APPENDIX 1

Measuring the Economic Impact of Agricultural Activities in the Regional Municipality of Niagara: Update using 2006 Census of Agriculture Data

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By

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Introduction

In the Fall 2004, Planscape and Regional Analytics Inc. completed an analysis of the economic impact of agricultural production in the Regional Municipality of Niagara. In what follows, we update this report using recent figures on agricultural production in the region taken from the 2006 Census of Agriculture.

Agricultural Production in the Regional Municipality of Niagara

Table 1 presents updated Gross Farm Receipts (GFR) information for the various sub-groups within the industry "Crop and Animal Production" located within the Regional Municipality of Niagara (Niagara) for 2001 and 2006. This data is also presented graphically in Figure 1.

Table 1: Gross Farm Receipts by Agricultural Commodity Group, 2001 and 2006

	2001	2006	% CHANGE
MISCELLANEOUS AGRICULTURE	$17,665,134	$45,341,427	157%
GREENHOUSE	$217,609,442	$289,099,652	33%
HOG	$8,084,580	$10,760,297	33%
CASH CROP	$20,799,197	$31,363,866	51%
NURSERY	$27,717,140	$48,902,783	76%
POULTRY	$90,835,580	$98,308,509	8%
GRAPE	$55,123,030	$66,458,705	21%
TENDER FRUIT	$41,584,040	$50,135,515	21%
BEEF	$4,459,614	$5,241,407	18%
HORSE AND PONY	$4,220,708	$7,849,642	86%
DAIRY	$23,296,554	$18,218,970	-22%
TOTAL PRODUCTION	$511,395,019	$671,680,773	31%

Figure 1: Gross Farm Receipts by Agricultural Commodity Group, 2001 and 2006

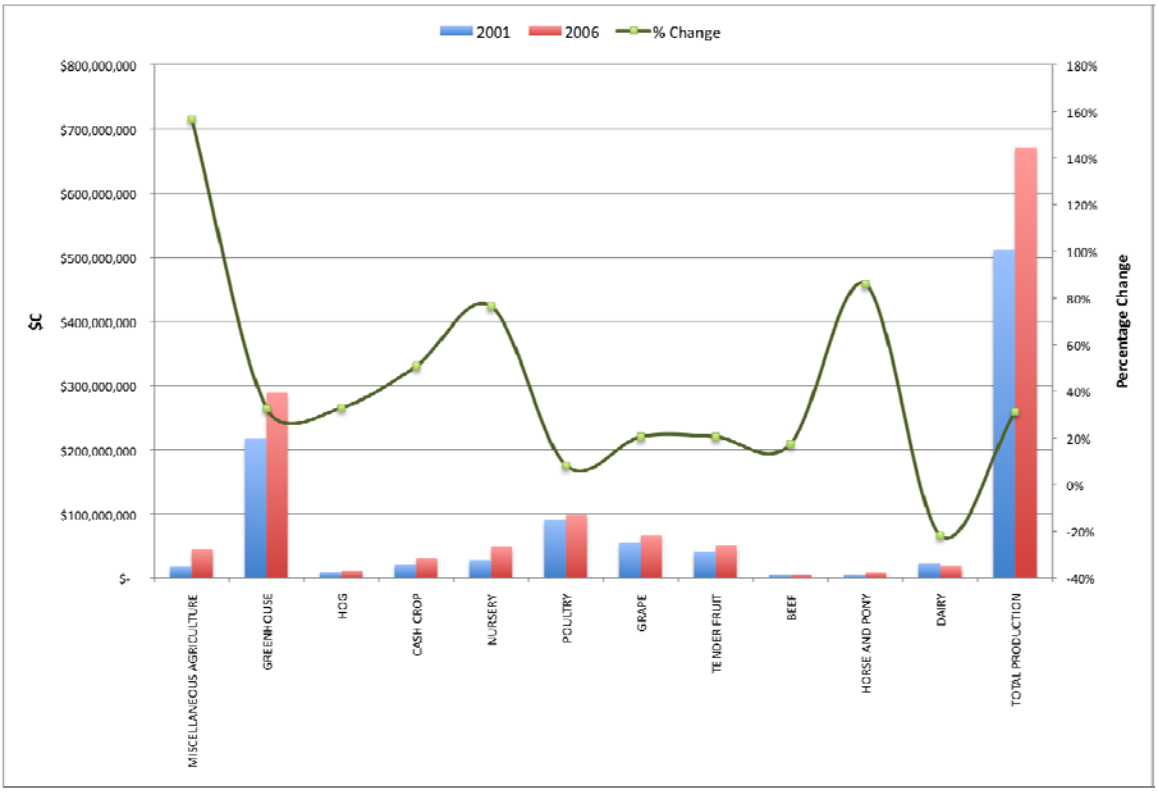
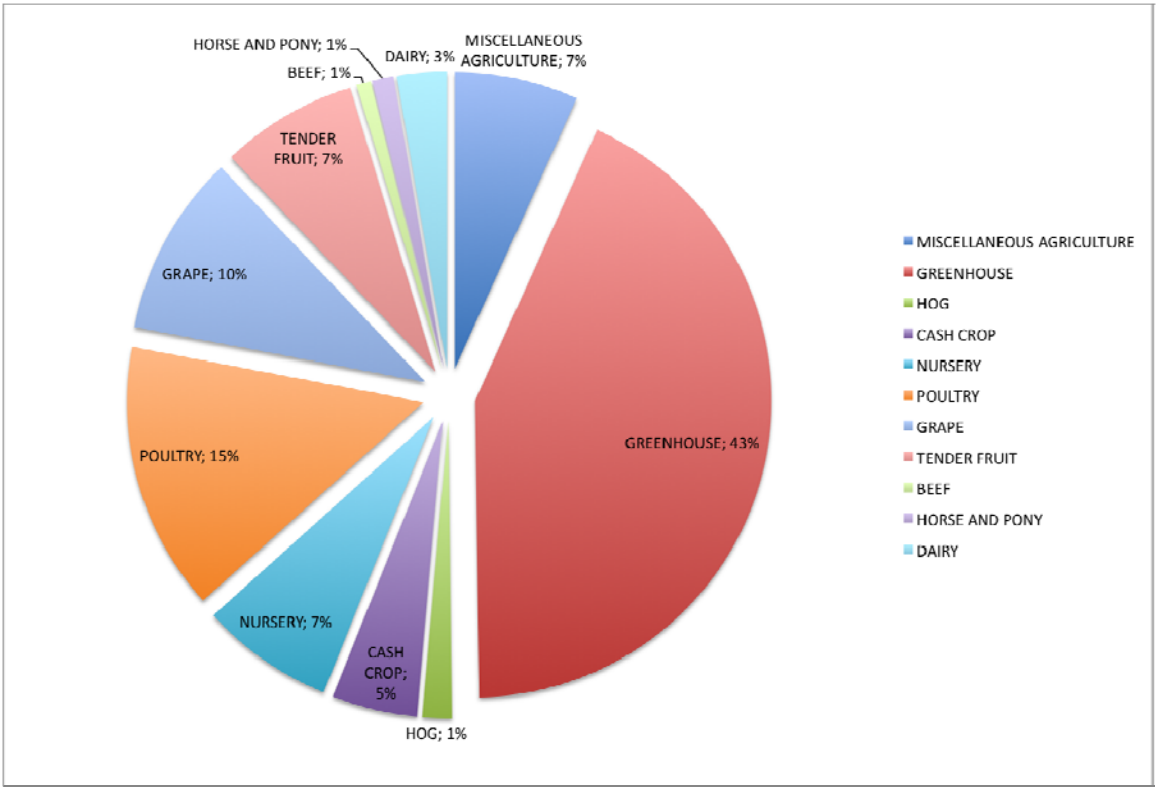


Figure 1 and Table 1 show that over the 2001 to 2006 period, Gross Farm Receipts (GFRs) increased for all of the commodity groups with the exception of Dairy production which experienced a 22 percent decline in GFR over the period. Total GFR over all commodities increased by 31 percent over the period. Most notable is the 157 percent increase in "Miscellaneous Agriculture" GFRs over the period.[1] Following the Miscellaneous category are "Horse and Pony", "Nursery", "Cash Crop", "Hog" and "Greenhouse" with period increases of 86, 76, 51, 33 and 33 percent respectively. In terms of sheer magnitude, agricultural production in Niagara the sector is dominated by Greenhouse-based production, followed by Poultry and Egg production and Grape and Tender Fruit Production (see Figure 2).

[1] The Miscellaneous Agriculture commodity group is composed of all those commodities not included in the specific groups shown in Table 1. The Miscellaneous Agriculture commodity group accounted for just over 3 percent of total GFRs in 2001 and nearly 7 percent in 2006. Clearly, the 10 commodity groups chosen for this analysis account for the majority of all GFRs in each of the two census years.

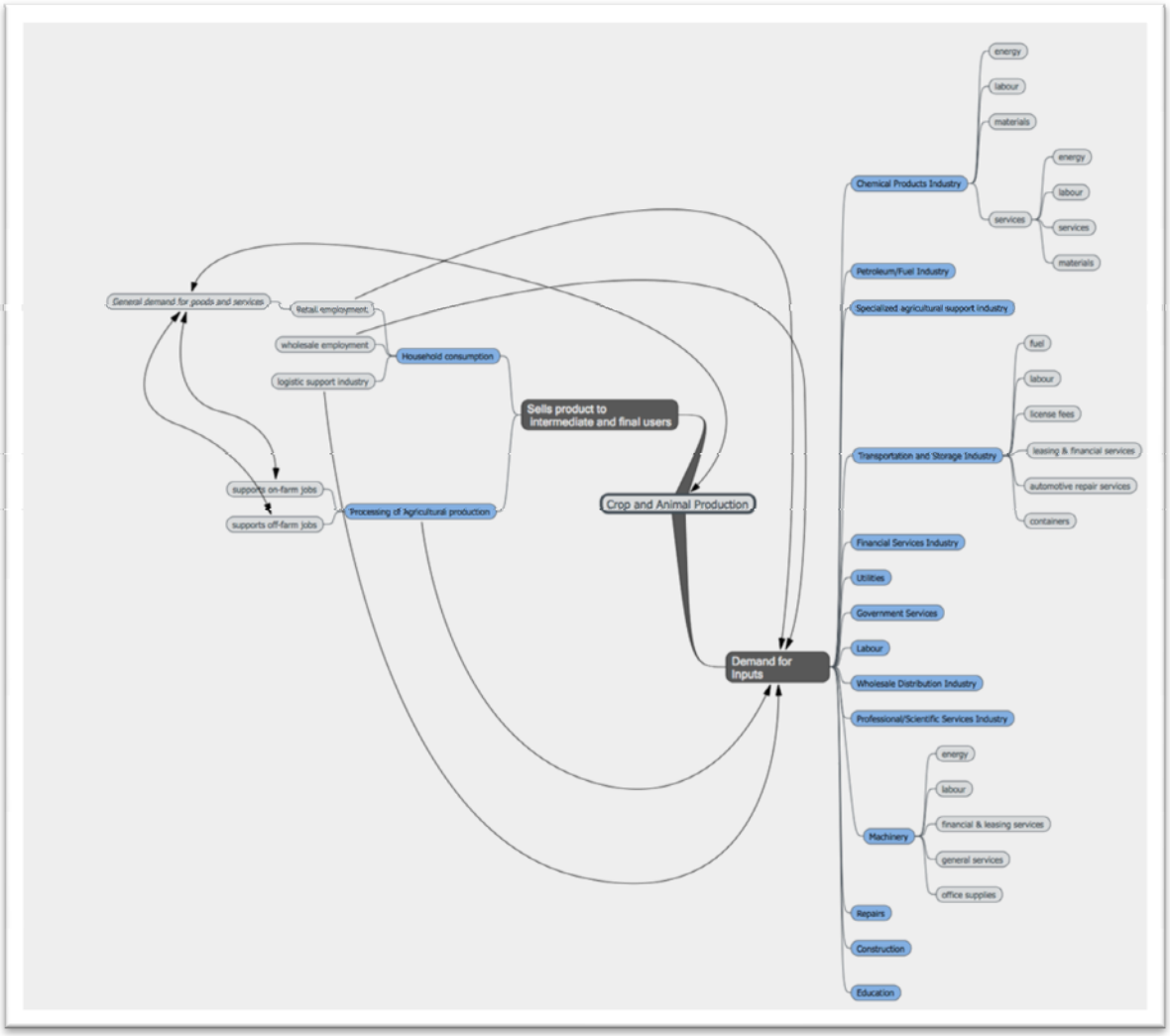
Figure 2: The Structure of Agricultural Production in Niagara



Measuring the Economic Impact of Agricultural Production in Niagara

Figure 3 presents a graphic representation of how we conceptualize the relationship between agricultural production in Niagara and the overarching regional economy. Indeed, Figure 3 is a work in progress and represents an attempt to articulate the intricate nature of the Agriculture Production Complex (i.e., cluster) including the effects associated with production as well as processing. In this current exercise, we are concerned only with the economic impacts stemming from agricultural production in Niagara (i.e., all of the linkages flowing from "Crop and Animal Production" to all of this industries input providers (and their input providers, and so on). Figure 3 does serve to provide the reader with a sense of how agricultural activities are intertwined with the overarching regional economy. In essence, the interconnections shown in Figure 3 are what give agricultural production in Niagara its multiplier effect.

Figure 3: Conceptual (Truncated) Representation of Impact Logic



The linkages pattern depicted in Figure 3 is partially captured in the regional economic impact model used to translate the production figures shown in Table 1 above into Niagara-specific economic impacts across many different industries inclusive of direct, indirect and induced impacts.

Agricultural operations in Niagara that generated nearly $672 Million in GFRs in 2006 are undoubtedly having a significant local (and indeed provincial and national) economic impact. The purpose of what follows is to estimate the magnitude and nature of this impact on Niagara.

The total economic impact of any industry is defined as the sum of its direct, indirect and induced economic impacts in the host economy. *Direct impacts* are

those that stem from the direct input requirements of the industry in question. Direct input purchases also stimulate additional rounds of spending as input providers purchase inputs from their input suppliers to produce their outputs (e.g., a producer of seeds purchases electriregion, a diesel fuel wholesaler purchases labour and the services of legal and financial experts etc.) and so on. These additional rounds of spending stimulated by the direct input purchases of the industry under study are referred to as the *indirect effects* (see Figure 3 for a representation of these rounds of spending - the income multiplication process in a regional economy).

Induced impacts refer to those additional rounds of spending that stem from income earned by workers in the various industries in the economy that are impacted directly and indirectly by the initial shock (i.e., by the activities of the industry in question – agricultural production in Niagara in this instance).[2] An example of an induced effect in an agricultural context would be as follows:

- The demand for greenhouse vegetables produced in Niagara is rising steadily;
- Producers in Niagara, to meet an anticipated 50 percent increase in demand for their products, begin to use existing greenhouse operations more intensively through the use of fertilizers, specialized consulting services, etc..
- Fertilizer manufacturers and pest management consultants, for example, begin to see growing demand for their products and services in the Region as greenhouse operators in Niagara begin to buy more inputs. This is part of the direct impact of agricultural production in Niagara.
- Fertilizer distributors and professional consultancies, in supplying more of their products to agricultural operations in Niagara, will have to purchase more of their own inputs as well. Fertilizer distributors, for example, will have to purchase more product, more transportation services, more fuel, utilities and labour. These purchases would be part of the indirect impact of agricultural production in Niagara;
- A new employee hired by the fertilizer manufacturer or the consulting firm (in response to the indirect impacts described above), for example, uses part

[2] When an industry is called upon to provide inputs to another industry, it too must draw inputs from its suppliers (see Figure 3). All industries buy labour to conduct their business, and a portion of the income earned by labour is spent in the economy (e.g., to buy manufactured items, services, consumables etc.), and this additional consumption demand must be met with additional industrial output. It is this additional industrial output, induced by the consumption behaviour of workers, which constitutes the induced effect of an initial shock.

of her/his net income to purchase food products, a variety of goods and services, a new Ford truck, and a new home.

- These purchases made by the employee in-turn stimulate the municipal (and indeed provincial) economy yet again (i.e., the food stuffs must be produced, the Ford truck must be manufactured and sold[3], and the home purchase represents a further stimulus to the local home-building and finance, insurance and real-estate industries. These impacts that flow from the original surge in demand for agricultural products via the spending of labour income are examples of induced impacts associated with agricultural production in Niagara.

The regional economic impact model developed for this project is designed to compute the total, direct, indirect and induced economic impacts in Niagara associated with agricultural production taking place within Niagara.

The Economic Impact of Agricultural Production in Niagara

Figure 4 presents Total Output Multipliers (TOMs) for all industries (i.e., Small Level NAICS industry groups) in the Niagara including the various components of the Region's Crop and Animal Production cluster. Total Output Multipliers (TOMs) measure the stimulatory effect of each component of the cluster in the Region on all industries producing goods and services in the Niagara inclusive of direct, indirect and induced effects. Generally speaking, the larger the multiplier for a given industry, the more connected that industry is to other industries in the economy, and hence the greater is its stimulatory effect on these linked industries if shocked. Figure 4 shows that all industries in Niagara, with three exceptions, possess TOMs which are in excess of 2.0. This means that for most industries in Niagara (including all components of the agricultural cluster), a one dollar increase in the demand for their output will translate into more than two dollars in output response across all linked industries in the economy (i.e., the total economic impact of a $1.00 increase in demand for the output of one industry is in excess of $2.00).[4] Every dollar of

[3] While the Ford truck would be manufactured in Oakville Ontario, and not in Niagara, it would likely be sold by a local Niagara dealership. As such, retail sales margins would accrue locally even though the manufacturing stimulus would leak out to Oakville.

[4] It is important to note that the structure of the Niagara economy used to compute these multipliers was based on a regionalized provincial Input-Output model pertaining to the year 1998.

output from Niagara's agricultural cluster therefore stimulates a total impact in excess of $2.00 in the Niagara economy.

Figure 4: Total Output Multipliers by Industry in Niagara

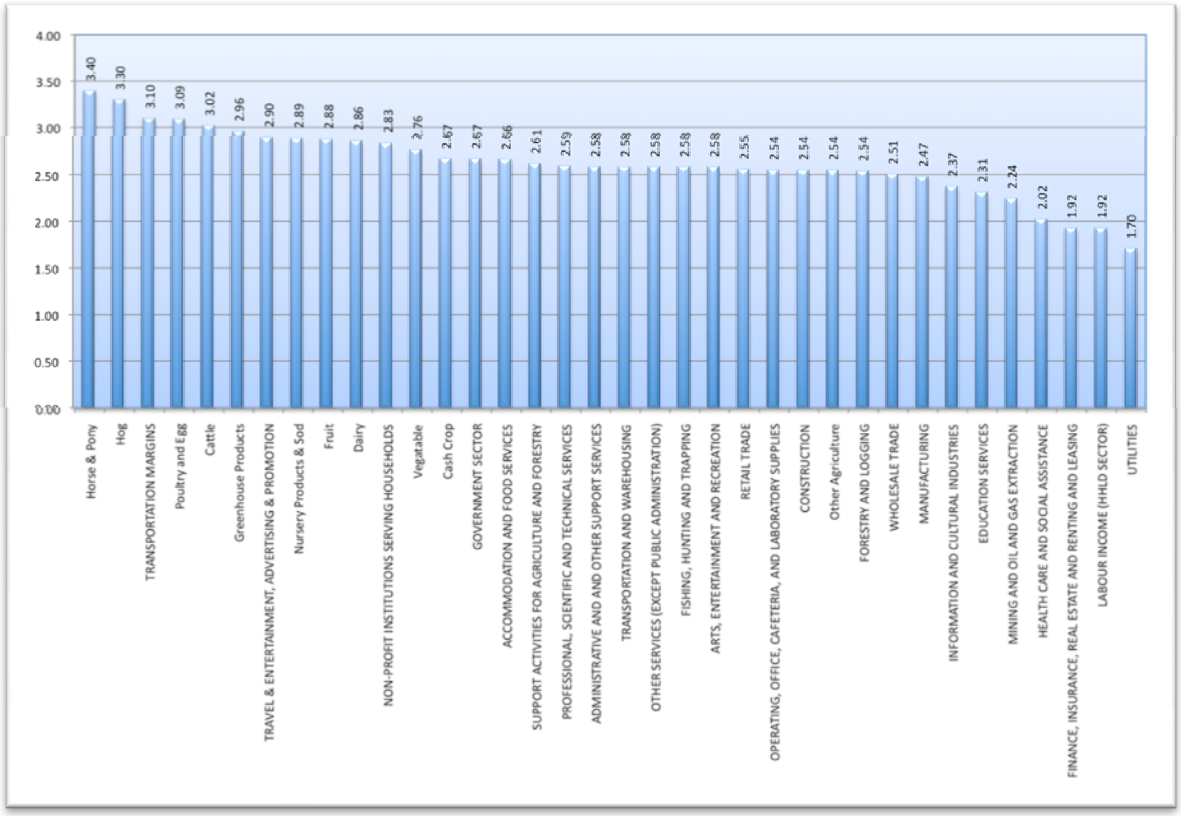


Table 2: Economic Impacts of Agricultural Production in Niagara, by Commodity Groups, 2001 and 2006

		GFR	Total Output Impact	Total Output Impact	Total Direct	Total Indirect	Total Induced	Total Labour Income	GDP
		2001	Closed Model	Open Model	Impact	Impact	Impact	Impact	Impact
1	ALL SUB-SECTORS COMBINED	$ 511,395,019.00	$ 1,799,386,402.14	$ 972,290,519.48	$ 403,599,447.83	$ 568,691,071.65	$ 827,095,882.66	$ 342,198,328.73	$ 619,833,793.84
2	GREENHOUSE	$ 217,609,442.00	$ 768,756,417.30	$ 421,239,371.01	$ 174,332,312.30	$ 246,907,058.71	$ 347,517,046.29	$ 143,779,886.88	$ 267,030,837.25
3	POULTRY	$ 90,835,580.00	$ 277,615,917.44	$ 189,493,340.52	$ 62,266,965.44	$ 127,226,375.07	$ 88,122,576.92	$ 36,459,374.51	$ 96,827,852.30
4	GRAPE	$ 55,123,029.90	$ 213,181,721.74	$ 89,525,423.44	$ 47,192,093.38	$ 42,333,330.06	$ 123,656,298.31	$ 51,160,910.73	$ 72,826,219.17
5	TENDER FRUIT	$ 41,584,040.10	$ 171,019,172.67	$ 58,634,843.05	$ 37,264,566.58	$ 21,370,276.47	$ 112,384,329.61	$ 46,497,305.30	$ 56,058,626.00
6	NURSERY	$ 27,717,140.00	$ 119,223,907.49	$ 40,346,106.71	$ 25,968,417.74	$ 14,377,688.98	$ 78,877,800.78	$ 32,634,489.14	$ 39,921,648.84
7	DAIRY	$ 23,296,554.00	$ 79,036,884.70	$ 55,999,838.07	$ 18,353,706.70	$ 37,646,131.36	$ 23,037,046.63	$ 9,531,227.30	$ 27,208,111.15
8	HOG	$ 8,084,580.00	$ 27,215,507.34	$ 18,953,858.10	$ 6,567,054.58	$ 12,386,803.52	$ 8,261,649.24	$ 3,418,131.59	$ 9,297,536.60
9	BEEF	$ 4,459,614.00	$ 14,718,997.64	$ 10,872,173.16	$ 3,365,494.12	$ 7,506,679.04	$ 3,846,824.49	$ 1,591,565.06	$ 5,146,226.26
10	HORSE AND PONY	$ 4,220,708.00	$ 14,302,781.93	$ 8,907,343.91	$ 3,199,186.34	$ 5,708,157.57	$ 5,395,438.02	$ 2,232,280.33	$ 5,142,475.19
11	CASH CROP	$ 20,799,197.00	$ 64,859,418.57	$ 45,772,614.40	$ 14,875,750.81	$ 30,896,863.58	$ 19,086,804.18	$ 7,896,874.63	$ 23,299,631.43
12	MISCELLANEOUS AGRICULTURE	17,665,134.00	49,455,675.31	32,545,607.12	10,213,899.84	22,331,707.28	16,910,068.20	6,996,283.26	$ 17,074,629.66

		GFR	Total Output Impact	Total Output Impact	Total Direct	Total Indirect	Total Induced	Total Labour Income	GDP
		2006	Closed Model	Open Model	Impact	Impact	Impact	Impact	Impact
1	ALL SUB-SECTORS COMBINED	$ 671,680,773.00	$ 2,362,005,039.80	$ 1,265,445,925.95	$ 528,283,657.07	$ 737,162,268.89	$ 1,096,559,113.85	$ 453,684,638.00	$ 813,601,090.10
2	GREENHOUSE	$ 289,099,652.00	$ 1,021,312,359.76	$ 559,627,167.13	$ 231,604,889.73	$ 328,022,277.40	$ 461,685,192.63	$ 191,015,219.19	$ 354,757,226.59
3	POULTRY	$ 98,308,509.00	$ 300,455,030.04	$ 205,082,719.48	$ 67,389,590.43	$ 137,693,129.05	$ 95,372,310.57	$ 39,458,841.43	$ 104,793,758.01
4	GRAPE	$ 66,458,705.40	$ 257,021,090.24	$ 107,935,716.76	$ 56,896,825.83	$ 51,038,890.93	$ 149,085,373.48	$ 61,681,803.42	$ 87,802,434.91
5	TENDER FRUIT	$ 50,135,514.60	$ 206,188,100.23	$ 70,692,699.00	$ 44,927,770.79	$ 25,764,928.21	$ 135,495,401.23	$ 56,059,159.31	$ 67,586,700.47
6	NURSERY	$ 48,902,783.00	$ 210,352,903.52	$ 71,184,721.85	$ 45,817,421.91	$ 25,367,299.95	$ 139,168,181.67	$ 57,578,716.30	$ 70,435,828.89
7	DAIRY	$ 18,218,970.00	$ 61,810,456.22	$ 43,794,432.85	$ 14,353,437.50	$ 29,440,995.35	$ 18,016,023.38	$ 7,453,855.37	$ 21,277,986.47
8	HOG	$ 10,760,297.00	$ 36,222,901.13	$ 25,226,931.07	$ 8,740,523.03	$ 16,486,408.05	$ 10,995,970.05	$ 4,549,415.19	$ 12,374,700.37
9	BEEF	$ 5,241,407.00	$ 17,299,312.74	$ 12,778,120.37	$ 3,955,482.34	$ 8,822,638.03	$ 4,521,192.37	$ 1,870,574.51	$ 6,048,385.88
10	HORSE AND PONY	$ 7,849,642.00	$ 26,600,209.66	$ 16,565,813.33	$ 5,949,823.45	$ 10,615,989.88	$ 10,034,396.33	$ 4,151,578.70	$ 9,563,937.90
11	CASH CROP	$ 31,363,866.00	$ 97,803,877.38	$ 69,022,190.83	$ 22,431,685.95	$ 46,590,504.87	$ 28,781,686.55	$ 11,907,984.60	$ 35,134,362.06
12	MISCELLANEOUS AGRICULTURE	45,341,427.00	126,938,798.87	83,535,413.28	26,216,206.11	57,319,207.16	43,403,385.60	17,957,489.97	$ 43,825,768.56

Table 2 presents a summary of the economic impacts associated with agricultural production in Niagara for 2001 and 2006. Over this period, GFRs in total increased by more than 31 percent to nearly $672 Million in 2006. Table 2 shows that agricultural production in 2006 (as was the case in 2001) is having a very significant regional economic impact. Specifically, we see that agricultural production in Niagara in 2006 resulted in:

- a total industry output impact (over all industries in the regional economy) of nearly $2.40 Billion;
- a regional GDP impact of nearly $814 Million; and,
- regional labour income of nearly $454 Million.

Figure 5: Economic Impacts by Commodity Groups in Niagara, 2006

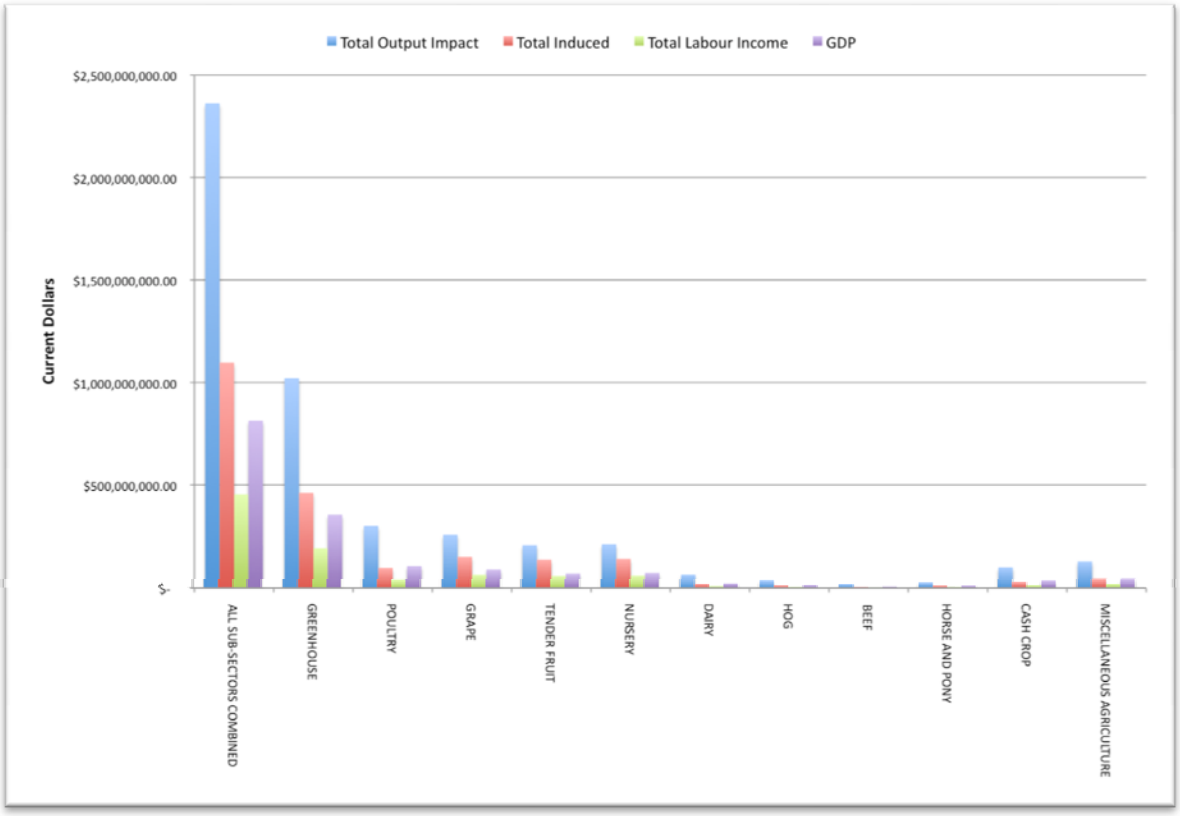


Figure 5 decomposes the total, induced, labour income and GDP impacts by agricultural commodity group in Niagara. Figure 5 shows that:

- nearly half of the total economic impact of all agricultural production in the region is due to the re-spending of wages earned through the direct and indirect impacts of this production (i.e., the induced impact);
    -
- greenhouse production dominates in terms of the total economic impact, followed by poultry, grape and tender fruit.

These findings underscore our conceptualization of the cluster shown earlier; clearly agricultural production is linked in myriad ways to all sectors of the economy and a great many jobs are dependent upon it, through direct, indirect and induced connections. Comparisons of 2006 impacts to those obtained using 2001 data reveal that this sector is growing in Niagara, and so its overall economic impact on the region.