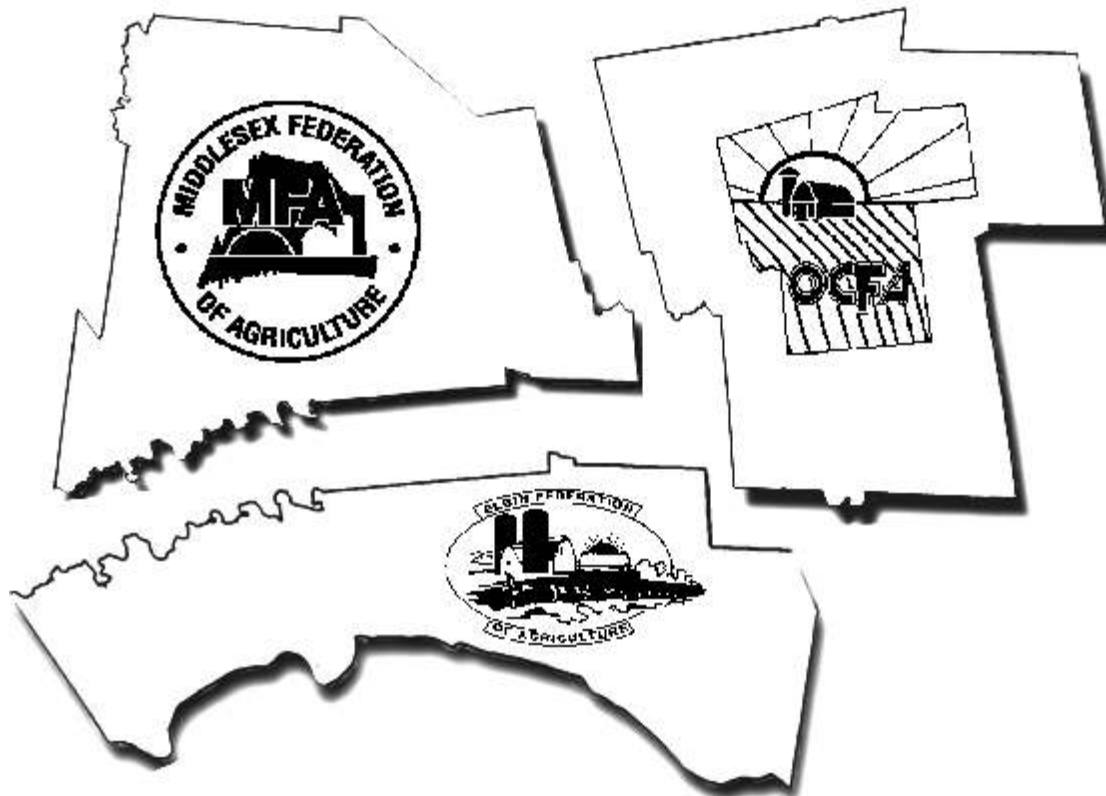


MIDDLESEX COUNTY AGRICULTURAL SECTOR ASSESSMENT STUDY



FINAL REPORT TO:

**Elgin, Middlesex and Oxford County Federations of Agriculture
Human Resources Development Canada
Elgin, Middlesex and Oxford Local Training Board
County of Middlesex**

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Executive Summary

Over the last 50 years, rural areas in Ontario and across Canada have experienced a decline in the number of farms and farmers. This has reached the point where, in most rural areas, the number of jobs in the service sector exceeds the number of jobs in agriculture. Many rural policy makers appear to have taken the position that agriculture is dead and strategies for the future must focus on services and other job producing sectors that do not depend on agriculture. People active in the agriculture sector accepted this initially, but more recently began to believe that the decline of agriculture was perhaps being overstated.

Recognizing this problem, a number of counties in Ontario began to look at the broader role of agriculture in their economy. They approached the University of Guelph and Harry Cummings and Associates to assist them in this work. The first study using this approach looked at the largest agricultural county in the province, Huron County (Cummings, Morris, McLennan, 1998). Several other studies have now been completed, including those in Prescott, Russell, Stormont, Dundas and Glengarry Counties (Cummings and Deschamps, 1999), Simcoe County (Cummings et al., 1999), Lambton County (Cummings et al., 2000), Frontenac, Leeds, Grenville, Lennox and Addington Counties (Cummings et al., 2000) and Perth County (Cummings et al., 2000). As in the other studies of this type which are completed or underway, the basic focus is on sales and jobs related to agriculture, directly or indirectly.

The jobs and sales data compiled by this study indicates that there are 12,054 jobs (6.0% of the County's total) tied to agriculture in Middlesex County and over \$984 million in sales from farms and businesses that buy from and sell to farms per annum. The employment and sales expenditure multipliers indicate that for every on-farm job in Middlesex County, there are an additional 0.89 jobs off the farm, and for each dollar in farm gate sales, there are an additional \$1.18 in sales in businesses that deal with farmers. Further details follow in this report.

The study started with a review of secondary data on the economy in Middlesex County, and in comparison with Ontario. There were 199,335 employees in Middlesex County in 1996, a decrease of 2.6% from 1991. A review of personal income levels in the county showed that income levels on average were slightly lower than those of Ontario as a whole, yet most are within the middle income range. The census data show that jobs in Manufacturing, Retail and Health and Social services in Middlesex County are large in absolute numbers. Education Other Service industries are also very significant in the county. Direct employment on farms declined by 7.3% between 1991 and 1996 (from

6,875 employees to 6,370). This is a somewhat poorer performance than overall employment in the county, which decreased 2.6% over the same time period. It also fares poorer than the 6.3% decline experienced by the agricultural sector in Ontario as a whole.

While farm employment declined, farm gate sales in Middlesex County increased by \$33.1 million, or 7.9%, to \$450.4 million between 1990 and 1995, producing 5.8% of the value of Ontario's farm gate sales in 1995. The number of farms in Middlesex County decreased by 5.5%, or 175 farms, from 1991 to 1996. As of 1996 there were 2,987 farms in Middlesex County, representing 4.4% of the total number of farms found in the province. Middlesex County encompasses 4.6% of the cultivated land area in the province. The data on farm size suggests that the farms on average are larger in Middlesex County than in Ontario. With respect to the type of farms, the County is very diverse. Field crops and livestock farms play the major roles in Middlesex County agriculture.

As part of the study, first-hand information was provided by primary producers through focus groups held in each of the three counties. Farmers reported a number of trends impacting agriculture in the Study Area. Most notably these include: the viability and vulnerability of smaller farms and their consolidation into larger 'corporate' farms; high levels of competition for available agricultural land; finding and retaining quality labour; and the low level of public awareness and support for farming. Issues relating to these trends include: municipal zoning and by-laws; public opinion; the sustainability of farming as a means of making a living and as an industry; environmental concerns; desirability of farm work, the value of certification programmes, costs of training, farmer management skills and decreasing competition among service providers.

The second part of the study involved a survey of businesses (hereafter referred to as Ag-related businesses) that buy from and sell to farm operations in the Study Area. The purpose of this survey was to estimate the value of sales related to agriculture and the number of jobs created by Ag-related businesses.

We estimate that there are 574 businesses beyond the farm gate related to agriculture in Middlesex. The sample survey of 307 businesses, including 118 businesses from Middlesex County, completed in the summer of 2000, produced an estimate of 2,239.8 jobs servicing farm operations in Middlesex County's Ag-related businesses. This refers to the jobs that are supported by farm operations and is in addition to the 6,370 on-farm jobs in 1996. In addition, from other secondary sources we estimated that 3,443.9 induced jobs in the Education, Government, Health and Social Service sectors were supported by the direct and indirect agricultural jobs. With respect to sales, we estimate that the \$450.4 million in farm gate sales produced another \$533.7 million in Ag-related

sales.

Other selected data indicate that there is a high level of exports from the Study Area (combined Elgin, Middlesex and Oxford Counties). An average of 33.2% of Ag-related sales for businesses in the Study Area were to markets outside the Study Area. Strong links exist between Agriculture and the Wholesale, Retail and Construction sectors. Specialty agricultural services such as veterinary services and custom farming services were also well-represented as linked industries. Other typical businesses included in the study were heating and plumbing, raw milk transport, feed and seed stores, accounting firms, truck sales and service and real estate brokers. An additional 54 businesses are located in the Study Area which are related to Agriculture, but do not deal directly with farmers. These businesses either manufacture or sell goods that are eventually used on farms (e.g. bearings and farm equipment), or are food processing and wholesale businesses which utilize products from farms that are sold to consumers (e.g. ice cream, corn oil and fresh produce).

According to employment criteria, the great majority of these businesses are classified as small; 47.5% of the businesses surveyed had less than five employees. The average number of employees in the businesses surveyed was 11.3, of which about 4.6 dedicated their time to servicing the Agriculture sector.

The results of the study are comparable to those of previous studies. Since the sector has a strong export base, there are significant opportunities for value-added processing and manufacturing industries related to agriculture in Middlesex County. The establishment of these value-added industries would lead to further Ag-related jobs. Planners, policy makers and business people in Elgin, Middlesex and Oxford counties have an important role to play in making this happen.

Acknowledgments

The organizations and agencies that have been part of the steering committee recognize the need for and the value of an economic impact study of the agricultural sector.

Considerable effort was made by the steering committee to ensure that this study was complete and provided the information that each participant desired. The completed study shows the value of the agriculture industry to the Counties of Elgin, Middlesex and Oxford and the City of London, as well as examining the labour training needs of the agricultural industry.

The following deserve the thanks of the agricultural community for their contributions of time and resources to this study:

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We appreciate your support!

Doug Duffin,

Chair, Steering Committee,

Elgin, Middlesex, Oxford Agricultural Economic Impact Study

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1.0 Introduction

This report attempts to assess the role of the agricultural sector in the economy of Middlesex County. It is one of four reports produced as part of the Elgin, Middlesex and Oxford County Area Agricultural Sector Assessment Study. There are three individual reports covering each of the counties, as well as a composite report which covers the three counties combined into a single study area. While providing an analysis of primary agriculture in the County, the study focuses on agriculture beyond the farm gate: the livestock feed processors, the truckers, the bankers, the computer service providers and advertisers as examples. In the past many studies of this type have restricted themselves to agriculture on the farm. By ignoring the size and importance of agriculture beyond the farm gate, the true impact of agriculture was underestimated. This study hopes to set the record straight and present a more complete picture of agriculture in the three counties.

We believe the reports will be of use to planners, economic developers, those involved in the agriculture sector, labour force and training agencies and providers, agricultural agencies and policy makers.

The basic focus of the study is on dollars and jobs, elements of our economy that everyone understands. The methodology relies mainly on a breakdown of these dollars and jobs into a formula for total impact which is $\text{Direct} + \text{Indirect} + \text{Induced} = \text{Total Impact}$. Each of the elements in this formula is examined in the report. The organizing framework for the study is "input-output like" in nature; agriculture is described by its linkages to all other sectors in the economy as it buys *inputs* and sells *outputs*: goods and services.

The research presented in the reports relies on data from the Population Census and agricultural census collected in 1996. This is to be updated in 2001 and will be available in 2003. A major portion of the report is also based on 1999 employment and sales data collected from businesses in the area. This data has never before been reported upon. For this study we did a number of innovative things not done in our other reports of this type. Focus groups with farmers were held in each of the counties in the summer of 2000. We also did special census tabulations on livestock data. This was designed to identify the size and importance of livestock operations in the area. Finally, an attempt was made to identify businesses that provide services to the agriculture sector but do not deal directly with farmers; equipment manufacturers, food processors, etc.

1.1 Background to the Research Project

Rural Ontario has experienced enormous change in the last fifty years. From a demographic perspective, in 1921, the population became dominantly non-farm based. At

the same time, within the rural population as a whole, non farm residences came to dominate. By 1981, the farm based population in rural Ontario accounted for only 18 percent of the rural population (Dasgupta, 1988, pp. 26-30). The rural economy has also undergone considerable transformation. Many residents of rural areas now gain employment by working in large urban places. The majority of farmers now earn a significant portion of their living off the farm. In general commercial farmers in Ontario, even those more traditional family farms, see themselves as a business. In many cases it is a business with a commitment to the land, the place and the environment that goes beyond the average business. Given relatively low profit margins for many, if you didn't love the land you wouldn't stay in the business.

The rural communities in which farmers live have changed. The average farm size has increased continuously since the early 1900's. The investment in capital has led to capital intensive farming with a decreasing need for labour. Greater levels of production are achieved with fewer and fewer units of labour. The value of farm gate sales rose 3.5% per year between 1986 and 1996, surpassing the growth rate of the Ontario Economy over the period. This occurred at a time that the number of farmers was decreasing. The composition of the labour force in Ontario and rural areas has changed and the total labour force in the service sector exceeds all goods producing sectors in the province and in rural areas. (Keddie, 1999, pp 30-31). Rural communities have changed along the way with more remote communities decreasing in size and function while rural communities adjacent to urban areas have grown welcoming urban workers wishing to live in the country.

With fewer farm workers, the linkages to support businesses in the community have become more important.

1.2 Introduction to the Elgin, Middlesex and Oxford Study Area

With \$1.31 billion in farm gate sales in the three counties, this study represents the largest total sales of any of the previous studies. In ranking counties in the province, Middlesex is 3rd and Oxford 6th out of all counties in the province in farm gate sales.

The counties can be referred to as the heartland, because they are part of the rich agricultural area of the province bordering on the southern great lakes. Climate is moderated by the lakes and the soils are rich, leading to high agricultural productivity. In addition, the areas are close to the large urban centres of Toronto, London, Windsor and Detroit. They also serve the smaller urban centres of St. Thomas, Woodstock, Tillsonburg and Ingersoll within their county boundaries. Productivity is high and markets are close.

The counties are also home to much industry and related service activity which takes advantage of the central location. Automobile and truck manufacturing, food processing, insurance and other heavy manufacturing take advantage of the area.

With this awareness of the background of the area and the presence of a growing urban population, a committee of local residents and organizations interested in agriculture, human resource development, planning and economic development was formed. They worked together to develop the guidelines for a study of the role of agriculture in the local economy. This was offered to tender and Harry Cummings & Associates was awarded the contract. The work began in the Spring of 2000, after a year of discussions and meetings. This is the report covering Middlesex County. Individual reports are available for each of the counties, as well as the summary report covering all three counties.

2.0 A Profile of the Economy of Middlesex County

2.1 Population and Employment in Middlesex County

2.1.1 Population in Middlesex County

For nearly half a century, the population of Middlesex County has been growing steadily, although the rate of this growth has slowed in the past twenty-five years (Table 2.1). The lowest percentage change in population took place between 1981 and 1986 (1.3%). The 1996 Population Census of Canada determined that 372,234 people were living in the county. Middlesex County exhibited the greatest growth of the three counties, in large part because of the rapid expansion of the City of London.

Table 2.1 Population in Middlesex County and Percent Change Since 1951.

	1951	1961	1971	1981	1986	1991	1996
Middlesex	162,139	221,422	282,014	318,184	322,471	372,234	389,616
% Change	N/A	36.6%	27.4%	12.8%	1.3%	15.4%	4.7%

Source: Statistics Canada, 1971, 1981, 1986, 1991 & 1996.

Although the 1996 census data show that the population increase in Middlesex County has not been significant over other years, notable pockets of growth are evident. Table 2.2 shows significant growth in the villages and rural townships of Middlesex County (e.g. Ailsa Craig 21.8%, London Township 7.5% and North Dorchester Township 9.5%). Higher rates of growth are also present in the larger towns and cities (e.g. Strathroy 12.2% and London 4.5%). At the same time, slower growth, and even negative growth, are being experienced in some of the rural township areas (e.g. Adelaide -3.5%, Lobo 0.4% and Mosa -2.4%). See Map 2.2 for township locations.

Table 2.2 Population in Middlesex County Townships and Municipalities, 1991 and 1996.

	1991	1996	% Change
Adelaide TP	1,970	1,901	-3.5%
Ailsa Craig VL	857	1,044	21.8%
Biddulph TP	2,196	2,208	0.5%
Caradoc TP	6,147	6,248	1.6%
Delaware TP	2,405	2,436	1.3%
East Williams TP	1,316	1,366	3.8%
Ekid TP	2,208	2,318	5.0%
Glencoe VL	2,148	2,178	1.4%
Lobo TP	5,529	5,553	0.4%
London C ¹	311,620	325,646	4.5%
London TP	4,646	4,996	7.5%
Lucan VL	1,847	1,958	6.0%
McGillivray TP	1,852	1,861	0.5%
Metcalfe TP	986	1,057	7.2%
Mosa TP	1,299	1,268	-2.4%
Newbury VL	419	430	2.6%
N. Dorchester TP	7,915	8,665	9.5%
Parkhill T	1,675	1,765	5.4%
Strathroy T	10,566	11,852	12.2%
Wardsville VL	447	440	-1.6%
West Nissouri TP	3,277	3,484	6.3%
West Williams TP	909	942	3.6%
Middlesex County	372,234	389,616	4.7%

Source: Statistics Canada, 1971, 1981, 1986, 1991 & 1996.

2.1.2 Employment in Middlesex County

The Standard Industrial Classification (SIC) system refers to the standard system used to organize Canadian industries into easily distinguishable categories or classifications. At the greatest level of aggregation in published census data, these industries are divided into 18 separate categories, and are presented in Table 2.3. The study uses the SIC system in analysing trends in employment in the study area.

¹ The City of London includes Westminster Township.

Table 2.3 Standard Industrial Classification Divisions (SIC, 1980).

Division	SIC Description	Division	SIC Description
A	Agriculture and Related Industries	J	Retail Trade Industries
B	Fishing and Trapping Industries	K	Finance and Insurance Industries
C	Logging and Forestry Industries	L	Real Estate Operator and Insurance Agent Industries
D	Mining, Quarrying and Oil Well industries	M	Business Service Industries
E	Manufacturing Industries	N	Government Service Industries
F	Construction Industries	O	Education Service Industries
G	Transportation and Storage Industries	P	Health and Social Service Industries
H	Communication and Other Utility Industries	Q	Accommodation, Food and Beverage Service Industries
I	Wholesale Trade Industries	R	Other Service Industries

Source: Statistics Canada, 1980.

The data in Table 2.4 show the relative importance of the individual sectors of the economy where residents are employed. As shown in Table 2.4, employment in Middlesex County decreased during the 1991 to 1996 period. The 1991 Census showed that 204,735 people were employed in the county². This number decreased to 199,335 people employed in the county by 1996, a decrease of 2.6% or 5,400 jobs. This is a greater decline than that experienced for the province as a whole. During the 1991 to 1996 period, employment in Ontario decreased by only 0.6%.

The table reveals that the Manufacturing sector provides the greatest number of jobs in both Middlesex County and across the province, followed by the Health and Social Services sector in Middlesex and the Retail sector in Ontario. Manufacturing in the county remained strong during the 1991 to 1996 period, decreasing by 1.0% or 2,465 jobs. In 1996 there were 30,040 Manufacturing jobs in Middlesex County. At the same time, Manufacturing jobs in Ontario declined by 2.2%. Jobs in the Retail sector declined by 9.8%, or by 2,740 jobs in Middlesex County, and was replaced by Health and Social Services as the second largest employer in the county. This is a greater decline than experienced in Retail across the province, which experienced a 5.4% decline in the sector. Other significant declines in Middlesex County include Government Services (-26.2%) and Construction (-18.2%). Significant declines in Fishing and Trapping (-100.0%) and Mining (-23.6%) were also experienced, although both of these sectors are quite small in the

²A job refers to the main source of income during the previous year. If someone was unemployed on the day of the census, but had worked at least three months during the previous year, then they were recorded as being active in a sector of the labour force.

county. Other Service industries experienced the greatest growth in the county, increasing by 16.1%, or 2,150 jobs, from 1991 to 1996.

Agriculture remained an important sector from 1991 to 1996. It is the twelfth largest employer in Middlesex County, although jobs in Agriculture declined by 7.3%, or 505 jobs from 1991 to 1996. This decline is greater than the overall 6.3% decline in Agriculture jobs throughout the province over the same time period.

Table 2.4 Employment by Industrial Sector in Middlesex County and Ontario, 1991 and 1996.

Industrial Sectors	Middlesex County				Ontario			
	1991	1996	Total Change	% Change	1991	1996	Total Change	% Change
Division A - Agriculture and Related Service Industries	6,875	6,370	-505	-7.3%	139,880	131,060	-8,820	-6.3%
Division B - Fishing and Trapping Industries	40	0	-40	-100.0%	1,965	1,915	-50	-2.5%
Division C - Logging and Forestry Industries	150	120	-30	-20.0%	13,965	11,405	-2,560	-18.3%
Division D - Mining, Quarrying and Oil Well Industries	275	210	-65	-23.6%	34,355	26,050	-8,305	-24.2%
Division E - Manufacturing Industries	30,350	30,040	-310	-1.0%	942,995	922,565	-20,430	-2.2%
Division F - Construction Industries	13,525	11,060	-2465	-18.2%	358,890	290,430	-68,460	-19.1%
Division G - Transportation and Storage Industries	5,575	5,970	395	7.1%	187,830	198,555	10,725	5.7%
Division H - Communication and Other Utility Industries	6,725	6,115	-610	-9.1%	188,630	173,040	-15,590	-8.3%
Division I - Wholesale Trade Industries	9,180	10,140	960	10.5%	233,915	278,220	44,305	18.9%
Division J - Retail Trade Industries	28,025	25,285	-2740	-9.8%	700,925	662,815	-38,110	-5.4%
Division K - Finance and Insurance Industries	10,980	9,720	-1260	-11.5%	253,135	228,880	-24,255	-9.6%
Division L - Real Estate Operator and Insurance Agent Industries	3,900	4,175	275	7.1%	100,090	111,890	11,800	11.8%
Division M - Business Service Industries	10,470	11,530	1060	10.1%	367,200	411,070	43,870	11.9%
Division N - Government Service Industries	10,380	7,665	-2715	-26.2%	411,450	304,640	-106,810	-26.0%
Division O - Educational Service Industries	17,215	17,175	-40	-0.2%	365,235	369,320	4,085	1.1%
Division P - Health and Social Service Industries	24,290	25,510	1220	5.0%	457,115	513,615	56,500	12.4%
Division Q - Accommodation, Food and Beverage Service Industries	13,440	12,760	-680	-5.1%	322,955	350,945	27,990	8.7%
Division R - Other Service Industries	13,330	15,480	2150	16.1%	355,310	414,980	59,670	16.8%
TOTAL	204,735	199,335	-5400	-2.6%	5,435,850	5,401,400	-34,450	-0.6%

Source: Statistics Canada, 1991 & 1996.

Table 2.5 focusses on three sectors, namely Primary, Manufacturing and Government Service Industries, which have been selected to examine changes in employment in the study area from 1981 to 1996. Totals are provided by county, for the study area and for the province. Employment in the Primary Industries, which in the study area comprises mostly Agriculture, has been on a fairly continuous decline throughout the study area and the province since 1981. However, the rate of decline in the study area has been slower than that of the province; an indicator of the strength of Agriculture throughout the study area. Employment in the Manufacturing Industries has also declined at a rate slower than that of the province, and has remained relatively stable in the study area since 1991. Government Service Industries has declined dramatically throughout the study area as well as the province, with a somewhat slower decline in jobs exhibited in the study area.

Table 2.5 Employment in Primary, Manufacturing and Government Services, 1981, 1991 & 1996.

	Primary Industries ³			Manufacturing Industries			Government Service Industries		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
Elgin County	5,740	4,795	4,315	9,355	9,070	9,345	1,185	1,870	1,325
Middlesex County	7,020	7,345	6,700	34,065	30,350	30,040	8,395	10,380	7,665
Oxford County	6,580	6,200	6,150	12,580	12,080	12,120	1,430	1,975	1,395
Study Area	19,340	18,340	17,165	56,000	51,500	51,505	11,010	14,225	10,385
Study Area % Change ⁴	N/A	-5.2%	-6.4%	N/A	-8.0%	0.0%	N/A	29.2%	-27.0%
Ontario	201,835	190,175	170,430	1,055,565	942,995	922,570	311,540	411,455	304,640
Ontario % Change ⁵	N/A	-5.8%	-10.4%	N/A	-10.7%	-2.2%	N/A	32.1%	-26.0%

Source: Statistics Canada, 1971, 1981, 1991 and 1996.

2.1.3 Family Incomes in Middlesex County

Table 2.5 provides data on family income distribution in Middlesex County, the province of Ontario and Canada. The distribution is organized according to income

³ Includes agriculture, forestry, fishing, trapping, mining, quarrying and oil well industries.

⁴ Indicates percentage change since the previous time period.

⁵ Indicates percentage change since the previous time period.

categories, ranging from under \$10,000 to over \$100,000.

Table 2.6 Family Incomes in Middlesex County, Ontario and Canada, 1996.

Income Category	Middlesex County		Ontario		Canada	
	No. of Families	% of Families	No. of Families	% of Families	No. of Families	% of Families
Under \$10,000	4,435	4.2%	148,050	5.0%	435,760	5.6%
\$10,000 - \$19,999	9,000	8.6%	256,630	8.8%	795,895	10.2%
\$20,000 - \$29,999	11,905	11.4%	332,130	11.3%	1,007,840	12.9%
\$30,000 - \$39,999	12,360	11.8%	336,440	11.5%	992,020	12.7%
\$40,000 - \$49,999	12,760	12.2%	340,325	11.6%	968,900	12.4%
\$50,000 - \$59,999	12,525	11.9%	324,370	11.1%	883,520	11.3%
\$60,000 - \$69,999	10,425	9.9%	289,155	9.9%	736,990	9.4%
\$70,000 - \$79,999	8,480	8.1%	235,015	8.0%	568,055	7.2%
\$80,000 - \$89,999	6,645	6.3%	179,900	6.1%	416,740	5.3%
\$90,000 - \$99,999	4,460	4.3%	127,945	4.4%	286,875	3.7%
\$100,000 and over	11,855	11.3%	362,765	12.4%	745,265	9.5%
Total Families	104,850	100.0%	2,932,725	100.0%	7,837,860	100.0%
Average Income	\$58,737		\$59,830		\$54,583	
Median Income	\$51,268		\$51,520		\$46,951	

Source: Statistics Canada, 1996.

As shown in the table, Middlesex County has a smaller percentage of families in the lower categories of income than either the provincial or national levels. Only 12.8% of the families in the county had incomes of less than \$20,000 while Ontario and Canada had levels of 13.8% and 16.0%, respectively. Similarly, the county had a smaller percentage of families in the two highest income categories than Ontario (15.6% vs. 16.8%), although higher than Canada (15.6% vs. 13.2%). Overall, a greater percentage of families in the county have somewhat lower than the provincial, but higher than national, average and median incomes.

Income in Middlesex County is more evenly distributed among families than at either the provincial or national level. In the county, 53.9% of the families had income in the

middle of the range of categories, between \$30,000 and \$80,000. In Ontario and Canada, these figures were 52.1% and 53.0%, respectively.

From an economic and social perspective, Middlesex County is fortunate in that even though family income is marginally lower than the average Ontario family, it is higher than that of the average Canadian family income. Furthermore, there is less disparity shown in the county. Income is relatively more evenly spread throughout the families with proportionately fewer families that have low incomes and few that have high disproportionately high incomes, as compared to the rest of the province and the country.

2.2 Agriculture in Middlesex County

2.2.1 Agricultural Characteristics of Soils

In the Canada Land Inventory (CLI) classification system of land capability for agriculture, mineral soils are grouped into seven classes according to their potential and limitations for agricultural use (Environment Canada, 1980:1). The most highly rated soils, those having no significant limitations for cropping, are designated Class 1. Soils with no agricultural potential are designated Class 7. Soils designated 2 to 6 indicate, in declining order, capability for agriculture. For organic soils a separate category, Class 0, was established.

Classes 1, 2 and 3 are considered suitable for sustained production of common field crops if specified management practices are observed. Class 4 is physically marginal for sustained arable agriculture. Class 5 is capable of use only for permanent pasture and hay. Class 6 is capable of use only for grazing and Class 7 soils are considered to be unsuitable for agriculture (although specialty certain specialty crops such as tobacco thrive under very controlled conditions in Class 7 soils). While the soil areas in Classes 1 to 4 are suited for cultivated crops, they are also suited for permanent pasture. Soil areas in all classes may be suited for forestry, wildlife and recreational uses. For the purposes of this classification trees, tree fruits, cranberries, blueberries and ornamental plants that require little or no cultivation are not considered as cultivated or common field crops. Summary descriptions of these soil classes are as follows (Environment Canada, 1980:1):

Class 1: ***No significant limitations in Use for Crops.*** The soils are deep, well to perfectly drained, hold moisture well and in a virgin state are well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for

a wide range of field crops.

- Class 2:** ***Moderate limitations that restrict the range of crops or require moderate conservation practices.*** The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management they are moderately high to high in productivity for a fairly wide range of crops.
- Class 3:** ***Moderately severe limitations that restrict the range of crops or require special conservation practices.*** The limitations are more severe than Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.
- Class 4:** ***Severe limitations that restrict the range of crops or require special conservation practices, or both.*** The limitations seriously affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. The soils are low to fair in productivity for a fair range of crops but may have high productivity for a specially adapted crop.
- Class 5:** ***Very severe limitations that restrict their capability to produce perennial forage crops, and improvement practices are feasible.*** The limitations are so severe that the soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants, and may be improved by use of farm machinery.
- Class 6:** ***Capable only of producing perennial forage crops and improvement practices are not feasible.*** The soils provide some sustained grazing for farm animals, but the limitations are so severe that improvement by the use of farm machinery is impractical. The terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.

Class 7: *No capability for arable culture or permanent pasture.* This class also includes rockland, other non-soil areas, and bodies of water too small to show on the maps.

Class 0: *Organic soils.* These soils are not placed in capability classes.

A series of subclasses has also been developed to describe the types of limitations which restrict the potential of the soils. The nine subclasses used in the soil capability classification for agriculture are as follows (Environment Canada, 1980:2):

Subclass C: Adverse climate. The main limitation is low temperature or low or poor distribution of rainfall during the cropping season, or a combination of these.

Subclass E: Erosion damage. Past damage from erosion limits agricultural use of the land.

Subclass I: Innundation. Flooding by streams or lakes limits agricultural uses of the land.

Subclass P: Stoniness. Stones interfere with tillage, planting and harvesting.

Subclass R: Shallowness to solid bedrock. Solid bedrock is less than three feet from the surface.

Subclass S: Adverse soil characteristics. Adverse characteristics include one or more of the following: undesirable structure, low permeability, a restricted rooting zone because of soil characteristics, low natural fertility, low moisture-holding capacity or salinity.

Subclass T: Adverse topography. Either steepness or the pattern of slopes limits agricultural use.

Subclass W: Excess water. Excess water other than from flooding limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.

2.2.2 Soil and Terrain Characteristics

The tables from which the data are drawn (Hoffman and Noble, 1975) indicate the potential for agriculture for most of the land within the Canada Land Inventory Area in Ontario, except for areas listed as 'unmapped'. Unmapped areas are those for which information about agricultural potential is unavailable for various reasons, and include military bases, parks and large urban and other areas which have never been mapped. The total acreages of the soil capability for agriculture the seven soil classes, organic soils and unmapped areas, for the relevant areas of the Canada Land Inventory Area in Ontario are shown in Table 2.7.

Table 2.7 Acreage of soil capabilities in Ontario.

Soil Class	Total Acres in Ontario
Class 1	4,818,520
Class 2	5,272,652
Class 3	6,240,574
Class 4	5,329,887
Class 5	3,395,346
Class 6	2,405,696
Class 7	19,850,048
Class 0	5,240,218
Unmapped	471,579
Total	53,024,520

Source: Hoffman and Noble, 1975:7.

Table 2.8 provides a breakdown for the acreages of soil capabilities in Middlesex County. This information has been adapted from Hoffman and Noble (1975).

Table 2.8 Acreages of soil capabilities in Middlesex County.

Township	Soil Class 1	Soil Class 2	Soil Class 3	Soil Class 4	Soil Class 5	Soil Class 6	Soil Class 7	Soil Class 0	Totals
Adelaide	22,877	15,497	7,855		1,070			266	47,565
Biddulph	26,570	1,540	11,570				510	510	40,700
Caradoc	2,269	50,741	586	1,672	4,615		869	2,503	63,255
Delaware	10,726	9,397	3,255		1,146		1,146		25,670
Dorchester N.	28,824	11,036	12,006		550			3,034	55,450
Ekfid		38,660	8,450	1,535	3,330		1,280	1,025	54,280
Lobo	28,955	3,580	12,005		1,790		510	510	47,350
London	56,326	20,184	13,378		414		414	414	91,130
McGillivray	31,025	24,575	9,930		770		770	1,535	68,605
Metcalfe	6,145	30,720	510		770			255	38,400
Mosa		22,785	6,910	9,215	8,450		2,560		49,920
Nissouri W.	46,262	1,805	7,008	2,105	1,205		905	905	60,195
Westminster ⁶	38,630	2,507	13,953		454		454	227	56,225
Williams E.	19,802	11,841	7,641		809		536	536	41,165
Williams W.	9,010	17,920	4,810		1,535		1,790	1,025	36,090
Indian Reserves #41 & #42	388	10,213	1,576	2,087	777		2,559		17,600
Unmapped									37,120
Totals	327,809	273,001	121,443	16,614	27,685		14,303	12,745	830,720

Source: Hoffman and Noble, 1975:33

From the table above, the proportional distribution of soils across the county by capabilities for agriculture can be determined. This is presented in Table 2.9.

⁶ Westminster Township has been amalgamated into the City of London since the 1996 Census. As such, data in the tables used in this report refer to the portion of the City of London which encompassed Westminster Township previous to the amalgamation. The maps, however, refer only to the City of London; Westminster Township data represent the agricultural component of the City.

Table 2.9 **Distribution of soils by CLI capability for Agriculture.**

Soil Class	Proportion of County	Comments
Class 1	39.4%	Suitable for sustained production of common field crops if specified management practices are followed.
Class 2	32.9%	
Class 3	14.6%	
Class 4	2.0%	Physically marginal for sustained arable use.
Class 5	3.3%	Capable of use only for permanent pasture and hay.
Class 6	0.0%	Capable of use only for grazing.
Class 7	1.7%	Unsuitable for agriculture.
Class 0	1.5%	Organic soils
Unmapped	4.4%	

Source: Hoffman and Noble, 1975:33

As shown in Table 2.9, almost 87% of the land area in Middlesex County that is classified under the Canada Land Inventory is suitable for sustained production of common field crops. Table 2.10 provides a breakdown for the acreages of soil subclasses, by individual township as well as for the county as a whole. This information has also been adapted from Hoffman and Noble (1975).

Table 2.10 Soil Subclass capabilities in Middlesex County (in acres).

Township	C	E	I	P	R	S	T	W
Adelaide						14,075	7,525	1,025
Biddulph		510					11,570	1,540
Caradoc		2,050				53,960	540	4,355
Delaware		1,280				8,960	2,100	3,070
Dorchester N.						8,960	11,140	1,280
Ekfid		1,280				34,310		16,895
Lobo		510				3,580	12,005	510
London		510				23,040	16,460	1,795
McGillivray		770				7,680	9,930	16,895
Metcalfe						19,710		11,520
Mosa		2,560				30,460		15,620
Nissouri W.		770				770	5,960	2,555
Westminster		510				2,050	15,690	770
Williams E.		510				7,425	7,270	3,840
Williams W.		1,790				11,010	4,810	6,910
Indian Reserves #41 & #42		1,250				1,400	770	4,990
Unmapped								
Totals		14,300				227,390	105,770	93,570

Source: Hoffman and Noble, 1975:33

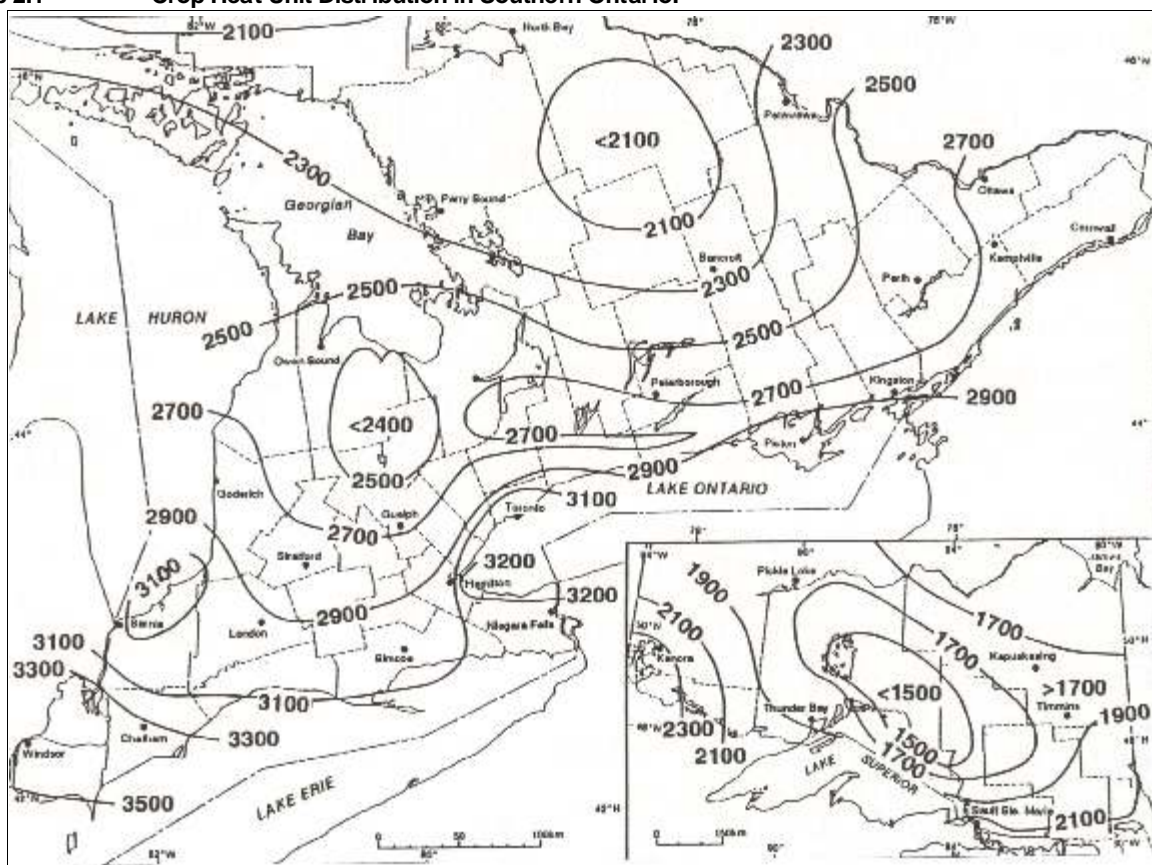
2.2.3 Crop Heat Units

There is a wide selection of hybrids and varieties for most crops. Most of the warm-season crops have a wide range of maturities. Crop Heat Units (CHU) provide an indexing system to assist farmers to select the most suitable hybrids and varieties for their area. This indexing system was originally developed for field corn and has been used in Ontario since 1961. The CHU ratings are based on the total accumulated CHUs for the frost-free growing season in each area of the province.

Daily CHU are calculated from daily minimum and maximum air temperatures drawn from separate calculations taken during the day and night. The daytime relationship uses 10 degrees Celsius (50F) as the base temperature and 30 degrees Celsius (86F) as the optimum because warm-season crops do not develop when daytime temperatures fall below 10 degrees Celsius and they develop fastest at about 30 degrees. The nighttime

relationship uses 4.4 degrees Celsius (40F) as the base temperature and does not specify an optimum temperature because nighttime temperatures very seldom exceed 25 degrees Celsius in Ontario. Daily CHU are calculated by using the average of the two daily values. The accumulated CHU that are available for tender crops such as corn, soybeans, tomatoes, etc., across southern Ontario, are shown in Map 2.1. This map shows the average CHU from the earliest planting to a logical season-ending date, based on historical data. The average CHU are based on the day-to-day accumulations between these dates for each year from 1961 to 1990 for individual weather stations distributed throughout the province.

Map 2.1 Crop Heat Unit Distribution in Southern Ontario.



Source: Brown and Bootsma, 1993:2

As shown in the map, Middlesex County ranges in CHU from approximately 2,700-2,900 CHU in the north to 3,100 in the southwestern corner of the county. The City of London, located close to the center of the county, averages 2,900 accumulated CHU annually, based on an average planting date of May 15 and an average season-ending

date of October 2. In comparison, Essex county has the highest rating, as it is the province's southernmost county, has an elevation of only 185 metres above sea level, and is located between Lake Erie and Lake St. Clair. The Dundalk Highlands (located north of Guelph) and the Algonquin Park Highlands have the lowest CHU ratings, as these regions have the highest elevations (mostly over 450 metres).

Latitude, elevation and distance to the Great Lakes all affect daily temperatures and have a marked influence on the accumulated CHU across southern Ontario. The change between isolines on the map in Figure 2.1 is gradual. However, the slope and soil type at a site also influence temperature. For example, south-facing slopes receive more heat than north-facing slopes, and sandy soils warm up faster than loam or clay soils. Microclimates also influence specific land situations. This makes it impossible to estimate the CHU rating closer than 50 heat units for any location.

2.2.4 Agricultural Land Use, Area, Farm Size and Products

Table 2.11 shows that the majority of farmland in Middlesex County is devoted to crops; 518,301 acres or 80.8% of the total farmland. Map 2.2 shows the total acreage in crops (excluding Christmas Trees) for each of Middlesex County's Townships. Areas of highest concentrations of crops are London, McGillivray and Caradoc Townships. Across the county, the ratio of unimproved pasture to improved pasture is almost 1:1, with slightly more unimproved pasture available than improved pasture.

Middlesex County

Total Acreage in Crops (excluding Christmas Trees) in 1996

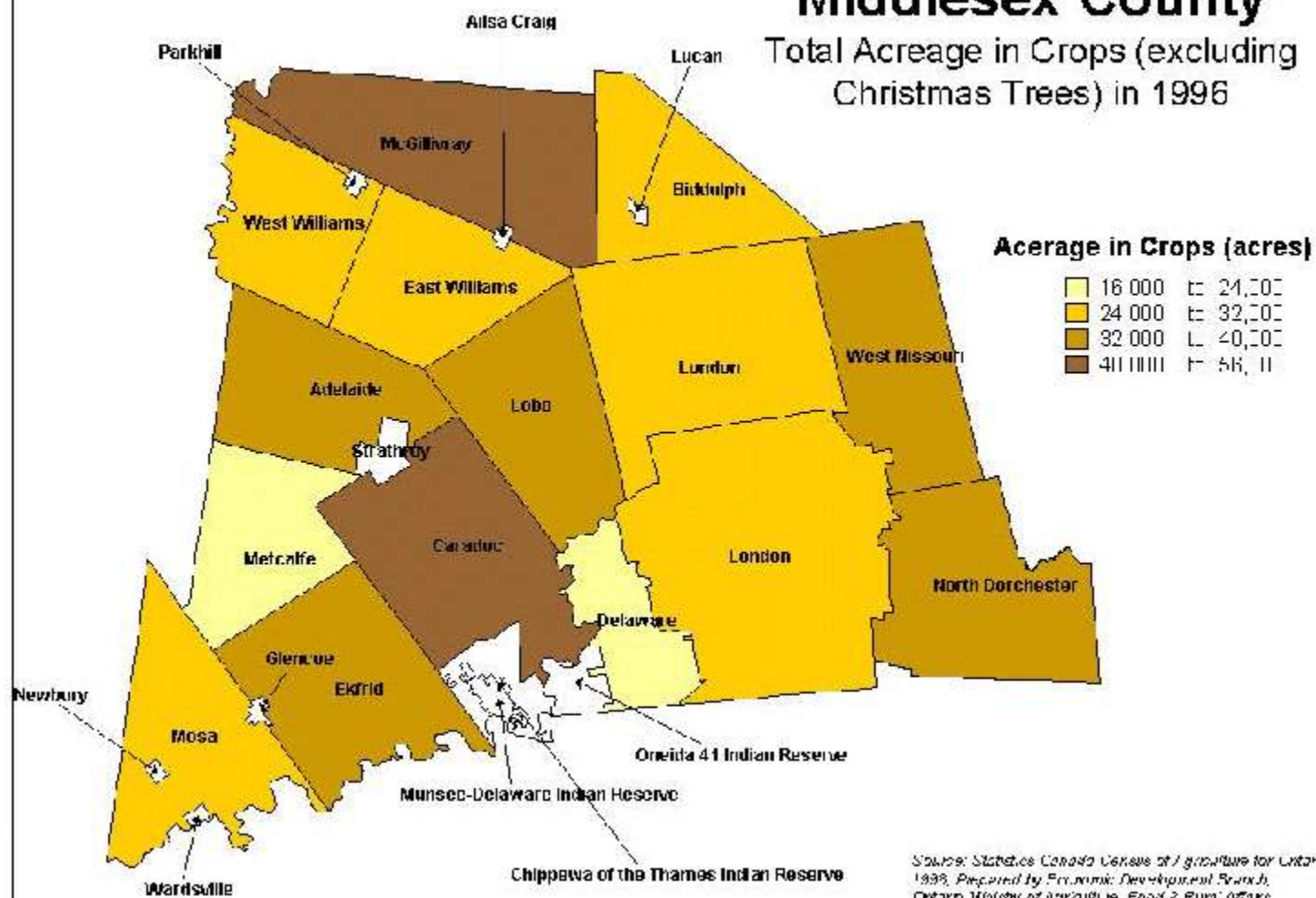


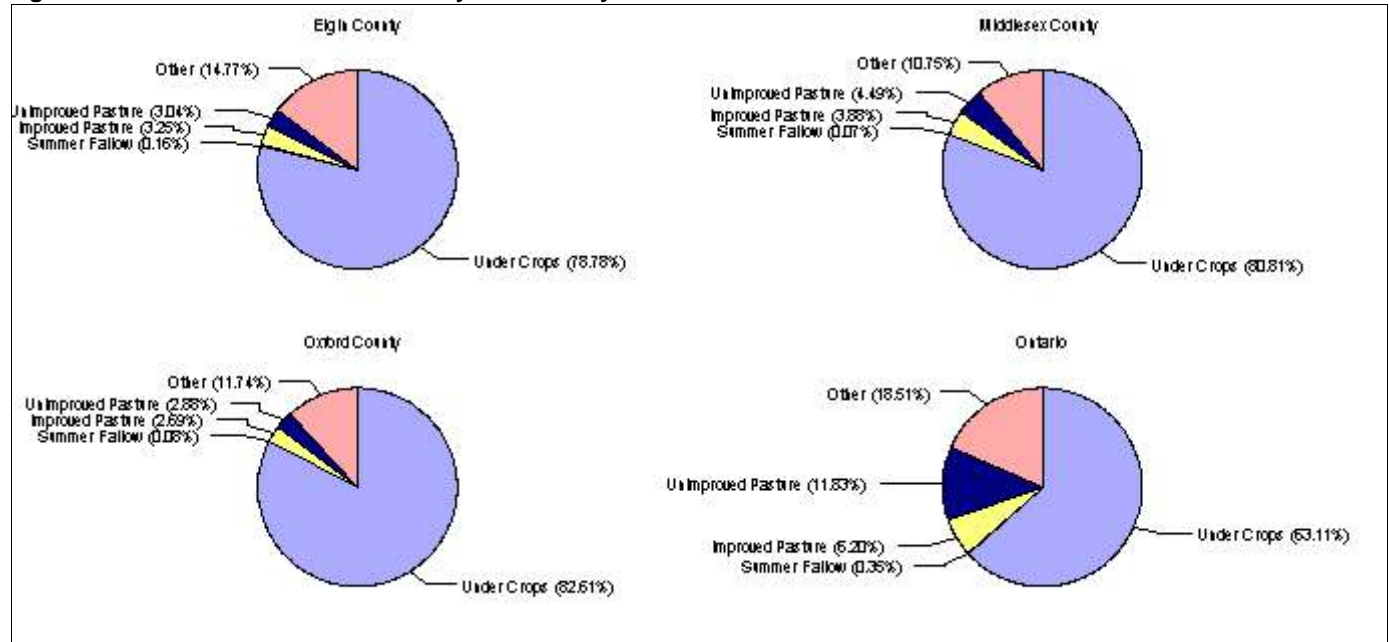
Table 2.11 Land Area Classified by Use (in acres).

	Under Crops	Summer Fallow	Improved Pasture	Unimproved Pasture	Other	Total
Adelaide	32,109	N/A	1,875	1,549	N/A	38,418
Biddulph	29,178	0	2,474	1,311	2,960	35,923
Caradoc	49,544	220	1,693	3,418	7,653	62,528
Delaware	16,842	N/A	921	1,061	N/A	21,036
Dorchester N.	33,314	N/A	1,568	1,474	N/A	41,501
Ekfid	38,403	16	3,155	3,780	6,026	51,380
Lobo	32,023	N/A	1,473	2,053	N/A	40,423
London	64,630	0	2,467	2,259	7,116	76,472
McGillivray	55,725	N/A	1,416	2,627	N/A	65,743
Metcalfe	23,715	N/A	1,681	1,699	N/A	30,984
Mosa	28,687	0	1,388	1,365	5,245	36,685
Nissouri W.	37,473	N/A	1,296	2,419	N/A	45,540
Westminster	24,322	N/A	1,491	1,222	N/A	30,378
Williams E.	28,280	0	1,387	1,240	3,728	34,635
Williams W.	24,056	N/A	597	1,350	N/A	29,757
Indian Reserves #41 & #42	N/A	N/A	N/A	N/A	N/A	N/A
Middlesex County	518,301	460	24,882	28,827	68,933	641,403
Ontario	8,759,707	48,492	860,786	1,641,692	2,568,888	13,879,565
% of Ontario in Middlesex	5.9%	0.9%	2.9%	1.8%	2.7%	4.6%

Source: Statistics Canada, 1996

Figure 2.1 compares the allocation of agricultural land uses in acres for each of the counties in the study area and the province. The importance of field crops in Middlesex County becomes apparent, representing the greatest proportion of classified land use with respect to product type throughout the county.

Figure 2.1 Land Area Classified by Use in Study Area and Ontario.



Source: Statistics Canada, 1996

Middlesex County has the most farms of the three counties; it is also the largest in terms of size and contains the most large farms. There are 2,987 farms in Middlesex County, representing 4.4% of the total number of farms found in Ontario (Table 2.12). London Township has the most farms of any township in Middlesex County as well as the most large farms. Overall, the majority of farms in Middlesex County (62.6%) are less than 180 acres in size.

Table 2.12 Farm Sizes in Middlesex County (in acres).

	0-179 acres	180-759 acres	760+ acres	Total Farms
Adelaide	107	76	5	188
Biddulph	121	57	6	184
Caradoc	214	80	12	306
Delaware	69	25	7	101
Dorchester N.	157	70	7	234
Ekfid	128	80	11	219
Lobo	159	62	8	229
London	201	99	18	318
McGillivray	123	101	12	236
Metcalfe	54	62	6	122
Mosa	80	52	11	143
Nissouri W.	173	74	9	256
Westminster	160	42	5	207
Williams E.	53	58	9	120
Williams W.	71	47	6	124
Indian Reserves #41 & #42	N/A	N/A	N/A	N/A
Middlesex County	1,870 (62.6%)	985 (33.0%)	132 (4.4%)	2,987
Ontario	42,372 (62.8%)	22,731 (33.7%)	2,417 (3.6%)	67,520

Source: Statistics Canada, 1996.

2.2.5 Types of Farms

Table 2.13 provides detail on the number of farms in Middlesex County by their major product type. Farms that specialize in field crops represent the greatest number of farms. Just over 1,300 farms, or 43.8% of the farms in Middlesex County have Field Crops as their major product. These farms represent 7.4% of the total number of Field Crop Farms in Ontario. Other important farm types in Middlesex County include Hog Farms (7.7% of Ontario's Hog Farms), Poultry Farms (5.9% of Ontario's Poultry Farms) and Livestock Combination Farms (4.5% of Livestock Combination Farms in the province).

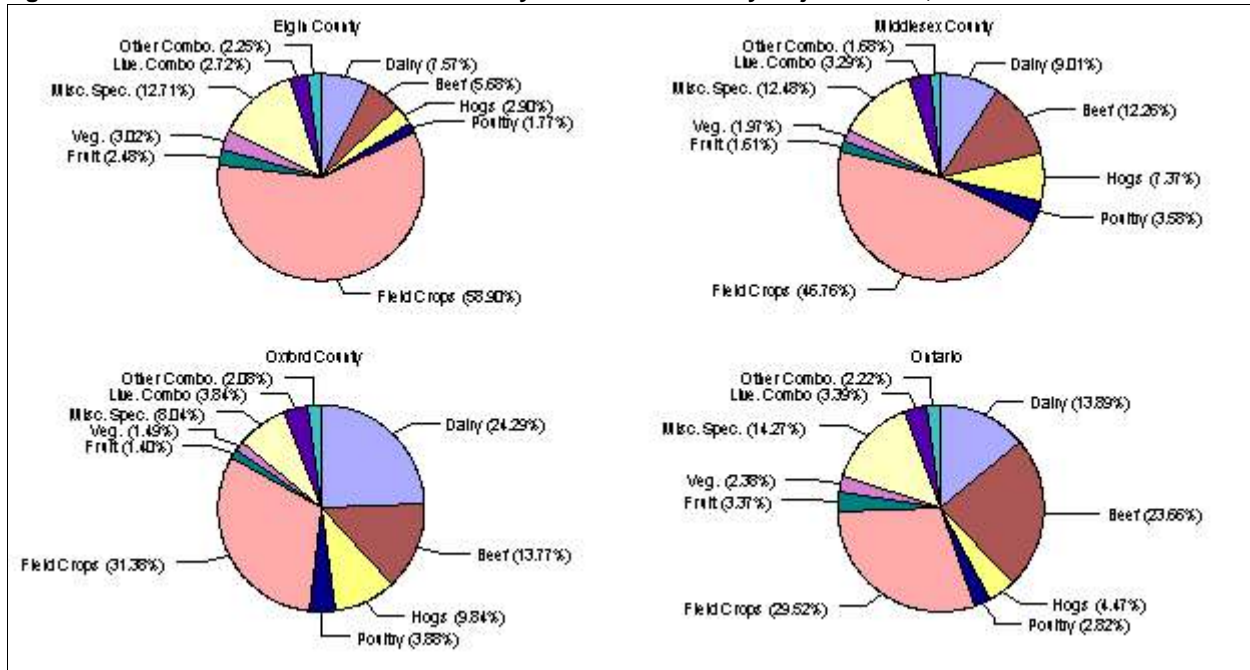
Table 2.13 Number of Farms in Middlesex County by Major Product, 1996.

	Dairy	Beef	Hogs	Poultry	Field Crops	Fruit	Veg.	Misc. Spec	Live. Comb	Other Comb
Adelaide	17	23	29	19	63	2	1	17	6	2
Biddulph	13	26	10	1	89	2	0	22	6	2
Caradoc	5	30	9	19	147	9	11	45	9	4
Delaware	6	7	4	1	43	4	1	23	1	4
Dorchester N.	45	15	13	1	76	1	6	45	16	4
Eldon	10	37	9	10	105	2	2	15	9	3
Lobo	10	33	5	7	120	3	8	24	4	0
London	38	25	17	11	141	4	4	44	8	7
McGillivray	22	40	27	2	109	2	2	18	2	5
Metcalfe	5	19	10	6	56	0	3	5	5	5
Mosa	3	17	5	3	88	0	1	11	2	2
Nissouri W.	42	28	24	10	93	1	5	20	13	3
Westminster	18	11	4	2	71	12	9	47	4	2
Williams E.	6	19	15	5	59	1	0	4	2	3
Williams W.	12	13	25	3	48	2	2	9	5	1
Indian Reserves #41 & #42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Middlesex County	252	343	206	100	1,308	45	55	349	92	47
Ontario	8,320	14,172	2,677	1,686	17,681	2,016	1,428	8,547	2,030	1,330
% of Ontario in Middlesex County	3.0%	2.4%	7.7%	5.9%	7.4%	2.2%	3.9%	4.1%	4.5%	3.5%

Source: Statistics Canada, 1996.

Figure 2.2 compares the proportions of farm types in Middlesex County with the other counties in the study area and those of the province.

Figure 2.2 Number of Farms in the Study Area and Ontario by Major Product, 1995.

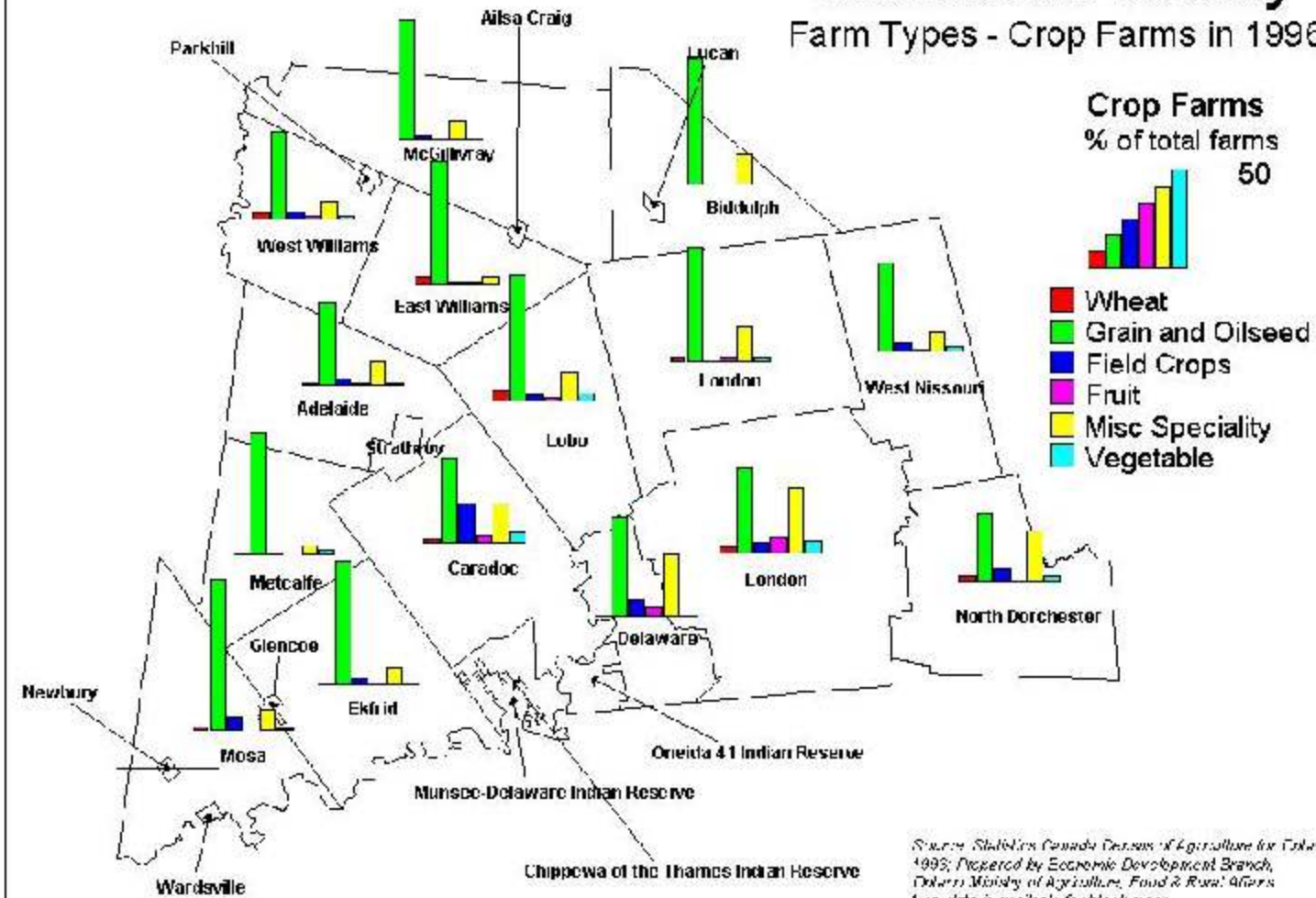


Source: Statistics Canada, 1996.

The importance of Field Crops is shown in the pie charts; in each of the counties Field Crops account for the greatest proportion of farms with 58.9% of the farms in Elgin County, 46.8% of the farms in Middlesex and 31.4% of the farms in Oxford. These proportions are higher than the provincial total of 29.5%, and shows that Field Crops in the study area make a valuable contribution to the province's output in that category. Maps 2.3 and 2.4 show the distribution of farms specializing in Field Crops and Livestock, respectively, across Middlesex County. At the same time, other categories of farms in the study area are also well-represented, especially in Middlesex and Oxford County, indicating a diverse and vibrant agricultural environment across the study area.

Middlesex County

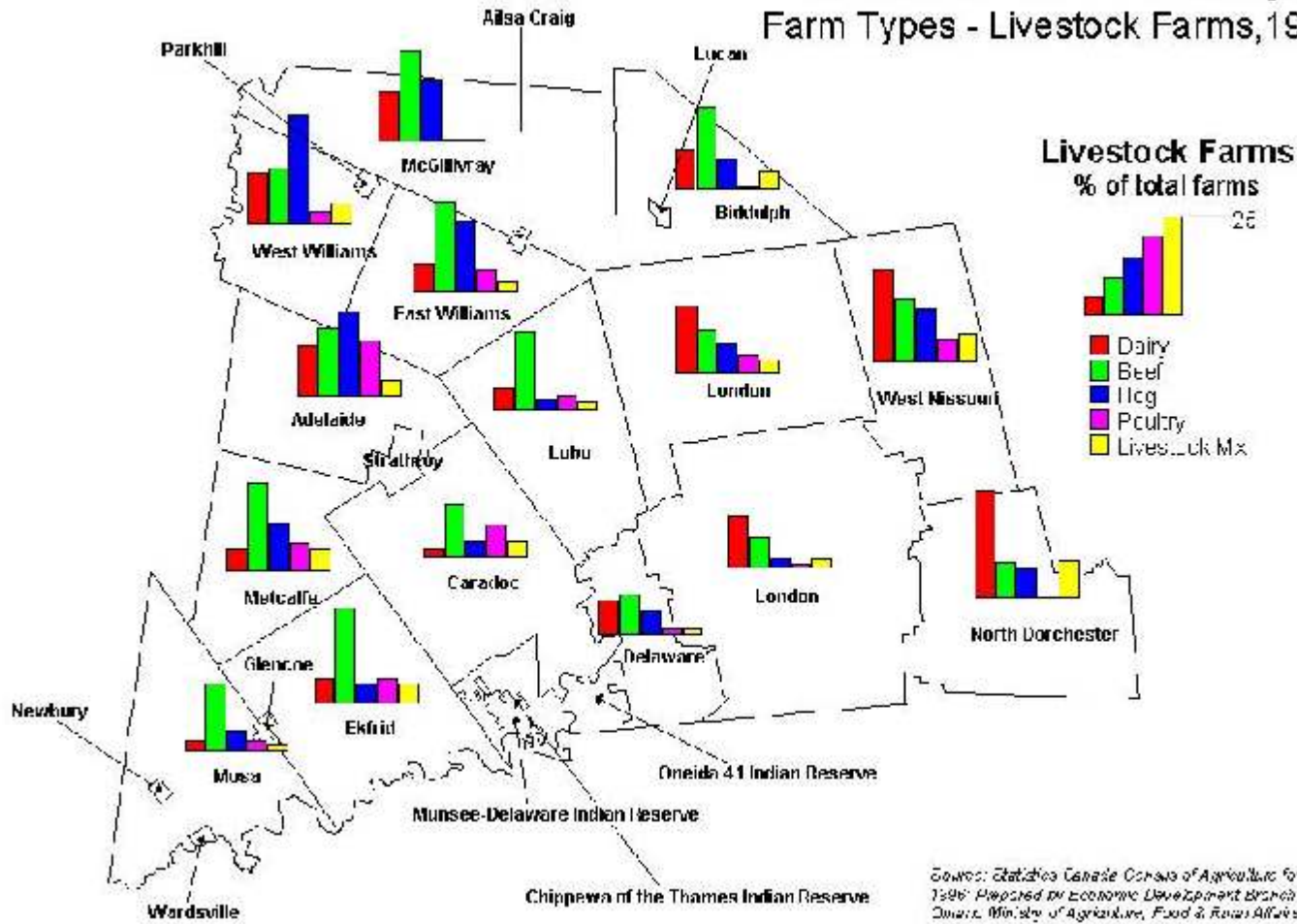
Farm Types - Crop Farms in 1996



Source: Statistics Canada Census of Agriculture for Ontario, 1996; Prepared by Economic Development Branch, Ontario Ministry of Agriculture, Food & Rural Affairs. * no data is available for these areas

Middlesex County

Farm Types - Livestock Farms, 1996



Source: Statistics Canada Census of Agriculture for Ontario, 1996. Prepared by Economic Development Branch, Ontario Ministry of Agriculture, Food & Rural Affairs. * no data is available for these areas.

2.2.5.1 Livestock in Middlesex County

Table 2.14 compares the 1996 populations of chickens, cattle (combined beef and dairy) and hogs in each township of Middlesex County, the study area as a whole and for the province of Ontario. The table also shows the average number of animals per acre of agricultural land at each of the three levels. As a whole, Middlesex County has the largest population of chickens in the study area (1,457,269), albeit in a smaller average concentration of chickens than the provincial average (2.27 vs. 2.56 animals per acre). Middlesex also has a smaller concentration of cattle (0.13 vs. 0.16 animals per acre), but a greater concentration of hogs (0.35 vs. 0.20 animals per acre). Within Middlesex County, McGillivray Township has the greatest population and highest concentration of cattle (14,255 animals and 0.22 animals per acre). Adelaide Township has the largest population of hogs (30,464 animals), and shares the greatest concentration of hogs with Williams West Township (0.79 animals per acre). London Township has the most chickens in Middlesex County (369,790 animals) although the greatest concentration of chickens in the county is in Adelaide Township (6.23 animals per acre).

Table 2.14 Livestock Populations and Concentrations in Middlesex County, 1996.

Area	Chickens		Cattle		Hogs	
	Total Animals	Animals Per Acre	Total Animals	Animals Per Acre	Total Animals	Animals Per Acre
Adelaide	239,406	6.23	6,193	0.16	30,464	0.79
Biddulph	2,802	0.08	5,555	0.15	6,725	0.19
Caradoc	113,692	1.82	4,510	0.07	12,258	0.20
Delaware	834	0.04	2,340	0.11	10,282	0.49
Dorchester North	75,946	1.83	6,945	0.17	12,864	0.31
Ekfid	82,444	1.60	6,554	0.13	12,885	0.25
Lobo	153,969	3.81	3,962	0.10	3,780	0.09
London	369,790	4.84	8,989	0.12	28,522	0.37
McGillivray	39,218	0.60	14,255	0.22	26,834	0.41
Metcalfe	112,796	3.64	3,125	0.10	11,683	0.38
Mosa	50,089	1.37	2,676	0.07	2,799	0.08
Nissouri West	122,702	2.69	7,884	0.17	21,450	0.47
Westminster	18,443	0.61	3,725	0.12	2,761	0.09
Williams East	63,478	1.83	4,817	0.14	19,071	0.55
Williams West	11,660	0.39	3,488	0.12	23,443	0.79
Middlesex County	1,457,269	2.27	85,018	0.13	225,821	0.35
Study Area	3,321,097	2.24	216,695	0.15	552,013	0.37
Ontario	35,596,946	2.56	2,285,996	0.16	2,831,082	0.20

Source: Statistics Canada, 1996.

2.3 Agricultural Economics in Middlesex County

2.3.1 Farm Gate Sales in the Study Area

In 1995, farm gate sales in the study area totalled over \$1.31 billion (Table 2.15), representing 14.5% of the province's total output in that year and an increase of 18.0% from 1990. During the same 1990-1995 period, farm gate sales in the province increased by \$1.1 billion (16.5%). Middlesex County had the greatest total of sales with over \$450 million, followed by Oxford County (\$418.6 million) and then by Elgin County (\$262.5 million). Farm gate sales per farm also increased across the study area by an average of \$27,333, or 20.8%.

The average sales per farm in the study area continues to be higher than those of the province; farms in the study area average sales 37.6% higher than those of the

average farm in Ontario. Province-wide, the number of farms decreased by 1,113 (1.6%) over the same period. In the study area the total number of farms also decreased between 1990 and 1995 by 2.3%, or 171 farms. However, the three counties in the study area continue to make an important contribution to the provincial output, providing 14.5% of the province's total farm gate sales in 1995, which was marginally higher than the 14.4% they contributed in 1990.

Table 2.15 Farm Gate Sales in the Study Area, 1995.

	1995 # of Farms	1995 Farm Gate Sales	1995 Sales per Farm	1990 # of Farms	1990 Farm Gate Sales	1990 Sales per Farm
Elgin	1,808	\$262,483,442	\$145,179	1,764	\$200,012,314	\$113,386
Middlesex	2,987	\$450,396,997	\$150,786	3,162	\$417,292,572	\$131,971
Oxford	2,342	\$418,604,361	\$178,738	2,382	\$341,542,208	\$143,385
Study Area	7,137	\$1,131,484,800	\$158,538	7,308	\$958,847,094	\$131,205
Ontario	67,520	\$7,778,476,483	\$115,203	68,633	\$6,671,452,382	\$97,205
% of Ontario in Study Area	10.6%	14.5%	137.6%	10.6%	14.4%	135.0%

Source: Statistics Canada, 1996.

Data from the 1990 and 1995 Ag-census indicate that two of the counties in the study area, namely Middlesex and Oxford Counties, are among the top ten producers with the largest value of annual farm gate sales relative to other counties in Ontario, ranking third and sixth respectively. Table 2.16 compares farm gate receipts for the leading agriculture producing counties in Ontario for these census years.

Table 2.16 Counties with the Highest Farm Gate Sales in Ontario, 1990 and 1995.

County/Regional Municipality	1990 Sales (\$ millions)	1995 Sales (\$ millions)	% Change
Huron	436.9	511.9	17.2%
Haldimand Norfolk R.M.	378.3	453.1	19.8%
Middlesex	417.3	450.4	7.9%
Kent	295.0	444.4	50.6%
Perth	366.2	430.3	17.5%
Oxford	341.5	418.6	22.6%
Niagara R.M.	318.9	408.3	28.0%
Wellington	320.1	373.1	16.6%
Essex	218.5	315.7	44.5%
Lambton	258.0	301.4	16.8%
Waterloo R.M.	257.8	301.4	16.9%

Source: Statistics Canada, Catalogue No. 95-356, Table 28.1, pp. 29-30; Catalogue No. 95-117-XPB, Table 28.1, pp. 184-185

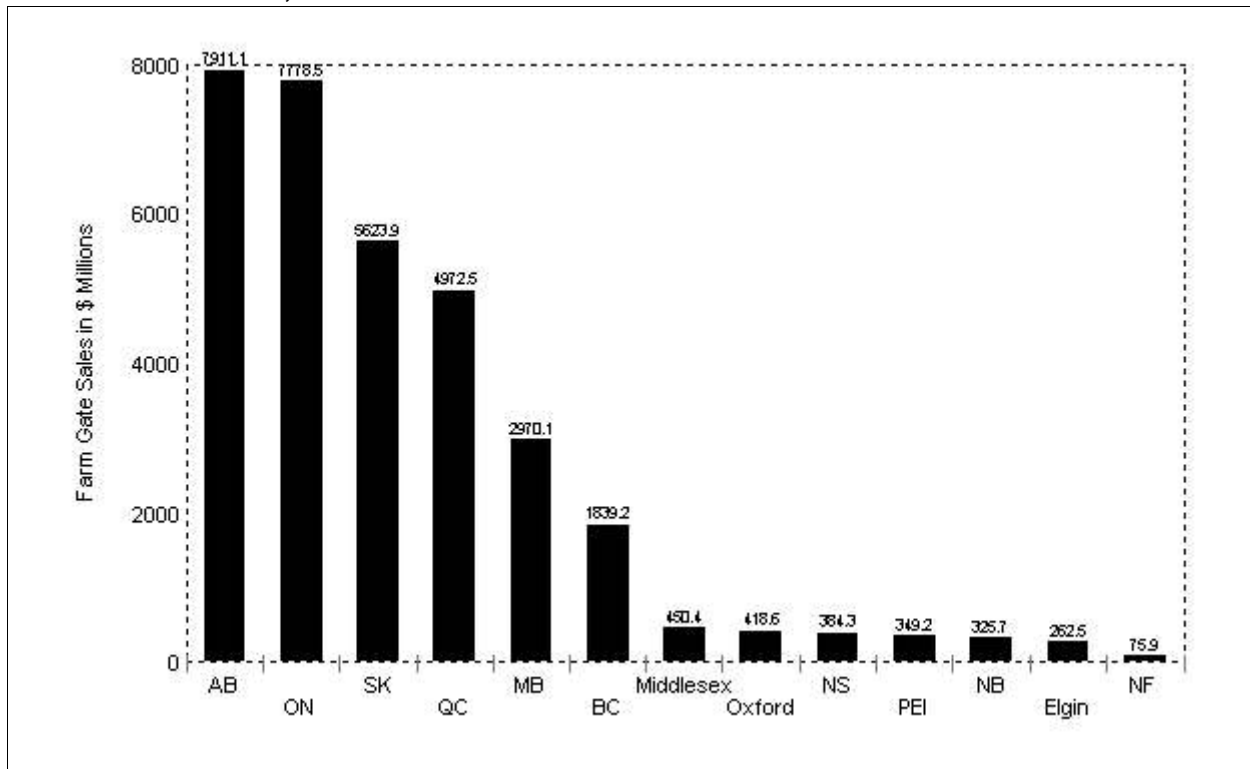
Ontario's counties compare well against other Canadian provinces in terms of farm gate sales. As shown in Table 2.17 and Figure 2.3, Elgin, Middlesex and Oxford counties are no exception. With over \$450 million and \$418 million in 1995 farm gate sales, Middlesex and Oxford Counties respectively, rank immediately behind British Columbia (\$1.8 billion) and ahead of Nova Scotia (\$384 million). In fact, farm gate sales in both of these counties were higher than New Brunswick and Newfoundland combined. Elgin County is also competitive at the provincial level, ranking immediately behind New Brunswick (\$325.7 million) and far ahead of Newfoundland (\$75.9 million).

Table 2.17 Farm Gate Sales for Counties in the Study Area and the Provinces of Canada, 1985, 1990 and 1995.

	Farm Gate Sales (in \$ millions)		
	1985	1990	1995
Alberta	4,473.9	5,541.9	7,911.1
Ontario	5,511.7	6,671.5	7,778.5
Saskatchewan	3,939.2	4,174.1	5,623.9
Quebec	3,028.9	3,889.6	4,972.5
Manitoba	2,035.2	2,238.5	2,970.1
British Columbia	1,059.0	1,321.2	1,839.2
Middlesex County	346.8	417.3	450.4
Oxford County	333.3	341.5	418.6
Nova Scotia	271.4	354.1	384.3
Prince Edward Island	197.9	270.0	349.2
New Brunswick	222.7	301.1	325.7
Elgin County	186.8	200.0	262.5
Newfoundland	45.2	68.0	75.9

Source: Statistics Canada Agricultural Census 1986, 1991 & 1996.

Figure 2.3 Farm Gate Sales for Elgin, Middlesex and Oxford Counties and the Provinces of Canada, 1995.



Source: Statistics Canada Agricultural Census, 1996

2.3.2 Farm Gate Sales in Middlesex County

Farm gate sales in Middlesex County grew by almost \$33.1 million or 7.9% between 1990 and 1995 (Table 2.18). During that time the number of farms in Middlesex County decreased by 175 farms (5.5%). London Township had the most farms in both 1990 and 1995, but Caradoc Township farms produced the highest farm gate sales with \$66.8 million in 1990 and \$77.5 million in 1995. As a result, farms in Caradoc had the highest per farm sales in 1995, averaging sales of over \$253,000 per farm in that year. On average, farms in Middlesex County had sales per farm that were 30.9% higher than those of the province as a whole, averaging \$150,786 compared to the Ontario average of \$115,203. Map 2.5 shows the distribution of farm gate sales at across the townships of Middlesex County.

Middlesex County

Gross Farm Gate Sales in 1995

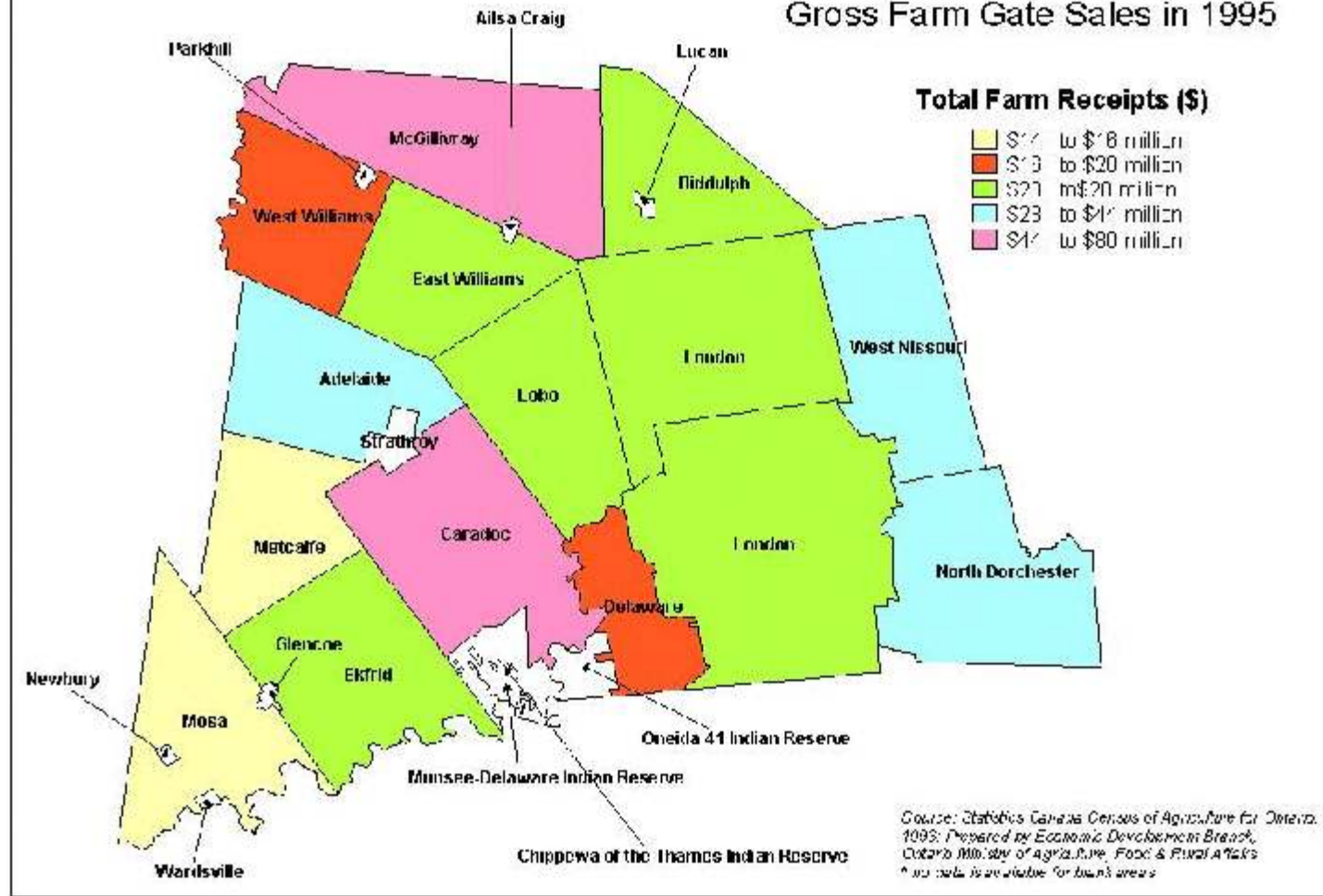


Table 2.18 Farm Gate Sales in Middlesex County, 1990 and 1995.

	1995 # of Farms	1995 Farm Gate Sales	1995 Sales per Farm	1990 # of Farms	1990 Farm Gate Sales	1990 Sales per Farm
Adelaide	188	\$38,064,131	\$202,469	214	\$44,860,780	\$209,630
Biddulph	184	\$20,697,832	\$112,488	186	\$18,423,957	\$99,054
Caradoc	306	\$77,541,631	\$253,404	339	\$56,812,747	\$167,589
Delaware	101	\$16,332,867	\$161,712	120	\$14,133,634	\$117,780
Dorchester N.	234	\$28,452,806	\$121,593	238	\$37,250,953	\$156,517
Ekfid	219	\$25,268,783	\$115,383	224	\$22,482,015	\$100,366
Lobo	229	\$22,043,553	\$96,260	228	\$18,011,892	\$79,000
London	318	\$48,143,350	\$151,394	356	\$50,334,177	\$141,388
McGillivray	236	\$45,255,762	\$191,762	254	\$33,690,943	\$132,642
Metcalfe	122	\$15,147,996	\$124,164	128	\$16,780,304	\$131,096
Mosa	143	\$14,457,014	\$101,098	153	\$13,404,971	\$87,614
Nissouri W.	256	\$32,837,900	\$128,273	271	\$30,670,898	\$113,177
Westminster	207	\$22,691,289	\$109,620	213	\$24,128,782	\$113,281
Williams E.	120	\$24,178,282	\$201,486	135	\$22,734,531	\$168,404
Williams W.	124	\$19,283,801	\$155,515	103	\$13,571,988	\$131,767
Indian Reserves #41 & #42	N/A	N/A	N/A	N/A	N/A	N/A
Middlesex County	2,987	\$450,396,997	\$150,786	3,162	\$417,292,572	\$131,971
Ontario	67,520	\$7,778,476,48 ₃	\$115,203	68,633	\$6,671,452,38 ₂	\$97,205
% of Ontario in Middlesex County	4.4%	5.8%	130.9%	4.6%	6.3%	135.8%

Source: Statistics Canada, 1996.

2.3.3 Farm Gate Sales per Acre of Farmland in Middlesex County

As shown in Table 2.19, the average sales per acre of farmland in Middlesex County is \$702, or \$142 (25.4%) higher than that for the province as a whole. Within Middlesex County, Caradoc Township has the highest average annual sales per acre of farmland with \$1,240. Mosa Township has the lowest average annual sales per acre with \$394.

Table 2.19 Farm Gate Sales per Acre of Farmland in Middlesex County, 1995.

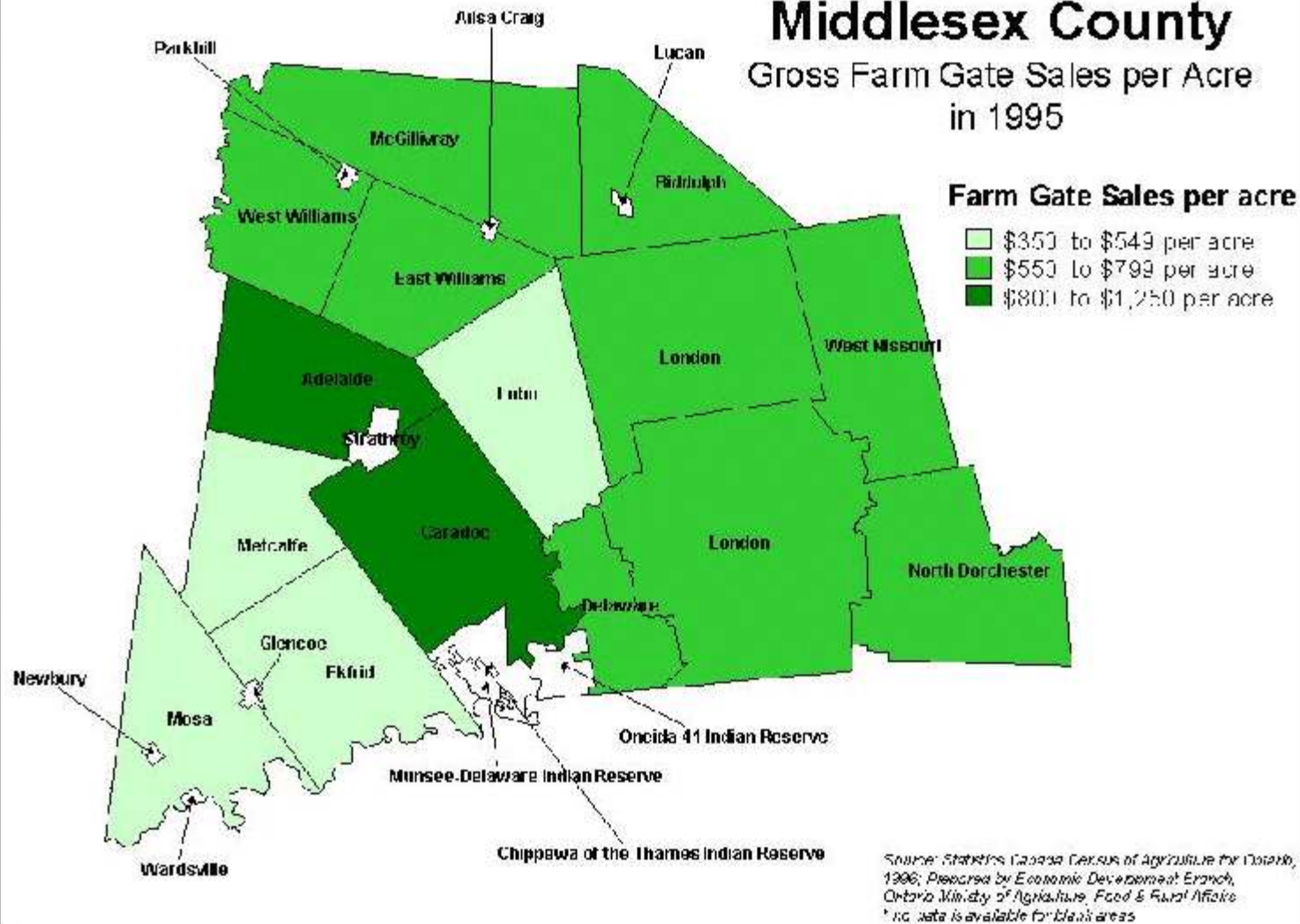
	Farm Gate Sales	Acres of Farmland	Sales per Acre
Adelaide	\$38,064,131	38,418	\$991
Biddulph	\$20,697,832	35,923	\$576
Caradoc	\$77,541,631	62,528	\$1,240
Delaware	\$16,332,867	21,036	\$776
Dorchester N.	\$28,452,806	41,501	\$686
Ekfid	\$25,268,783	51,380	\$492
Lobo	\$22,043,553	40,423	\$545
London	\$48,143,350	76,472	\$630
McGillivray	\$45,255,762	65,743	\$688
Metcalfe	\$15,147,996	30,984	\$489
Mosa	\$14,457,014	36,685	\$394
Nissouri W.	\$32,837,900	45,540	\$721
Westminster	\$22,691,289	30,378	\$747
Williams E.	\$24,178,282	34,635	\$698
Williams W.	\$19,283,801	29,757	\$648
Indian Reserves #41 & #42	N/A	N/A	N/A
Middlesex County	\$450,396,997	641,403	\$702
Ontario	\$7,778,476,483	13,879,565	\$560

Source: Statistics Canada Agricultural Census, 1996

Map 2.6 shows the distribution of Farm Gate Sales per acre across the townships of Middlesex County.

Middlesex County

Gross Farm Gate Sales per Acre in 1995



2.3.4 Operating Expenses and Net Revenue in Middlesex County

While the farms in Middlesex County have higher average sales and sales per acre, Table 2.20 shows that they also have higher average annual expenses than those of the province. In 1995, Middlesex County farms had a total of just over \$370 million on-farm expenses. Map 2.7 shows the distribution of operating expenses at the township level in Middlesex County. This averaged \$578 per acre of farmland; \$106, or 22.4% higher than the average annual expenditure per acre of farmland in the province. Map 2.8 shows the distribution of operating expenses per acre at the township level in Middlesex County.

Table 2.20 Operating Expenses and Net Revenue in Middlesex County, 1995.

	Total Operating Expenses	Acres of Farmland	Sales per Acre	Operating Expenses per Acre	Net Revenue per Acre
Adelaide	\$30,649,195	38,418	\$991	\$798	\$193
Biddulph	\$17,234,991	35,923	\$576	\$480	\$96
Caradoc	\$63,498,395	62,528	\$1,240	\$1,016	\$224
Delaware	\$14,710,002	21,036	\$776	\$699	\$77
Dorchester N.	\$23,253,444	41,501	\$686	\$560	\$126
Ekfid	\$20,731,142	51,380	\$492	\$403	\$89
Lobo	\$18,521,649	40,423	\$545	\$458	\$87
London	\$38,699,111	76,472	\$630	\$506	\$124
McGillivray	\$38,122,641	65,743	\$688	\$580	\$108
Metcalf	\$12,260,816	30,984	\$489	\$396	\$93
Mosa	\$12,077,425	36,685	\$394	\$329	\$65
Nissouri W.	\$25,955,836	45,540	\$721	\$570	\$151
Westminster	\$19,534,041	30,378	\$747	\$643	\$104
Williams E.	\$19,672,152	34,635	\$698	\$568	\$130
Williams W.	\$15,529,421	29,757	\$648	\$522	\$126
Indian Reserves #41 & #42	N/A	N/A	N/A	N/A	N/A
Middlesex County	\$370,450,261	641,403	\$702	\$578	\$124
Ontario	\$6,545,516,325	13,879,565	\$560	\$472	\$88

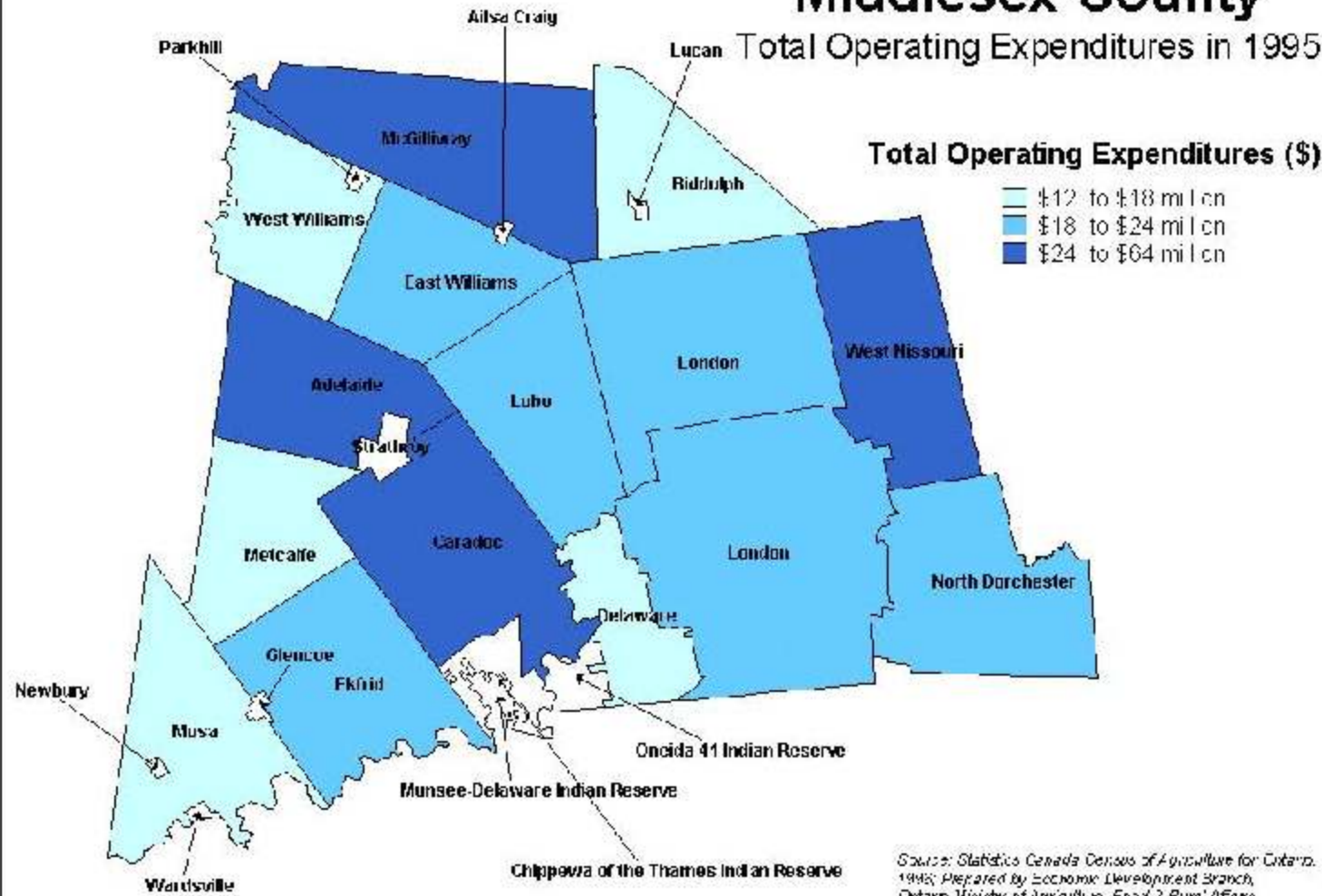
Source: Statistics Canada Agricultural Census, 1996

However, once the expenditures are subtracted from the farm gate sales per acre, the table reveals net revenue per acre in Middlesex County are higher than those for the

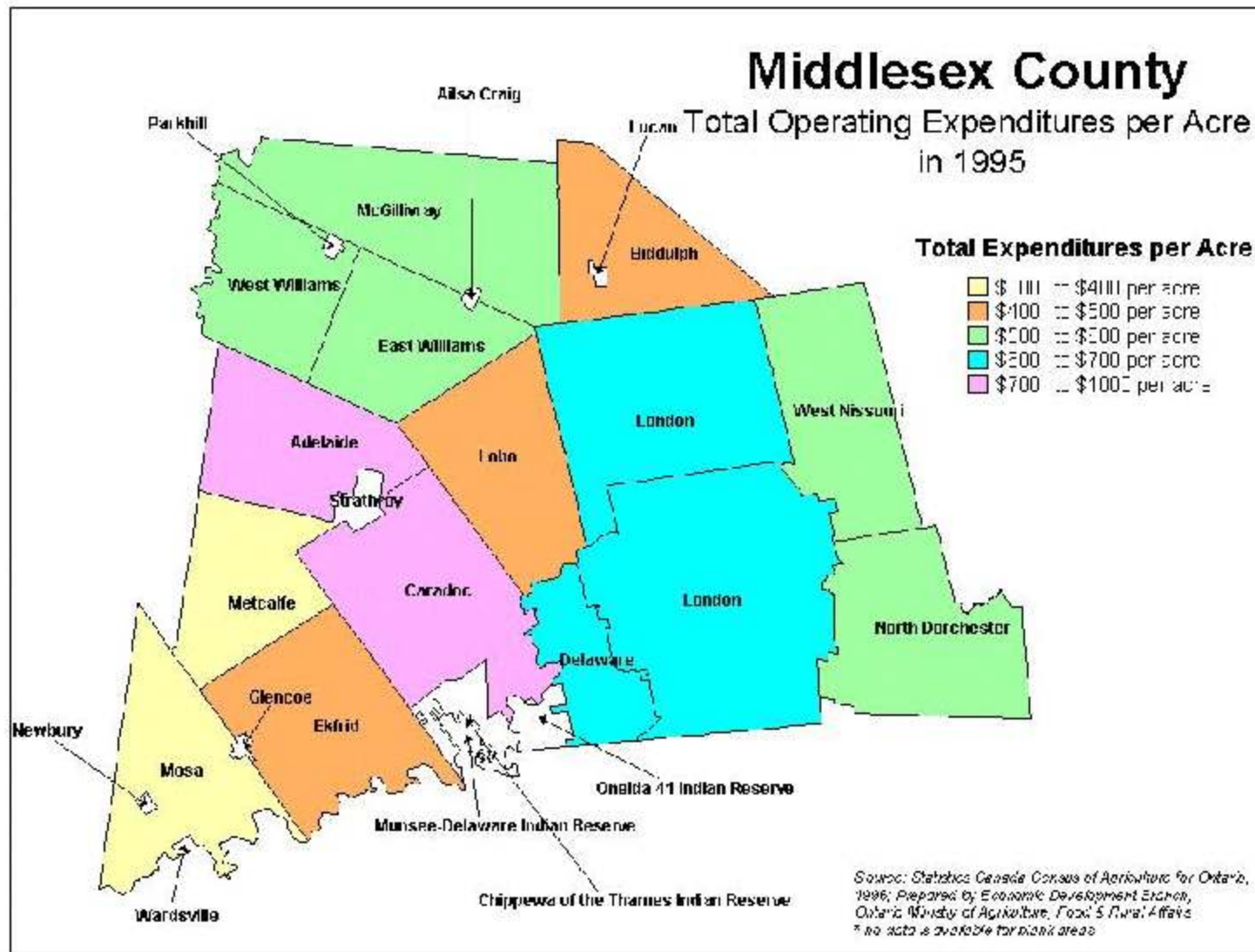
province. As shown in the table, Middlesex County farms demonstrate higher levels of net revenue than the provincial average (\$88).

Middlesex County

Total Operating Expenditures in 1995



Source: Statistics Canada Census of Agriculture for Ontario, 1995; Prepared by Economic Development Branch, Ontario Ministry of Agriculture, Food & Rural Affairs
 * 0% data is available for blank areas



2.4 Elgin, Middlesex and Oxford Primary Producers Focus Groups

Throughout the month of August, Focus Groups were held in each of the three counties that comprise the Study Area. A total of twenty farmers from a variety of farm types and sizes provided the study team with inputs regarding the trends, issues, and challenges facing agriculture in their respective counties. The following section provides the results from these focus groups, organized according to three primary subject areas:

- Trends In Farm Sizes In The Study Area
- Ag-related Labour Force Issues In The Study Area
- Linkages With The Local Business Community

2.4.1 Trends In Farm Sizes In The Study Area

Defining Farm Size

Farmers elaborated that farm size is difficult to define, and is largely dependent on what is being farmed. They stated that words such as ‘small’, ‘medium’ and ‘large’ are relative terms, especially as the Canadian contribution to global input is minimal and farms tend to be much larger in the United States. As a unit of measurement, acreage is sufficient to measure the size of crop farms, but is not sufficient to apply to livestock operations as vertical integration (especially of poultry and hogs) would be better measure using some sort of animal unit measurement. Farmers felt that these forms of measurement would allow for more realistic rules and regulations regarding zoning and other farm-related planning issues.

Current Trends in Agriculture

Consolidation Into Larger Farms and Corporate Ownership

The farmers stated that farms are becoming fewer and larger. They state that farms must grow in size and access expensive technology in order to remain competitive. This not only leaves small farms vulnerable, but as farm sizes increase the local rural community is also shrinking. Farmers on these larger operations are frequently looked upon as ‘managers’ rather than farmers. In the opinion of the focus group participants, only slim profit margins are keeping the corporations from taking over.

Urbanization

While increasing population has forced farmers to increase production (one participant stated that a farmer has to feed double the people they did in 1971), this is being done in the face of rapid urbanization of agricultural land. Farmers stated that the proliferation of small hobby farms are resulting in inefficient farms, and eventually to a loss in the number of farms. They also showed concern that the development of severed

properties by 'urbanites' is reducing the amount of available farmland.

Decreasing Public Profile

Farmers in the Focus Groups were quite concerned about the public profile of agriculture in general. They felt that society as a whole has become removed from agriculture, and many non-farmers do not appreciate what goes on in the day-to-day operation of a farm (such as euthanasia or the removal of dead stock). They state that part of the blame for this also lies with the media, who are quick to blame farm operations for environmental mishaps, such as the Walkerton E. coli outbreak in spring 2000.

Loss Of Tradition

The groups stated that there is an aging population of farmers, and as they retire this results in the loss of smaller farms. As few farm children are returning to the farm after having completed their studies, it is likely that even some of the larger farms will not be passed along to family members. As the group member recognize farming as a way of life as well as a big business, they are also concerned about the loss of family farming tradition.

Foreign Ownership of Farms

Focus Group members expressed concern over foreign ownership of farms by wealthy farmers who purchase large tracts of agricultural property, making it very difficult for local farmers to compete to buy land. They suggested that Canadian immigration policies are too open with regards to allowing this to happen and that it was impacting upon local agriculture. Farmers also expressed concerns over the farming practices imported by foreign farmers, which may not be environmentally sound.

Issues With Current Trends

Municipal Zoning and By-laws

One of the issues identified by the Focus Groups in dealing with increasing farm sizes is the high level of bureaucracy involved in zoning and by-laws regarding that impact upon agriculture. They feel that many small farmers are placed at a disadvantage because of too many inflexible rules and regulations which lack common sense (e.g. the need for some building permits). They feel that this is the result of most policy-makers' lack of practical farming experience. However, focus group members favored some sort of controls, as long as they were clearly defined and properly enforced.

Public Opinion

The second issue identified by Focus Groups aims at improving public opinion towards agriculture, which they perceived as being negative. Farmers often feel that they are in conflict with urbanization, animal rights groups and environmentalists. The reason

for these conflicts, according to the farmers, are that these groups have little practical knowledge, or interest, of how a farm operates. In order to raise public opinion of agriculture, the focus group members suggested that 'urbanites' need to be educated as to where their food comes from, and the importance of agriculture in Canadian society.

Sustainability Of Farming

At the individual farm level, the Focus Groups identified the sustainability of farming as a means of making a living as a very important issue. Farmers stated that the larger commercial farms can succeed on small profit margins by increasing production, resulting in an emphasis on large farms. As such, they feel that these large farms have greater influence and access to the market than smaller privately-run farms, which have limited negotiating ability with regards to commodity prices. This again leaves the smaller farms vulnerable. In order to resolve cash-flow problems, small farm operators frequently take off-farm jobs. Reduced government services has also made operating a small farm more expensive as many of these services now have to be paid for.

As an industry, the issue of recruitment was identified. Focus Group members observe a decreasing agricultural population, and recognize the need for younger people to start farming. They state that many young people want to farm as a career, but that the high costs of start-up prevent them from doing so. Organizations such as 4-H and Junior Farmers are still very important, but lack the influence and direction they once enjoyed. A reduction in the number of agricultural fairs was also identified as an issue, as this was where a great deal of recruitment had typically taken place in the past.

Environmental Concerns

Focus Group members identified environmental concerns as an important issue. Specifically, the farmers were concerned about the environmental impacts of larger commercial farms, unsafe practices by a limited number of farmers (who by doing so give an unfavorable example of farming to society) and the loss of livestock by certain species of wildlife.

2.4.2 Ag-related Labour Force Issues In The Study Area

Farm Labour

Focus Group member report that most of the work on the farm is carried out by the farmer and his family. Although the need for manual labour has been greatly reduced by advances in technology, most farms still employ hired help in the forms of part- and full-time workers, farm kids, and offshore workers for tobacco farms. Farmers themselves frequently take employment off of their farm; in many cases they undertake custom work for

other farmers, although the costs of equipment and repairs is high.

Availability of Qualified Labour

Farmers reported that there is a good supply of labour available in the Study Area. This is because of the large population base to draw from as well as the types of agriculture in the area. Livestock farms are able to provide year-round employment, which results in stable, reliable and dependent workers. However, farmers reported difficulty in providing year-round employment for small farms and cash crop farms as they former requires a diversity of skill and the latter only provides seasonal employment. In many cases, cash crop farmers like to hire high school kids to work on the farm, but many youth employment grant programs exclude those students under 15 years of age.

While farmers agree that there is an adequate supply of labour, they also agree that quality labour is hard to keep on the farm. The reasons for are that the pay for working on a farm is low compared to the alternatives, and that the perception of working on a farm is negative.

Training

Farmers stated that farm workers require a diversity of on-farm skills, and prefer to hire people with previous farming experience. In addition, workers may also require specific certifications, such as spraying, mechanics, welding and basic veterinary care. Farmers saw these skills being acquired from a number of sources, the most important of these being on-the-farm training (self-taught and hands-on experience). They also saw 4-H and OATI courses as important sources of training. They placed less emphasis on formal avenues of education, such as high school co-op, college and university programmes as these frequently lacked practical applications.

Issues With Human Resources and Training

Desirability of Farm Work

Focus Group members were of the opinion that most Canadians do not want to work on a farm, due to the fact that most of our society has become removed from agriculture. They are further discouraged by low pay and benefits packages and a demanding work environment. As a result, it is difficult to find people with the right attitude to work on farms. Those people who do want to work on farms prefer to do so on a contract basis, but government regulations require the employer farmer to make unpopular deductions such as EI and CPP.

Value of Certification Programmes

The value of certification programmes was raised as an issue by the focus groups. They perceive that the programmes are in place to appeal regulations, but they are too

narrow in scope and have little practical impacts. They also raised concern regarding over-specialization of farm workers as a result of too much training. Farmers also feel that the rural component in schools has deteriorated, and that they need to include more practical components at all levels of the education system.

In terms of where training should take place, focus group members stated that most of the people with hands-on experience grew up on farms. Farming for them is a way of life; it is diverse and difficult to teach in formal settings and is best done on-site. Farmers also raised the issue of safety and liability of the farmer in conducting on-site training.

Costs

Focus group member identified the costs involved in human resources and training as an important issue. With commodity prices dictating the level of investment the farmer can afford annually, the farmer must consider the economic return on this investment. As farms become larger, the associated costs become greater. When coupled with the difficulty in recruiting and keeping quality labour on the farm, it is more economical for farmers to hire custom workers and invest in labour-saving technology than to train farm workers. Other factors which support this type of investment are the costs of Workman's Compensation, the threat of unionized farm labour, and the low level of return for effort in hiring young people on employment grants. These grants place too many restrictions on the activities of young employees on the farm to make it worthwhile for the farmers to keep them employed.

Farmer Management Skills

The Focus Group recognized farmers' lack of management skills as an issue; they admit to not always being the best employers as they are often too busy operating the farm. The group recommended farmers have access to management training, as well as training in marketing.

2.4.3 Linkages With The Local Business Community

Types of Businesses Dealing With Farmers

Farmers report dealing with a number of business types. These include a variety of 'traditional' farm-related businesses (pre-mix, seed, chemical and feed companies, equipment dealers, custom workers, elevator operators, fuel dealers, veterinarians, drainage contractors, transport businesses and marketing boards), professional services (banks, accountants, and lawyers) as well as some services that are shared with residential needs and urban populations (retailers and general contractors). Farmers report that most of the businesses they deal with regularly are located within 20 miles of

their farms; 60-100% of the businesses they support are located in their home county (depending on where their farm is located in relation to the county boundary).

Trends In Agriculture-related Businesses

Focus group members were unanimous in stating that Agriculture-related businesses were increasingly fewer, bigger and located further away. Many of the co-operatives and farm equipment dealers have either closed or have been consumed by other companies. Seed and chemical companies have merged and are providing 'bundled' products and services. They also state that as municipalities become more population and complex that 'traditional' agricultural retail businesses are moving away from agriculture and servicing the broader rural market. Farmers stated that they are loyal to local businesses and services and want to support them, but many of the remaining businesses are inefficient and poorly stocked for their needs. They have also observed a loss of local service by banks and utilities as restructuring has closed many local branches.

Issues With The Farm and Ag-business Relationship

Less Competition

Farmers have identified that the trends in Agriculture-related businesses has resulted in less competition. Smaller, convenient businesses (e.g. local hardware stores) are slowly getting squeezed out of business. Amalgamation of farm equipment dealers has reduced the choice of dealers for farmers to buy from; farmers reported being forced to purchase from the nearest farm equipment dealer rather than being able to choose a preferred dealer in more distant locale. Farmers also expressed a dislike for major corporations dictating to, and monopolizing local dealers. When discussing the trend of bundled seed and chemical services, farmers could not come to a consensus as to the quality of service; some preferred bundled services and some did not.

Increase of Available Information

Farmers in the focus group identified the increase in available information as a positive issue. Most of the focus group members described using computers and the Internet in their everyday farm operation. Computer applications were used for accounting and communications, and the Internet is a valuable source for weather forecasts, commodity prices and equipment purchases. Farmers are in favour of using the technology as the information available assists them in making better decisions and forcing better service from providers. At the same time, word-of-mouth referrals for Agriculture-related businesses (both good and bad) remain an important source of information. Professional competence in service provision, especially veterinary care, is very important.

More Self-reliance By Farmers

With many goods and services amalgamating and moving further away, farmers have taken the initiative and placed greater emphasis in on-farm activities such as milling and increasing their parts inventory. Many farmers have also taken to conducting their own marketing, and also have been filling the voids in the local business community by operating commercial elevators and increasing the level of custom work. They report that custom fertilizing, planting and combining are increasing, but ploughing and discing are decreasing because of time and expense restraints.

3.0 Economic Impact Analysis: An Overview

Economic impact is generally a measure of the impact of a sector or a project on all sectors of the economy. Economic Impact Analysis studies are aimed at identifying "...changes in a local economy resulting from a stimulus (positive or negative) to a particular segment of the economy" (Davis, 1990, p 5). These studies are often based on one of the several standard methodologies of regional analysis: the economic base analysis and input-output analysis (Faas, 1980, p. 4).

3.1 Economic Base Approach

Economic Base Theory maintains that economic growth is only possible if the economy's export grow (Bradfield, 1988, p.38). The theory is based on the belief that as exporting industries expand their sales, there will be an increasing demand for inputs locally which will consequently drive local economic growth (Bradfield, 1988, p.39). In economic base theory, the economy is classified into two sectors of basic and non-basic. The basic sector includes industries that ultimately export their product out of the region. The non-basic sector is the economic activity with final sales remaining inside the region (Davis, 1990, p. 10). These are support industries that provide everything from industrial inputs to houses for basic sector employees (Higgins and Savoie, 1995, p. 66). The exporting industries are identified as basic sectors while all other industries are classified as non-basic.

According to economic base theory, exports are the engine of the local economy. It follows then that the export of goods supports all other needs of the economy (Bendavid-Val, 1991, p. 77). Economic base theory and its supporters carry the separation of basic and non-basic sectors to the point where they attempt to predict the relative impact of the basic sector on the non-basic sector. The prediction of economic impact is assessed through two economic indicators known as the economic base ratio and economic base multiplier. Economic base theory has been refined to the point where it can be questioned: "[W]hat is the overall gain in employment or income in the region associated with each gain in export sales?" (Bendavid-Val, 1991, p. 78).

The question is answered through the economic base ratio indicator and the base multiplier indicator (Bendavid-Val, 1991, p. 780). The economic base ratio calculates jobs that are theoretically created from one additional job in the basic sector. The economic base ratio is the ratio between employment in the basic and non-basic sectors and is supported by the idea of basic and non-basic employment combined equaling total employment (Bendavid-Val, 1991, p. 78). The economic base multiplier is the ratio of total

employment to basic employment and indicates how many jobs in total are provided for each basic job. Thus, the economic base multiplier is the total sum of the jobs created in both sectors from one job in the basic sector (Bendavid-Val, 1991, p. 78). The economic base method is used in this study to estimate jobs in the service sector related to the basic sector of agriculture.

3.2 Input-Output Analysis

Input-Output (IO) analysis is used to measure the inter-relationships between economic activities at the sectoral, national and regional levels. Linkages are expressed by estimating the sales (outputs) from a given sector to all other sectors in the economy, and by estimating inputs from all other sectors to a specific sector. What makes the IO model so useful is the comprehensiveness of the model which disaggregates the economy into individual sectors (Josling, 1996, p. 5). Disaggregation permits analysis at the sectoral level, providing researchers with a close-up view of the economy. This analysis allows the researcher to assess where each sector purchases its inputs and where it sells its outputs. Such analysis is invaluable in identifying what investment will provide the greatest impact on an economy (Poole et al., 1994, p. 30).

The IO model estimates the movement of expenditures through the economy. This is traced through four different levels of expenditure: intermediate and primary suppliers, and intermediate and primary purchasers (Bendavid-Val, 1991, p. 88). Suppliers - intermediate and primary - purchase inputs for processing into inputs. Purchasers - intermediate and primary - buy outputs from suppliers and either use them to manufacture a product, or sell them as a final product (Bendavid-Val, 1991, p.88).

Input-output analysis has two main approaches. The Open Model allows the estimation of only the direct and indirect effects of a sector. The Closed Model estimates these, as well as the induced effects of a sector. The open model is used to trace the flow of variables between sectors of the economy (ie. direct and indirect expenditures). The open model does not measure induced spending in the economy; expenditures on food, services and other household expenses would not be included (Davis, 1990, p. 59). The closed model is used to measure all aspects of the economy, including the direct, indirect and induced effects. Treating the household sector as a producer that sells labour to other purchasing sectors assesses induced effects (Davis, 1990, p. 59). As this study aims to measure all of the effects of agriculture on the Perth County economy, it is based on the Closed Model approach.

There are several problems associated with the IO model. The first is that it is time-

specific; it takes a snapshot of the economy at a specific point in time. This model cannot account for changes in product demand or input costs, or for the introduction of new technology into the industrial sector (Davis, 1990, p. 62). Thus, the IO model does not adjust for the changing nature of the economy. A second problem of the IO model is the cost and time needed for the construction of the tables associated with this analysis. For this reason, the analysis for this study has been carried out using a survey-based “input-output-like” approach.

3.3 Multipliers

Given the previous discussion of economic base analysis and input-output analysis, the reader may question where the application of the two models leads. One of the best uses is that they allow the analyst to identify the impacts of economic changes or shocks to a system. Essentially, what these models do is measure the multiplier effects that result from a change in the economic system. In basic terms, multiplier effects are the relationship between direct jobs produced by a project or sector and indirect and/or induced jobs caused by the direct jobs, presented in a single number (Lewis et al., 1979, p. 1). Therefore, an economic multiplier can be used to estimate the impact of change in one variable (for example, the value of agricultural production) on another variable (for example, the value of non-agricultural production). Direct employment and production in the agriculture sector will affect the rest of the economy by supporting employment in related industries as well as in the retail sector. In this way, “...a multiplication of transactions occurs in the economy by people re-spending money” (Van Hove, 1995, p. 66). The multipliers calculated for this research include a sales expenditure multiplier and an employment multiplier.

4.0 Middlesex County Study Methodology

Initial research for the study was carried out from May to September 2000. The economic impact of agriculture in Middlesex County was measured through an accounting of the total sales and employment of Agriculture and Agriculture-related (Ag-related) businesses in the county. This work involved a review of the primary data from Statistics Canada's 1996 Population Census of Canada and 1996 Agriculture Census to study the direct economic impacts of agriculture on the economy of Middlesex County. A survey-based 'input-output-like' approach was used to measure the indirect impacts. The survey was aimed at businesses that sell products to, or buy products from, the farmer. The induced economic and employment impacts of the Agriculture sector were also studied using primary data derived from the Statistics Canada census data.

4.1 Direct Impact Methodology

Data were taken from the 1996 Population Census of Canada and the 1996 Agricultural Census and yielded information on the economy of Middlesex County, including general labour trends and population data. Where appropriate, data from earlier censuses were incorporated to examine long-term trends in employment and sales in the county. This information has been presented in Section 2.0 of this report. For the purposes of this study, Direct Impacts are the jobs and sales generated 'on the farm'.

4.2 Indirect Impact Methodology

For the purposes of this study, Indirect Impacts are jobs and sales generated 'off the farm' by businesses which interact directly with farm operations through buying and selling products and services. It should be noted that 'related to agriculture' includes only those businesses that buy from or sell to the farm business; sales to farm families for personal consumption are excluded from the indirect impact assessment, but are included later as induced impacts.

The research method used to measure the indirect impacts was a survey-based 'input-output-like' approach. This was completed through a telephone survey conducted from July 1999 to September 2000. The method and survey format was originally developed for use in a similar survey in Huron County in 1996 (Cummings, Morris and McLennan, 1998), and used again with some modifications (primarily translation into French) in Prescott, Russell, Stormont, Dundas and Glengarry Counties in eastern Ontario in 1998 (Cummings and Deschamps, 1999), Simcoe County, Lambton County and Perth County in 2000. The methodology was designed to identify the value of gross sales and

the jobs produced by a sample of businesses related to agriculture. From this sample, an estimate was produced for the total population of agriculture-related businesses in the Study Area, as well as an estimate for these businesses at the county level. This in turn provided an estimate of the economic impact of these Ag-related businesses in Middlesex County and the Study Area through indirect employment and sales.

4.2.1 Development of the Business Inventory and Survey Sample

The survey was based on a random sample of local Ag-related businesses. A list of Ag-related businesses was developed by collecting lists from a number of sources in the area: Elgin, Middlesex and Oxford Federations of Agriculture Representatives, Municipal Offices, Chambers of Commerce, Economic Development Offices and the Yellow Pages. The original list of 2,207 businesses was reduced to 2,004 (592 in Elgin County, 767 in Middlesex County and 645 in Oxford County) by eliminating businesses that were either out of business, double-listed or had moved out of the county.

In order to attain a sample of businesses representative at the 95% confidence level for the 2,004 businesses in the inventory, an original sample size of 322 businesses was selected at random from the adjusted inventory. As 104 of the first 413 contacts were businesses that did not directly buy from or sell to farm operations, it was estimated that 25.2% of the businesses in the adjusted inventory had no direct interaction with farm operations. The inventory was adjusted accordingly, to a final estimate of 1,499 total Ag-related Businesses in the Study Area (443 in Elgin County, 574 in Middlesex County and 482 in Oxford County), with a sample size of 306 required for a 95% confidence level. The sample was drawn to represent the Study Area as a whole; a confidence level of 95% at the county level for each of the three counties would have required a total of 750 surveys in the three counties together. In total, 307 businesses were surveyed; 301 of them provided data regarding employment. A total of 297 provided sales data. Of the 307 businesses that were surveyed, 84 were located in Elgin County, 125 were located in Middlesex County and 98 were located in Oxford County. These provided the study with confidence levels of 90%, 92% and 91%, respectively, for each of the three counties. This section reports on the results of the Ag-related businesses in Middlesex County.

During the course of the telephone survey, respondents were asked to provide information regarding the total value of sales and employment figures for their business for the previous fiscal year. They were also asked to estimate the percentage of sales related to the agriculture sector through sales to, or purchases from, farm operations. Data were entered directly onto a spreadsheet; paper copies of the surveys were not kept.

4.2.2 Total Gross Sales for the Businesses Surveyed

Total gross sales for the businesses surveyed include sales related and unrelated to the Agriculture sector. For example, a plumbing business may have sales to farmers for their farm business, sales to farmers for their house, and sales to non-farmers. Agriculture-related sales include only those sales to farmers for operating the farm. Sales unrelated to agriculture include those of farmers for their personal use, as well as sales to non-farmers.

The sample included Ag-related businesses that buy or sell products or services to agriculture, but may also buy or sell to other sectors of the economy. Total gross sales are divided by the location of these sales; 27.3% of total gross sales for the businesses surveyed in Middlesex County were made outside of the Study Area. The businesses in the sample generate sales: i) inside Elgin, Middlesex and Oxford counties, ii) outside Elgin, Middlesex and Oxford counties but in Ontario, iii) outside Ontario but in Canada, and iv) outside Canada. Table 4.1 illustrates the total gross sales for the businesses surveyed, by the location of these sales.

Table 4.1 Total Gross Sales of the Businesses Surveyed in Middlesex County (92% level of Confidence).

# Businesses n = 118	i. Sales in Study Area	ii. Sales in Ontario	iii. Sales in Canada	iv. Sales Worldwide	Total Sales
Sales in \$'s	\$153,981,488	\$54,594,567	\$2,978,000	\$1,019,500	\$212,573,555
% total sales	72.4%	25.7%	1.4%	0.5%	100.0%

Source: 2000 Ag-business Survey

The survey determined that total gross sales was \$212,573,555 for the 118 businesses that provided sales data. The initial estimate for total gross sales generated inside the Study Area is \$153,981,488, or 72.4% of the total gross sales for these businesses. Total gross sales for these businesses outside of the Study Area but in Ontario was \$54,594,567, or 25.7% of total gross sales. Total gross sales outside of Ontario but in Canada accounted for \$2,978,000 or 1.4% of total gross sales. Sales made outside of Canada accounted for \$1,019,500 or 0.5% of total gross sales.

4.2.3 Agriculture-related Sales for the Businesses Surveyed

Part of the telephone survey asked respondents to estimate the percentage of their sales that were related to agriculture, either by providing products and/or services to farm businesses, or by purchasing products of agricultural origin. The survey determined that \$109,718,730, or 51.6% of total gross sales from the businesses surveyed were related to

agriculture through purchases made from, or sales made to, farm operations. Ag-related businesses in Middlesex County have sales both related and unrelated to agriculture. By separating the Ag-related sales from sales unrelated to agriculture, and using the same percentages for location of sales as in section 4.2.2, we are able to estimate both the type and location of sales for the businesses surveyed. These figures are illustrated in Table 4.2.

Table 4.2 Ag-related Sales of the Businesses Surveyed in Middlesex County (92% level of Confidence).

# Businesses n = 118	i. Sales in Study Area	ii. Sales in Ontario	iii. Sales in Canada	iv. Sales Worldwide	Total Sales
Total Sales	\$153,981,488	\$54,594,567	\$2,978,000	\$1,019,500	\$212,573,555
Ag-related (51.6%)	\$79,476,741	\$28,178,700	\$1,537,079	\$526,210	\$109,718,730
Unrelated to Agriculture (48.4%)	\$74,504,747	\$26,415,867	\$1,440,921	\$493,290	\$102,854,825

Source: 2000 Ag-business Survey

4.2.4 Total Gross Sales for Middlesex County Ag-related Businesses

From the sample, we can estimate the total gross sales of all Ag-related businesses in Middlesex County. This includes sales both related and unrelated to agriculture. We have already established that there are approximately 574 Ag-related businesses in Middlesex County; a total of 118 of these provided sales data. This represents 20.6% of the total number of businesses (e.g. $118/574 * 100 = 20.6\%$). By dividing the total estimated number of businesses (574) by the total number of businesses surveyed (118), a sampling multiplier of 4.86 (e.g. $574/118 = 4.86$) can be used to calculate the total gross sales for Ag-related businesses in Middlesex County. Table 4.3 illustrates the estimated total gross sales for all Ag-related businesses in Middlesex County. This estimate was derived by applying the sampling multiplier to the total gross sales of the 118 businesses which provided sales data. Once again, the table presents the data according to location of sales.

Table 4.3 Estimated Total Gross Sales for Ag-related businesses in Middlesex County Using Sampling Multiplier for Sales (based on 92% level of Confidence).

# Businesses n = 574	i. Sales in Study Area	ii. Sales in Ontario	iii. Sales in Canada	iv. Sales Worldwide	Total Sales
Total Sales	\$749,028,596	\$265,570,180	\$14,486,203	\$4,959,263	\$1,034,044,242
Ag-related	\$386,607,196	\$137,072,661	\$7,476,978	\$2,559,698	\$533,716,533

Unrelated to Agriculture	\$362,421,400	\$128,497,519	\$7,009,225	\$2,399,565	\$500,327,709
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Source: 2000 Ag-business Survey

It should be noted that sales data from financial institutions, such as banks and credit unions, were analysed somewhat differently. Typically their sales would be based on profits generated from loans and services provided to farm businesses. However, this information is difficult to obtain. Therefore, for the purposes of this study, 'sales' by financial institutions are based on the number of employees at the institution multiplied by an average salary of \$30,000.

By using the figures from the businesses surveyed and applying the multiplier of 4.86, we can estimate that Ag-related businesses in Middlesex County generated \$1,034,044,242 in total gross sales. Of this, \$749,028,596 in total gross sales were generated within the Study Area. Total gross sales generated outside of the Study Area but inside Ontario was \$265,570,180. The total gross sales generated outside of Ontario but still in Canada were \$14,486,203, and the total gross sales outside of Canada were \$4,959,263.

4.2.5 Agriculture-related Sales for Ag-related Businesses in Middlesex County

Total Ag-related sales for all Ag-related businesses in Middlesex County can also be derived using estimates of the Ag-related sales generated by the businesses surveyed. These sales data are also illustrated in Table 4.3. Using the same 4.86 sales sampling multiplier, we can estimate that the total Ag-related sales for businesses in Middlesex County were \$533,716,533. Of this, \$386,607,196 were Ag-related sales generated in Elgin, Middlesex and Oxford counties. Ag-related sales outside of Elgin, Middlesex and Oxford counties but inside Ontario were \$137,072,661. Ag-related sales generated outside of Ontario but in Canada were \$7,476,978 and sales generated outside of Canada were \$2,559,698.

4.2.6 Number of FTE Employees Working at the Businesses Surveyed

The survey separated employees at the Ag-related businesses into two categories. The first are employees who work on activities related to the agriculture sector. The second includes employees who work at Ag-related businesses, but do not serve the agriculture sector. For example, a veterinary office may have four veterinarians specializing in large mammals (Ag-related employees) and one veterinarian specializing in house pets (unrelated to the agriculture sector). Data on both types of employees were

collected in the survey, and organized to reflect the total Full Time Equivalent (FTE) number of jobs at that business based on a 1,875 hours per year workload (7.5 hours a day X 5 days a week X 50 weeks a year). Using the FTE jobs as a measure of employment allows for greater insight into the total number of jobs, at the Full-time level, that are supported by sales and services to farms.

Altogether, 125 businesses surveyed in Middlesex County provided employment data. The total number of employees at these businesses was 1,634, comprised of 1,130 Full-time employees, 407 Part-time employees and 97 seasonal employees. Based on the hours and weeks worked over the course of a year, and using the FTE calculation as shown above, the initial estimate for the total number of FTE jobs at the businesses surveyed is 1,529.7. This includes all employees (full-time, part-time and seasonal employees) for the businesses surveyed, regardless of whether or not they perform activities related to the agriculture sector. One would assume that the number of total employees should be substantially larger than the total number of FTE jobs. The reason that the total FTE number is close to the total number of employees, even though 251.3, or 16.4% of the employees at these businesses were either part-time or seasonal employees, is because the average work-week for Full-time employees is actually 44.3 hours; higher than the FTE job equivalent of 37.5.

For the businesses surveyed, it is estimated that 31.9% of the employees spent their time on activities related to buying from and selling to farm operations. As a result, of the 1,634 employees, 360 Full-time, 130 Part-time, and 31 Seasonal employees worked on activities related to sales and service to farms. When converted to FTE jobs, a total of 487.8 of the total 1,529.7 FTE jobs were related to agriculture. Table 4.4 summarizes FTE jobs at the businesses surveyed in Middlesex County.

Table 4.4 FTE jobs for the businesses surveyed in Middlesex County (92% level of Confidence).

# of Businesses Surveyed n = 125	Total FTE Jobs	% Ag-related Jobs	Ag-related FTE Jobs
Middlesex County	1529.7	31.9%	487.8
Study Area	3386.7	40.7%	1376.8

Source: 2000 Ag-business Survey

The survey also determined that there are jobs generated outside of the Study Area by Middlesex County Ag-related businesses. This is calculated by multiplying the total FTE jobs by the percentage of sales generated outside of the Study Area (27.6%). Therefore, the total number of FTE jobs generated by sales outside of the Study Area by the businesses surveyed is 422.2. Of these, 134.7 service the agriculture sector (422.2 X 31.9%).

4.2.7 Number of FTE Employees Working in Ag-related Businesses

The total number of FTE jobs for all Ag-related businesses in Middlesex County, as well as the total FTE jobs that serve the agriculture sector, can be derived from the sample. A sampling multiplier for employment can be calculated by dividing the total number of Ag-related businesses in the inventory (574) by the number of respondents who provided employment data (125). This results in a sampling multiplier of 4.59. From these values, the total number of FTE jobs for all Ag-related businesses in Middlesex County can be estimated at 7,024.5 (1,529.7 X 4.59). Of these, an estimated 2,239.8 FTE jobs serve the agriculture sector. Table 4.5 illustrates the estimated total and Ag-related jobs using the sampling multiplier for employment. Note that figures may not add up exactly due to rounding.

Table 4.5 Estimated Total and Ag-related FTE Jobs in Middlesex County Using Sampling Multiplier for Employment (Based on 92% level of Confidence).

# of Businesses n = 574	Total FTE Jobs	% Ag-related Jobs	Ag-related FTE Jobs
Middlesex County	7024.5	31.9%	2239.8
Study Area	16865.8	40.7%	6856.4

Source: 2000 Ag-business Survey

Using the sampling multiplier, total FTE jobs created by sales generated outside of Elgin, Middlesex and Oxford counties can also be calculated. The total number of FTE jobs generated by sales outside of the Study Area is 1936.2. Of these, 617.3 work on

activities related to the agriculture sector.

4.3 Induced Impact Methodology

An examination of the induced effects of agriculture was conducted. Induced employment refers to jobs in the Education, Government, Health and Social service sectors which are supported by services used or purchased by Agriculture employees. Population Census (1996) employment data from service sector jobs, in the two townships from each county with the highest farm gate sales in 1995, were compared to jobs in the Agriculture and Manufacturing sectors, in the same townships, to calculate the ratio of service sector jobs which are supported. This ratio is 0.40. This ratio is also being applied to each county, as the City of London (which is included as part of Middlesex County data) is central to the Study Area and provides services to both Elgin and Oxford counties as well as Middlesex. The total number of induced jobs which are supported in Middlesex County by Agriculture has been calculated at 3,443.9 (6,370 direct jobs + 2,239.8 indirect FTE jobs X 0.40).

5.0 Results

5.1 Introduction to the Elgin, Middlesex and Oxford Counties Results

The aim of this chapter is to present the results of the study, including findings concerning the direct, indirect and induced impacts of agriculture and agriculture-related businesses on the economy of Elgin, Middlesex and Oxford counties (forewith referred to as the Study Area). This chapter includes findings of an in-depth examination of the backward and forward linkages of agriculture-related businesses.

This research focuses on the economic impact of the Agriculture sector. More specifically, it focuses on agriculture-related businesses in the Study Area. Both primary and secondary data collection were undertaken; the primary research collection was an 'input-output-like' survey approach of Ag-related businesses in the Study Area. Further calculations of the induced and direct impacts were completed, based on Population Census of Canada data and, to some extent, on multipliers from previous studies (Cummings et al., 1998, 1999 & 2000). The final analysis of the data illustrates that the Agriculture sector continues to be very important to the economy of Elgin, Middlesex and Oxford counties.

The study aimed to identify the total economic impact of the agriculture sector in the Elgin, Middlesex and Oxford counties. While published data present significant farm gate sales for the Study Area, there was no evidence to prove the actual impact of the agriculture sector. Similarly, published data showed that direct employment in agriculture in 1996 continued on a downward trend. From this information, it was predicted that this decline would continue while employment in other sectors would grow. Given this trend and subsequent predictions, estimates of some aspects of the employment patterns in Elgin, Middlesex and Oxford counties were made. Through a profile of the Study Area, the direct impact of the agriculture sector was illustrated through the employment data for the area's economy, which illustrated growth and decline industries (Section 2 of this report). However, this did not provide the full story of the economic impact of agriculture to Elgin, Middlesex and Oxford counties. To provide a clearer picture of the indirect impact of the Study Area's agriculture sector, the input-output-like methodology was applied.

5.2 Direct, Indirect and Induced Impact Results

5.2.1 Estimated Direct Sales and Jobs

Direct impacts refer to the value of sales and number of jobs created by the agriculture sector in the Study Area. Direct sales are equivalent to the value of farm gate sales. In 1990, the value of farm gate sales in the Study Area was \$958.8 million. This

figure increased 18.0% to \$1,131.5 million in 1995. Farm gate sales from the Study Area represent 14.5% of Ontario's total farm gate sales. When the value of the Study Area's direct sales is compared to Canada's ten provinces, it ranks seventh behind British Columbia and ahead of Nova Scotia in value of gate sales produced (Middlesex and Oxford counties on their own produced higher farm gate sales than Nova Scotia, Prince Edward Island, New Brunswick and Newfoundland; Elgin County produced higher farm gate sales than Newfoundland). In 1991 the Study Area's agriculture sector contained 17,485 employees. This number includes farm owners, operators and labourers. In 1996, this number fell 5.5% to 16,515 employees.

5.2.2 Estimated Indirect Sales and Jobs

The indirect impacts of agriculture refer to the value of sales and number of jobs created by Agriculture-related businesses in the Study Area. An Agriculture-related business is defined here as any business which sells directly to, or buys directly from, farming operations. This study found that the value of indirect impacts created by these businesses is substantial.

5.2.2.1 Location of Agriculture-related Businesses in the Survey

Agriculture-related businesses are located in rural areas, villages, towns and cities in every township across the Study Area. Greater numbers of Agriculture-related businesses are found in and around Aylmer, Ingersoll, London, St. Thomas, Strathroy, Tavistock, Tillsonburg and Woodstock. Other important centres for Agriculture-related businesses were found in smaller communities, such as Ailsa Craig, Belmont, Burgessville, Embro, Glencoe, Norwich, Thorndale, and West Lorne. Table 17 illustrates the location of the businesses which were surveyed, by County.

Table 5.1 Location of Agriculture-related Businesses in the Inventory and Surveyed.

County	# of Businesses in Inventory	# of Businesses in Survey
Elgin County	592	84
Middlesex County	767	125
Oxford County	645	98
TOTAL	2,004	307

Source: 2000 Ag-business Survey

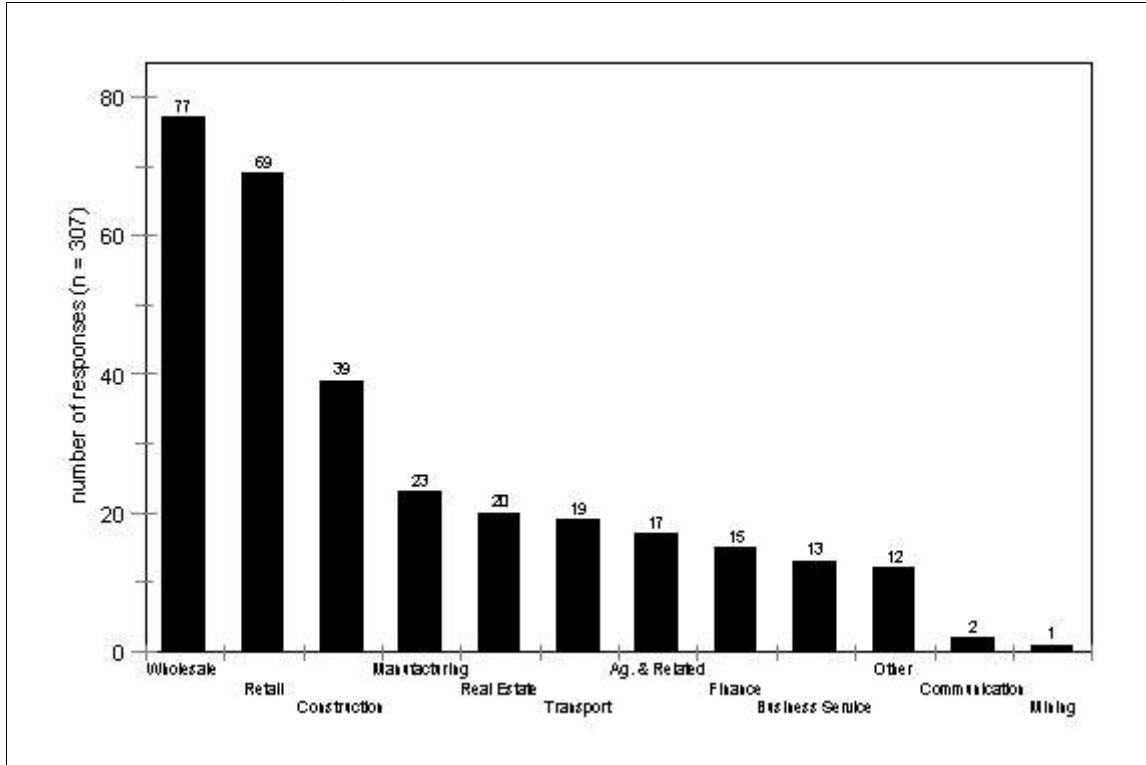
5.2.2.2 Characteristics of the Businesses Surveyed

The common characteristic of all the businesses surveyed is that they deal in some way with the agriculture sector. More specifically, all of the businesses surveyed either sell products or services directly to, and/or buy products or services directly from agricultural producers. It is important to note that these Ag-related businesses may also conduct trade with other sectors of the economy.

For the purposes of this study, the surveyed businesses were categorized according to their primary activity, using the Standard Industrial Code (SIC) categorization method developed by Statistics Canada. This system separates Canadian businesses into eighteen divisions, or sectors, such as Manufacturing, Retail Trade and Agriculture and Related Service Industries. Employment data for all eighteen sectors in the Study Area for 1991 and 1996 were presented earlier in Table 2.3.

During the agriculture-related business survey, businesses from three industrial sectors (Education, Health and Government Services) were deliberately omitted from the survey as their impacts are being considered under Induced impacts. This leaves fifteen possible sectors with which Ag-related businesses could form links. As illustrated in Figure 5.1, the study surveyed businesses in twelve of these fifteen sectors.

Figure 5.1 Response Rate by Industrial Sector.



Source: 2000 Ag-business survey

This suggests that the agriculture sector has links with almost every sector of the Study Area economy. Connections were found with the following sectors: Wholesale Trade, Retail Trade, Construction, Manufacturing, Real Estate and Insurance, Transportation, Finance, Business Services, Other Services, Communication and Mining. Linkages were also found among businesses classified as Agriculture and Related Service Industries.

The survey did not include businesses from the following sectors: Fishing and Trapping Industries, Forestry or Accommodation Food and Beverage Industries. This does not mean that these industries do not exist in the Study Area; they may not be directly linked to agriculture, or may not have had enough local representation to be picked up by the survey sample.

Some of the industries analysed in the study have comparatively stronger linkages with the agricultural sector. Of the 307 businesses surveyed, high representation of Ag-related businesses are found in Wholesale Trade (77 of the business surveyed), Retail Trade (69), Construction (39), Manufacturing (23) and Real Estate and Insurance (20). Businesses within the Agriculture and Related Services sector are also making strong

linkages with other businesses within that sector (17 of the businesses surveyed). Characteristics of the businesses surveyed in various sectors of the Elgin, Middlesex and Oxford counties' economy are discussed below.

i) Agriculture and Related Service Industries

The study found that strong linkages exist between businesses within the Agriculture and Related Service Industries sector in the Study Area. Most often, backward linkages are in the form of services provided to farms by these businesses such as veterinary services and land drainage services. More specialized services include breeding services, seed cleaning and custom planting and harvesting. Many of the smaller businesses in this sector are run on a seasonal or part-time basis by farmers. In total, 17 businesses from the agriculture and related services sector were surveyed. A typical example is Van Gorp Draining and Excavating, which provides tile drainage systems.

ii) Mining, Quarrying and Oil Well Industries

Only one business from this sector was surveyed, which provided a backward link to agriculture through the supply of sand and gravel.

iii) Manufacturing Industries

A variety of products linked to the agriculture sector are manufactured by businesses in the Study Area. In total, 23 businesses from the sector were surveyed. Backward linkages to agriculture exist through the sale of such products as steel tanks, agricultural chemicals, stabling and concrete. An example of such a manufacturing business is May-Gray Hydraulics, which provides hydraulic repairs. A forward linkage involves the manufacturing of food products from agricultural goods, most notably meat processing. An example of such a business is Appin Abattoir.

iv) Construction Industries

Thirty-nine businesses from the construction sector were surveyed. These businesses have strong backward linkages to agriculture through building construction, septic systems, fence installation, electrical contracting, excavating, plumbing and heating. One example of a construction business in the Study Area is Cast Away Fencing, which provides livestock fencing.

v) Transportation and Storage Industries

A total of 19 businesses from the transportation and storage sector were included in the survey. These businesses have backward linkages to agriculture through the transport of livestock, fill and raw milk, as well as grain handling and elevators. Forward linkages are also present through the purchase of grain from farms. An example of a business from this sector is Mike Nesbitt Trucking Inc., which transports grain.

vi) *Communication and Other Utility Services*

Two businesses from this sector were included in the survey; they have established backward linkages to agriculture through the provision of two-way radio services to farm operations.

vii) *Wholesale Trade Industries*

A number of wholesale dealers have established backward links to the agriculture sector through the sales of building materials, lumber, farm machinery, feed and seeds. Forward linkages are also present, primarily through the purchase of seed, grain, soy beans and alfalfa for resale. A total of 77 businesses from the sector were surveyed, an example of which is Bumstead Fuels, which provides gas and diesel fuels to farmers.

viii) *Retail Trade Industries*

Businesses in the retail trade sector are primarily selling products to the general public for personal or household consumption, and in providing related services such as installation and repair. However, they also have strong backward linkages to agriculture through the sale of products to farmers for use in the farm business, such as tire, truck and auto sales and service, hardware sales and computer sales and service. Some forward linkages also exist in the food retail sector, where goods are purchased from farms for resale. In total, 69 businesses from the retail sector were surveyed, an example of which is Norwich Home Center, which provides plumbing supplies and hardware.

ix) *Finance Industries*

A total of 15 financial service and insurance businesses were surveyed. These include banks and credit unions, which have backward linkages to agriculture through the provision of loans and banking services to farm operations. In many cases, local branches have a department responsible for servicing farm operations. An example of a finance industry in the Study Area is the Rochdale Credit Union in Ingersoll.

x) *Real Estate and Insurance Industries*

Real estate and insurance agencies have strong backward linkages to the agriculture sector. The main service provided to agriculture is the selling of agricultural property. These businesses are also involved in land appraisals and leasing farm properties. The survey included 20 real estate and insurance businesses, an example of which is Gary Breman Real Estate, which provides real estate appraisals and sales.

xi) *Business Service Industries*

Business service industries surveyed include accountants and lawyers that provide, respectively, financial accounting services such as general accounting and taxes, and legal services particularly in relation to real estate transactions. The survey included 13

businesses from this sector, including Allied Accounting and Tax Services Inc.

xii) Other Service Industries

According to Statistics Canada, other service industries is broken down into four major groups. These are: Amusement and Recreational service industries such as theatres, sporting events, casinos and amusement parks; Personal and Household service industries such as beauty salons, laundry facilities and funeral services; Membership Organization industries such as religious organizations, business organizations and professional membership associations; and Other Service industries, which are the most relevant to agriculture as they include machinery and equipment rental and leasing, welding shops that repair farm machinery and equipment, and auctioneers providing service for livestock owners. In total, 12 of these businesses were included in the survey, an example of which is Pete's Welding and Repair.

5.2.2.3 Importance of the Agriculture-related Business Survey

This study measures the importance of a business through its total gross sales per year and through the number of full-time equivalent (FTE) employees at the business. This provides an assessment of all the economic activities of the business, both related and unrelated to agriculture. For example, if a plumbing and heating business serves both residential and agriculture-producing (ie. farm-business) customers, the total gross sales of this business would include both Ag-related and unrelated sales.

a) Sales for the Agriculture-related Businesses Surveyed

All of the businesses surveyed had some sales related directly to the agriculture sector. During the survey, the owner (or manager) of the business was asked to estimate the total gross sales for their business as well as the percentage of those sales that could be attributed to the agriculture sector. For example, if a plumbing and heating business has \$500,000 in total gross sales per year, and the owner estimates that 50 percent of these sales are agriculture-related, then the total agriculture-related sales for that business would be \$250,000 ($\$500,000 \times 50\%$).

Ninety-seven percent of the businesses surveyed provided sales data (297 of 307). Statistics Canada classifies an industry with less than \$5 million in annual sales as a small business. A medium-size business has sales between \$5 million and \$25 million per year. Businesses with sales above \$25 million are considered large.

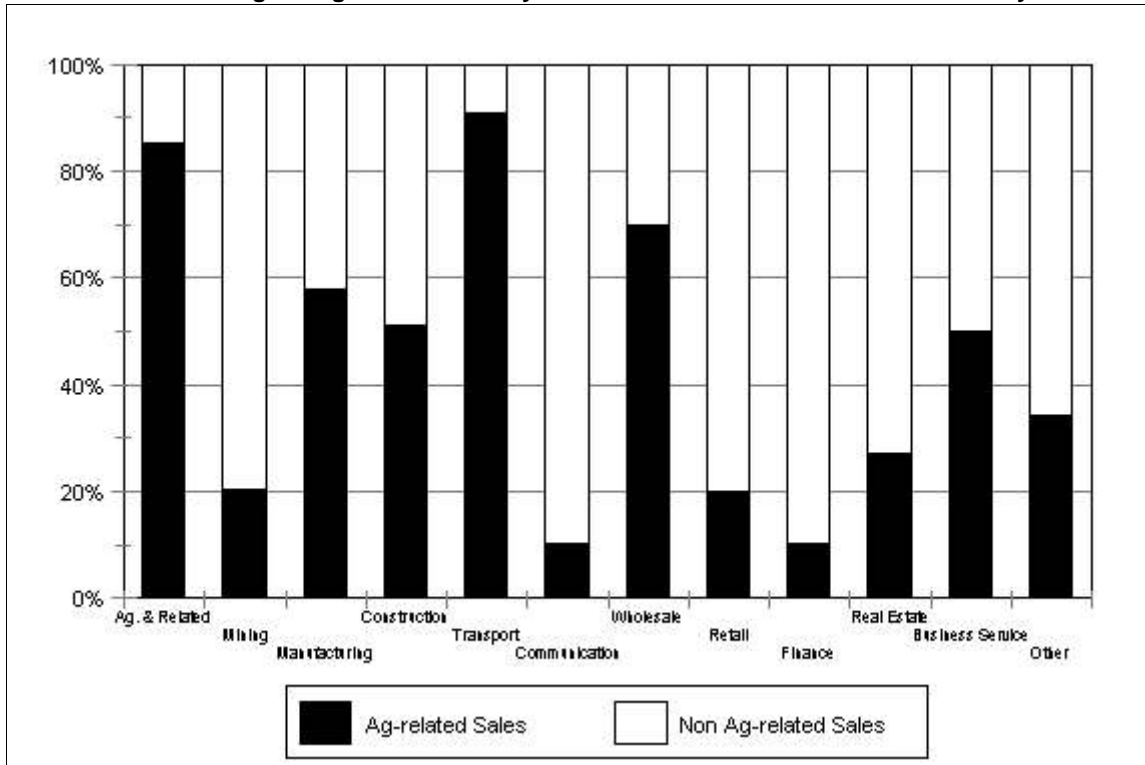
By this classification, businesses related to agriculture in The Study Area are generally small. Eighty-six percent of the business surveyed had sales under 5 million (254 of 297); 51 percent of businesses have sales below \$500,000 (152 of 297). This number

is close to the median gross sales of \$400,000 for the businesses surveyed (the mid-point sales for the businesses surveyed; 148 businesses with sales above and 148 businesses with sales below). In this instance the median value provides additional insight into the types of businesses in the Study Area as it is not influenced by extremely high or extremely low values.

This study found that agriculture-related businesses have a wide range of sales, and some with very high sales. Sales for the businesses surveyed ranged from \$30 thousand to \$52 million. The average total gross sales for the businesses that provided sales data was \$1,804,138. Only one business in the Study Area had sales in excess of \$25 million; the top quarter (74 businesses) had sales over \$1.75 million. Overall the total gross sales for the 297 businesses that provided sales data in the Study Area, including sales related and unrelated to agriculture, was \$535,829,055.

On average, the businesses in the study attributed 55.1 percent of their sales to the agriculture sector. As a result, the total agriculture-related sales for these businesses was \$295,190,970. The average agriculture-related sales for the 297 businesses that provided sales data was \$993,909. There were a number of businesses with high agriculture-related sales figures. Nineteen percent of the businesses surveyed (56 of 297) had agriculture-related sales in excess of \$1 million. Forty-four percent of the businesses surveyed had agriculture-related sales below \$100,000 (132 of 297). Figure 5.2 illustrates the percentage of Ag-related Sales according to Industrial Sector for the businesses that provided sales data.

Figure 5.2 Percentage of Ag-related Sales by Industrial Sector for the Businesses Surveyed.



Source: 2000 Ag-business Survey

Agriculture-related sales of the businesses surveyed in various sectors of the Elgin, Middlesex and Oxford counties' economy are discussed below.

i) Agriculture and Related Service Industries

Average gross sales for the 17 agriculture and related businesses that provided sales data were just over \$2.66 million. Of this, an average of 84.8%, or \$2.26 million are attributable to sales related to the agriculture sector.

ii) Mining, Quarrying and Oil Well Industries

As only one business in this sector was surveyed, it is not fair to calculate an average for the industry based on a single entry. However, for this business, gross sales was estimated to be \$500,000. Of this, 20%, or \$100,000 can be attributable to sales related to agriculture.

iii) Manufacturing Industries

The study found that manufacturing businesses surveyed had average gross sales of just over \$1.27 million. Of this, 57.4%, or about \$731,000 are sales related to agriculture.

iv) Construction Industries

Average gross sales for businesses surveyed in the construction industry in the Study Area are almost \$490,000. Of this, 50.6%, or almost \$248,000 can be attributable to sales related to agriculture.

v) *Transportation and Storage Industries*

Transportation and storage businesses surveyed in the Study Area had average gross sales approaching \$2.56 million. Businesses stated that 90.5%, or almost \$2.31 million of these sales were attributable to agriculture.

vi) *Communication and Other Utility Services*

Communication industries surveyed in the Study Area reported average gross sales of almost \$388,000. Of this, \$38,800 or 10.0% came from sales attributable to agriculture.

vii) *Wholesale Trade Industries*

The study found that wholesale trade businesses providing goods and services to farm operations averaged \$2.78 million in gross sales. Of this, 69.5%, or just over \$1.93 million are sales attributable to agriculture.

viii) *Retail Trade Industries*

Retail stores typically sell products for personal or household use. However, many also sell products to the agriculture sector, most notably truck dealers and hardware stores. Average gross sales for the retail businesses surveyed was just over \$1.48 million, with 19.7% or about \$292,000 being attributable to sales related to agriculture.

ix) *Finance Industries*

As mentioned earlier in the report, sales data for finance institutions were calculated by multiplying the number of employees at the branch by an annual average salary of \$30,000. By using this method, the average gross sales for finance businesses surveyed in the Study Area was just over \$1.17 million, with 9.9%, or \$116,000 being attributable to agriculture.

x) *Real Estate and Insurance Industries*

Average gross sales for the real estate and insurance businesses surveyed in the Study Area were just over \$2 million, with 26.7%, or almost \$536,000 of these sales being related to agricultural properties.

xi) *Business Service Industries*

The business service industry in the Study Area is dominated by legal and accounting firms. Average gross sales for the businesses surveyed from this sector were \$1.32 million, with 49.5% or about \$651,000 being attributed to sales related to agriculture.

xii) Other Service Industries

Average gross sales for businesses surveyed in the other service industries were almost \$1.05 million, with 33.9% or just under \$356,000 being attributable to sales related to agriculture.

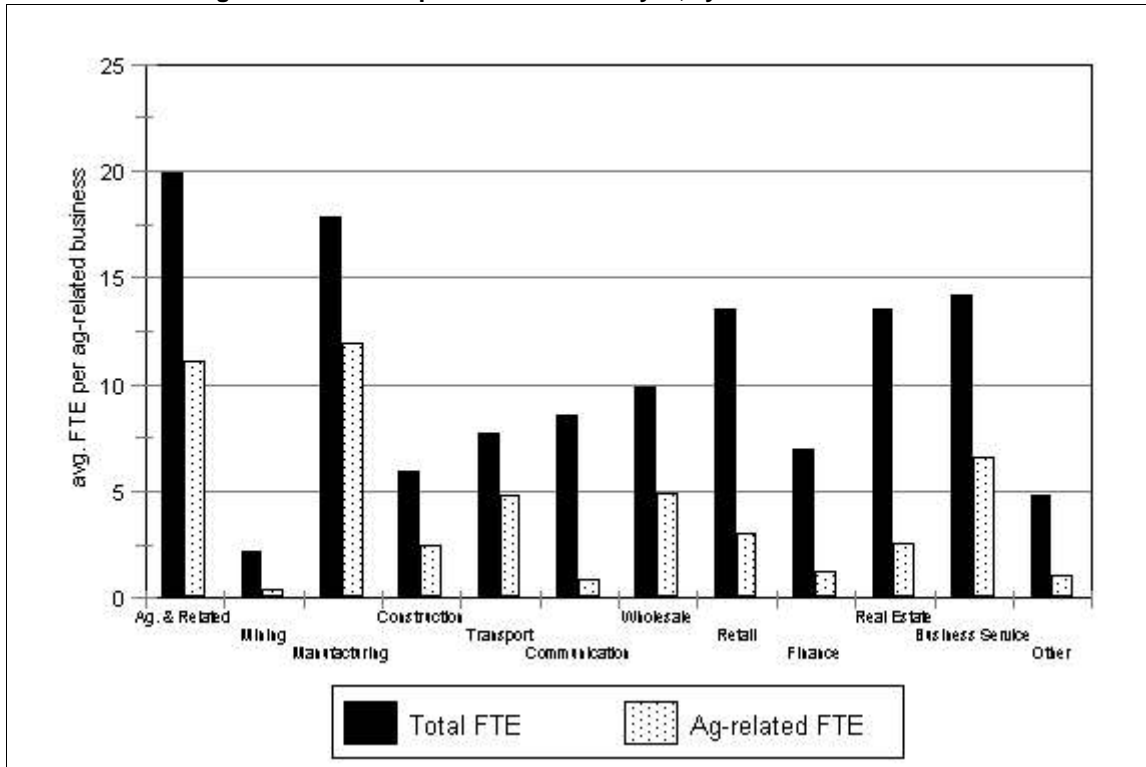
b) Employment for the Agriculture-related Businesses Surveyed

The importance of a business is also measured by the number of FTE jobs it supports. This information was gathered for the business location surveyed, as well as for any other outlets of that business in other locations. An assumption of this study is that the percentage of sales related to agriculture is equivalent to the percentage of employees serving the agriculture sector for their business. For example, if the plumbing and heating business mentioned in section a) employed 20 people, it would be assumed that 50% of these jobs (10) are supported by sales generated to the agriculture sector. However, in the final analysis the percentage of FTE jobs may not equal the percentage of sales as some sectors/businesses report more working hours per job than others.

The number of employees in a business is another indicator of the importance of that business in the economy. According to Statistics Canada, a small business employs one to 50 people; a medium business employs 51 to 250 people and a large business employs over 250 people.

In total, 301 businesses provided employment data. By this standard, 96 percent of the agriculture-related businesses in the study are small (289 of 301 that provided employment data). The remaining 4 percent, 12 businesses, were in the medium-business range. The average number of employees (as calculated by FTE jobs) for the businesses surveyed is 11.3. However, about 47.5 percent of the businesses surveyed have less than five employees (143 out of 301), and 71 percent of the businesses surveyed have less than 10 employees (215 out of 301). Figure 5.3 shows the average number of employees by industrial sector for the businesses surveyed.

Figure 5.3 Average Number of FTE per Business Surveyed, by Industrial Sector.



Source: 2000 Ag-business Survey

All of the businesses in the study exchange goods and/or services with the agriculture sector. As such, it can be assumed that each of these businesses must have employees dedicating some or all of their work-time on activities to serve these exchanges. The average number of employees working on activities related to serving the agriculture sector for the businesses surveyed was 4.6. Of the businesses surveyed, 42 percent had at least two employees working strictly on agriculture-related activities (127 out of 301).

5.2.2.4 Exports of the Agriculture-related Businesses Surveyed

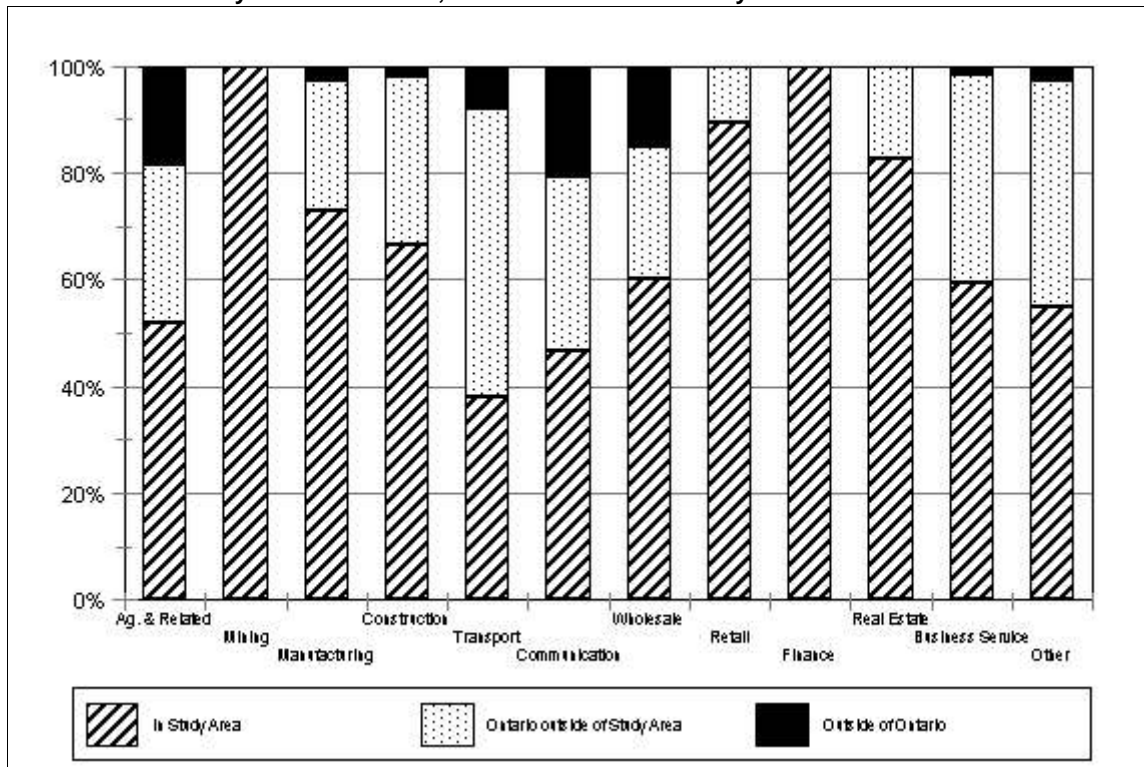
According to the 297 businesses that provided sales data for the study, 66.8% of their sales are made within Elgin, Middlesex and Oxford counties. This remaining 33.2% of their sales are exports to other locations in Ontario (24.7%), and outside of Ontario (8.5%). These sales represent the total sales for all the Agriculture-related businesses surveyed, including sales related to and unrelated to agriculture.

As shown in Figure 5.4, Transportation and Storage businesses have the greatest percentage of exports with 61.9% of their sales being made outside of the Study Area

(8.2% of which is made outside of Ontario), and the remaining 38.1% staying in Elgin, Middlesex and Oxford counties. Communication businesses make 53.4% of their sales outside of Elgin, Middlesex and Oxford, although this figure is derived from only two businesses. Agriculture and Related Services export 29.7% of their sales outside of Elgin, Middlesex and Oxford, but in Ontario, with a further 18.5% of sales going beyond the province. Other service industries export 42.2% of their sales outside of Elgin, Middlesex and Oxford, but inside Ontario, and 2.9% of their sales outside of Ontario. Business service industries receive 38.9% of their sales from locations outside of Elgin, Middlesex and Oxford, and 1.9% of sales outside of Ontario. Wholesale businesses generate 24.9% of their sales outside of the Study Area, but still in Ontario, and a further 15.0% of their sales from outside of the province. Construction businesses generate 31.5% of their sales out of the Study Area, but still in Ontario, and a further 2.1% out of the province.

Of the twelve Industrial Sectors which are represented by the agriculture-related businesses surveyed in this study, only four of the industrial groups retain 80 percent or more of their sales in Elgin, Middlesex or Oxford counties. These include: Real Estate and Insurance Agent Industries (82.6%), Retail Industries (84.2%) and Finance Industries (99.8%) and Mining (100.0%; although this figure is based on a single business).

Figure 5.4 Sales by Industrial Sector, for the Businesses Surveyed.



Source: 2000 Ag-business Survey

5.2.2.5 Summary: Agriculture-related Businesses in Middlesex County

The analysis shows that businesses that buy from or sell to the agriculture sector in the Study Area generate a sizeable amount of money and jobs inside Middlesex County. Furthermore, these companies generate flows of income and expenditure outside the county in terms of both employment and income. It is estimated that \$386.6 million in agriculture-related sales are generated in Elgin, Middlesex and Oxford counties by agriculture-related businesses in Middlesex County. These businesses generated almost \$137.1 million in agriculture-related sales in other parts of Ontario and a further \$10.0 million outside of Ontario. This income is exchanged among the three sales regions which benefits local businesses. The total amount of agriculture-related sales for all three sales regions is \$533.7 million.

Businesses supported by agriculture generate additional sales in other sectors of the economy. Total sales of agriculture-related businesses in Middlesex County reach over \$1,034 million, including sales related and unrelated to agriculture. This is shown in Table 5.2.

Table 5.2 Gross Sales Generated by all Middlesex County Agriculture-related Businesses.

Location of Sales	Ag-related Sales	Total Sales: Related and Unrelated to Agriculture
Sales in Study Area	\$386,607,196	\$749,028,596
Sales in Ontario (other than Study Area)	\$137,072,661	\$265,570,180
Sales Outside Ontario	\$10,036,676	\$19,445,466
Total Sales	\$533,716,533	\$1,034,044,242

Source: 2000 Ag-business Survey

Indirect employment is a further impact of the agriculture sector. Table 5.3 shows that the total Full Time Equivalent Jobs created by agriculture-related businesses in the Study Area by Middlesex County businesses is approximately 5,088.3, including jobs related and unrelated to agriculture. Of this, approximately 1,622.4 are indirect agriculture jobs created by agriculture-related businesses in Middlesex County. In addition, there are jobs supported outside the Study Area by both Elgin, Middlesex and Oxford residents purchasing outside the Study Area and by jobs in subsidiary locations of Middlesex County businesses. There are 1,936.2 jobs maintained by Middlesex County agriculture-related businesses which are supported by sales located outside of the Study Area. Of these, 617.3 are positions related to the agriculture sector. These jobs are supported through sales inside and outside of the Study Area, and are important linkages for the Middlesex County economy.

Table 5.3 Full Time Equivalent Indirect Jobs Generated by Middlesex County Businesses.

	Agriculture-related Jobs	Total Jobs Related and Unrelated to Agriculture
Jobs in Elgin, Middlesex and Oxford	1,622	5,088
Jobs outside Elgin, Middlesex and Oxford	617	1,936
Total FTE Jobs	2,240	7,025

Source: 2000 Ag-business Survey

5.2.3 Estimated Induced Jobs

Induced agricultural impacts are impacts on businesses that benefit from the expenditure of wages and salaries of workers in the Agriculture and Agriculture-related sectors. For the purposes of the current study, we have not calculated Induced Sales, but this would definitely add a significant figure to the overall Ag-related sales total of agriculture-related businesses in Middlesex County through the salaries of employees in

the Education, Health and Government Service sectors.

Induced jobs refer to service sector jobs that are supported by services purchased by agriculture employees. These represent jobs in the Education, Government and Health and Social service sectors. To make estimates of the induced jobs in the Study Area, a combination of six administrative areas was utilized; Malahide and Southwold Townships from Elgin County, Caradoc and London Townships from Middlesex County and Zorra and Norwich Townships from Oxford County were selected to represent the Study Area as they had the greatest total direct agricultural (ie. farm gate) sales in 1995. The total direct employment figure for the two primary production industries in the six townships, Agriculture and Manufacturing, (4,995 and 3,525 respectively for a total of 8,520 jobs) in the area was divided into the total number of jobs in the Education, Government and Health and Social service sectors (1,025, 580 and 1,805 respectively, for a total of 3,410 jobs). This calculation indicates that for every job created in the two primary production industries, 0.40 induced jobs were supported by them in these three service sectors.

When this number is applied to the total number of direct and indirect jobs related to agriculture in Middlesex County (6,370 direct jobs and 2,239.8 indirect jobs for a total of 8,609.8 jobs), it indicates that 3,443.9 induced jobs are supported by agriculture in Middlesex County.

5.2.4 Total Direct, Indirect and Induced Impacts

As shown in Table 5.4, there are 6,370 direct, 2,239.8 indirect and 3,443.9 induced jobs created as a result of the agriculture sector in Middlesex County. Thus, farm operations, businesses they buy from and sell to, and services that support farmers and farm businesses are estimated to support an estimated 12,053.7 jobs. When this figure is divided by the total number of direct agriculture jobs, an employment multiplier of 1.89 is the result. This calculation allows us to estimate that for every job in the agriculture sector, an additional 0.89 jobs related to agriculture are supported.

Table 5.4 Total Sales and Employment Related to Agriculture in Middlesex County.

	Sales	Jobs
Direct	\$450,396,997	6,370
Indirect	\$533,716,533	2,239.8
Induced		3,443.9
Total	\$984,113,530	12,054

There are \$450,396,997 in direct sales and \$533,716,533 in indirect sales associated with agriculture in Middlesex County. Therefore, approximately \$984,113,530 in agriculture-related sales are generated in the Middlesex County economy. In order to estimate the sales expenditure multiplier in the county, the total amount of agriculture-related sales for the area (\$984,113,530) was divided by the total amount of direct sales for the area (\$450,396,997) to calculate a sales expenditure multiplier of 2.18. In short, we can use this calculation to estimate that for every dollar generated by direct agricultural sales (farm gate sales), an additional \$1.18 in sales related to agriculture is also produced.

Although they have not been included in this study, there are also industries in Elgin, Middlesex and Oxford which are related to Agriculture, but do not deal directly with farmers. The study identified an additional 54 businesses related to Agriculture that did not deal directly with farm operations. This included 34 businesses that manufacture products which eventually are used on farms, such as ball bearings, farm equipment and hose fittings. These 34 businesses are predominantly machine shops and farm equipment manufacturers, with annual sales less than \$5 million and employing fewer than 50 people. The remaining 20 businesses identified are involved in the processing and selling of products which originate on farms, such as corn products, dairy products and fresh produce. These 20 businesses are medium to large food processing and wholesale businesses, with annual sales ranging from \$5 million to over \$25 million and employing from 50 to over 250 people. Almost 100% of sales in businesses in the latter category were ties to agriculture.

5.3 Comparison to Previous Studies

As mentioned previously, this type of study (using the same methodology) has been completed in five other locations in Ontario: Huron County (1998); Prescott, Russell, Stormont, Dundas and Glengarry Counties (1999); Simcoe County (1999), Lambton

County (2000) and Perth County (2000). Tables 5.5 and 5.5 compare sales and job data from those studies with the current Middlesex County study.

Table 5.5 Total Ag-related Sales in Huron, PRSD&G, Simcoe, Lambton and Perth Counties, compared with Middlesex County.

	Huron ⁷	PRSD&G	Simcoe	Lambton	Perth	Middlesex
Direct	\$511,918,855	\$363,496,609	\$264,884,68 1	\$301,426,48 1	\$430,255,814	\$450,396,997
Indirect	\$1,489,000,00 0	\$756,453,565	\$518,691,95 7	\$472,117,37 5	\$652,906,727	\$533,716,533
Total Sales	\$2,000,918,85 5	\$1,119,950,17 4	\$783,576,63 8	\$773,543,85 6	\$1,083,162,54 1	\$984,113,530
Sales Expenditure Multiplier	3.91	3.08	2.96	2.57	2.52	2.18

Source: Cummings et al., 1998, 1999 & 2000

Table 5.6 Total Ag-related FTE Jobs in Huron, PRSD&G, Simcoe, Lambton and Perth Counties, compared with Middlesex County.

	Huron	PRSD&G	Simcoe	Lambton	Perth	Middlesex
Direct	5,025	5,955	4,770	3,920	4,935	6,370
Indirect	14,186	4,516	2,237	1,624	3,133	2,240
Induced	3,528	7,007	7,414	3,382	3,066	3,444
Total Jobs	22,739	17,478	14,421	8,926	11,134	12,054
Employment Multiplier	4.53	2.94	3.02	2.28	2.26	1.89

Source: Cummings et al., 1998, 1999 & 2000

The results of this study compare well to the previous studies, surpassing the other county-level studies in many of the categories. Middlesex County is a superior county in terms of agricultural output, and is competitive with the highest agricultural producing counties in the province. The study shows that Middlesex County is one of the most important agricultural-producing counties in the province, and agriculture in Middlesex is an essential part of the County's economy.

⁷ Huron County was the first study of this type to be carried out. As such, the methodology has been continuously refined throughout the course of time. The higher numbers in Huron County's Indirect Sales and Jobs figures may reflect these refinements.

6.0 Results Conclusions

Agriculture is clearly a dominant player in Middlesex County's economy, providing approximately 6.0% of employment in the county and generating just over \$984 million in annual sales. The sector touches an estimated 574 businesses dealing directly with farm operations as well as the vital public service sector.

Estimated expenditures of \$984 million are generated by agriculture producers and agriculture-related businesses within Middlesex County. This is the estimated flow of sales and expenditures generated by farm operations as well as sales related to the agriculture sector. While previous estimates indicated that 6,370 jobs existed in the agriculture sector in 1996 (Statistics Canada, 1996 census), the study shows that an further 2239.8 jobs were tied indirectly to the agriculture sector in Middlesex County through agriculture-related businesses, and an additional 3,443.9 jobs were supported by agriculture in education, government and health and social service. Clearly, this has a significant impact on the economy of Middlesex County, where the total estimated number of jobs is 199,335. Multipliers associated with the sales and employment data suggest 0.89 jobs off the farm for every 1 on the farm, and \$1.18 off the farm sales for every \$1 generated by farm gate sales.

The county is very rich with agriculture and potential for agriculture and related industries. Of the soils in Middlesex County, 87% of the soils are classified as class 1, 2 and 3 and judged to be capable of sustained agricultural production.. This compares with our recent work in the countries adjacent to Kingston where 21% (Cummings et al., June 2000, p. 9) of soils are class 1, 2 and 3. The class 1, 2 and 3 soils of the area represent 4.4% of such soils in Ontario. With this important Ontario and national resource present in the area, communities and society as a whole must make every effort to preserve the agricultural community and to ensure that it happily coexists with other activities in the area.

The agriculture sector supports and is supported by businesses across and outside the county. Dominant in the lists of businesses linked to agriculture, were wholesale, retail and construction businesses. In addition there are strong linkages to the food processing sector inside and outside of the county. While there has been a steady erosion of jobs on the farm in this county, the core agricultural activity has remained as vitally important as it has in the past.

The physical impact of agriculture on land use in the area and the continuing growth of farm gate sales at rates that are close to those of the rate of growth of the provincial economy indicates a vibrant agricultural industry. The \$450.4 million in sales is linked to \$370.4 million in expenditure, most of it in the study area. This multi-million dollar industry

must be handled with care by local and provincial planners and policy makers. Its long term role is something we can depend on. Let us make sure it is sustained and sustainable.

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