

# SULLIVAN COUNTY FARM ROOT CELLAR

## Feasibility Study for a Mushroom Production, Cheese Aging and Education Center



Photo Courtesy: Glynis Hart, Eagle Times

**March 19, 2019**

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# INTRODUCTION

## About the Sullivan County Farm and the Root Cellar Feasibility Study

Sullivan County located in west-central New Hampshire, in the foothills east of the Connecticut River, owns 2,100 acres of undeveloped land in the town of Unity. Much of this land is comprised of former farms. On these lands, as part of the County Complex, is the County Farm. The original intent of the county farm was to provide work in exchange for room and board for members of the community who could otherwise ill-afford food or lodging. At its peak, Sullivan County Farm was an operating dairy, a sheep wool producer, and an apple orchard. Residents of the farm raised enough food to feed themselves, provide wood for heating their residencies, and produce their own clothes. As part of its infrastructure, in 1931 the farm added a 1,500 square foot root cellar to hold its apple harvest through winter. By the 1960's the "County Farm" form of social assistance became obsolete, replaced by other models of welfare. The farm's landbase and infrastructure fell into disuse and disrepair.

Recently efforts have begun to revitalize the county farm. The lands are leased to beef and maple producers, and a local beagle association. The county has added greenhouses, a community garden and begun refurbishing the apple orchards. The county also recently added hiking trails connecting all the land parcels for community use, and some of the original barns and outbuildings have been refurbished and re-purposed for official county business.

One building that has not yet undergone transformation is the root cellar. The 1,500 square foot root cellar is a cement floored, unheated, stone-walled building built into the south facing side of a hill within the confines of the primary buildings in the County Complex.

The County Commissioners commissioned this study to explore the suitability of the root cellar for two potential purposes: a mushroom propagation facility for producing finished mushrooms for sale or mushroom spores for resale to commercial mushroom growers, and a cheese aging facility for regional cheese producers. Ideally the county would like the facility to serve multiple producers and provide educational opportunities for the community.

## About the Project Team

Rose Wilson of [Rose Wilson Consulting LLC](#) and Allen Matthews of [Elemental Development, LLC](#) were hired to complete the feasibility study. Rose Wilson founded Rose Wilson Consulting LLC in 2004 to specialize in business planning and development for the farm and food sector. Since this time Rose has consulted with over 300 farms, businesses and organizations. Prior to this, Rose was Business Development Manager for Harpoon Brewery, and a National Sales Manager and Vertical Market Supervisor for Geographic Data Technology, Inc. Rose is a graduate of Dartmouth College, and a joint US-Canadian citizen.

Allen Matthews founded Elemental Development to continue consulting on business plans involving agricultural and environmental sustainability initiatives. Allen previously coordinated Farm Viability Enhancement at UVM's Center for Sustainable Agriculture and Director of Sustainable Agriculture at Chatham University's Master's program Eden Hall Farm. Allen is a farmer and was a lead researcher and co-author of Best Management Practices to Log-Based Shiitake Cultivation in the Northeast.

## CHANGING AGRICULTURE - BACKGROUND

The U.S. Department of Agriculture's Economic Research Service (ERS) reports that the Net Farm Income across the United States has dropped to the lowest value in the past 12 years.

The 1992 USDA Census of Agriculture showed that New Hampshire had 2,445 farms with \$114,070,000 Gross Farm Income. By the last reported Census of Agriculture in 2012, the number of NH farms had almost doubled to 4,391 and Gross Farm Income grew by 67% to \$190,907,000 for the state. However, the average Gross Farm Income per farm had dropped from \$46,654 in 1992 to \$43,477 in 2012.

Those same statistics in 1992, showed that 188 of those total 2,445 farms were in Sullivan County, with a Gross Farm Income of \$12,746,000. Twenty years later, in 2012, Sullivan County had increased to 298 farms with a Gross Farm Income of \$17,311,000. Over those 20 years, the number of farms in Sullivan County grew by 46% and their total farm gross market value had increased by 36%, demonstrable growth yet lagging behind the state as a whole. In 2012, farms in Sullivan County occupied 39,015 acres, with a median farm size of only 43 acres.

At first glance, it seems a pleasant surprise to see that Gross Farm Income had increased over those 20 years. However, with more farmers on less farm acreage, and higher farm operating costs, the actual Net Farm Income per farm decreased in Sullivan County from a positive \$2,698 per farm in 1992 to a loss of (-\$8,018) per farm in 2012. Basically, with approximately 100 more farms in 2012, the average net income had dropped by minus (-\$10,716) per farm. While Sullivan County farms did not break even in 2012, their average per farm loss was less than the State average of (-\$10,039). In 2012 the total Net Farm Cash Income from all farms in Sullivan County came to a combined loss of (-\$2,389,000).

### DIGGING DEEPER

Small farms, under 50 acres, dominate the county with the average farmer age at 58 years of age, about equal to the NH state average for farming. About 76% (226) of Sullivan County's farmers had average value of sales of less than \$9,998 in 2012. According to that Census data, only 24 farmers in Sullivan County reported a gross value of sales of over \$100,000.

Traditionally, the major crops in NH include grains, nursery-greenhouse-trees, milk and cattle-calves, and poultry. In Sullivan County, these trends appear to hold with Market Values of Crops representing 53% and Livestock Sales representing 47% of gross farm sales. According to input from NH Cooperative Extension and the NH Agriculture Department, both felt that the net losses per farm expressed in 2012 were likely driven by losses from dairy, which as an industry has been operating at below break-even on the average cost of production for many years in New Hampshire and New England at large.

### DIRECT SALES

Back in 1992, at the request of diversified, sustainable farmers, for the first time, USDA - Census of Agriculture began documenting statistics of agricultural products sold directly to individuals for direct consumption. Initially, they tried to collect that data on a statewide basis. New Hampshire reported 511 farms reporting \$4.2 million in Direct Farm Sales to Consumers that year. Perhaps this was the

initial document's year of the "Local Food Movement" and "Value-added" farm products. By 1997, New Hampshire documented 680 farms generating \$8.8 million in Direct Sales to Consumers. That reflected a more than 50% increase in "value-added" farm products in just five years. By 2012, New Hampshire documented 1,386 farms reporting \$20.3 million in "Value Added" Sales Direct to Consumers.

USDA Census of Agriculture, now collects "Value-Added" Direct Sales from Farm to Consumers at the county level across the country as an economic indicator of progress. By 2012, 103 farmers in Sullivan County reported direct sales, up from 80 farmers in 2007. Over that 5 year period, direct sales also increased from \$784,000 in 2007 to \$1,315,000 in 2012. There is a clear expectation that New Hampshire's 2017 Census report is expected to continue to show a direct farm sale increase. This feasibility study was developed to analyze the possibility of value added production in products such as mushroom propagation and production and collective cheese aging.

# MUSHROOM PROPAGATION, PRODUCTION & EDUCATION CENTER FEASIBILITY ANALYSIS

## *METHODOLOGY*

This feasibility study approaches the overall mushroom enterprise review with an initial suggested assumption that there is a growing interest in mushroom production at the local and regional level. The presenting expectation was that the “Root Cellar” might act as a source for mushroom spawn for commercial and home scale growers across New Hampshire, as a mushroom production facility for one or more mushroom entrepreneurs, and as an education center teaching mushroom production for home scale and commercial production.

To explore the feasibility of each of these possibilities, the researchers first conducted an on-site review of the facility to assess the physical asset in question. They followed this with a market survey to current mushroom farmers and growers to understand market conditions, needs and demands of growers. The researchers analyzed the results of the onsite review and market surveys to identify what, if any, potential opportunities presented themselves and then developed and tested a model to assess the feasibility of these opportunities.

Primary data analysis collected for recommending the proposed facility was gathered from current mushroom farmers and growers through surveys distributed via Survey Monkey. In addition, direct interviews were collected from several commercial growers from the region. The Survey Monkey survey was disseminated via an e-mail sent to the Northeast Forest Grown Mushroom Network list-serve. The Northeast Forest Grown Mushroom Network was developed ten years ago as a result of research by the University of Vermont and Cornell University. Presently, their on-line list-serve represents over 300 beginning and experienced growers from throughout the northeast.

Farmers and growers of the Northeast Forest Grown Mushrooms Network provided input on the following issues:

- What is the general demand for spawn and mushroom production?
- What is the volume of production and what are sales income estimates?
- What are the prices currently received for these products?
- What is the sense of market demand for a mushroom facility in New Hampshire?
- Is there room for a new provider of the service being proposed?
- What element of mushroom production would be recommended and why?

From the survey responses, coupled with the building review, a vision for a potential model emerged. This model was then developed using capital requirements, cost of production estimates and yields available from existing commercial growers and third party data coupled with the income and market data provided by the grower surveys to assess its logistical and financial feasibility.

## *ANALYSIS*

This study began in order to assess the suitability and demand for operating the Sullivan County Farm Root Cellar as a Mushroom Production and Education Center including acting as a source for mushroom spawn for commercial and personal growers across New Hampshire, providing space for

mushroom production and serving as an education center teaching mushroom production, propagation and related topics for home scale and commercial production.

### Site Review Analysis

#### Mushroom Spawning

Caring for mycelium of different types to raise spawn, in one location, requires a wide range of separate temperature and moisture levels, and most importantly, a sterile environment. It also requires a highly skilled and experienced mushroom grower. Based on the space and skill set constraints, it is not recommended that the project model include spawning at this time. This could be an opportunity for a second phase if a second story is added, and a qualified mushroom spawn expert can be found to oversee and lead the effort.

#### Mushroom Production

One can grow approximately 110 pounds of mushrooms per week per 322 square feet. With the current Root Cellar foot print (41' x 23'), assuming no need for spawning, the space could be fully repurposed to mushroom production and packing if basic renovations are made such as a sound roof system; air exchange and ventilation (important to ensure optimal O2 to CO2 concentrations for optimal growing conditions); customized zones for humidity and temperature control; electricity; heating and cooling system; hot and cold running water; and access (a roadway to the building). In addition, specific capital expenses related to the Mushroom Enterprise would also require an 8' x 10' walk-in cooler; rust-proof, food grade shelving; and portable humidifiers for additional humidity in the grow room(s).

Assuming the 943 square foot is divided into thirds, with two thirds reserved for production and one third reserved for packing and storage, the facility could support a modest commercial mushroom production enterprise producing ~216 pounds of mushrooms per week (11,227 pounds per year).

Mushroom specific infrastructure needed to support this effort would include stainless steel (rust proof, food grade) shelving, a walk-in cooler, tables for packing, and several humidifiers. These investments could be achieved with a capital budget of \$30,000.

#### Education Center

The packing room could be utilized to host educational workshops. If a second story is eventually added it could provide a dedicated space for educational activities and community engagement. Educational workshops would provide beneficial supplemental income to the mushroom production enterprise.

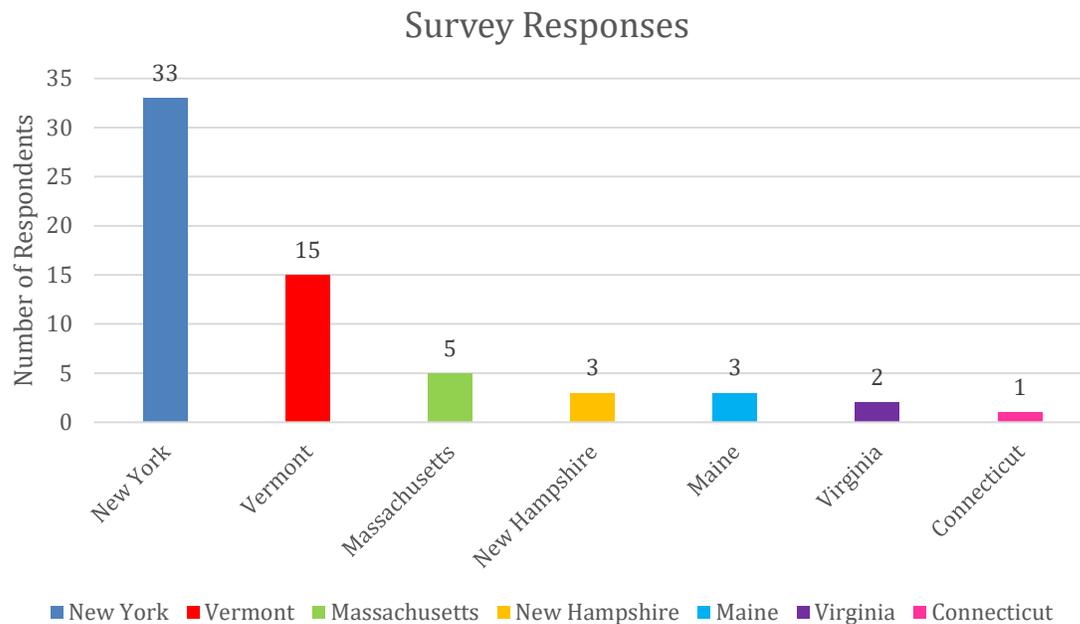
With the site review completed, the study turned to the next question: what is the extent of market demand for such a mushroom facility in New Hampshire?

## Responses from Northeast Forest Grown Mushroom Network

Sixty-two growers responded to our inquiry from seven states. The overall sense researchers received from the responses was that there was sufficient demand for locally grown mushrooms and for grower education opportunities to warrant exploring suitability of the Root Cellar as a Mushroom Production and Education Center.

### Details from the Survey Responses

The longest operating grower of those responding has been growing mushrooms since 1987 while the newest producer responding just began growing this past season. Thirty percent (19) of the growers have been growing for less than three years, and most of these growers were not commercially selling mushrooms in 2018.



Of the respondents who sold fresh mushrooms in 2018, 22.5% (14) sold less than \$1,000 worth of mushrooms. Approximately 47% of participants reported greater than \$1,000 in annual mushroom sales. In addition, it is quite impressive that 14.5% (9) of the growers indicated they were successful at marketing more than \$5,000 of fresh and dried mushrooms direct to consumers.

If we only focus on the 43 growers who reported at least some level of direct sales in 2018 (69% of all respondents), **21% of this subset reported sales of \$5,000 or more last year!**

Altogether, 43 successful farmer/growers indicated that they had grown a total of 72,243 pounds of locally raised mushrooms with a market value of \$573,957 plus another \$102,500 of other value-added mushroom products, spawn and tinctures in 2018.

Growers in the survey indicated that they had grown the mushroom strains below, although only a limited amount of certain varieties were actually sold commercially.

Shiitake	Oysters	Lions Mane
Chestnut	Stropharia	Maitake
Reishi	Nameko	Pipino
Parasol	Shaggy Mane	Blewit
Almond Agaricus	Morel	Turkey Tail

Clearly, shiitakes are the most preferred for sales, with 98.4% of responses. Oyster varieties represented being grown by 49.2%, with Wine Caps at 34.9% and Lions Mane being grown by 31.7% of the growers.

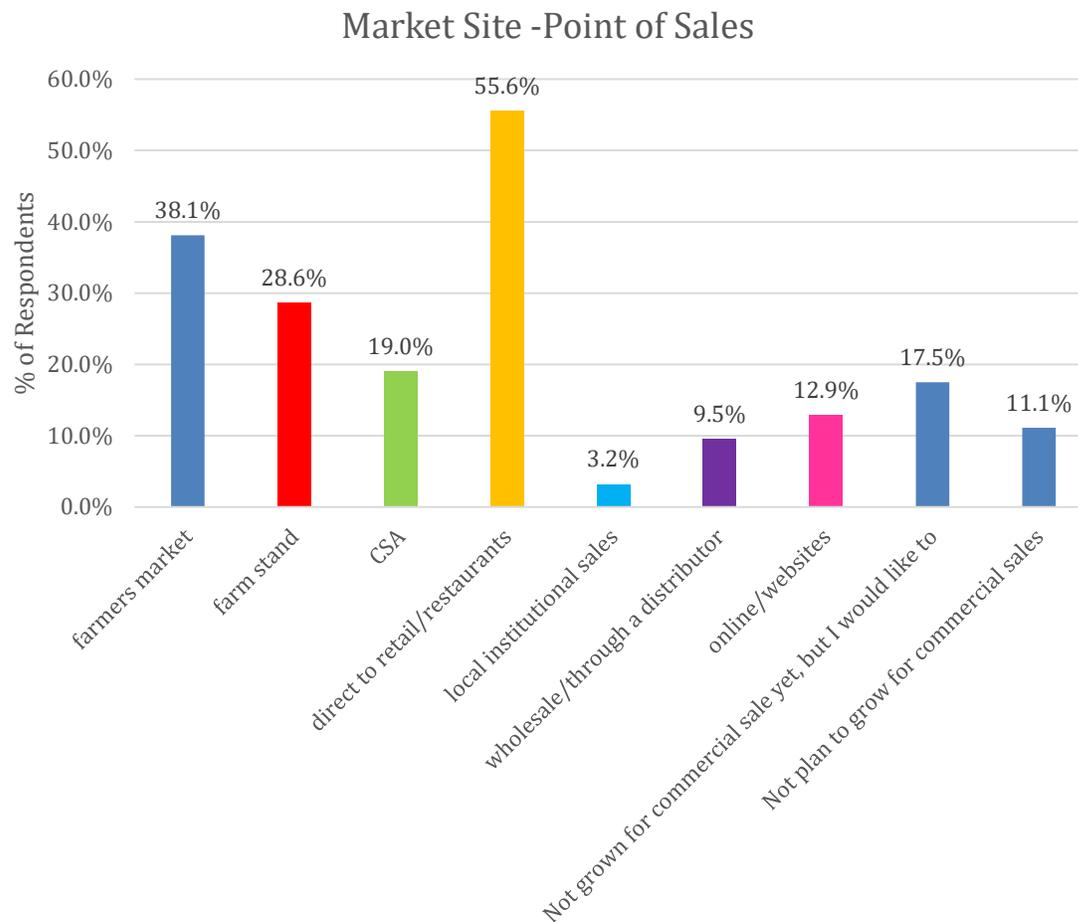
By far, the most successful commercial spawn enterprise in our survey was [Field and Forest Products](#) of Wisconsin, with 86.7% of growers purchasing spawn from them. Other professional commercial growers who are growing and selling spawn for sale to members of the Northeast Forest Grown Mushroom Network include [Fungi Ally](#) (16.6%) from Massachusetts; [Fungi Perfecti](#) (16.6%) from Washington; [North Spore Mushrooms](#) (6.7%) from Maine; and [Wichland Woods](#) (3.3%) from New Hampshire. Northeast growers also indicated getting a minimal amount of spawn from [Mushroom People](#) in Tennessee and [Smugtown Mushrooms](#) in New York.

In the forest grown mushroom report of 2012 to USDA-SARE, growers were expecting to receive \$10 to \$12/pound for wholesale accounts and approximately \$16/pound for direct sales of fresh shiitake mushrooms. In our 2018 study, pricing for shiitakes ranged from a low of \$8/pound to a high of \$20/pound when broken down into ¼ pound baskets at \$5/basket. Rural versus urban locations and access to direct sales strongly influence the price available to producers.

Mushroom Price for Direct sales to consumers –

Variety	Range	Average per Pound
Shiitake	\$8 - \$20	\$14
Oyster varieties	\$6 - \$16	\$12
Lions Mane	\$10-\$18	\$14
Wine Caps	\$8 - \$20	\$12
Maitake/Nameeko/Unusual	\$16-\$20	\$16

Most northeast mushroom growers market their products in a wide variety of outlets with direct sales to retailers and restaurants being the most common sales channel, used by 55% of growers. Farmers markets (38%) and Farm stands (28.6%) are also regular points of sale for a large number of smaller growers.



It is interesting to note that for many of the larger, mushroom entrepreneurs, **as much as 98% of their fresh mushroom sales are grown indoors** and they can provide year-round supply to their customers.

As many growers increase their experience, value-added mushroom products are being seen as a new opportunity by the more experienced growers. Participants mentioned that an increased amount of dried mushrooms are coming to the market and expanding seasonal sales. More entrepreneurial growers are packing medicinal powders in capsules and adding the opportunities for sales of tinctures and extracts. Farmers markets seem to be a chance to add shiitake mushroom soups, mushroom patés, and even fresh baked specialty mushroom pizzas to growers’ offerings. Those growers who have been developing commercial customers have also expanded into sales of dried mushrooms, tinctures, and prepared foods.

Only a very few mushroom growers have the expertise to develop and market spawn. As mentioned, over 87.6% of those responding obtain their spawn from Field & Forest Products in Wisconsin. Field & Forest Products have been able to keep prices fairly stable, have a wide range of mushroom spawn types available, and seem to have set a standard for consistency and availability.

Through personal interviews, growers shared that early stage challenges included balancing increased production with the ability to accurately predict sales, and navigating the rapid growth of competition. As more and more beginning growers entered the market, pricing often began to become unstable in some of the direct market sites and farmers markets. Seasonality and changing weather continue to be challenges. As growers expand into larger scale operations, developing and retaining quality, long term employees has become an issue.

Most mushroom growers in the region have focused on forest grown mushrooms outdoors. Growers agreed that the different moisture and temperature controls needed between growing fresh mushrooms and mushroom spawn would be challenging in an indoor facility such as the Root Cellar.

### *ASSESSMENT OF FEASIBILITY*

After assessing the site review and grower surveys, the researchers believe the Root Cellar could be renovated to support a moderately sized commercial mushroom production enterprise, that there is market demand for finished mushrooms, and there is grower interest in mushroom production and agro-forestry workshops.

Given these insights, the question then became, could a modest mushroom production enterprise be viable and what might this model look like?

### *PROPOSED MODEL FOR MUSHROOM PRODUCTION*

The researchers explored both the financial and logistical considerations for a viable model. Assuming there may not be an experienced mushroom grower championing the effort, the researchers sought to develop a model that could be fairly turn-key for any interested individual or organization to operate. With this in mind, the researchers identified three guiding principles that would help any effort succeed:

1. The researchers recommend the enterprise purchase “mushroom blocks” from a leading mushroom spawn provider. These blocks arrive as self-contained sterilized/pasteurized pre-inoculated substrates ready to begin fruiting. This turn-key production plan, while perhaps more expensive, than buying or sourcing and sterilizing substrates and propagating spawn, alleviates two key risks: needing a champion with a high degree of mushroom production expertise to operate the production facility, and needing a sterile environment and laboratory infrastructure to prepare, sterilize and inoculate the substrates. It also enables the entire production space be dedicated to growing out mushrooms an income generating use of the space, rather than reserving room to grow spawn, a cost center.
2. The researchers recommend production be limited to a single variety, and for that variety to be oyster mushrooms. By limiting production to one variety the enterprise can maximize the growing space (no need for additional room dividers and skills to create and maintain separate growing spaces), and oysters are recommended because they are the easiest to grow, alleviating the need for an experienced grower to be onsite.
3. The researchers also recommend the enterprise seek to partner with Sullivan County to present the enterprise as a workforce training development opportunity for inmates. If the

enterprise sticks with the two principles above, then the work to be done will not require experienced growers, however it will require a significant amount of manual labor. Growing mushrooms is a manually intensive enterprise. One can yield between 1.46 to 3.36 pounds of finished mushrooms per labor hour. At the lower productivity range, the enterprise would not be able to afford more than New Hampshire's minimum wage. At the higher productivity range, the enterprise could afford to pay higher wages as it would require fewer labor hours to yield the same proposed output. Providing a workforce development program for inmates could solve both a need for a low-skilled, low-wage labor pool while also providing valuable job force training skills for inmates who complete the program.

Using these three foundational principles to guide the model, it is possible the mushroom production enterprise could be established on a fairly limited capital budget and break even while being operated by an individual or organization without significant mushroom production experience.

### The Model

The model assumes:

#### Production

- One can produce 110 pounds of mushrooms per 322 square feet
- 632 square feet will be available for mushroom production
- Based on the above, the operation will be able to produce approximately 216 pounds of mushrooms per week
- 50 pounds of mushrooms per week could be sold via farmers markets at \$16 per pound
- The remainder would be sold to restaurants and retailers at \$12 per pound
- The operation could host one workshop per quarter with up to 25 participants per workshop charging a registration fee of \$50 per participant
- One can yield between 1.46 to 3.36 pounds of mushrooms per labor hour, thus to produce 11,227 pounds of mushrooms one could require as many as 3.6 to as few as 1.6 FTE. To this end, production labor has been budgeted assuming a total outlay of \$63,821 (hourly pay plus 15% for payroll taxes) which could equate to as many as 3.6 FTE earning as low as \$7.25 per hour to as few as 1.6 FTE earning as much as \$16.30 per hour.
- Mushroom blocks (ready to grow sterilized substrate pre-inoculated with mushroom spawn) are available from Field and Forest at a commercial rate of 10 blocks for \$100.
- Each mushroom block will yield an average of 2.25 pounds finished mushrooms
- To produce 11,227 pounds of mushrooms, the enterprise will require approximately 4,990 blocks, for a total cost of \$49,000
- Shipping the blocks will cost an additional \$15-16,000
- Packaging supplies (cartons, labels, etc) for finished mushrooms will cost approximately \$1,120 and will also require a shipping expense
- The enterprise should budget \$600 for other supplies (cleaning supplies, general supplies), repairs and maintenance
- The enterprise should budget up to \$2,000 for utilities based on assuming 3 million BTU required for heating in the winter and 1.5 million BTU for cooling in the summer along with some expense for humidity and lights
- The model assumes no rent is required by the County for use of the facility

General, Sales and Administration

- The business will need to budget for marketing expenses (point of sale, demos, marketing/farmers market staff, social media, farmers market supplies and fees, etc.) Researchers recommend a \$5,000 allocation for sales and marketing
- 200 miles per week in travel to deliver mushrooms to sales accounts and farmers markets at \$0.58/mile
- Possibility for credit card processing fees of up to 4% if using/accepting credit cards for example if using “Square” at farmers markets
- \$3-400 per year for computer and internet fees (website domain hosting fees)
- \$100 per year for licenses and registrations
- \$2,200 per year for general and liability insurance with at least \$1,000,000 for liability
- \$1,600 per year for workers compensation insurance based on \$2.49 per \$100 of wages
- \$200 per year for office expense (supplies, postage, other)
- No management salary, it is assumed the manager is one of the FTE production employees
- No compensation for workshop presenters, funding for workshop presenters may be available through grants or philanthropic support of partnering organizations
- No depreciation expense is being assessed to the enterprise

Capital Requirements

<b>PRO FORMA CAPITAL BUDGET</b>	
<b>Proposed Root Cellar Mushroom Enterprise</b>	
<b>900 SQ FT</b>	
<b>CAPITAL EXPENSE</b>	
Metal shelving	\$ 14,980
8'x8'x10' walk in cooler	\$ 12,000
Humidifier	\$ 1,750
<b>TOTAL CAPITAL EXPENSE</b>	<b>\$ 28,730</b>

- \$14,980 for twenty 60"x24"x72" 4 rack stainless steel shelving (includes \$600 in shipping)
- \$12,000 estimate to build an 8'x8'x10' walk in cooler
- \$1,750 to purchase 6-8 humidifiers for the growing area, assuming approximately \$250 per unit

Operating Budget Profit and Loss

<b>PRO FORMA INCOME STATEMENT</b>	
<b>Proposed Root Cellar Mushroom Enterprise</b>	
<b>900 SQ FT</b>	
<b>PRODUCTION</b>	
Mushrooms (in pounds per year)	11,227
<b>REVENUE</b>	
Mushroom Sales- Restaurants & Retailers	\$ 103,522
Mushroom Sales- Farmers Markets	\$ 41,600
Workshops	\$ 5,000
<b>TOTAL REVENUE</b>	<b>\$ 150,122</b>
<b>COST OF GOODS SOLD</b>	
Labor	\$ 63,821
Mushroom Spawn in Block Kits ready to grow	\$ 49,897
Freight Shipping for Mushroom Spawn	\$ 15,600
Sales packaging- cardboard trays, bags, labels	\$ 1,120
Freight Shipping for Packaging	\$ 300
Repairs, maintenance	\$ 500
Supplies	\$ 100
Production Facility Expenses	
Utilities	
heat	\$ 401
electric	\$ 1,630
water	\$ -
<b>TOTAL COGS</b>	<b>\$ 133,368</b>
<b>COGS as a % of Gross Income</b>	<b>89%</b>
<b>GROSS PROFIT</b>	<b>\$16,754</b>
<b>GROSS MARGIN</b>	<b>11%</b>
<b>GENERAL, SALES AND ADMINISTRATION EXPENSE</b>	
Marketing	\$ 5,000
Bank Service Charges; Credit Card Processing Fees	\$ -
Car & Truck/Distribution Expenses	\$ 6,032
Computer & Internet Expenses	\$ 340
Licenses, Fees & Permits	\$ 100
Insurance Expense	\$ 2,200
Workers Comp Insurance	\$ 1,589
Office Expense (Supplies, Postage, Other)	\$ 200
<b>TOTAL GENERAL, SALES &amp; ADMINISTRATION EXPENSE</b>	<b>\$ 15,461</b>
<b>GS&amp;A Expense as a % of Gross Income</b>	<b>10%</b>
<b>EBITDA (EARNINGS BEFORE INTEREST, TAXES, DEPRECIATION &amp; AMORTIZATION)</b>	<b>\$ 1,292</b>
<b>EBITDA MARGIN</b>	<b>1%</b>
<b>INTEREST EXPENSE</b>	<b>\$ -</b>
<b>DEPRECIATION EXPENSE</b>	<b>\$ -</b>
<b>TOTAL ADJUSTED EXPENSES</b>	<b>\$ 15,461</b>

<b>NET FARM INCOME FROM OPERATIONS (OPERATING PROFIT)</b>	<b>\$ 1,292</b>
<b>OPERATING MARGIN</b>	<b>1%</b>
<b>INCOME BEFORE TAXES</b>	<b>\$ 1,292</b>
<b>INCOME TAXES PAID OR (REFUND)</b>	<b>\$ -</b>
<b>NET PROFIT</b>	<b>\$ 1,292</b>
<b>NET MARGIN</b>	<b>1%</b>

Proposed Implementation Plan

- Phase 1: Conduct the basic renovations required: initial road access and construction of sealed roof, entrance/exits, insulation, wall separations, electricity, heating, ventilation, humidity and water/septic systems.  
 Outfit the Root Cellar with shelving, walk in cooler, humidifiers, packing tables.  
 Identify/designate an individual or entity to oversee the mushroom production operation.  
 Hire staff, purchase mushroom blocks, initiate production, sign up for farmers markets, begin selling mushrooms at farmers markets and to restaurants.  
 Begin coordinating with growers and industry professionals to host quarterly workshops.  
 Support any operating shortfall with philanthropic outreach and grants (especially to fund workshops and guest presenters).
  
- Phase 2: Expand workshops to regional trainings and workshops celebrating farmer and grower entrepreneurs who can share their expertise in growing the wide range of mushrooms growing in the Northeast, as well as various wild herbs, flowers, fruits, nuts and trees available in our region.
  
- Phase 3: Build out second floor to include a sterile spawn production space and larger education center.  
 Add walls in the Root Cellar mushroom production space to facilitate cultivation of multiple mushroom varieties.

**CONCLUSIONS**

There is potential to host a modest commercial mushroom production enterprise in the Root Cellar. It will be important to include growers and their leadership in planning the enterprise and the educational opportunities both to ensure the operation does not compete with other local growers for mushroom markets and to ensure the workshops will generate interest with the grower community and can be led by experienced professionals.

It is recommended NOT to include producing mushroom spawn at this time as it will be costly, require a much higher degree of expertise and a sterile environment. It is also not a service the growers are seeking. At this time access to reputable, reliable spawn providers is adequate and it is important to NOT compete with these local and regional spawn producers. The study suggests that focusing on workshops and education information could be a successful entry for this enterprise for Sullivan County and that a production model that assumes the mycelia/spawn is being cultured by other local

regional mushroom growers elsewhere, would make it feasible to use the below-ground Root Cellar for educational programs and growing, packaging and marketing actual mushrooms.

The Root Cellar facility could initially serve as an educational center encouraging beginning growers to learn about a wide range of mushrooms focused on forest grown mushrooms. Eventually, farmers could learn to extend their season by learning about growing indoor mushrooms. This educational facility could possibly grow to serve as a broader agro-forestry education center.

As presented by an advisor from New Hampshire's Wichland Woods, "such a Center could offer information and training for cultivating agro-forestry crops such as: mushrooms, (both food and medicinal), non-woody plants (e.g., ostrich fern, ramps, black cohosh, ginseng, Indian cucumber root, cattails, etc.), woody plants with edible fruits and nuts, and plants with parts for winter ornament (e.g., winterberry holly, variegated dogwoods, native bittersweet, etc.) Then, once the mushroom production and training facility was up and running, it could be expanded to provide training and demonstrations on a variety of agro-forestry crops, utilizing the County's extensive adjacent forestland."

### *RECOMMENDATIONS*

- (1) Connect with NH Cooperative Extension, NH Department of Agriculture, Markets and Food and USDA-Rural Development, local and regional social service organizations for work force development, growers, and like-minded organizations to present the project, gain support and develop a plan to fund the capital costs and operating budget, complete the renovations and implement the project. Identify who among the group might be willing/able to lead the effort and oversee the day to day functions of the mushroom production enterprise once operational.
- (2) Use the information from this feasibility study to explore grant possibilities such as USDA-SARE Research and Education as well as New Innovation grants (pre-proposals due July 2019), USDA-NESARE Partnership grants (due April 2019), and NH Specialty Crop grants (usually due in April).
- (3) Collaborate with experienced regional growers to begin organizing a series of workshops on various aspects of growing and marketing both forest-grown and indoor grown mushrooms and introducing participants to the wide varieties available and growing in NH. Expand offerings to include other forestry value added products as a new focus for commercial agro-forestry products from the region.

# CHEESE AGING ENTERPRISE ANALYSIS

## METHODOLOGY

This feasibility study approaches the cheese aging enterprise from an initial suggested assumption that there is demand from commercial cheesemakers for shared aging infrastructure, and that traditional aging facilities from underground caves such as this in-ground Root Cellar might be ideal. Furthermore, it was suggested that the shared cheese aging enterprise could also be an education center teaching for cheese making and cheese aging to home scale and commercial producers. Guidance from early interviews clearly suggested that an individual or lead organization would be required to operate the cheese aging operation and education center.

Concerns to be addressed in the research include:

- (1) Is the Root Cellar well suited to aging cheese?
- (2) Is there demand for shared-use cheese aging facilities?
- (3) How could a cheese aging enterprise incorporate educational content into its activities?
- (4) If an operational plan is established, would income from cheese aging services and educational programming income be sufficient to cover annual operating expenses?
- (5) If an operational plan is established, what would the build out and vision look like?

Primary data analysis collected for recommending the proposed facility was gathered from local current and former cheese makers, including three who have not only relevant cheese industry expertise but also have a vested interest in multi-producer/shared use cheese aging infrastructure and an understanding of the complexities that arise with such an operation. Two were consulted via telephone/e-mail while the three with shared use expertise also visited the site in person with the interviewers.

### Cheese makers Consulted

Beth Carlson is a former affineur for Neil's Yard Dairy and Vermont Shepherd. Beth assisted Vermont Shepherd found the Consortium of Vermont Cheese Producers, a strategy Vermont Shepherd initiated in 1995 to support Vermont dairy farms by providing cheese making instruction, recipes, aging and marketing services. Beth was instrumental in starting and overseeing the multi-farm cheese aging cave.

Ellyn Ladd, VP of Operations, Grafton Village Cheese Company. Grafton Village Cheese makes, ages and markets its own cheese and provides private label cheese-making and aging services for others. Grafton Village Cheese is in the process of exploring the feasibility of expanding their cheese aging facilities and private label services and was interested in assessing whether the Root Cellar could meet these needs.

Jeremy Stephenson, Beaver Meadow Consulting and Cheese Program Director for Spring Brook Farm Cheese LLC. Jeremy is exploring the feasibility of establishing a private label cheese making, aging and marketing service for dairy farms, this could be done in concert with existing infrastructure and cheese producers or could be done through developing new infrastructure. Jeremy was interested in assessing whether the Root Cellar could be

the center of his vision. Jeremy also provided input on demand and need for shared aging infrastructure from the perspective of Springbrook Farm as a potential user of the service.

Jeannine Killbride, Co-Owner and Cheesemaker, Cobb Hill Cheese. Jeannine provided input on demand and need for shared aging infrastructure from the perspective of a potential user of the service.

Liz Gunther, Owner and Cheesemaker, Three Cow Creamery. Liz provided input on demand and need for shared aging infrastructure from the perspective of a potential user of the service.

With input from these cheese makers and industry experts, the feasibility study addresses the following issues:

- What is the general demand for cheese aging and shared cheese aging facilities, and what are the benefits and concerns of shared infrastructure?
- What volume of aging space might be needed and what would be considered a reasonable rate for aging services?
- What functions would be required of the facility and what would an aging cheese facility's work schedule look like?
- What skills/expertise would be required to run the operation?
- What is their assessment of the cost benefit of repurposing the Root Cellar for this application?
- If there is reason to consider the Root Cellar as appealing for this application, what might the capital investment and infrastructure needs be?
- Would they recommend the facility be repurposed for cheese aging and why?

## ANALYSIS

Evidenced by Grafton Village Cheese's exploration of cheese aging expansion, Jeremy Stephenson's exploration of shared-use cheese aging and private label production services, and a recent announcement by the town of Hardwick that it is planning and designing a new business park to include cheese aging and distribution capacity for Jasper Hill Farm,<sup>12</sup> there is regional demand for cheese aging capacity. However, the need is business specific, non-uniform, and location driven. Neither Springbrook Farm, Cobb Hill Cheese or Three Cow Creamery, three creameries in the Upper Valley, expressed interest in off-site or shared use aging capacity. The question therefore is, for those for whom there is an interest, can the Root Cellar meet their needs?

After visiting the Root Cellar, Beth Carlson, Ellyn Ladd, and Jeremy Stephenson agreed that while there may be demand, the Root Cellar is not well-equipped to meet it.

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<sup>1</sup> Hardwick Announces Plans For New Manufacturing And Business Center. Caledonian Record 5/12/2018

<sup>2</sup> Hardwick Local Business Accelerator Feasibility Study. [https://hardwickagriculture.org/sites/default/files/documents/hardwick\\_feasibility\\_final.pdf](https://hardwickagriculture.org/sites/default/files/documents/hardwick_feasibility_final.pdf)

## (1) Inconvenience & Cost of Production Expense

Cheese making involves a series of processes including making milk, transforming milk into cheese, aging cheese, and prepping the finished product for shipping and delivery. Cheese aging comprises only one of these many aspects of cheese production. Moving one aspect of the process off site increases logistical complexity and expense for the cheese maker.

### a. Inconvenience

Many cheesemakers, especially smaller producers, do all the aspects of cheese making, from milking to processing, aging, sales and marketing, themselves. These producers may not feel comfortable entrusting the aging (critical to the quality of the finished product) to others; nor may they have the time or physical capacity to relocate part of their process remotely. As one local cheesemaker interviewed indicated, any distance greater than a 10 mile radius from the farm is too great.

### b. Increased Cost of Production Per Pound

Any introduction of distance between processes incurs a transportation expense (time, labor, infrastructure (vehicles), gas, repairs and maintenance, licenses, etc.) to move the product to and from the aging facility. It also requires paid staff or a third party to attend to the aging product on a daily basis. Many small cheese makers do not have the financial capacity to pay for these services, the cost of which may vary greatly depending on how much cheese is being transported per trip, how far the cheese must travel, and how much capacity the facility has room to age (the more cheese being moved or aged, the lower the cost per pound as the expense is shared over a greater quantity of product).

In its current size (41' x 23' x 8' not including the entryway partition), Beth Carlson noted the building would be similar in size to Vermont Shepherd's Consortium of Vermont Cheese Producers aging facility which a capacity of approximately 20,000 pounds. In a Cheese Aging Feasibility Study Beth co-authored in 2004, the study notes that: At its height the Consortium of Vermont Cheese Producers had 7 producers participating but within seven years of operating, membership had fallen to two. To help fill the space, custom aging services were offered to other cheese producers. At its peak there were roughly 3,500 pounds of custom aged cheese in the cave. The cave employed two full time and two part-time employees: 1 affineur/technical advisor/administrator/marketing position, 1 affineur, 2 part time administrators.

If we assume solely the labor expense using Vermont Shepherd as an example, we might project an annual labor of ~ \$110,000 (two FTE at \$40,000; two PTE at \$15,000). If the Root Cellar were filled to capacity and if the cheeses were aged for 6 months, then the Root Cellar could support 40,000 pounds of cheese annually, at a labor cost of \$2.75 per pound. If the Root Cellar could staff its operation with only one FTE and one PTE, the cost would still be \$1.38 per pound of cheese, which may/may not be feasible for prospective producers, and which would require the Root Cellar be operating at maximum capacity.

## (2) Cost Benefit of Renovating Versus New Build

An initial assumption upon embarking on this study was that the Root Cellar, being partially underground and built into a hillside might be ideal for aging cheese, as traditional cheese aging has occurred in similar settings.

According to our experts this assumption is inaccurate. Ideally, a cheese aging facility is a perfectly insulated cube in which one can then introduce climate control for temperature and humidity to control the microbiome. Within the cube, further partitioning of the space enables multiple microbiomes to be created providing specific aging conditions for multiple varieties of cheese. The original benefit of underground aging was that it naturally produces consistent temperature and humidity control. With the Root Cellar, however, being only partially underground, it exacerbates swings in humidity and temperature both in general and then more specifically within certain areas of the room based on proximity to exposed walls, thus providing no inherent benefits from its partial underground nature.

## (3) Appeal

One of the Root Cellar's key features is the aesthetic appeal of its stone walls. In order to make the building a perfectly insulated cube, the walls would need to be resurfaced, hiding this key aesthetic appeal from view. The building and its charismatic charm would lend itself well to activities that are open to the public and leverage its aesthetic appeal such as a restaurant, tasting room, and/or visitor and education center.

Our experts expressed concern that the size and scale of the building as it stood, would be insufficient to support an offsite aging facility and that with no material benefit from its partial underground nature, if given the option between building new and closer to existing cheese making operations or renovating this facility, the choice would be to build new.

## Cheese Aging Needs & Concerns

- Cheese aging needs temperatures to be maintained within a range of 50-55°F. The temperature cannot exceed 60 degrees or cheese will dry out. Even a 1.8°F to 3.6°F fluctuation in temperature will result in a different cheese rind.
- The second story (if a second story were added) may require heat, if the Root Cellar is to be used naturally, any heat from the second floor would impact the cheese aging below. Cheese also gives off heat as it ages. Temperature would need to be monitored and closely controlled.
- Cheese needs a relative humidity of 85-90%, up to 95% humidity for alpine and washed rind cheeses (the goal is to provide an environment that is cool and loaded with moisture). If the Root Cellar is to be used naturally, it will likely become too humid in summer and too dry in winter. Humidity would need to be monitored and closely controlled.
- A cheese aging facility needs ventilation and air circulation as cheese gives off ammonia.
- Sanitation is very important even though you are growing mold.
- Cheese mites can be an issue.
- Liability concerns for listeria, salmonella, and damage to individual producers cheese are critical risk factors.

- Employment and staffing considerations: fresh cheese needs to be turned every day until it stops leaving a wet spot, then it needs to be turned every other day until it develops a mold, then it needs to be washed and turned every day along with washing the boards. Over time the washing and turning will taper down to once per week, with the goal being to manage the mold growth and avoid a soggy bottom. Because of this erratic schedule, and the manual and repetitive nature of the task, it can be difficult to attract and retain labor for this low-skilled, low-wage task, yet it is crucial to the end result of the product.
- Logistical considerations:
  - A blue cheese cannot be aged with other cheeses; a bloomy rinded cheese (soft cheeses) require three separate microbiomes thus three distinct rooms or partitions for different stages of aging.
  - Where would space for packing go? This may cut into the space available for aging. The packing area would need space for boxes, scale, tables, labels, etc. The Root Cellar is quite small, as an example, Springbrook Farm built a 30' x 60' hillside cellar that ages 4,500 twenty pound wheels of cheese per year (90,000 pounds) and it outgrew this facility within 5 years.
  - For any new cheese aging facility one would want robotic equipment for the repetitive manual tasks (wheel turning). Robotic equipment would require 14-16' high ceilings. The Root Cellar only has an 8' ceiling. Raising the ceiling by 8' would enable you to double the aging space and leverage robotic aging equipment but it may impact the ability to build a second floor, and/or become a much more costly renovation than originally planned or than building new.
- Minimal renovation requirements: the vermiculite with asbestos would need to be remediated; rock walls would need to be covered with a permeable barrier, such as white washed (natural lime, applied 5-6 time would be the lowest cost solution) to prevent black mold; the facility would need floor drains, a sink, a cement floor that is cleanable, aging boards and racking, insulation, hot and cold running water, electricity, and a bathroom for the cheese inspector; the facility would need to be partitioned if trying to age multiple styles of cheese or soft cheeses; there would need to be proper drainage around the outside of the building; ideally a loading dock and road access for tractor trailers would be desirable.
- Ideally for a new or repurposed facility the experts recommend
  - a 100' X 200' aging facility with
    - The ability for 4 distinct micro climates
    - A milk truck wash bay
    - A pack room
    - A loading dock and road infrastructure to support tractor trailer access
  - The cost to build new or renovate the Root Cellar to meet these recommendations would be somewhere around \$4.5 million

## CONCLUSIONS

The Root Cellar presents multiple challenges to being repurposed for cheese aging. Being only partially embedded in a hill complicates rather than benefits its appropriateness for this purpose. The size of the Root Cellar limits the volume of cheese that can be aged, introducing inefficiencies to the cost of production, and inhibiting the ability to utilize robotic infrastructure, which will result in necessitating the ability to attract, train and retain low-skilled, low wage employees for

repetitive yet critical manual labor or to greatly increase the cost of renovations to raise the ceiling.

The conclusion is that there is no intrinsic advantage in utilizing the Root Cellar for cheese making and affinage. For the cost one would spend to renovate the Root Cellar into a decent cheese aging facility one could build a great new one. That said, the aesthetic appeal of the Root Cellar's rock walls would make it a great tasting room, visitor and education center, a facility that could celebrate and introduce visitors to the rich wealth of agricultural production in the region.

### *RECOMMENDATIONS*

Expand the educational component of the mushroom production enterprise to include dairy and cheesemaking content.

Following is an inexhaustive list of potential dairy related curriculum and workshop topics for consideration:

- Teaching how to wash cheese
- Teaching about dairy farms and how milk is made
- Teaching microbiology short courses on the chemistry of cheese making and the aging process
- Teaching climate control and how to maintain it, the science behind why it work including: vapor pressure and dew point humidity
- ELO- extended learning opportunities in which students can select a skill they wish to learn more about and custom design a course that connects it to their academics

Consider adding a “tasting room” feature or event to the educational focus to introduce the community and visitors to the breadth of agricultural products produced in the region and provide a history of the Root Cellar and County Farm celebrating the unique aesthetics of the building. An example to consider could be the [Mad River Taste Place](#), “The Mad River Taste Place is dedicated to celebrating the makers and growers of the Mad River Valley. Here you will find high quality, handmade artisan food and drink and can learn about the people behind these products. The Taste Place is a learning center, tasting gallery, retail store and gathering place focused on local, artisan food and drink. Over 50 makers are represented with a wide selection of products that range from cultured butter, naturally leavened bread, handmade chocolates, an extensive and changing selection of Vermont cheeses, old-world style charcuterie, craft beer, hard cider, wine and distilled spirits. Many of these products are made within just a few miles of the Taste Place.” While the Root Cellar may not be focused on retail sales, per se, it could explore the Mad River Taste Place example from the perspective of the tasting and education functions.

## NEXT STEPS

- (1) Connect with NH Cooperative Extension, NH Department of Agriculture, Markets and Food and USDA-Rural Development, local and regional social service organizations for work force development, growers, and like-minded organizations to present the project, gain support and develop a plan to fund the capital costs and operating budget, complete the renovations and implement the project. Identify who among the group might be willing/able to lead the effort and oversee the day to day functions of the mushroom production enterprise once operational.
- (2) Use the information from this feasibility study to explore grant possibilities such as USDA-SARE Research and Education as well as New Innovation grants (pre-proposals due July 2019), USDA-NESARE Partnership grants (due April 2019), and NH Specialty Crop grants (usually due in April).
- (3) Collaborate with experienced regional growers to begin organizing a series of workshops on various aspects of growing and marketing both forest-grown and indoor grown mushrooms and introducing participants to the wide varieties available and growing in NH. Expand topics to include other agro-forestry and value added products, dairy and cheese making. Explore incorporating a tasting center highlighting the products and history of the region and the County Farm and celebrating the Root Cellar as a historic agricultural building.

## APPENDIX

### *TECHNICAL ADVISORS*

On behalf of the project team we would like to thank all of the individuals consulted for their expertise and support.

### MUSHROOM PRODUCTION

#### **FIELD AND FOREST PRODUCTS (WISCONSIN)**

N3296 Kozuzek Road, Peshtigo, WI 5415

800.792.6220

[fieldandforest@centurytel.net](mailto:fieldandforest@centurytel.net)

[fieldforest.net](http://fieldforest.net)

#### **FUNGI ALLY (MASSACHUSETTS)**

978.844.1811

[fungially@gmail.com](mailto:fungially@gmail.com)

[fungially.com](http://fungially.com)

#### **MUSHROOM PEOPLE (TENNESSEE)**

560 Farm Road; P.O. Box 220; Summertown, TN 38483

(931) 964-4400

[mushroom@thefarm.org](mailto:mushroom@thefarm.org)

[mushroompeople.com](http://mushroompeople.com)

#### **MUSHROOM MOUNTAIN (SOUTH CAROLINA)**

129 Merritt Rd., Liberty, SC 29657

864.855.2469

[sporeprints@gmail.com](mailto:sporeprints@gmail.com)

[mushroommountain.com](http://mushroommountain.com)

#### **NORTH SPORE (MAINE)**

207.854.3500

[info@northspore.com](mailto:info@northspore.com)

[northspore.com](http://northspore.com)

#### **SMUGTOWN MUSHROOMS (NEW YORK)**

585.690.1926

[Smugtownmushrooms@gmail.com](mailto:Smugtownmushrooms@gmail.com)

[smugtownmushrooms.com](http://smugtownmushrooms.com)

### **WICHLAND WOODS (NEW HAMPSHIRE)**

David Wichland  
64 High Street, Keene, NH 03431  
603.357.2758  
[wichlandwoods@hotmail.com](mailto:wichlandwoods@hotmail.com)  
[wichlandwoods.com](http://wichlandwoods.com)

### **Cornell University: Small Farms Program**

Steve Gabriel  
[sfg53@cornell.edu](mailto:sfg53@cornell.edu)  
[blogs.cornell.edu/mushrooms/suppliers](http://blogs.cornell.edu/mushrooms/suppliers)  
[blogs.cornell.edu/mushrooms](http://blogs.cornell.edu/mushrooms)  
[cornellmushrooms.org](http://cornellmushrooms.org)

### **Northeast Forest Grown Mushroom Network**

University of Vermont: Center for Sustainable Agriculture  
To subscribe to the list serve, send an email with no subject to [listserv@list.uvm.edu](mailto:listserv@list.uvm.edu)  
In the body of your email, type SUBSCRIBE MUSHROOMS and then your first and last name.  
For example if your name is Jane Doe, type SUBSCRIBE MUSHROOMS Jane Doe

### **THIRD PARTY DATA FOR MUSHROOM PRODUCTION MODEL**

[\*How to Set Up a Low Tech Mushroom Farm\*](#), Sayner, A., GroCyle

[\*The Complete Guide To Starting A Mushroom Farm\*](#), FeshCap Mushrooms

[\*Georgia Specialty Mushroom Feasibility Study\*](#), Bachtel, D., Tinsley, K., HDRC, DHCE, Porter, D., 2002

[\*Make Money By Growing Mushrooms\*](#), Marshall, E., Nair, N.G., 2009

[Uline.com](http://Uline.com) - Commercial Shelving

[Travis Industries heating calculator](#)

[New Hampshire Electric Co-op](#) - Utility Rates

[Classcodes.com](#) - Workers Compensation Rates

## CHEESE AGING

Beth Carlson  
Windsor, VT  
[gbrebis@aol.com](mailto:gbrebis@aol.com)

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Cheese Program Director, Spring Brook Farm Cheese LLC  
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Department of Health and Human Services  
29 Hazen Drive, Concord, NH 03301  
603.271.3989  
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## *BUSINESS SUPPORT SERVICES & VESTED COMMUNITY PARTNERS*

The following entities and organizations may provide business planning resources and/or be aligned in vision and mission and could be vested partners in a shared vision for the Root Cellar Education and Tasting Center.

New Hampshire Community Loan Fund  
Charlene Andersen, Farm Food Lender  
7 Wall Street, Concord, NH 03301  
603.856.0773  
[candersen@communityloanfund.org](mailto:candersen@communityloanfund.org)  
[communityloanfund.org](http://communityloanfund.org)

“The New Hampshire Community Loan Fund's Farm Food Initiative delivers customized financing and business education for farmers and food producers.”

NH Small Business Development Center  
[nhsbdc.org](http://nhsbdc.org)

Offers education programs around the state and free e-learning courses.

SCORE  
[sba.gov](http://sba.gov)

Provides free and confidential business mentoring through local Chapters or Online Counseling to small businesses.

UNH Extension, Sullivan County Office  
Seth Wilner, Agricultural Business Management Field Specialist  
603.863.9200  
[seth.wilner@unh.edu](mailto:seth.wilner@unh.edu)

“Our team assists farmers, agriculture tourism businesses, and related industry sectors in the areas of business planning, financial management, marketing and risk management. We help entrepreneurs develop sound business plans and enhance their ability to use financial analysis techniques to inform production decisions.”

Vital Communities  
Beth Roy, Valley Food & Farm Manager  
195 N Main St, White River Junction, VT 05001  
802.291.9100  
[beth@vitalcommunities.org](mailto:beth@vitalcommunities.org)  
[vitalcommunities.org](http://vitalcommunities.org)

“Valley Food & Farm fosters the relationships that keep agriculture a vital part of Upper Valley life.”

D Acres of New Hampshire Permaculture Farm and Educational Homestead  
218 Streeter Woods Road, Dorchester, NH 03266  
603.786.2366  
[info@dacres.org](mailto:info@dacres.org)  
[dacres.org](http://dacres.org)

“D Acres of New Hampshire is a not-for-profit Permaculture Farm and Educational Homestead located in Dorchester, NH. The Mission of the organization is to function as an educational center that researches, applies and teaches skills of sustainable living and small-scale organic farming. Striving to improve the human relationship to the environment, the center functions as a demonstration farm to role model exemplars of healthy living. Sharing a communal living situation, individuals come to respect and share values of interdependence and love of nature. In addition, the organization supports educational activities directed toward improving the quality of life of residents and the larger community.”

Kearsarge Food Hub  
11 West Main Street, Bradford, NH  
603.938.5323  
[info.kearsargefoodhub@gmail.com](mailto:info.kearsargefoodhub@gmail.com)  
[kearsargefoodhub.org](http://kearsargefoodhub.org)

“We envision a local food economy that thrives on community partnerships and values healthy food and farms.”

Taproot Farm & Environmental Education Center  
Melissa Grella  
PO Box 245, Lancaster, NH 03584  
603.631.6761  
[info@taprootnh.org](mailto:info@taprootnh.org)  
[taprootnh.org](http://taprootnh.org)

“Taproot Farm & Environmental Education Center (Taproot) is a 501(c)3 tax exempt organization. Our work is guided by our mission, which is nurturing care for the environment by educating, inspiring, and connecting communities to the land, to their food, and to each other in a holistic manner.”

Village Roots Permaculture Farm & Learning Opportunities  
Marty Castriotta & Ellen Denny  
134 Old Settlers Road, East Alstead, New Hampshire 03602  
603.477.5533  
[marty@theorchardschool.org](mailto:marty@theorchardschool.org)  
[villageroots.org](http://villageroots.org)

“Village Roots is a diversified farm on the Orchard Hill Community in East Alstead, NH that uses a holistic approach to food production. We use intensive integration of plant, animal and fungal systems to produce high quality food, while striving always to build fertility.”

Wichland Woods  
David Wichland  
64 High Street, Keene, NH 03431  
603.357.2758  
[wichlandwoods@hotmail.com](mailto:wichlandwoods@hotmail.com)  
[wichlandwoods.com](http://wichlandwoods.com)

“Wichland Woods is a unique, local myco-business located in the Monadnock Region of New Hampshire. By educating the public about mycology, we strive to promote people’s awareness about the health and ecological benefits of mushrooms. Through various workshops, Wichland Woods encourages people to expand their gardening realm into a mycological-friendly landscape. We educate the public on the techniques of “backyard mushrooming” and how everyday resources can be used to cultivate their own mycelia network. We create over a dozen local strains of mushrooms, which are carefully expanded using sterile techniques. By working with other northeast mycologists, we are promoting the health benefits that mushrooms have in our world.”

### *FUNDING SOURCES*

To support the recommendations following is a partial list of potential sources of capital to implement the renovations needed to transform the Root Cellar into an educational and visitor center.

#### **Corporate Charitable Giving**

C & S Wholesale Grocers ([community.cswg.com](http://community.cswg.com)) - Provides mini grants designed to Strengthen communities by supporting the small changes that unite people and bring results.

Eversource ([eversource.com](http://eversource.com)) -Supports economic and community development, the environment and initiatives that address local, high-priority concerns and needs.

#### **Crowdfunding**

Barnraiser ([barnraiser.us/](http://barnraiser.us/)) - Mission based crowdfunding website focused on supporting the sustainable food movement.

Indiegogo ([indiegogo.com/](http://indiegogo.com/)) - A global crowdfunding website.

#### **Grants**

AFRI USDA -([csres.usda.gov](http://csres.usda.gov)) - Several grants available for efforts relating to obesity prevention, food safety, food security, etc.

Community Development Finance Authority – ([nhcdfa.org](http://nhcdfa.org)) - Provides grants to communities including nonprofits, municipalities, counties, community development organizations and for-profit businesses.

Corporation for National and Community Service – ([nationalservice.gov](http://nationalservice.gov)) - Provides grants to non-profits, schools, government agencies and other community organizations and groups that utilize volunteers.

Sustainable Agriculture Research & Education – ([sare.org](http://sare.org)) - Sustainable Community Innovation Grants award up to \$15,000 for activities that connect or make links between the farm and non-farm parts of a community for the purpose of economic development.

USDA Beginning Farmers and Rancher - ([nifa.usda.gov](http://nifa.usda.gov)) - Provides grants to collaborative efforts or partnerships for a variety of technical assistance.

USDA Community Facilities Direct Loan and Grant Program ([rd.usda.gov](http://rd.usda.gov)) - Provides funding to purchase, construct, and/or improve essential community facilities, purchase equipment and pay related project expenses.

USDA Community Food Projects Competitive Grants Program ([nifa.usda.gov](http://nifa.usda.gov)) - Provides grants to public, tribal and non-profit organizations for work related to meeting food needs of low-income individuals and increasing self-reliance of communities.

USDA Farmers Market Promotion Program ([ams.usda.gov](http://ams.usda.gov)) - Provides funding to efforts that work towards increasing domestic consumption of, an access to, locally and regionally produced agriculture products.

USDA Rural Business Enterprise Grant ([usda.gov](http://usda.gov)) – Provides funding to projects that facilitate the development of small and emerging rural businesses.

USDA Small Business Innovation Research ([nifa.usda.gov/fo/sbir.cfm](http://nifa.usda.gov/fo/sbir.cfm)) - Provides funding for projects dealing with agriculturally related manufacturing and alternative and renewable energy technologies.

### Lending Organizations

ACCION USA ([accionusa.org](http://accionusa.org))- A microfinance organization that provides business owners with access to working capital and financial education.

Capital Regional Development Council ([crdc-nh.com](http://crdc-nh.com)) - A regional development non-profit corporation specializing in providing small business lending and consulting programs.

KivaZip – ([zip.kiva.org](http://zip.kiva.org)) - Provides 0% interest loans to socially impactful entrepreneurs in the United States and Kenya.

New Hampshire Community Loan Fund ([communityloanfund.org](http://communityloanfund.org)) - A Community Development Financial Institution providing lending and investments to businesses in operation greater than one year.

RSF Social Finance - ([rsfsoicalfinance.org](http://rsfsoicalfinance.org)) -Makes investments, provides loans and donates funds to help for-profit and nonprofit ventures cover mortgage, construction and working capital.

USDA Farm Service Agency ([fsa.usda.gov/nh](http://fsa.usda.gov/nh)) – Provides direct and guaranteed loans for farm ownership and operating including storage and packing facilities.

## New Hampshire Angel Investor Groups

eCoast Angel Network ([ecoastangels.com](http://ecoastangels.com)) - Focuses on early-stage companies primarily in the seacoast region involved with advanced technology, e-commerce, healthcare, and industrial products.

First Run Angel Group Conway ([firstrunangelgroup.com](http://firstrunangelgroup.com)) - Focuses on businesses primarily in the Mount Washing Valley region.

Granite State Angels ([granitestateangels.com](http://granitestateangels.com)) - Focuses on early-stage and seed investments for business enterprises with the potential for rapid growth.

## Private Foundations

Ben & Jerry's Foundation ([benandjerrysfoundation.org](http://benandjerrysfoundation.org)) - Provides grants to organizations with 501(c)3 status for projects the support sustainable and food systems, social and environmental justice.

Farm Aid ([farmaid.org](http://farmaid.org)) - Provides grants to organizations with 501(c)3 status for projects the support sustainable practices, access new markets and other tools and resources.

Surdna Foundation ([surdna.org](http://surdna.org)) - Provides grants to organizations with 501(c)3 status for projects the support sustainable communities guided by principles of social justice, healthy environments, local economies and thriving cultures.

The Henry P. Kendall Foundation ([kendall.org](http://kendall.org)) - Provides grants to invited proposals for work conducted to increase consumption and production of local sustainably produced food.

The John Merck Fund ([jmfund.org](http://jmfund.org)) - Provides funding to organizations that are building a regional food system in New England.

## *MUSHROOM VARIETIES IN THE NORTHEAST*

Source: Cornell University's Small Farm Program

Steve Gabriel - Agroforestry Specialist

607-255-2142 [sfg53@cornell.edu](mailto:sfg53@cornell.edu)

### Maitake (Hen) – *Grifola Frondosa*

Log, stump and ground mushroom – Plug and sawdust spawning options

### Lion Mane (pom) – *Hericium Enrinaceus*

Log and stump mushroom- Plug and sawdust spawning options

### Black Morel – *Morchella Esculenta*

Burn site, apple orchard or raised bed mushroom – Sawdust spawning

### Blue Oyster – *Pleurotus Columbinus*

Cold weather strain mushroom – Plug and sawdust spawning options

### Eastern Oyster – *Pleurotus Ostreatus*

Log and stump mushroom – Plug and sawdust spawning options

### Shiitake – *Lentius Edodes*

Wide range, log and stump mushroom – Plug and sawdust spawning options

### Reishi – *Ganoderma Lucidum*

Log and stump mushroom – Plug and sawdust spawning options

### Shaggy Mane – *Coprinus Comatus*

Lawn and compost mushroom – Sawdust spawning

### Garden Giant – *Stropharia Raqosee*

Garden and compost mushroom – Sawdust spawning

### Elm Oyster – *Hypsizyqus Ulmarius* (there is a wide range of spawn types for oysters)

Companion garden, stump, log and straw decomposer mushroom- Plug, wood chip and sawdust spawning options

NEW ENGLAND MUSHROOM GROWER SURVEY 2018

THE FIRST 10 PERSONS RETURNING THEIR RESPONSE TO THIS SURVEY WILL BE REGISTERED TO BE ELIGIBLE FOR A BAG OF MUSHROOM SPAWN IN 2019 FROM THEIR FAVORITE MUSHROOM SPAWN PROVIDER.

This survey will help complete a feasibility analysis on developing an alternative mushroom enterprise to help revitalize an old "county farm" property. Some of the land is leased to entrepreneurial farmers who produce local foods such as beef and maple products. We are working with a rural county that has added greenhouses, a community garden and begun refurbishing the apple orchards for cider. That county is exploring the possibility of refurbishing a 1,500 sq. ft. "Root Cellar" as a regional site for an educational site where various mushrooms could be cooperatively produced and marketed.

Please list your zip code for our records \_\_\_\_\_ Today's date \_\_\_\_\_

Were you growing mushrooms on 2018?

Do you plan to grow mushrooms in 2019?

When did you start raising mushrooms for commercial sale?

What strains of mushrooms do you grow? (please check all that apply)

- |                 |       |             |     |
|-----------------|-------|-------------|-----|
| Shiitake        | ___   | Oysters     | ___ |
| Lions Mane      | ___   | Chestnut    | ___ |
| Stropharia      | ___   | Maitake     | ___ |
| Reishi          | ___   | Nameko      | ___ |
| Pipino          | ___   | Morel       | ___ |
| Shaggy Mane     | ___   | Blewit      | ___ |
| Almond Agaricus | ___   | Turkey Tail | ___ |
| Other           | _____ |             |     |

Of any of the mushroom strains below, please note the type of substrate spawn do you use? Do you prefer Sawdust, Plugs or Grain spawn for each type you grow?

(Please the type of spawn you prefer for varipus mushrooms you grow)

- |                 |       |             |     |
|-----------------|-------|-------------|-----|
| Shiitake        | ___   | Oysters     | ___ |
| Lions Cap       | ___   | Chestnut    | ___ |
| Stropharia      | ___   | Maitake     | ___ |
| Reishi          | ___   | Nameko      | ___ |
| Pipino          | ___   | Parasol     | ___ |
| Shaggy Mane     | ___   | Blewit      | ___ |
| Almond Agaricus | ___   | Turkey Tail | ___ |
| Other           | _____ |             |     |

If you sell commercially, how many pounds of mushrooms do you estimate that you raise in 2018? (please complete all that apply)

Shiitake	___	Oysters	___
Lions Cap	___	Chestnut	___
Stropharia	___	Maitake	___
Reishi	___		
Almond Agaricus	___		
Other	_____		

What is the average retail sale price per pound of the various mushrooms did you estimate that you sold this past year? (please complete all that apply)

Shiitake	___	Oysters	___
Lions Cap	___	Chestnut	___
Stropharia	___	Maitake	___
Reishi	___		
Almond Agaricus	___		
Other	_____		

What is the estimated gross dollar value of your mushroom sales last year?

\_\_\_\_\_

Which mushroom company do you prefer for spawn purchases? (Please check all spawn providers that you have successfully purchased from so far)

- \_\_\_ wichlandwoods (NEW HAMPSHIRE)
- \_\_\_ NORTH SPORE (MAINE)
- \_\_\_ SMUGTOWN MUSHROOMS (NEW YORK)
- \_\_\_ FUNGI ALLY (MASSACHUSETTS)
- \_\_\_ FIELD AND FOREST PRODUCTS (WISCONSIN)
- \_\_\_ FUNGI PERFECTI (WASHINGTON)
- \_\_\_ LAMBERT (PENNSYLVANIA)
- \_\_\_ MUSHROOM PEOPLE (TENNESSEE)
- \_\_\_ MUSHROOM MOUNTAIN (SOUTH CAROLINA)
- \_\_\_ MYCOSOURCE INC (ONTARIO, CANADA)

10. Can you suggest names and contacts for any other spawn providers?

Name \_\_\_\_\_  
Email \_\_\_\_\_ Cell \_\_\_\_\_

## NEW ENGLAND MUSHROOM GROWER SURVEY 2018 – COMMERCIAL GROWERS

We are wrapping up the survey to NE Mushroom Growers list this week, and want to ask you a few specific questions as one of the largest growers in the survey's region. All of your responses will be kept in confidence, and only shared as a summary in the report. This survey will help complete a feasibility analysis on developing an alternative mushroom enterprise to help revitalize the "old farm" property in Sullivan County, New Hampshire. They are exploring the possibility of refurbishing a 1,500 sq. ft. "Root Cellar" as a regional site for an educational site where various mushrooms could be cooperatively produced and marketed.

**Please complete and send your responses to me at [allen.matthews@gmail.com](mailto:allen.matthews@gmail.com)**

If you have questions, please call me at 802-318-1041

Please check which grower your response represents:

- FIELD AND FOREST PRODUCTS (WISCONSIN)
- FUNGI ALLY (MASSACHUSETTS)
- LAMBERT (PENNSYLVANIA)
- NORTH SPORE (MAINE)
- SMUGTOWN MUSHROOMS (NEW YORK)
- WICHLAND WOODS (NEW HAMPSHIRE)
- Other \_\_\_\_\_

When did you first start raising mushrooms? \_\_\_\_\_

When did you start raising mushrooms to sell direct to consumers? \_\_\_\_\_

In 2018, how many total pounds of fresh mushrooms did you sell? \_\_\_\_\_

If you raise mushrooms indoors, what % of your sales come from indoors? \_\_\_\_\_ %

In 2018, how many total ounces of dried mushrooms did you sell? \_\_\_\_\_

In 2018, how many pounds of mushroom spawn did you sell? \_\_\_\_\_

What varieties of mushrooms do you raise for sale? (please check all that apply)

- |                 |                          |             |                          |
|-----------------|--------------------------|-------------|--------------------------|
| Shiitake        | <input type="checkbox"/> | Oysters     | <input type="checkbox"/> |
| Lions Cap       | <input type="checkbox"/> | Chestnut    | <input type="checkbox"/> |
| Stropharia      | <input type="checkbox"/> | Maitake     | <input type="checkbox"/> |
| Reishi          | <input type="checkbox"/> | Nameko      | <input type="checkbox"/> |
| Pipino          | <input type="checkbox"/> | Morel       | <input type="checkbox"/> |
| Shaggy Mane     | <input type="checkbox"/> | Blewit      | <input type="checkbox"/> |
| Almond Agaricus | <input type="checkbox"/> | Turkey Tail | <input type="checkbox"/> |
| Other           | _____                    |             |                          |

If you sell mushroom spawn commercially, what varieties do you grow to sell?

(please complete all that apply)

Shiitake	___	Oysters	___
Lions Cap	___	Chestnut	___
Stropharia	___	Maitake	___
Morel	___	Almond Agaricus	___
Please list any other	_____		

Other than fresh mushrooms, dried mushrooms, and spawn, please list other value-added mushroom related products do you sell?

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What is your estimated gross mushroom products sales last year? \_\_\_\_\_

Of your total sales, please break down the % of sales between sales of fresh, dried, spawn, tinctures, tools and other products you sold last year?

Enter % of total sales breakdown by different products you sell:

_____ Fresh	_____ Dried
_____ Spawn	_____ Tincture
_____ Tools	_____ Other products

When starting out, what were your biggest challenges?

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What are your biggest challenges for this coming year?

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Please add any comments:

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To receive a copy of our report, please complete and return to [allen.matthews@gmail.com](mailto:allen.matthews@gmail.com)

**NAME** \_\_\_\_\_

**ADDRESS** \_\_\_\_\_

**EMAIL** \_\_\_\_\_ **CELL** \_\_\_\_\_