The Changing Structure of the Soybean Market in Michigan

August 2022

Michigan Soybean Committee

Introduction

Soybeans are a major crop in the United States and Michigan. Depending on the year the U.S. is either the first or second largest producer of soybeans in the world and is the world's second largest exporter. Brazil is the major competitor in global markets. This paper analyzes the current state of the soybean sector in Michigan. This includes the current state of exports, and livestock utilization. Also considered is the impact of the new Zeeland crushing plant in Ithaca on the basis. Alternative and developing markets for soybean oil is also analyzed. Soybean oil is no longer a only a byproduct of soybean crushing but is a commodity of increasing value and has an expanding number of product applications.

The livestock sector in Michigan is growing slowly which has increased the demand for soybean meal in the state. The poultry sector is growing the fastest, although there is also potential growth in dairy and hog production if more workers could be found. Turkey production may soon increase dramatically if Michigan Turkey Producers add another shift at their plant. Michigan Turkey is undergoing infrastructure renovations to increase production. The new soybean crushing plant has improved the basis in Michigan especially for those growers who deliver to the crushing plants.

Exports will remain an important outlet for soybeans. Approximately half the soybeans grown in the U.S. are exported. China will remain the largest market for the foreseeable future. While China faces severe demographic problems, its growing middle class and the country's preference for meat will increase exports in the future but at a slower rate. Countries with the best potential for growth are those with a younger growing population, and a growing income. Many of these countries are in Southeast Asia. African countries also have potential especially if climate change limits these countries ability to grow oilseeds. It may be easier for countries in West Africa to obtain soybeans from the U.S. than from other African countries.

The war in Ukraine may also open temporary export markets for soybean oil in the Mideast and North Africa. These countries have traditionally imported sunflower seed oil from Ukraine, and Russia. Potential disruptions along Black Sea ports as well as the potential inability to grow crops in war zones could reduce output in Russia and Ukraine in the future.

The Current State of Soybean Production and Utilization

There are many trends that are impacting the soybean market. Among these are rising input costs, and uncertainty in Russia and Ukraine. Ukraine is especially important in the production of oilseeds, being the largest producer of sunflower seeds in the world. Another important factor impacting the demand for soybeans is the growing global middle class which has led to an increase in the demand for livestock feed.

Table 1 shows the U.S. balance sheet for soybeans from 2015/16 to 2021/22. The crop year runs from September 1 through August 31.

Table 1: U.S. Balance Sheet for Soybeans 2015/16 – 2021/22

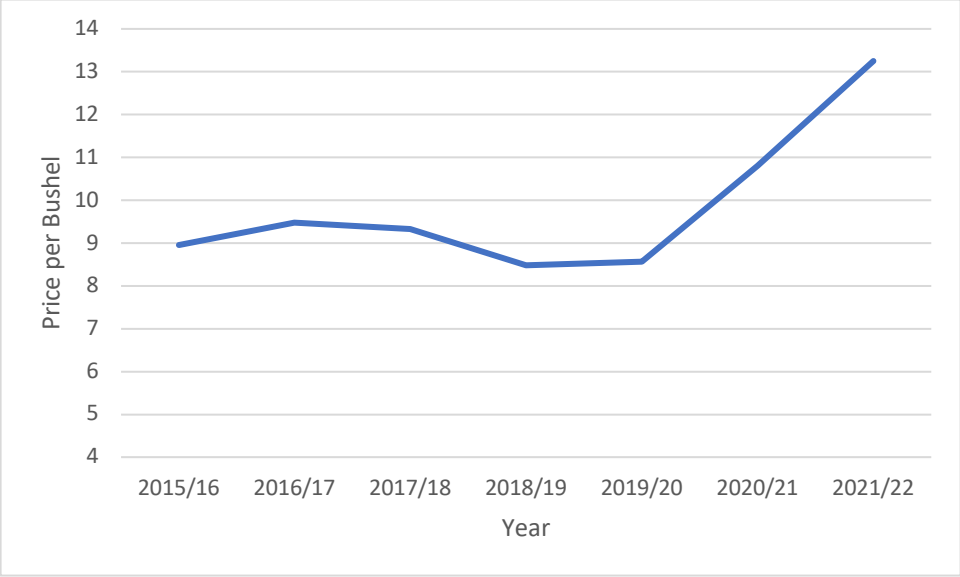
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Supply (Million Bushels)							
Beginning Stocks	191	197	302	438	909	525	257
Production	3,927	4,296	4,412	4,428	3,552	4,216	4,435
Imports	24	22	22	14	15	20	15
Total Supply	4,141	4,516	4,735	4,880	4,476	4,761	4,707
Demand (Million Bushels)							
Crush	1,886	1,901	2,055	2,092	2,165	2,141	2,215
Exports	1,943	2,167	2,134	1,753	1,679	2,261	2,090
Seed, Feed and Residual	115	146	108	126	108	103	117
Total Demand	3,944	4,214	4,297	3,971	3,952	4,504	4,422
Ending Stocks	197	302	438	909	525	257	285

Source: USDA

During this time period, average production of soybeans was 4.18 billion bushels. Most years the biggest market for soybeans is exports followed by domestic crush. Seed, feed, and residual uses are generally less than 3 percent of output, and imports are well less than 1 percent of total supply. Ending stocks have been trending down since 2018/19, which indicates that the demand for U.S. soybeans is relatively high.

Figure 1 shows the price of soybeans during the same time period.

Figure 1: Price of Soybeans 2015/16 – 2021/22



Source: USDA

From 2015/16 through 2018/19 the price of soybeans varied from $8.48 to $9.47 a bushel. There was a slight increase in 2019/20, and then a dramatic increase to $13.25 a bushel in 2021/22. In early September

of 2022, the price of soybeans was $14.20 a bushel. Short crops in Brazil have helped increase the price of soybeans.

Table 2 shows the balance sheet for soybean meal from 2015/16 to 2021/22. While exports are an import outlet for soybean meal, the primary market for soybean meal is the domestic feed market.

Table 2: U.S. Balance Sheet for Soybean Meal 2015/16 – 2021/22

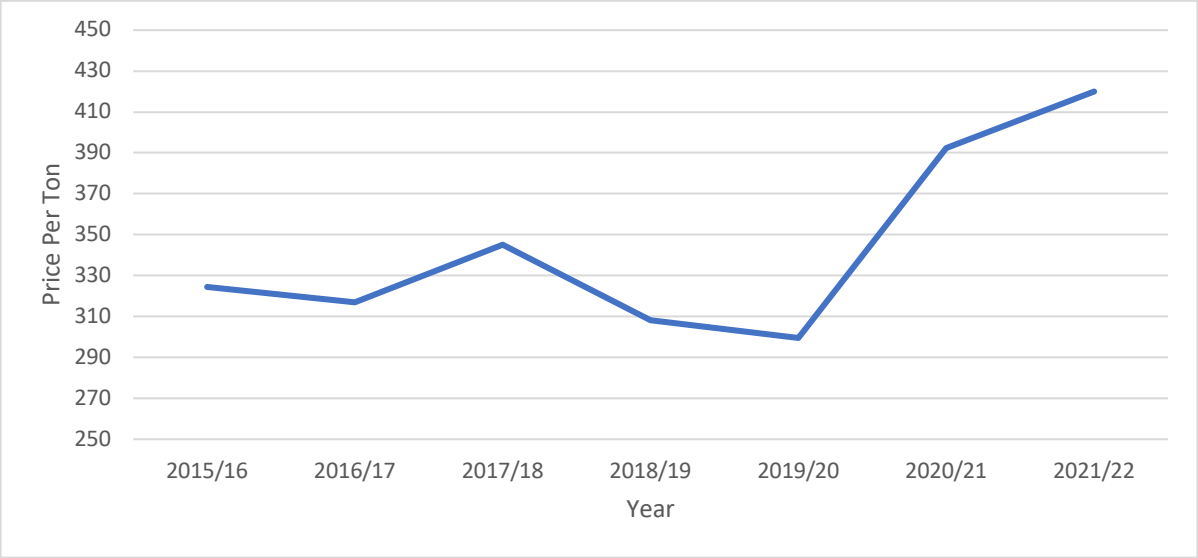
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Supply (1,000 tons)							
Beginning Stocks	260	264	401	555	402	341	341
Production	44,672	44,787	49,226	48,814	51,100	50,565	51,909
Imports	395	345	483	683	629	783	450
Total	45,327	45,396	50,109	50,052	52,142	51,689	52,700
Demand							
Domestic Consumption	33,110	33,416	35,535	36,268	37,967	37,580	37,900
Exports	11,953	11,580	14,018	13,383	13,834	13,768	14,400
Total	45,063	44,995	49,554	49,650	51,801	51,348	52,300
Ending Stocks	264	401	555	402	341	341	400

Source: USDA

Approximately 75 percent soybean meal goes to domestic consumption and 25 percent goes to exports. Exports are also an important outlet for soybean meal. Ending stocks for soybean meal do not vary as much as soybeans. Carryover stocks have been between 341,000 and 402,000 tons since 2018/19.

Figure 2 shows the price of soybean meal from 2015/16 to 2021/22.

Figure 2: Price of Soybean Meal 2015/16 – 2021/22



Source: USDA

Unlike the price of soybeans and the price of soybean oil there has been more variation in the price of soybean meal. The price of soybean meal declined slightly from 2015/16 to 2016/17 before rising to $345 a ton in 201/18. The price declined in 2018/19 and again in 2019/20 to a low of $299 a ton before rising to $420 in 2021/22. In early September of 2022, the price of soybean meal was about $418 a ton.

Perhaps the biggest change in the last 10 to 15 years has been the market for soybean oil. The development of biodiesel appears to be a major driver in the increased demand for soybean oil. The balance sheet for soybean oil is shown in table 3.

Table 3: U.S. Balance sheet for Soybean Oil 2015/16 – 2021/22

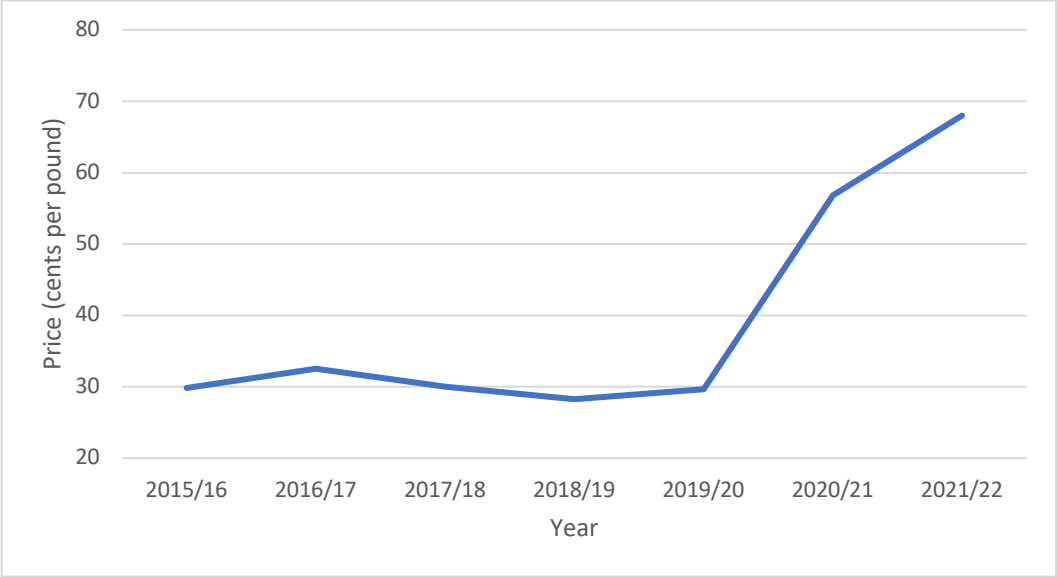
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Supply (Million Pounds)							
Beginning Stocks	1,855	1,687	1,711	1,995	1,775	1,853	2,131
Production	21,950	22,123	23,772	24,197	24,911	25,023	26,205
Imports	287	319	335	397	320	302	450
Total	24,092	24,129	25,819	26,590	27,006	27,177	28,786
Demand							
Food and Other Uses	14,492	13,662	14,046	14,211	13,659	14,473	14,385
Biodiesel	5,670	6,200	7,334	8,663	8,658	8,850	10,700
Exports	2,243	2,556	2,443	1,940	2,837	1,723	1,625
Total	22,405	22,418	23,823	24,815	25,154	25,046	26,710
Ending Stocks	1,687	1,711	1,995	1,775	1,853	2,131	2,076

Source: USDA

Unlike soybeans and soybean meal, exports are a relatively small outlet for soybean oil, generally in the range of 10 percent of production a year. However, the war in Ukraine may increase foreign demand for soybean oil. Ukraine is the largest producer of oil from sunflower seeds, and disruptions in that country could force other countries, especially those in the Mideast to buy more soybean oil from U.S. suppliers. The biggest change in the soybean oil market has been in the increase in the use of soybean oil to produce biodiesel. Biodiesel utilization almost doubled from 5.7 billion pounds in 2015/16 to 10.7 billion pounds in 2021/22. Without the demand from biofuels the demand for soybean oil would have essentially been unchanged during the time period.

The increase in biodiesel demand may be one of the reasons why the price of soybean oil has been increasing. This is shown in Figure 3. However, this increase in the price of soybean oil has improved the competitiveness of alternative feedstocks such as used cooking grease (Ates and Bukowski).

Figure 3: The Price of Soybean Oil 2015/16 – 2021/22



Source: USDA

From 2015/16 to 2018/19 the price was very steady at approximately 30 cents a pound. Since then, the price has risen dramatically. In 2021/22 the price was 68 cents a pound. As of early September of 2022, the price was 66 cents a pound. The use of soybean oil in biofuels has helped support the price. However, the long term future of biofuels is in doubt. The automobile industry has rejected diesel engines, and some trucks may eventually transition to electric, especially those who run shorter routes. Conversely, there is still potential to use biofuels in the maritime and airline industry. Maritime shipping and air transport account for approximately 15 percent of all petroleum used for transportation worldwide.

Exports are an important part of the soybean sector in Michigan. As table 1 shows, about half the soybean crop produced in the U.S. is exported. As a result, transportation plays an important role in moving soybeans from areas of production to areas of consumption and utilization. A separate study on infrastructure outlines some of the issues in more detail. There are few soybeans that travel on Michigan's Class I (largest railroads), but short line railroads do play an important role in moving soybeans to shipping points, especially Toledo.

Water transportation is also important for exports. Barges are used to transport soybeans from interior ports, primarily along the Mississippi River to New Orleans. Barge rates appear to be increasing over time. In August of 2022, barge rates were $456.91; in August of 2021, they were $347.63; and in August of 2020, they were $316.04. Rates are higher during harvest season and farmers and elevators look for a outlets for soybeans.

Ocean rates have also increased. In July of 2022, bulk grain rates from the Gulf of Mexico to Japan were $70.88 per metric ton. The rate from Pacific Northwest ports to Japan is $41.31 per metric ton. These rates are higher than in 2020, but lower than 2021. It appears that supply chain disruptions in the shipping sector are slowly being addressed.

Most of the soybeans in Michigan are shipped via truck. Good data on trucking rates are difficult to fine, but it appears that rates in Michigan are about $5.50 a mile. Assuming the truck carries 80,000 pounds or 40 tons of soybeans yields a per ton rate of 13.75 cents per mile. Michigan has a competitive advantage in trucking because the state has the highest weight limits in the country.

Table 4 shows the estimated Michigan balance sheet for soybeans.

Table 4: Michigan Balance Sheet 2021 (bushels)

Supply	
Acres Harvested	2,140,000
Yield (bushels per acre)	51
Total Output	109,140,000
Demand	
Soybean Meal and Oil	23,580,000
Exports out of Michigan	78,220,000
Carryover	7,340,000

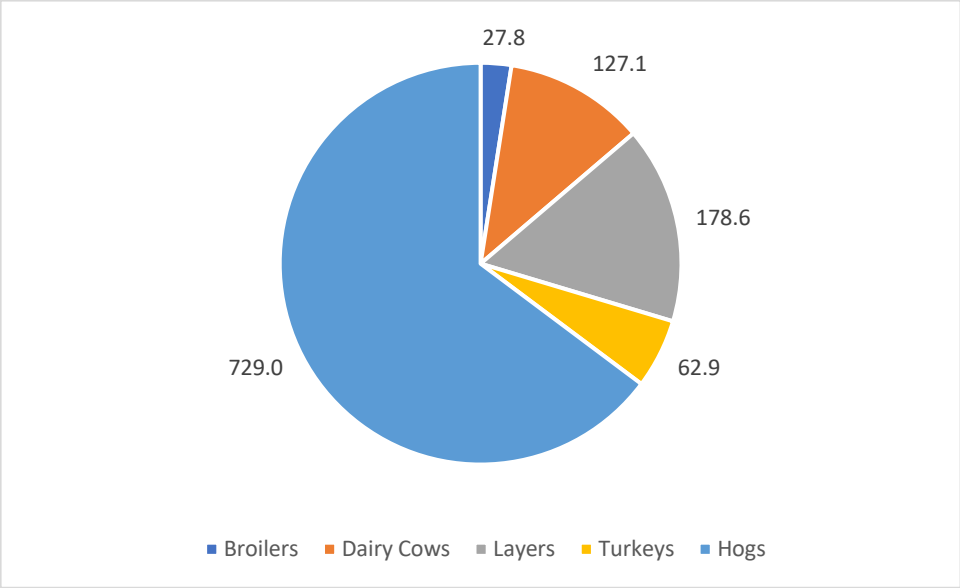
Source: Michigan Agricultural Statistics

These figures need to be considered carefully. Some soybean oil may leave the state. The balance sheet does show that close to 80 percent of the soybeans produced in Michigan are exported out of the state either in the form of soybeans or soybean meal. The increase in soybean crushing has moved Michigan from a net importer of soybean meal to a net exporter. Some of the meal likely goes to Canada along with soybean exports. Soybeans also are delivered to the Southeast United States to feed poultry and hogs.

Michigan Livestock Situation and Outlook

Current consumption for soybean meal in Michigan is estimated to be about 1.12 billion pounds (560,000 tons) a year. Using 47.5 pounds of soybean meal per bushels yields annual utilization in Michigan of 23.58 million bushels of soybeans a year. The dominant species is hogs followed by layers and dairy cows. The breakdown of the utilization of soybean meal in Michigan is shown in Figure 4.

Figure 4: Soybean Meal Consumption in Michigan 2021 (million pounds per year)



It should be noted that these figures assume that the hogs produced in the state are raised form birth until they reach market weight. If some feeder pigs are sent to other states to be finished, the hog figure is overstated. Since the early-2010s, There has been an increase in layers and broilers, turkeys are constant, hogs have increased slightly, and dairy cows have declined. Dairy cow numbers could increase if there were more workers willing to work on dairy farms. About 65 percent of soybean meal was fed to hogs, slightly less than 16 percent was fed to layers, 11 percent was fed to dairy cows, about 6 percent to fed to turkeys and about 2.5 percent was fed to broilers.

There are plans to increase animal numbers, especially hogs and turkeys. One major drawback is access to labor to process hogs and turkeys. If additional workers can be found to operate a second shift for both hogs and turkeys the number of these animals raised in Michigan will increase and the demand for soybean meal will also increase. Michigan Turkey Producers is in the process of increasing their capacity. They are in the process of installing labor saving machinery that will make them less dependent on workers. The utilization of soybean meal for turkey production is likely to expand dramatically.

The does appear to be a movement of animals away from the southwest to the Midwest. Drought and higher temperatures have improved the competitive position of the Midwest. This is likely to continue in the future.

The crushing capacity in Michigan is approximately 50 million bushels a year. The translates to 2.37 billion pounds of soybean meal. The state has now become a net exporter of soybean meal. This is further evidence that there is a potential to expand animal agriculture in the state, and increase the use of soybean meal in the state. The shortage of labor now appears to be the biggest constraint to growth of livestock production in Michigan.

The Market for Soybean Oil

Soybeans have a neutral flavor profile, fatty acids that are desired by consumers, and makes an excellent cooking oil. Most of the soybean oil produced in the U.S. will be used for cooking oil in the foreseeable

future. The development of high oleic and organic soybean oil also improves the competitiveness of soybean oil in the cooking oil market. The potential loss of sunflower oil production in Ukraine will likely increase the demand for soybean based cooking oil from other countries. Cooking oil is an important source of calories in developing countries (Glauber, Laborde and Mamun).

The demand for soybean oil used for cooking is likely to increase in the short term due to the war in Ukraine. Ukraine accounts for 50 percent of the world's sunflower seed exports, and 46 percent of global sunflower oil production and Russia accounts for another 25 percent of exports (Glauber, Laborde, and Mumun).

The war in Ukraine has impacted the entire supply chain. While Russia currently allows for exports out of its Black Sea ports 15 percent of the grain storage facilities in the Black Sea have been damaged. While not impacting this year's crop, Ukrainian farmers may have difficulty obtaining fertilizers and parts in the future. Also, farmland that is mined may not be planted for some time.

In addition to its use as a cooking oil, there are some pharmaceutical uses for soybean oil. Highly refined soybean oil can be used as an Active Pharmaceutical Ingredient to deliver nutrition to patients intravenously. It can also be used as a thickening agent for the production of soft gelatin capsules, creams, and lotions (ADM).

There remains a strong potential for increased use of soybean oil for industrial uses. Soybean oil has the potential to replace petroleum based products for a number of applications. Increased uncertainty in petroleum markets and the fact that soybean oil has a less adverse impact on the environment and in some cases is safer to handle and use than petroleum based products. For example, soy based solvents soy based lubricants (USDA ERS).

These environmental and social benefits have become more important as consumers and other stakeholders have become more demanding of the methods used by firms to produce goods and services.

Among some of the uses of soybean oils are surfactants, emulsifiers and alkyd resins for paints and rubber compounds (USDA ERS, Brentin). Soy oil can also be used as an input in making PVC, and other types of plastics (USDA ERS). Another use of soybean oil is ink, it is particularly popular in the newspaper industry. As of 2017, 90 percent of the newspapers in the U.S. used soy ink (Shurtleff and Aoygai). However, this market is likely to continue to decline as people increasingly get their information from the internet and television. There is also development ongoing to develop soybean based toners for printers (Brentin). Toner is very expensive and it could be possible to develop soy based toners that could be less expensive.

Additional uses are as solvents that can be used as cleaners. Soybean oil can also be used to make oleochemicals, these in turn can be used to make soaps, personal care items, and intermediaries used in other chemical processes (Brentin). Also soybean based oils and greases can be used for air tool lubricants, bar and chain oil, elevator hydraulic fluid, gear oil, two cycle engine oil, transformer fluid, and other fluids and oils (Brentin).

These markets are particularly important because the food demand for soybean oil is relatively stagnant. Demand is likely to increase by about the same rate as the population, about 1 percent a year. One estimate is that industrial uses for soybean oil will increase by 28 percent in the 2022/23 crop year (Fuel and Lubes).

There appears to be two primary demand drivers for soybean oil based products. The first is the federal government's BioPreferred Program. This program was first introduced in the 2002 Farm Bill and has been renewed in succeeding Farm Bills (USDA RD). The program requires the federal government to give preferential treatment to biobased products when purchasing products. It also creates a certification process for biobased products along with a label for certified products. The program allows for a ready made market for some biobased products and allows manufacturers of biobased products to innovate in new product development and take advantage of economies of scale while minimizing risk.

The second driver is Corporate Social Responsibility. Consumers, employees, investors, and regulators are increasingly demanding that firms behave in a way that minimizes environmental impacts. Producing and using biobased products are one way firms can signal to interested groups that they are behaving in a way that promotes the environment. Firms that are under pressure to reduce their carbon footprint or that are interested in reducing the environmental impact of their business may also switch to biobased products.

Traditionally, one factor holding back the use of soybean oil in the manufacture of products is the higher price of soybean oil compared to petroleum based products. For many firms lower cost inputs are the key decision on whether or not to use soybean based products. However, if the price of petroleum increases at a faster rate than soybeans, soybean oil will become more competitive. Another potential cost saving of soy based materials is lower disposal costs.

The Impact of the Zeeland Farm Services Plant in Ithaca

The Zeeland Farm Services plant in Ithaca is on the leading edge of increased soybean crushing in the U.S. Soybean crushing in the U.S. is expected to increase by 650 to 700 million bushels in the next few years; this represents an increase in soybean crushing by about 25 to 30 percent. This will increase the basis other areas besides Mid-Michigan.

The basis varies from year to year and from location to location based on output, weather conditions and other factors. Nonetheless, the basis around the Zeeland soybean plants is considerably lower than other locations. Current basis figures reinforce this. The basis in Zeeland and Ithaca is 5 cents. In other locations it is between 55 and 75 cents a bushel. Currently in northern Illinois, the basis is between about 45 cents and in Toledo the basis is 25 cents a bushel. These figures indicate that given current conditions, producing soybeans close to a crushing plant increases the price received by farmers by a least 40 cents a bushel.

Table 5 shows the difference soybean prices in different states from 2017 to Sept. 2022. These figures come from the USDA. The figures in 2017-2019 come from the annual statistics publication, and the figures for 2020 through 2022 come from Prices Received by Farmers.

Table 5: Soybean Prices in Different States 2017-2022

State	2017	2018	2019	Oct. 2020	Oct. 2021	Sept. 2022
Illinois	9.60	8.74	9.15	9.93	12.00	14.50
Indiana	9.61	8.73	9.10	9.81	11.90	14.50
Michigan	9.39	8.53	8.90	9.92	12.30	15.60
Ohio	9.62	8.69	9.15	9.98	12.10	14.70

Source: USDA

In 2017 through 2019, the price of soybeans in Michigan was lower than in surrounding states. In 2017 through 2019, the price in Michigan was about 20 to 25 cents a bushel lower than surrounding states. In 2020, the price in Michigan was similar to Illinois and Ohio, and 11 cents higher than Indiana. In September 2021, the price in Michigan was 20 to 40 cents higher in Michigan than surrounding states and in September 2022, the price in Michigan was close to a dollar a bushel higher in Michigan. It appears that increased processing capacity has increased the price received by farmers in Michigan.

Export Potential

China is and will continue to be the largest importer of soybeans. However, the long term potential for growth in the Chinese market is limited. The population of China is likely to decline in the second half of the century and the market is rapidly maturing. The war in Ukraine will increase the demand for soybean oil in some nontraditional markets, especially in the Middle East and Northern Africa. Ukraine is a major producer of sunflower oil, and the loss of this production will put pressure on food oil markets. The situation in Ukraine remains in a state of flux, and if access to Black Sea ports is closed, the exports of soybean oil will increase. Tables 6, 7, and 8 show the major export markets for soybeans, soybean meal, and soybean oil.

Table 6: Major Soybean Export Markets 2017-2021 (Millions of dollars)

Country	2017	2018	2019	2020	2021
China	12,224	3,119	8,005	14,077	14,134
Mexico	1,574	1,818	1,878	1,878	2,669
European Union	1,637	2,968	1,853	1,889	2,223
Egypt	364	1,164	995	1,444	1,434
Japan	973	927	971	1,064	1,350
Indonesia	922	998	868	887	1,085
Taiwan	586	854	691	606	736
Bangladesh	391	434	388	484	476
Thailand	467	593	531	568	466
Vietnam	288	469	273	425	395
Rest of the World	2,029	3,713	2,240	2,201	2,440
Total	21,455	17,057	18,693	25,523	27,408
Top Ten as Percent of Total	91	78	88	91	91

Source: USDA

Approximately 90 percent of all soybeans were imported by the top ten countries, and China often imports more than 50 percent of all soybeans. The trade war with China and the African Swine Fever outbreak in 2018 adversely impacted exports, and it shows that it is difficult to lose such a large market. The total value of exports declined by more than 20 percent from 2017 to 2018. There are several countries on this list that have the potential for expansion. These are Egypt, Bangladesh, Indonesia, Vietnam, and perhaps Nigeria.

Bangladesh as a young population with a median age of 27.9 and 45 percent of the population is under the age of 25. Real GDP is growing at approximately six percent a year and a per capita GDP of $4,800. Bangladesh is a growing producer of seafood. Exports to Bangladesh should grow in the future.

Exports to Indonesia should also increase in the future. Indonesia is the largest country in Southeast Asia with a population of 277.3 million people, which makes it the fourth largest country in the world based on population. Approximately 40 percent of its population is under the age of 25, with a median age of 21.1. It also has the largest economy in Southeast Asia with a per capita GDP of $11,400. This country is a solidly middle income country. The primary issues is the large Muslim population which limits hog production, and the large palm oil industry which restricts soybean oil utilization. Nonetheless, the market fundamentals are strong for more soybean exports to that country.

Another major Southeast Asian country with potential is Vietnam. It has a population of approximately 103.8 million people. The median age is 31.9 and 38 percent of the population is under the age of 25. Real GDP is growing at about 6 percent a year. Per capita GDP is $8,200; and the country has a fast growing middle class.

Egypt has traditionally accessed much of its food through Russia and Ukraine. This might change as a result of the war in Ukraine. It has a population of 107.7 million with which more than half are under the age of 25 and more than a third are under the age of 15. Real GDP is growing at a rate of 4 percent and per capita GDP is $12,000 making Egypt a middle class country. The U.S. has traditionally offered food aid assistance to Egypt to help stabilize the country. Egypt could also be a major market for soybean oil exports.

Turkey is a country in a similar situation to Egypt's. The U.S. has recently expanded soybean exports to that country. Turkey's population is 83.0 million and 39.1 percent of the population is under the age of 25. The median age is 32.2 years old. More than 15.6 million people live in Istanbul and another 5.3 million live in Ankara. Per capita real GDP is $28,400 and before the recent economic slowdown, economic growth was strong. Turkey may continue to desire to diversify sources of food products away from Russia.

One country that is particularly interesting is Nigeria. It has the largest population in Africa with more than 225 million people, of which more than 60 percent are under 25 and 40 percent are under the age of 15. The largest city Lagos, has a population of more than 15 million, making it larger than many countries. GDP per capita is $4,900 and real GDP is only growing about 1 percent a year. If some underlying social and military problems can be solved, Nigeria has a great potential to be a major soybean importer.

Table 7: Major Soybean Meal Export Markets 2017-2019 (tons)

Country	2017	2018	2019
Philippines	2,245,176	2,372,405	2,350,689
Mexico	1,793,169	1,960,037	1,961,950
Colombia	1,071,052	1,351,928	1,383,061
Canada	1,007,823	1,098,215	1,075,445
Ecuador	203,421	352,462	604,500
Dominican Republic	538,294	540,607	598,765
Vietnam	211,638	838,838	591,153
Guatemala	403,813	473,002	509,574
Japan	275,144	363,681	374,301
Morocco	236,909	608,557	360,836
Rest of the World	3,759,814	4,358,768	3,799,719
Top Ten as Percent of the Total	68	70	72

Source: USDA

Soybean meal exports tend to be to countries located close to the U.S. and for countries that may not have capacity to crush their own soybeans. About 70 percent of the soybean meal exported out of the U.S. goes to the top ten countries. North African countries such as Morocco may have more potential for growth.

Table 8: Major Soybean Oil Export Markets 2017-2019 (tons)

Country	2017	2018	2019
South Korea	290,957	309,277	392,477
Mexico	265,364	164,050	147,722
Dominican Republic	194,471	157,001	141,475
Columbia	58,027	83,021	93,358
Peru	98,369	141,258	63,268
Guatemala	36,838	29,714	35,891
Venezuela	25,357	24,008	21,801
Jamaica	13,420	18,920	16,532
Canada	2	102,356	13,045
Mozambique	9,248	8,322	13,045
Rest of the World	185,609	181,680	112,428
Top Ten as Percent of the Total	84	85	89

Source: USDA

Major soybean oil importers tend to be similar to soybean meal importers with the exception of the Philippines which is the largest importer of U.S. soybean meal but not is not a major importer of soybean oil. The market potential in Venezuela is limited by the collapse of that economy. One country that has potential is India. It appears that India will soon have the world's largest population within the next two or three years. The median age is 28.7 and about 44 percent of the population is under the age of 25. Real GDP grew at about 7 percent a year from 1997 to 2017. Per capita GDP is $6,100. India does not

grow enough soybeans to meet is cooking oil needs. Some of the countries that currently import from Ukraine and Russia, that may turn to the U.S. for their cooking oil needs are Egypt, Pakistan, Bangladesh Turkey, Lebanon, and Morocco (Liefert)

China is and will remain the largest export market for U.S. soybeans. It's is the world's largest market for food products and as more people can afford a meat diet the demand for soybeans is likely to increase. The primary short term risk is another animal disease outbreak such as the African Swine Fever outbreak with would reduce the number of animals in China. The primary long term risk is a stagnant or declining population. It is unlikely that the exports of U.S. soybeans will continue to grow as the Chinese economy and population matures.

Another mature market with limited export potential is Europe. Many soybeans exported to Europe are delivered to Rotterdam, but are then distributed throughout Europe. The European Union is also in the process of enacting its Farm to Fork policy that is designed to make agricultural production more environmentally sustainable while enhancing farm income (Bryant). The potential regulations could make it more difficult to export to Europe if these regulations are enacted. However, if these regulations reduce yields, markets currently served by Europe particularly in Africa could turn to the U.S. for soybeans and especially soybean oil.

The war in Ukraine has also introduced uncertainty into global agricultural markets. Russia and Ukraine account for 77 percent of sunflower seed oil exports (Liefert). Currently, shipping from Black Sea ports is continuing. However, disruptions of shipping could occur, and planting may also be disrupted, some of the largest agricultural producing regions in Ukraine are near the front. Declines in the value of the Ukrainian and Russian currencies may make it difficult for farmers in those two countries to buy inputs, especially fertilizers. Russia may also enact export controls in order to reduce domestic food price inflation; this will force countries currently dependent on Russian exports to look for imports from other countries.

Summary

Soybeans are an important crop for Michigan. Approximately 2 million acres a year are devoted to soybean production in Michigan every year. As a result of expanded soybean processing in the state no longer needs to import soybean meal to feed its livestock. However, the state does have the ability to expand soybean utilization in the state by raising more livestock. Access to labor appears to be the biggest constraint. Hog processing and dairy production appear to be particularly impacted by labor shortages.

The new crushing plant in Ithaca has improved the basis. The basis at both Ithaca and Zeeland is close to zero. The basis in other parts of the state are in the range of 40 to 60 cents a bushel, which is somewhat higher than Toledo and is similar to Northern Illinois. While it might be too early to tell, it appears that farmers in Michigan now obtain a higher price for their soybeans relative to producers in surrounding states.

Exports play a key role in the profitability of growing soybeans. About 40 to 50 percent of the soybeans produced in the U.S. are exported. Exports are also important for the soybean meal and soybean oil markets. Prices for soybeans, soybean oil, and soybean meal have been trending upward despite the increase in the value of the dollar that makes U.S. products more expensive in foreign markets. Biodiesel

and other nonfood uses for soybean oil has increased the demand and price for soybean oil. This is likely to continue in the future.

China will continue to be the dominant export market for soybeans, but it is quickly maturing and the potential for further growth is somewhat limited. The same is true for Canada and Europe. Countries in South and Southeast Asia have more potential. While it may be a somewhat difficult market to develop Nigeria has a great deal of potential as a market. Nations in North Africa and the Middle East also have potential, especially given the current war in Ukraine.

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