to make equalization payments. Perhaps the more limiting aspect of the Pittsburgh market is the relatively small amount of milk that receives the Class I price.

The consensus among agricultural economists indicates that the Class I price on the Pittsburgh market, which is set by a State regulatory commission, serves to attract milk from areas outside the normal milk shed. The Class I price set by the Pennsylvania Milk
Control Commission is usually above the Class I price of Ohio milk markets. The fact that the regulatory body has the authority to control price only within the state's boundaries makes lower priced milk from Ohio attractive to Pittsburgh dealers. In a study conducted by the Agricultural Marketing Service, milk distributors in several cities having State Milk Control, including Pittsburgh, reported supplies of sanitary milk outside the state obtainable at prices from twenty-five cents to one dollar per hundred below the state Class I price. A high Class I price also tends to encourage increased production and expansion of dairy operations within the state. The total effect has been to increase the amount of milk in the market and thus decrease the relative amount receiving the Class I price.

One method by which a state or city can limit the entry of new producers into the field or limit the quantity of "outside" milk, is through sanitary inspections made by health officials. Opinions expressed by producers within the county who ship or have shipped milk to Pittsburgh indicates that during certain periods of time the level of standards required by the Pittsburgh Board of Health has fluctuated, due to the strictness of enforcement rather than actual changes in requirements. It is impossible to determine the validity of these opinions; they are presented here as opinions

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that were expressed rather forcefully at times during interviews with producers. There is also some indication that sanitary restrictions have served to limit the amount of milk that moves between markets. One official in the Co-operative was of the opinion that milk which did not receive a Class I price on the Chicago market would move to both the Pittsburgh and Wheeling markets were it not for the sanitary restrictions. Movements of this type have been made possible through the development of tank trailers large enough to be economical and providing a service more flexible than rail shipment. Some weight is given this opinion by the Agricultural Marketing Service study mentioned above. During the period from June 1953 to June 1954 the dealers' buying price on the Pittsburgh market was eighty-three cents per hundred weight above the price calculated for a market that distance from the greatest milk surplus area of Wisconsin. The calculated price was the Wisconsin price plus the costs of transportation. The eighty-three cents per hundred weight was, however, below the rates charged for transporting milk, which varied from $0.97 to $1.00 per hundred weight. The study quoted also indicates that should sanitary and economic regulations be removed to allow more freedom of milk movement, it is doubtful if large scale interregional movements would occur. On

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the other hand, relatively small movements can have a disruptive
effect on the market to which they move.

The sanitary regulations of the Pittsburgh Health Department
have been a factor in the decline in the number of shippers sending
milk to the Pittsburgh market. As sanitary regulations have become
more stringent some small-scale producers have not been fit to
invest the capital needed for improvements and have reverted to
producing milk for manufacture or have gone out of dairying. The
approximate number of shippers declined from 162 in May 1955 to
145 in May 1959. The average production per shipper increased from
9,400 pounds in the peak month of 1955 to 10,277 pounds per shipper
in the peak month of 1959.

The seasonal pricing plan used by the Pennsylvania Milk Control
Commission to "even out" production over the entire year has not
been completely successful. The plan used attempts to adjust the
price so that peak warm season production is avoided by lowering
the price and a more even production is achieved throughout the
year by increasing the price during the fall months. Information
provided by the Dairymen's Co-operative Sales Association indicates
that production continues to fluctuate seasonally, with the largest
amount of milk being marketed during the warm season.

In general, the Pittsburgh marketing system as it operates in
Belmont County, provides an adequate outlet for whole milk. The
utilization or the amount of milk receiving the Class I price is
the most limiting feature. The relatively low utilization, together
with the strict sanitary requirements have caused some producer dissatisfaction. Evidence of this may be seen in some changes that have occurred in the Wheeling market discussed below.

The Wheeling Market.

The Wheeling market provides an outlet for slightly over 50 per cent of the milk produced in Belmont County. The situation of Belmont County with respect to the Wheeling market is more favorable in terms of distance than the situation with respect to the Pittsburgh market. Nearness to the market has allowed Belmont County to become a major source of milk supply for the Wheeling area. Transportation charges are comparable to those of the Pittsburgh market so that no great advantage occurs in hauling rates, for smaller vehicles are used. The convenience of the dairy farms, within 35 miles of Wheeling as compared to 80 miles from Pittsburgh, is the important factor, for city health departments and the milk dealers prefer to be able to inspect the farms easily. In addition a near-by supply is usually the most dependable in terms of quality, due to ease of inspection and as a year-round source of milk.

The advantage of being near the market is illustrated by the proportion of the total receipts of milk on the Wheeling market supplied by Belmont County. The following table indicates the position held by Belmont County in the Wheeling market.
### Table 2

**The Position of Belmont County in the Wheeling Milk Market**

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Producers in Belmont County</th>
<th>Per Cent of Total No. of Producers in the Market</th>
<th>Total Milk Production Receipts for Year (pounds)</th>
<th>Estimated Production from Belmont Co. (pounds)</th>
<th>Estimated Per Cent of Total Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>331</td>
<td>24.04</td>
<td>148,034,563</td>
<td>37,009,000</td>
<td>25</td>
</tr>
<tr>
<td>1957</td>
<td>308</td>
<td>23.36</td>
<td>145,827,681</td>
<td>35,378,000</td>
<td>24.26</td>
</tr>
<tr>
<td>1958</td>
<td>301</td>
<td>23.27</td>
<td>151,709,247</td>
<td>36,031,000</td>
<td>23.75</td>
</tr>
</tbody>
</table>


The Wheeling market has been described as chaotic before the adoption of the Federal Milk Marketing Order in November 1955. West Virginia has no state regulatory body and the market was uncontrolled except for the bargaining power of the Dairymen’s Co-operative Sales Association. Milk considered excess on other markets such as the Canton, Ohio, market was being trucked to Wheeling and "dumped" on the market. At the same time milk in the lowest use classes on the Wheeling market was being transported to other markets and sold at Class I prices. These conditions served to depress the price paid producers and to cause fluctuation in the

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7 Information supplied by the Federal Milk Market Administrator in Wheeling, West Virginia, June 30, 1959.

8 Information supplied by the Dairymen's Co-operation Sales Association, Wheeling, West Virginia Office.
milk supply. Federal regulation of the Wheeling market has served to stabilize the situation and increase the utilization of milk produced in the area covered by Federal regulation, which includes Belmont County, by requiring dealers to use local milk in the highest possible classes before "importing" milk from other areas. In the short period of time since the Federal Order has been in effect, utilization on the Wheeling market has been substantially better than on the Pittsburgh market, averaging above seventy-five per cent.

The class prices on the Wheeling market are arrived at by formulas based on the current value of certain manufactured milk products and do not receive the amount of criticism leveled at the Pittsburgh prices. The authority of the Federal Order extends across state lines and prevents a situation such as confronts the Pittsburgh market, that is, Federal Order prices apply to milk purchased in that part of the marketing area located in Ohio the same as to that part located in West Virginia. The possibility of severe competition from "foreign" milk seems less likely on the Wheeling market for these reasons.

The standards of sanitation required by the Wheeling Health Department have received less criticism than those of Pittsburgh. These standards can also serve to limit the area from which the milk supply comes.
The sanitary requirements do not seem to be as important a factor in the decline of the number of producers as was the case in the Pittsburgh milk shed. The amount of decline is shown in Table 2. The advent of the bulk-milk tank in the Wheeling area may also have had an influence on the decline in producer numbers. The prospect of changing from can to bulk milk shipment in the future may have had an influence on producers who were contemplating a change in type of farming, so that these producers dropped out of dairy farming.

The number of bulk-milk tanks in the Wheeling area has increased rapidly. In May of 1957 there were 77 producers having bulk tanks; one year later there were 177; and by January 1959 there were 275. The bulk-milk tank also influences the size of the dairy operation. In order to spread the cost of installing a bulk-milk tank over more units of production, the herd size is increased. Once the tank is installed the tendency seems to be to increase the size of the operation over and above the amount necessary to cover added costs. Some idea of the scale of operations may be obtained from a comparison of the average daily production of the producers in the Wheeling market having bulk tanks and those shipping milk by the can method. In June 1958 the average daily production of producers having bulk-milk tanks amounted to 533 pounds; that of the can producers amounted to 311 pounds. At this time the milk from producers

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9 Information supplied by the Federal Milk Market Administrator, Wheeling, West Virginia, June 30, 1959.
having bulk tanks represented 21 ½ per cent of total producer milk. A part of the increase in bulk tanks has been due to producers, located mainly in the western part of the county, becoming dissatisfied with the Pittsburgh market and the efforts of some of the Wheeling milk dealers to organize and convert these producers to bulk-tank shipment to the Wheeling market. Six tank truck routes are now in operation in Belmont County. An additional factor that may make the Wheeling market more attractive than the Pittsburgh market is the plan used to encourage even production throughout the year.

The base and excess plan in effect in the Wheeling market area, encourages production during the fall months, normally a period of low production. The fall months are called the base-forming period and the amount of milk produced during these months is the amount which can be produced during the warm season and will receive the base price. Milk produced during the warm season in excess of the base amount receives a lower price to discourage its production. This type of pricing plan puts the responsibility for even yearly production on the individual producer and thus adds what appears to be more personal incentive than does the seasonal price plan used on the Pittsburgh market.

From the foregoing discussion it would appear that the Wheeling market has advantages to offer over the Pittsburgh market. The initial cost of the bulk-milk tank and additional equipment has served to limit the shift of producers to this market. The long-run effect of the "bulk" type of operation may be to reduce the number of producers in the county as has been done by the increased cost of production of farms producing milk for manufacture.

The Manufactured Milk Market.

The location of the manufacturing plant at Barnesville in the western part of the county, makes this outlet for whole milk the most accessible of the major markets. The condensery at Barnesville provides a market for between 20 and 23 per cent of the milk produced in the county. Milk is picked up at the farms in ten gallon cans and delivered to the condensery for processing into manufactured milk products.

The finished products, largely evaporated milk, are sold throughout the northeastern United States. Situation is again an important factor for there are very few condenseries this near the east coast and the market furnished by this population complex. Milk shipped by truck can be delivered to the centers of population in the east the morning of the day following its loading or what amounts to overnight delivery time. The situation provides a freight rate advantage of $.10 per hundred pounds over manufacturing plants in
Wisconsin. Advantages such as situation are important in meeting competition in the manufactured milk business.

The price paid producers for milk for manufacture, commonly called grade-B milk, is considerable below the prices paid for milk for fluid use. The May 1959 price for grade-B milk at the Barnesville condensery was $3.10 per hundred pounds; the Wheeling blend price was $3.87 and the Pittsburgh blend price for milk from Belmont County was $3.72. Sanitary standards are less strict and the milk produced under these conditions is considered a less valuable product. The amount of investment in a dairy farm producing milk for manufacture is usually smaller than that of a farm producing milk for fluid use. The farmer producing grade-B milk is often engaged in additional types of agricultural activity or else does not devote his full attention to farming and has off-the-farm employment. Many of these producers were converted from cream production and were small operators from the beginning. Many of them are advanced in years and have not desired to modernize their operations to produce grade-A milk. The over-all financial condition of the producers of grade-B milk is poor, so that with increasing costs of production the decline in numbers has been greater than among the producers of milk for fluid use. In 1946 the average cost of producing 100

11 Letter from Vernon Frazier, a producer of milk for manufacture in Belmont County.

pounds of four per cent milk in Ohio was $4.12; in 1958 the approximate average cost was $5.65, an increase of 37 per cent. The grade-B price mentioned above indicates the precarious position of these producers. In May 1955 there were an estimated 496 producers of milk for manufacture; by May 1959 the number had declined to an estimated 370 producers. Lack of easily obtainable alternatives have influenced the rate of decline and kept producer numbers up. The margin of profit can become exceedingly small under these conditions before the number of producers changes greatly, however, there is a limit below which these operations can no longer exist. The near future will probably see a decline in the number of farms producing milk for manufacture as the main source of income.

Opinions expressed by officials at the Barnesville condensery indicate that they expect the majority of the future production of grade-B milk to come from part-time operations. The operator will secure most of his income from another source, perhaps employment in industry, and produce grade-B milk as insurance against lay-offs or as a source of employment for his immediate family. Given an


14 Interview with R. H. Baker, The Ohio State University, July 21, 1959.

increase in employment opportunities as industrialization in the Ohio Valley increases, and the permissive features of the habitat, the production of grade-B milk may continue on a part-time basis. The situation of the county with respect to markets for manufactured milk products should insure demand and an efficient part-time operation allow production at competitive prices.

Competition.

The situation of the county with respect to the fluid milk markets is its greatest advantage in meeting competition. The majority of the milk dealers surveyed during the above mentioned Agricultural Marketing Service survey were in favor of local milk supplies. The nearness of the milk supply was considered important in ensuring quality, for frequent inspections are necessary and a suitable location makes this easier. Local supplies are considered more reliable both from the standpoint of quality and reliability of delivery. This could be an important factor during the winter months. "Outside" sources of milk were considered less reliable in terms of availability, in other words, they were not always available when needed. The price of these supplies also tended to be higher than the price of local supplies during periods of shortage. Agreements made between local co-operatives and local milk dealers have advantages other than strictly the price agreed on. Local health departments tend to favor near-by supplies because they can
remain within the budget allotted for inspection if extensive field trips are not necessary.\textsuperscript{16}

Milk from other areas may be attracted by the Pittsburgh Class I price, but the relatively low utilization of between 50 and 60 percent plus the fact that the Belmont County supply has the advantages listed above, has allowed this competition to be met favorably. The Co-operative was willing to pay the utilization fee to Belmont County producers to insure a stand by supply within 60 miles of Pittsburgh and this in itself has been important in meeting competition. In addition, the condensery at Barnesville provides an outlet for milk in excess of market demands. It would appear then, that given the existing conditions of situation, the dealer and health department preferences, and the influences of the Co-operative, Belmont County producers are meeting competition in the Pittsburgh market.

Situation again is the important factor in respect to the Wheeling market. A definite advantage is present in ease of transportation and handling. The same health department and dealer attitudes are present in this market. The Federal Milk Marketing Order has served to stabilize the market and in a sense prevents the disrupting influences of "outside" milk shipments. The increase in number of bulk-milk tanks and size of dairy operations should,
given good management, allow competition to be met more readily than under the can system.

The situation of the county is important in meeting competition in the manufactured milk markets of the northeastern states. The grade-B producers of the county have, in effect, been meeting competition but, given the present conditions of increasing costs of production, prices below those of fluid milk, and the relatively inefficient type of operation, it is doubtful if this type of production can continue as a main source of income. As a part-time activity it has possibilities for the future.

The changes that are occurring within the dairy industry of the county, reflected in the decrease in producer numbers, would seem to indicate that while competition is being met, the position of the dairy farmer is not as desirable as it might be. In the case of the producers of milk for manufacture, the price received for the product calls for excellent management to keep the cost of production low enough to provide a profit. The number of full-time producers capable of doing this would appear to be small, for only about 18 per cent of the herds studied in 1946 had costs under $3.50.17 In the 1946 study 34 per cent of the herds studied had costs between $3.51 and $4.50.18 The producers of milk for fluid use are in a better position because of the higher price

17 Baker and Falconer, op. cit., computed from Table 1, p. 6.
18 Ibid.
received for their product, but even so, intelligent management is required if costs are to remain below the selling price. The final chapter is devoted to an examination of some of the future possibilities of the dairy industry of the county.
IV. FUTURE POSSIBILITIES

The economic facts of life examined in the previous section—price received and average cost of production—indicate that only the more efficient dairy farms will be able to operate profitably in the future. The following section presents the changes that are occurring as efficiency of operations is improved and assesses the future possibilities for the dairy industry of Belmont County.

Changes in Scale of Operations.

Reference has been made to the increase in herd size and scale of operation brought about by the shift to the bulk method of milk handling. Producers of grade-A milk who do not use the bulk method have also tended to increase the scale of operations to spread the rising costs of production over more units of output. An illustration of the change in size of operation may be seen in the increase in average herd size of the members of the Dairy Herd Improvement Association. In 1950 the average size of these herds was 14 cows; in 1958 the average herd size was between 21 and 22 cows.¹ The increase in all herds in the county was not this great, for the members of this organization are considered to be the more progressive dairymen in the county and represent only about 5 or 6

¹ Information obtained from the Belmont County Extension Agent, June 30, 1959.
per cent of the total number of grade-A milk producers. The average size of the farms has also increased; in 1950 the average size was 95.8 acres, and in 1955 the average size was 110.7 acres.\footnote{Let's Look at our County and State: Belmont County, College of Agriculture, The Ohio State University and The Ohio Agricultural Extension Service (Columbus, Ohio, 1957), p. 13.} During the same period of time the number of farms in the county declined from 2,707 in 1950 to 1,997 in 1955.\footnote{Ibid.}

The necessity of increasing the size of operation has placed a premium on the managerial skills and capital resources, of the operator. The larger unit requires the operator to channel his activities into those functions which are directly connected with dairying and to abandon practices such as the for hire operation of hay balers, combines and other farm equipment, and the keeping of other types of animals or growing of cash crops such as corn on a limited scale. The larger unit must also be a more productive unit and this calls for careful animal selection and constant herd improvement. In achieving greater production there has been a shift in the breed of dairy animals from the traditional Jersey and Guernsey breeds to the Holstein breed, which now makes up over half the dairy animals in the county. This has been done to achieve a greater output per animal and to utilize further the grass producing abilities of soils. The Holstein breed, in general, produces more milk per animal than the average Jersey and makes more
efficient use of roughage such as grass silage. The increased feed requirements of the larger unit calls for managerial skill in producing quality feed crops and in soil conservation practices.

The producers of manufacture-grade milk have not adopted the progressive measures of larger and more productive units to the same extent as have the majority of the grade-A producers. Information as to the average size of Belmont County herds is unavailable. An idea of the probable size may be obtained from data for Monroe County, (Figure 1). The average herd size in this county is 6.7 cows; the average size of herd of members of the Dairy Herd Improvement Association was 21.5 cows. The type of animals kept by grade-B producers are usually less productive and are often mixed breeds. Some idea of the difference in levels of production may be obtained from production data for May 1959. In that month production of grade-B milk averaged 4,355 pounds per shipper; production of grade-A milk averaged 10,227 pounds per shipper. Total production of the 740 shippers of grade-B milk in the four county area of Belmont, Monroe, Harrison, and Jefferson counties amounted to approximately 3,222,700 pounds; the 352 shippers of milk for fluid use produced almost 3,600,000 pounds.

Seasonal fluctuation in production is also greater among these

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4 Information supplied by the Monroe County Extension Agent, June 29, 1959.

5 Information supplied by the United Dairy Company, Barnesville, Ohio, May 27, 1959.
producers. A part of this lower production is due to relatively few high-production type animals in the grade-B herds. The former cream producers in particular are prone to keep animals producing milk high in butterfat content, rather than animals of greater production such as the Holstein. Advanced feeding practices, such as grass silage, are also used to a lesser extent, as are adequate soil conservation practices.

The accounting methods used by farmers in general are often less than adequate. In the case of the grade-B producers this is a factor in the inefficient type of operation that is being maintained. Many of these operators are unaware that they are failing to meet all their expenses and are actually meeting only variable, or out of pocket costs, while fixed costs such as building repair, and soil improvement are being only partially met. This situation can continue over a period of time, but given increasing variable costs as well, it would appear that more of these producers will either have to become grade-A producers or be forced out of dairying in the future. The inefficient producers of milk for fluid use may also be forced out. The price received is greater, but so are the expenses, so that larger and more efficient units appear to be the answer to continuance in the dairy industry. The future will probably see a further increase in herd size and in production per animal and a decrease in number of animals and number of dairy operations. The trend toward larger, more efficient units, taken together with freight rate advantage due to the situation, will be
important factors in meeting future competition. The trend toward larger, more efficient units, is emphasized by a few instances of especially large operations scattered over the county. Some of these have herds of over 70 cows and operate over acreages considerably above the average. Operations of this size arouse interesting speculation as to the possibility of a development similar to the "cow pools" which recently began operations.

Innovations.

"Cow pools" are a very recent and highly controversial development in the dairy industry. They are an extremely large grade-A dairy operation in which the owners of the dairy animals place their cows in a large unit or pool to be housed, fed, milked, and the product marketed by the pool manager. A fee is charged the owner for the use of the facilities and costs of operation are pro-rated over all animals in the pool. A fee for management services is also charged. The size of the first operation, Fashion Farms, near Meservey, Iowa, has increased since operations were begun in August 1958. Operations were begun with 648 cows in the pool; 6 by May 1959, 800 cows were being cared for, 7 and 7,000 more were

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reported to be on the waiting list. The goal set by the manager is 2,000 head. The size of the operation is not particularly spectacular for large dairies of a comparable size have been in operation in California and New Jersey for several years. The method of operation is the distinguishing feature, for the other large operations have the farmers care for their own animals and have the pool do the milking and selling, or have the farmers milk their cows on the pool farm which cares for the animals. The cows in the large operations of California are usually owned by a dairy company or a corporation rather than individual farmers. Indications point to a spread of the type of operation begun in Iowa through the other midwestern states. The facilities for an operation of about 1,500 cows are now under construction between Canton and Wooster, Ohio.

Some aspects of the cow pool technique would appear to have favorable applications to the dairy industry of Belmont County. One of the attractions of the Iowa pool is the opportunity it offers grade-B producers to become grade-A producers with no capital outlay and also frees the cow owner's time and labor. Grade-A producers who desire to enlarge operations may do so without

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10 Hoard's Dairyman, op. cit., p. 483.
11 Farm Journal, op. cit., p. 37.
additional investment in buildings and equipment. Older dairymen who wish to retire or who find satisfactory labor unavailable are attracted as are farmers who dislike the constant labor requirements of dairying. Some other aspects of pool operation cast doubts on how well many of the grade-B producers in the county would fare. Since operating cost is pro-rated, low producing animals will show no profit and their owner will be charged for losses the pool suffered because of them. This might make pooling completely unattractive to many of the grade-B and inefficiently handled grade-A herds in the county. Some of the Iowa farmers with cows in the pool were planning to engage in other types of farming such as feeding hogs or raising beef animals to utilize land and equipment. The permissive and limiting features of Belmont County would appear to limit the alternatives open to a farmer with cows in a pool. The limitations would not be as severe as usual since the activities engaged in would not be the main source of income. The production of hay and grain to supply the cow pool could be a possible alternative, but plans for the Iowa pool indicate that less hay, Belmont County's strong point, will be used in the future. No silage is fed and alfalfa pellets, a manufactured feed, are to be used to replace hay. The pool technique as used in Iowa is less than one year old. How rapidly the idea will spread remains to be seen. L. H.

12 Ibid.
14 Hoard's Dairyman, op. cit., p. 491.
Brown, a Michigan State University economist, quoted in the May issue of the Farm Journal, page 82; said after a visit to the Iowa operations, "The cow pool idea will undoubtedly expand." The cow pool technique provides an interesting possibility for the future.

The establishment of a cow brokerage, operated by the condensery in Barnesville, is another future possibility. This organization would be designed to provide high production type animals, probably Holsteins, at prices attractive to producers interested in increasing production and size of operation. The possibility of such an organization would appear to emphasize the need for higher production per animal and also concern over future milk production in the county.

The consensus among agricultural economists and officials in the dairy industry indicate the probable displacement of more of the county's dairy farmers in the future. How rapidly this occurs is influenced to a degree by possible alternatives. The following section is devoted to an examination of possible alternatives.

Alternative Opportunities.

In recent years the number of beef cattle in the county has been increasing. Using Ohio Agricultural Statistics for 1950\(^\text{15}\) and

County Estimates for 1958 and subtracting the number of milk cows and heifers two years old and over in the county from all cattle and calves, there has been an increase of 3,700 head in cattle other than milk cows and heifers. This increase would tend to indicate beef production as a possible alternative. A study conducted by E. T. Shaudys and J. H. Sitterley in 1954, and published in 1957, on beef production in 13 southeastern Ohio counties indicated that the 131 farms studied lost an average of $7.17 on each 100 pounds of beef produced in that year when the value of all inputs and return payments were considered. The authors point out that all the costs included in this study do not have to be met every year, but, "over the life of the resources employed all production costs must be covered for a farmer to continue producing beef." A later report, written by R. H. Bross of the Ohio Agricultural Experiment Station indicates that an excellent beef manager, operating on 500 acres of land with 55 brood cows, and having a business valued at $50,000, who grows enough grain to feed the young animals to


18 Ibid.

slaughter weights averaging 850 pounds, will receive a family income of $3,275 a year or $1.06 an hour. Another excellent manager who cannot raise sufficient grain to feed young animals to slaughter weights will receive about $1.00 per hour for family labor. In order to achieve this, 750 acres of land will be needed if much of it is in slope and the investment will amount to approximately $65,000. These figures are based on a herd of 96 cows. In the same article data was given for farms producing grade-A and grade-B milk. An efficient manager of a full-time dairy farm producing grade-A milk at $4.00 net per hundred pounds, having 20 cows that average 10,000 pounds of milk per cow, on a hill farm of 120 acres, will receive a family labor income of about $4,925 a year or $1.59 per hour. Capital investment would amount to about $23,500. The same producer selling grade-B milk at $3.00 net per hundred pounds will receive a family labor income of about $3,225 a year or $1.04 per hour and capital investment will amount to about $22,000. The foregoing statistics indicate that beef production and grade-B milk production return about the same amount of profit per hour of labor, however, the beef operations require a considerably greater amount of capital investment. From these reports it appears doubtful that beef production will become a leading type of agriculture in Belmont County. The grade-B producer who could not invest enough capital to produce grade-A milk would have difficulty producing beef on a scale having returns comparable to those of grade-B milk production.
The inefficient grade-A producer would likewise have difficulty producing beef profitably. The part-time farmer with sufficient land might find a beef herd attractive because of the fewer hours of labor required and returns slightly above those of grade-B milk.

Pork production as a main type of agriculture appears doubtful when the topography and soils of Belmont County are considered. Yields per acre are below those of the corn belt farms and the dangers of erosion would tend to limit more acreage being planted to corn. It is doubtful if feed could be produced in quantity to support pork production. Sheep numbers have continued to decline with only 4,000 estimated in the county in 1958.20 The dog problem and low profits make sheep a doubtful alternative. Large scale poultry operations of a specialized nature, such as turkeys, are in existence, but the investment is high and the opportunities offered by this to a displaced dairyman seem limited. Small fruit production is a possibility that may attract some marginal producers. The extent to which this will become an alternative is problematical for this type of agriculture as a main source of income is relatively recent and has attracted few farmers, however, opinions expressed by extension workers indicate optimism.

In general, employment opportunities in industry are limited. The industrial growth of Belmont County has been less than desirable when comparisons are made with the changes that have occurred in

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20 Ohio Agricultural Statistics: County Estimates, p. 11.
the rest of the state. In 1947 Belmont County ranked 54th in percentage change in value added by manufacture; in 1954 Belmont ranked 76th in percentage change in value added by manufacture. The percentage change in numbers of workers employed in Belmont County from 1939 to 1953 was down by nearly 20 per cent, or stated another way, almost 20 per cent fewer people were employed in 1953 than in 1939. These facts give some idea of the general conditions of industry and indicate the relative inability to absorb displaced dairymen.

The steel industry of Wheeling area provides most of the present employment for part-time farmers. This particular segment of industry has been troubled with obsolescence and often feels the effect of declines in business before similar industries in other areas. The strip mines of the county and those in Harrison County to the north provide limited opportunities for what amounts to part-time employment. The new aluminum industry at Clarington in Monroe County is also providing a limited amount of employment. The construction of this plant which required about two years and employed sizeable amounts of local labor, at high wages, attracted dairymen


22 Ibid.

into off farm employment, many for the first time. Improvements of Route 40, which traverses the county from east to west and Ohio Route 7 which runs north and south through the county, have also provided some employment. The shaft coal mines of the county are highly mechanized and attracted very few farmers. The general lack of employment opportunities is born out by the loss of population in Belmont County. The population of the county declined 8.2 per cent from 1940 to 1950. The decline has continued at a decreasing rate since 1950, amounting to an estimated 1.2 per cent. The percentage decline has been slight since 1950, but only 5 of the 88 counties in Ohio showed such a decrease. The industrial potential represented by large reserves of steam coal, salt deposits and the abundant labor supply present in the upper Ohio Valley should increase employment opportunities in the future. In the near future the industrial cities further north, such as Canton and Akron, will probably provide the nearest large source of off farm employment.

The lack of easily obtainable alternatives has been a factor in the continued operations of inefficient dairy farms. This situation will probably continue to slow the rate of decline in producer numbers.

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25 Ibid.
Summary.

The physical features of Belmont County have permitted the development of the dairy industry as the main source of agricultural income. Other types of agriculture have been practiced but have given way, for the most part, before competitive influences from regions more naturally favored. The changes, in scale of operations and in efficiency, now taking place in the county, together with the favorable situation with respect to markets appear to indicate that the dairy industry will continue to provide the majority of the agricultural income. The importance of agriculture in the total economy of the county will probably decline in the future.
BIBLIOGRAPHY

Public Documents


Publications of State Governments.


Falconer, J. I. Twenty Years of Ohio Agriculture, 1910-1930. Ohio Agricultural Experiment Station, Bulletin Number 326. Wooster, Ohio, 1933.


Let's Look at Our County and State: Belmont County. College of Agriculture, The Ohio State University and The Ohio Agricultural Extension Service. Columbus, Ohio, 1957.


McBride, C. G. The Development of Market Milk Areas in Northeastern Ohio. Ohio Agricultural Experiment Station, Bulletin Number 469. Wooster, Ohio, 1930.


Statistical Data of Belmont County Agriculture. Department of Rural Sociology, The Ohio State University and The Agricultural Extension Service. Columbus, Ohio, 1947.

Wallraubenstein, P. P., and Falconer, J. I. The Estimated Gross Cash Income from the Sale of Agricultural Products from Ohio Farms, by Counties. Department of Rural Economics, The Ohio State University and The Ohio Agricultural Experiment Station. Columbus, Ohio. Published annually. 1928-1940.


Books


Reports

Journals and Periodicals


Unpublished Material