

100 Years of Dairy Farming

Town of Dryden Tompkins County, New York

Bernard F. Stanton • George J. Conneman • Carl A. Crispell • Susan B. Hoskins • Stuart F. Smith



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Abstract

A history and analysis of farm management surveys for the previous year, conducted on every dairy farm in the Town of Dryden each decade save one, from 1908 through 2008 is presented. Five times as much milk was sold in 2007 from dairy farms based in Dryden as was sold in 1917. Labor productivity in terms of milk sold per worker has increased 35 times in the century reflecting the great gains made from advances in agricultural technology. Dairy farm numbers have decreased from 206 in 1907 to 8 in 2007. Dryden's dairy farms continue as an important contributor to the economy of the Town.

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Preface

This report reflects the joint efforts of the dairy farmers in the Town of Dryden who have provided the basic data over the decades to Cornell faculty and students, who collected their records for summary and analysis. Four Cornell retirees, listed as authors, interviewed the dairy farmers in 1988 and again in 2008. One additional author, Susan B. Hoskins, image analyst from IRIS (Institute for Resource Information Sciences), prepared the detailed aerial-photo maps of the Town of Dryden. Former A&LS Dean David L. Call encouraged this continuing project and provided the funds for its publication.

We salute Dr. George F. Warren, who directed the first successful farm management survey in Tompkins County in 1908 and encouraged the subsequent studies made in 1918, 1928, and 1938 in a number of the towns of Tompkins County. His son, Professor Stanley W. Warren, directed the subsequent studies made in the Town of Dryden in 1948, 1958, and 1968. Professor B. F. Stanton, then an undergraduate student, worked as an enumerator for Stan Warren on the 1948 study. Professor G. J. Conneman directed the study made in 1977 and Stanton the one in 1988.

To the farmers of Dryden and Tompkins County, special thanks are given for serving as both teachers and cooperators to generations of Cornell students and faculty. Without their willing collaboration, this project and countless others, could not have been completed and made available to the general public.

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Some photos in this publication are from "Barns of the Dryden Lake Area." The photos are used with permission by the Dryden Town Historical Society, 36 West Main Street, Box 69, Dryden, New York 13053. The photographers are D. Van Hall and K. Maloney.



Photo By: D. Van Hall

100 Years of Dairy Farming

Town of Dryden, Tompkins County, New York

Much has changed in dairy farming in the past 100 years throughout the western world. What has taken place in the Town of Dryden in the Finger Lakes region of New York State is not all that different from what has occurred or is taking place in most of the traditional dairy farming areas of the northeastern quadrant of the United States. There are fewer dairy farms and more cows on the farms that remain. The cows are larger and much more productive than those of 100 years ago. Science and technology have been applied to improve dairy operations. The land base supporting these modern businesses is managed by a group of skilled farm operators.

Part I

The Historical Setting for the Study in 2007

The first successful farm management survey in the United States was conducted by George F. Warren and his students in Tompkins County in the summer of 1908 covering the business year 1907. The results of that famous study were published by Cornell University as Agricultural Experiment Station Bulletin 295 in March 1911. This personal interview survey examined farming as a business and found out what could be learned by studying the records and experiences of farmers in four townships of the County:- Dryden, Danby, Ithaca, and Lansing. Farmers, agricultural leaders and professors judged this study to be a monumental piece of research, as well as a source of practical information about how to manage a farm business successfully. It was the forerunner of many more farm management surveys and record-keeping projects conducted in cooperation with farmers during the years that followed.

The Historical Base on Which This Continuing Study Has Been Built

There were 297 farmers in the Town of Dryden, who were visited by students and faculty in the summer of 1908, and provided records of their farm business operations for the year April 1, 1907 through March 31, 1908. The time period was chosen by Prof. Warren to cover a full cropping year and end when inventories of hay and grain were small. Farmers recalled their purchases and sales during that year and made estimates of the value of their assets and debts. Cooperation was excellent; estimates of labor incomes were made and then reviewed with cooperating farmers before the enumerators left the area. Similar records were taken from 148 farmers in Danby, 105 in the Town of Ithaca and 219 in Lansing. Of the 297 original records obtained in Dryden, 207 were classified as dairy farms and have served as a base for comparison for study with dairy farms in subsequent decades.



George F. Warren



Early farm management survey party.

In the summer of 1918, during World War I, Professor Warren followed up his first farm management survey in Tompkins County with a second one returning to the Town of Dryden. Again in the summers of 1928 and 1938 similar studies were conducted to gain information on the changes that had occurred over those decades. Professor E. G. Misner in *Agr. Exp. Sta. Bull. 782, Thirty Years of Farming in Tompkins County, New York*, provided the following summary comments about the results obtained in these early studies each decade:-

"...In 1918, a study was made of 250 farms in Dryden Township for the crop year 1917. Results were mimeographed. Because of the war, no other townships were included at this time."

"In 1928, labor-income records of 916 farms in six townships were taken for the year 1927. Some of the records for that year were used in the classification of land in the county, and were published in Experiment Station Bulletin 590."

“In 1938, a study was made for the crop year 1937, of 544 farms in Danby, Dryden, Groton, Lansing, and Ulysses Townships. The results have been published as Experiment Station Bulletin 728.”

“This bulletin brings together some of the results for the four crop years of 1907, 1917, 1927, and 1937 for the farms studied. All of the data were obtained by the survey method; each farm operator was interviewed by an enumerator who had a specially prepared blank for recording information. Farm accounts were used as much as possible.”

Because Dryden was the only Town from which labor income records had been obtained each decade, Misner prepared table 21 in his bulletin to summarize farmers’ experiences over the four decades.



Edward G. Misner

Table 21: Capital, Receipts, Expenses, and Labor Income, Dryden Township, 1907,1917, 1927, 1938

Item	Average per farm			
	1907	1917	1927	1937
Number of farms	297	250	225	150
Capital	\$5,471	\$8,561	\$8,046	\$8,508
Receipts:				
Increase in capital	64	181	161	213
Crops	378	400	237	196
Livestock products	599	1,037	1,146	1,652
Livestock sold	160	351	413	395
Miscellaneous	29	92	348	174
Total receipts	\$1,230	\$2,061	\$2,305	\$2,630
Expenses	434	1,205	1,477	2,018
Farm Income	\$796	\$856	\$828	\$ 612
Interest @5%	274	428	402	425
Labor Income	522	428	426	187

Source: Misner, E. G., C. U. Agr. Exp. Sta. Bull. 782, pg. 21

A brief appraisal of Misner’s summary table reminds us of how relatively small the changes in price levels were over this relatively long period of time. 1907 was a year of relative prosperity for farmers compared to the long years of agricultural depression in the 1880s and 1890s. World War I in 1917 brought higher prices for grains and milk, but the small farms of Dryden still only achieved modest labor incomes. The agricultural depression of the 1920s and 1930s is also reflected in the labor incomes for 1927 and 1937. Farm numbers were cut in half in Dryden between 1907 and 1937 as a substantial number of farmers went out of business.

Leadership for these Continuing Studies

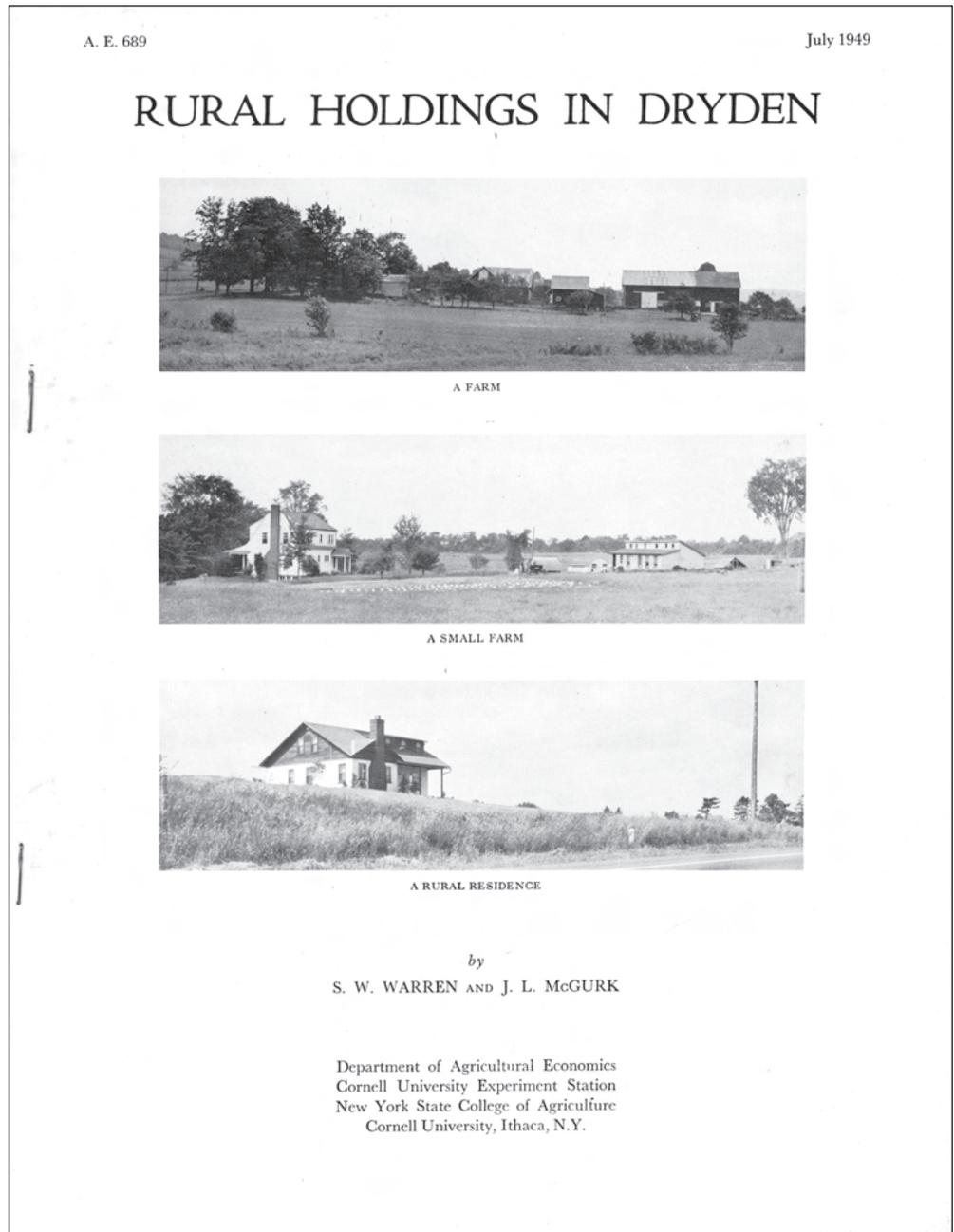
Professor G. F. Warren, the Department Head until his death in 1938, was the force behind the studies made in Tompkins County in 1907, 1917, 1927 and 1937. His son,



George F. Warren

Stanley Whitson Warren, widely renowned teacher of farm management at Cornell, took leadership for subsequent studies for the crop years, 1947, 1957 and 1967. He concluded that dairy farming was the dominant form of commercial agriculture for much of the State, and concentrated subsequent historical, survey efforts on the dairy farms in Dryden in succeeding comparative studies. He established the rule that a dairy farm was considered to be included in the Town of Dryden, if milk was shipped from a bulk tank or milk house located within its borders. Of the original 295 records obtained in 1908 in Dryden, 207 were established as dairy farms.

Figure 1: Rural Holdings in Dryden, Tompkins County, NY, 1948



In the summer of 1948, labor income records were obtained from all the farms in Dryden as had been done each decade since 1908. In addition short records were obtained from every “rural holding” in the town defined as “an open-country house and the land used with it”. In their summary publication S. W. Warren and J. L. McGurk reported:

“There were 738 rural holdings in the open country in the summer of 1948. These holdings were divided into five groups:- farms, other farm holdings, small farms, rural residences, and other holdings. Holdings with 200 work units* were classified as farms. Those with 30 to 199 work units on farm work were classified as small farms, and those with less than 30 work units on farm work as rural residences.”

*A work unit is defined as the average amount of work accomplished by a man in ten hours.



Stanley W. Warren

Table 1: Number of Residences

Town of Dryden, Tompkins County, New York, 1948

Location	Number	Percent of total
Dryden Village	259	20
Freeville Village	101	8
Varna and Route 13 east	102	8
Etna, West Dryden & Malloryville	77	6
Open Country	738	58
Total	1277	100

Source: Warren, S. W. & J. L. McGurk, Rural Holdings in Dryden, C.U. A.E. 689, July 1949”

A second publication was prepared in January 1950 by J. L. McGurk, *Farming in Tompkins County in 1947*, A.E. 718. This report combined farm management records obtained from dairy farms in Dryden with those obtained in Danby and Lansing for the crop year 1947-48 to study change observed in each decade since 1907 as well as to comment on the reasons for the differences observed in productivity and profitability among the farms.

In 1958, S. W. Warren supervised a farm management study of the farms selling milk in the Town of Dryden and summarized his research in *Farm Economics*, “A Fifty Year Record of the Town of Dryden”, March 1959. Some of the initial statements as well as Table 1 from his report follow:

“...Only farms with 200 or more productive man work units and a full time operator were included in the analysis. In 1907, 206 farms were enumerated, but in 1957 only 65 farms were enumerated (table 1). The decline in the number of farms is largely the result of the combination of farms to make larger units and the removal of the poorer land from farming. The total number of cows on the 65 farms in 1957 was almost exactly the same as the number on the 206 farms in 1907. The total amount of milk produced in 1957 was almost double that produced in 1907.”

Table 1. Average Size of Farm Businesses

Town of Dryden, Tompkins County, New York

Item	1907	1917	1927	1937	1947	1957
Number of farms	206	159	118	111	70	65
Acres operated	132	148	152	147	191	225
Crop acres	69	75	72	66	76	106
Number of cows	11	10	10	14	25	35
Man equivalent	1.7	1.8	1.7	1.8	2.0	1.9

The average number of workers per farm (man equivalent) has been two or slightly less than two throughout the entire period. If one of the 1907 farmers were to look at the present farm businesses of the Town of Dryden, the only thing which he would recognize is the labor force...”

The original farm management records obtained by S. W. Warren and his students for the crop year 1957-8 also served as the basis for an M. S. study by Yu-Kang Mao, *An Economic Study of Farms in Different Land Classes in the Town of Dryden, 1927to 1957*. This study examined some of the difficulties of generalizing about expected intensity of land use and profitability within the general boundaries of land class maps. The importance of individual farm managers in either exceeding, or not achieving, expectations within land classes was identified.

The succeeding study made by Allen Lines in 1967 (*Sixty Years of Change in Farm Businesses, A.E. Res 303*), under Professor Stanley Warren’s direction, set the general pattern for the subsequent studies made in 1977, 1987 and 2007. Lines gave special attention in his study to the sources of financing that dairy farmers were using. His summary table on this issue was of particular interest to many.

Table 19: Relation of Debt to Various Items, 1968

Town of Dryden, Tompkins County, New York

Item	Farms with no debt	Debt less than 50% of farm capital	All farms
Number of farms	13	33	51
Man equivalent	1.7	1.9	1.9
Number of cows	36	50	48
Pounds of milk sold	412,448	566,859	544,222
Average capital	\$62,618	\$90,326	\$86,825
Milk sold per cow	11,457	11,337	11,338
Cows per man	21	26	25
Milk sold per man	242,616	298,347	286,433
Percent of farms with one operator over 50	62	39	41
Labor income/operator	\$2704	\$6248	\$5279

Source: Lines, Allen E., A. E. Res, 303, September 1969

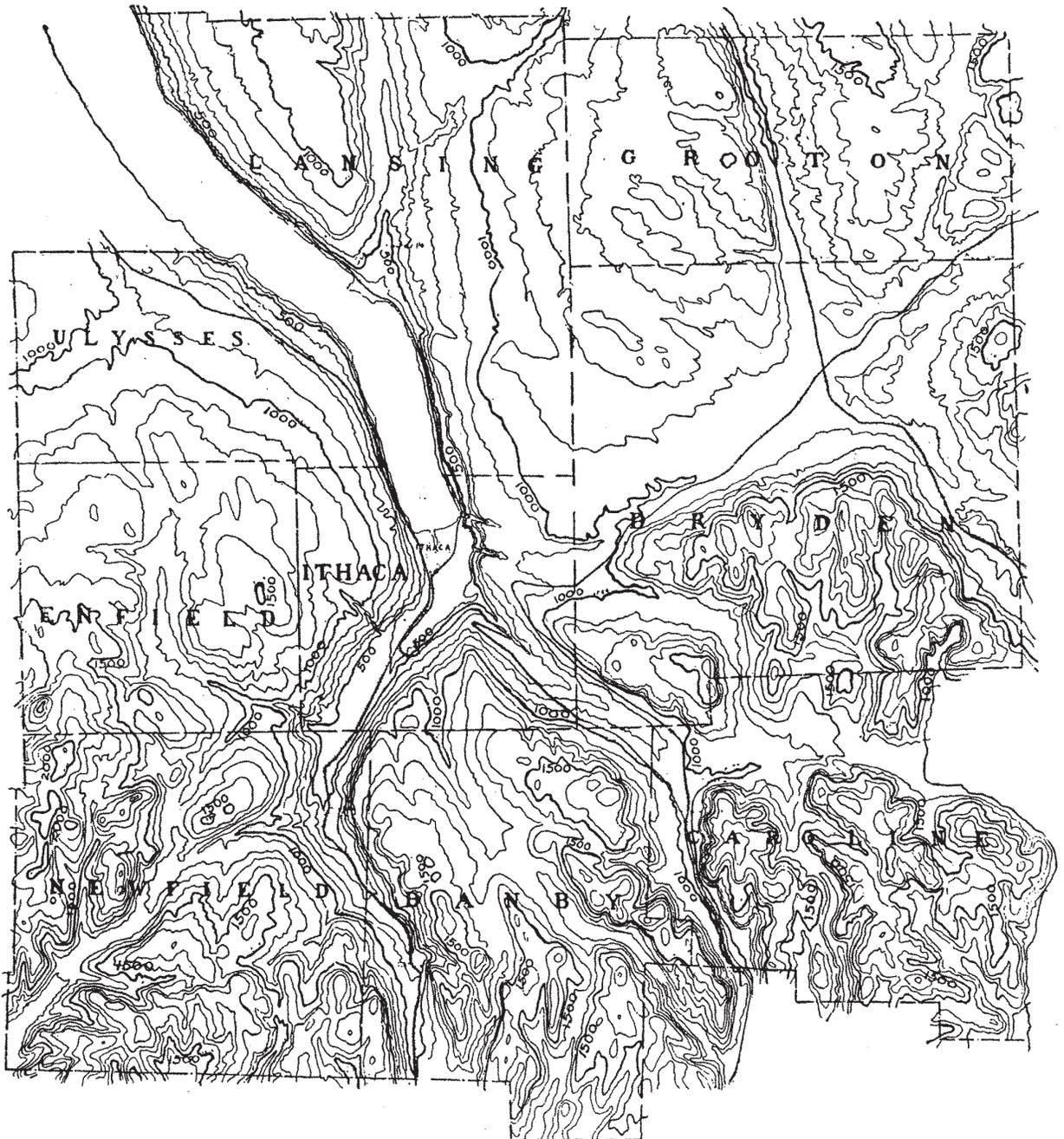
Lines found that the debt-free farms were smaller and managed by older operators, but that there was little difference in average productivity in milk sold per cow or per man. There were only five farms with more than 50% debt in 1967.

Historic Base For Final Three Studies

It is on this historic base of farm management studies in the Town of Dryden, that faculty and students have returned to the township in 1978, 1988, and 2008 to obtain a similar farm management record from each dairy farm business for the preceding crop year. Dryden was chosen for this continuing series of studies, because the town's physical characteristics, are so much like those of many of the other traditional dairy areas of New York State, where milk production is the primary source of farm business income. Dryden includes both hill and valley areas. Over time, forest increasingly has returned to more and more of the town's landscape; vigorous productive agriculture continues in those areas with the most productive soils. In a variety of ways, changes in dairy farming in Dryden mirror similar changes occurring elsewhere in New York State, and in the northeastern quadrant of the United States (from Minnesota to New England on the north and Missouri to Maryland on the South).

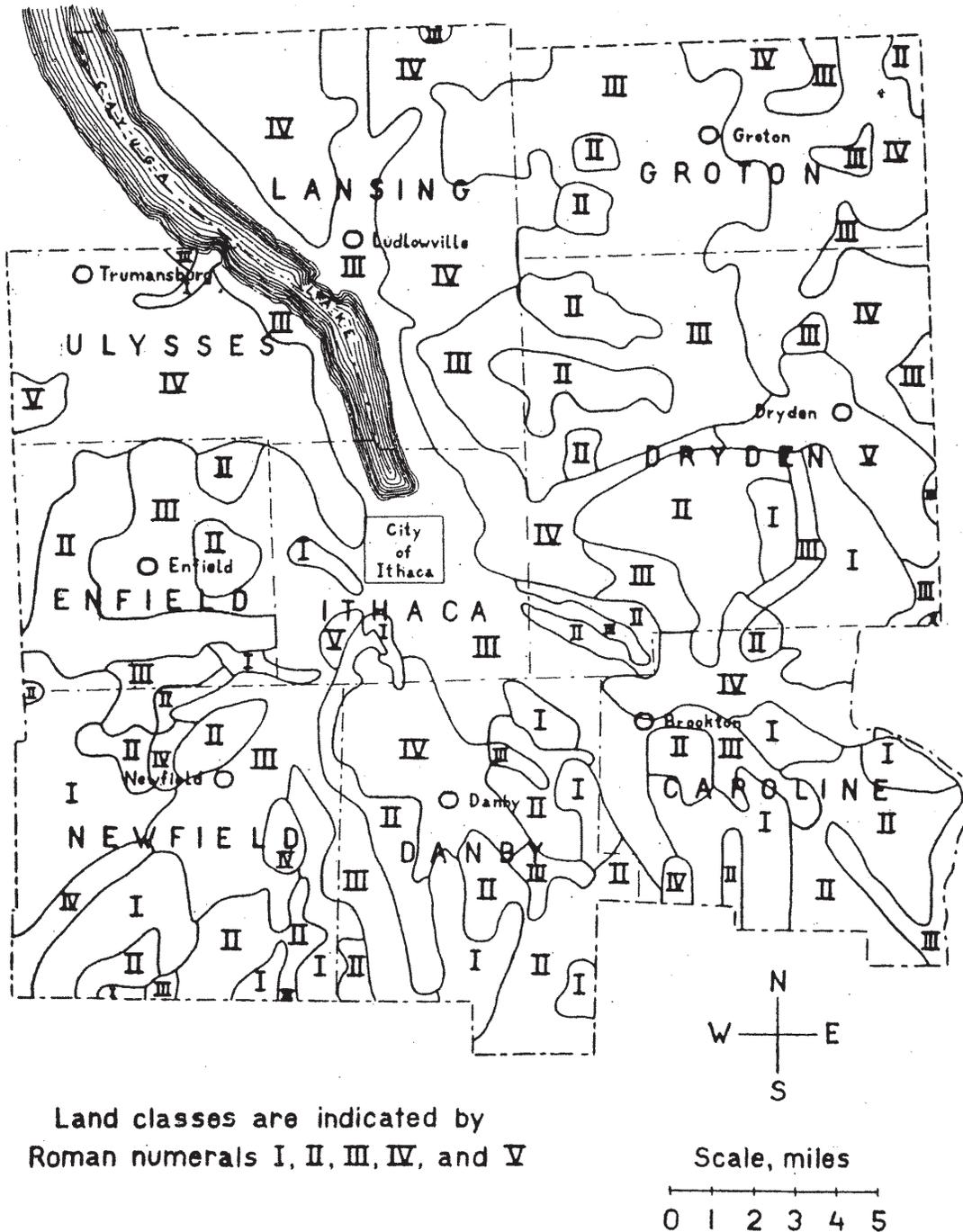
The topographic map in Figure 2 is reproduced from Bulletin 295 as presented by G. F. Warren and K. C. Livermore in their historic study published in 1911. It outlines the hill and valley land within the borders of the County. Farm records were obtained from all parts of the town in 1908 on the hills as well as in the valleys. Farming was the major occupation of rural residents. The Village of Freeville is located at the intersection of the two railroads cutting across the Town as diagonal lines in Figure 2. The Village of Dryden is located a few miles to the southeast of this major rail intersection of 100 years ago.

Figure 2: Topographic Map of Tompkins County



At the end of the 1920s as more and more farms in the hills and plateau country of the state were abandoned, Professors G. F. Warren and F. F. Hill led a systematic effort to study the possibility of classifying land areas based on their economic potential in agriculture and other uses. The first such effort to draw such a land utilization map was made for Tompkins County in 1930-32 by A. B. Lewis drawing heavily on the farm management survey data obtained for the crop year 1927 by Prof. E. G. Misner and staff from 907 farms in the Towns of Caroline, Danby, Dryden, Ithaca, Groton, Lansing and Ulysses.

Figure 3: Land-Classification Map of Tompkins County



Land classes are indicated by Roman numerals I, II, III, IV, and V

The methodology for the classification of all the land in the county was developed by driving all the roads of each of the towns and observing economic activity at all locations. Soils, elevation, topography, and access to all-weather roads were among the important criteria used in making the classifications. Land Class I was deemed the least desirable for agriculture and Class V was considered the most economically viable. The general recommendation was that the best uses for land in Classes I & II were forestry and recreation. The methodology developed to classify the lands in Tompkins County was further refined and then used to provide similar maps for all of the agricultural counties of the State. Funding was provided by the State of New York and the USDA to prepare the necessary soils maps for each of the counties in a span of 20 years between 1933 and 1952.



Part II

An Overview of the Ten Decades of Dairy Farming

An important part of the land within the borders of the Town of Dryden in 2008 is included in Agricultural District 1, one of the two agricultural districts in Tompkins County. Agricultural Districts establish the location of parcels of land which are eligible to receive use-value assessments (UVA), because of their primary use for agricultural purposes. Lands included within these districts are reviewed annually and are then assessed for tax purposes as held primarily for agricultural uses. Thus, one way to get an overview of lands held primarily for farming in the Town of Dryden in recent years is to examine a map identifying lands included in Agricultural District One of Tompkins County, New York (Figure 4.)

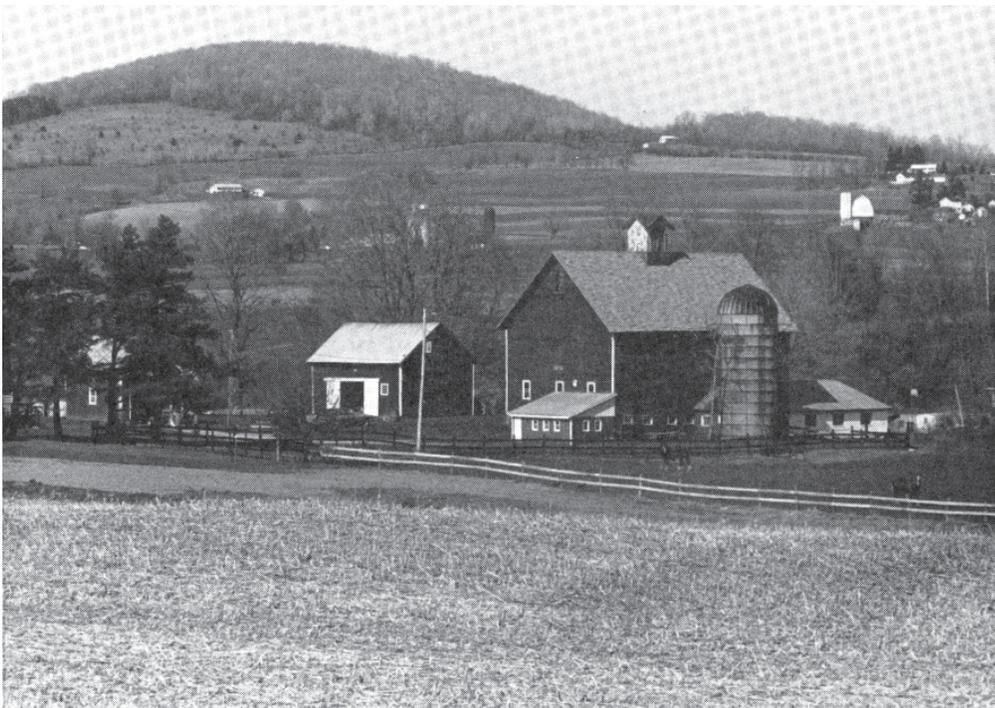
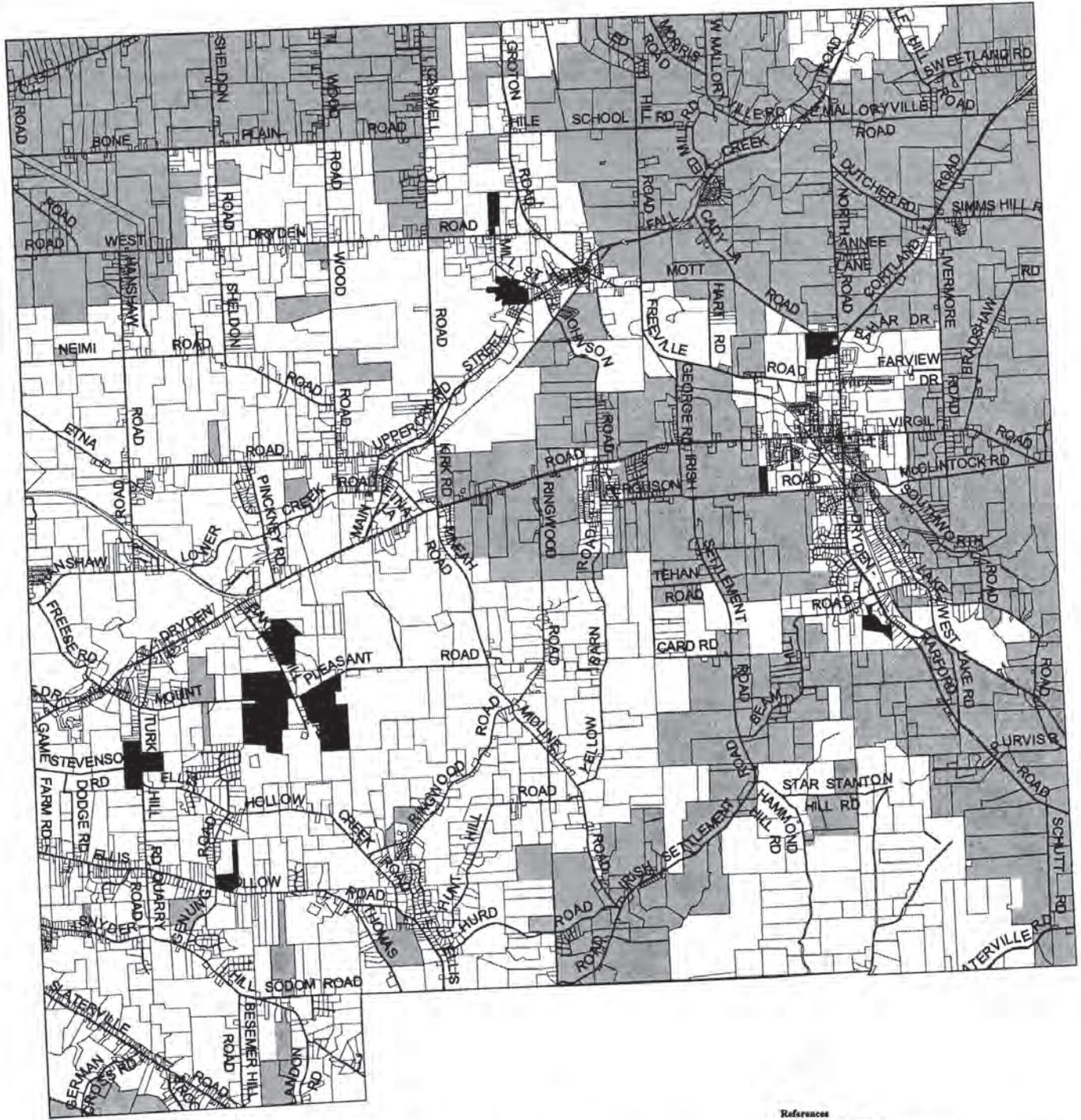


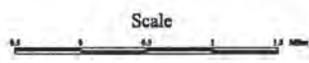
Photo By: D. Van Hall

Figure 4: Town of Dryden, Tompkins County, NY, 2006



Town of Dryden

2006 Tax Parcel Boundaries
 Parcels not in Agricultural District Receiving Agricultural Assessment
 Agricultural District 1



References
 Roads and Hydrography by
 Tompkins County Digital Planimetric Map 1991-1992 & ITCTC

 2005 Agricultural District Boundaries and
 2006 Tax Parcel Boundaries produced by
 Tompkins County Information Technology Services
 and the Tompkins County Assessment Department

 Agricultural district boundaries were rectified to 2006 tax parcel boundaries by
 Tompkins County Information Technology Services
 and were verified as accurate by the Cornell Cooperative Extension

Disclaimer
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The map of the Town of Dryden in Figure 4 identifies each of the parcels of land in the Town included in Agricultural District One in 2006. NYS Route 13 (Dryden Road) cuts across the town and provides the main artery of traffic connecting the cities of Ithaca and Cortland. Dryden is also the home of Tompkins–Cortland Community College; the village of Freeville is located in the upper middle half of the map. The Town of Ithaca and Cornell University border the map on its southwest corner. The large number of small parcels shown in that area, bordering this central hub of employment, reflects the strong influence of this urbanized complex on land values in the Town. One can see some of the similarities of the borders when comparing the lines drawn in the Land Classes for Dryden in 1934 and the location of Agricultural District One in 2006.

The wonderful overview of land use in the Town of Dryden (Figure 5) was brought together by Susan Hoskins, Image Analyst, Institute for Resource Information Sciences (IRIS), Crop & Soil Sciences, ALS. It identifies the areas where forest and recreational uses of land are dominant, as well as the areas where farming remains the primary economic activity. Greater detail on land use within the Town of Dryden is provided in the Appendix, where Figure 5 is further divided into four separate quadrants where individual fields and parcels can be observed with greater clarity. Further detailed maps can be obtained from the website (<http://www.nysgis.state.ny.us/>) listed on Figure 5.

Forested and ‘undeveloped’ areas on the hills in the southern half of the town make up a substantial area. The relatively wet and imperfectly drained soils in the northwestern part of the Town outside the agricultural district are readily identified including pockets of wetlands identified on the map. Most of the commercial farming in Dryden is found inside the borders of Agricultural District 1. Some of the land within the Agricultural District 1 is rented by dairy farmers located in the Towns of Groton and Virgil. Likewise some of Dryden’s dairymen rent part of their cropland in Agricultural District One to the north in the Town of Groton.

A careful study of the four preceding maps helps one gain perspective on the forces which have influenced decisions on land use over time in an agricultural county which also contains the State’s Land Grant University. Located in the rapidly urbanizing northeastern part of the county, the Town of Dryden has been strongly influenced by growth along the busy highway connecting Ithaca and Cortland. In the 100 years following the initial farm management surveys, new agricultural technology and science have been adopted by enterprising farmers. The horse in 1907 was the major source of power and transport for much of Tompkins County. Today horses are still important users of resources in the county, but primarily for recreation. Specialized farms provide a place for horse owners to board and exercise their animals. Polo ponies provide Cornell students with another way to compete in intercollegiate athletics. Wetlands are now identified and protected, an idea hardly compatible with business decisions made by farmers and land owners a century ago.

Not surprisingly the amount of land area used for commercial farming in the Town of Dryden has decreased dramatically over the past 100 years. Some farms were cut out of the forest which had little chance to survive on lands with steep, stony slopes. Professor G. F. Warren in the concluding pages of his historic bulletin in 1911 wrote, “...many fields were unwisely cleared that should have been kept in



Photo By: D. Van Hall

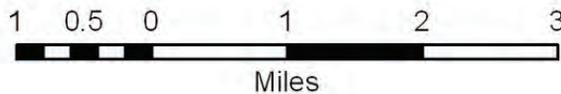
Figure 5: Aerial Photo of the Town of Dryden, Tompkins County, 2007



Source:

Orthophotos (2007)
New York State GIS Clearinghouse
<http://www.nysgis.state.ny.us/>

Roads
Census (2000)
<http://cugir.mannlib.cornell.edu/>



permanent forests. Some fields that are not adapted to machine farming are left to grow up to weeds and later to trees. Many other fields are being farmed that should be abandoned. When such fields are too steep, or too stony, or when the soil is too shallow for profitable farming, the sooner they are abandoned the better. Merely because a field has been cleared is no reason why it should be farmed. But when farming ceases forest trees should be planted..." (pp.556-7, Warren & Livermore, Bull. 295, 1911)

The abandonment of farm land in parts of the town has continued over the decades; much of it has slowly returned to forest. Nature has slowly returned open fields to brush, and then to saplings, and then gradually to forest. This has been a common phenomenon throughout the Northeastern United States. Commercial farming is centered in the chosen spots with productive soils located on all-weather roads.



Photo By: D. Van Hall

Changes in Resources Used Over Time

Of the approximately 58,000 acres in the Town, 27,000 were being operated by the 206 dairy farmers interviewed for the study for the crop year 1907-08 (Table 1). With World War I in progress there were still 23,500 acres operated by 159 farmers providing records for 1917-18. By 1927 farm numbers and acreage had dropped to 118 farms shipping milk from the 17,900 acres they operated. Ten years later in 1937 with the economic depression still a reality, 111 farms remained with 16,300 acres still in farms.

Table 1: Changes in Resources Used For Dairy Farming

Town of Dryden, Tompkins County, New York

Year	Number of farms	Acres in farms*	Crop acres	Percent of total area** in dairy farms
1907	206	27,200	14,200	47
1917	159	23,500	11,900	41
1927	118	17,900	8,500	31
1937	111	16,300	7,300	28
1947	70	13,400	6,100	23
1957	65	14,700	7,000	25
1967	51	14,200	6,700	24
1977	31	9,600	5,500	17
1987	21	7,600	5,400	13
2007	8	4,600	3,050	8

*Comparisons are made for farms selling milk or dairy products from 1907 onwards. Other farms were also in operation in Dryden but not producing milk for sale.

**The land area of the Town of Dryden is approximately 58,000 acres.

After World War II (1947) mechanization and jobs outside farming had cut dairy farm numbers to 70 on 13,400 acres. Farm numbers held reasonably steady in 1957 and 1967 (Table 1) but declines were more noticeable in 1977 and 1987. There were only 21 dairy operations in 1987, using 7,600 acres, that were shipping milk from bulk tanks located within the borders of the town. And some 20 years later in 2007, only 8 dairy farms were shipping milk from bulk tanks located in Dryden using a little less than 4,600 acres of farm land, some of which was rented to the north in the

Town of Groton. At the same time some of the high quality cropland within Dryden was being rented by other commercial dairymen shipping milk from the north side of the town line in the Towns of Groton and Virgil. Competition for productive cropland in the town has been strong among these remaining, successful dairy farm managers.

In 1907 and the immediate decades following, most farms had a flock of chickens, a team of horses, a family garden, and often some pigs and sheep. In the 1920s and '30s farm sizes increased; autos and trucks were in wide use by farmers and tractors were rapidly replacing horses as sources of farm power. With the advent of World War II off-farm employment provided alternatives for those living on the hills and poorly drained soils. This hastened the consolidation of farms into units that could take fuller advantage of new technology and mechanization. This was particularly true in the 20 years between 1987 and 2007 as dairy farms with more than 500 cows became much more common throughout the commercial dairy regions of New York and the rest of the country.

Table 2: Changes in Productivity and Labor Efficiency

Town of Dryden, Tompkins County, New York

Year	Labor force	Number of milk cows	Milk sold	Milk sold per worker
	<i>Worker years</i>		<i>Million lbs.</i>	<i>pounds</i>
1907	350	2,265	*	*
1917	286	1,600	7.2	25,000
1927	212	1,180	7.0	33,000
1937	200	1,550	8.9	44,500
1947	140	1,750	11.9	85,000
1957	124	2,275	19.6	158,000
1967	97	2,450	27.8	286,000
1977	64	1,775	22.1	356,000
1987	49	1,570	24.5	498,000
2007	40	1,540	35.2	880,000

* not enumerated

The great changes in productivity and labor efficiency in the dairy industry that have occurred in the Town of Dryden over the past 100 years are shown in Table 2. The steady reductions in the agricultural labor force in Dryden occurred at the same time that total production increased steadily over the decades. The changes on dairy farms in Dryden have followed much the same patterns as those happening across New York State and nationally. Fewer workers and a smaller number of crop acres produce much more milk by taking advantage of the advances in improved housing and milking facilities, herd health and nutrition. Gains in plant breeding and forage production as well as improved management skills of current dairy farmers also enhanced production efficiency. These tremendous advances in a span of 100 years reflect the ways in which knowledge gained from research and extension have been applied by successful dairy farm managers to bring about these surprising results.

Some of the changes in table 2 are particularly noteworthy. While the number of dairy cows being milked has varied within a relatively modest range over 100 years from a low of 1180 in 1927 to a high of 2450 in 1967, the amount of milk sold in 2007 was five times greater than its was in 1917 and 1927. Milk sold per worker thus increased in each decade by large percentages. In the 20 years between 1987 and 2007, it increased again by more than 75%. With such impressive increases in productivity, the number of farms producing milk declined dramatically. In the years following World War I and the depression years of the early 1930s, dairy farming provided very modest incomes for families with few opportunities for employment off the farm. After World War II, more off-farm jobs were available to assist the transition out of full-time farming and farm numbers declined accordingly.

In 2007 total milk sales in Dryden were provided by a number of small farms with 70 cows or less and a few larger ones; a pattern quite common throughout Upstate New York and the rest of the country. Milk sold per worker in table 2 was calculated by dividing total sales from all the farms by the total number of workers, reflecting the overall productivity of dairy farming in the Town.

Changes in Size of Business

Five different ways of measuring size of business are presented in Table 3. All of these reflect important components of what it takes to operate a successful business. They are different ways of describing the amounts of important resources used by farm managers in dairy farming.

Table 3: Key Resources Used in Dairy Farming

Town of Dryden, Tompkins County, New York

Year	Total acres	Crop acres	Number cows	Worker equivalent	Average capital
	<i>Averages per farm</i>				
1907	132	69	11	1.7	\$ 6,290
1917	148	75	10	1.8	10,290
1927	152	72	10	1.8	10,700
1937	147	66	14	1.8	9,400
1947	191	76	25	2.0	23,100
1957	226	107	35	1.9	46,000
1967	278	131	48	1.9	87,000
1977	300	178	57	2.0	248,000
1987	359	259	75	2.3	545,000
2007	579	381	193	5.0	1,218,000

In the decades before World War II there were many farm units of approximately 160 acres, or a quarter of a section (one square mile). There were enough smaller farms to bring the average farm size down to the smaller numbers shown in table 3 before 1947. After the war most farmers were seeking to enlarge their farm units by buying good crop land from their neighbors or renting land close to their dairy

barn. Farm size continued to increase each decade after 1937, a result from buying more land from those going out of farming or renting from other land owners.

The number of cows per farm increased steadily each decade from 1947 onward. The standard stanchion barns of the first half of the twentieth century were replaced rather steadily by free stall housing systems with milking parlors in more recent decades, which allowed more cows to be milked with less physical labor. The rather persistent average of a two-worker equivalent business, as the norm, continued throughout much of the twentieth century. The impact of larger, more capital-intensive businesses on the totals is reflected in the averages for 2007 in this summary for the Town.

The average capital investment per farm in the decades before World War II may seem small based on 2007 prices. But in the 80 years between 1907 and 1987 producer prices had increased 10 times. Persistent agricultural depression was the general rule in those earlier years. Dryden farm land values have benefited in the years between 1987 and 2007 from a combination of demand for land to build homes outside villages and cities, and the Agricultural Districts Law. Thus, almost all farm land serviced by an all-weather road in proximity to Cortland or Ithaca has benefited in terms of its expected value as real estate beyond its expected returns when used in farming.



Photo By: K. Maloney

Changes in the Labor Force for Dairy Farming

For most of the years between 1907 and 1987, the majority of dairy farmers relied on themselves and members of their family for a majority of the labor they used. Extra labor by the day or the month was hired when needed especially in the summer and for harvest periods. Larger dairy herds often employed one or two full-time hired men. The averages in Table 4, reflect this general pattern on farms in Dryden over the years until 1987.

Table 4: Members of the Labor Force on Dairy Farms

Town of Dryden, Tompkins County, New York

Year	Operators	Unpaid family	Hired	Total
		<i>Months</i>		
1907	12.0	2.0	6.4	20.4
1917	12.0	4.5	5.2	21.7
1927	12.0	4.9	4.6	21.5
1937	12.0	3.9	5.8	21.7
1947	12.0	4.1	7.6	23.7
1957	13.7	3.1	6.1	22.9
1967	14.3	2.6	5.6	22.5
1977	15.7	2.5	6.4	24.6
1987	16.4	2.4	9.3	28.1
2007	16.2	*	43.8	60.0

* Family labor was commonly paid wages in some manner, after World War II.

During the years following World War II a number of dairy farms in Dryden were operated as partnerships by fathers and sons or two family members. This is reflected in the average number of operator months in the first column of table 4. Highly skilled farm labor has been increasingly difficult to find and hire. The averages for hired labor in 2007 include immigrant milkers working regularly on the largest dairy farms. Successful farm managers throughout the United States are dependent on these willing, able workers who come from a variety of locations outside the United States. Dairy farmers with larger herds seek permanent legislation to make it possible for these workers to participate legally in the labor force.

Changing Rates of Production

In the years before World War II only modest progress was made in raising crop yields on farms and increasing rates of production by farm animals. New technology was being discovered during those years but resources to apply these improvements on farms were less widely available. Major gains came steadily in the postwar years.

The steady increases in yields per cow and per acre of crops are reflected in the results from farms in Dryden, especially in the years from 1947 forward (Table 5). Improved rations for livestock, improved genetics resulting from artificial breeding for cows, and improved varieties of corn and alfalfa plus increased fertilization brought about increased productivity. Improved cropping systems buttressed by chemical weed control and new adaptable planting and harvesting equipment all contributed to these gains. Dryden dairymen demonstrated the same kinds of advances made elsewhere in agriculture across this state and the rest of the country, some with noteworthy success.

Table 5: Average Rates of Production

Town of Dryden, Tompkins County, New York

Year	Milk sold per cow	Corn silage per acre	Hay equiv. per acre	Milk sold per worker
	<i>pounds</i>	<i>tons</i>	<i>tons</i>	<i>pounds</i>
1907	**	9.4	1.3	**
1917	4,400	7.6	1.2	25,000
1927	5,700	9.2	1.3	33,000
1937	5,700	8.7	1.5	44,500
1947	6,900	9.0	2.1	85,000
1957	8,500	10.7	2.5	158,000
1967	11,300	17.8	2.5	286,000
1977	12,500	13.4	2.4	356,000
1987	15,600	16.0	2.9	498,000
2007	22,800	21.7	3.0	880,000

** Not calculated in 1907

The importance of weather in determining crop yields is suggested by the variability in the averages shown for recent decades. Much of the ups and downs for crop yields reflect the amounts and timeliness of rains in individual years.

One other way to gain perspective on the results achieved by the dairy farmers that provided data each decade in Dryden is to compare their average rates of production and labor productivity (table 6) with that of participants in the New York Dairy Farm Business Summary published annually by the Department. Farmers included in this summary are considered to be above average, successful managers of their businesses.

Table 6: Comparison of Town of Dryden Rates of Production With Dairy Farm Business Summary Averages

Year	<i>Cows per Farm</i>		<i>Milk sold per Cow</i>	
	Dryden	DFBS	Dryden	DFBS
1957	35	33	8,500	8,900
1967	48	51	11,300	12,100
1977	57	71	12,500	13,600
1987	75	101	15,600	16,300
2007	193	350	22,800	23,100

Year	<i>Cows per Worker</i>		<i>Milk sold per Worker</i>	
	Dryden	DFBS	Dryden	DFBS
1957	18	18	158,000	163,000
1967	25	27	286,000	324,000
1977	29	28	356,000	386,000
1987	32	32	498,000	517,000
2007	38	43	880,000	987,000

DFBS = New York Dairy Farm Business Summary published annually by the Department of Applied Economics and Management

There are many similarities in the trends shown in these two sets of summary data from historical series. The overall trends in rates of production are much alike. Cows per farm have increased each decade. Rates of milk production in Dryden are modestly lower than those for DFBS but follow closely those for the statewide group. Likewise the number of cows per worker track together very well. Milk sold per worker increased each decade for both groups with a major increase over the last two decades.

Historical Perspective

Farming in Dryden, studied so carefully 100 years ago by Professor George F. Warren, continues to mirror changes on successful farm businesses in the rest of New York State. His study covering the 1907 crop year, presented in *C. U. Agr. Exp. Sta. Bulletin 295*, summarized the survey records from every farm in each of the towns on the eastern side of Lake Cayuga in Tompkins County:- Danby, Dryden, Ithaca and Lansing. Earlier surveys had been taken in the three towns on the western side of the Lake and in the towns of Caroline and Groton as well. The experience gained from these earlier efforts allowed changes to be made in the questions asked and the procedures to calculate labor incomes for each of the farms studied. George

F. Warren and his son, Stanley W. Warren, chose to return to study changes in dairy farming in Dryden every ten years, because they concluded that the resources in the town of Dryden were the most representative among the towns of the county, of the situation elsewhere in the state. The results presented above provide solid evidence of their good judgment and strong sense of perspective over this span of 100 years.

Obtaining Farm Records and Their Analysis

For each of the studies made in Dryden one decade after the preceding one through 1987, labor income records were obtained from each farmer that required estimates of annual receipts and expenses from their records and tax returns. This also required obtaining net worth statements for both the beginning and end of that crop year. These complete records became more and more difficult to obtain as these businesses grew in size and complexity, even though the number of participants became smaller. In 2007 records were obtained from the dairy farmers in the Town using the same forms as the ones distributed by the US Census of Agriculture in January 2008. Dryden dairymen were encouraged at a meeting held in November 2007 to make a copy of the forms they turned in to the Census in February 2008 or to let us make a copy of them. We did not plan to seek complete labor income records because of the diversity of those shipping milk and the effort to maintain confidentiality of individual businesses.

The averages presented are made for the group of farms as a whole. For example, by dividing the total pounds of milk sold for all the farms by the total number of workers, we obtained the average pounds of milk sold per worker. This approach provides perspective on what was happening on the group of farms in the town in total, rather than taking an average of averages, where each farm had an equal weight, whether small or large. In this manner the averages for 2007, and also those for 1987, looked at dairy farming in Dryden as if it were operated as one big farm, even though the individual parts of it were of quite dissimilar sizes.

When there were a larger number of farms in the town, and most were quite similar in size, an average of averages and an average of totals usually yielded quite similar results. Early analysts often compared these two approaches and concluded that for rates of production, an average of averages was often preferable. Such an average provided a solid idea of what most active farmers experienced. By definition, unusual farms, such as those operated by the University or by a unit of government (County Home for the Needy) were not included in most studies. In 2007, every farmer shipping milk from a bulk tank located within the borders of the Town was included, whether operated by a part-time or full-time operator. This study for 2007 includes 3 farms with less than 50 cows, 3 with from 50-99 cows and 2 with more than 100 cows. Records were obtained by the four Cornell retirees (George Conneman, Carl Crispell, Stuart F. Smith & B. F. Stanton), who had participated in collecting and summarizing the farm records from Dryden in 1988.

Changes in Prices

To get some perspective on the labor incomes and capital investments reported in the preceding tables, a table reflecting the changes in producer prices for all commodities was included in the summary reports issued for 1967 and 1987 and has been updated to include 2007 as well.



Photo By: D. Van Hall

Table 7: Index Numbers of Producer Prices

Year	All Commodities, 1907-2007	
	1967 = 100	1987 = 100
1907	33.6	10.9
1917	60.7	19.8
1927	49.5	16.1
1937	44.9	14.6
1947	76.6	24.9
1957	93.3	30.4
1967	100.0	32.6
1977	194.2	63.2
1987	307.1	100.0
2007	508.5	165.6

Source: U.S. Bureau of Labor Statistics

The changing index numbers of Producer Prices for all commodities, provided in Table 7, gives some perspective on the changes in prices paid and received by farmers in the context of the larger US economy. The decades between 1907 and 1937 were a time when producers were facing deflation in many years, except for World War I, rather than steady rates of inflation. Expectations were modest and additional capital was not readily available to take advantage of new technology in agriculture.

World War II, however, left the nation with a greatly expanded economy and high expectations for the future. Prices rose rapidly, especially between 1947 and 1957, and then again between 1977 and 1987. Many can recall a national boom in agricultural land prices in the mid-1980s followed next by a downward period of adjustment extending into the early 1990s. These index numbers suggest that producer prices have increased in total by 15 times over the past 100 years.

One way to look at the impact of changing prices is to multiply the labor income of \$522, obtained by an average farmer in Dryden in 1907, by 15, the multiple of the increase in producer prices over the century. This results in an adjusted total of \$7,830, a modest income for one's labor in operating a business by any standards currently. Clearly, such comparisons ignore all the changes in technology and differences in the things that money could buy each decade compared with the present. A similar comparison made for average capital in 1907 and 2007 shows that \$6,365 in 1907, converted to 2007 prices becomes \$95,475. In both cases, putting 1907 results into 2007 dollars may be of interest for historical reasons but does not tell us much beyond showing how substantial the changes in prices have been over the course of the century.



Photo By: D. Van Hall

Summary Observations

Great changes have occurred in American agriculture over the past 100 years. The changes in dairy farming within the Town of Dryden likewise have been striking and impressive. Because the resource base in the Town is much like that of the dairy industry in New York State and the rest of the Northeast, this historical record may also be of considerable interest to a wider audience than just the residents of the Town.

Key points that stand out from this study include:

- (1) Milk sold from the agricultural resource base in the Town has increased nearly every decade. Five times as much milk was sold from the Town in 2007 as was sold in 1917 with considerably fewer resources required to produce it.
- (2) The decrease in the number of dairy farms from 206 in 1907 to 8 in 2007 is perhaps the most striking statistic in this report. A few, well-managed, large farms can now produce a large amount of milk from the Town's agricultural resource base efficiently.
- (3) The labor force engaged in farming has decreased each decade. Labor productivity in terms of milk sold per worker has increased by 35 times during the century, reflecting the great gains from improvements in agricultural technology, breeding, plant and animal nutrition, and management skills.
- (4) Only the most productive and well-adapted acres of farm land are now being used by dairy farmers to provide the forage base for milk production. A little over 5% of the Town's area now produces the crops needed for the milk it produces for sale, in contrast to 25% in 1907.
- (5) Rates of production have steadily increased across the decades for both the cows and the crops grown to feed them. For example, milk per cow increased from 4,400 pounds in 1917 to 22,800 in 2007.
- (6) Dryden's dairy farmers can be expected to continue to be a productive component of the Town's economic base within Tompkins County into the immediate future.

Special thanks are extended to the farmers who actively supported the study of their business operations over the span of ten decades (1907 – 2007). Leadership by George F. Warren, and his son, Stanley W. Warren, made this continuing project possible. We salute the farmers of the Town and the Warrens for their roles in making possible this report and those that preceded it. The authors hope that readers outside the Town of Dryden, Tompkins County, NY will reflect on similar results observed in their respective settings. One can expect that the rates of change observed in these past decades will continue into the immediate future for the dairy industry in this part of the world.



Photo By: K. Maloney

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Appendix A

Information about the Agricultural Districts Law in New York

“New York amended the property tax laws to grant a ten-year exemption on new or reconstructed farm structures in 1969 and enacted the Northeast’s first agricultural district law in 1971 (Bills and Boisvert, 1990a, 1990b). That enabling legislation spelled out the types of land deemed eligible for districting, steps local governments must follow to enroll or remove land in an agricultural district, and the provisions that applied to landowners who decide to enroll their land within an agricultural district boundary.”

The Agricultural District Concept in New York

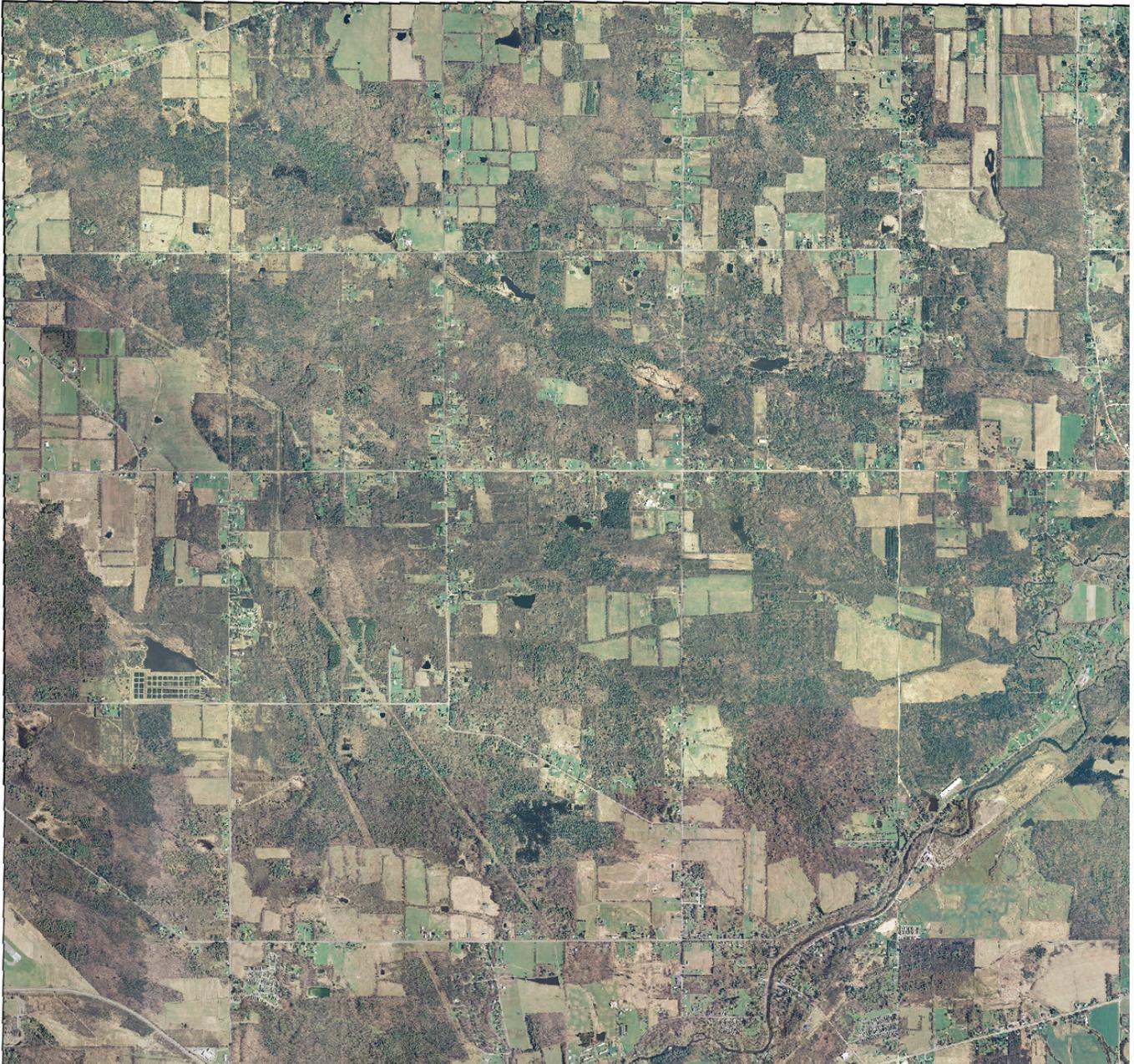
The Agricultural District Law contains six major provisions designed to facilitate the retention of agricultural land in three basic ways. The law restricts many of the usual land management options open to local governments. District authority may supersede local ordinances designed to regulate farm structures or practices beyond the normal requirements of public health and safety. Within an agricultural district, the right of government to acquire farmland by eminent domain can be exercised only after serious consideration has been given to alternative sites. Finally, the right of public agencies to advance funds for construction of public facilities to encourage non-farm development must be preceded by public notices and hearings, along with reviews by state agencies. State agencies must modify their administrative regulations and procedures to facilitate the retention of agricultural land. These provisions are designed to promote a more stable environment for farm operations and to reduce non-farm competition for scarce rural land resources and the uncertainties that can lead to a gradual disinvestment in agriculture. Some increased costs of production to comply with local ordinances or with procedures and regulations established by state agencies may also be avoided by farmers whose land is in an agricultural district.

Finally, The Agricultural Districts Law may provide direct monetary benefits to farmers who are willing to participate in a district for an extended period of time. Special use districts that overlap the boundaries of a district are restricted in the imposition of benefit assessments or special ad valorem levies on farmland within the district. These restrictions apply to improvements for water, sewer, lighting, non-farm drainage, and solid waste disposal or other landfill operations. In addition, qualified landowners can apply for an agricultural assessment. These owners receive an exemption designed to remove the land’s nonagricultural value from the property tax roll. Thus, taxes are levied based on capacity to produce agricultural commodities.

Source: “Bills, Nelson L. & Bernard F. Stanton, Trends in Land Use,” from Hirschl, T. A. & T. B. Heaton, *New York State in the 21st Century*, p.179-180

Appendix B

Maps of the four quadrants of the Town of Dryden



Northwestern Quadrant of the Town of Dryden



Northeastern Quadrant of the Town of Dryden



Southwestern Quadrant of the Town of Dryden



Southeastern Quadrant of the Town of Dryden

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY
AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
TOMPKINS COUNTY, NEW YORK

SOIL ASSOCIATIONS

ASSOCIATIONS DOMINATED BY HIGH-LIME SOILS

Developed on Glacial Till

LH Lima-Honeoye: Dominantly moderately well drained, silty soils on gently rolling to moderately steep topography

Developed on Glacial Till and Lake-Laid Material

HC Hudson-Cayuga: Dominantly moderately well drained, heavy-textured soils on moderate to steep slopes

Developed on Lake-Laid Material

HR Hudson-Rhinebeck: Moderately well drained and somewhat poorly drained, heavy-textured soils generally free of stones and gravel

Developed on Glacial Outwash

P Palmyra: Well-drained, light-textured soils on stratified sand and gravel

ASSOCIATIONS DOMINATED BY MEDIUM-LIME SOILS

Developed on Glacial Till

CL Conesus-Lansing: Moderately well drained and well drained, medium-textured soils on gently rolling topography

Developed on Glacial Outwash and Till

HV Howard-Valois: Mainly well-drained, light-textured and medium-textured, gravelly soils on level, rolling, or steep topography

ASSOCIATIONS DOMINATED BY LOW-LIME SOILS WITH A STRONG FRAGIPAN

Developed on Glacial Till

LE Langford-Erie: Moderately well drained and somewhat poorly drained, medium-textured soils on rolling to moderately steep topography

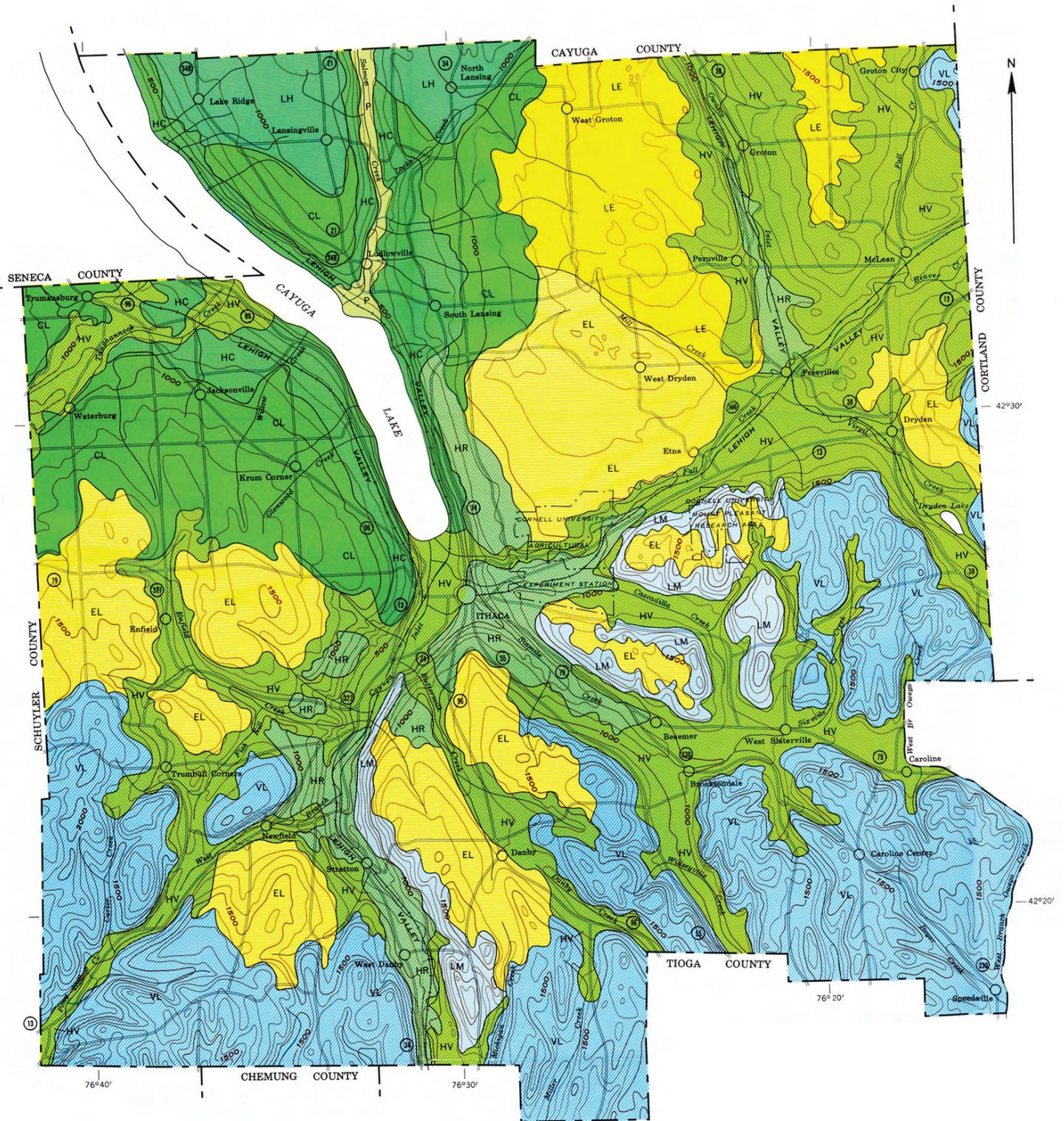
EL Erie-Langford: Dominantly somewhat poorly drained, silty soils on mild topography

ASSOCIATIONS DOMINATED BY VERY LOW-LIME SOILS WITH A STRONG FRAGIPAN

Developed on Glacial Till

VL Volusia-Lordstown: Somewhat poorly drained and well-drained soils on rolling to steep topography

LM Lordstown-Mardin: Well drained and moderately well drained, shallow and deep soils on rolling to steep topography



Scale 1:126,720



Picture of Landscape, "Dryden Lake Barns" from pg. 20, "Barns of the Dryden Lake Area", Dryden Historical Society, 1987

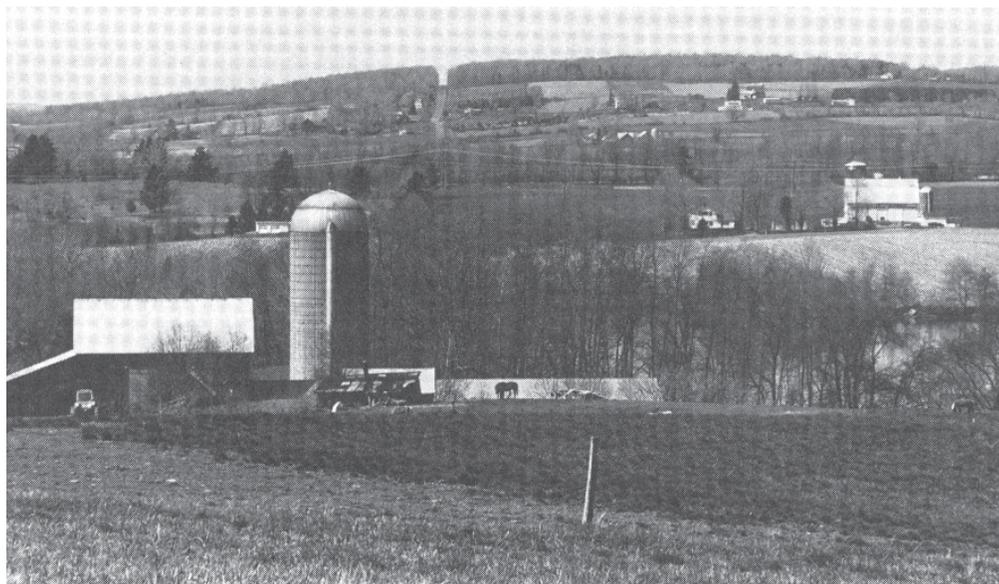


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RB No	Title	Fee (if applicable)	Author(s)
2008-01	The New York State Agricultural Immigration and Human Resource Management Issues Study		Maloney, T. and N. Bills
2007-01	Dairy Farm Management Business Summary, New York State, 2006	(\$20.00)	Knoblauch, W., Putnam, L. and J. Karszes
2006-07	Financial Performance and Other Characteristics of On-Farm Dairy Processing Enterprises in New York, Vermont and Wisconsin		Nicholson, C. and M. Stephenson
2006-06	Dairy Farm Management Business Summary, New York State, 2005	(\$20.00)	Knoblauch, W., Putnam, L. and J. Karszes
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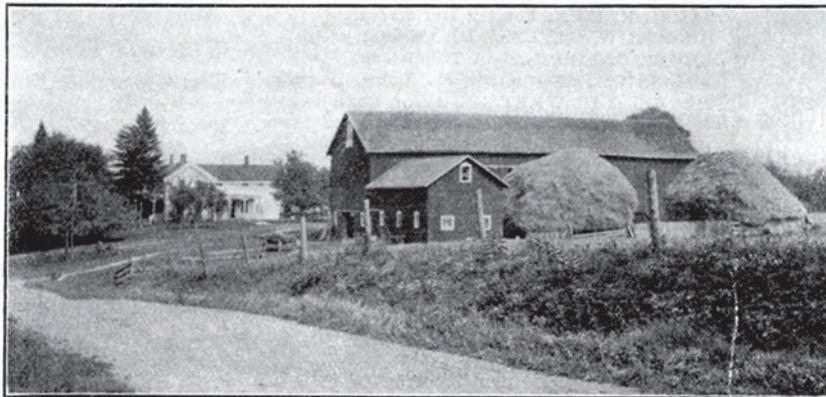
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MARCH, 1911

BULLETIN 295

CORNELL UNIVERSITY
AGRICULTURAL EXPERIMENT STATION OF
THE COLLEGE OF AGRICULTURE
Department of Farm Management

AN AGRICULTURAL SURVEY
TOWNSHIPS OF ITHACA, DRYDEN, DANBY AND
LANSING, TOMPKINS COUNTY, NEW YORK



By G. F. WARREN AND K. C. LIVERMORE

ASSISTED BY

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F. E. ROBERTSON, E. L. BAKER

ITHACA, N. Y.
PUBLISHED BY THE UNIVERSITY