

Cheese Making 101 for Farm Marketers: Making Quality Cheese

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Quality cheese is a function of 1) having the appropriate equipment and facilities; 2) adhering to strict cleaning and sanitation regimens; 3) starting with high quality milk and ingredients; 4) knowing and following the cheese make procedure; and 5) finishing the cheese properly. The information given below are ideas and suggestions collected through years of experience and are intended to be a starting place when considering entry into the cheese making industry at any level. Additional material can be found in the reference handout accompanying this workshop.

Equipment and Facilities:

If one is starting the construction of facilities from scratch, one of the first decisions made should be related to the location of the facility. If the new cheese making facility is to be located on the farm where the milk is produced then a location upwind of barns or other potential sources of undesirable aromas and airborne contaminants. Also, placing the facility as far from the barns as practical limits traffic between animal housing and cheese making facilities. If building off the farmstead, then one may want to consider the proximity of waste ponds, industrial sites, and landfills among possible sources for airborne contaminants. Other considerations regarding location with less bearing on quality may include the availability and quality of roads and service drives as well as the proximity of markets or supply sources.

Once a decision has been made about location, the design and construction of the facility must be carefully planned. If the facility is being placed in a pre-existing building, one must ensure that any possible contaminants are removed and the building is brought up to food handling standards. If the construction of the building is from scratch materials, then providing a space compatible with a food processing environment will be simpler. Roof and ceilings should be sound and properly insulated to prevent leaks and condensation which could drip onto food contact surfaces or exposed food. Floors, walls, and ceilings should be constructed of non-absorbent, cleanable materials. If wood-frame construction is used then special attention should be paid to the selection of materials in the wet zone near the floor to wall junction. Avoid construction techniques that will call for a wooden wall plate a floor level. Where possible, avoid surfaces that will require paint since the paint will eventually become a potential contaminant. Items such as lights, conduits, utility piping and switchboxes that must be attached to the walls or ceilings should be done so with a space between the item and the surface to which they are attached. This will allow for regular cleaning of walls and ceilings and eliminate any potential harborage for filth or vermin. If mezzanine (attic) space is to be used to keep ceiling clutter at a minimum, the mezzanine must be accessible for inspection.

Floors and drains are the most important surfaces in the cheese making facility. There is no substitute for floors that are properly sloped for rapid draining and no pooling. Flat floors and low numbers of drains are common in existing facilities and will need to be re-graded while in a new facility there should be no tolerance for shoddy work when it comes to floor and drain installation. When you finish at the end of the day, one should not have to move water to the drains with a squeegee. There are many suitable surfaces available, but they must all be smooth, cleanable and impervious to food and cleaning/sanitation chemicals.

Entries to the cheese making area should be properly constructed and should not be a direct opening to the outside. A space should be available for the changing or sanitation of footwear and possibly clothing when moving from the outdoors or auxiliary areas of the plant into the make room. This can be as simple as a large vestibule with a bench or as complicated as a complete locker-room facility, as long as the need to prevent entry of undesirable contaminants is met. All doors must be self-closing and tight. One of the utilities that is often overlooked in construction of small facilities is the air-handling capability. The air supplied to the make room should be under positive pressure and filtered using a minimum of 95% efficiency filters. When opening a door or window to the make room, one should feel air coming out of the room, thus preventing air-borne contaminants from entering. Adequate ventilation will also prevent accumulation of odors and condensation.

In the category of utilities, one must also consider the quality promoting characteristic of having adequate lighting to observe the condition of both product and process environment. Water in various states from ice to steam may be used in the facility and will often be in contact with the food-contact surfaces if not the cheese itself. Therefore, the quality of the water will have a direct effect on the quality of most cheeses. An ample supply of high quality/safe water will be needed for making cheese which will, in turn, require appropriate waste handling facilities. Always know where the whey and gray water are going to end up, and that regulations for returning water to the environment are being met.

As the design of the facility is put together, make sure to know the dimensions of the equipment that is expected to be installed in the cheese making facility. Wherever, possible three feet of space around and between individual pieces of equipment will make life easier. If decisions about close proximity have to be made then make sure that areas that will need to be accessed frequently get the largest allocation of space. A scale drawing of both the facility and the equipment will be helpful in visualizing the layout of the make room and auxiliary spaces. A little tedious preparation work at this stage of the planning process will make life easier when operations begin.

Equipment for use in the cheese making facility should meet USDA, USFDA, and/or 3-A SSI standards of construction and materials. In the State of Michigan, the final word on the acceptability of equipment will come from the Michigan Department of Agriculture and Rural Development (MDARD) inspection team. Therefore, one should contact MDARD very early in the planning process and should regularly consult with the inspector before making any major purchases. Resale of equipment that looked like a good deal on the spot, but did not meet the standards of good sanitary design and construction is not a distraction that the budding entrepreneur needs to deal with.

Cleaning and Sanitation:

Protecting the public health should be the first goal of a proper cleaning and sanitation program. The removal and destruction of disease-causing (pathogenic) bacteria, viruses, parasites, toxins, allergens, and unacceptable additives will prevent the food product being produced in the facility from becoming associated with public health events such as recalls and the associated bad press.

Protecting the quality of the product through proper cleaning and sanitation will prevent unacceptable changes in the flavor, body & texture, color and nutrients. Loss of control of the environment in which the cheese is being produced can have dramatic effects on cheese quality and the consistency of a particular variety. Protecting the integrity of processing systems is related to the build-

up of soils in biofilms. These microscopic, living films can be responsible for corrosive pitting which eventually make the equipment almost impossible to clean. And, the fact is that a surface cannot be sanitized if it is not first cleaned.

Of course, cleaning and sanitation have to start with the individual's personal hygiene. Barn clothes are not cheese making clothes and have no place in the cheese make room. Anyone working with animals should shower and change clothing/footwear before participating in cheese making activities. This is especially important if the individual is going to be working with the handling and packaging of cheese for sale. Hands must be washed frequently, even if they are covered by approved rubber gloves. A rubber glove that touches an insanitary surface is just as much a carrier as a well washed bare hand.

High Quality Milk and Ingredients:

Whether the milk being used for cheese making is from a total mixed ration farm, an organic farm, a friend/family farm, local farm, grazing farm (you get the idea), as the saying goes, "You cannot make a silk purse out of a sow's ear." Before even thinking about making cheese make sure the quality of the milk to be used meets your standards of acceptability. The Somatic Cell Count (SCC) and the Standard Plate Count (SPC) should at least meet the requirements for the Pasteurized Milk Ordinance, but should actually be even better no matter the source. Counts that are high for SCC will result in poor yields, weak body and textures, and potential off-flavors while high SPC's can result in very strong off-flavors as well as body and texture issues.

Cheese Making Procedure:

Any cheese manufacturing process can be characterized as a controlled spoiling of milk. The fresh, slightly sweet, bland flavor of high quality milk is replaced by a partition of that milk into cheese and a by-product called whey. Cheeses may be characterized in a variety of ways including hardness, moisture, and microbiological characteristics.

Microbiological Classification

Unripened

w/ starter	Cottage, Cream
w/o starter	Ricotta, Queso Blanco

Ripened

Bacterial

Internal

w/o eyes	Cheddar, Parmesan, Colby
w/ eyes	Swiss, Jarlsburg, Dagano

External

Limburger, Muentser

Mold

Internal

Bleu, Stilton, Gorgonzola

External

Camembert, Brie

There are thousands of cheeses made around the world and the manufacturing procedures may be miles apart or may differ by a few minutes or degrees. For an excellent introduction to the cheese making process, I recommend the Cheese Making Technology website authored by Dr. Art Hill of the University of Guelph. (<http://www.uoguelph.ca/foodscience/cheese-making-technology>)

Many beginning cheese makers start with an easily manufactured lactic style cheese such as chevre (goat milk). The coagulation process is primarily a lactic acid function and is almost fool proof because the process can all be done at approximately room temperature. As long as the milk is of high quality and the culture is robust you will end up with a curd that is usable for many applications. The artisan will learn to make even this simple cheese with little variation between batches as long as the milk

quality does not change. Even high quality milk supplies may change in character as the seasons and feeding regimes change, so a good cheese maker may take advantage of the seasons.

The manufacture of rennet cheeses introduces many more variables and requires greater knowledge, patience and creativity. I recommend the beginner attend one of more of the many Cheese Making workshops held in the US and Canada. Of note, I would recommend the Artisanal Cheese Makers Workshops at Michigan State University or the Vermont Institute of Artisanal Cheese Workshops at the University of Vermont. Both are listed in the References section.

Finishing the Cheese:

Once the cheese has completed the day or two of the cheese making process, there may be days, weeks, months and yes, even years of work to complete the process of producing a high quality cheese. The finishing process for a lactic cheese, may involve simply placing the finished cheese into an appropriate package for retail or wholesale marketing. If this is the case then the most important decisions to be made involve the marketing of the product. Or, one may be adding spices of herbs to the cheese and may coat the cheese with a variety of items including ashes and nuts.

However, if you are making a rennet cheese such as Gouda, you will need a controlled environment to allow for the formation of a natural rind. The cheeses will require constant care to make sure that wild growth does not cover the surface and to make sure that the proper amount of drying is taking place. Cheeses with eye, such as MSU's Dagano, require brining, followed by tempering and ripening at an elevated temperature of approximately 60 F to allow the formation of the holes by production of carbon dioxide. If the gas is produced too fast you may get too many small eyes, while if the production is too slow you may not get enough eyes.

The true artisan cheese maker is not someone who made a little cheese that came out pretty well the first time. The real test is learning to make the same cheese every time and to make a cheese that meets the expectations of high quality that the consumer of artisanal cheese desires. The consumer will not repeat their purchase if the quality of the cheese cannot be counted on but will pay a fair price for a product that they can count on and be assured that it is being produced in a safe manner.

References:

Cheese Associations:

<http://www.greatlakesgreatcheese.com>

Michigan Cheese Makers Cooperative

<http://www.cheesesociety.com>

American Cheese Society

University Dairy Foods and Text Books

<http://www.foodsci.uoguelph.ca/dairyedu/home>

On line text book Dr. Goff

<http://www.foodsci.uoguelph.ca/cheese/>

Cheese site Dr. Hill

<http://nutrition.uvm.edu/viac/>

VIAC at U. Vermont

<http://www.productcenter.msu.edu/>

MSU Ag & NR Product Center

Web Sites of Interest:

http://www.michigan.gov/documents/mda/MilkProducersProcessorGuide_215087_7.pdf

MDA

http://www.michigan.gov/documents/DY-348_DairyFarm_Requirements_13196_7.pdf

MDA

<http://www.smalldairy.com/dairy%20resources.html>

List of dairy resources

<http://wisconsinairyartisan.org/artisans.html>

Wisconsin Dairy Artisan

Network

<http://www.vtcheese.com/index.htm>

Vermont Cheese Council

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

Pacific NW Cheese Project

<http://ilovecheese.com/>

Dairy Management Inc.

<http://www.cheese.com>

All about Cheese

<http://www.cheesereporter.com/books.htm>

books & videos

Consultants:

<http://www.dairyfoodsconsulting.com/index.shtml>

Peter Dixon Vermont

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

Neville McNaughton

Cheese Supplies:

http://www.dairyconnection.com/default.jsp	Dairy Connection
http://www.orchard-dairy.co.uk/downloads%5CChoozitRipening&MouldCultures_20022009102952.pdf	Choozit
http://www.cheesemaking.com/	New England Cheese Making
http://glengarrycheesemaking.on.ca/accessories.htm	Glengarry cheese Making
http://www.danlac.com/	Danlac - Canadian supplies
http://www.dairylandpackaging.com/	Dairyland Packagaing

Equipment

http://www.heritage-equipment.com/index.php	Heritage Equipment
http://www.curdknives.com/	Dairy Fab LLC
http://www.kuselequipment.com/	Kusel Equipment Co. Wisc.
http://www.widairysupply.com/	Wisconsin Dairy Supply -Milk Tanks
http://www.imexchange.com/	International Machinery Exchange – Wisc.

Affinage

http://babcock.wisc.edu/node/34	Travel reports by Artisan Cheesemakers Babcock Institute
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Business plan templates and resources are available from the following sources:

<http://www.aec.msu.edu/product/index.htm> MSU Product Center for Ag& N R- look under Market Reports

<C:\Users\G. William\AppData\Roaming\Microsoft\Word\References 2-12.docx> U Minn. Ag Plan on line business planning document with reviewer option

https://www.msu.edu/~steind/farm_business_plan.html MSU Extension District Farm Management Educator Dennis Stein

<http://www.sba.gov/content/templates-writing-business-plan> Small Business Administration

<https://www.agecon.purdue.edu/planner/> Purdue University online Business Plan Tool

Business Planning

By G. William Robb

There are several ways to start a business but today, especially if you plan to borrow money, the first recommendation is to develop a business plan. A business plan helps you think through where you want the business to go and how to get it there. The key is to write it down so that it is meaningful for you and it forces you to think through segments of your business.

A business plan helps you communicate your business to others. Externally it helps you present your business to lenders, investors, or partners. Internally it helps the management team communicate the business goals and operations to employees and family members. How you write your business plan will depend on how you plan to use it. You will probably emphasize the financial section if your plan is part of a credit proposal. For internal use with employees or family members you will most likely concentrate on the operations or personnel sections.

A business plan will generally have the following sections;

Executive summary: Concisely summarize your business. This can often be completed after each of the sections are completed.

Business description: An overview of the business outlining the resources, labor, capital, products and target markets.

Business Mission, Vision and Goals: These business objectives should be clear and help set your short term and long term goals.

Organization and management: Describes the business organization and legal structure. This is a good place to highlight the management skills and experiences of the members. What changes or investments are required?

Market analysis: Marketing is critical step that needs much investigation before production starts. Regional and national market trends should be identified. Describe the special niche that the product fills. Retail, wholesale, brokers or sales force options should be investigated.

Products or service line: Describe the products and any special manufacturing required. Sources of raw materials, contracts and or talents should be delineated.

Financials: Your financial documents should prove to you and your lenders or investors of the soundness and success of the business venture. Budget spreadsheets and other tools may be helpful.

Business transition or member exit plan: All businesses will eventually end. Consider family and business members needs.

Supportive material: Include any material the supports above mentioned items. This can include maps, legal descriptions, equipment sources or biographies of business members.

Business plan templates and resources are available from the following sources:

- Ag Plan U. Minnesota, Center for Farm Financial Management
<https://www.agplan.umn.edu/>
- MSU product Center for Agriculture and Natural Resources
<http://www.aec.msu.edu/product/index.htm> look under Market Reports
- MSU Extension District Farm Management Educator Dennis Stein
https://www.msu.edu/~steind/farm_business_plan.html
- Small Business Administration
<http://www.sba.gov/content/templates-writing-business-plan>
- Purdue University online Business Plan Tool
<https://www.agecon.purdue.edu/planner/>
- Michigan Department of Agriculture, Summary Requirements for Michigan Dairy Processing Plants
http://www.michigan.gov/mda/0,1607,7-125-1569_16958_16960-179881--,00.html

Welcome to Artisan Hands-On Basic Cheese Making

At the MSU Dairy Plant

Welcome to the Michigan State University Artisan Hands-on Basic Cheese Making Workshop. The course idea started when Bill Robb, Extension Dairy Educator in west Michigan realized the potential existed in Michigan to grow farmstead cheese production. The local foods trend, growth of agri-tourism with a well established Michigan winery industry offered potential for artisanal cheese businesses. Bill approached Dr. Partridge about offering the educational workshop in the excellent teaching facilities at the MSU Dairy Plant. Two classes were offered in 2009 and since a total of six classes were held usually during ANR Week in March. Typically the workshop contains a nice balance of hands-on labs and lecture where students experience producing six cheeses. The long term goal is to help build the artisanal, farmstead cheese industry in Michigan.

Workshop coordinators

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Schedule

Monday,

10:00 a.m. Registration

10:30 a.m. Review raw materials (milk, rennet, culture, salt, color), cleaning and sanitation methods

Noon Lunch

1:00 p.m. Raw materials, cleaning and sanitation methods (continued)

2:30 p.m. Break

3:00 p.m. Labs:

Tour plant equipment; Set lactic cheeses

5:00 p.m. Adjourn

Tuesday,

8:00 a.m. Lab: Ladling lactic cheeses

Lecture: Starter Cultures and Varieties

Lab: Set cheeses

Noon Lunch

1:00 p.m. Labs:

Brine making and maintenance, Cheese making – rennet

Packaging options

Ricotta/heat and acid coagulation

5:30 p.m. Cheese tasting party

Wednesday,

8:00 a.m. Labs: Mozzarella, direct acidification, flavoring and packaging of lactic cheeses

Noon Lunch

1:00 p.m. Lectures:

Aging Facilities – business planning and budgets

Management and resources

5:00 p.m. Adjourn

Types of Cheese Production

- *Artisan cheeses maximize hand production and traditional cheesemaking practices.*
- *Farmstead cheeses are produced on the farm with milk from animals raised on that farm.*
- *Specialty cheese is defined as cheese produced in limited volume, with distinctive characteristics that result in high quality products, create added value and command a premium price from consumers.*
- *Commodity cheeses are cheeses produced in large volume—more than 40 million pounds nationally in a year—that appeal to a wide audience of consumers.*

Source : Specialty Cheese in Wisconsin: Opportunities and Challenges Laurie S. Z. Greenberg
UW-Madison Center for Integrated Agricultural Systems July 2005

