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**The Economic Impact of the Michigan Food
Processing Industries**

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EXECUTIVE SUMMARY

This report analyzes the economic impact of Michigan's food processing industries, with a discussion on the potential and barriers to further sector growth.

Major Findings

The total economic impact of food processing in Michigan is estimated to be \$25 billion and 134,000 jobs. These impacts include direct, indirect and induced economic activity. Table 1 shows the summary of the impacts.

	Within Sector	Total
Economic Impact (\$ billions)	14.657	24.971
Impact on Employment	40,828	133,980

Sources: U.S. Census Bureau, IMPLAN, MEDC

The economic impact data is based on the 2007 Economic Census and represents the most recent data available. As such it is likely an underestimate of the current (2010) economic impact of the food processing sector. Nonetheless, the sector has shown fairly strong growth between 2002 and 2007 expanding by 19.8 percent in terms of direct (within sector) impact. This represents a compound annual growth rate of 3.7%.

The Michigan Economic Development Corporation (MEDC) provided 2007 employment counts for this sector using their in-house database of Michigan employment from Economic Modeling Specialists Inc. The MEDC data suggests that employment in food processing industries remained stable or slightly increased over the period.

Economic Potential

This study also analyzes the economic potential of various food processing activities in order to examine the growth potential of the sector. Examples considered include a dry milk power plant, a small-scale artisanal cheese manufacturer, a \$20 million fruit juice facility, a small-scale fruit processor, a value-added product expansion in sugar processing, a large-scale expansion in beef processing, and a small-scale vegetable processing expansion. Total economic impact varies from \$125,000 for the artisanal cheese facility to \$459 million for the dry milk powder facility. Total impact on employment varies from 1 for the artisanal cheese manufacturer to 2,288 for the beef plant expansion.

Barriers to Increased Food Processing

Among the barriers mentioned by industry participants to expanded food processing are:

- Levels of taxation especially income tax, property tax and the Michigan Business Tax.
- Regulations covering wastewater disposal and the classification of food processing byproducts.

THE ECONOMIC IMPACT OF THE MICHIGAN FOOD PROCESSING INDUSTRIES

This report analyzes the economic impact of Michigan’s food processing industries, with a discussion on barriers to further sector growth. Economic impacts are estimated with industry data based on the 2007 Economic Census (the latest available data) with standard economic impact modeling approaches. To demonstrate potential economic outcomes of expanding food processing in Michigan, several hypothetical sector build-outs are modeled for their direct and secondary economic impacts on production and employment. Additionally, several food processors provide accounts of ongoing challenges for food processors and potential barriers to future growth of the food processing sector in Michigan.

Economic Impact

The total economic impact of food processing in Michigan is estimated to be \$25 billion and 134,000 jobs. These impacts include direct, indirect and induced economic activity. Table 1 shows the summary of the impacts.

Table 1: Summary of Economic and Employment Impact of Food Processing		
	Within Sector	Total
Economic Impact (\$ billions)	14.657	24.971
Impact on Employment	40,828	133,980

Sources: U.S. Census Bureau, IMPLAN, MEDC

The economic impact data is based on the 2007 Economic Census and represents the most recent data available. As such it is likely an underestimate of the current (2010) economic impact of the food processing sector. Nonetheless, the sector has shown fairly strong growth between 2002 and 2007 expanding by 19.8 percent in terms of direct (within sector) impact. This represents a compound annual growth rate of 3.7%.

The Michigan Economic Development Corporation (MEDC) provided 2007 employment counts for this sector using their in-house database of Michigan employment from Economic Modeling Specialists Inc. The MEDC data suggests that employment in food processing industries remained stable or slightly increased over the period.

Table 2 provides a detailed breakdown by processing industry. Implicit in Table 2 is the anticipated economic multiplier of 1.70. This multiplier indicates that every dollar of output in the processing sector creates an additional 70 cents through indirect and induced effects.

Table 2: Size of Food Processing in Michigan (\$1,000s)

Industry	Within the Industry	Total
Pet food manufacturing	14,420	22,836
Other animal food manufacturing	196,957	267,211
Flour milling and malt manufacturing	64,567	87,101
Soybean and other oilseed processing	64,567	65,034
Fats and oils refining and blending	64,567	76,763
Breakfast cereal manufacturing	1,241,137	1,800,280
Sugar manufacturing	459,520	913,060
Chocolate and confectionary manufacturing	21,227	35,649
Confectionary manufactguring from purchased chocolate	21,227	31,988
Nonchocolate confectionary manufacturing	229,760	394,964
Frozen food manufacturing	418,288	740,484
Fruit and vegetable canning/pickling/drying	985,837	1,582,121
Fluid milk and butter manufacturing	1,283,759	2,312,518
Cheese manufacturing	274,832	470,178
Dry/condensed/evaporated milk manufactruing	2,330,785	4,557,970
Ice cream and frozen dessert manufacturing	70,379	139,081
Animal (except poultry) slaughtering	1,059,640	1,691,548
Poultry processing	664,034	1,176,822
Meat processed from carcasses	528,799	874,742
Bread and bakery product manufacturing	1,320,977	2,422,614
Cookie/cracker/pasta manufacturing	14,983	16,481
Tortilla manufacturing	188,171	310,287
Snack food manufacturing	142,927	229,775
Coffee and tea manufacturing	71,783	104,951
Seasoning and dressing manufacturing	324,137	516,041
All other food manufacturing	346,658	613,132
Soft drink and ice manufacturing	2,155,532	3,362,239
Breweries	66,725	101,561
Wineries	30,995	53,960
Total	14,657,190	24,971,391

Sources: U.S. Census Bureau 2010, IMPLAN

Table 2 also shows that Michigan has a diversified portfolio of food processing industries. This includes some well known industrial processors such as Kellogg's, Michigan Sugar and Leprino to name a few. It also has a well developed fruit and vegetable processing sector. This diversity is likely a function of the wide range of crops produced in the state.

While Michigan has a wide range of food processing industries it does not rank particularly high relative to other states in terms of total shipments. Table 3 shows the relative size by state of food processing. Michigan ranks 19th. This is similar to its ranking in terms of farm output. Given the size of the state and its farm sector it is no surprise that California is far and away the largest food processing state in the country. North Carolina's rank shows the importance of animal processing and the fact that tobacco remains a major agri-food processing activity.

Michigan is last in the Great Lakes Region which is comprised of Ohio, Michigan, Indiana, Illinois, Wisconsin and Minnesota. Illinois, Wisconsin and Ohio rank in the top ten states in the US. Given the size of their livestock sectors, these figures reinforce the relative importance of livestock production in food processing activities. With the exception of dairy processing, Michigan does not have a large livestock processing sector, and this lowers its ranking. Conversely, Michigan's large fruit and vegetable sectors boost its ranking.

Impact on Employment

Employment appears to be holding steady. Employment in the sector is estimated to be 40,828 with an overall employment impact of 133,980 jobs. It should be noted that employment includes all jobs both full-time and part-time and has not been adjusted to be full-time equivalents (FTEs). Table 4 shows the level of employment by food processing industry. It should be noted that the list of industries in table 4 is somewhat different than those in table 2 because the data sources are different and the list of industries is slightly different.

It should be noted that employment figures in Table 4 may differ from Census estimates for some industries. The MEDC provided employment estimates by industry using databases generated from Economic Modeling Specialists Inc. (emsi); emsi applies employment figures by the Census Bureau and other government statistic reporting agencies to establishment data provided by Dun and Bradstreet to generate industry profiles for the state. Industry multipliers provided by IMPLAN were then used to estimate each industry's contribution to total state employment. Such total impacts account for direct, indirect and induced employment resulting from each industry, where indirect and induced effects include employment in other sectors. While the individual sources of employment (e.g. direct, indirect, induced) for the industries listed above are estimates, the overall employment within each industry is identical to the figure provided by emsi.

Due to the use of different databases, the 2006 processing employment estimate in *The Economic Impact and Potential of Michigan's Agri-Food System* published by the MSU Product Center and the estimate in this paper are not directly comparable. However it does appear that employment in the sector is holding its own and in some industries appears to be increasing. Employment in fruit and vegetable processing appears to be increasing, as well as in the wine, beer, and distilling industries. Animal product processing appears to be holding steady and sugar processing appears to have declined.

Table 3: Ranking of Agri-Food Processing Sectors by State

Rank	State	Value of Shipments (\$ Billions)
1	California	80.79
2	North Carolina	46.97
3	Texas	43.22
4	Illinois	36.42
5	Wisconsin	32.86
6	Pennsylvania	31.58
7	Iowa	30.00
8	Georgia	27.92
9	Ohio	27.71
10	Virginia	23.07
11	Minnesota	20.62
12	Tennessee	20.47
13	Nebraska	19.74
14	New York	19.34
15	Missouri	18.96
16	Indiana	18.51
17	Kansas	17.78
18	Florida	17.44
19	Michigan	14.79
20	Arkansas	14.13
21	Washington	13.96
22	Kentucky	12.10
23	New Jersey	12.08
24	Colorado	10.69
25	Alabama	9.26
26	Maryland	8.62
27	Oregon	7.75
28	Louisiana	7.63
29	Massachusetts	7.51
30	Arizona	6.58
31	Oklahoma	6.41
32	Idaho	6.10
33	Utah	5.65
34	Mississippi	5.41
35	South Carolina	4.95
36	South Dakota	3.23
37	Connecticut	3.17
38	North Dakota	3.16
39	New Mexico	2.70
40	Vermont	2.39
41	Delaware	2.31
42	Alaska	2.28
43	Maine	2.14
44	Nevada	1.78
45	New Hampshire	1.39
46	Hawaii	1.18
47	Montana	0.90
48	Rhode Island	0.84
49	West Virginia	0.70
50	Wyoming	0.18

Source: U.S. Census, 2010

Table 4: Food Processing Employment in Michigan

Industry	Employment within Industry	Total
Pet food manufacturing	47	223
Other animal food manufacturing	359	1,225
Flour milling and malt manufacturing	512	2,504
Starch and vegetable oil manufacturing	259	848
Breakfast cereal manufacturing	3,908	14,628
Sugar manufacturing	1,136	8,132
Chocolate and confectionary manufacturing	769	1,942
Nonchocolate confectionary manufacturing	129	288
Frozen food manufacturing	2,286	3,941
Fruit and vegetable canning/pickling/drying	4,374	15,976
Fluid milk and butter manufacturing	3,196	16,785
Cheese manufacturing	730	4,086
Ice cream and frozen dessert manufacturing	272	1,039
Animal (except poultry) processing	2,554	9,711
Poultry processing	1,762	3,305
Meat processed from carcasses	1,418	5,392
Seafood processing	156	506
Bread and Breakfast product manufacturing	6,969	12,872
Cookie, cracker and pasta manufacturing	1,300	3,542
Tortilla manufacturing	198	340
Snack food manufacturing	1,024	3,692
Coffee and tea manufacturing	680	2,781
Flavoring syrup and concentrate manufacturin	73	394
Seasoning and dressing manufacturing	853	2,389
All other food manfuacturing	904	2,173
Soft drink and ice manufacturing	4,012	12,286
Breweries	344	1,233
Wineries	568	1,623
Distilleries	36	124
Total	40,828	133,980

Sources: U.S. Census 2010, IMPLAN, MEDC

Potential of Additional Processing

To demonstrate potential economic impacts of expanding food processing in Michigan, several hypothetical sector build-outs are modeled for their direct and secondary economic impacts on production and employment. These activities point out the wide range of opportunities potentially available to food processors in Michigan. These include a large dry milk power plant, a small scale artisanal cheese manufacturing facility, a \$20 million fruit juice facility, a small scale fruit processor, a value-added product expansion in sugar processing, a large scale expansion in beef processing, and a small scale vegetable processing expansion.

The results of the economic impact are shown in table 5.

Activity	Direct	Total
Dry Milk Powder Processing Plant	206,954	459,296
Artisanal Cheese Plant	125	276
Fruit Juice Plant	20,000	33,315
Expanded Beef Plant	220,628	423,324
Small Fruit Processor	500	832
Expanded Sugar Product Processing	300	650
Expanded Frozen Vegetable Processing	500	890

Activity	Employment	Direct	Total
Dry Milk Powder Processing Plant		250	2,011
Artisanal Cheese Plant		0	1
Fruit Juice Plant		31	115
Expanded Beef Plant		500	2,288
Small Fruit Processor		1	3
Expanded Sugar Processing		1	6
Expanded Frozen Vegetable Processing		4	7

The large scale animal product activities—dry milk powder and the expanded beef processing facility—have the greatest potential economic impact both in terms of output and employment. However, it should be noted that while these opportunities exist there is likely only room for one or two more of these types of plants in Michigan due to economies of scale. Even then it is likely that considerably more animals would have to be raised in Michigan in order to meet the raw materials needs of these activities. Nonetheless, these figures show the potential impact of expanding the state’s livestock sector. Michigan is a state with abundant water supplies, and is a net exporter of feedgrains. These factors coupled with the state’s high unemployment rate make the state well suited to expand the processing of livestock products.

The economic and employment impact of the other activities are smaller, as scale economies of processing facilities are not as large. However large impacts are possible if multiple firms or facilities enter these industries. This is especially true for artisanal cheese production and the fruit and vegetable processing. While the individual impact may be small, if several of these operations were to come into existence the total impact of output and employment may be quite large. It should be noted the artisanal cheese plant is integrated into an existing farm and as a result there is no additional direct employment. Additionally, Michigan's unique microclimates and its proximity to large population centers make the state well suited to expand the processing of fruits and vegetables, especially minimally processed fruits and vegetables.

In conclusion, there are demand drivers and cost considerations that place Michigan in a desirable position. Given an increase in fuel prices and further uncertainty about fuel costs, producing near large population centers has become more cost competitive. Michigan is located within a day's drive of many large cities. The growing interest in locally produced food also dovetails with the interest in reducing transportation costs, and also works to Michigan's advantage. This is particularly the case for minimally processed fruits and vegetables. It should be noted that this advantage applies primarily to areas located near major interstate highways; it is less of an advantage in Northern Michigan.

Barriers to Food Processing

A brief questionnaire was sent to food processors to determine the barriers to food processing. Among the barriers mentioned was taxation. This included income and property taxes as well as the Michigan Business Tax. While food processors rank state taxes high on their list of issues, many non-food sectors also note similar challenges generated by Michigan's tax system.

One barrier that does seem to disproportionately impact the food processing sector is wastewater treatment and regulation. Over regulation by the Department of Environmental Quality (DEQ) now part of Department of Natural Resources and Environment (DNRE) has been identified. This includes the classification of food processing byproducts. One processor believes that "non hazardous process residuals be considered a "valuable byproduct" or "a residual of value" as opposed to being designated as a low hazard solid waste." An example of this is beet process lime which can be used to lower the PH levels in highly acidic soils. Other food processing byproducts can also be used as soil conditioners provided they are applied at agronomic rates. Processors view existing regulatory treatment of such value generating byproducts as an issue to further growth of Michigan's food processing sectors.

Summary

Food processing is an important source of economic activity and employment in Michigan. The overall economic impact of the sector is estimated to be \$24.97 billion and the overall impact on employment is estimated to be almost 134,000 jobs. Within the

sector itself, the economic impact is estimated to be almost \$14.66 billion with an employment of nearly 41,000.

Given the state's economic situation, geographic location, the diversity and expanse of Michigan crop and feedgrain production, and access to large population centers, there is a good potential to expand processing. Both large and small scale processing activities have potential to be successful.

However, to be successful barriers to enhanced processing need to be addressed. While there are several barriers to enhanced processing, there appears to be only one that has a particularly adverse affect on food processing, waste water treatment and handling. Policies that would allow the effective and efficient disposal of waste water would improve the ability to expand Michigan's food processing activities. Such expansion generates new direct investment in facilities and equipment and fosters economic growth; particularly to rural areas, many of which are facing high rates of unemployment. Building up Michigan's food processing sector not only generates increased demand for Michigan farm products but also sets in motion secondary impacts that benefit all sectors of the economy.

Appendix: Methodology and Issues of Economic Impact Analysis

IMPLAN, a standard economic impact software package was used to generate indirect and induced employment and sales estimates. IMPLAN utilizes user supplied estimates of the direct sales and/or employment and provides associated indirect and induced effects estimates. Direct effects are the changes in the industries to which a final demand change was made; indirect effects are the changes in inter-industry purchases as the respond to demand of the directly affected industry; and induced effects generally reflect changes household spending resulting from activity generated by the directly impacted industry (MIG, p.102).

IMPLAN estimates are based on the following assumptions:

- Constant returns to scale: production functions are considered linear; if additional output is generated all inputs used to generate that output increase proportionately.
- No supply constraints: an industry has unlimited access to raw materials and its output is limited only by the demand for its products. This assumption can be an issue when unemployment is low and prices are rising. However, given the current state of Michigan's economy additional output can be generated with little, if any impact on input markets. This is especially true of labor and real estate markets.
- Fixed commodity input structure: price changes in one input do not cause a firm to buy substitute goods. Inputs are used in fixed proportion to one another. This is related to the first assumption.
- Homogeneous sector output: the proportion of all commodities produced by an industry remains the same regardless of total output in that industry. An industry won't increase the output of one product without proportionally increasing the output of all its other products. This is also related to the first assumption. (MIG, p.103).

Generally speaking, these assumptions are not excessively binding particularly when analyzing the impacts of undertaking new economic activity on a small or medium scale. Nonetheless they are estimates and the true economic impact and employment levels may be different. Generated impact estimates are at best approximations of the expected true economic impacts.

IMPLAN uses economic and employment figures for each industry from published sources although some estimates are systematically inferred for certain industries due to restrictions on publishing data that would identify particular firms within an industry. Past ratios of employment to sales are often used for inferring total economic activity of additional output or employment. This was done in some meat processing industries, some dairy industries and the animal food industry.

A major benefit of using a software package such as IMPLAN is that provides data for all sectors of the economy within a consistent accounting framework (Leones, Schluter and

Goldman, p.1126). It is important to be consistent when analyzing different industries or when trying to measure the economic impact of a sector on the entire economy (Leones, Schluter and Goldman, p.1126).

One important thing to remember in this analysis is that the value of food processing is backward linked to the farm and agricultural input supply sectors. That is to say these figures also include the value of the farm products that were used to produce them. In this case the additional value of on farm production is an indirect impact of having food processing in the state.

Data for the economic impact section comes from the U.S. Census Bureau's *2007 Economic Census* which was published online earlier this year, and can be directly compared to previous studies. The employment figures were provided by the MEDC using emsi data. The Michigan Department of Agriculture staff facilitated the use of emsi data as a more complete measure of employment to the Economic Census of this sector. As a result, we strongly discourage direct comparisons of employment impacts to past reports for estimating change in sector employment and employment impact.

References

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