

An Evaluation to Determine the Feasibility of a
Multi-Purpose Grain Processing Facility in Vermont

2012

MILL FEASIBILITY STUDY



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November 20, 2012
Updated December 15, 2013

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Funded in part by:
Vermont Agricultural Innovation Center
University of Vermont Extension

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Overview

Over the last 8 years, the demand for local grain has continued to increase in Vermont and the surrounding region. The demand exists for both food-grade and livestock grain. Increasing livestock grain prices have forced many farmers to begin producing their own grain and/or look to local producers to meet their needs. Projects led by UVM Extension and the Northern Grain Growers Association (NGGA) are underway to build the capacity of farmers to produce more and better quality grain for both markets. However, even after 8 years of work, there have been only small increases in grain acreage in the state of Vermont. According to the growers, the primary barrier to expansion is the lack of adequate infrastructure to process the grains into a saleable product as well as conducting sales, marketing and distribution of a finished product. Meanwhile, millers have identified barriers of working with local growers as lack of volume and highly variable inconsistencies in moisture, protein, ash, shrunken, shriveled or broken kernels content, falling numbers, and mycotoxin levels.

In 2010, a subcommittee of the NGGA was created to investigate the potential of constructing a mill in Vermont as a means of addressing infrastructure processing needs for access to market.

The objective of this feasibility study is to provide an overview of processing infrastructure needs and challenges, and offer potential solutions and practical advice. It is to provide an example of the investment and infrastructure required to build a mill sized and scaled appropriately for Vermont, offer sources for the equipment and professionals required for build out, demonstrate what it might cost to operate such a mill including pay price to growers, discuss pricing and markets, and establish whether there would be a market for the product, and the possible feasibility of such a venture.

The overall goal would be that if this idea proves feasible, someone will be interested in building the infrastructure or partnerships needed to develop a commercial scale outlet for grain growers in Vermont.

The study was completed through extensive interviews with existing and past milling and feed operations, mill suppliers, grain growers, and flour buyers from retailers such as coops and stores to commercial bakers, as well as reviewing third party research.

Conclusions

Saturated Market

The study found that the American flour market is saturated with high quality mid-western wheat from established providers with loyal customer following. Commercial buyers have access to high quality, hard wheat, conventionally grown flour for as low as \$0.30 per pound, and certified organic for \$0.50 per pound. In Vermont and upstate, eastern New York, it costs growers approximately \$0.25 per pound to produce an average wheat crop, not including flour processing, packaging or distribution expense.

30% Operating Capacity To Achieve EBIDTA Break Even

A commercial scale mill in Vermont could break even on an EBIDTA cash flow (earnings before interest, depreciation, taxes, and amortization) selling certified organic flour at \$0.50 per pound, if it could achieve a minimum operating capacity of 30% in a purchased land scenario (see page 5, scenario 1), and 40% in a leased land scenario (see page 5, scenario 2).

60% Operating Capacity Realistic Break Even

Realistically, however, the mill should anticipate requiring 60% operating capacity to cover for unanticipated expenses, and subjective expenses including interest and debt service principal, income taxes, depreciation, and amortization. Following are examples of potential additional expenses.

Additional expenses in a purchased scenario

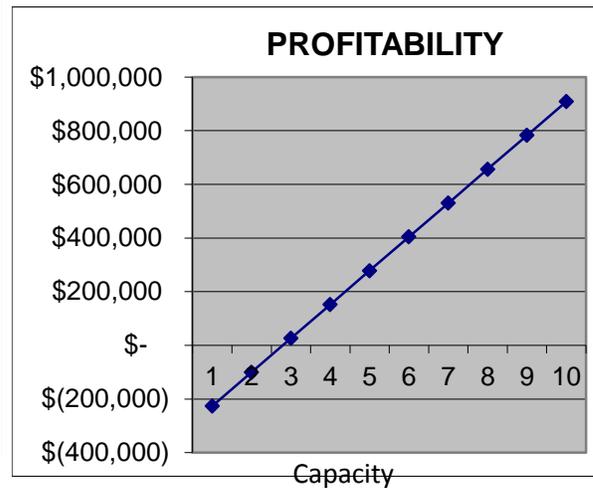
SUBJECTIVE ANNUAL EXPENSES	
DEPRECIATION EQUIPMENT (ASSUME 15 YR EQUIPMENT, 30 YR BUILDING)	\$ 122,333
LOAN PRINCIPAL & INTEREST (ASSUME 20 YR, 6%)	\$ 213,640
TOTAL	\$ 335,973

Additional expenses in a leased scenario

SUBJECTIVE ANNUAL EXPENSES	
DEPRECIATION (ASSUME 15 YR EQUIPMENT, 30 YR BUILDING)	\$ 112,333
LOAN PRINCIPAL & INTEREST (ASSUME 20 YR, 6%)	\$ 144,862
TOTAL	\$ 257,196

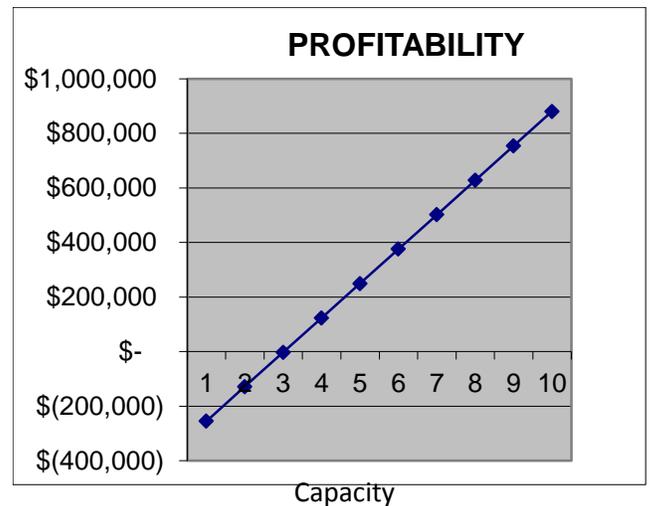
SCENARIO 1: EBIDTA Profitability Assuming Purchase of Land/Building

	UTILIZATION	PROFITABILITY	TONS WHEAT USED
	10%	\$ (226,036)	818
	20%	\$ (99,917)	1637
Minimum →	30%	\$ 26,203	2455
	40%	\$ 152,322	3273
Recommended →	50%	\$ 278,441	4092
	60%	\$ 404,560	4910
	70%	\$ 530,679	5728
	80%	\$ 656,799	6546
	90%	\$ 782,918	7365
	100%	\$ 909,037	8183



SCENARIO 2: EBIDTA Profitability Assuming Leased Land/Building

	UTILIZATION	PROFITABILITY	TONS WHEAT USED
	10%	\$ (254,816)	818
	20%	\$ (128,697)	1637
	30%	\$ (2,577)	2455
Minimum →	40%	\$ 123,542	3273
	50%	\$ 249,661	4092
Recommended →	60%	\$ 375,780	4910
	70%	\$ 501,899	5728
	80%	\$ 628,019	6546
	90%	\$ 754,138	7365
	100%	\$ 880,257	8183



Start Up Capital

Unless the business can secure financing to cover the burn rate (proportion of operating expenses not covered by operating income) until break-even is attained, the mill will fail. Gaining traction in a saturated market is the most difficult form of product entry, requiring a prolonged market adoption rate, and increased marketing effort and investment. Examples of similar ventures demonstrate it can take up to 11 years to reach break-even (Navajo Pride, grain mill project in New Mexico). With average operating expenses of \$2.4 million per year at 40% operating capacity (in both a leased or owned scenario), the mill could need up to \$26 million in start-up operating capital to cover eleven years of burn rate, plus an additional \$1.6-2.5 million in infrastructure investment.

Partnering For Success

The best likelihood for success will be if the mill can enter into a mutually beneficial relationship with an established brand such as King Arthur Flour, La Meunerie Milanaise, or Champlain Valley Milling. In such a relationship, the mill could be independently owned and operated, or operated as a co-owned entity with the partner.

The mill would take responsibility for the risk and resources required to source and produce the product, and sell the product to the partner for resale. The partner brand would take ownership of championing the product in its established sales and marketing channels and would provide supportive technical expertise to the mill on production issues and concerns.

This synergy would lead to a more rapid progression through R&D phase and training of production staff that would help ensure the mill can produce a consistent flour that meets the partner's and their customers' expectations.

Similarly, focusing on creating a "blended" product as the core product whose brand messaging can leverage its use of local wheat while not requiring it to rely exclusively on local wheat will yield a more consistent product with better baking properties, minimize risk exposure from poor local crop yields in any given year, and reduce operating expenses as mid-western grain can be sourced at a lower cost. This would enable the mill to manage operating expenses while covering the cost of paying local growers a fair price (\$600/ton) for the higher costs of production in the local region.

Lastly, being proactive in educating bakers and consumers about the natural variations to be expected with the product and providing them with tools to be able to quickly identify the specifics of the product, such as test results, so bakers can immediately adapt recipes to each batch, will provide consumer confidence and further strengthen the buyer-seller relationship.

1. With a product that packs the essence of Vermont into every package, buyers and bakers looking for ways to incorporate more locally grown foods into their diets and offerings, as well as consumers on a national scale who are drawn to the name recognition the Vermont brand commands, especially within the artisanal food industry, will be tempted to try the product.
2. With an established brand to provide credence, the new and unproven product has an opportunity to largely surpass hesitation from wary customers, an issue that otherwise plagues new brands, slowing market adoption, which may be unacceptable in a saturated market.
3. With a consistent, high quality product, the ability to convert a first time buyer into a repeat buyer is facilitated, thus cultivating a reliable sales base that requires minimal marketing overhead.

Recommendations

The recommendations for next steps:

1. Approach each of the potential milling business partners mentioned above: King Arthur Flour, La Meunerie Milanaise and Champlain Valley Milling, to discuss their interest and possible involvement in the project. If there is interest from one or more entities, development of a business plan should ensue.
2. Approach individuals interested in owning/operating the mill. Several existing mill and feed operations, such as Green Mountain Feeds, Green Mountain Flour, and Morrison's Custom Feeds have expressed interest in exploring expanding their businesses to accommodate a commercial scale grain mill.
3. Development of a business plan
 - a. Identify a project lead to work on the development and coordination of the business plan and interested parties.
 - b. Determine whether new milling infrastructure is necessary. For example, La Meunerie Milanaise or Champlain Valley Milling may be willing to provide toll milling service or buy Vermont wheat and create a line of Vermont grown grain products with their existing milling infrastructure.
 - c. Work closely with partners, producers, state agencies, individuals, and organizations who have expressed an interest in the project to continue to build buy-in and support for the project. See list of interested parties below.
 - d. Finalize ownership and business model.
 - e. Continue to research product specifications and mill infrastructure to ensure design and build infrastructure will meet product needs. For this study the AGREX AGS-1DB-1000 mill which is the mill used by La Meunerie Milanaise for its certified organic, All Purpose White Flour was used as the basis for production and cash flow analysis. However, some commercial bakers have mentioned they prefer flour produced from the mill equipment used by Champlain Valley Milling and Heartland Mills.
 - f. Finalize site selection and location. Accessibility to rail and a lot size of 3-4 acres to allow for future expansion would be ideal.
 - g. Refine cash flow and financial projections.
 - h. Develop a target market prospect list with projected sales volumes, seek to secure placement for 2,500 tons of flour (which equals the volume produced at 40% operating capacity, and is the default minimum volume required to break even to cover both a leased or purchased scenario).

- i. Explore additional products. Research the potential demand, production needs and feasibility for other grains and products.

- j. Budget for a liaison with technical expertise in local wheat production to interface between the growers and the mill to coordinate product flow and provide technical assistance to growers while also providing technical assistance to the mill. This will boost the project's ability to produce more consistent grain but also help the mill adapt to potential variations in incoming product. While the goal is to produce consistent quality grain inputs, the study found that the nature of Vermont's smaller scale production, and variations in soils and topography will naturally increase the likelihood that there will always be fluctuations in the raw inputs. Therefore to proactively minimize these weaknesses from threatening the business, developing a plan that includes partnering with an experienced miller who can adapt to variations in raw inputs, and having a technical liaison that can provide assistance both to the miller and the grower would be ideal. As a note, both La Meunerie Milanaise and Champlain Valley Milling have demonstrated an ability to accommodate inputs of local grains and produce a consistent, high quality, commercial "local" product for several years.

Individuals and Organizations Interested in the Project

In order to complete the recommendations following is a list of individuals and organizations who have expressed an interest in this project and who have indicated a desire to remain in contact for further involvement.

Allen Freund, Investor

Bill Hoag, Commercial Baker

Dan Hudson, UVM Extension Agronomist

Daniella Malin/Zachary Stremlau, Green Mountain Flour, Owners

Elizabeth Gleason, VHCB, Funder/NGO

Eric Dutil, Green Mountain Feeds, Owner

Francie Cacavo, Olivia's Croutons, Owner

Glenn Loati, La Panciata, Owner

Heather Darby, UVM Extension Agronomist

Jeffrey Hamelman, King Arthur Flour, certified Master Baker and Bakery Director

Klaas Martens, Grower

Ken Van Hazinga, Grower

Lynda Prim/Joe Bossen, Beancrafters, Dry Beans Feasibility Study

Les Morrison, Morrison's Feeds, Owner

Macy Mullican/Shelburne Green LLC, Developer

Michael Bittel, King Arthur Flour, VP National Flour Sales

Northern Grain Growers Association, Brent Beidler, President

Randy Georgre, Red Hen Bakery, Owner

Robert Beauchemin, La Meunerie Milanaise, Owner

Findings

Break Even

Assuming selling wholesale bulk certified organic flour (white or wheat) at \$0.50 per pound, with up to 75% certified organic grain from local growers at \$600/ton (\$0.30 per pound) and 25% certified organic grain from mid-western suppliers at \$450/ton (\$0.225 per pound), and assuming the wheat meets the mill's specifications, the mill would need to operate at 40% capacity, processing 3,273 tons of grain per year, selling 2,455 tons of flour and 818 tons of wheat middlings per year to break even using an EBIDTA cash flow (earnings before interest, depreciation, income taxes, and amortization) in both a leased and purchased scenario.

In order to cover additional subjective expenses such as depreciation, and debt service on a 6% 20 year loan, the mill would need to run at 60% capacity, processing 4,910 tons of grain, selling 3,682 tons of flour and 1,227 middlings.

Capacity

The AGREX AGS-1DB-1000 mill has a one ton per hour capacity. Estimating maximum capacity to be 85% efficiency of 52 weeks per year, running 24 hours per day, seven days per week, the mill could yield a maximum of approximately 6,100 tons of flour and 2,000 tons of feed from just under 8,200 tons of grain.

At break-even which would be 40% of maximum capacity, the plant would be processing 63 tons per week, running approximately 16 hours per day, with the mill itself running 12 of those hours per day, five days per week, fifty two weeks per year. Alternatively the mill could run six days per week with slightly shorter shift runs to accommodate staffing flow or longer prep and clean up time.

Output Efficiency

On average from an all-purpose wheat flour, the mill will yield a production output of approximately 75% flour to 25% middlings. By-products have value and can be sold as animal feed or further processed into bran and wheat germ for premium pricing value added food products. Up to 20% of the by-products could be extracted for bran and wheat germ leaving 5% for feed. For this feasibility study, it is assumed all by-products will be sold as feed.

Raw Materials

Product Requirements

Ideally grains will come to the mill with a moisture content of 12-12.5%. The mill has a maximum moisture content threshold of 14%. Growers who supply grains with a moisture content higher than 14% will have deductions from their pay price.

With respect to protein and gluten, bakers are looking for 11% or better for hard wheat varieties. The mill may need to set minimum acceptable standards for protein content.

Similarly the mill will have a threshold of acceptable mycotoxin levels.

The mill can work with a wide variety of grains so long as their fat content remains at 12.5% or below. A fat content any higher than this will gum up the machinery. When considering the

mill's markets it is important to take into account both the food grade and feed grade market needs. For example, the feed companies may have little use for oats or spelt, thus limiting any ability to generate income from by-products. Feed companies prefer wheat, barley and corn. Corn could be made to work with the mill, however it has a higher fat content and would need to be de-germinated prior to processing.

Supply

There are two critical components to supply for the mill- quality and quantity of grain production in Vermont. At present there are over 1,000 tons of certified organic grain grown in Vermont and eastern, upstate New York. The table below is a representative sampling of the certified organic acreage in current production.

Grower	Acreage	Yield (T)	Average Yield/Acre (T)
Gleason Grains	40	35	0.875
2 farms near Ben Beidler Farm	55		
Butterworks Farm	50		
Ken Van Hazinga	20		
Francie Cacavo	35		
Klass Martens		0.5-1	
Great River Farm	20-30	20-30	1
Morrison Feeds	25		
Morrison suppliers in VT/Westport, NY	1,000		
Tom Kenyon	100+		
Louis Rainville	100+		
Greg Bouchard	50		
Mark Boyden	100+		

Assuming the mill supplies up to 75% of its needs from local sources, the mill would need up to 2,455 tons of local grain per year at 40% operating capacity and 6,150 tons at 100% capacity. Assuming an average yield of 1 ton per acre, this would mean between 2,500-6,150 acres in production. While Heather Darby, of University of Vermont Extension, along with growers interviewed for the study, felt that achieving 2,500 acres under cultivation in Vermont would be possible, Robert Beauchemin, owner of La Meunerie Milanaise who has experience sourcing grain from local suppliers, said he would count on needing double the amount of acreage under production to mitigate risk from low harvest years. This would mean Vermont would need to have approximately 5,000 to 12,000 acres under cultivation. Even if growing to 5,000-12,000 acres is doable, there is no sense among UVM Extension or the growers as to when Vermont could achieve such volume.

Growing Conditions

Vermont's small state has significant variations in soils and growing conditions, and much smaller land parcels than mid-western states. While this may lead to less consistency in supply, and less efficiency in dealing with more growers, it is not insurmountable. UVM Extension has been working with growers to evaluate and develop grain production strategies. Darby for example noted that heavy clay soils are best suited for winter wheat and hence why most of Addison county growers prefer winter wheat. However, spring wheat is more feasible for farmers outside of the Champlain Valley. For growers in the Northeast Kingdom spring wheat actually grows better and is less prone to winter kill. Jack Lazor of Butterworks Farm, for example, grows mostly spring wheat. If the project involved a combination of spring and winter wheat it would provide staggered supply and enable many more farmers to grow based on their soil type and location.

Production Rates

For Vermont and eastern, upstate New York, a conservative estimate is that if growing wheat best suited for one's soil and location, an acre of land should be able to yield a minimum of 2,000 pounds (one ton) of wheat per year. Growing wheat less suited to one's soil type and location (for example spring wheat in the Champlain Valley or winter wheat in the Northeast Kingdom) would yield an average of 1,500 pounds (0.75 ton) per year. Hard red, soft white, heirloom winter, and spring wheat yields and quality have been monitored by Darby since 2009 and further information can be gained through viewing trial reports at www.uvm.edu/extension/cropsoil/.

Dan Hudson, also of University of Vermont Extension, noted that because of Vermont's geography and climate, attempts to cultivate grain on a commercial scale may be best suited for soft wheat, which yields a low protein pastry or cake flour, however markets are not as strong for soft wheat given its limited applicability, and it is more prone to Fusarium head blight.

Darby's research has demonstrated that hard wheat can be grown in Vermont on a commercial scale, and given its higher desirability on the market (hard wheat forms the basis of all-purpose and bread flour), the project will focus on a hard wheat as the core grain for the mill.

Both Darby and Hudson stress that crop rotation with will be essential, especially in organic systems. Crop rotation recommendations include forage legumes such as clover and alfalfa, as well as financial crops such as black turtle beans, soybeans, and other edible dry beans. A legume sod crop, such as clover will provide important weed control and nitrogen contributions to the system, while dried beans will provide income while allowing for a break in the grain growing cycle for pest and disease control.

If growers are interested in dried beans as a crop rotation, there is a concurrent feasibility study underway for a Vermont dry bean processing facility. A relationship between the dry bean entity and the mill could provide synergies in access to markets for growers, which would strengthen the raw materials supply chain, and could potentially serve to cost share on distribution and marketing expenses for the finished products, providing savings in efficiency and expense while expanding markets.

Production Equipment

With respect to harvesting equipment, Vermont's hilly terrain and smaller farms require smaller scale equipment than what is used in the mid-west. Dan Hudson suggests a "leaner-gleaner" or small "contour-based" combine would work well in Vermont, as would the old Allis Chalmers "All Crop" harvesters, built from the 1930 through 1960's, and the International Harvester 403, the first 4-way, self-leveling contour combine produced. While it may sound as though access to equipment is an issue, there are several farms in Vermont with combines and harvesting equipment, and Darby notes that there is plenty of equipment available both old, slightly old, and new. There are also several custom harvest operations.

Raw Materials Cost

Growers cost of production for Certified organic wheat in Vermont and upstate New York averages approximately \$500 per ton (\$15 per bushel, \$0.25 per pound, assuming 60 pounds per bushel, 33 bushels per acre). Some growers have transportation to bring the grain directly to the mill, while other suppliers may require the mill to hire transportation. The cost for certified organic local grain over the past few years, combined, dried, and stored has ranged from \$450-\$700 per ton (\$0.225/lb to \$0.30/lb) + transportation which ran an average of \$0-3 per loaded mile. Certified organic grain from the mid-west hit a low of \$220 per ton a couple of years ago but generally ranges between \$370-450 per ton + transportation expense of \$35-40 per rail car or \$100-150 per tractor-trailer load, with each load averaging a maximum of 22 tons.

For this study we will assume a worst case scenario of \$600 per ton pay price for certified Organic grain less any expenses incurred to bring the grain within tolerable product specification limits + an average of \$0.01/pound transportation expense, which came from calculating \$3 per loaded mile for 200 miles per 22 ton load.

Product

Create Consistency within Inconsistency

As a way to enable the mill to start up while the local grain industry builds capacity, mitigate risk from low yield years, produce a more consistent quality product, and yet leverage the marketing value of the Vermont grown grain, it is recommended that the mill focus on branding the product as a flour that includes local grains but does not set a minimum amount. If the mill were to communicate with growers at harvest each year to identify how much grain would be available from local sources it could then compare this to its annual sales projections and identify how much additional grain would be needed from the Midwest. It could then use this as its blend ratio for the year, thus ensuring that

1. each batch has some local grain in it,

and that

2. each batch from the same year has an equivalent proportion of local to domestic grain.

The nature of any product marketed on its “terroir,” the region in which it is grown, is that it will reflect the growing conditions of that year, which naturally will create inconsistency. But making an effort to optimize consistency within that inconsistency is what differentiates successful products. A *Denominazione di Origine Controllata e Garantita* (DOCG) Barolo wine vintage’s flavor for example is significantly influenced by the amount of rain the region receives each year. As such, each year’s vintage will taste different from the next, however, each bottle from the same vintage will taste similar.

While flour isn’t wine, the same principal applies, especially for professional bakers: celebrate change, but minimize its impact on the user. If the user has to adapt their recipes to utilize the flour, limiting it to a single annual adaptation if possible, rather than batch per batch will significantly diminish the investment required on their end to create successful results, which will lead to repeat buying and customer loyalty. Meanwhile, capitalizing on the marketing value of the inconsistencies that come with “terroir” as a strength, can build appreciation and anticipation for the annual flour’s release, and actually catalyze sales.

La Meunerie Milanaise, an exporter of Québec grown and milled, certified organic flour is an example of a flour mill that celebrates the organic and local nature of its wheat. That said however, the mill realizes it also needs to keep these from becoming deterrents to purchasing. To do so, the mill makes every effort to

1. Educate: point out and educate customers that variation is to be expected
2. Inform: provide the information on specific variations for each batch
3. Advise: provide tips for how to address variations and adapt the product to one’s needs.

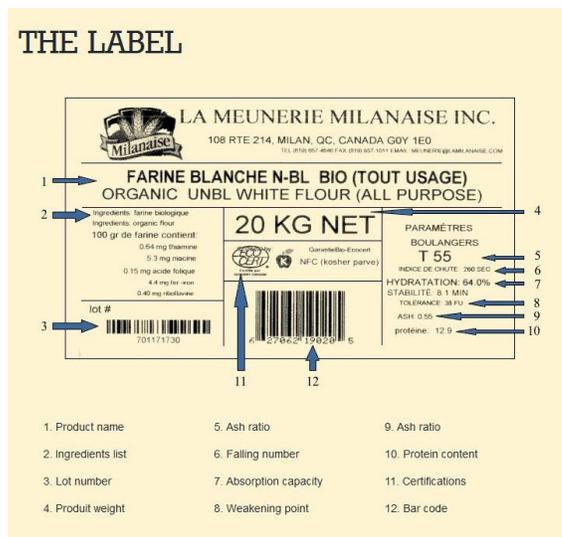
As an example, on its website the mill educates its consumers by stating: “Our flour was made from organic wheat, without soil-improving and stabilization agent. Like agriculture products, it

was normal to see wheat variation. All depend of variety, production site, type of ground and fertilization period (dung or compost). We present a complete analysis made in real time, during production.”¹(sic)

Following this assertion, it then informs its users explaining how every day’s run of flour is tested with a farinograph, results are posted on the website and demonstrates how users can use the control number on their 20 kg bag label to download results specific to their purchase.

Alongside the description of the results, the website then advises its baking audience about what to do with the results by providing tips for how to manipulate the product as needed to achieve a desired result, for example: “Generally, flours should have a Hagberg falling number between 220 and 280 to obtain best fermentation intensity... For a quick fermentation, it is important to correct the falling number by adding \pm 20 to 50 malted barley for each 20 kg of flours, depending on the malted barley.”²

The company also provides a detailed label on the product that shows the test results for that batch (see following page).



La Meunerie Milanaise flour label

All of these steps are aimed at easing the burden placed on the consumer by the natural variations that come as a feature of the product, to make it less of a deterrent in purchasing decision making.

¹ <http://lamilanaise.com/commercial/farino/?lang=en>

² <http://lamilanaise.com/commercial/la-qualite-la-milanaise/?lang=en>

Product Specifications

High quality flour for all-purpose and bread baking uses should have a finished moisture content of 14%, a protein content of 9-12%, a low ash content, and a Hagberg Falling Number, which measures the alpha-amylase enzyme activity in grains and flour, ranging between 220 to 280. Millers take these specifications seriously because they are critical to baking quality.

Following is a description of the quality control King Arthur Flour employs.

As millers, we believe in maintaining the highest standards and the most precise specifications in the industry, ensuring consistency in every bag, in every kitchen, every time.

Precise flour specifications

Our flours begin with the highest grade of wheat, selected especially for its baking properties. Our careful milling – which in any given type of flour allows a variance of only .2% (two-tenths of a percent) in protein content and .02% (two-hundredths of a percent) in ash content – results in consistent performance from bag to bag, year to year. And we never add any benzoyl peroxide, chlorine dioxide, potassium bromate, or other unnecessary chemicals to our flour. Because of the wheat we select and the way we mill it, our flour needs no artificial enhancements. The difference shows in the unmatched texture, taste, and volume of everything you bake. Breads rise higher, cakes are moister, and piecrust is more tender.

Careful milling

Our white flours are milled from the innermost heart of the wheat berry, avoiding the dark mineral particles near the bran (outer layer of the wheat kernel) and germ. The heart of the berry contains the lightest color and the richest, gluten-producing protein.

Some flour producers mill closer to the bran so they can get more flour out of a bushel of wheat. Then they bleach the flour to eliminate the darker flecks of bran left in their flour, giving it the appearance of pure white flour. Yet bran left in white flour affects baking performance because its hard, sharp edges cut through gluten strands, making it more difficult to develop good structure in your baked goods.

By avoiding the outer layers of the wheat berry, we both ensure there are no particles of bran to reduce the rising performance of our white flours, and eliminate the need to bleach the flour to mask darker flecks.

Protein content

Protein content refers to the ability of flour to produce gluten, the elastic component of a dough that can capture and hold carbon dioxide; higher protein levels are better for yeast breads, lower protein levels are better for tender cakes and pastries.

The quality and consistency of the protein in flour is as or more important than the wheat's raw protein content. It is what enables us to assure bakers that our flour will perform the same way today as it did a generation ago, the same in the spring as it does in fall, from season to season and year to year – so your results will always be the same. For serious bakers, that promise means a lot.

Low ash content

Ash is simply an indirect measure of how much bran is in the flour. A higher ash content means more bran. Because bran darkens flour and interferes with the formation of gluten in developing dough, we make sure our white flours have a low ash content.³

³ <http://www.kingarthurfLOUR.com/flours/commitment.html>

Conventional Versus certified Organic

According to Bob Lisecky from AGREX, demand for certified Organic flour on the US east coast is growing at a rate of 25-30% per year. La Meunerie Milanaise, for example, cannot keep up with its US demand. It is currently building a mill on the US west coast to better meet western demand, and is exploring options for capacity expansion on the east coast. Commercial bakers interviewed for this study, in addition to research completed for the recent *Vermont Milled Grain Products Local Market Study Report* did not necessarily support the need for certified organic, except to point out that it had better be “certified Organic,” if they can buy equivalent or higher quality, conventional flour at half the cost. For example, La Panciata, Northfield, VT sources premium North Dakota flour for less than \$30 per 100 pound bag.

White, All Purpose Flour Versus Whole Wheat; Stone Ground; or Sifted (Bolted) Flour

As Americans look to improve their eating habits they are being advised to consume more “whole grain” foods. As such, demand for whole wheat, and stone ground flour have grown in recent years. However, even with an uptick in demand, and a healthier nutritional profile, the reality is that whole wheat flour has reduced baking qualities and a limited shelf life. For an effort whose mission would be to foster commercial cultivation of local grains, the fewer barriers and limitations to market for the initial product, the better. Therefore, opting to produce an all-purpose, white flour while being less “healthy,” will provide the mill with the largest possible target market audience. Even with an all-purpose white flour, the mill can leverage its local, certified organic growing techniques, and use of heritage grains, such as Red Fife, Champlain, and Ladoga wheat, which can perform well in Vermont’s climate, as opportunities to differentiate the product from competitors and also elevate it to a “healthier” all-purpose flour.

Other Grains

As sales for the core product enable the mill to cash flow and as the staff become skilled with the equipment, production could extend to other grains and products. There is growing interest in alternative or heritage grains, such as Triticale, Spelt, and Emmer, along with gluten free grains, such as Amaranth. Market demand for heritage and gluten alternative grains has not been quantified, and the grains may present issues with the milling equipment or have reduced ability to generate sales from by-products. There is also demand for rye, buckwheat, barley, rolled oats, and corn meal, however oats and barley require different processing equipment, and corn would require special pre-treatment to de-fat the kernels prior to milling. Research into demand and processing potential for alternative grains should be prioritized by those that have been observed to perform well in Darby’s growing trials. Product line expansion will be helpful in the long run to increase penetration with existing customers, and to keep “mind share” by giving a brand something to talk about. But product line expansion is not mandatory as an initial roll out strategy, it increases operating expense as well as the risk for distraction and over-extension.

Target Market

The ideal target market for Vermont grown and processed grains will be commercial bakeries and retail establishments serving a clientele that has the disposable income to afford local grain products, and has an appreciation for and desire to seek out products made from local ingredients be it for personal, environmental, or local economics concerns. It will also be to consumers and bakers out of state who value the perceived attributes and personality of the Vermont brand: “beautiful, peaceful, natural, pure, authentic, genuine, respectful of the environment.”⁴

Wholesale

From interviews with commercial Vermont bakeries who have or currently use local grains, the study found that their consumption of total domestic flour came to approximately 207 tons of flour per bakery per year. Of this volume, they source approximately 56 tons per bakery per year from local suppliers, thus local purchasing makes up approximately 27% of their total needs.

If these accounts were to switch entirely from their existing local suppliers, the project would need 44 commercial accounts currently using local grains to break even. However, commercial bakers have stressed they would be unlikely to alter the volume they are sourcing from existing suppliers (both domestic and local), and they would be unlikely to alter their ratio of local to domestic flour purchasing.

Therefore unless bakers actively pursue expansion and penetration of *their* markets – increasing sales of existing local grain products, or launching new products utilizing local grains, they have no need for additional local supply. Bakers also cautioned that while there is a market for locally grown grain baked goods and certified Organic baked goods, demand is tempered by the products’ higher price points. Further exacerbating the issue from their perspective is that there is an over-abundance of high quality, domestic flour on the market. It is hard for them not to justify sourcing higher quality domestic flour if it is available at less than half the cost of a local alternative.

Based on these findings, the study conservatively estimated potential volume from “commercial accounts who already value locally grown grains” to be 50% of the average account’s current volume of local flour sourcing. At this rate, the mill would require 88 commercial accounts who already value local grain to break even, assuming each account sourced approximately 28 tons of flour from the mill per year. At present there are approximately five to ten such accounts in Vermont. To find the remainder, the study recommends outreach to bakers who attend the annual Kneading Conference in Maine. The conference attracts a pre-qualified audience of commercial bakers who already value the concept of local grains.

When broadening the discussion to all commercial bakeries, according to the *Vermont Milled Grain Products Local Market Study Report*, there are 119 commercial bakeries in Vermont, of which 31 report annual gross sales over \$200,000. These “large” commercial bakeries are estimated to use a combined total of 408 tons of white flour and 26 tons of whole wheat flour

⁴ O’Neal Strategy Group, Inc. *Leveraging the Vermont Brand*. 2003

per month, which equates to a total market of 4,896 tons of all-purpose flour and 312 tons of whole wheat flour per year.

As noted above, of these “large” commercial bakers approximately 8% are known to source local grains and fit the description of our pre-qualified target market. Attempting to convert the 92% of commercial bakeries who are not yet using local grains will require a more intensive marketing strategy because the value proposition and benefits of locally sourced flour do not yet resonate with them or their customers, at least not highly enough to have influenced their purchasing decision-making. According to the market study report, “the higher volume bakers are very price sensitive, and are used to getting discounts for volume... While there was some sense that a local premium could be supported, it would not be large.”

Greenmarket Farmers Markets

In April, 2010, Greenmarket adapted a rule that all participating bakers must use at least 15% locally grown flour in their products. The Greenmarket Farmers Market is also working to promote a Regional Grain Initiative. Communicating with the Greenmarket to make outreach to their bakers and Regional Grain Initiative would be advisable.

Vermont/New Hampshire Farmers Markets

Similarly to the Greenmarket Farmers Markets, many if not all Vermont and New Hampshire Farmers Markets stipulate that baked goods vendors use a certain percentage of local grains in their products. Contacting the Vermont Farmers Market Association would facilitate identifying which farmers markets to approach, to then make outreach to baked goods vendors.

Retail

According to the *Vermont Milled Grain Products Local Market Study Report*, 67% of “small retailers” (country stores, convenience stores, corner markets, and independently owned grocery stores) in Vermont were interested in carrying a local flour. Their most commonly sold package is a five pound bag. If the mill produced a five pound bag as its standard retail product, it would need to sell 982,000 five pound bags or 98,000 fifty pound bags for the bulk bins, to break even. Meanwhile, total sales for all-purpose flour by small retailers in Vermont averages 300,000 five-pound bags per year. If only 67% of these are interested in carrying a local offering, then the total market potential from small retailers (if they purchased all their needs from the mill) would come to a maximum of 201,000 five pound bags per year. This means in a best case scenario the mill would still need to find a market for an additional 781,000 five pound bags.

When looking at the sales volume of large and small retail accounts, grocery stores, and cooperatives across Vermont, the study found average annual sales of locally grown grain (both in the bulk and pre-packaged section) to be approximately two tons per account per year, which equates to 800 five pound retail bags. At this rate, the mill would need 1,228 retail accounts to break even.

Partnering

A strategy to encourage immediate demand and sales throughput would be to partner with an established brand. Ideally King Arthur Flour would champion the project and embrace the product as a new addition to the King Arthur Flour line up. This would be the ultimate positive outcome. In order to do so, King Arthur Flour needs to be involved in the planning and design of

the facility and the milling partnership, as well as guiding the flour product specifications, and providing technical support during product testing to help dial in the mill and offer guidance on standard operating procedures for staff to follow. The flour could then be submitted to King Arthur Flour quality control and upon approval, be packaged and resold in King Arthur Flour sales and marketing channels as the King Arthur Flour, certified Organic, “Vermont Grown Grain” product offering. At the very least every effort should be made for the mill’s product to be available in the King Arthur Flour Baking Center, catalog, and online store, whether it is branded as a King Arthur Flour product or not.

The synergy with King Arthur Flour appears natural, for King Arthur Flour is a Vermont based milling icon, re-known across the United States as an embodiment of the Vermont brand. While it may seem that flour is only a commodity to the average consumer, King Arthur Flour has been able to bridge the gap and create a “sexiness” about flour that commands a premium and has built a customer loyalty following that is unsurpassed. It is also a company with a triple bottom line that includes social and environmental responsibility. If anyone could find a way to sell 800,000 five pound bags of certified Organic, Vermont Grown Flour, King Arthur Flour would be it. The product could be positioned to further capitalize upon the Vermont brand essence that King Arthur Flour already exudes and become in essence the ultimate flour for the baker that has everything and now wants just a little bit more of that Vermont authenticity. It doesn’t need to be marketed for its bread baking qualities so much as for its terroir, unique and varying taste that may be different with every batch, and the essence of Vermont and “back to the land” that it inspires. A question for King Arthur Flour would be, if the product were positioned and sold within its baking center, online and print catalog, how many five pound bags does it think it could sell? Would 982,000 be a reasonable target? Too much? Too little?

Pricing

Following is a table that shows retail and wholesale prices paid for local, certified organic, and conventional, domestic flours across the state current as of October, 2012.

Wholesale Flour		Price/lb
\$29/100lb bag	0.29	North Dakota Milling, Premium White Flour
\$25-38/50lb bag	0.50- 0.76	Local Flour, Certified Organic Vermont and La Meunerie Milanaise sourced flours
\$50/50lb bag	1.00	Green Mountain Flour, Certified Organic, Vermont, Stone Ground Wheat Flour
Retail Flour		
BULK		Price/lb
\$2.49/lb	\$2.49/lb	Green Mountain Flour, Certified Organic, Vermont, Buckwheat Flour
\$1.59/lb	\$1.59/lb	Green Mountain Flour, Certified Organic, Vermont, Stone Ground Wheat Flour
\$2.79/lb	\$2.79/lb	Green Mountain Flour, Certified Organic, Vermont, Polenta
\$1.59/lb	\$1.59/lb	Beidler Family Farm, Certified Organic, Vermont, Whole Wheat Flour
\$2.19/lb	\$2.19/lb	Beidler Family Farm, Certified Organic, Vermont, Spelt Flour
\$0.79/lb	\$0.79/lb	King Arthur Flour, All Purpose Flour
\$1.29/lb	\$1.29/lb	King Arthur Flour, Whole Wheat Pastry Flour
\$0.65/lb	\$0.65/lb	King Arthur Flour, Pastry Flour
\$1.29/lb	\$1.29/lb	King Arthur Flour, Certified Organic Artisan Flour
\$1.29/lb	\$1.29/lb	Nameless Brand, Certified Organic Sifted (bolted) Flour
\$0.49/lb	\$0.49/lb	Round Table, Pastry Flour
BAGGED		Price/lb
\$2.40-3.69/2lb bag	1.52	Green Mountain Flour, Certified Organic, Vermont, Stone Ground Wheat Flour
\$6.69/5lb bag	1.34	Beidler Family Farm, Certified Organic, Vermont, Whole Wheat Flour
\$2.79/5lb bag	0.56	Gold Medal, All Purpose Flour
\$5.99-7/5lb bag	1.30	King Arthur Flour, Certified Organic, All Purpose Flour
\$3.99/5lb bag	0.80	King Arthur Flour, All Purpose Flour
\$5.99/10lb bag	0.60	King Arthur Flour, All Purpose Flour
\$34.65/25lb bag	1.39	Champlain Valley Milling, Certified Organic, Vermont White Bread Flour
\$12.99/25lb bag	0.52	King Arthur Flour, All Purpose Flour
\$23.99/50lb bag	0.48	King Arthur Flour, All Purpose Flour
\$6.95/3lb bag	2.32	King Arthur Flour, Pastry Flour
\$8.60/5lb bag	1.43	King Arthur Flour, Bolted (sifted) White Spring Wheat Flour
\$29.99/50lb bag	0.60	King Arthur Flour, Bolted (sifted) White Spring Wheat Flour
\$49.99/50lb bag	1.00	King Arthur Flour, 11.7% protein, certified organic, High Ash, Artisan Flour

Wholesale Feed (Shorts, Middlings)		
<u>BULK</u>	Price/lb	
\$185-400/ton	0.093-0.20	Certified Organic, grown in Québec, west, and mid-west
Retail Feed (Shorts, Middlings)		
<u>BAGGED</u>	Price/lb	
\$18-19/50lb bag	0.37	Conventional small animal feed (chickens)
29.99/50lb bag	0.60	Certified Organic, grown in Québec, processed in Vermont

Pricing for the mill in this study was based on assuming the lowest price point paid for certified organic product from the wholesale prices noted above.

With respect to how the mill structures its pricing, commercial accounts said they value a stable pricing structure where a pre-agreed upon price can be set for the year or season. The same would be valuable for the grower pay price. Both grower and buyer pricing could have contingencies to change pricing if need be to accommodate unforeseen or unexpected changes. Should the season go as planned and the product arrive within product specification requirements, having set pricing facilitates setting expectations, and enabling budgeting and cash flow analysis for all parties involved.

The Mill

Agrex AGS-1DB-1000



An example of the 75 ton per day AGREX DB 1000 mill

- One milling line, grinding capacity: 25 Tons/12:0 am.
- Ideal to grind soft and durum wheat, buckwheat, spelt, kamut, rye and other cereals
- Complete milling lines, horizontally developed: cleaning, tempering, resting and grinding units on one floor. THEY DO NOT NEED SPECIFIC BUILDINGS for the installation.
- Available in different models and versions to satisfy every client's needs with maximum low flexibility, reduce the maintenance and running costs, obtain excellent qualities and outputs.
- Cut down installation time: all our milling lines are assembled and tested in our factory.
- AGS10 mills can be multi-line installed, allowing one to obtain different kinds of flours optimizing the production demands.
- According to AGREX, "the overall investment is not comparable to that of a traditional mill: the economic return is definitely quicker!"

Infrastructure

In addition to the mill itself, following is a list of other capital equipment and infrastructure needs

CAPITAL COSTS	
MILL	\$ 566,000
MILL TRANSPORTATION	\$ 15,000
STORAGE TANKS (EXTERNAL)- assume 8 100 ton silos, x 50,000	\$ 400,000
CONVEYORS	\$ 50,000
BUCKET ELEVATOR	\$ 20,000
FORKLIFT	\$ 6,000
WORK BENCH & TOOLS for maintenance	\$ 5,000
CLEANING EQUIPMENT (Shop vac- \$500, etc.)	\$ 5,000
CLEANER	\$ 45,000
DRYER	\$ 100,000
ASPIRATOR/AIRWASH	\$ 45,000
BUILDING/CONSTRUCTION, EXPLOSIVE PROOF	\$ 100,000
PLUMBING	\$ 50,000
ELECTRICAL SWITCH	\$ 13,000
ELECTRICAL WIRING	\$ 65,000
FLOUR BAGGER	\$ 200,000
TOTAL	\$ 1,685,000

Ideally the mill would eventually have its own grain and flour testing lab but for initial launch the mill is projected to outsource testing to UVM Extension's Cereal Grain Testing Lab.

Building & Site Selection

The mill requires a 6,200 square foot space with access to water, three phase power, truck loading/unloading docks, and room for at least three external storage tanks, to hold raw grain, and by-products.

Ideally, the mill would be situated along a rail line as the ability to source raw materials or move finished product via rail is substantially less expensive and more efficient. Rail cars can transport 80 tons+ per car, whereas semi-trailers carry an average of 22 tons. Transportation expense for the mill to acquire wheat will be estimated at \$3/loaded mile assuming a semi-trailer transporting 22 tons an average of 200 miles per load.

To plan ahead for future expansion, the mill is advised to select a site with 3-4 acres, although a minimum of ½ an acre should be sufficient to house the mill itself.

If one were to consider purchasing a site and constructing the facility, one would be looking for a 3-4 acre site with railroad access, truck route access and three phase power.

The cost would average

\$500,000 3-4 acres on rail line

\$300,000 for new mill building (assume 6,200 square feet x \$48.50/square foot insulated

\$800,000 building construction, not including electrical wiring)

There is an existing mill for sale that may be of interest for such a project. The Green Mountain Feeds mill at 2681 Leicester Whiting Road in Leicester, Vermont is currently for sale for \$500,000. The property is on the rail line. It comes with eight external 40-50 ton storage silos, an office building, a salvageable grain mill/tower structure, and an old warehouse and various sheds that would need to be torn down. In addition to cost of the site, a new mill building would be required. Total costs for this location would be approximately:

\$500,000	land and storage silos
\$60,000	teardown old structures
\$300,000	for new mill building (assume 6,200 square feet x \$48.50/square foot insulated building construction, not including electrical wiring)
<u>-\$400,000</u>	(value of eight 50 ton storage tanks)
\$460,000	(not including electrical wiring)

Three additional examples for potential sites include Morrison Feeds, Green Mountain Feed, and Green Mountain Flour. Les Morrison recently acquired eight structures near/along the rail line in St. Johnsbury, Vermont with the intent of exploring transforming them into a food grade milling operation. Green Mountain Feeds has been offered a half acre lot adjacent to their current feed facility in Bethel that could house the 6,200 square foot mill. And Green Mountain Flour could potential lease land and a commercial warehouse building built to suit from Black Bear Realty, in See It Made Industrial Park in Windsor, Vermont, which is also on a rail line.

If one were to consider a leasehold situation, current value added food industrial manufacturing space in the Shelburne Green Agricultural Industrial Park is leasing for approximately \$11.50/square feet including CAM (shared overhead expenses). At 6,200 square feet this would come to \$71,300 per year in lease expense.

Milling Logistics

Operating at full capacity the AGREX mill can process 2,204 pounds per hour. Assuming an 85% efficiency, the mill could process a maximum of 8,183 tons per year if it operated 24 hours per day, 7 days per week, 52 weeks per year.

Assuming 90% of the grain will be stored on farm, and 10% will be stored at the mill, the mill should have sufficient silos to store up to 820 tons of grain.

The mill will achieve break-even at approximately 40% capacity. At 40% capacity, the mill would be processing 3,273 tons of wheat per year, producing 2,455 tons of flour and 818 tons of feed. This would break down into 63 tons per week, two eight hour shifts per day, five days per week, with each shift operating the mill for six hours, with two hours for preparation and clean up.

Incoming grain would be dumped outside an external silo(s). A bucket elevator would load the grain into the external silo(s). Grain may need to go into a drying storage silo, which would be outfitted with a mesh bottom and fan to lightly blow dry air through the grain. Grain may also need to pass through an additional cleaning process and an air-wash/aspiration process to remove mycotoxins.

When the grain is ready for milling, it will be moved on a conveyor system from the outside storage silos into the mill's inner storage bin (hopper). The grain in the hopper would go through three cleaning machines. After cleaning, the grain would undergo a tempering process

by which water would be added to bring the moisture of the wheat up to 16% and the grain allowed to rest for up to twenty hours. The tempering process enables the bran to separate much more easily from the wheat. The grain is then moved into the grinding mill which has its own EPA approved filtration system. During the milling process the temperature of the grain will rise and reduce the moisture content to the desired target of 14% for flour. Once the flour reaches 14%, the wheat would be bagged, loaded into totes or stored in bulk. By-products would be conveyed outside and the bucket elevator would load them into the feed storage bin. Once there is sufficient feed for a semi-trailer load, a feed mill will send a truck to come under the storage bin, and pick up the feed.

Cash Flow Logistics

Assuming the mill needs to store 10% of its grain needs on site, the mill will need to be prepared to have up to \$500,000 tied up in raw materials inventory expense when at maximum capacity. At break-even of 40% capacity, the mill should expect to have \$203,000 set aside for start-up inventory expense to cover 10% of 3,273 tons.

Staffing

At break-even, the mill is expected to be able to operate with two production staff per shift (therefore four production staff to cover two shifts), one full time plant manager/head miller, one office manager, one part time agronomist/lab/production/grower liaison, and one sales/marketing associate. As production increases additional hourly wage production staff can be hired as needed.

Salaries and hourly wages for staff were based on industry averages. Payroll expenses were assumed at 7.65% of total wages. Workman's comp insurance was based on industry averages.

Historic Precedence & Current Infrastructure

Until the mid-1800's, when the Erie Canal and intercontinental railroad made it easier to move grain long distances, Vermont had the distinction of being the "breadbasket of New England."⁵ In 1840, Vermont's grain production attained a peak of 19,320 tons per year.⁶ While growing grain commercially has diminished here over time there has consistently been a commercial presence in the milling business for both feed and food grade products. Although there are no large scale commercial food mills in Vermont at the moment, the equipment from a former all-purpose flour mill in Jericho still exists and could potentially be useful in a start-up operation as a way to build cash flow to invest in newer equipment, or use as the long term if the equipment performs within acceptable financial and operable standards. Jack Lazor may have connections to investigate this equipment. The mill is now a museum hosting the snowflake Bentley collection.

Following are brief summaries of current and past milling operations located in Vermont, New York, Maine, and Québec, to demonstrate the depth and breadth of the North East grain growing industry.

⁵ <http://www.kjonline.com/news/maine-vermont-wheat-crops-locally-grown-food-grain.html>

⁶ <http://northerngraingrowers.org/consumers>

Flour Milling Operations

Beidler Family Farm

Brent and Regina Beidler have been experimenting with growing grains on their farm and have added a small stone mill and bagging operation to grind and sell their flour and grains. Beidler Family Farm produces certified organic stone ground whole wheat flour and spelt flours. The flours are available in bulk and in five pound bags.

Butterworks Farm

Jack Lazor of Butterworks Farm in Westfield, Vermont has similarly been leading a small commercial grain growing and stone ground milling venture for several years in Westfield, Vermont. Butterworks Farm produces certified organic, stone ground whole wheat flour, rye flour, and cornmeal.



Butterworks Farm Grain Label



Butterworks Farm Granary



Butterworks Farm Grain Silo

Champlain Valley Milling

Founded in 1985, family-owned and operated Champlain Valley Milling is the largest certified organic mill in the Northeast. Roller mill, hammer mill, and stone milling capacity provide a variety of flours.⁷ The infrastructure is made up of older Allis Chalmers mills, rollstands and bolters, set up and designed by "Heinz." The mill sells certified organic flour to customers throughout all fifty states. The mill has the capacity to produce 20 tons per day, and operates three shifts per day, five days per week, for a total annual capacity of approximately 5,200 tons per year. The company is run by the family and three employees. In recent years Champlain Valley Milling has purchased wheat from local Vermont and New York growers, notably Klaas Martens and Tom Kenyon.

Products are certified organic, sold in 50, 25, 10, and 5 lb. bags and 2 lb. bags for retail available and include:

whole grains
Wheat
Rye
Spelt

cracked grains
Wheat
Rye
Spelt
Emmer (farro)

grain mixes
Freekeh mix
7 grain and seed mix

⁷ <http://www.grownc.org/wholesale/grains/mills/champlain>

Emmer (farro)

Freekeh

whole flour (bran is included)

Whole wheat bread

Whole wheat pastry

Whole rye

Whole spelt

Whole emmer

Whole pumpernickel rye

bolted (sifted) white flour

Bread

Pastry

All purpose

Spelt



Champlain Valley Milling Labels and Packaging

Gleason Grains

Ben Gleason in Bridport, Vermont has been operating Gleason Grains, a stone ground mill since the mid-1980's. His business has continued to grow, producing and processing up to 50 tons per year. Gleason Grains has been a leading inspiration in Vermont's grain growing community. Gleason Grains produces certified organic, stone ground whole wheat flour, bolted (sifted) flour, and wheat berries. Most product is sold in 50 pound bags, with a small volume packaged as five pound bags.



Gleason Grains 50 pound bags



Gleason Grains Mill

Green Mountain Flour

Green Mountain Flour, started by Zachary Stremlau and Daniella Malin in Windsor, Vermont is a new business that began purchasing local grains to produce stone ground flours for its own value added baked goods. Consumers interested in the baked goods also became interested in the flour, and recently the company expanded their product offerings to include their flour and ground grains. The business has an 8" and a 20" Meadows Mills stone mill. The 8" mill can process 50 pounds per hour, and the 20" mill can process 400 pounds per hour. The larger mill is set up to sift flours and the smaller mill to create cracked grain cereals and porridges. At present the business' production approximates 50 tons per year. Green Mountain Flour produces certified organic, fresh, stone ground whole wheat flour, buckwheat flour and polenta in bulk and two pound bags.



Green Mountain Flour Mill



Green Mountain Flour two pound retail bags

Green Mountain Milling

From the mid 1990's through 2006, Green Mountain Milling operated a stone ground flour mill in Pittsford/Florence, Vermont. The mill bought and processed mid-western and Québec wheat, selling flour to commercial accounts throughout New England. The mill had two stone mills, each capable of processing 300-400 pounds of flour per hour. The mill closed due to personal issues facing the owner. Instead of reselling the business as an operating entity, the infrastructure was dismantled and sold.

King Arthur Flour

"King Arthur Flour is America's oldest flour company, founded in Boston in 1790 to provide pure, high-quality flour for residents of the newly formed United States. More than 220 years later, we're the nation's premier baking resource, offering everything from top-quality baking products to inspiring educational programs—all backed by the passion and commitment of our dedicated employee-owners."⁸ In 1984 King Arthur Flour relocated its headquarters to Norwich, Vermont where it opened the King Arthur Flour Bakery and Bakery Education Center, The Baker's Store, a retail center, and The Baker's Catalogue, an order fulfillment service for online and catalog sales. The company owns no milling infrastructure, it contracts with companies such as Cargill for its private label milling needs. King Arthur Flour is a B (Beneficial) Corporation, demonstrating its commitment to shareholders, business partners, community, and the environment. The company has between 100 to 250 employees and annual sales between \$25 to \$75 million.

⁸ <http://www.kingarthurfour.com/about/history.html>



King Arthur Flour Baker's Store



King Arthur Flour five pound retail bags

La Meunerie Milanaise

Robert Beauchemin helped catapult the Québec, certified organic grain industry when he launched La Meunerie Milanaise thirty years ago. Through building processing infrastructure and providing technical assistance to help farms grow product it could use, the mill created a supply chain and quality control for its raw materials. According to Robert, Québec's grain industry received significant financial assistance in the 1970's from the provincial government who invested in tile drainage infrastructure for agricultural producers with clay soils, and this was also a large reason for Québec's success. In addition to building its supply chain, La Meunerie Milanaise works closely with the baking community to develop products the bakers would use. This relationship and customized production coupled with stable pricing, slowly enabled the mill to become a preferred and valued supplier to many northeast bakers and retailers. La Meunerie Milanaise supplies certified organic flour throughout Québec and the Eastern United States. It has two AGREX mills in Québec producing certified organic, or "almost" organic, all purpose flour serving the eastern market. The company also produces stone ground flour, sifted flour, and whole wheat flour. As mentioned, not all the products are certified organic. La Meunerie Milanaise has a processing capacity of approximately 110 metric tons of organic flour weekly, producing a range of flours with bolting rate (sifting) varying from 100% (integral flours) to 64% (unbleached white flours). Its packaging equipment can bag up to 30 units per minute.

Maine Grains

Maine Grains is a stone ground milling venture that recently opened in Skowhegan, Maine to support the local grain growing and farm and food economy. The project cost approximately \$1.5 million and involved purchase and renovation of the Somerset Grist Mill building into a mill, commercial kitchen, and tenant spaces for local businesses. The mill portion of the project required approximately \$900,000 and took five years of planning and development. Funding was raised via grants, debt, and a Kickstarter Fundraising program.

Maine Grains' milling infrastructure includes a four-story brick building which provides vertical elevation for stacking grain storage bins to feed the milling process. Equipment for the mill includes a stone mill, which is a specially designed slow turning mill from Austria that keeps the flour cool, cleaners, a de-hulling machine, packing and weighing equipment, mechanical systems (heating and plumbing), storage bins, ductwork, conveyor systems, and electrical hook-up. Examples of the layout and equipment follow on the next page.



Site Layout



The grain dryer: a new, mobile, custom built small scale grain dryer built by Art Haines of Applied Robotics in Norridgewock, Maine.



The stone mill with owners Amber Lambke and Michael Scholz



Maine Grains storage bins



Maine Grains retail packaged flour

Feed Milling Operations

Green Mountain Feeds

Green Mountain Feeds is a certified organic Feed Mill in Bethel, Vermont. The company has continuously expanded, growing production from 25 tons per year on three shifts to 50,000 tons per year on a single shift.

Morrison's Custom Feeds

Les Morrison owns and operates Morrison's Custom Feeds in Barnet and St. Johnsbury, Vermont. Morrison's Custom Feeds processes approximately 33,000 tons of certified organic feed per year. Les recently acquired eight buildings in downtown St. Johnsbury as a potential site for a food grade flour mill to complement his feed business. Les has been experimenting with a Bryerstone Mill stone mill, with a capacity of 50 pounds per hour, however, his plan is to install a commercial scale mill. He has acquired a 10 ton batch dryer, a continuous 24 hour filler, and has storage capacity for 5,000 to 10,000 tons of grain. Les also has 23 acres of his own acreage under grain cultivation.



Morrison's Custom Feeds, Barnet, Vermont.

Maine Organic Milling

In 2010 Maine Organic Milling (MOM) formed as a cooperative with twelve members to acquire and operate the former Blue Seal Feed, Inc. mill in Auburn, Maine. The project started seven years earlier when some of the farms rented a rail siding for train cars to pull off and sit until emptied. According to the cooperative, the railroad was so supportive that it charged them only \$1 rather than the usual \$1,000 for the siding rental. The mill employs four people and has worked out an agreement with CROPP/Organic Valley for overhead/administration responsibilities. Organic Valley sources and procures 99 percent of the grain and keeps the inventory and cost of the inventory until MOM is ready to purchase it. This saves MOM from having to cash flow grain until it is ready to grind and ship finished goods. Customers pay Organic Valley for their feed before it is delivered so there is no issue with late payments. Since Organic Valley is managing the finances and the billing, this eliminates an office position MOM would otherwise have to fill, and by reducing overhead, they are able to reduce the amount they have to charge for the grain.

The mill sources wheat from Saskatchewan but hopes to source several thousand tons per year from Maine growers in the coming years. The mill is a certified organic Feed operation, capable of producing 2 tons of mash every five minutes. It currently produces approximately 200 tons per month of mash and pellets.

Maine Organic Milling secured funding from a variety of sources for start up and capital investment, including farmer-invested equity, the Maine Department of Agriculture, Food & Rural Resources Agricultural Marketing Loan Fund, the Finance Authority of Maine, other industry supporters and volunteer sweat equity. CROPP helped with the initial purchase of the mill and “was very excited to assist MOM in the mill startup,” says John Cleary, New England dairy coordinator for CROPP (Coulee Region Organic Produce Pool). “It is keeping a local mill in operation, supporting farmers and producing feed for livestock, all part of their (CROPP) mission.”⁹

Pictures of MOM can be found on the following page.

⁹<http://www.mofga.org/Publications/MaineOrganicFarmerGardener/Fall2010/OrganicGrain/tabid/1731/Default.aspx>



Maine Organic Milling, in the former Blue Seal Mill in Auburn, Maine.



Jason Jordan at the computer of Maine Organic Milling.



Grain storage tanks at Maine Organic Milling in Auburn, Maine.

Resources

Following is a compilation of resources that may be useful for further research.

Mill Infrastructure

Heinz

Heinz is a mill designer and installer who designed the Heartland Mills and Champlain Valley Milling mills. Randy George of Red Hen Bakery can find contact information for Heinz.

Bob Lisecky

AGREX, Inc.

boblisecky@sympatico.ca; 416-456-5780; <http://www.agrex.it/>

AGREX is an Italian mill manufacturer, producing “small” scale commercial mills. AGREX is the mill manufacturer supplying La Meunerie Milanaise.

Eastern Millwright Regional Council

<http://emwrc.org/>

Eastern Millwright Regional Council professionals are expertly trained and engaged with the construction, installation and maintenance of complex machinery, containing moving, interconnected parts. The millwrights are precision craftsmen who install, upgrade, maintain, diagnose, and repair industries’ most complex and intricate machinery to ensure they operate in perfect working order.

New England Millwrights

Tom Brock

Cassie Street Rr 4

Barre, VT 05641

Greg Dunn

4492 VT Route 100

Newport Center, VT 05855

Grain Mill Expert Electrician

Greg has worked with Green Mountain Feeds, Poulin Grain, Pheonix Grains, Old Mill, Troy. Greg is recommended by Green Mountain Feeds for his knowledge of the electrical code requirements for milling, his reasonable rates, and excellent service.

Black Diamond Builders

Black Diamond Builders completed the recent addition and renovation of Green Mountain Feeds mill. The company is knowledgeable about building code requirements for milling, and produced a better quality finished product for \$65,000 less than other bids received.

Production Infrastructure

<http://www.yazallcrop.com/>

An internet source for Allis Chalmers All Crop Harvesters.

http://www.ssbtractor.com/allis_chalmers_manual.html

An internet source for Allis Chalmers product manuals.

Klaas Martens

Eastern New York Grower

315-694-1263

Klaas has plans for converting peanut drying wagons into grain dryers. He also has a custom dryer he made from cutting the cab off of a long dump truck, making a hutch out of it, installing an air floor and a fan in the front with a small salamander propane heater aimed at the fan.

Ken Van Hazinga

TioGrain Farm

Shoreham, Vermont

<http://northerngraingrowers.org/wp-content/uploads/buying-your-dream-machine-pdf.pdf>

Ken has written a helpful document on equipment needs and sources for grain growing in Vermont.

Production Technique and Advice

Heather Darby

University of Vermont Extension

Agronomist and Nutrient Management Specialist

278 S. Main St, St. Albans, VT 05478

(802) 524-6501 ext 437

heather.darby@uvm.edu

<http://www.uvm.edu/extension/cropsoil/grains>

Dan Hudson

University of Vermont Extension

Agronomist and Nutrient Management Specialist

397 Railroad Street, Suite 3

St. Johnsbury, VT 05819-1740

(802)751-8307 ext 356

daniel.hudson@uvm.edu

<http://agronomator.wordpress.com>

Lynda Prim

NOFA-VT

Vegetable & Fruit Technical Assistance Coordinator

(802)434-4122 ext 21

lynda@nofavt.org

Jack Lazor
Butterworks Farm
<http://butterworksfarm.com/jack.html>
Jack@butterworksfarm.com

Jack is in the process of writing *Amber Waves of New England*, a book on grain production. The book will include many historical numbers, tips, and advice. A brief can be found in the 2011 NGGA newsletter.

Northern Grain Growers Association
<http://northerngraingrowers.org/growers>

The Northern Grain Growers Association is a “farm grown” organization. Since 2004 many of the grain growers in Vermont have been gathering together for exchanging ideas, networking, and camaraderie. The initial focus of the group was to enhance organic seed saving, plant breeding, and variety improvement. Over time the group has developed a somewhat broader focus which includes all aspects of grain production. In recent years the interest in local grains has been increasing and the group now includes bakers, local eating enthusiasts, agricultural support personnel, and many beginning farmers.

Appendices

List of Persons Consulted

Amber Lambke, Maine Grains
Ben Gleason, Gleason Grains
Bob Lisecky, Agrex
Dan Hudson, UVM Extension
Daniela Malin, Green Mountain Flour
Eric Dutil, Green Mountain Feeds
Glenn Loati, La Panciata
Heather Darby, UVM Extension
Jack Lazor, Butterworks Farm
Ken Van Hazinga, Grower
Klaas Martens, Grower
Les Morrison, Morrison's Custom Feeds
Louise Calderwood, Everything Agriculture
Lynda Prim, NOFA-VT
Randy George, Red Hen Baking Company
Robert Beauchemin, La Meunerie Milanaise

Additional Resources Consulted

O'Neal Strategy Group, Inc. *Leveraging the Vermont Brand*. 2003
Robb, W. *Vermont Milled Grain Products Local Market Study Report*. 2012
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<http://en.wikipedia.org/wiki/Barolo>
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http://greenmountainflour.com/Grist_Mill.html
<http://www.grownyc.org/greenmarket/topics/grainsweek>
<http://www.grownyc.org/files/gmkt/grainbooklet.pdf>

<http://www.grownyc.org/wholesale/grains/mills/champlain>
<http://www.hwfc.com/CoopScoop/Nov10/main3article.html>
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<http://www.navajopride.com/Flour.html>
<http://northerngraingrowers.org/>
<http://northerngraingrowers.org/wp-content/uploads/buying-your-dream-machine-pdf.pdf>
<http://www.organicvalley.coop/newsroom/press-releases/details/article/maine-organic-milling-launches-states-first-exclusively-organic-feed-mill/>
<http://www.pointandpost.com/jobs/jobpage.asp?jobid=RV-BLK0717ASP&dn=www.agoodjob.com>
<http://www.stb.dot.gov/stb/docs/NGCC/NGCC%20June%202%202009%20Minutes.pdf>
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