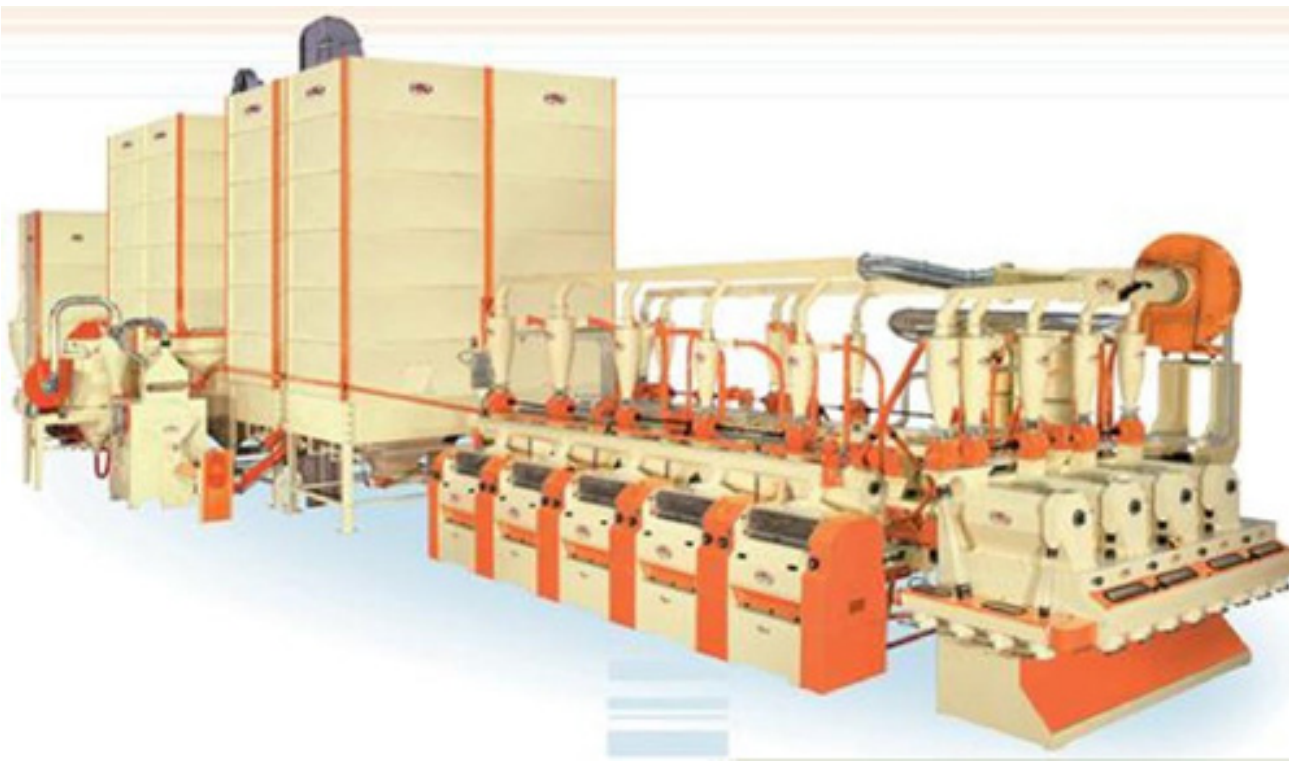


# OAT MILLING FEASIBILITY STUDY



Feasibility of an Oat Milling/Processing Facility at the Kohler Company

December 22, 2015

Principal Researcher:  
Russell Kashian, Ph.D.

UW – Whitewater, Fiscal & Economic Research Center (FERC)

Cynthia K. Jaggi, Food to Market  
Kaia Fowler, Market Research Manager  
Emmett Storts, Lead FERC Assistant  
Taylor McDarison, FERC Graphic Designer

## Overview

The objective of this feasibility study is to provide an overview of the oat milling infrastructure needs and challenges for the client, and to offer potential options and practical advice. It provides an example of the investment and infrastructure required to build an oat mill sized and scaled appropriately for the client, make recommendations for the equipment required and the costs for build out of a new facility, estimate what it might cost to operate such a milling operation including pricing and markets, and establish whether there would be a market for the milling operation, and the financial feasibility of such a venture.

Market research was conducted to assess the feasibility of the client providing milling services to oat growers and selling milled oat products to buyers in the Wisconsin area. This research identifies target markets and potential clients for the client, and provides a market assessment of the projected growth of various markets, including oats and oat products, gluten free oat products, craft breweries, bakeries, and specialty stores.

The study was completed through extensive interviews with existing milling operations, mill suppliers, grain growers, and buyers from craft breweries, commercial bakeries, and specialty stores, as well as by reviewing third party research.

## Conclusion

### Market Size and Saturation

The study found that the Wisconsin oat market is somewhat saturated with high quality oats being produced from established providers with a loyal customer following. Commercial buyers have access to high quality milled oats, for as little as \$440 per ton. The study found the market size for oats in the client's region is between 1,200 and 1,500 tons per year. It was also found that the overall perception in the market is one of satisfaction with current suppliers and no strong evidence of market growth.

Market research confirmed that the largest market for oats in the 150-mile region surrounding the client, Wisconsin is in commercial baked goods (estimated 800 tons of oats annually). However, a substantial number of commercial bakeries do not source oats at all. Specialty food stores — including food cooperatives and health stores with an interest in a new line of gluten free oats — account for approximately 80 tons of oats annually. If all grocery stores, excluding convenience stores, were counted, the market demand would equate to approximately 500 tons of oats sold within the 150-mile radius, however, this demand is already being supplied. Breweries, in contrast, source approximately 225 tons of oats annually, to produce stout beers, where oats are used as a main ingredient.

### Milling Operation EBIDTA Breakeven: The Client's 700 acres

A commercial scale oat milling operation located at the client, and milling 700 acres of oat production, will not breakeven on an EBIDTA cash flow basis (earnings before interest, depreciation, taxes, and amortization), selling milled oats at \$440 per ton, based on the calculated total revenue, variable costs and capital costs.

	Medium Price	Price Variance (30%)	Price Variance (-30%)
Total Revenue	\$93,278	\$121,261	\$65,295
Final Total Capital Cost	\$674,465	\$674,465	\$674,465
Total Variable Costs	\$124,728	\$124,728	\$124,728
Total Revenue Less Variable Costs (EBTIDA)	-\$31,450	-\$3,467	-\$59,433
Breakeven Point (years)	Never	Never	Never

Note: In Wisconsin, oats can be harvested once a year.

## Milling Operation EBIDTA Breakeven: Capturing Entire Wisconsin Oat Market within 150-mile radius of The client

The market demand for milled oats within a 150-mile radius of the client is between 1,200 and 1,500 tons of oats annually. A median of 1,350 tons was used for this study.

A commercial Oat milling operation located at the client, milling 1,350 tons of oats, will not breakeven on an EBIDTA cash flow basis, selling oats at \$440 per ton, based on the calculated total revenue, variable costs and capital costs. The client can only produce 379 tons of oats and would need to make up the difference by purchasing 971 tons of oats to meet market demand.

### Scenario 2: Breakeven

	Medium Price	Price Variance (30%)	Price Variance (-30%)
Total Revenue	\$332,736	\$432,556	\$232,915
Final Total Capital Cost	\$1,110,522	\$1,110,522	\$1,110,522
Total Variable Costs	\$351,976	\$351,976	\$351,976
Total Revenue Less Variable Costs (EBTIDA)	-\$19,240	\$80,580	-\$119,061
Breakeven Point (years)	Never	12.53	Never

Note: In Wisconsin, oats can be harvested once a year.

### Start Up Capital

Gaining traction in a saturated market is the most difficult type of product entry, requiring a prolonged market adoption rate, and increased marketing efforts and investment. This, in addition to the price being too low, is the main obstacle from entering the market.

Market research found the cost of oat milling equipment is \$135,277, for the scale the client would be operating. Utilizing a selling price of \$440 per ton for oat flakes with a 30% variance and oat yields from the past five years, a

breakeven point will not be reached from 700 acres the client already owns. In order to capture the entire market within a 150-mile radius, the client would need 2,497 acres of oats to meet market demand. Breakeven will not be reached

### Start Up Capital for Small-Scale Operations

	Small-Scale Capital
Total Storage of Oats and Equipment	\$550,834
Cost of New Facility	\$323,504
Oat Milling and Packaging Equipment Costs	\$135,227
Sub Total Capital Costs	\$1,009,565
Contingency Cost (10%)	\$100,957
Total Capital Costs	\$1,110,522

### Recommendation

FERC recommends the client not to use its financial resources to expand into the production and milling of oats, due to the fact that the market is already saturated and current demand is being met with satisfaction from established milling operations with loyal customers. In addition, the market research showed no incremental forecasted increase in demand in the foreseeable future. Other factors for this recommendation include substantial capital costs associated with purchasing the equipment, building the facility and unfavorable timelines to breakeven points. Oat pricing elasticity and variances favor this recommendation as well.

## Findings - Breakeven Analysis

### Scenario 1: Small Scale milling Operation - The Client's 700 acres

In this Scenario, the client expends the capital necessary to start and launch the small scale oat mill. The company uses their 700 acres of farmland to grow oats. After harvest, the oats will be transported to a mill which will also be owned by the client. Here the oats will be processed and packaged to be shipped to customers. The price

for oats over the past 18 years has reflected a 30% price variance. In this scenario, the client will only be purchasing small scale oat milling equipment due to the small volume of oats being harvested off their 700 acres of production. The following table reflects the revenue and pricing of this scenario:

Revenue	Median Price	Price Variance (30%)	Price Variance (-30%)
Selling Price of Processed Oats perTon	440	572	308
Amount of Farming Land (acres)	700	700	700
Amount of Raw Oats Produced (tons)	379	379	379
Amount of Processed Oats (tons)	212	212	212
Total Revenue	\$93,278	\$121,261	\$65,295

Note: The amount of raw oats produced in this Scenario is 379 tons. After processing, 379 tons is reduced to 212 tons of oats. Ref: [15]

### Storage Costs

After the oats are harvested they must be stored. The storage costs associated with the 379 tons of raw oats, the estimated production from 700 acres, are indicated below.

	Median Price
Storage per Ton	\$407
Total Storage	\$154,418

Reference: [18]

### Facility Costs

The cost of building a new facility, based on constructing a 4,928 square foot building, for the oat milling operation are estimated below.

	Costs
Facility Electrical Costs	\$50,000
Facility Price per Square Foot	\$50
Square Footage Needed	4,928
Cost of New Facility	\$323,504

### Packaging Equipment

The Oat Milling and Packaging Equipment Costs are indicated below for the small scale equipment capable of milling 5 tons of oats per hour. A more in-depth analysis of the list of equipment needed to mill oats can be found in the milling section of this study.

	Median Price
Oat Milling and Packaging Equipment Costs	\$135,227

Note: This equipment can mill and package oats at 11 tons per hour, derived from the processing time of each piece of equipment. This can be seen in the mill section of this study. Ref: [19]

### Total Capital Costs for Oat Milling Operation

	Costs
Total Storage	\$154,418
Cost of New Facility	\$323,504
Oat Milling and Packaging Equipment Costs	\$135,227
Sub Capital Costs	\$613,150
Contingency Cost (10%)	\$61,315
Final Total Capital Costs	\$674,465

Note: Contingency Cost is the cost of permits, licenses and other startup costs.

### Variable Costs

	Median Price
Amount of Farming Area (Acres)	700
Amount of Raw Oats Produced (Tons)	379
Processing Capabilities (Tons per Hour)	5
Time to Complete Oats Milling and Packing (Hours)	76

Reference: [15] [16]

### Equipment Power Costs

	Median Price
Equipment Power Costs per Hour	\$12.66
Total Equipment Power Costs	\$959

Reference: [19]

### Planting Costs Based on 700 Acres of Oats

	Median Price
Cost of Planting Oats per Acre	\$133
Total Costs of Planting Oats	\$93,548

Note: A further breakdown of how the \$133.64 was found can be seen in the production cost section of the report. Ref: [15]

### Labor Costs

	Median Price
Labor Costs per Hour	\$261
Total Labor Costs	\$19,758

Note: A further breakdown of how the \$261 was found can be seen in the labor subsection within the mill section of the report. Ref: [10]

The cost to transport grain from the farm to the mill was estimated at five miles for this scenario.

### Transportation Costs

	Median Price
Price per Bushel	\$0.19
Number of Bushels to Transport	22,740
Base Fee	\$350
Transportation Costs	\$4,671

### Total Variable Costs

	Median Price
Total Machine Power Costs	\$959
Total Costs of Planting Oats	\$93,548
Total Labor Costs	\$19,758
Transportation Cost	\$4,671
Maintenance Cost (2%)	\$5,792
Total Variable Costs	\$124,728

Note: Maintenance costs est. at 2% of the total equipment cost.

### Opportunity cost

Opportunity cost is the loss of potential gain from other alternatives when one alternative is chosen. This cost is not actually paid but rather is a logical exercise in allocating resources. The opportunity cost of expending the capital on farming and milling oats is shown below.

#### Opportunity Cost of Alternative Investments

	Median Price
Risk Free Assets Return (2%)	\$13,489
Total Opportunity Costs	\$13,489

Note: The risk free asset used is the average of 5, 7, and 10-year U.S. treasury bond.

#### Breakeven Point - Oat Milling Operation

	Median Price	Price Variance (30%)	Price Variance (-30%)
Total Revenue	\$93,278	\$121,261	\$65,295
Final Total Capital Costs	\$674,465	\$674,465	\$674,465
Total Variable Costs	\$124,728	\$124,728	\$124,728
Total Revenue Less Variable Costs (EBTIDA)	-\$31,450	-\$3,467	-\$59,433
Breakeven Point (years)	Never	Never	Never

Note: In Wisconsin, oats can be harvested once a year.

### Scenario 2: Small-scale Milling Operation Capturing Entire Wisconsin Oat Market within 150-mile radius of The Client

Scenario 2 is similar to Scenario 1, but instead of using just the 700 acres of land the client has available to grow oats, it will also mill oats from other farms to meet market demand. The market demand, determined through market research, is between 1200 and 1500 tons of oats. An estimate of 1,350 tons was used in the study calculations.

Revenue	Median Price	Price Variance (30%)	Price Variance (-30%)
Selling Price of Processed Oats perTon	440	572	308
Amount of Farming Land (acres)	2,497	2,497	2,497
Amount of Raw Oats Produced (tons)	1,350	1,350	1,350
Amount of Processed Oats (tons)	756	756	756
Total Revenue	\$332,736	\$432,556	\$232,915

Note: The amount of raw oats that will be produced with 2497 acres of land will be 1350 tons. When processed, the 1350 tons is reduced to 756 tons of oats. Ref: [15]

### Storage Costs

Storage costs are based on 1,350 tons of raw oats, produced from 2,497 acres of land.

	Median Price
Storage per Ton	\$407
Total Storage	\$550,834

### Capital Costs

The cost of constructing a new facility in this scenario would require 7,145 square feet.

	Small Scale
New Facility Electrical Costs	\$50,000
New Facility Price per Square Foot	\$56.50
New Square Footage Needed	4,928
Cost of New Facility	\$323,504

### Packaging Equipment

The equipment necessary to process oats can do so at a rate of 5 tons per hour. A more in-depth analysis of the list of equipment needed to mill oats can be found in the milling section of this study.

	Median Price
Oat Milling and Packaging Equipment Costs	\$135,227

Note: The small-scale equipment can process 43 tons per hour vs. small scale at 11 tons per hour. This can be seen in the mill section of this study. Ref: [19]

### Scenario 2: Total Capital Costs

	Costs
Total Storage	\$550,834
Cost of New Facility	\$323,504
Oat Milling and Packaging Equipment Costs	\$135,227
Total Capital Costs	\$1,009,565
Contingency Cost (10%)	\$100,956
Final Capital Fixed Costs	\$1,110,522

Note: Contingency Cost is the cost of permits, licenses and other startup costs.

### Variable Costs

The estimates used in this scenario are based on the amount of oats, in tons, that would be produced on 2,497 acres of farmland to meet market demand.

	Median Price
Amount of Farming Area (Acres)	2,497
Amount of Raw Oats Produced (Tons)	1,350
Processing Capabilities (Tons per Hour)	5
Amount of Time Running (Hours)	270

Ref: [15] [16]

### Equipment Power Costs

	Median Price
Equipment Power Costs per Hour	\$12.66
Total Equipment Power Costs	\$3,420

Ref: [19]

### Planting Costs

	Median Price
Cost of Planting Oats per Acre	\$133
Total Costs of Planting Oats	\$93,548

Ref: [15]

### Labor Costs

Please note the productivity on the small-scale equipment is higher, resulting in reduced labor costs.

	Median Price
Labor Costs per Hour	\$261
Total Labor Costs	\$70,479

Note: A breakdown of the \$261, can be found in the labor subsection within the mill section of the report.

Ref: [10]

### Transportation Costs

A price of \$0.19 per bushel was estimated in the calculations to transport the oats to the milling facility.

	Median Price
Price per Bushel	\$0.19
Number of Bushels to Transport	22,740
Base Fee	\$350
Transportation Costs	\$4,671

Ref: [20]

### Purchasing of Additional Oats

Because the client can only produce 379 tons of oats they need to make up the difference by purchasing the oats. The difference in this scenario is 971 tons.

	Median Price
Additional Amount of Oats	971
Number of Bushels per Acre	58
Total Number of Bushels	56,318
Price per Bushel of Oats	\$2.95
Total Cost of Additional Oats	\$166,138

### Total Variable Costs

	Median Price
Total Machine Power Costs	\$3,420
Total Costs of Planting Oats	\$93,548
Total Labor Costs	\$70,479
Transportation Cost	\$4,671
Total Cost of Additional Oats	\$166,138
Maintenance Cost (2%)	\$13,721
Total Variable Costs	\$351,976

Note: Maintenance costs est. at 2% of the total equipment cost.

### Opportunity Cost

	Median Price
Risk Free Assets Return (2%)	\$20,191
Total Opportunity Costs	\$20,191

Note: The risk free asset used is the average of 5, 7, and 10-year U.S. treasury bond.

### Scenario 2: Breakeven

	Median Price	Price Variance (30%)	Price Variance (-30%)
Total Revenue	\$332,736	\$432,556	\$232,915
Final Capital Costs	\$1,110,522	\$1,110,522	\$1,110,522
Total Variable Costs	\$351,976	\$351,976	\$351,976
Total Revenue Less Variable Costs (EBTIDA)	-\$19,240	\$80,580	-\$119,061
Breakeven Point (years)	Never	12.53	Never

Note: In Wisconsin, oats can be harvested once a year.

### Scenario 3: Depreciation Model – Mill (The Client 700 Acres)

In this Scenario, IRS Depreciation schedules for the equipment and the cost of the new facility are applied. For equipment, a seven-year depreciation period is used and 20 years depreciation schedule is used for the building [14]. This table shows that the client will not break even due to the price not being high enough.

Breakeven Analysis - Depreciation - Small-Scale Mill

	First 7 Years	Next 13 Years	After 20 Years
Total Revenue	\$ 93,278	\$ 93,278	\$ 93,278
Capital Costs	-	-	-
Machinery Depreciated Over 7 Yr Period	\$ 45,516	\$ 45,516	\$ 45,516
Farming Facility Depreciated Over 20 yr Period	\$ 17,793	\$ 17,793	-
Total Capital Costs	\$ 63,309	\$ 63,309	45,516
Variable Costs	-	-	-
Planting Oats	\$ 93,548	\$ 93,548	\$ 93,548
Maintenance	\$ 5,793	\$ 5,793	\$ 5,793
Machine Power	\$ 959	\$ 959	\$ 959
Labor	\$ 19,758	\$ 19,758	\$ 19,758
Transportaion	\$ 4,671	\$ 4,671	\$ 4,671
Total Variable Costs	\$ 124,728	\$ 124,728	\$ 124,728
Profit	(\$94,758)	(\$94,758)	(\$31,450)
ROI	-149.68%	-149.68%	-69.10%

### Scenario 4: Depreciation Model –The Client Captures Entire Market Demand

Scenario 4 uses the IRS depreciation schedules as the client positions to capture the entire 150-mile radius area market study area. Using the depreciation schedules show breakeven would be reached after the building was completely depreciated in 20 years.

Breakeven Analysis - Depreciation - Small-Scale Mill

	First 7 Years	Next 14 Years	After 20 Years
Total Revenue	\$ 332,736	\$ 332,736	\$ 332,736
Fixed Costs	-	-	-
Machinery Depreciated Over 7 Yr Period	\$ 107,810	\$ 107,810	\$ 107,810
Farming Facility Depreciated Over 20 yr Period	\$ 17,793	\$ 17,793	-
Total Fixed Costs	\$125,602	\$125,602	\$ 107,810
Variable Costs	-	-	-
Planting Oats	\$ 93,548	\$ 93,548	\$ 93,548
Maintenance	\$13,721	\$13,721	\$13,721
Total Costs of Additional Oats	\$166,138	\$166,138	\$166,138
Machine Power	\$3,420	\$436	\$436
Labor	\$32,036	\$32,036	\$32,036
Transportaion	\$ 4,671	\$ 4,671	\$ 4,671
Total Variable Costs	\$313,533	\$310,549	\$310,549
Profit	(\$106,400)	(\$103,416)	22,186
ROI	-84.71%	-82.34%	20.58%

### Conclusion

The standard when it comes to businesses investing capital into new projects is an expected payback of 5 to 7 years. In Scenario 1, ‘never’ is not acceptable period returns. Scenario 3, in which the depreciation model is used shows breakeven can never be reached. That is when the client will start to see a return on investment. In Scenario 4, a positive return on investment can be seen once the facility is completely depreciated in 20 years. This is due to the cost of capital being depreciated over time. Within Scenario 2, breakeven points are not much more favorable. Breakeven points of 12.5 years and ‘never’ are not acceptable returns. The caution here is also the market is mature and somewhat saturated, with no new entries to the existing market as well as market demand already being satisfied. While obtaining 100% of the market is not achievable, it provides the ‘best case’ scenario. However, it should be noted, that even in this scenario, **the project is not profitable**. It is simply less unprofitable.



## Value Chain

Oats are grown in temperate regions where there is a low summer heat and great rainfall. Typically they are grown in northwest Europe, Central Canada, and the Midwest United States. Oats are an annual plant, which, in Wisconsin, can be planted from mid-April to early August. During the early Wisconsin spring, the late thaw may present a challenge when planting oats. The challenge is in drilling the land to plant the seeds. The ground has to be thawed enough to use the no-till drill and other farming equipment, but still firm enough to support the weight of such equipment. To decrease the difficulty of this problem, it is important not to till the ground in the fall prior to planting oats. Growers also need to pay close attention to spring weather patterns; looking for spring mornings in which the ground is firm enough to hold the equipment but soft enough to drill. [7][13][8]

Growing oats with other crops involves a degree of uncertainty. Relevant factors include weather, insects and weeds. Some of these can be insured through the USDA, which has varying rates based on planting and harvest dates and yield history. To protect the farmer from this uncertainty, a contracted price is determined between the producer and the processor. The processor agrees to buy the harvest at the price if it meets the specified standards. At harvest, the oats are stored in grain elevators with the producer until the processor calls for delivery. Once sold, the oats are transported by bulk truck or railcars to cleaners who process the oats for buyers. [11]

In some cases, the processor does the cleaning and hulling; in other cases it is contracted to a third party. Cleaned oats are sampled to ensure quality, and are inspected for weather damage, insects, disease and mold. Cleaning also removes unsuitable oats for milling. These are doubled, pin, light, and hulled oats. Materials such as dust, stems and weed seeds are also removed. Doubled oats are oats with two groats, which are not well developed. Pin oats contain thin groats, while light oats contain a high percentage of hulls. [6]

After cleaning, oats are heated to allow the oat hulls to brittle, which facilitates de-hulling.

Heating also gives them a roasted flavor and partially deactivates lipase enzymes. The temperature of the heating ranges from 190 to 208 degrees Fahrenheit and moisture content is reduced from 12% to 7-10% during the process. [10]

Oat processing is the conversion of raw oats into oat flakes. The initial step is to clean, grade and de-hull the raw oats. This requires the uneatable outer shell of the oat to be separated from the inner oat groat. Centrifugal acceleration is used in this process. The oats are fed by gravity onto the center of a horizontally spinning stone, which accelerates them towards the outer ring. Groats and hulls are separated on impact with this ring. The oat groats are steamed, softened and rolled to make flattened oats, called rolled oats. They acquire a flake type structure of varying thickness. The oat hulls are used as feed, processed further into insoluble oat fiber, or used as a biomass fuel. In the processing operations, the dehulling efforts face conflicting controls. For example, dehulling efficiency and groat breakage both increase with rotor speed. Groat yield increases with efficiency and decreases with breakage. However, these results are optimal depending upon genotypes and the external environment. Yield varies from 50% at a low rotor speed and specific genotypes to just above 70% for faster speeds and alternative genotypes. As a result, this report will focus on a yield of 60% of tonnage. In addition, with an anticipated loss of 4% of tonnage being lost during the cleaning, steaming and flaking of the rolled oats, the remaining 36% is converted to husks and hulls.

After the groats are separated from the hull they are passed through a steamer. This is done to bring the moisture content up from 7-10% to 10-12%. It also increases the temperature of groats to between 210 and 220 degrees Fahrenheit, which ensures lipolytic enzymes are inactive. They are again cooled to produce quality flakes. To increase taste, gum, sugar, salt or other malt and syrups can be added. [10][12][9][6][5]

Finally, the regular and quick oat flakes are rolled to uniform thickness and specifications based on the final product they will become an ingredient in. They are then packed and distributed for the next step in the process.

Between the producers and processors are grain companies or commission brokers. The grain company connects buyers and sellers by buying the oats from the producer and selling to the processors. Commission brokers also connect buyers and sellers but, instead of taking ownership of the oats, they charge a commission for their services.

Once the processors have purchased the oats, they can use them as an ingredient in the creation of another product or treat and process them for human consumption. When they are processed, oats go through several steps to be edible. They are dry heated and steamed with enzymes to give them a nutty flavor. The small and large groats are separated with the large groats entering the groat steam and the smaller groats into the cutting system. They then pass through a steel cutter turning them into flakes. Then they are bed dried before being packaged. They also can be rolled into hammer mills where they are ground to create flour or bran. Once the processors have completed the processing of the oats, distributors connect the processors with retailers. The distributor takes ownership of the oat product and takes care of storage and transportation to retailers. The retailers are the final stage of the oat supply chain. They are responsible for selling the final good that was produced by the farmer and processed by food processors. [4]

Throughout the oat supply chain, regulatory bodies are involved, such as the Food and Drug Administration (FDA) and United States Department of Agriculture (USDA). Regulations often add costs to production. There are also transportation costs when transporting the oats from the producers to the cleaners and then to processors and the distributors. [13]

### Production Costs

The following table breaks down the potential production costs of farming oats in dollars per acre. It also compares Wisconsin averages to United States averages.

Production Costs

	United States		Wisconsin	
	2013	2014	2013	2014
Operating Costs				
Seed	15.47	16.28	15.295	15.585
Fertilizer	46.02	46.19	57.21	54.95
Chemicals	2.8	2.76	1.58	1.61
Custom Operations	9.04	10.14	8.54	8.785
Fuel, Lube, and Electricity	23.35	24.09	20.405	20.405
Repairs	14.35	14.57	12.45	12.685
Straw Baling	3.01	3.38	3.78	3.925
Interest on Operating Inputs	0.05	0.04	0.05	0.035
<b>Total Operating Costs</b>	<b>114.09</b>	<b>117.45</b>	<b>119.31</b>	<b>117.98</b>
Allocated Overhead				
Hired Labor	0.79	0.87	0.33	0.34
Opportunity Cost of Unpaid Labor	36.53	38.83	34.315	34.96
Capital Recovery of Equipment and Equipment	81.49	84.08	72.39	75.07
Opportunity Cost of Land	101.02	108.31	102.28	106.04
Taxes and Insurance	6.08	6.29	6.775	6.91
General Farm Overhead	9.6	9.99	8.585	8.75
<b>Total Allocated Overhead</b>	<b>235.51</b>	<b>248.37</b>	<b>224.675</b>	<b>232.07</b>
Actual Costs Paid	15.68	16.28	15.36	15.66
<b>Total Costs</b>	<b>129.77</b>	<b>365.82</b>	<b>134.67</b>	<b>133.64</b>
Percent Change from Previous Year		3%		1%

Ref: [16]

## Capital Costs

The capital costs of the equipment needed to transform the raw oats into finished oat products can range from \$135,288.33 to \$1,932,083.33 depending on the scale of the equipment. The equipment needed, power required to operate them, the low and high range price are broken down in the following table.

Equipment Costs / Capacity Breakdown / Power Breakdown

Machine Name	Equipment Costs - Price	Capacity - Low (Tons/ Hour)	Power - Low (Kw/ Hour)
Professional Oat Dehuller Machine	\$7,500	0.83	14.38
Pre-Cleaning Machine	\$3,300	15.00	2.20
Oats Boiling Machine	\$550	0.55	16.10
Oats Kiln Machine	\$1,050	83.20	15.00
Sieving Machine	\$833	1.75	0.47
Color Sorting Machine	\$16,250	2.70	3.25
Grain Magnet	\$100	-	-
Dicing Cutter Machine	\$1,767	0.22	1.63
Dust Separator Machine	\$917	-	6.82
Sorting Machine	\$22,945	3.75	2.75
Twill Steamer	\$7,500	2.00	4.00
Roller Mill	\$3,267	10.30	1.10
Drying Machine	\$60,000	22.40	17.50
Plan Sifter Machine	\$3,500	0.46	10.00
Oats Packing Machine	\$5,750	1.00	2.20
<b>Total</b>	<b>\$135,228.33</b>	<b>5 (Average)</b>	<b>97</b>

Capacity Breakdown Note: The grain magnet and dust separator do not have capacity figures as they are parts within the mill that do not process oats, but contribute to the overall process. Ref: [19]

Power Breakdown Note: The grain magnet does not have power figures as it is a part within the mill that does not process oats, but contributes to the overall process. Ref: [19]

## Building and Storage

The client will need a facility to house the equipment listed above. For the smaller sized equipment, a minimum of 4,928 square feet of space would be required. The estimated cost is \$56 per square foot. [3][17]

Before and after oats are processed they need to be stored. Storage unit sizes range from 5 to 15,000 tons and range in price from \$75,077 to \$261,807. The average cost per ton is \$407.98 per ton. If the client were to use its own land, this would result in storage costs of \$154,418.91. If the client were to capture the entire market, that cost would rise to \$905,706.71. [18]

## Transportation

A common question in business is whether to do it yourself or outsource to a company already in the market. Thus far there are substantial up-front capital costs, and hiring a grain transportation company to transport the oats from the farm to the mill would be less expensive and a more efficient use of capital resources. Relevant companies, some located in Wisconsin, have an average base fee of \$350 plus, for the amount to be transported. The cost of transportation can be based on distance needed to travel or the amount of the grain in bushels. In the case of the client we use the amount of bushels because grain transportation companies that go by distance are unlikely to transport at such a small distance. There are roughly 60 bushels of oats in a ton leading to 22,740 bushel in total that need to be transported. This multiplied by the market price for transporting a bushel of oats which is \$0.19 gives us a total transportation cost of \$4,670. If the client were to capture the whole market, while still farming themselves, the cost would be the same, as other producers will pay to transport their grain to the mill. [20]

## Labor

Below is an estimate of the labor needed to operate and maintain the machines needed to process oats, which would not vary in terms of whether the small or small-level equipment is used. [10] These numbers are derived from industry research on oats milling facilities with the recommended operators per machine. The following numbers are based on running the equipment at 100% efficiency.

Note: The client could hire fewer people, but efficiency would be sacrificed. For example, the client could hire a machinist and an unskilled laborer costing them \$27 an hour, \$15 for the machinist, \$12 for the unskilled labor. Within this hour of work, two man hours of tasks are being done efficiently and to standards. Now instead, the client attempts to cut costs by hiring one laborer at \$15 an hour to do both the job of the machinist and the unskilled laborer. Now the machinist, who will only work for \$15 an hour because of his skills, has to do the work of a machinist, which takes an hour, and the work of an unskilled laborer, which also takes an hour. The machinist will have to take two hours to do the work assigned and be paid \$30 for his work, thus costing The client more money for the same amount of work.

Labor Costs

Position	Number in Position	Salary (\$/hr)	Total Cost Per Hour
Plant Manager	1	\$20	\$20
Administrative Assistant	1	\$10	\$10
Technician Operator	8	\$15	\$120
Unskilled Workers	8	\$12	\$96
Janitor	1	\$15	\$15
<b>Total</b>	<b>19</b>	-	<b>\$261</b>

## Utilities

Power Costs [19] Estimated power costs based on the price of electricity being \$0.13 per kWh.

Machine Name	Price of Power - Low (\$)
Professional Oat Dehuller Machine	1.87
Pre-Cleaning Machine	0.29
Oats Boiling Machine	2.09
Oats Kiln Machine	1.95
Sieving Machine	0.06
Color Sorting Machine	0.42
Grain Magnet	-
Dicing Cutter Machine	0.21
Dust Separator Machine	0.89
Sorting Machine	0.36
Twill Steamer	0.52
Roller Mill	0.14
Drying Machine	2.28
Plan Sifter Machine	1.30
Oats Packing Machine	0.29
<b>Total</b>	<b>12.66</b>

## Price

The average price received for selling processed oat flakes in the year 2013/14 is \$259 per ton and in year 2014/15 is \$364 per ton. The average price received in the last 18 years is \$443 per ton adjusted for inflation. This figure, weighted with the average in the last three years gives us a price of \$440 per ton. Over this 18-year period, the maximum fluctuation in the next year's price is 30% above or below the current year's price. [17]

## Research Objectives

Food To Market obtained the market research through conversations with two oat producers within a 150-mile radius of The client Farms Department, along with 15 interviews with potential

customers and end users for milled oat products. In addition, Food To Market confirmed production volumes for three oat mills. This information is meant to help the client learn about milling service preferences and market trends in Wisconsin, as well as the market need and preferences for milled oat products in the region. In order to gather the necessary information, the following questions were asked of milled oat purchasers:

- Do you Purchase milled oats products?
- Which of the following milled oats products do you purchase?
  - Rolled oats
  - Steel cut thick rolled oats
  - Quick cooking rolled oats
  - Oat Flour
  - Gluten free rolled oats (reg)
  - Gluten free rolled oats (thick)
  - Gluten free rolled oats (quick)
  - Gluten free oat flour
  - Other (please indicate)
- What quantity of each do you purchase in a given year?
  - Who are the leading suppliers of milled oats products in the region? What about in the US?
  - What do you think causes them to be considered market leaders?
  - How satisfied are you with your current milled oats product supplier? (scale of 1 to 5)
  - What do you like best about your current milled oats products supplier?
  - Are there any products that it is difficult or impossible to find a supplier for? (If yes, how much demand is there or would there be for that product in an average year?)
  - If you could quickly and easily acquire regionally milled fresh oat products, would that influence your decision to use or carry such products?
  - When would you choose oats over other grains?
  - Typically, how important is proximity of the supplier to your company when purchasing milled oats products?
    - How important is price to your company when purchasing milled oats products?
    - How important is quality to your company when purchasing milled oats products?
  - Within the next 18 months, do you think that your company will be increasing, decreasing, or maintaining the amount of milled oat products you purchase?
  - What criteria does your company use to select suppliers of milled oats products?

- What are two trends or issues that are going to affect the way you do business within the next 18 months?
- Would you be open to considering a new source for milled oat products?

In addition, the following questions were asked of milled oat producers:

- Do you produce gluten free oats? (If yes, exclusively or in addition to regular oats?)
- In the past three years what market trends have you noticed for oats?
  - In particular, is demand for oats increasing, remaining the same, or decreasing? (Also ask about GF oats if they produce them).
  - What do you think is driving the demand for oats and milled oats products at this time?
- In your opinion, what are the most popular milled oats products?
- What are some emerging markets for oats?
- In your opinion, is there a shortage of mills for oats in the area?
- Is there room in the market to increase oat production?
  - Is Wisconsin and the nearby states a good place to grow oats? Why or why not?
- Do you contract with a miller to have the oats you produce milled?
  - If yes, which mill or mills do you use?
  - What criteria do you use when selecting a mill? (location, reputation, equipment, gluten free, price turn around, other?)
- Do you grow other crops in addition to oats?
  - If yes, what percentage of sales would you say is oats?
- What companies would you consider the main source of milling services for oats in the region? (GF oats?)
- In terms of quantity, about how much oats does a farm your size produce on average in a year?

## Market Assessment Executive Summary

The fifteen oat users within a 150 mile radius of the client who were interviewed by Food To Market can be separated into four groups by industry: breweries, bakeries, specialty food stores, and cooperatives.

## Breweries

Food To Market interviewed five different breweries, the majority of whom said they purchase rolled oats exclusively, in quantities ranging from 500 to under 2,600 pounds. There are 317 breweries located within a 150 mile radius of the client, 161 of which are located in Wisconsin. Food To Market estimates the total demand from breweries to be approximately 160,000 to 450,000 pounds annually. (This is a rough estimate based on the average quantity of oat product purchased by respondents multiplied by the number of breweries in a 150 mile radius of the client.)

The main qualities that breweries seem to value in a supplier varied; however, there was a common desire expressed by respondents to remain with suppliers with whom they had already formed business relationships. All representatives from this industry expressed satisfaction with current suppliers, although a majority said they would be open to considering a new supplier. It appears that the primary use of oats in this industry is for oatmeal stouts, which are not made by all breweries and are often made in small quantities for a single product, making this industry in general a low-volume purchaser of oat products. The majority of respondents said say their businesses would most likely be increasing the amount of oat products they would be purchasing in the next 18 months, which makes sense considering one of the major trends brought up by respondents was an increase in the size of breweries, as well as the quantity of new breweries cropping up in the area. This may lead to consolidation of beer distributorships.

## Bakeries

Like the businesses in the brewing industry which generally purchased only a single oat product, businesses in the bakery industry interviewed by Food To Market usually said they purchased only rolled oats, in quantities ranging from 1,200 to 12,500 pounds annually, with the exception of one bakery who said they purchased around 75,000

pounds a year. Food To Market included manufacturers of baked goods within a 150 mile radius of the The client and found about 1,300 companies. Based on this, Food To Market estimates the total demand from bakeries within 150 miles of the client to be approximately 1.6 million pounds of oats annually. This is rough estimate based on the number of baked goods manufacturers located within 150 miles of the client, multiplied by the lowest quantity purchased by an average-sized bakery interviewed. The lowest quantity was picked in order to account for the number of bakeries contacted who said they did not purchase any oat product at all. Bakeries were more likely than breweries to purchase gluten free oats, especially since there are many bakeries that specialize in gluten free products. Reasons for choosing a supplier varied greatly in this industry, as did the suppliers perceived as being market leaders, though product availability and convenience seemed to be prevailing criteria. Bakeries also seemed to be satisfied with their current suppliers but, once again, seemed open to new suppliers as well. When asked about the quantity of oat products they predicted to be purchasing in the next 18 months, all respondents said their businesses would most likely be maintaining their current quantities.

## Specialty Food Stores

According to respondents from this industry, specialty food stores, unlike the previous two industries, on average purchase multiple different oat products from millers, including gluten free products. Respondents said they purchased around 200 to 600 pounds of each oat product per year. Using SIC codes for cooperative food stores, independent grocery stores and health food stores, Food To Market located about 800 companies within 150 miles of the client. Based on an estimate of 200 pounds a year per store, that would be about 160,000 pounds sold annually through those types of stores. If the industry category "other specialty food stores" NAICS code is used, there are just above 2,400 companies which would results in 480,000 pounds of oats sold per year. If

all grocery stores (but not convenience stores) are included, then the market size is nearly 1 million pounds. This is an estimate based on the number of each type of retail store located within 150 miles of the client, multiplied by the lowest total quantity of all oat products purchased by those interviewed. The lowest quantity was used in order to account for the number of stores contacted who said they did not purchase any oat product at all. It was also difficult to get an idea of the demand for oats from this market because some answered in cases rather than pounds or were unable to give an estimate at all. Quaker and Bob's Red Mill were by far the most popular suppliers among businesses in the specialty foods industry, mainly due to their production capacity and reputation. Bob's Red Mill, in particular, seems to have the reputation of being the place to go for gluten free products. Neither have locations in the client's target area, however. Availability of certain products was very important in choosing a supplier for businesses in this industry, which suggests many specialty food stores have particular needs driven by a particular customer demand. Like the other two industries, the specialty food industry, as well, seemed to be satisfied with current suppliers, yet open to the idea of choosing a new supplier with the proper motivations. Representatives spoke of the growing demand for products that are gluten free, as well as products that are organic, non-GMO, and whole grain. The majority predicted their stores would be maintaining the amount of oat products purchased within the next 18 months.

## Industry Quick Facts

Quick Facts for Bakery Cafe Industry	
Revenue: \$8.1 billion	Growth Rate: <b>Increase</b> 2.4%
Profit: \$446.9 million	Wisconsin's % of U.S. Market: 1.3%
Quick Facts for Bakery Product Manufacturing	
Revenue: n/a	Growth Rate: <b>Increase</b> 3%

Quick Facts for Breweries	
Revenue: \$32.6 billion	Growth Rate: <b>Increase</b> 2.3%
Profit: \$2.6 billion	Wisconsin's % of U.S. Market: 4.3%
Quick Facts for Craft Beer	
Revenue: \$5 billion	Growth Rate: <b>Increase</b> 5.5%
Profit: \$2.6 billion	Wisconsin's % of U.S. market: 4.3%

Quick Facts for Cereal (IBIS World)	
Revenue: \$11 billion	Growth Rate: <b>Increase</b> 0.9%
Quick Facts for Cereal (First Research)	
Revenue: \$11 billion	Growth Rate: <b>Increase</b> 3%

Quick Facts for Gluten Free	
Revenue: \$2.34 billion	Growth Rate: <b>Increase</b> 19.2%

Quick Facts for Milling - Grain	
Revenue: \$20 billion	Growth Rate: <b>Increase</b> 4%

Quick Facts for Corn, Wheat, & Soybean Wholesaling	
Revenue: \$133.5 billion	Growth Rate: <b>Increase</b> 1.3%

Grain Milling Companies in Wisconsin			
Company	Location	Revenue	Total Employees
Lacrosse Milling Company	Cochrane, WI	-	-
Boyd Feed and Supply	Boyd, WI	-	-
S & S Custom Roasting	Beaver Dam, WI	-	-
Lonesome Stone Milling, LLC	Lone Rock, WI	\$200,000	3
Podgorski Grain Farms	Merrill, WI	\$120,000	2
Ardent Mills, LLC	Kenosha, WI	-	31

# References

- 1 Coblenz, Wayne, and Mike Bertram. "Fall-Grown Oat Forages: Cultivars, Planting Dates, and Expected Yields." *Focus on Forage* 14.3 (2012): 1-3. Wisconsin Team Forage. University of Wisconsin Extension. Web.
- 2 "The Common Agricultural Policy and the Food Chain: Entering A New Era of Cooperation." *Research Handbook on EU Agriculture Law* (n.d.): 267-68. KPMG International. Web.
- 3 "ConAgra Oat Milling Facility." *ConAgra Oat Milling Facility*. YoungLove, n.d. Web. 05 Jan. 2016.
- 4 Darby, Heather, and Rosalie J. Wilson. *Mill Feasibility Study*. Tech. UVM Extension, n.d. Web.
- 5 Doehlert, D. C., D. P. Wiesenborn, M. S. McMullen, J. B. Ohm, and N. R. Riveland. "Effects of Impact Dehuller Rotor Speed on Dehulling Characteristics of Diverse Oat Genotypes Grown in Different Environments." *Cereal Chemistry* 86.6 (2009): 653-60. Print.
- 6 Doehlert, D. C., M. S. McMillen, and J. L. Jannink. "Oat Grain/Groat Size Ratios: A Physical Basis for Test Weight." *Cereal Chemistry Journal*. AACCI International, n.d. Web.
- 7 Ferguson, Shon, Simon Weseen, and Gary Storey. "Project on African Agriculture." *Anthropology News* 28.5 (1987): 13-15. University of Saskatchewan Department of Agricultural Economics. University of Saskatchewan. Web.
- 8 Ferguson, Shon, Simon Weseen, and Gary Storey. "University of Saskatchewan --- Organic Information Website --- Reports." *Costs in the Organic Grain Supply Chain*. University of Saskatchewan, n.d. Web. 05 Jan. 2016.
- 9 *Oat Dehulling and Separating System*. Tech. Henan Win Tone Equipment Manufacture Co., Ltd., n.d. Web.
- 10 *Oats Processing Plant Project Report: Industry Trends, Manufacturing Process, Equipment, Raw Materials, Cost and Revenue*. Rep. Imarc Group, 2015. Web.
- 11 "Oats:Wisconsin." *Journal of Arachnology* 43.2 (2015): 229-30. United States Department of Agriculture. Web.
- 12 Peltonen-Sainio, P., M. Kontturi, and A. Rajala. *Impact Dehulling Oat Grain to Improve Quality of On-farm Produced Feed : 1.Hullability and Associated Changes in Nutritive Value and Energy Content*. Publication. Agricultural and Food Science, n.d. Web.
- 13 Stute, J. K., J. L. Posner, and J. L. Hedtcke. "Wisconsin Integrated Cropping Systems Trial Project." *Wisconsin Integrated Cropping Systems Trial Project RSS*. Wisconsin Integrated Cropping System Trial Project, n.d. Web. 05 Jan. 2016.
- 14 United States. Department of The Treasury. Internal Revenue Service. *How to Depreciate Property*. Internal Revenue Service, n.d. Web.
- 15 18 years of oat production and prices. N.d. Raw data. United States Department of Agriculture, Washington D.C.
- 16 *Oat Farming Overhead*. N.d. Raw data. United States Department of Agriculture, Washington D.C. *Oat Farming Overhead*. N.d. Raw data. United States Department of Agriculture, Washington D.C.
- 17 Facility resource: [http://www.alibaba.com/product-detail/Industrial-Prefab-Poultry-House-Poultry-Barn\\_60321431897.html?spm=a2700.7724838.8.31.h72LYF](http://www.alibaba.com/product-detail/Industrial-Prefab-Poultry-House-Poultry-Barn_60321431897.html?spm=a2700.7724838.8.31.h72LYF)
- 18 Storage resources: [http://www.alibaba.com/product-detail/Galvanized-Oat-Bran-Storage-Steel-Silo\\_60104467283.html?spm=a2700.7724857.29.46.KrZUyV](http://www.alibaba.com/product-detail/Galvanized-Oat-Bran-Storage-Steel-Silo_60104467283.html?spm=a2700.7724857.29.46.KrZUyV)
- 19 [http://wholesaler.alibaba.com/product-detail/Oats-Bran-Storage-Steel-Silo-Grain\\_60246963470.html?spm=a2700.7724857.29.55.KrZUyV](http://wholesaler.alibaba.com/product-detail/Oats-Bran-Storage-Steel-Silo-Grain_60246963470.html?spm=a2700.7724857.29.55.KrZUyV)
- 20 [http://www.alibaba.com/product-detail/durable-low-price-100-1000-ton\\_60332866237.html?spm=a2700.7724857.29.64.KrZUyV](http://www.alibaba.com/product-detail/durable-low-price-100-1000-ton_60332866237.html?spm=a2700.7724857.29.64.KrZUyV)