



Cornell University
New York State Agricultural Experiment Station

Small Scale Food Entrepreneurship: A Technical Guide for Food Ventures

Second Edition



Editor

Olga I. Padilla-Zakour, Ph.D.

Department of Food Science & Technology, Cornell University

Published in 2008 by

The Northeast Center for Food Entrepreneurship at the New York State Food Venture Center

www.nysaes.cornell.edu/necfe

Support provided by the New York Farm Viability Institute, www.nyfvi.org

This publication is for educational purposes only. The companies listed do not constitute an exhaustive list, nor does mention represent an endorsement by Cornell University.

Dedication to Dr. Don Downing

This guide is dedicated to the memory of Dr. Donald L. Downing, Professor Emeritus of Food Processing at the Department of Food Science and Technology, Cornell University, who passed away suddenly on February 29, 2008. He was the creator and first director of the New York State Food Venture Center and over his entire career helped thousands of people in the food industry, especially farmers, processors and entrepreneurs in New York State. He was always helpful, professional, unselfish, infectious energetic and generous of spirit. He will be forever remembered as a true mentor and friend.



Contributors

Cornell University

Judy Anderson (jla2@cornell.edu)

Malcolm C. Bourne, Ph.D. (mcb2@cornell.edu)

Donald Downing, Ph.D.

Elizabeth Keller

Cheryl Leach (cal35@cornell.edu)

Sarah Lincoln

Olga Padilla-Zakour, Ph.D. (oip1@cornell.edu)

Dennis Shaw

Robert Weybright

Randy Worobo, Ph.D. (rww8@cornell.edu)

Other Contributors

Susan Callahan, University of Vermont

Catherine Donnelly, Ph.D., University of Vermont

Cecilia Golnazarian, Ph.D., University of Vermont

Todd Pritchard, Ph.D., University of Vermont

Todd Silk, University of Vermont

Beth Calder, Ph.D., University of Maine

Kirk Dolan, Ph.D., Michigan State University

Julie Elmer, Rutgers University

Wendy Hess, R.D., CDE, Vermont

Diane Wright Hirsch, MPH, RD, University of Connecticut

Luke LaBorde, Ph.D., Pennsylvania State University

Brian Norder, Vermont Food Venture Center

Bonita Oehlke, Bureau of Markets, Massachusetts

If you would like to reproduce any materials, please contact the NECFE at the NYSFVC.

Cornell University

Department of Food Science & Technology

NECFE at the NYS Food Venture Center

630 W. North Street

Geneva, NY 14456

315-787-2273/2622

Fax: 315-787-2397

How to Use this Guide

This guide was designed to increase awareness of food processing and safety issues related to entrepreneurial food products. It is intended to provide the reader with the basic knowledge and vocabulary necessary to ask questions and understand answers relating to owning and operating a specialty food business. This guide does not cover any one topic in detail; it is an overview.

Notes on included topics:

Regulations: Food products are regulated both by state and Federal statutes. Since all states must, at minimum, abide by the Federal statutes and laws, there is a common basis for state regulations throughout the Northeast. However, some states have instituted regulations in addition to the Federal minimum. We have addressed this point of potential confusion by listing, where appropriate, the regulations in use by the most stringent state in the Northeast. The rationale is that a processor will be in less danger of regulatory repercussions if the most stringent regulations are the ones followed. It should be noted, however, that pronounced differences between state regulations are generally the exception rather than the rule.

Food Product Types: Information on a variety of food product types is presented in this text. This is done because specialty food processors may branch into more than one product type. The manual should maintain its relevance regardless of the food product being considered or produced.

Contact Information for Agencies and Organizations: A number of agencies and organizations, both at the state and national level, have a network of local branches. Because there simply isn't room to list every local branch, the contact information provided here is for the main office or in some cases the state office. Please contact these central locations for information about branches close to your business.

Table of Contents

Dedication to Dr. Don Downing	1
List of Contributors	2
How to Use This Guide	3
Table of Contents	4-6
I. Introduction	
Overview of the Northeast Center for Food Entrepreneurship	8-9
Introducing a New Food Product into the Marketplace	10-11
Steps to Start a Specialty Food Business	12-13
Pros and Cons of Starting a Specialty Food Business	14
II. Business & Marketing Issues	
Business Plan Basics	16
Components of a Successful Business Plan	17
Types of Legal Business Entities	18
Marketing Considerations for the Small-Scale Food Processor	19-20
Accounting for Your Business Activities	21-23
Business Certification Requirements	24-26
Insurance Coverage for Food Entrepreneurs	27-28
The United States Small Business Administration	29-31
Financial Resources for Small Businesses	32-33
Facility Registration & Record Keeping Requirements	34
III. Food Safety & Sanitation	
What is pH and How It is Measured?	36-39
Water Activity: Another Critical Factor for Safety of Food Products	40-42
Guide to Schedule Process Development	43
Hazard Analysis Critical Control Point System (HACCP)	44-46
Six Areas of Sanitation/Relationship to Food GMPs and PMO Requirements	47-48
Reduced Oxygen Packaging (ROP) of Foods	49-50
Food Allergy Awareness	51-52
Labeling of Foods Containing Allergens	53
Food Handler Certification	54
ServSafe™ Certification	55
IV. Acidified & Low Acid Products	
Acidified (pickled) Foods	57-58
Fruit & Vegetable Juice safety and HACCP Requirements	59-60
Low Acid Foods	61-62
Required Analyses of Various Types of Products	63
Examples of Schedule Process for Acidified Food Product and Processing Records	64-66

V. Dairy Products	
Cheese Production	68-69
Yogurt Process Schedule	70-71
Example of Schedule Process for Yogurt	72
VI. Meat & Poultry Products	
Pathogen Reduction/HACCP for Meat & Meat Products	74
Fermented Sausages	75-76
Jerky & Dried Snack Meats	77-78
Smoked Meats & the Smoking Process	79-80
Shelf Stable Dried Sausage	81-84
Example of Schedule Process for Meat, Poultry, Sausage and Jerky Product	85
VII. Fish Products Process Models	
Introduction to Processed Fish Product Regulations	87
Example of Schedule Processes for Fish Products	88-89
VIII. Other Product Types	
The Science & Technology of Making Preserves	91-92
General Procedure for Making Preserves and Jellies	93
Certified Organic Foods	94-95
IX. Labeling	
Labeling Requirements	97-100
Meat Labeling Basics	101-103
Nutrition Labels	104
Nutrition Labeling Exemption	105
Examples of Nutrition Labels	106-108
Nutrient & Health Claim Basics	109
Uniform Product Code (UPC)	110
X. Processing Facilities & Equipment	
Purchasing pH Meters	112-113
Basic Standards for Home & Commercial Kitchens	114
Minimum Food Processing Facility Requirements for New York State	115
Basic Requirements for a Small Scale Food Processing Establishment	116
Small Scale Food Processing Equipment	117-119
Purchasing Used Equipment	120-121
Steam Kettles in Food Processing	122-123
Food Container Selection Tips – Glass	124-125

XI. Resources

Laboratories Providing Food Analysis Services	127-128
Equipment Suppliers	129-130
Overview of Pertinent Federal Regulatory Agencies	131-133
USDA Rural Development Offices in the Northeast	134-135
State Agencies/Universities Pertinent to Small Scale Food Producer	136-142
Farm Bureaus in the Northeast	143
References for the Small Scale Food Processor	144
Glossary	145-148

I Introduction

An Overview of the Northeast Center for Food Entrepreneurship

Origin

The Northeast Center for Food Entrepreneurship (NECFE) started as a joint effort to expand the activities of the New York State Food Venture Center at Cornell University and the Center for Food Science at the University of Vermont, and was funded in part by Fund for Rural America/CSREES/USDA from January 2000 to January 2005.

Currently, NECFE activities are carried out only by the New York State Food Venture Center (NYSFVC) with support from the New York State Agricultural Experiment Station and the New York Farm Viability Institute (www.nyfvi.org), Federal Formula Smith Lever, and fees for service. The NYSFVC, which began operations in 1988 under the direction of Dr. Donald Downing, was an extension program of the Department of Food Science & Technology at Cornell University funded by New York State. The Venture Center provided technical assistance on food manufacturing issues to entrepreneurs and food companies by drawing on Cornell experts, links with the FDA and USDA, and the professional knowledge of the center director and extension support specialists. Every year the Center receives over 1000 requests for assistance and provides in depth support to 200 entrepreneurs to ensure the safety and commercialization of over 500 food products.

Mission

To provide comprehensive assistance to beginning and established food entrepreneurs thus promoting sustainable economic development of rural communities. The Center offers services, outreach, and research development opportunities in four critical areas: product process development, product safety, process/product technology transfer, and product commercialization.

Program Areas

NECFE assists entrepreneurs by providing educational materials, workshops, direct assistance, and referrals to appropriate organizations, in the following areas:

- Entrepreneurship Training
- Product Process Development
- Product Safety Evaluation
- Guidance in local, state and Federal Regulatory Compliance
- Linkages to Business Assistance
- Referrals to Local Suppliers and Service Providers

Funds for loans and grants are not available through this program.

Expertise

Cornell University brings valuable resources and experience to the Center. A team of professionals with expertise in all aspects of food entrepreneurship will encourage and support food business in the rural Northeast. Teaching, research and extension programs are integrated to support food manufacturing, business management and marketing activities of agricultural, value-added, food products.

Facilities

Through the center, entrepreneurs have access to established Cornell facilities such as:

- **Analytical Laboratories** for extensive product analysis and methods development.
- **Fruit and Vegetable Technology Pilot Plant** offers extensive equipment for a wide variety of processing, testing, and scale-up operations. Controlled temperature and humidity rooms are available for storage and shelf life studies.
- **Vinification and Brewing Technology Laboratory** is a pilot plant serving wine makers and brewers for collaborative research and development in winemaking and brewing.
- **Food Processing and Development Laboratory** includes a 10,000 ft² pilot plant equipped with a wide selection of pilot-scale equipment, available for use by clients on a contract basis.
- **Dairy Pilot Plant** equipped with cheese, yogurt, and ice cream processing capabilities.

Geographical Region

The Center has a mandate to serve New York State. Requests from neighboring states and other areas are accepted upon availability of resources on a cost recovery basis.

Introducing a New Food Product to the Marketplace

A story of a beginning specialty food entrepreneur

Mary has a special recipe to make hot mustard that everybody loves. After trying her product with family and friends, she is convinced that she could produce her product commercially and sell it to local stores and supermarkets. Not knowing how to start this venture, she decides to call the Health Department for advice. A friendly inspector tells her that there are basic requirements and regulations whenever a new food product is going to be introduced into the marketplace. He recommends that Mary contact her state agriculture department for advice.

That afternoon, Mary calls her state department of agriculture. The official to whom she speaks acquaints her with the regulatory requirements for producing mustard in her state. The official tells Mary she needs to have a scheduled process for her product and may need to have some laboratory analysis conducted. The official tells Mary he has heard about a center, the Northeast Center for Food Entrepreneurship, which can assist her in her venture. He gave Mary the telephone number for the NECFE and suggests that she also calls her local cooperative extension office for further assistance.

The next day, she calls NECFE to explain her idea and her uncertainty about where and how to start. The NECFE representative explains to Mary that there are several areas she needs to evaluate to determine if her idea is feasible and in line with her personal business goals. First, it is important to determine if the mustard can be produced commercially the same way she makes it at home, or if formula adjustments or preparation changes are necessary to comply with regulations and to ensure safety and stability of the final product. Details such as the acidity of the product, specific ingredients, cooking temperature, and the type and size of jars and labeling are very important at this stage. But it is also critical to assess the economic feasibility of Mary's mustard. The representative refers Mary to other NECFE professionals who will help her with safety evaluations, regulatory compliance and process development, as well as the business and marketing aspects of food production. The representative also tells Mary how she can log onto their website (www.nysaes.cornell.edu/necfe) to find more information that explains the process. She encourages Mary to read all the information on the website and call back once she is ready for the next step.

After reading the material on the website she realizes now that her idea will take more work than she originally anticipated, but she also knows that she wants to follow through with a solid business approach. She calls the food process authority at NECFE to find out if her mustard formulation needs to be changed. After a safety evaluation and minor changes in formulation and processing, Mary has a product that meets FDA and state regulations.

It took Mary 4 weeks to work out her final recipe and she is now ready to try the market. Before a test market is performed, she needs to evaluate the initial product feasibility based on her expectations and market realities. The process authority at the NECFE refers Mary to a local business assistance program.

The business professional meets with Mary and they both look at her short-term goals, production issues, suppliers, pricing, distribution, start-up investment and possible specialty markets. Mary wants to start small to make sure she has the right product before she invests significant resources into her venture. Competition is strong in this category but Mary can target specific markets by providing a high quality natural product. After a long session, she decides to produce 20 cases of her hot mustard to approach some of the local specialty stores with samples and to test her product in the local farmer's market. Mary does not have a commercial kitchen at

home and, at this early stage, it is better to utilize an existing facility. Mary looks into using a local restaurant, a co-packer, a shared use kitchen and the pilot plants available to her as a client of the NECFE to manufacture the initial batch. She also needs to start working on her business plan. The business professional gives Mary a list of local sources for business assistance and encourages her to call them for in-depth consultation.

Mary is able to secure manufacturing space once a week at a local restaurant to prepare her mustard. She now sources different suppliers of ingredients, jars and labels to understand the cost of raw materials, both at a very small scale and at a little bigger scale. She works with a label company to design and print prototype labels that should be reviewed by the regulatory agency for final approval prior to the commercial batch production. She wants to include nutrition facts on her product, but she decides to wait until she has solid sales due to the added expense of the nutritional content analysis required.

To start commercial production she needs to register the processing facility with the FDA under the Bioterrorism Act of 2002 and to obtain the necessary food manufacturing permits and approvals required by Federal and State laws. After three weeks of research, meetings and visits, Mary schedules her initial batch production for Monday, the weekday the local restaurant is closed to the public. Mary makes a 20-gallon batch in a steam-jacketed kettle, which is a little different from the 1-gallon batch she usually makes at home. She carefully measures all the ingredients and follows her formula to make sure her mustard is safe and of high quality. Her filling, capping and labeling operations are manual at this point, and turn out to be the slowest stage in production. She determines the cost of production, estimates distribution and marketing cost, studies the competition and decides to price her mustard at \$ 4 per 8 oz jar, which gives her an estimated 25% profit.

With her samples on hand, Mary demonstrates her mustard to the owner of the local specialty store. She is able to convince the owner to take two cases on a trial basis and to secure space in the store to demonstrate her product on weekends. She also talks to a friend who has a booth at the farmers market. The friend agrees to share the booth with Mary so she can try selling her mustard personally. This one-on-one contact with consumers gives Mary a better sense of what consumers look for in mustard. She is also able to test out labeling and marketing strategies on a small scale. Mary also decides to approach the convenience store at the other side of town to test her product. She is not successful there since the manager finds her mustard too expensive.

Mary remains focused on positioning her mustard as a high value specialty product. Once she has established a market for her mustard at local specialty shops and farmers markets, she plans to expand her distribution channels by hiring a broker and a distributor. She makes it a point to ask her competitors and specialty food store managers for referrals. She knows working with a broker or a distributor will require constant follow-up on her part, and possibly selling incentives. At this early stage in her business, however, personal distribution is a better fit for her resources and short-term business goals. In the meantime, her mustard is selling at a rate of two cases per week at the local store and 1 case per week at the farmers market.

Mary is excited about the future possibilities but she also understands the importance of a solid business strategy to be successful. Entrepreneurs like Mary have unique products and ideas that with the appropriate technical and business support have the potential to become sustainable business ventures.

Steps to Start a Specialty Food Business

Introduction:

The following is a list of the basic steps to start a specialty food business. While each specialty food business is unique and subject to specific product requirements, the list below outlines the overall process. The steps are grouped by topic. Keep in mind that each topic effects the others: your product type and packaging will effect your labels; the ingredients to make your product will effect your cost and production plans.

The Product:

1. Develop a prototype. Test it out on family and friends. Collect and incorporate feedback on flavor, texture, and appearance.
2. Determine the market form you would like the product to have: shelf-stable, refrigerated, frozen, baked, canned, etc.
3. Determine the batch size you will need for commercial operation. A good start-up size for a liquid product (dressings, etc.) is 5-10 gallons. For solid product, consider a 15-25 pound batch.
4. Consult a Process Authority to scale up your recipe. Take the following into consideration:
 - The formulation may change due to regulatory and food safety requirements.
 - Testing (pH, water activity, etc.) may be required for compliance with regulations.
 - It may take several attempts to achieve a scaled-up product comparable to the original; ingredient amounts will not change proportionately. For example, you may double the tomato sauce in a BBQ recipe but find you only need to slightly increase the amount of garlic.
5. Get approval for your recipe from a Process Authority. This resulting document, a Scheduled Process, will help avoid product safety and quality issues.
6. Determine the cost of ingredients based on your approved, scaled-up recipe.

Business Planning:

1. Write a Business Plan. It will help you focus your business goals and determine if you need funding.
2. Consider liability insurance. It is affordable and can protect personal assets in the event of a problem with your product.
3. Determine a form for your business: sole proprietorship, corporation, partnership, limited liability, and subchapter(s) corporation.
4. Register your business with the state and with the county. Fill out and submit a DBA (doing business as) form.
5. Get assistance from business resources: state agricultural departments, state extension organizations, SBDCs, SCORE, local economic development agencies.

Labels:

1. Decide on a product name.
2. Determine applicable regulatory requirements. Ask your state regulatory officials for help or contact NECFE. Consult the FDA Food Labeling Guide.

3. Determine what storage information must be on your package: refrigerate, refrigerate after opening, etc.
4. Choose a size and shape, which is compatible with your packaging.
5. Invest as much in your label as possible. They are the first thing customers will see.
6. Make test labels, or labels for small, initial, batches, on a computer printer to cut costs.
7. Decide if you wish to make health or nutrient claims. If you do, you must have nutritional analysis done and invest the time and money for FDA compliant nutrition labeling.
8. Decide whether or not to invest in a bar code. The yearly fee is based on the number of products and gross sales, but most large stores and chains will not consider your product without one. If you do not plan to sell to large distributors, you don't need one.

Market Decisions:

1. Write a Marketing Plan. It is a framework for research on competition, ceiling prices, target markets, etc. and structures your marketing goals and methods.
2. Decide where you will sell your product. Generally, start off small – at farmers markets, fairs, roadside stands, etc. These are also good places to test market your product.
3. Determine a selling price for your product, taking the competition and your financial needs into account.
4. Develop a distribution method: your car, the mail, a fellow specialty food entrepreneur, distributor, or broker.

Production:

1. Decide where you will produce your product: commercial kitchen, pilot plant, or co-packer.
2. Obtain all necessary permits and approvals, both Federal and State, required for food manufacturing
3. Find storage space for ingredients, packaging, and the final product.
4. Schedule time with experts at the production facility to learn about equipment.
5. Determine when, based on ordering supplies, you can produce and package product.
6. Schedule time at a processing facility to produce your product.

Pros and Cons of Starting a Specialty Food Business

The specialty food business can be rewarding and exciting. It can also be a real struggle. Listed below are some pros and cons of starting and running your own specialty food business. The list is intended to provide a realistic picture of specialty food manufacturing. Keep in mind that several of the items listed are qualitative, that is, their importance depends largely on how strongly you feel about them.

Advantages:

- Being your own boss.
- Creating your own work environment: hours, flexibility, etc.
- Doing something in which you believe
- Reaping the benefits of hard work and long hours directly.
- Variety, challenges, and opportunities for creativity, full use of knowledge
- More open earning and growth potential
- Satisfaction of a successful venture, a product well received
- Empowerment

Disadvantages:

- Risk of failure
- Time Commitment – 60-70 hrs per week is normal
- Financial strain as assets become tied to business start up and success
- Strain on family due to financial and lifestyle change
- Emotional burnout
- Unavoidable business roles/requirements you'd rather not fill
- Rejection of your product by consumers

Should you decide to pursue a specialty food business venture, there are a number of things you can do to minimize risk and maximize your chance of success:

- Develop a Business Plan
- Regularly review your business plan to remind yourself of goals and maintain focus
- Develop a marketing plan
- Learn and follow food regulations and requirements
- Maintain accurate, current records
- Analyze your financial status on a regular basis and make necessary adjustments
- Comparison shop for quality inventory in a timely fashion
- Learn to recognize and solve problems promptly
- Draw a line between your personal life and your business life and stick to it

II

Business & Marketing Issues

Business Plan Basics

A Business Plan is an ever-evolving document which specifies the type of business you are running, the goals you have for that business, detailed plans for how you will accomplish these goals, and research-supported reasons why your business should pursue a particular direction.

Importance – The Business Plan serves as a reference point for your venture. As such, it is critical when:

- Assessing your business success/potential for success: The business plan facilitates the identification and resolution of potential issues.
- Locating funding sources: The business plan requires you to target areas where financing is needed as well as possible sources of that financing.
- Applying for funding: Investors want to know that your business is viable, profitable and meets their criteria. The business plan proves this.
- Receiving business assistance: Organizations providing assistance need to understand your business. The business plan gives them the information they need to help you.

Writing a Business Plan

The critical aspects of the business plan are: the amount of serious thought put into development; and the content of the resulting document. Writing a business plan is often a challenge. You know you are on the right track if:

- New issues and problems become evident. This means you are approaching the process objectively and taking time to make fundamental decisions, which will impact the future of your business.
- You are constantly reevaluating and revising your objectives and goals in response to new information regarding:
 - a. Marketing
 - b. Technology and regulations
 - c. Capital needs and resources

Financial institutions will not be as attached to your venture as you are. In order to convince them of the viability of your business, and of yourself as a responsible entrepreneur, you must have a business plan that honestly addresses the opportunities as well as the threats that face your venture.

Assistance

A number of agencies, such as Small Business Development Centers, can assist you in creating a business plan.

Components of a Successful Business Plan

A successful business plan should include the following items:

1. Executive Summary - A one page overview of the business plan.
2. Description of the Business
 - a. Include products and/or services
 - b. Form of business organization – sole proprietorship, partnership, corporation, limited liability corporation – and why you chose it.
3. Business Goals and Objectives – Establish goals and target dates for reaching them
4. Project Description – How does the planned business operation help to achieve the objectives
5. Market Assessment – Marketing Plan for the product(s) you will be producing
6. Research trends in your industry
 - a. Describe the competition
 - b. Identify new and target customers
 - c. Describe how you will reach new customers
7. Management & Personnel
 - a. Organizational chart or description of key positions
 - b. Biography or resume of key staff
8. Financial Statements
 - a. Income statement and balance sheet
 - b. Current year's annual budget
 - c. 2 years projected budget
9. Outline the Sources and Uses of Funds for this Project
 - a. Sources include your equity and any financing or assistance from town, county, state or other agencies
 - b. Uses should be categorized into land, site preparation, building and equipment. (Will any working capital, eg. inventory, be financed?)
10. List of owners – including names, addresses, and phone numbers.

Types of Legal Business Entities

Business Entity	Advantages	Disadvantages
Sole Proprietorship	• Easy to organize - DBA • Less reporting • No Double Tax • Least amount of regulation	• Unlimited Liability • Fewer tax benefits • Termination upon death of owner • Adverse tax consequences upon sale • Limited ability to raise capital
General Partnership (optional)	• Few formalities • Combination of resources and talent • Personal tax benefits • Low organizational costs • Minimal regulatory control	• Unlimited liability • Power of each partner • Dissolution upon death of a partner • Partnership profits taxes as income to the partners • Decision making authority often impaired
Limited Partnership	• General partners have additional capital • Limited partners have limited liabilities • Allocation of income & losses • Avoids “double tax” • Finite existence	• Initial organization cost high • Limited partners have no control • Partnership profits taxed as income to partners • Compliance with state & federal securities laws
C-Corporation	• Limited liability of shareholders • Perpetual existence • Flexibility of financing through outside investors • Transfer of ownership by sale/gift of stock • Tax benefits available to corporate employees	• Initial organizational cost high • Annual reporting requirements • Personal liability of owners • Double taxation • High degree of government regulation
S-Corporation	• Same as for C-Corporation • Taxed at the individual shareholder level	• Except for tax consequences, same as for C-Corporation • With minor exceptions, only individuals can be shareholders • Limited to one class of stock • Must use calendar year
Limited Liability Company	• Limited liability without limits on management participation • Flexible ownership and capital structure • No double tax • Allocation of tax benefits	• Initial organizational cost high • Poor tax treatment of fringe benefits • Transferability must be governed by buy/sell provisions

References

Wold, Cameron, Helen Sumner, Marilyn Schlake. NxLeveL™ “Tilling the Soil of Opportunity.” 1st Edition. J. Philips Gottswols. 1999.

Marketing Considerations for Small-Scale Specialty Food Producers

The National Association for the Specialty Food Trade has adopted the following description of specialty foods:

Specialty food products ...shall mean: foods, beverages, or confections meant for human use that are of the highest grade, style and/or quality in their category. Their specialty nature derives from a combination of some or all of the following qualities: uniqueness, exotic origin, particular processing design, limited supply, unusual application or extraordinary packaging or channel of distribution... the common denominator of which is their unusually high quality.

Small-scale specialty food processors face unique challenges and opportunities when marketing their products. If the venture is to be successful, the processor must decide what market the product will thrive in, what the competition is, and how to market the product given the processor's available resources. A marketing plan facilitates business success by requiring the processor to address each of these marketing issues through marketing goals and strategies. The research necessary for marketing plan development also prevents entry into an unprofitable business venture.

The marketing goals should meet the following "SMART" criteria:

1. **Specific** – for example, earn \$30,000 in net sales
2. **Measurable** - target date for completion
3. **Attainable** – not so high that you cannot reach them
4. **Rewarding** – they reflect the reasons you started the business in the first place
5. **Timeline** – they should include short term and long term goals

Once goals have been defined, the food entrepreneur must research the existing market place and competition (market & competitive analysis). In addition, the food entrepreneur must test-market the product and evaluate the results. This test will indicate how and if the marketing goals can be reached, given the entrepreneur's available resources. Analysis of test marketing also provides a basis for a marketing strategy for the product.

As part of the market strategy, the food processor must pursue venues for product introduction to the market place. One of the most cost-effective methods is through direct marketing at local farm stands, farmers markets, and festivals. The product's reception at these outlets is a good indication of how the product will be received in the larger market place. An added benefit comes from meeting customers face-to-face, providing an opportunity to determine customer preferences and get a sense of the reasons people buy a product. This information can give food entrepreneurs new marketing ideas or revise existing ones.

Even the most established producers try out new ideas and products at local farm stands and farm markets. This is a good time to study the competition, identify trends in local and regional specialty food items, market size, and pricing. Further information on gourmet and specialty food availability and pricing can be found on the web (on-line) by searching for the product type in your favorite search engine. In addition, summer sales to vacationers can result in a following for a product, which can be accessed through mail order.

The marketing strategy for a product must be reevaluated and revised whenever changes in the business, the market, or the product occur. For example, as the business expands, the entrepreneur may decide to hire a co-packer to handle the manufacturing. The entrepreneur may also decide to hand over product distribution to a distributor. This distributor sells to retailers and other distributors, developing new markets for the product. The above changes in the business will effect product price, the product's position in the market, and the amount of profit the entrepreneur receives from each unit sold. Since the product's market attributes have changed, a new market strategy is necessary.

As the business grows, you will need to research national markets for wider distribution. Attending trade shows for specialty foods will broaden your view of the specialty food business and market in such areas as the gift trade, health food stores, ethnic foods, and the export market. As you expand your marketing views, your marketing plan must expand to include them.

Marketing Resources:

To gain a sense of the state of a market at large, try reading industry periodicals for trends in food distribution. Some are:

Stagnito's New Product magazine – Food and beverage from concept to consumer, published monthly. www.newproductsmag.com

ID Magazine – Published monthly, serving food service industry. This publication describes trends in the food industry. Circulation inquiries: (847) 763-9627. www.foodservicetoday.com

FDM (Food Distributor's Magazine)
P.O. Box 811768, Boca Raton, FL, 33481-1768. (516) 447-0810.

Food Institute Report – American Institute of Food Distribution, Inc., 1 Broadway, CN 791, Elmwood Park, NJ, 07407. www.foodinstitute.com

You can also consult trade associations for product-specific, large-scale, marketing information.

Use college libraries for access to internet sites that provide demographic information for free or at cost. One such site, available through many educational institutions, is <http://www.marketresearch.com>. For demographic information, try the U.S. Census, either on line or through your local library, which may have it on CDROM.

References

Hall, Stephen F., *From Kitchen to Market: Selling your gourmet food specialty*, Upstart Publishing Company, 1996.

White, Gerald B. and Wen-fei L. Uva, *Developing a Strategic Marketing Plan for Horticultural Firms*, Department of Agricultural, Resources and Managerial Economics, College of Agricultural and Life Sciences, Cornell University, Ithaca, NY

Accounting For Your Business Activities

Accounting is a general term that refers to the procedures used to track a business's income and expenses. Analysis of these numbers can be used to help answer questions about the fiscal status of a business. Accounting is a necessary task for any business regardless of size and can become an effective management tool. There are two basic reasons to keep detailed financial records for a business:

1. To monitor the movement of monies in and out of your business to help determine profitability.
2. Provide the necessary information to complete required information filings such as taxes.

The accounting process is easier to understand if broken down into four groups of associated tasks:

- Obtain and keep receipts or other acceptable records, of payments to and expenditures from your business. This should include, when at all possible, receipts for small (gas purchase, road tolls, etc.) as well as large expenditures.
- Record the receipts in your general ledger using either a manual or computerized accounting system. This should be done on a regular basis - weekly, if not daily.
- Summarize your income and expenditure records on some regular and periodic basis (daily, weekly or monthly) in the form of financial and operational reports.
- File all necessary payroll and business tax forms with the appropriate agencies. Most businesses hire an outside accountant or CPA for tax filings.

Segregating Business Activities

You must identify and categorize the different types of business income and expenses. At the same time you must have documentation providing reasonable proof of sales and purchases as well as any other expenses incurred. This is done by setting up separate general ledger accounts for each type of income, purchase and expense. Your business will need to keep track of a minimum of eight basic types of records:

- Sales records – Invoices; cash register tapes; sales slips
- Cash receipts - Cash register tapes; numbered, dated paper receipts; checks received; checks deposited
- Cash Disbursements - Store receipts; numbered, dated petty cash receipts
- Accounts Payable – Monies owed by you to your suppliers as evidenced by sales invoices
- Accounts Receivable - Monies owed to you by your customers as evidenced by sales invoices and any checks or cash payments received in payment
- Banking records - bank statements; deposit slips; copies of cancelled checks
- Payroll records - employees' tax forms; time sheets; any payments made to employees; evidence of any deductions from wages paid; tax reports and payments made to government agencies
- Inventory records – saleable items as well as a separate inventory of fixed assets. (Desks, tools, etc.).

Accounting Systems

Some small businesses rely on manual bookkeeping systems. These may range from a checkbook and shoebox of receipts to a purchased, pre-packaged, system, which can be found at

most office supply stores. While the checkbook/shoebox method may be more familiar, it is subject to mathematical error and will require hand manipulation of the numbers to manually generate reports.

Today, many small businesses are purchasing computerized accounting software. Provided that information is entered correctly and promptly, software can provide up-to-the-minute information and often offers reporting capabilities that can be customized for specific information needs. Choosing appropriate accounting software is not simple. You should understand the various accounting, record keeping, and reporting tasks of your type of business, as well as your computer hardware requirements prior to purchasing a program. Additional features such as flexibility, expandability, online or toll-free help lines and training can also be important. Many of the current software packages allow you to share information with other applications such as spreadsheets or word processors, which can be very helpful.

Accounting Methods

There are two basic accounting methods: cash and accrual. The cash method of accounting recognizes a transaction when cash changes hands. (e.g. a sale at the time payment is received. An expense is recognized when a payment is made.) Many small businesses choose this method of accounting because it is closest to keeping a checkbook and is simpler and less costly than the accrual method.

The accrual method recognizes both sales and expenses at the time they are incurred, regardless of when payments are made. Sales are recorded in a Sales Journal. Monies owed to you for goods/services purchased from you are recorded as Accounts Receivable. Goods/services purchased by your business for which payment is subsequently made to other vendors are tracked in the Accounts Payable. Each of your customers has a separate account in which their purchases, invoice numbers, sales amounts, and records of payment are maintained.

Accrual accounting is more complex than cash based accounting in that it uses a record keeping entry system called double-entry bookkeeping. In this method, for every transaction there are two entries into the accounting system called debits and credits where the total debits must equal the total credits. For example, a sale of goods records both a receivable and a reduction in inventory. Double-entry bookkeeping is attractive because it ensures mathematical accuracy and is intended to give a realistic picture of the business's financial situation. Accrual accounting can be initially confusing so it is advisable to obtain appropriate professional assistance when changing over to this type of system.

Reporting

Reporting business activities is a modern business practice that can be either **mandatory** or **voluntary**. Mandatory reporting occurs when government agencies require a variety of reports at the end of the fiscal year (year end) depending on the business activities. (It should be noted that fiscal "year end" can follow a calendar year or another pre-determined time period as chosen by a company during its formation. However, businesses operating on a cash basis must use a calendar year as their fiscal year. Therefore, the fiscal year for cash base businesses ends December 31).

Mandatory reports include payroll, which must be done at least on a quarterly basis or more, depending on total payroll dollars and tax returns. Often, small business owners will hire a

Certified Public Accountant (CPA) or other bookkeeping professional to help prepare business tax returns.

Other mandatory reports can be imposed by other agencies involved with the activities of a specific business. Examples of these might be sales reports by which market assessments are calculated, or are used to track market trends. Agencies involved with the monitoring and regulation of specific businesses should be contacted to determine their specific requirements.

Voluntary reports can take a variety of forms. The following are some common examples that can be used to help manage your business:

Balance Sheet - A snapshot of your assets, liabilities and capital (net worth) at a particular given point of time.

Income Statement - Summarizes the sources and total amounts (by category) of sales revenues and expenses to determine the profit/loss for the period. Income statements are usually generated monthly, but some businesses prefer quarterly. The expenses are normally divided into groups of expenses directly associated with the cost of producing your products/services, and expenses that are indirect, such as selling, administrative, or overhead expenses.

Cash Flow Statement - Summarizes the cash inflows and cash outflows for the period just ended. These are also used to project cash inflows and outflows over a time period. These should be monitored closely to avoid cash shortages.

Business Certification Requirements

What is Business Certification?

Business certifications verify and qualify businesses seeking targeted assistance for ventures owned and controlled by socially and economically disadvantaged individuals. Certification is an effort to insure equal access to contracting opportunities with State and Federal government agencies and large companies.

Why Apply for Certification?

A business is not eligible for programs associated with its special ownership status until it is certified. Once certified, you are eligible to have your business listed in various printed and online directories. Directories are often used by firms looking to fulfill requirements to contract a certain percentage of their business with various targeted minority populations.

Certification also entitles businesses to a number of assistance programs. These programs often provide mentoring or other business related services. Because there are very few monies or loans set aside for this specific purpose, certification rarely entitles a business to tap into special start-up or expansion monies.

Who Certifies Businesses?

A variety of agencies certify businesses at the local, State and Federal level. Some agencies are private and some are government-run and/or authorized. The SBA uses 3rd party private certifiers. There is a charge for the certification process and the services of the certifiers. Businesses are encouraged to shop for best price and value.

Where you choose to get certified depends largely on the type of programs in which you are interested, where you are doing business, and whether or not your business activities cross state lines. Cities, states and national entities have their own certification procedures, forms and requirements. A number of organizations offer assistance with the certification process. Check with your local Chamber of Commerce and SBA office for more information.

U.S. Small Business Administration Certifications

Certification as an 8(a) firm: 8(a) applicants must generally be in business for at least two years before applying. The business must be a small business unconditionally owned and controlled by one or more individuals deemed to be socially or economically disadvantaged and eligible to receive federal contracts. The 8(a) Program requires that the net worth of a business be less than \$250 thousand (excluding his or her ownership interest in the applicant firm and the equity in his or her personal residence). Once a firm has been accepted into the SBA's 8(a) program, they are automatically qualified for all SBA benefits.

- program participants have business opportunity specialists assigned to them for helping their firms evolve into economically viable business entities.
- businesses also are eligible to participate in SBA's Mentor program.

Small Disadvantaged Business: A small disadvantaged business is one that is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged. This can include a publicly owned business that has at least 51 percent of its stock unconditionally owned by one or more socially and economically disadvantaged individuals and whose management and daily business is controlled by one or more such individuals.

HUBZone: HUBZones were created to promote economic development in distressed areas, according to census tracts. A firm can be found to be a qualified HUBZone business if: it is small; located in a “historically underutilized business zone” (HUBZone); owned and controlled by one or more U.S. Citizens; and at least 35% of its employees reside in a HUBZone. See: <https://eweb1.sba.gov/hubzone/internet/application-guide.cfm> for an online or downloadable application.

Certification as a Women-Owned Business: A WOB (also called WBE - Women's Business Enterprise) is one that is 51% owned and controlled by one or more women. Some certifications look to the source of funds that were used to start the business as indication of true ownership. For instance, if a husband and wife are married, and the wife uses some of their joint savings to start a business, it does not qualify for certification as a WOB.

The Women's Business Enterprise National Council (WBENC) has a certification process for a WOB. Applications are accepted on a rolling basis and are reviewed by a local committee made up of corporate representatives. A site visit to your place of business takes place once the review has been conducted.

Certification as a Minority Owned Business: A MOB (also called MBE - Minority Business Enterprise) is one that is 51% owned and controlled by one or more people who are from a non-white ethnic category. The National Minority Supplier Development Council, Inc. provides independent certification and a loan pool for certified businesses. http://www.nmsdcus.org/MBEs/toolkit_certification.html

Certifying Agencies by State:

NYS M/WBE Certification:

NYS Dept. of Economic Development
Division of Minority & Women's Business Development

30 South Pearl Street
Albany, NY 12245
(518) 292-5250

633 Third Avenue
New York, NY 10017
(212) 803-2414

<http://www.nysegov.com>

Download the form: http://www.nylovesbiz.com/Small_and_Growing_Businesses/mwbe.asp

Vermont Certification: <http://www.aot.state.vt.us/civilrights/DBE.htm>

Rhode Island Certification: <http://www.mbe.ri.gov>

Maine Certification: <http://www.maine.gov/mdot/disadvantaged-business-entrprises/dbe-home.php>

Massachusetts Certification: <http://www.cweboston.org/>

Connecticut Certification: <http://www.ct.gov>

New Hampshire Certification:

<http://www.nh.gov/dot/bureaus/humanresources/laborcompliance/dbe/index/htm>

New Jersey Certification: <http://www.panynj.gov/bus/objo/objcert.html>

New York MBE/WBE/DBE/SBE Certification:

Division of Minority and women's Business Development

30 South Pearl Street

Albany, NY 12245

518-292-5250

<http://www.empire.state.ny.us>

Pennsylvania Certification: <http://www.dgs.state.pa.us/babd/site/default/asp>

Insurance Coverage for Food Entrepreneurs

Insurance coverage is an important piece of any business operation, particularly food businesses. Some coverage types listed below should be considered in the early phases of a business and others become more relevant as a business grows and assets increase. The coverage types listed are for insuring a business. Personal assets should be insured separately. Consult an insurance agent whenever coverage options are being considered.

Why should I have Insurance?

1. Protect the assets you can't afford to lose: home, business, finances.
2. Many distributors won't take your product without it.
3. Many shared-use kitchens and pilot plants require it to use their facilities.
4. You can be held liable for accidents even if you have done everything reasonable to avoid them.

Types of Insurance

General Liability

General liability is protection, including legal defense, from claims against you and your company alleging bodily injury or property damage to others because of your activities. Product liability insurance, a component of general liability, is particularly important to food producers.

Product liability coverage provides protection against claims resulting from food-borne illness or injury. Typical policies provide \$1 million in coverage, although \$2 million coverage is not unusual. Average premiums for \$1 million coverage range from \$400 to \$1000 per year. Coverage for high-risk products may cost more. The Hartford is an insurance company, which has a program for small food producers that has worked out well for many producers. Almost any independent multi-line insurance agent should be able to write policies under-written by The Hartford.

Stores selling your food product may request a "Certificate of Insurance." This is a universally acted form giving evidence that your company has liability coverage in place. Additionally, larger stores, co-packers and shared-use processing kitchens may require "Additionally Insured" status on your policy. Naming them in this way broadens their protection under your coverage.

Property

Coverage for your business property might include ingredients, inventory, finished product, processing equipment and packaging materials. One type of property coverage is Property Liability which insures against injuries to others occurring on your property.

Optional property coverage includes computer equipment and data, property at trade shows, salesperson samples, and property in transit. Several coverage options available to food processors and other manufacturers include protection for product recall expenses and product adulteration and contamination.

Workers Compensation

If you have employees of any kind (full time, part time or seasonal) you are required by state law to obtain Workers Compensation insurance. This type of insurance provides benefits for on-the-job injury and may include the following:

- Medical treatment
- Physical therapy and/or job re-training
- Wage reimbursement for lost time
- Disability settlements
- Survivors' benefits

Annual cost is based on the wages paid for each applicable employee job classification. Job classifications are based on the tasks your employees perform.

Commercial Auto

If your business is a Corporation or LLC and you purchase company cars, you will need to insure them on a commercial auto policy. If you rent vehicles or have employees using personal vehicles for company purposes, consider hired auto liability and employers non-owned auto liability insurance.

When purchasing a commercial auto policy, make sure to list all potential drivers. This frees you to choose any of your employees as drivers, at any time.

Umbrella

An umbrella policy can provide an additional layer of coverage over all other liability policies (General Liability, Product Liability, Workers Compensation and Commercial Auto) in the event of a major incident or large legal award.

Choosing an Insurance Agent

Choosing an insurance agent is as important as choosing an insurance policy. A good agent will have good communication skills, a thorough knowledge of the industry, and provide maximum services at reasonable prices. Most insurance agents are chosen based on referrals from: bankers, accountants, other businesses, trade organizations. Contact people in these categories when looking for an agent. They will be happy to get you started.

Conclusion

Since food is a high-risk product, all food entrepreneurs should carry product liability insurance to protect themselves and their personal assets prior to providing samples to prospective clients. Although many risks are out of your control, you can be held responsible for damages resulting from mishandling and other errors at any step in the process from farm to table. Product Liability insurance provides the minimum protection. Additional coverage can and should be added at appropriate stages of your business development in consultation with your insurance agent.

References

Wold, Cameron, Helen Sumner, Marilyn Schlake. NxLeveL™ "Tilling the Soil of Opportunity." 1st Edition. J. Philips Gottswols. 1999.

United States Small Business Administration

The U.S. Small Business Administration (SBA) has many programs to fit the variety of needs of start-up and expanding businesses.

General Requirements for Securing a SBA Loan

1. Good personal credit history is important but not essential; blemishes may make it more difficult to qualify.
2. File personal and business tax returns. The SBA will not approve loans for individuals with unpaid taxes.
3. Collateral (lack of collateral does not mean that you cannot secure a business loan.)
4. You must be willing to personally guarantee 20% of the business loan.
5. You must have a **business plan** that includes financial statements, projected income, and expenditures.
6. You will be required to invest anywhere from 10-30% of your own personal money into the business.
7. Business experience or entrepreneurial business training.

Loan Programs

The Small Business Loan Pre-qualification Program

Designed to help all small businesses, especially for armed forces veterans, borrowers in designated geographic areas, exporters, minorities, rural businesses, selected industries and women. This program helps a business prepare the loan pre-qualification application, the approval of which results in an SBA-guaranty commitment letter. This letter speeds lender consideration of the loan and allows for a maximum SBA guaranty of 85 percent for loans up to \$150,000, and 75 percent for loans above \$50,000.

Interest rates: rates are negotiable, tied to the prime rate, and can be either fixed or variable but may not exceed SBA maximums.

Collateral: to secure the loan, the borrower must pledge available assets; loans are not declined when inadequate collateral is the only unfavorable factor. Personal guaranties of the principals are required.

Eligibility: eligibility generally requires that: the purpose of the loan is to start or expand a business; an existing business has average annual sales for the preceding three years not exceeding \$5 million and employs no more than 100 people, including affiliates; the business and the owners have good credit; and the business owners are of good character.

7(A) Loan Guaranty Program

The 7(a) Loan Guaranty Program provides loans to small businesses unable to secure financing on reasonable terms through normal lending channels.

SBA LowDoc Loan Program

The New SBA LowDoc further streamlines the business loan process, increases the maximum loan amount to \$150,000, and calls for a response from the SBA within 36 hours of receiving a complete application.

SBA Express

Maximum \$150,000 loan, response time is 36 hours. However, this program allows the lenders to use their own forms and processes to approve loans guaranteed by the SBA.

Certified Development Company (504) Loan Program

Provides growing businesses with long-term, fixed-rate financing for major fixed assets such as land and buildings. The maximum SBA debenture is generally \$1 million. The program is designed to enable small businesses to create and retain jobs; the CDC's portfolio must create or retain one job for every \$35,000 provided by the SBA.

International Trade Loans

For businesses preparing to engage in or currently engaging in international trade, or are adversely effected by competition from imports.

The Export Working Capital (EWCP)

Program provides short-term working capital to exporters. A letter of pre-qualification is also available.

Microloan Program

Makes funds available to nonprofit intermediaries, who in turn make loans to eligible borrowers in amounts from under \$100 to a maximum of \$35,000. The intermediary usually processes completed applications.

SBA Affiliates

BICs - Business Information Centers provide business counselors, reference material and computer software to assist with all aspects of starting or expanding a business.

TBICs - Tribal Business Information Centers provide free, on-site use of an extensive reference library of computer software, business and industry publications, current management video tapes, free and confidential business counseling, and free and low-cost training.

OSCSs - One Stop Capital Shop is a partnership between SBA and a local community designed to offer small business assistance from an easy to access, retail site, and all under one roof. Located in a distressed area, and generally targeting under-served communities or SBA's new markets.

SCORE - Free counseling, advice, and information on starting a business through the *Service Corps of Retired Executives*.

SBDCs - Free consulting services through the network of district *Small Business Development Centers*. SBDCs also conduct training events throughout the district - some require a nominal registration fee.

USEACs - U.S. Export Assistance Centers.

WBCs - Women's Business Center's goal is to provide the information and expertise necessary to plan for economic independence through business ownership.

MED-Minority Enterprise Development Through its business development program known as the 8(a) Business Development Program, the SBA assists small businesses owned and controlled by socially and economically disadvantaged individuals.

For more information and the office SBA office nearest to you, look under "U.S. Government" in your telephone directory, or contact:

SBA Answer Desk: 1-800-U-ASK-SBA

Fax: 202-205-7064

TDD: 704-344-6640

Regulatory fairness: 1-800-REG-FAIR

Internet Home page: <http://www.sba.gov>

U.S. Business Advisor:

<http://www.business.gov>

US Small Business Administration Northeast District Offices

Connecticut

Connecticut District Office
330 Main Street, 2nd Floor
Hartford, CT 06106
(860) 240-4700 Phone
(860) 240-4659 Fax

Massachusetts

Massachusetts District Office
10 Causeway Street, Room 265
Boston, MA 02222-1093
(617) 565-5590 Phone
(617) 565-5598 Fax

New Hampshire

New Hampshire District Office
JC Cleveland Federal Building
55 Pleasant Street, Suite 3101
Concord, NH 03301
(603) 225-1400 Phone
(603) 225-1409 Fax

Maine

Maine District Office
Edmund S. Muskie Federal
Building, Rm 512
68 Seawall Street
Augusta, Maine 04330
(207) 622-8274 Phone
(207) 622-8277 Fax

Vermont

Vermont District Office
87 State Street, Room 205
PO Box 605
Montpelier, Vermont 05601
(802) 828-4422 Phone
(802) 828-4485 Fax

Rhode Island

Rhode Island District Office
380 Westminster Mall, Room 511
Providence, RI 02903
(401) 528-4562 Phone
(401) 528-4539 Fax

New York

New York District Office
26 Federal Plaza, Suite 3100
New York, NY 10278
(212) 264-4354

Syracuse District Office
401 S. Salina Street 5th Floor
Syracuse, New York 13202
(315) 471-9393 Phone |
(315) 471-9288 Fax

Buffalo District Office
111 West Huron Street, Suite 1311
Buffalo, New York 14202
(716) 551-4301 Phone
(716) 551-4418 Fax

Financial Resources for Small Businesses

Micro Loan Funds - Developed to assist micro-enterprises with financing for start-up and small business expansion at market rates for loans ranging from \$100 - \$25,000. Micro loan funds are administered with local community, state, or federal money. Some private and non-profit economic development organizations have micro loans funds.

Contact: Look in the yellow pages under economic development for a local agency. The SBA (www.sba.gov/financing) offers a Micro Loan Fund through its local service centers. Search the web for private loan funds using key words; micro loan.

USDA Rural Development Fund - Established to enhance the quality of life for rural residents by providing financial and technical assistance in obtaining homes, jobs, and essential community facilities.

Business and Industry (B&I) Guarantee Loan Program - helps create jobs and stimulate rural economies by providing financial backing for rural businesses. It guarantees up to 80% of a loan made by commercial lenders for working capital, machinery and equipment, buildings and real estate, and certain types of debt refinancing.

Business and Industry Direct Loans - provides loans to public entities and private parties who cannot obtain credit from other sources. Loans can be for improving, developing, or financing business and industry, creating jobs, and improving the economic and environmental climate of rural communities (including pollution abatement).

Eligible applicants - any legally organized entity, including cooperatives, corporations, partnerships, trusts or other profit or nonprofit entities, Indian tribes or federally recognized tribal groups, municipalities, counties, any other political subdivision of a State, or individuals.

Detailed information and applications - available through State and local offices of USDA Rural Development.

Small Business Investment Corporation (SBIC) Leverages private money with Federal dollars for venture funds. Debt and equity investments in established companies for buyouts, IPO's, strategic partnerships, or bridge loans.

Special Small Business Investment Corporation Funding (SSBIC) Funding socially or economically disadvantaged entrepreneurs, under the SBIC guidelines.

Venture Capital (Private investors or “angel” investors) A source of equity for start-up provided by professionals who invest in young, rapidly growing companies with the potential to develop into significant businesses. Venture capitalists also purchase equity securities and assist in the development of new products and services. Professionally managed venture capital firms are usually private partnerships or closely held corporations funded by private and public pension funds, endowment funds, foundations, corporations, wealthy individuals, foreign investors, and the venture capitalists themselves. Generally, they participate actively in the business because

they take higher risks with the expectation of higher rewards - up to 40-50% of profits. An investor looks at a company's technical and business merits, revenue track record and growth potential. Businesses just getting started that haven't received initial investments (friends, family, etc) will not qualify for investment funding.

The Rural Venture Capital Demonstration Program designates community development venture capital organizations as demonstration programs to attract increased investment in private business enterprises in rural areas. Such organizations establish a rural business private investment pool to make equity investments in rural private business enterprises. To search for venture capitalist backing from large corporations, local business firms, and government programs, and for more information about selecting a type of capital, visit the internet site: www.BusinessFinance.com.

Sustainable Agricultural Research and Education Program (SARE) Federal competitive grants program that provides funding for research, demonstration, education and extension projects carried out by scientists, producers, educators and private sector representatives. For information on producer grants in the Northeast Region call 802-656-0487 or visit www.sare.org

New York Farm Viability Institute is an independent and incorporated nonprofit organization led by agricultural producers and dedicated to assisting farms of different sizes, sectors, production practices and location in New York State. The Institute works to foster a vibrant agriculture business sector in New York by supporting applied research, outreach education, information transfer, adoption of technology, business planning and market analysis. NYFVI promotes practical solutions to challenges facing New York's farms. The Institute offers a multi-million dollar grant program for farm-based research and education outreach that result in farm-level increases in profit, reductions in cost, job growth, farmland retention and adoption of technology. Funded projects must measure and report on the impact the work produces on each farm. Project results are shared with the agricultural community to help others in making decisions about change on their farms. To prioritize challenges and opportunities to consider in making funding decisions, the Institute seeks input from farmers, farm organizations, educators, researchers and others in the public and private sectors. Visit www.nyfvi.org

New York State Department of Agriculture and Markets.
www.agmkt.state.ny.us

Facility Registration and Record Keeping Requirements Under the Bioterrorism Act of 2002

Since December 12, 2003, nearly all food processing facilities must submit form 3537 to the FDA to register under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. See <http://www.cfsan.fda.gov/~tcjm/ffregui3.html#b> for questions and answers on who needs to register and www.fda.gov/furls to register on line or <http://www.cfsan.fda.gov/~furls/frm3537.pdf> to download form for registration by mail or fax.

The FDA is now phasing in the new record keeping requirements that are specified in the Bioterrorism Act of 2002, which is designed to enhance the security of the U.S. food supply. According to Lester M. Crawford, FDA Commissioner “These records will be crucial for FDA to deal effectively with food related emergencies”. Most manufacturers, processors, packers, transporters, distributors, receivers, holders and importers of food in the US are subject to these record requirements. For a complete explanation of who is subject to the record keeping requirements, please check the FDA website, <http://www.fda.gov/oc/bioterrorism/bioact.html> for the complete text of the rule and other helpful information.

The requirements of the rule state that manufacturers, etc. must keep records that identify the immediate previous source of all food and ingredients received by their facility and the immediate recipient of the products produced by the manufacturer and sold to a retailer or distributor. Products sold directly to an end-user (consumer) are exempt from the requirement. The records must be available to the FDA as soon as possible after their request, but not longer than 24 hours. FDA inspectors requesting these records must have a reasonable belief that an article of food is adulterated or is a serious threat to public health. Records, in either paper or electronic format, should be kept on premises or at a reasonably accessible location and must be kept by the manufacturer for 6 month to 2 years, depending on the shelf stability of the food product.

The rule is being phased over the next 15 months. Large businesses (over 500 employees) must have their system in place by December 9, 2005. Small businesses (more than 10 FTEs* but fewer than 500 FTEs) must comply by June 9, 2006 and very small businesses (fewer than 10 FTEs) must comply by December 11, 2006.

The FDA may bring civil action or seek criminal prosecution for businesses that fail to establish and keep the required records.

When establishing your record sheets, don’t forget to include lot codes for both incoming ingredients and out going products as well as dates for received and manufactured products.

* FTEs = Full time employee or equivalent. See FDA website for explanation.
<http://www.fda.gov/oc/bioterrorism/bioact.html>

III

Food Safety & Sanitation

What pH is and How It is Measured

I. Acidity and pH

Acidity plays a primary role in food preservation. In conjunction with such factors as thermal processing, water activity, and chemical preservatives, acidity inhibits food deterioration and spoilage. Because acidity is so important to food preservation, food processors have a vested interest in measuring and maintaining a specified acidity in their products. The measure of the degree of acidity of a sample is called pH.

In technical terms, pH is a measure of hydrogen ion (H^+) concentration in a sample: the greater the H^+ concentration, the more acidic the product. Mathematicians and scientists have developed a scale of pH values (Figure 1) to facilitate pH measurement. Note that the pH scale is inverse; the higher the acidity of a food, the lower the pH. Technically, any product with a pH below 7 is acid to some extent. However, the preservative properties of acidity are most useful at a pH of 4.6 or lower. A higher pH allows microorganisms to grow, especially a bacterium called *Clostridium botulinum*, which produces a lethal toxin causing botulism.

Food products fall into one of three pH classifications:

- Acid Foods: products with a natural pH of 4.6 or below. Ex. tomatoes, citrus fruits, rhubarb, peaches, apples, grapes, cherries, plums.
- Low-acid Foods: foods (other than alcoholic beverages) with a pH between 4.6 and 7.0. (Ex. most vegetables, meat, milk, some tropical fruits, fish, eggs.) Low-acid does not refer to acid foods with a low pH. Low-acid refers to a lower acid concentration than that of acid foods. Because pH scale is inverse, the pH of low-acid foods is higher than that of acid foods.
- Acidified Foods: low-acid foods that have their pH lowered to 4.6 or less by the addition of acids or acid foods. (Ex. pickles.) Food processors manufacturing acidified foods must complete the Better Process Control School, a program offered nationwide throughout the year.

A product pH is taken on a finished product to determine the regulatory category to which the product belongs. It is important to measure the equilibrium pH, that is, the pH of the finished product when the pH values for the individual ingredients are all the same.

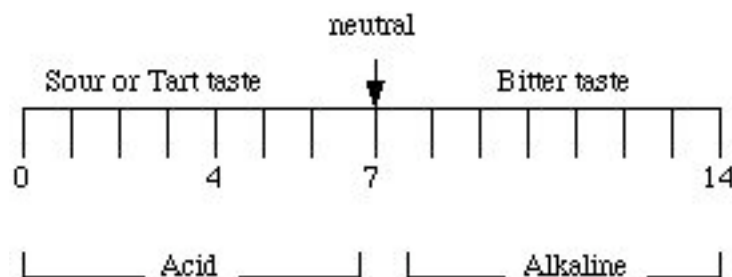


Figure 1. The pH scale

2. *Methods for Measuring pH*

The pH of a product can be measured in one of three ways:

- a. Colorimetric Estimation: the use of indicator papers or solutions to detect pH.
- b. Paper is dipped in the sample and changes color immediately. The color is compared to standards, which come with the pH paper.
- c. Solution is added to a product sample. The color changes immediately. The pH is estimated based on color standards.

Section 114.90 of the Code of Federal Regulations states that the colorimetric method may be used only if the pH is below 4.0. Because the colorimetric method is not very accurate, use of a pH meter is highly recommended.

- **Titrateable Acidity:** Titrateable acidity is *not the same* as pH. Titrateable acidity measures both bound and free hydrogen ions in a solution. pH measures only free hydrogen ion (H^+) concentration. Titrateable acidity is an indication that the pH of a product is no higher than some maximum value. Since it is not a specific pH indicator, the Code of Federal Regulations states that titrateable acidity may be used for process control only if the product has an equilibrium pH of 4.0 or lower.

Because the titrateable acidity of a product is a function of ingredient acidity and use, the relationship between titrateable acidity and pH is product-specific. The relationship can only be determined through product testing and handling. An established relationship between the titrateable acidity and pH of a product can be a useful way to detect an acidity problem in either the ingredients or final product. As such, titrateable acidity serves as an important indicator of product quality.

- **Potentiometric Method (pH meter):** This is the most common, most exact method of pH measurement. Measurement is based on the electrical potential difference between two electrodes, the reference electrode and the sensing electrode. pH meters measure this difference and convert it to a pH value between 0 and 14. Section III describes how to use a pH meter to take a product pH. Accuracy is important since the regulations require a meter capable of reading the pH value to two decimal places for all food products with a product pH above 4.0.

3. *Measuring Product pH*

This section describes how to take the pH of a sample using a pH meter. Refer to the following definitions and Figure 2 (important parts of a typical pH meter) for clarification. A **buffer** is a mixture that contains both a weak acid and a weak base. It is capable of absorbing additions of either strong acid or strong base with little change in pH. Since a buffer can maintain its pH, it acts as a reference for your pH meter. Buffers are required for pH meter calibration. An **electrode** is the part of the pH meter that, when immersed in the product sample, actually measures the pH (see Figure 3). Although some pH meters have two separate electrodes on two separate wires, most have both electrodes attached to one wire and housed within the same covering.

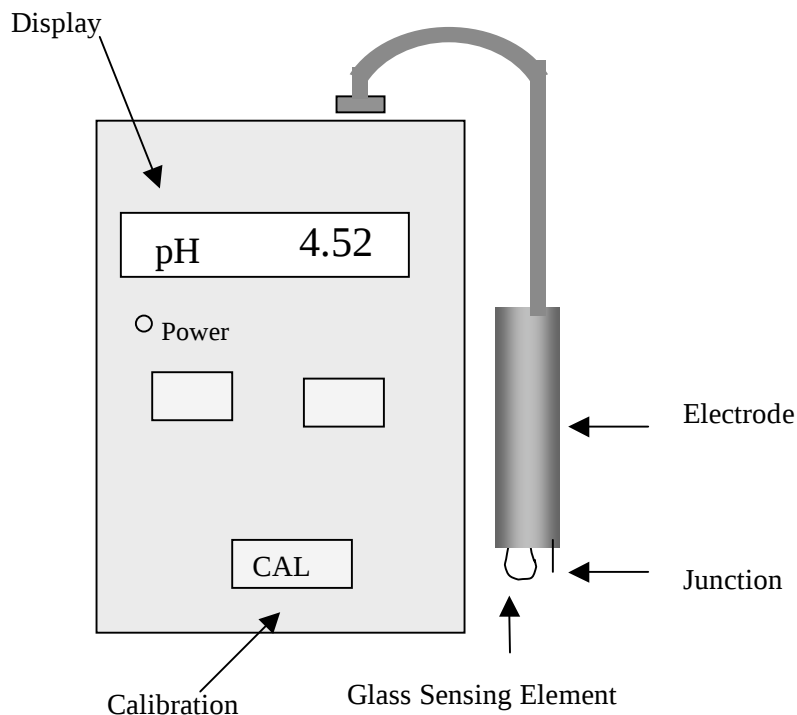


Figure 2: Important parts of a typical pH meter

4. Preparing the Sample

Liquid & Solid Component Mixtures (Ex. whole fruit in syrup, large pickles)

- Drain the contents of the container for 2 minutes on a U. S. standard no. 8 sieve inclined at a 17-20° angle. Record the weight of the liquid and solid portions. Retain each separately.
- Remove solids and blend to a uniform paste. Adjust the paste temperature to 77°F and take the pH (see step 3.)
- Mix samples of the solid and liquid portions in the same percentage as the original sample and blend to uniform consistency. Adjust the temperature of the blend to 77°F and take the equilibrated pH (see step 3).

Marinated Oil Products (Ex. some sauces, marinades and dressings)

- Separate the oil from the solid product.
- Blend the solid in a blender to paste consistency.
- Adjust temperature of product to 77 °F and take the pH (see step 3).

Semisolid Products (Ex. pudding)

- Blend product to a uniform paste.
- Adjust the temperature of the sample to 77°F and take the pH (see step 3).

Special Product Mixtures (Ex. antipasto)

- Pour off oil. Blend remaining product to a paste.
- Adjust the temperature to 77°F and take the pH (see step 3).

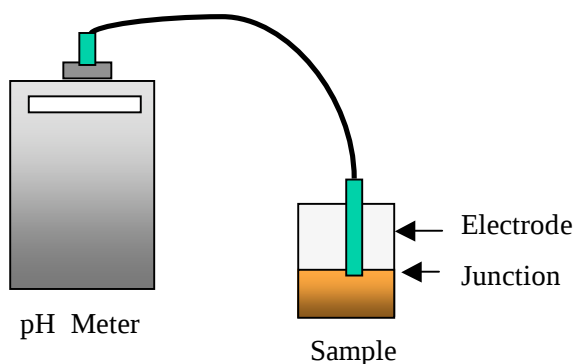
5. Calibration

- Follow the directions that came with your pH meter. Be sure to have the required buffers on hand to calibrate the reference electrode.
- Calibration should be done at least once a day.
 - a. If the product must have an equilibrated pH near 4.6, calibrate after each sample.
 - b. If samples contain grease or oil that could coat the electrodes, calibrate every 2 to 3 samples.
- Temperature will effect the pH reading. Recalibrate if the temperature of the product and/or room change. Take the product pH at the temperature used for calibration.

6. Taking the pH Measurement

- Thoroughly rinse the electrode(s) with distilled water – use a squirt bottle or some of the next sample. *Blot*, do not wipe, excess water off the electrode(s) with soft tissue paper.
- Place the rinsed electrode into the sample, deep enough so the reference electrode junction is immersed in the sample (see Figure 3).
- Wait for the pH reading to stabilize. This should take less than 1 minute. If it takes longer, your electrodes may be clogged with fats or proteins from previous samples. Follow manufacturer instructions for cleaning your electrodes.
- Once the reading has stabilized, record the pH.

Figure 3. Setup for taking a pH measurement.



7. Record Keeping

For Shelf-stable acid or acidified products it is important to keep records of pH and pasteurization time temperature measurements. Records must be kept for each lot (batch) of product produced. Keep records in ink for at least 3 years.

References

Code of Federal Regulations. Title 21 part 114. Office of the Federal Register, National Archives and Records Administration. 2000.

Fleming, Henry P. and Ralph N. Costilow. Acidified Foods: Principles of Handling and Preservation. 2nd Edition. Pickle Packers International, Inc. 1997.

Water Activity: Another Critical Factor for Safety of Food Products

Randy Worobo and Olga Padilla-Zakour

If you read the federal or state regulations regarding microbial food safety, two values are always mentioned: pH and water activity. The pH of a food is a measurement of its acidity in terms of the concentration of acid ions (hydrogen ions) with 4.6 being the limit to define acid and low acid foods. Therefore, any food with a pH below or equal to 4.6 is acid and any food with a pH above 4.6 is classified as low acid.

The second value is water activity, a term most people are not familiar with, which refers to the water in a food that is available for microbial growth. Water activity also effects chemical and enzymatic reactions but these effects will not be covered in this article. Based on regulations, if a food has a value of 0.85 or below, is classified as non-hazardous, because there is not enough free water to allow the growth of pathogens. We will discuss what water activity is, how it is measured, how it relates to microorganisms and the applications of this concept in food manufacturing.

Water Activity vs. Moisture Content

The value of Water Activity is different than the moisture content (% water) in a food product. The moisture content is the total moisture, that is, the amount of bound plus free water present in the sample. Water Activity is specific, it provides a measurement of the free moisture and is usually expressed as a_w or percentage Equilibrium Relative Humidity (%ERH). To perform the measurement, a sample of the food product is put in a small container, then the container is placed inside a chamber that seals the sample from the outside environment. A sensor inside the chamber measures the relative humidity of the air above the food. After a period of time this relative humidity measurement remains constant due to the establishment of equilibrium between the air and the food. This final reading is then called % ERH if it is expressed on percentages (0 to 100%) or Water Activity if it is expressed as values between 0 and 1.0.

The laboratory determinations of water activity used to take hours to reach equilibrium. With modern technology, the measurement of water activity is simple, accurate and fast. Readings can be obtained in minutes in most cases and in less than one hour for difficult samples. Meters that produce accurate readings are currently priced between \$ 2,000 and \$ 6,000 depending on the model and manufacturer.

Water Activity and Preservation

Microorganisms like humans require water for growth and reproduction. Water acts as an essential solvent that is needed for most biochemical reactions in living organisms. The lack of water prevents the microorganisms from growing but it does not necessarily accelerate the death of microorganisms. An excellent example of this is bakers yeast. The yeast is purchased in a dried form and once water and a small amount of growth substrate (sugar) are supplied, the yeast begins to grow. The fact that microorganisms are unable to grow at low water activities can be used as a form of food preservation.

Water activity (a_w) is an index of the water that is available for utilization by microorganisms. Pure distilled water has a water activity of 1.0. Solutes (salt, sugar) that are dissolved or solids that absorb water can reduce the amount of available water. Salting was one of the early methods of preserving foods and is still used today. By adding high concentrations of salt, the a_w is lowered sufficiently to prevent the growth of most microorganisms. In a similar manner sugar is used to produce food products such as candied fruits, jams and jellies that are no longer susceptible to spoilage by bacteria and by most yeasts and molds. Perhaps the most common method of food preservation is by not binding up the available water but by removing it through drying. Dried and dehydrated foods include meats, seafood, vegetables, spices, fruits, pasta, bakery and dairy products. The final moisture content and water activity of each dehydrated product will depend on the characteristics of the food, the distribution and storage temperature, the packaging conditions and expected shelf-life. In general, most dried products will have a final water activity below 0.8. For meat products, the USDA regulations require a minimum holding temperature during dehydration to be 145°F. The elevated dehydration temperature not only assists in the drying process but also prevents the growth of pathogens and most spoilage organisms. In some cases, the dehydrated food will be reconstituted, as in dried milk or vegetables while in others, the products will be consumed in the dried form as for beef jerky or croutons. The dried and dehydrated products must be kept in an environment with a relative humidity lower than the equilibrium relative humidity of the product ($a_w \times 100\%$). If the dried foods are exposed to higher relative humidity environments, the products will take on the water and their a_w will increase. This increased a_w may now be of concern for growth of spoilage organisms or pathogens. Therefore, proper packaging of dried or water activity controlled products is essential for safety and quality. Airtight containers such as glass jars, cans or sealed pouches, will prevent moisture exchange with the environment. Most plastic bags will provide good protection against moisture changes, as long as the bags are not punctured or open.

The level of water activity reduction to render your food safe from spoilage and potential pathogens depends on your food and what microorganisms are of concern. In general, most bacteria are inhibited at a_w of 0.85. This includes food pathogens as well as spoilage bacteria. Yeasts and molds are more tolerant to lower water activities and require a a_w of 0.60 to ensure food preservation. This is why bread spoils due to mold growth and not bacterial growth. The pH is another critical factor for microbial growth. If the minimum pH and a_w for specific microorganisms are known, it is possible to design or adjust food products to control pathogens and extend the shelf life. Table 1. summarizes critical values of a_w and pH to support microbial growth.

If a pH and water activity of food products is known or measured, then it is possible to study processing and packaging alternatives, and formulation changes to render a safe, quality product. Table 2 below shows examples of foods with typical water activities.

Table 1. a_w and pH values critical for microbial growth.

Minimum a_w	Minimum pH	Microorganism
1.00	-	<i>Caulobacter</i>
0.985	5.3	<i>Campylobacter jejuni</i>
0.97	5.0	<i>Listeria monocytogenes</i>
0.96	5.0	<i>Clostridium botulinum</i> (non-proteolytic)
0.95	5.0	<i>Pseudomonas</i> species
0.95	4.6	<i>Yersinia enterocolitica</i>
0.95	4.4	<i>Eschericia coli</i>
0.95	4.0	<i>Salmonella</i> species
0.95	3 to 3.5	<i>Lactobacillus</i> species
0.93	5.0	<i>Clostridium perfringens</i>
0.93	4.6	<i>Clostridium botulinum</i> (proteolytic)
0.91	4.9	<i>Bacillus cereus</i>
0.86	4.0	<i>Staphylococcus aureus</i>
0.8 to 0.6	<2.0	Many yeasts and molds

Table 2. Typical water activities for various foods and food products.

Water Activity	Foods
1.00 to 0.95	Fresh meat, fruit, vegetables, canned fruit in syrup, canned vegetables in brine, frankfurters, liver sausage, margarine, butter, low-salt bacon
0.95 to 0.90	Processed cheese, bakery goods, high moisture prunes, raw ham, dry sausage, high-salt bacon, orange juice concentrate
0.90 to 0.80	Aged cheddar cheese, sweetened condensed milk, Hungarian salami, jams, candied peel, margarine
0.80 to 0.70	Molasses, soft dried figs, heavily salted fish
0.70 to 0.60	Parmesan cheese, dried fruit, corn syrup, licorice
0.60 to 0.50	Chocolate, confectionery, honey, noodles
0.40	Dried egg, cocoa
0.30	Dried potato flakes, potato crisps, crackers, cake mixes, pecan halves, peanut butter
0.20	Dried milk, dried vegetables, chopped walnuts

References

- Marsili, R. 1993. Water activity: why it's important and how to measure it. Food Product Design, December issue
- Rotronic Instrument Corporation. Technical flyer
- Troller, J.A. and Christian, J.H.B. 1978. Water activity and food. Academic Press, Inc., New York.

Guide to Scheduled Process Development

A scheduled process is a detailed procedure for a single product issued by a recognized Process Authority that includes formulation, critical control points, processing steps, and storage, distribution, selling conditions/restrictions.

A Process Authority, based on regulations, is a person or institution with the expert knowledge and experience to make determinations about the safety of a food process and formulation. A Process Authority must maintain product confidentiality.

Importance of a Scheduled Processes:

- New York State Department of Agriculture and Markets **requires** it for most products. The other states in the NECFE region are moving in a similar direction.
- FDA requires it for acidified (pickled) products that do not need refrigeration.
- The development process forces a critical study of your operations leading to the discovery of potential safety concerns:
 - Unmet regulatory requirements
 - Changes in recipe, processing, or production that could effect product safety and quality
 - Critical steps which are not being verified or documented
 - During the approval process, a recognized Process Authority reviews your procedure and makes suggestions for improvement if necessary.
 - It provides a basis for required safety documentation.

Writing a Scheduled Process:

Every Scheduled Process must:

- Descriptively identify the type of product (condiment, pet food, beverage, etc.)
- List the exact formulation of the product: itemized ingredient list with weights (grams, ounces, pounds, etc. NOT tablespoons, teaspoons, cups, etc.)
- Give precise directions for the process; the reader should be able to follow a comprehensive step-by-step process (Try drawing a flow chart of your procedure and take the steps from that.)
- Include your name, address and phone numbers, fax, e-mail address
- State the date on which the document was developed.
- Provide results from required lab analyses (see page 9)
- Identify packaging to be used (type and size of container, container material, etc.)
- State if product is to be sold refrigerated, frozen or shelf-stable
- Each product produced must have a unique scheduled process.
- You must follow the approved schedule as written and maintain appropriate records of critical control points such as pH, temperature, etc. for every batch of product made.

Amendments:

You should review the scheduled process for each product periodically to determine if changes are necessary or have crept into your process due to consumer demand, ingredient problems or changes in processing equipment. These changes must be filed as an amendment to an existing scheduled process. If the changes are significant, you may need a new scheduled process.

Hazard Analysis Critical Control Point System (HACCP)

Hazard Analysis Critical Control Point (HACCP) plans are a systematic approach to the production of food products based on the principles of food safety. Unlike analyses of food products that evaluate the microbial safety of the food after it has been produced, HACCP systems are a pro-active approach to food safety. Potential problems are identified before production begins, enabling effective and efficient monitoring during production to ensure that the problems have not occurred. The practice of identifying and observing potential areas of concern allows a company to *recognize and correct* food safety issues in real time. While the primary concern of HACCP principles is the production of microbiologically safe food products, the application of hazard analysis and control concepts can also increase food quality.

The principles of HACCP were originally developed in the early 1970's by individuals working at the Pillsbury Company, NASA and the US Army Research Laboratory, as a means of supplying microbiologically safe foods for astronauts during space flight. Since then the principles of HACCP have been refined and adopted by a number of food industries. To date, the principles of HACCP are required by the US Government for use in the seafood industry, the meat and poultry inspection service and in those plants producing meat and poultry products. While not specifically mandated in the dairy industry, a pilot plan is presently in place to evaluate its value in this specific environment. In addition, there is increasing discussion about requiring the use of HACCP plans in other food sectors, especially fresh and processed produce. Other food processors are utilizing the principles of HACCP not only as an aid to assure food safety, but also at the request of those companies with which they do business. Since HACCP is here to stay, an understanding of HACCP concept and principles should be incorporated into your product development.

HACCP is based on seven principles. These principles are:

- 1) conduct a hazard analysis of the food product.
- 2) identify critical control points within the process.
- 3) set limits for the critical control point(s).
- 4) establish how the critical control point(s) will be monitored.
- 5) determine corrective actions that will be taken in the case of limit failure.
- 6) establish means of verifying the system is in compliance.
- 7) establish record keeping for the system.

Principle 1: Hazard Analysis

The first principle in developing a HACCP plan involves a hazard analysis of the product from the delivery of raw ingredients to the consumer's plate. A hazard analysis team should be formed consisting of, at a minimum: management, personnel who are familiar with the handling of the ingredients, personnel who are familiar with the sales and distribution of the product, and personnel responsible for the cleaning/sanitation of the processing plant.

Once the HACCP team has been established, a fact sheet should be developed which describes the product being evaluated. This sheet includes the company name, the HACCP Category under which the food falls, a description of the product, the packaging size(s), the

temperature requirements for storage, distribution and display of the product and finally, the intended customer base. The information gathered here will aid the HACCP team in identifying the hazards associated with the production process.

The next step of the hazard analysis is to develop a flow chart of food production. Each unit process is noted in the flow chart. Arrows may be used to show the order in which production steps occur. Once the flow diagram has been developed, the potential hazard(s) associated with each step are identified and evaluated. This evaluation includes justification of each potential hazard and identification of steps that will be taken to control the hazard.

Principle 2: Identification of critical control points

Critical control points are different from control points in that failure to be within a set limit at these points may result in an unsafe product. If there is no process further downstream that will eliminate a potential hazard, then the point at which it can last be removed is the critical control point for that hazard. Typical critical control points include cooking time/temperature parameters, cooling time/temperature parameters, proper acidity (pH) and water activity.

Principle 3: Setting Acceptable Critical Control Point Limits

The third principle is to establish acceptable limits for each of the identified critical control points. The critical limits should be established in conjunction with a processing authority and should be based on scientifically valid data.

Principle 4: Establishing Monitoring Methods

The fourth principle establishes the exact methods for monitoring critical control point(s). This step should include what will be evaluated but also how it will be evaluated, how often it will be evaluated and who will evaluate the step. It is important to note that, in order to comply with regulations, you must follow your monitoring process as you establish it in the HACCP plan.

Principle 5: Determining Corrective Actions

The fifth principle is to determine corrective actions that will be taken in the case of limit failure. The process you will use in the event that a critical limit has been breached should be spelled out as specifically as possible in this section. Pre-determination of corrective actions is important, since your response will be essential to bringing the process back into control. Your corrective actions will also be critical to any evaluation of the effected product for safety conducted by a process authority.

Principle 6: Record Keeping

Principle 6 includes establishing proper record keeping for the system. The record keeping system is required to establish that the food product has been produced under controlled conditions. Any and all data required for the monitoring outlined in Principle 4 must be recorded and maintained. The records should include the data obtained at all critical control points, data routinely collected at non-critical points in the process and, in those cases when a corrective action was required, the form of the corrective action taken. The type of product being produced dictates the period of time for which records must be maintained and/or accessible.

Principle 7: System Verification

The final principle of HACCP is to establish a means of verifying that the system is in compliance. The verification step should include a calibration schedule for monitoring devices and procedure for confirming that individual(s) responsible for monitoring have been performing and recording the monitoring activities at the designated points. Establishing a verification system is the final chance to insure that the process is under control and is being monitored as outlined.

Once a written HACCP plan is instituted, the processing procedures must be followed as written. It is important to note that HACCP plans are not etched in stone, never to be changed. On the contrary, HACCP plans are a living, changing system that can, and should, evolve as the business evolves. If a change in the process occurs, the HACCP plan must be evaluated and revised by a recognized process authority to reflect the changes. Similarly, if changes in the established critical limits, monitoring or verification procedures occur, the HACCP plan must once again be updated and the new plan put into immediate effect. Most importantly, the HACCP plan being used must accurately reflect the realities of the processing procedure.

The specific requirements for each of the seven principles can be found in the Code of Federal Register, Part 417- Hazard Analysis and Critical Control Point (HACCP) Systems. In addition, the USDA/FSIS supplies a number of generic HACCP models and guides as well as other pertinent information. The following are contact points with which to start:

USDA/FSIS, HACCP Small Plant Coordination Office (202) 720-3219

USDA Meat and Poultry Hot line (800) 535-4555

FSIS Web site: www.fsis.usda.gov

FDA Web site: www.fda.org

For free copies of generic plans: (202) 690-0824

Six Areas of Sanitation & Their Relationship to the Requirements of the Food GMPS & PMO

For the most part, compliance with good manufacturing practices and sanitation requirements are the foundation for safe food production. The table that follows takes each of the six sanitation areas and relates them to specific citations in Food & Drug Administration's 21 Code of Federal Regulations Part 110, Good Manufacturing Practice (GMP) regulations and the Pasteurized Milk Ordinance (PMO). Additional guidance on GMPs and requirements for the sanitary production and storage of food products can be found in FDA's "CURRENT GOOD MANUFACTURING PRACTICE IN MANUFACTURING, PACKING, OR HOLDING HUMAN FOODS" 21 CFR Part 110, and in the FDA "Pasteurized Milk Ordinance (PMO)"

Six Areas of Sanitation (SSOP's)	Description	Code of Federal Regulations Reference	PMO reference (Section 7 unless noted otherwise)
1. Safety of Process Water	Water must be safe and of adequate sanitary quality when used for: processing, washing, rinsing, conveying product, ice manufacturing.	110.37(a); 110.80(a)(1)&(b)(16)	7p (water supply), Appendix D (Standards for Water Sources)
	No cross connections between sewer or wastewater, and process water	110.37(b)(5)	
2. Condition and cleanliness of food contact surfaces	Food contact surfaces must be designed, fabricated, maintained, and installed to be able to withstand the environment in which they are used and the action of appropriate cleaning compounds. Surfaces must have smoothly bonded seams.	110.40(a)&(b)	10p (sanitary piping), 11p (Construction and repair of containers and equipment)
	Clean and sanitize surfaces before use, after interruptions, and as necessary in order to protect against the introduction of microorganisms.	110.35(d)(2); .80(b)(1) & (b)(10) & (b)13(ii):	12p (Cleaning and sanitizing of containers and equipment)
	Gloves should be impermeable, clean, and sanitary; outer garments suitable to the job preformed.	110.10(b)(1)&(5)	
3. Prevention of Cross Contamination	Food handlers must: maintain adequate personal cleanliness; wash, and sanitize hands whenever they become contaminated; follow effective measures to prevent finished product contamination by raw materials, other ingredients, or refuse; remove jewelry that cannot be sanitized;	110.10(b)&(b)(2)&(b)(3) & (b)(4)&(b)(7)& (b)(8) &(b)(9); 110.80(b)(6)& (b)(13)(v)	15p(B) (cross connections)
	Abstain from eating, chewing gum, drinking, or using tobacco near exposed food or equipment; store clothing or personal items away from exposed food and equipment.		
	Plant design must reduce potential for contamination of food, food contact surfaces, and packaging material. Plant design must permit employees to protect against contamination of food from clothing or personal contact and facilitate separation of operations.	110.20(b)(1)&(2)&(4)	

	Hand washing sanitizing facilities must: be placed where good sanitary practice dictates their use; promote effective hand-cleaning and sanitizing preparations; have water at suitable temperature; have a sanitary towel service or suitable drying device designed to prevent recontamination.	110.37(e)&(e)(1) -(4)	
	The plant must have: an adequate sewage disposal system; adequate, readily accessible toilet facilities, maintained in sanitary condition; self-closing doors which do not open into areas where food is exposed to air, unless steps have been taken to protect food from airborne contamination.	110.37(c)&(d)	
4. Protection of food, food packaging material, and food contact surfaces from adulteration.	The following are designed to protect food from contamination: - holding methods for raw materials - handling methods for work-in-progress - equipment - mechanical steps - batters, breadings, sauces, dressings, etc. - filling, assembly, packaging and other operations - storage and transportation	110.40(a);110.80&(a)(5)&(a)(7)&(b)(5)&(b)(7)&(b)(10)&(b)(12)&(b)(13); 110.93	13p (storage of cleaned containers and equipment), 14p (storage of single service containers), 15p(A) (protection from contamination), 18p (bottling and packaging), 19p (capping), 21 (clean properly constructed vehicles)
	Food must have adequate physical protection from contaminants that may drip, drain, or be drawn into the food.	110.20(b)(4);.80(b)(10)&(b)(12) (iv)	
	• Pesticides may be used only when food, food contact surfaces, and packaging material protected from contamination. • Toxic cleaning compounds, sanitizing agents, and pesticides identified, held, and stored in a manner that protects food, food contact surfaces, and packaging material from contamination. • All relevant regulations for their use must be followed	110.35(b)(2)&(c)	
	Compressed air or other gases, which are mechanically introduced must be treated to prevent contamination of food.	110.40(g)	
5. Control of employee health conditions and hygiene that could result in microbiological contamination of food, food packaging material, and food contact surfaces.	A food handler who has an illness or open lesion, or other source of microbiological contamination that presents reasonable possibility of contamination of food, food contact surface, or packaging material, must be excluded from such operations.	110.10(a)	6p (toilet facilities), 8p (hand-washing facilities), 20p (personnel cleanliness) , Section 13 (Personnel Health), Section 14 (Procedure When Infection or High Risk of Infection is Discovered)
6. Exclusion of pests.	No pests shall be allowed in any area of a food plant	110.35(c)	3p (outer openings adequately protected against entrance of pests), 9p (no evidence of pests in milk plant), 22p (surroundings free of harborages)

From the U.S. Food and Drug Administration web site: <http://vm.cfsan.fda.gov/~comm/daissop.html>

Reduced Oxygen Packaging (ROP) of Foods

You probably have seen it advertised in the television commercials: vacuum packaging will extend the life of dried and refrigerated foods. You talk to a VP machine supplier who claims it will double the shelf life of your refrigerated product. But before buying the unit, you must understand the safety concerns, limitations, and regulations that cover this packaging option.

Definition of Reduced Oxygen Packaging (ROP)

Reduced Oxygen Packaging is any packaging procedure that results in a reduced oxygen level in a sealed package. This packaging option offers advantages such as extended shelf life but raises many microbiological concerns. A Hazard Analysis Critical Control Points (HACCP) approach is currently mandatory or recommended for this type of packaging depending on the kind of foods being processed.

Microbiological Hazard of ROP

A bacterium called *Clostridium botulinum* that produces a deadly toxin or poison (botulism) is the main microbial concern when using ROP. One reason for this concern is that as an anaerobe *C. botulinum* can grow in the absence of air or oxygen, something most other pathogens and spoilage organisms cannot do. Additionally, it is very resistant to heat because it produces spores. Some types can grow slowly under refrigerated temperatures but it grows better at room temperatures. It is present everywhere and therefore any food can be contaminated with it.

Clostridium botulinum can be controlled through the water activity and pH of the product. It cannot grow if the water activity is below 0.93 or if the product pH is lower than 4.6. Safety concerns and controls are discussed further in the safety sections below

Types of ROP

Vacuum Packaging reduces the amount of air from a package and is hermetically sealed, also includes vacuum skin packaging.

Controlled Atmosphere Packaging is an active system that continuously maintains the desired atmosphere within the package (agents that bind oxygen or compounds that emit a gas are incorporated in the package).

Modified Atmosphere Packaging is gas flushing and sealing or reduction of oxygen through respiration of produce or microbial action - one time modification of gaseous composition inside the package.

Sous Vide is the vacuum packaging of raw or partially cooked foods, followed by pasteurization to reduce the microbial load and rapid refrigeration/freezing -- reheating before consumption is required.

Cook-chill is a process that uses a plastic bag filled with hot cooked food from which air has been expelled and which is closed with a plastic or metal crimp (similar to hot-filled).

Benefits of ROP

- Anaerobic environment (no oxygen) that prevents the growth of aerobic spoilage organisms responsible for off-odors, slime, and texture changes.
- Reduces oxidation of foods, retards rancidity and color deterioration.
- Fresh-Never Frozen appeal for refrigerated products.

Safety Concerns

The extended shelf life offers the opportunity for pathogens to grow slowly over a longer period of time. Refrigeration is often used with ROP as a way to control microbial growth but required temperatures (below 41°F) are difficult to maintain during distribution and at retail stores and homes. The anaerobic conditions favor the growth of *Clostridium botulinum*, which is not detectable by sight or smell. If spoilage organisms are not growing to indicate the end of the shelf life, the food could appear acceptable even though pathogens are present. Pasteurization of ROP foods will not destroy the spores of *C. botulinum* and may actually make conditions prime for them by destroying competing spoilage organisms that normally limit their growth.

Safety Guidelines for ROP – Based On FDA 2005 Food Code

Use ROP for foods that do not support the growth of *C. botulinum* such as:

- Foods with a water activity below 0.91.
- Foods with a pH of 4.6 or less.
- USDA inspected and cured meat which has salt (brine concentration of 3.5% or more) and nitrates and nitrites (120 ppm of sodium nitrite)
- Frozen foods with the labeling statement “Important-Keep Frozen Until Use”
- Control Atmosphere Packaging that maintains enough oxygen to control the growth of *C. botulinum*

In addition, the following precautions should be implemented:

- Refrigerated ROP foods should have a maximum shelf-life of 14 days clearly marked on the label
- Refrigeration temperatures of 41°F or below should be maintained and indicated on the label - “Important -Must be kept refrigerated at 41°F (5°C) or below”
- Proper employee training
- Use of HACCP program
- Use of Multiple Barriers

Regulations for ROP

Current regulations specify the need for two barriers against *C. botulinum* and other pathogens for ROP foods. Acceptable barriers are:

- Refrigeration with “use by” date
- pH below 4.6
- Water activity below 0.91
- Use of oxygen permeable film
- Presence of high level of non-pathogenic competing microorganisms (raw meat, fermented cheeses containing live cultures)
- Freezing

General Regulations

The FDA and USDA have guidelines specified in the 2005 Food Code and most states have equal or similar requirements. In most cases a processor must file a petition to the Department of Agriculture and Markets or the Department of Health to produce ROP foods. In addition proper documentation must be kept. Contact these agencies directly for more information on regulations or contact the NECFE. A list of agencies, complete with contact information is available.

Food Allergy Awareness

Food allergies have the potential to negatively impact any food business regardless of size. This impact ranges from a nationwide recall of a food due to undeclared ingredients, to the tragic death of a consumer with resulting lawsuits and publicity. Since 2 to 2.5% of the US population have food allergies, close to 3 million of which are serious peanut or tree nut allergies, it makes sense to cultivate awareness for food allergen prevention in food production.

Food allergens, the proteins that cause allergic reactions, are part of HACCP. They fall under the heading of Chemical Hazards and should be addressed as such, regardless of business size. The control of food allergens in a food processing plant presents many challenges, but knowledge and awareness are the keys to success. All food producers can take steps to minimize these risks and produce a safe product by having an allergy prevention plan.

What is a Food Allergy?

There are many types of adverse reactions to components of food. A so-called “allergy” may in fact be a food intolerance. A true allergic reaction involves the body’s immune system and is a response to a “foreign” protein or **allergen**. Exposure to an allergen results in an allergic reaction. In addition to gastrointestinal and skin symptoms, anaphylaxis, the most severe reaction, may result in respiratory and circulatory symptoms leading to shock and death. The onset of an attack can occur within minutes. Avoidance of the offending food is the only safe course of action for many sufferers. Ingredient declarations on food labels are therefore vitally important.

Common Food Allergens

Almost 90% of all allergic reactions are caused by a small group of foods. These are peanuts, tree nuts (almonds, walnuts, hazelnuts, etc.), eggs, milk, soybeans, wheat, fish and shellfish. A single peanut can cause a fatal reaction for the severely allergic. Food allergy is the leading cause of anaphylaxis outside the hospital setting, causing an estimated 30,000 emergency room visits annually. It is also believed to be responsible for 100-200 deaths each year.

Since the proteins making up the structure of each food are entirely different, it is possible to substitute allergens with alternate ingredients. For instance, it is possible for a peanut-sensitive individual to safely eat tree nuts. However, since sharing processing equipment between product with a substitute and product with a potential food allergen creates contamination issues, a prevention plan is essential.

Allergen Prevention Program

The design and application of an Allergen Prevention Program (APP) is a practical way to control an allergen from inadvertently entering the product. An APP includes, but is not limited to the following steps. (Remember, regardless of your operation’s size, you can tailor these measures to fit your situation. Being small is no excuse to ignore this topic.)

- *Form an allergen prevention team in your company.* Since the plan should be facility, product and line specific, the team should be made up of employees close to the daily plant operations in addition to management. An individual with knowledge of food allergies may need to be consulted.
- *Allergen-clean system.* This is your first line of defense. The allergy prevention team must establish the definition of an allergy-clean system for each processing line. Checklists to document cleaning should be developed and followed. If equipment is very difficult to

clean, the processor should consider making only one product on this line, either allergen containing or allergen free.

- *Conduct a risk evaluation for your entire production system.* The allergen-prevention team should review the entire system to determine where the risk of product contamination by an allergen is high and develop strategies to manage the risk. Possible points for cross-contamination should be identified. Any later changes or modifications in the plant must be done in consultation with the allergy prevention team.

- *Create Allergen maps.* An allergen map is a flow chart(s) showing areas of possible cross-contamination in your process. A flow chart showing multiple lines may be necessary. Once points of potential cross-contamination have been identified, appropriate measures can be instituted.

- *Monitor ingredients with suppliers to verify absence of foreign material.* An allergen could enter the product stream through an ingredient, which not only contaminates the product, but also contaminates the entire processing system. The ingredient specification should include the statement that the ingredient being purchased is free of foreign material, including allergens not listed on the ingredient statement. Some food producers also conduct on-site audits of suppliers. If your company does contract work for another business, it is very possible you will be audited yourself for allergen awareness and will be required to have a written plan for your facility in order to be awarded the contract.

- *Design your system to prevent contamination.* For example, add peanuts last in the process to minimize equipment exposure. Also, if you add a new process line keep allergen awareness in mind. Enclosed systems or systems in which products are well contained are important.

- *Try to schedule long runs of product when possible.* Run a product with allergens at the end of the production day. Minimize scheduling changeovers. If possible, dedicate a line to the exclusive production of an allergen-containing product. Maintain accurate records of production and cleaning schedules.

- *Reworking one product into a different product is one of the biggest sources of cross-contamination.* Use rework only in products containing the same ingredients. Identify and document containers that will be added back into the product stream at a later time.

Containers should not be used reused unless they are designated for a specific product or a documented and approved container-cleaning process is in place.

- *Proof Packaging and labeling.* Since labeling is the primary means for identifying allergens to consumers, it is vital that product labeling be done correctly. Conduct an initial evaluation to verify that the draft copy of the label includes all ingredients, including allergens. Vigilance is needed to make sure the label and carton matches the finished product. Do not let ingredient changes or substitutions occur without evaluating and changing the label as necessary.

- *Implement Regular employee training.* This is one of the most effective tools for avoiding inadvertent contamination with allergens. Get your staff on board by utilizing printed material and videos at employee training meetings from the organization listed below. Retrain regularly. You may wish to ask an allergic individual to speak to your group about his/her life.

For More Food Allergy information, including printed material, informational videos and product recall notices by e-mail contact: The Food Allergy Network

10400 Eaton Place, Suite 107

Fairfax, VA 220030-3179

Tel: 703-691-3179

www.foodallergy.org

References

The Food Allergy Network as listed above.

“A Comprehensive Approach to Reducing the Risk of Allergens in Foods”, Deibel et al, The Journal of Food Protection, Vol.60, No. 4, 1997, Pages 436-44

“Reducing Allergen Risks”, Dairy Foods, Donna Gorski, Senior Editor, February 1997, Pages 31-34

Labeling of Foods Containing Allergens

In 2006, a new food labeling law, the Food Allergen Labeling and Consumer Protection Act (FALCPA), took effect.

Food labels are required to state clearly whether the food contains a "major food allergen." The law identifies as a major food allergen any of eight allergenic foods: milk; eggs; fish such as bass, flounder, and cod; crustacean shellfish such as crab, lobster, and shrimp; tree nuts such as almonds, walnuts, and pecans; peanuts; wheat; and soybeans. The law also identifies as a major food allergen any ingredient that contains protein derived from any of these eight foods.

Manufacturers must identify the presence of a major food allergen in one of two ways: in the list of ingredients, manufacturers must state the source of an allergenic ingredient in parentheses after the name of that ingredient; or after or next to the ingredient list, manufacturers must add "contains" followed by the name of the source of each allergenic ingredient in the food. For example:

Option 1:

Ingredients: Enriched flour (wheat flour, malted barley, niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid), sugar, partially hydrogenated soybean oil, and/or cottonseed oil, high fructose corn syrup, whey (milk), eggs, vanilla, natural and artificial flavoring, salt, leavening (sodium acid pyrophosphate, monocalcium phosphate), lecithin (soy), mono- and diglycerides (emulsifier)

Option 2:

Contains Wheat, Milk, Eggs and Soy

Food Handler Certification

Mandatory employee training and certification in safe food handling is becoming increasingly common within many areas of the food industry. As there are a multitude of agencies involved in food licensing, anyone starting a food business must determine which municipal, county, state and federal agencies have regulatory jurisdiction and which training requirements apply.

Training requirements may apply to all food service employees or just to management or supervisory employees. Those geared toward managers and supervisors tend to be of greater length and much more detail than the general staff training programs. Training courses include Better Process Control School (BCPS), Serv-Safe™ and those offered by licensing and regulatory agencies such as regional branches of the Food & Drug Administration or the US Department of Agriculture, and state departments of health or agriculture.

BCPS is based upon a curriculum provided by the Food Processing Institute and is usually sponsored by food science departments at land grant universities. The Food & Drug Administration requires processors of shelf-stable low acid and acidified foods to have a BCPS-certified person on the premises during production of these foods. Attendees may take two days of acidified foods training only or the entire four-day curriculum, which includes the low acid processing component.¹

Serv-Safe™, sponsored by the National Restaurant Association, follows a HACCP-based model for food safety, focusing upon critical control points in the food handling process where hazards can be eliminated or reduced to acceptable levels. Serv-Safe™ training covers 16 hours with an exam at the end. Passing grade is 70; people who get over a 90 can become certified to train others in Serv-Safe™.

As more jurisdictions adopt the FDA's 1999 Model Food Code, food handler certification will be mandated for a wider variety of employees. A thorough understanding of applicable regulations is mandatory for any food-processing establishment. Look in your phone book for contact information for local departments of health or consumer protection. A list of state departments of health and/or agriculture is available.

¹. Title 21, Code of Federal Regulations, parts 108, 110, 113 and 114.

ServSafe™ Certification

The National Restaurant Association (NRA) has developed a program known as ServSafe™, available in a number of different formats, designed to educate those in the food industry on food safety related topics. The certification program is broken into three units, each of which has a different focus. The three units include: Food Safety's Impact on the Operation, The Flow of Food Through the Operation, and Managing Your Operation.

Unit 1 addresses the importance of providing safe food, including the steps to take to ensure food safety. The world of microbes is covered, including various bacterial, viral and protozoan organisms that can cause food safety problems. Each organism, its associated foods and symptoms are discussed. Section three of unit 1 is dedicated to contamination, food allergies and food borne illness due to toxins. The final topic in unit 1 discusses how employees can be a source of contamination.

In unit 2 proper handling of food products is evaluated. The unit begins with a discussion of the proper means of purchasing and receiving food products, including necessary receiving temperatures and conditions of various food products. Next is a section on how to keep food safe while it is in storage. Included are the correct temperatures of storage, proper storage procedures, use of FIFO and suitable coverings for foods in storage. The third section of unit 2 describes measures to be taken during the preparation of food in a facility, including the prevention of cross contamination, correct thawing methods, and how to cool foods during preparation. The next section addresses instructions and regulations concerning the protection of food during service. Topics include proper hot holding of foods and off site catering. The final section of unit 2 covers Hazard Analysis Critical Control Point (HACCP) plans. The section defines each step of HACCP and gives examples of concept implementation.

In unit 3 addresses cleaning, sanitizing, and pest management. Topics include proper cleaning techniques and factors that effect the efficacy of cleaning procedures. Sanitizing practices are presented and each method (chemical and heat) is discussed. This section is especially important in light of the need to prevent cross contamination of food with the cleaning/sanitizing compounds used in the facility. The final topic of the section is on the use of integrated pest management and the importance of maintaining a pest-free food production site.

The program is applicable to any and all individuals who deal with the production of food products. It is especially valuable for those individuals who are responsible for the preparation, cooking and serving of foods. The course is a good introduction to the topics of food safety and HACCP. Food safety and handling education, such as the ServSafe™ Certification program, is not presently mandated for all employees in an establishment. However, a number of states mandate that an individual educated in the principles of food safety and with authority for the establishment to be present anytime food is being prepared.

ServSafe™ Certification courses are taught throughout the United States. The courses range in length from a single 8-hour refresher to courses that meet once per week for 4-6 weeks. For more information on where to attend one of the courses you can contact the NRA at their website (<http://www.edfound.org/>) or you can try contacting your local Extension Office and/or State Department of Health.

IV

Acidified & Low Acid Products

Acidified (Pickled) Foods

Acidified or “pickled” food is a category of food products that is very popular with food entrepreneurs and farmers interested in value added opportunities. Many products are traditionally processed this way, including pickles (cucumbers) and pickled vegetables, meat and eggs. The variety of products and flavors is limited only by the creativity of food processors as new formulations and presentations continuously debut in food stores to meet consumer’s new expectations and ethnic preferences.

Definition

It is important to understand the regulatory meaning of an acidified food. From the regulatory point of view, foods are classed as acid, low acid or acidified depending on the natural acidity of each product. A product’s acidity is measured based on a pH scale. If the raw or initial product has a pH above 4.6 it is considered a low acid food. If the pH is below 4.6 then the food is classified as an acid food. Acidified foods are low acid foods to which acid or acid ingredients are added to produce a final equilibrium pH of 4.6 or below. **Equilibrium pH** means the final pH measured in the acidified food after all the components of the food have achieved the same acidity.

The pH value of 4.6 is important because it is the limiting factor for the growth of an extremely dangerous microorganism called *Clostridium botulinum*, which produces a potent toxin that causes the lethal disease botulism. The regulations concerning acidified foods were established to assure the control and inhibition of the growth of *Clostridium botulinum* by proper acidification and pH control, as this microorganism is very heat resistant and therefore it is not destroyed by pasteurization or cooking temperatures below 212°F.

We all relate to the word pickled as a food item being treated with an acid liquid, typically vinegar or lemon/lime juice. In doing this procedure we extend the shelf life of the product due to the preservative effect of the acid as well as develop or produce a sour or pickled taste in the product. In a way, we are imitating a traditional fermentation process by directly adding the acid component to the product. Any food grade acid can be used such as vinegar (acetic acid), citric acid, lactic acid, malic acid or phosphoric acid.

Regulations

If you are seriously interested in making acidified foods, you must become familiar with the acidified foods regulations described in the Code of Federal Regulation Title 21 Part 114 for FDA regulated products and Title 9 Parts 318 and 381 for USDA regulated products. It is also important to review the FDA guidelines for inspection of acidified foods manufacturers available at FDAs website. In addition, any food manufacturer must obey the Good Manufacturing Practices regulations described in Title 21 Part 110. All documents are available through NECFE for your convenience.

Strictly speaking, the regulations only cover acidified foods that are shelf-stable, that is, foods that are sold without refrigeration in sealed containers. In reality, any food processor that manufactures acidified or acid foods, refrigerated or not, should follow the safety factors explained in the FDA and USDA regulations.

Processing Requirements

Prior to starting the production of acidified foods, the processor must register the establishment or processing facility with FDA. The specific products and procedures used to manufacture the final products, called "schedule processes" must also be filed with FDA. In addition, the processor must complete a training program called the "Better Process Control School" or equivalent before engaging in commercial production. This program is offered annually in May by Cornell University and at different dates by other schools. Most likely the processor will need the assistance of a "Process Authority" to develop or verify the schedule process and to help with the filing and documentation requirements. NECFE has several Process Authorities that will work with you during this stage.

Acidified foods must be properly acidified to a pH below 4.6, but in practice this value is usually 4.2 or below for safety reasons. The regulations also require a thermal process or heating step to kill all the pathogens and any other spoilage microorganisms that could grow during the shelf life of the product. To assure quick and proper acidification, the food is normally cooked or heated with the acid before being filled into the final container. The pH is checked, controlled and documented prior to filling and closing. The heating or pasteurization step or process must be done either by hot-filling the product or by the boiling water bath process. The heating temperature and time are critical factors that must be monitored, controlled and documented. The final equilibrium pH is checked and documented after the product has received the heating step. Any other critical safety factors must be monitored, checked and documented as specified by the schedule process.

To measure the pH, the processor must use a pH meter with two decimal places accuracy if the final pH is 4.0 or above. A pH meter is the best method to measure pH and it is recommended for all products and values. If the pH is below 4.0, other methods can be used such as pH paper or a pH meter with one decimal place.

Containers for acidified foods should be such that a hermetic seal is obtained. The best containers are cans and glass jars/bottles with metal caps lined with a compound called plastisol. With these closures, a good vacuum is obtained. Vacuum is a good indicator of a hermetic seal and helps to keep the quality of the product.

References:

Code of Federal Regulations. Title 21 part 114. Office of the Federal Register, National Archives and Records Administration. 2000.

Fruit and Vegetable Juices: Safety and HACCP Requirements

Fruit juices were considered safe due to their high acid content until a number of outbreaks in the 1990's were associated with the consumption of fresh apple and orange juices. The pathogens responsible for the illnesses were *Salmonella spp.*, *Escherichia coli* O157:H7 and *Cryptosporidium parvum*. As a result of these outbreaks, the USA FDA issued a final rule in 2001 entitled "Hazard Analysis and Critical Control Point (HACCP); Procedures for the Safe and Sanitary Processing and Importing of Juice" (21 CFR Part 120).

The rule requires processors and importers of juices to establish a HACCP plan to minimize the risk of juice contamination with biological, chemical or physical hazards. The HACCP plan must be developed individually for each processing establishment by a team of knowledgeable individuals that includes persons trained in juice HACCP. Any company producing 100% juice or juice puree used in manufacture of juices and beverages, is required to comply with this regulation. The law requires the juice (before bottling or after bottling) to be treated with a process that achieves at least a 100,000 fold decrease in the number of pertinent pathogen(s) likely to occur in the juice. This requirement is known as the 5-log reduction performance standard. The pertinent pathogen is the most heat resistant microorganism of public health concern that may occur in the juice.

For apple juice or apple cider, the processors must address critical control points to eliminate the risk of *E. coli* O157:H7 and *C. parvum*. For orange juice, the most likely risk comes from *Salmonella spp.* Other juices might need to address pathogens such as *Listeria monocytogenes*. Approved processing methods to control microbiological hazards are thermal pasteurization and UV light.

For apple juice or cider at pH values of 4.0 or less, the current recommendations for thermal processes to achieve a 5-log reduction for oocysts of *Cryptosporidium parvum* (in addition to the three aforementioned vegetative bacterial pathogens) based upon a conservative evaluation of the available scientific data, are:

160 degrees F for 6 seconds (recommended treatment conditions in New York),
165 degrees F for 2.8 seconds,
170 degrees F for 1.3 seconds,
175 degrees F for 0.6 seconds, or
180 degrees F for 0.3 seconds

Citrus processors have the option of treating the surface of the fruit prior to juice extraction because it is unlikely that the pathogens will enter intact sound fruit under current industry processing practices. Proper monitoring, verification, and validation procedures are necessary to ensure that the HACCP plan is effective.

In addition to microbial hazards, the rule also established the maximum level of patulin allowed in a juice at 50 ppb. Patulin is a metabolite of certain fungi such as *Aspergillus clavatus*,

Aspergillus claviforme, *Byssosclamyces fulva*, *Penicillium patulum*, and *Penicillium expansum* and, as a mycotoxin, could pose a health risk if found in significant quantities in fruit juices. Patulin is typically associated with unsound, rotting fruit and must be prevented from entering the juice by sorting out infected fruit before juice extraction.

There is one exemption in the HACCP rule for retail establishments. A retail establishment is an operation that provides juice directly to consumers. Even though these operations are not required to implement a HACCP plan and therefore might not pasteurize or UV treat the juice, they must label fresh juices with a warning statement that describes the risk of consuming untreated juices: "WARNING: This product has not been pasteurized and, therefore, may contain harmful bacteria that can cause serious illness in children, the elderly, and persons with weakened immune systems."

Strict sanitary conditions, good agricultural practices, adherence to current good manufacturing practices, and utilization of clean healthy fruit are necessary to minimize the presence of microbiological and chemical contaminants in fresh squeezed juices.

More information available at the FDA website:

<http://www.cfsan.fda.gov/~comm/haccpjui.html>

Low Acid Foods

Over the years we have received many inquiries about the possibility of processing and marketing low acid foods in a small-scale operation. The many food safety and regulatory compliance issues associated with low acid foods present unique opportunities and challenges as a start-up venture.

Definition

Foods are classified based on their acidity and water availability using two values: pH and water activity. The **pH** refers to the degree of acidity in a food and it is measured with a pH meter. Foods with a pH above 4.6 are classified as low acid. Examples are meats, milk, eggs, vegetables, and formulated products such as soups, baked products and entrees.

Water activity refers to the water in the food that is available (free) for microbial growth. It is measured with a water activity meter in a scale from 0 to 1. Foods with values below 0.85 are considered non-hazardous regardless of their acidity, because they do not support the growth of harmful bacteria. Examples are dried and semidried products.

Processing

Low acid foods are closely monitored by regulatory agencies because they can support the growth of many pathogens (microorganisms that pose health hazards) due to their high pH. Typical preservation techniques for these products include pasteurization combined with refrigeration, freezing, dehydration and retort canning. In general, regulatory agencies will not allow low acid foods to be manufactured in the home for retail sale; a dedicated processing facility must be used.

Canning: Retort canning of meats, vegetables and other low acid foods is not a simple task due to the initial investment in specialized equipment, regulatory compliance, safety issues and required training. Canning is not usually a small-scale operation and represents a very difficult starting point for a food entrepreneur.

Freezing: Frozen products represent a viable alternative, although appropriate facilities are needed. In this case, leasing or renting space from a processing facility that has freezing and storing capacity is recommended. Alternatively, a co-packer can manufacture the product for you. In either case, you can assess the feasibility of introducing a new frozen product into the marketplace without a large initial investment. Take into consideration also that frozen distribution and frozen retail space are costly. It could be difficult to open this market for a new specialty product.

Refrigeration: Refrigerated products are an option for a short shelf-life food, typically 7 to 14+ days depending on processing, packaging and formulation options. In most cases, the food will need to be pasteurized or otherwise treated to ensure the safety of the final product. This is extremely important if the food is ready to eat (the consumer will not need to cook the product prior to consumption). Specialty products are often displayed in the refrigerated deli section of a supermarket. However, as in the case of frozen products, refrigerated shelf space in retail establishments is limited and can be difficult to obtain.

Dehydration: Dehydration is another viable option for low acid products such as dried meats, vegetables, cereals, nuts, and other mixes. The advantages of dried foods include extended shelf life, no need for refrigeration and the availability of shelf-space at the retail level. Relatively small dehydrators and ovens can be purchased from restaurant equipment suppliers to be used by small-scale processors.

Product Safety

The critical points, such as pH, temperature and water activity, that need to be controlled will greatly effect the processing and packaging techniques chosen to preserve or to extend the shelf-life of a low acid food product. Vacuum packaging (VP), also called reduced oxygen packaging, is often seen as an ideal way to extend the life of a product, but there are a number of serious safety concerns associated with its use. VP is regulated by state and federal regulations and cannot be implemented without expert evaluation and approval by an appropriate process authority. Consult with your local regulatory offices before purchasing a VP machine as a special permit is normally necessary.

Required Analyses of Various Types of Products

When submitting a formula (recipe) for a scheduled process review, you must include the results of the following analyses for each product formulation.

Type of Product Produced	Analyses Required	Regulatory Agencies Involved
Acid Food Tomato based Products (marinara, etc.) Fruit Based Products (Chutneys, preserves) Fermented Products (sauerkraut, etc)	pH	- Food and Drug Administration (FDA) - State departments of Agriculture
Acidified Foods Pickles/ Pickled Vegetables (relishes, chow-chow) Eggs & Meats (Pickled Polish sausage)	pH of both brine and solids	- FDA – (requires establishment/ process registration) - State departments of Agriculture
Low Acid Foods Dessert Toppings (fudge or fruit sauces) Cake-in-a-jar Soups (creams, chowders) Pet Foods (dog biscuits, dog or cat foods)	- pH - Water Activity (a_w)	- FDA - (requires establishment/ process registration) - State departments of Agriculture
Smoked & Salted Fish Hot Smoked/Air or Vacuum Packaged Cold Smoked/Air or Vacuum Packaged	- pH - Water Phase Salt (WPS)	- State departments of Agriculture - FDA
Meats – Dried or Smoked Jerky Smoked Fowl Sausage Dry/ Semi-dry Fermented Hot Smoked Pickled (see acidified foods)	- pH - Water Activity (a_w) - Moisture	- State departments of Agriculture - United States Department of Agriculture (USDA)
Cold Filled Products (not heated) Dressings Condiments	- pH - Water Activity (a_w)	- FDA - State departments of Agriculture
Dairy Products	- pH - Titrateable pH (TA) - Aerobic plate count - Coliform testing	- FDA - State departments of Agriculture – Dairy divisions
Dried Products	- pH - Water Activity (a_w)	- FDA - State departments of Agriculture

Scheduled Process Form for Acid, Acidified or Low Water Activity Foods

Please fill in the form to draft a scheduled process for approval, or copy the format and build your own.

Product Name _____
 Date _____
 Company Name (if chosen) _____
 Name of person responsible for product _____
 Address _____
 City, State, Zip _____
 Telephone / Fax _____

Required Analyses: Please record values for all that apply – See Required Analyses Sheet

pH _____ a_w _____
 (Water Activity)

Ingredients: Remember to list by weight

	Ingredient*	Descriptors (fresh, canned, sliced, etc.)	Weight (oz, lb, g, kg, etc.)**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

* If using vinegar, note the acid strength (stated on the bottle) of the brand you use. Ex: Vinegar (5%).

** All ingredients, even liquids must be weighed. PLEASE do not assume that 1 cup = 8 oz; a cup of garlic powder weighs much less than a cup of molasses.

Procedure: List ALL steps necessary to make your product.

1. _____
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____
 7. _____
 8. _____

Container type and size: _____

How will product be sold? Shelf-stable Refrigerated Frozen
 Likely buyers: Individuals Institutions Restaurants

Processing Records SAMPLE FOR ACID and ACIDIFIED FOODS							
Product Name							
Date	Production Code	Ingredients/Packaging Materials (supplier, code)	Container size/ # cases packed	Process Time and Temp. or Hot Fill Temp.	pH of sample (equilibrated)	Visual Closure Inspection	Distribution (# cases, destination)

pH Meter Checks: pH in buffer 4.00 and 7.00

Date			
Time			
Initials			

Signed: _____

Reviewed: _____

Processing Record									
(Example for Acidified Foods containing Solids)									
Product: _____			Container Type/Size: _____			Production Date: _____			
Minimum Initial Temperature: _____			Initial Temperature Measured: _____						
Minimum Process Time/Temperature scheduled: _____			Process Temperature/Time measured: _____						
Maximum % solids: _____			Code: _____			No. of cases packed: _____			
Time of sample	Net Weight	Weight Solids	Weight Liquid	% Solids	pH of Brine or Liquid	pH of solids	pH (post-pack) <i>Equilibrated</i>	Visual Closure Inspection	
Ingredients/Packaging Materials (suppliers and codes – this batch)									
Product Distributed to (# cases and destination): _____									
pH Meter Checks: pH in buffer 4.00 and 7.00									
Date								Signed:	
Time								Reviewed:	
Initials									

V Dairy Products

Cheese Production

Cheese manufacturing began in ancient times with the practice of transporting milk in animal stomachs and bladders. Over the centuries, cheese making has been modified and refined. Today, at least 800 different types of cheeses have been identified worldwide. These cheeses may be produced from the milk of any species. Although cows' milk is most commonly used in the U.S. and Western Europe, there is increasing interest in the manufacture of goats' and sheep milk cheese.

All varieties of cheese share a basic production process in which starter cultures of lactic acid bacteria play a key role. The striking differences among various cheeses result from relatively small changes in manufacturing procedure. Figure 1 represents a simplified procedure for the manufacture of various types of cheese¹. Steps within parentheses are dependent on the variety being produced.

Below are suggestions that will help you make a safe and successful product:

1. **Milk:** The milk must be of good initial quality and free from antibiotics. Ensure that the milk is correctly standardized.
 - Unripened cheeses (cream, Neufchatel, cottage, etc.) must be made from pasteurized milk.
2. **Monitor:** You must obtain a thermometer and pH meter to correctly monitor
 - time and temperature of the milk heat treatment
 - the temperature of the milk in the cheese vat
 - the acidity (pH value) during cheese production.

Cheese legally prepared from raw milk must be held for 60 days at temperatures not less than 35°F before sale to eliminate disease-causing organisms.
3. **Foodborne disease:** Although cheese is generally considered to be a low-risk food, both hard and soft types have been associated with significant outbreaks of foodborne disease in recent years. Major risk factors include:
 - the use of unpasteurized milk
 - insufficient growth of starter microorganisms
 - post-pasteurization contamination from equipment, environment, or personnel.

Follow the guidelines in the Code of Federal Regulations for your specific cheese type. This information can be found in 21CFR 133 or online at www.access.gpo.gov/nara/cfr (click on "search by keyword and enter the type of cheese").

¹Varnam, A. H. and J. P. Sutherland. 1994. Milk and milk products: technology, chemistry, and microbiology. Chapman and Hall, New York. p. 277.

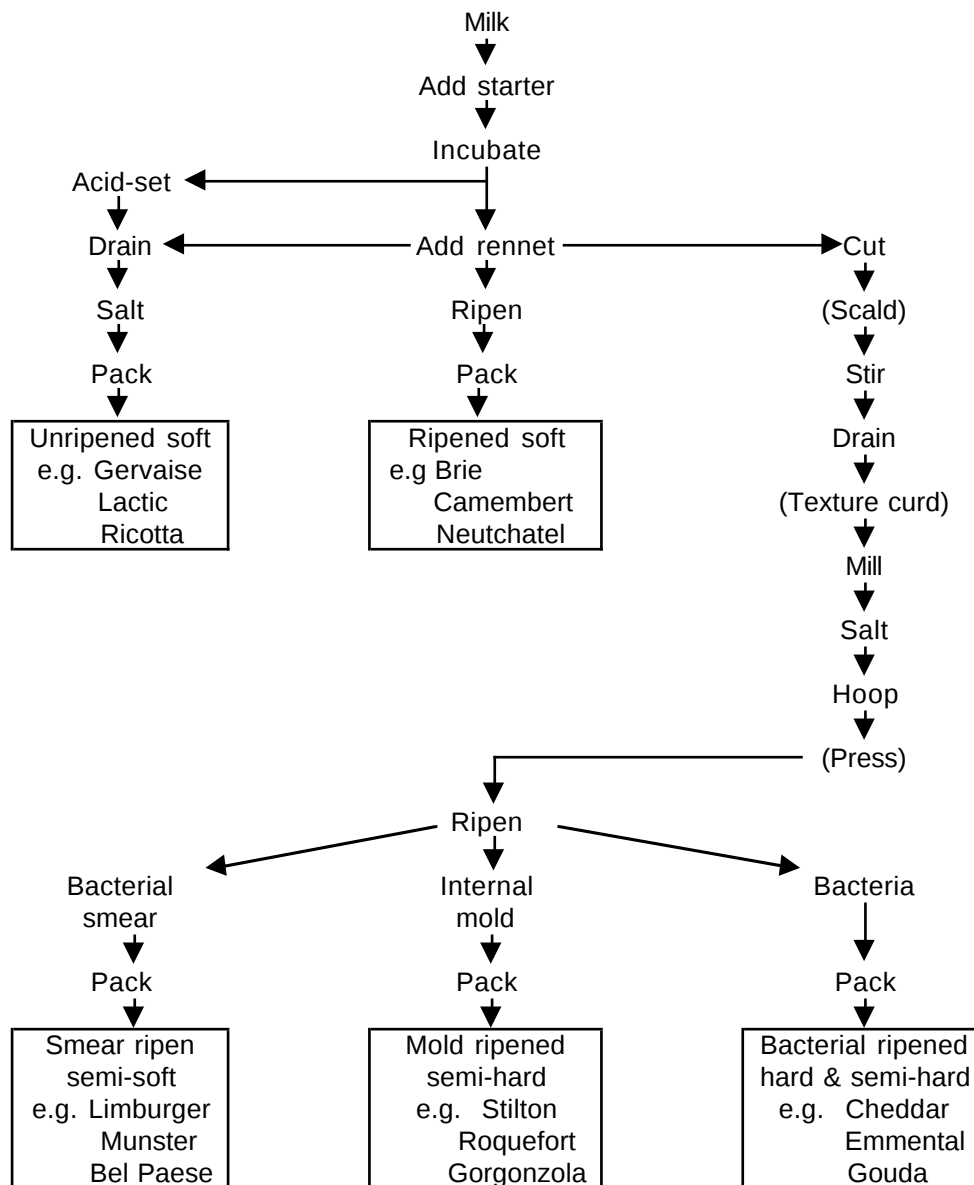


Figure 1

Below is a sample of suppliers of starter culture, equipment and/or technical services.

New England Cheesemaking Supply Company
P.O. Box 85
Ashfield, MA 01330
(413) 628-3808

ABC Research Corp.
3437 SW 24th Ave.
Gainesville, FL 32607
(352) 372-0436

Chr. Hansen Ingredient Technology
1595 MacArthur Blvd.
Mahwah, NJ 07430
(800) 343-4680

The Yogurt Process Schedule

Ingredients: Yogurt is produced by culturing one or more of the following dairy ingredients: Cream, milk, partially skimmed milk, or skim milk used alone or in combination. Yogurt can also have one or more of the following optional ingredients added: concentrated skim milk, nonfat dry milk, buttermilk, whey, lactose, lactalbumins, lactoglobulins, or whey modified by partial or complete removal of lactose and/or minerals, to increase the nonfat solids content of the food. If added, these ingredients must be included in the culturing process. Nutritive carbohydrate sweeteners such as sugar, molasses, and dried malt extract can also be added.

Pasteurization/Homogenization: All dairy ingredients must be pasteurized at a temperature of at least 161°F for a period of at least 15 seconds, or for a time and at a temperature equivalent. Typical pasteurization for fortified milk used for yogurt production is 185 – 195°F for 30 to 60 minutes. All dairy ingredients may be homogenized prior to the addition of the bacterial culture.

Cooling: After pasteurization, fortified milk is cooled to 106–113°F (41–45°C). Once cooled, the milk is ready for starter culture inoculation.

Fermentation: *Lactobacillus bulgaricus* and *Streptococcus thermophilus* are then mixed with the pasteurized fortified milk at a concentration of 1-3%, according to manufacturers directions. The mixture is incubated at 106-113°F (41 – 45°C) until a pH of 4.6 or lower is attained (4-6 hours). The fermentation process should be monitored and time/temperature/pH values should be recorded. If inoculated milk is fermented in a vat (stirred) it is immediately placed in sterile packaging and refrigerated. Yogurt produced in consumer packaging is removed from incubation and refrigerated immediately.

Flavoring: Flavoring can be added to the chilled fermented yogurt. This is referred to as Swiss-style yogurt. Sundae-style yogurt results when fruit or fruit flavoring is added to the bottom of the consumer package, followed by the inoculated base, and then incubated until the predetermined acidity level is attained. Before the addition of bulky flavors (i.e. fruit) yogurt shall contain:

Product	Milkfat/solids (not fat) content
Yogurt	Not less than 3.25% milkfat Not less than 8.25% milk solids not fat
Lowfat Yogurt	Not less than 0.5% milkfat nor more than 2% milkfat Not less than 8.25% milk solids not fat
Nonfat Yogurt	Less than 0.5% milkfat Not less than 8.25% milk solids not fat

Bulky flavors must have sufficient characterizing fruit flavoring to provide a distinct recognizable flavor level. All ingredients used must be safe and suitable.

Heat Treatment (Optional): Yogurt may be heat treated after culturing is complete. This treatment destroys live and active cultures and may extend shelf life of the product.

Vitamin A and D addition (Optional): If added, yogurt shall contain not less than 2,000 International Units (IU) vitamin A per quart within the limits of good manufacturing practice. If added, yogurt shall contain 400 IU of vitamin D per quart within limits of good manufacturing practice.

Packaging: Product must be labeled in bold print **“Keep Refrigerated”**.

Quality Assurance: All raw milk for pasteurization, condensed and dried milk, finished product and the plant in which products are processed shall comply with all applicable requirements of the “Grade A Pasteurized Milk Ordinance – 1995 Recommendations of the United States Public Health Service, Food and Drug Administration, Publication No. 229” or latest revision. The raw milk for pasteurization, milk plant, and pasteurized milk and milk products must be in compliance with, and certified by, a State Milk Sanitation Officer. Milk laboratories approved by Federal and State agencies must do all testing of raw milk, and products. Compliance with good manufacturing practices and sanitation requirements helps assure production of a safe product. “Six Areas Of Sanitation And Their Relationship To The Requirements Of The Food Good Manufacturing Practices And Pasteurized Milk Ordinance,” is an overview of pertinent compliance information.

Pertinent Regulations:

“Grade A Pasteurized Milk Ordinance – 1995 Recommendations of the United States Public Health Service, Food and Drug Administration, Publication 229”.
Milk Safety Program (FF-305) FDA, 200 C Street, SW, Washington, DC 20204.

“Sanitation Compliance and Enforcement Ratings of Interstate Milk Shippers”.
Milk Safety Program (FF-305) FDA, 200 C Street, SW, Washington, DC 20204.

Code of Federal Regulations: Yogurt (21 CFR 131.200), Lowfat Yogurt (21 CFR 121.203), Nonfat Yogurt (21 CFR 131.206).

Suppliers of starter culture and/or technical services include:

New England Cheesemaking Supply Company	Dairy Connection, Inc.
P.O. Box 85	501 Tasman Street
Ashfield, MA 01330	Madison, WI 53714
(413) 628-3808	(608) 242-9032

Example of Schedule Process for Yogurt

Product Name
Measured pH = 4.5

Date
Company Name
Company Address
Company Telephone and Fax Numbers

Critical Factors¹

INGREDIENTS ²	WEIGHTS ³ (grams)	% BY WEIGHT ⁴
Pasteurized-Homogenized Whole Milk	3051.00	95
Nonfat Dry Milk Powder	93.00	2.9
Culture Mixture ⁵	67.00	2.1
TOTALS	3211.00	100%

PROCEDURE⁶:

- 1) Place pasteurized-homogenized milk in clean vat.
- 2) Fortify the milk by adding nonfat dry milk powder. Add powder slowly with continuous stirring until solids are completely dissolved.
- 3) Heat the fortified milk to 185°F and continue heating for an additional 30 minutes.
- 4) Cool fortified milk to 110°F using an ice water bath. Then inoculate with culture mixture consisting of *Streptococcus salivarius ssp. thermophilus* and *Lactobacillus delbrueckii ssp. bulgaricus*. Mix the culture in thoroughly.
- 5) Pour mixture into clean 8 oz. plastic containers. Seal containers and place in an 110°F incubator.
- 6) Monitor and record acid production (time/temperature/pH). Immediately place yogurt in refrigerated storage once a pH of 4.5 is attained.
- 7) Product label must include **“Keep Refrigerated”**.

NOTES:

- 1) These critical factors will be determined by the Process Authority and added to our formula.
- 2) Ingredients must be listed in descending order by weight.
- 3) All ingredients must be weighed. PLEASE do not assume that 1 cup = 8 ounces. Weighed ounces and fluid or volume ounces are not usually equal. Good kitchen scales can be purchased at most kitchen/restaurant supply stores.
- 4) Don't worry about calculating percentages. We will figure that out.
- 5) Prepare following manufacturers directions pending culture type.
- 6) Write down the steps you use when making your product. They may not look like the ones given above. We will revise your procedure to include control points such as pH. However, you must include cooking temperatures, filling temperatures, the pH measurement, the type/size of container used, and the conditions under which the product will be sold (refrigerate, etc.).

VI

Meat & Poultry Products

Pathogen Reduction/ Hazard Analysis and Critical Control Points for Meat and Meat Products

Safe meat and meat product production is promoted by the HACCP approach, which is currently endorsed by regulators and industry alike as the best workable tool for meat safety. Every manufacturing facility producing meat or meat products must develop and implement a HACCP plan for each product. The emphasis of this system is to **prevent rather than correct** food safety hazards through a systematic approach. Theoretically this is a “farm-to-table” strategy for assuring safe meat and meat products for the consumer.

The Pathogen Reduction/HACCP Final Rule, as it applies to the meat industry, consists of four major elements:

- Mandated Sanitation Standard Operating Procedures (SSOPs)
- Mandated **HACCP** plan that address all significant hazards associated with products.
- Mandatory *E. coli* testing and monitoring in slaughter plants.
- Pathogen Reduction Performance Standards for Salmonella in all slaughter plants and plants producing raw ground products, based on a national data baseline.

A team must be created to develop a HACCP plan for each meat product that incorporates these elements. In the meat industry, each HACCP team must, by USDA regulations, include at least one individual from the processing plant and one person trained through a course of instruction in meat HACCP. A number of courses fulfilling this need are offered through various industry associations. Below are two possible contacts:

North American Meat Processors Assoc.
1910 Association Drive
Reston, VA 20191
(703) 758-1900 or (800) 368-3043
www.namp.com

American Association of Meat Processors
P.O. Box 269
Elizabethtown, PA 17022
(717) 367-1168
www.aamp.com

Generic HACCP Plans for meat can be found at:
http://www.fsis.usda.gov/Science/HACCP_models/index.asp

Fermented Sausages

Modern Understanding of Ancient Products

The drying by salting of a highly valued food, meat, has occurred for many centuries to prevent spoilage. Under favorable conditions, primarily the inclusion of salt and the subsequent addition of sugar to overcome the harshness of the salt, these comminuted products were often found to have a distinctive and enticing aroma, flavor, and “bite.” Although an in-depth understanding of the process was lacking, many sausage-makers were able to replicate the results from batch to batch. Since many sausage-makers and/or regions had unique styles and seasonings, a vast array of fermented sausages were passed down with various differences, similarities, and names.

Sausage terminology is, at best, a confusion of historic, regional, seasonal and political nomenclature. Thus, what is known in some parts of the world as a Kielbasa is known elsewhere as Salami (or even Salame). We will try to ignore most of this confusion as we take a modern look at a class of very popular value-added meat products: fermented sausages. To do this, we will first give a few general, as well as regulatory, definitions with examples:

Fermented Sausages – Are a class of chopped or ground meat products that, as a result of microbial fermentation of a sugar, have reached a pH of 5.3 (although 4.6-5.0 is more typical) and have undergone a drying/aging process to remove 15-25% of the moisture. These products are typically cured, but not necessarily cooked/smoked. Although the USDA does not formally define a Semi-Dry or Dry sausage, they do describe each as follows:

Semi-Dry Sausages undergo a moisture loss of up to 15% of the total. Final water activities (a_w) range from .90-.94. These sausages are generally cooked/smoked prior to sale or consumption. These sausages should be refrigerated. Examples: Summer sausage, Thuringer, Cervelat, Landjaegar.

Dry Sausages undergo a moisture loss of up to 25% of the total. Final a_w ranges from .85-.91. Typical pH ranges are 4.7-5.0, slightly higher than Semi-dries. Many of these products are considered shelf stable due to low a_w , and may be sold and consumed without heat treatment. Examples: Pepperoni, Salami(s).

Since there is a natural presence of fermentative bacteria present on meat surfaces in small relative numbers, the process of producing a fermented product may be as simple as grinding, salting, sugaring, and waiting. However, the chances of a failed product resulting in great health risks are considerable. While the production of fermented sausages relies heavily on the art of the procedure, we can use a modern, scientific, understanding of the fermentation process and microbiological inversion from spoilage/pathogenic bacteria to the correct fermentation bacteria to consistently produce high quality, safe products. Here are some steps to help control the process to a successful product:

1. **Raw Meat and Non-Meat Ingredients:** Only the highest microbiological quality meat should be utilized in these products. If in doubt, don't use it! Remember: the process will set up conditions for the growth of bacteria. Give your fermentative bacteria a chance and minimize their competition.

2. **Starter Cultures:** Use them! Follow manufacturer's recommendations and utilize the technical services of the manufacturer (generally free or inexpensive).
3. **Fermentation Process:** Critically monitor the time that the product is above 60° F prior to reaching a minimum pH of 5.3. This is the period in which toxicogenic *Staphylococcus* may grow. Develop a process that will lower the pH within regulatory guidelines for Staph (Degree/Hour limitations). If your product does not reach pH 5.3 within the specified time – DISCARD! To achieve a 5-log reduction of *E.coli* 0157:H7, specific fermentation procedures must be followed or a moist heating step after fermentation must be applied prior to drying.
4. **Drying:** If drying is too slow, moisture buildup at the surface allows unwanted yeast and mold growth. If drying is too fast, a protein crust develops which hinders interior moisture loss resulting in possible spoilage. A relative humidity of the drying chamber maintained 3-5 points below that of the sausage with low velocity airflow is suggested.

Below are some suppliers of starter culture and/or technical services.

ABC Research Corp.
3437 SW 24th Ave.
Gainesville, FL 32607
(352) 372-0436

Chr. Hansen Ingredient Technology
1595 MacArthur Blvd.
Mahwah, NJ 07430
(800) 343-4680

Quest Intl. Food Ingredients
5115 Sedge Blvd.
Hoffman Estates, IL 60192
(847) 645-7000

Bavaria Corp. Inc
1020 Ocoee-Apopka Rd.
Apopka, FL 32703
(407) 774-8345

Butcher & Packer
1468 Gratiot Avenue
Detroit, MI 48207
(800) 521-3788

Jerky and Dried Snack Meats

This class of value-added meat products is one of the fastest growing segments of the meat industry, and, indeed, the entire snack food industry. The appeal of jerky and dried snack meats to both producers and consumers is strong for a number of reasons. Consumers view these products as the answer to demands for nutritious and non-fattening snack foods. Even the shelf-stable quality has a place in today's outdoor activities and on-the-go lifestyle. Producers are attracted to these products because they can be affordably produced on small to medium scale with great opportunities for niche marketing. In addition, the labor-intensive aspect of these products is easily compensated for by the retail prices consumers are willing to pay (often \$10-15 per lb). These factors allow small start-up operations with a distinct product to grow with demand.

Brief History:

Although jerky is only now enjoying a resurgence of popularity, it goes back hundreds of years, in various forms, to many cultures. Dried meats prepared by native peoples in the Western Hemisphere were dubbed **Jerky**, **Charqui**, or **Xarque** by European explorers. Native Americans further processed jerky into a higher-energy product called **Pemmican** by grinding the jerky and mixing it with animal fats. The African version, **Biltong**, was similar in nature although it was often produced with ostrich meats as well as beef.

Most early versions involved salt/seasoning rubs instead of today's marinades. Today, jerkys made with salt/seasoning rubs are termed **Carne Seca**. There are also the related **Kippered** products, which will be described later, and Meat Snack Sticks which are akin to sausage but fall under a regulatory grouping with Jerky. Below are some generalities, differentiations and guidelines to producing jerky and dried meat snacks.

Jerky (& Carne Seca): These products can vary greatly. Jerkys are typically prepared from strips of lean muscles cut with the grain of the muscle fibers. They can be cured or non-cured, smoked or non-smoked, seasoned with marinade or rubbed with a basic salt & pepper mixture, and can come from any species (beef, pork, lamb, poultry, etc.). As a shelf-stable, ready-to-eat food, the following USDA regulation for water activity applies: $A_w \leq 0.85$: 1. Extra care is taken to remove all visual fat to prevent rancidity. Uniform thickness is critical to good product quality and food safety. Typical marinade steps range from 18-24 hrs., usually with periodic mixing of the product.

The cooking/drying step should include control points for pathogenic bacteria. Examples: final temperature, final a_w (Water Activity) time to final temperature, process controls, etc. For example, within 3 hours of the start of the heating process, the internal temperature for beef and lamb must reach 145°F or 165°F for poultry and pork, held for 15 seconds.

Additional Definitions:

Formed Jerky: jerky-like products of shredded or ground lean meats, seasoned, and formed prior to drying.

Pemmican: May have limited mass appeal. A high-energy, nutritious food that may have a niche market for winter activities, etc. Unlike jerky, which is unlikely to become rancid due to the absence of fat, Pemmican may need rancidity controls.

Kippered Meats: These products are very similar to jerky but are not regulated to the low A_w of jerky. These products are not shelf-stable without further controls such as vacuum packaging and heat processing.

Meat Snack Sticks: Also a class of meat products which can show great variety. Generally, these products are shredded/ground, seasoned, cured, stuffed into small-diameter casings and cooked/smoked/dried. Since they typically contain higher percentages of fats, they need rancidity controls, such as antioxidants and vacuum packaging. Typically should have pH values of 5.0 or lower with reduced water activity.

Much like sausages in productions, meat snack sticks are usually acidulated with lactic or another organic acid to result in a tangy taste and a longer shelf life. Although meat fermentation produces this acid, the smaller diameter product can be directly acidified with various food-grade acids without hindering the drying process. Thus, meat snack sticks can be produced in a more mechanized, efficient, fashion than a typical dry or semi-dry sausage.

Since such a diverse range of products is housed under the Jerky and Dried Snack Meats category, unique recipes, shapes, styles, etc. abound. This class of value-added meat products is an excellent venture for the creative food entrepreneur with a knack for attention to detail and quality.

New York State Department of Agriculture and Markets requires a scheduled process before Jerky manufacturer can request permission from NYSDAM for product to be vacuum packaged.

Smoked Meats and the Smoking Process

It's the rare individual who can pass the attractive aroma and mahogany-red color of smoked meats without an irresistible craving. Beyond the color and flavor aspects of smoked meat products, smoke is also applied for its preservative effect. There are more than 200 components of natural wood smoke that contribute to these desirable attributes in subtle and mysterious ways. These components can be broken into three groups: Solids (ash, tars), Non-condensable (gases), and Condensable (acids, carbonyls, phenols). It is the latter group of Condensable that contributes the primary attributes of smoking.

Attributes and Smoke Components

Color: The attractive smoked color is primarily the result of carbonyl compounds reacting with free amino groups of meat proteins. This reaction results in a brownish colored furfural compound. To achieve the desired reddish mahogany color of a cured product, it is important to allow time for cure color development prior to this smoking reaction.

Skin Formation: Organic acid components foster skin formation on the surface of skinless sausages by causing a coagulation of surface proteins on the product. This casement may also minimize internal spoilage by acting as a barrier.

Flavor: Overall flavor and aroma cannot be linked to any one component, but are the result of a spectrum of volatile compounds. Research has indicated, however, that the phenols are the primary factors in aroma profiles. Subtle distinctions in aroma can be achieved through the use of different woods to create the smoke.

Safety/Regulatory Concerns

Approved woods (USDA/FSIS): include non-resinous hardwoods (hickory, oak, apple, cherry, other fruit woods, etc.), mesquite wood, redwood, and corncobs.

Rancidity: The smoking of meat products has been observed to minimize rancidity. Phenolic compounds serve as the antioxidant in this case.

Smoking as a preservative: Although many chemical components may provide an antibacterial effect, it is largely assumed that the phenolic compounds, along with carbonyl and formaldehyde, are the primary agents. However, the meat processor generally should not rely on smoking as a preservative since smoke is only a surface phenomenon; any surface disruption, i.e. slicing, will effectively destroy the preservation.

Liquid Smoke: Liquid Smoke is growing in popularity in spite of its misnomer, "artificial" smoke. In fact, liquid smoke is a distillate of natural smoke, eliminating the unwanted tars, resins, and ashes of the conventional process. Products receiving a liquid smoke require no special in labeling other than "Smoked." Since liquid smoke is sold in oil or water carriers, or even dry on salt or sugar carriers, its convenience and versatility may benefit the processor. Care should be taken as to the quantities used since liquid smoke is purified and quite potent.

The Smoking Process

Hot Smoking vs. Cold Smoking: When a product is hot smoked, the cooking and smoking cycles are combined and the smoking process takes place during the early portion of the cook cycle. There are specific minimum time/temperature requirements depending on the specific meat product smoked. Cold smoked products, such as dry salami or Prosciutto hams, are not cooked. These products acquire the smoked flavor, aroma and color from being smoked in a relatively cool smoking chamber, thus avoiding substantial increases in product temperature. If the product is not considered shelf-stable, the cold smoking process requires maintenance of a 41°F or less internal product temperature. A different set of requirements apply to smoked fish products.

Factors Effecting the Quality of Smoke Applications

Heat and Humidity: During conventional wood burning smoke procedures, the heat and humidity of the sawdust is important. Generally, a smoldering fire (1100-1400°F) will generate optimal smoke density and aroma compounds. It is also important that the product surface is warm and not too wet, although a dried product will not “take” a good smoke. Good surface conditions will allow a good smoke to deposit without streaking.

Loading the Smokehouse: Loading the smokehouse properly is critical for two reasons: 1. Product touching other product, racks, etc. will have non-smoked defect marks where the contact occurred; 2. An overloaded or improperly loaded house may limit air circulation and leave some products with minimal smokes. Technical assistance from the manufacturer is available to processors utilizing liquid smokes.

Entrepreneurial Opportunities

Many aspects of the smoking process lend themselves to exploration by the entrepreneur. New products may be developed from different species of meats. The amounts of smokes and method of application may provide opportunities for unique products. Many casing manufacturers now market casings with a pre-smoked film layer that deposits onto the product during cooking. These casings may provide the entrepreneur with alternatives and opportunities. In addition, the various sources of smoke woods can lend a distinctive touch to an old favorite.

Shelf Stable Dried Sausage

Raw Meat Material: Only USDA inspected meat or that from an approved source may be used. Whether fresh or frozen, there must be no detectable signs of spoilage and it must be held refrigerated (41°F or lower) or frozen (0°F or lower). Procedures should include a quality control program to ensure the use of microbiologically safe raw ingredients.

Non-Meat Ingredients: Starter culture, spices, additives and casings are to be stored in a safe, protected and sanitary fashion. All food additives used are to be approved for use and from approved sources.

Thawing: Thawing, when used, is to be conducted under appropriate time/temperature controls as follows to prevent pathogen growth:

7. Under refrigeration that maintains the food temperature at 41°F or less.
8. Completely submerged under running water:
 - At a water temperature of 70°F or below
 - With sufficient water velocity to agitate and float off loose particles in an overflow and
 - For a period of time that does not allow thawed portions to be above 41°F.

Grinding: The meats used should be ground or chopped at low meat temperatures (below 30°F) to maintain the well defined fat and lean particles desired in this type of sausage.

Mixing: The ground meats and spices are thoroughly mixed with curing ingredients, such as nitrates, nitrites, antioxidants and bacterial starter cultures, for meat fermentation. The addition of a commercial lactic bacteria starter culture and simple sugars, such as dextrose or corn sugar, promote lactic acid bacterial growth during fermentation. The bacteria starter culture is harmless and limited to 0.5% in dry sausage formulation

Stuffing: Producers may still allow the mixture to age under refrigeration for several days to encourage the fermentation process or may stuff the mixture directly into identified casings (size & type). The product then undergoes fermentation at temperatures between 65°F–120°F from table 1 (depending on the starter culture – See Table 1).

Table 1 - Typical Starter Culture Strains

Pediococcus cerevisiae

1. Optimum growth at 110°F (80°F – 120°F)
2. Fast fermentation and inhibits unwanted bacteria

Lactobacillus plantarum

1. Optimum growth at 100°F (65°F – 120°F)

Micrococcus varians

1. Optimum growth at 90°F or less

Fermentation : Bacterial fermentation is used to reduce the meat pH to 5.3 or less to prevent the growth of staphylococcal food poisoning as well as produce a desired acid flavor. The fermentation occurs during a one to three day process in a “greening room” which provides a carefully controlled environment designed to obtain specific fermentation results. (See Table 2 and Table 3)

In place of fermentation a producer may use Glucono Delta Lactone (GDL) or a suitable food acid.

Table 2 – Time-Temperature Control During Fermentation

A process can be judged acceptable as long as the product consistently reaches a pH of 5.3 or less using:

- (1) Fewer than 1200 degree/hours when the highest fermentation temperature is less than 90°F
- (2) Fewer than 100 degree/hours when the highest fermentation temperature is between 90°F and 100°F
- (3) Fewer than 900 degree/hours when the highest fermentation temperature is greater than 100°F

Degrees are measured as that temperature over 60°F (the critical temperature at which staphylococcal growth effectively begins). Degree/hours is the product of time in hours and the difference in temperature between 60°F and the temperature used. Degree/hours are calculated for each temperature used in the process. The limitation of the number of degree/hours indicated in points (1), (2) and (3) depend upon the highest limitation temperature in the fermentation process prior to the time that a pH of 5.3 or less is attained. Processes exceeding 89°F prior to reaching a pH of 5.3 are limited to 1000 degree/hours; processes exceeding 100°F prior to reaching pH 5.3 are limited to 900 degree hours.

Processors are encouraged to measure temperature at the surface of the product. Where this is not possible, processors should utilize fermentation room temperatures. Temperatures and humidity should be balanced throughout the fermentation room.

$$(\text{Temperature} - 60) \times \text{Hours} = \text{Degree/hour}$$

Table 3 - Constant Temperature Processes

Guidelines for maximum degree/hours at specified times and temperatures are provided in this chart.

The time-temperature relationships for constant temperature processes are as follows:

Degree/Hours	Temperature Hours by °F	Hours Allowed Guideline
1200	75	80
1200	80	60
1200	85	48
1000	90	33
1000	95	28
1000	100	25
900	105	20
900	110	18

Salmonella Control: Salmonella is controlled by either the moist heat treatment employed to control *E. coli* or by controlling the Aw (water activity) at or below 0.94.

E. coli Control: In light of food borne outbreaks of *E. coli* O157:H7 linked to dry fermented ready-to-eat sausage products, all procedures for dry sausages must be conducted to show products achieve a 5-log reduction of *E. coli* O157:H7. Full documentation is required. This can be accomplished by using one or more of the following options: Modify processing procedures to include a moist heating step after fermentation, but prior to drying. The moist heating

can be accomplished by using a sealed oven or steam injection to raise the relative humidity above 90% throughout the cooking process and meet one of the following time-temperature requirements (Table 4):

Table 4 – Moist Heat

Minimum °F Internal Temperature	Minimum Holding Time in Minutes at that Temperature
130	121
131	97
132	77
133	62
134	47
135	37
136	32
137	24
138	19
139	15
140	12
141	10
142	8
143	6
144	5
145	4

Examples of Processes Yielding a 5 log or More Reduction in *E. coli* 0157:H7

- Ferment at 90°F to pH 5.3 and heat to 125°F about 7 hours, then dry for ≥ 7 days (large casing).
- Ferment at 90°F to pH 4.6 and hold at 90°F for ≥ 6 days (small casing).
- Ferment at 90°F to pH 4.6 and heat to 125°F about 7 hours (small and large casings).
- Ferment at 110°F to pH 4.6 and hold at 110°F for ≥ 4 days (small and large casings)
- Drying to a water activity of 0.850 or less or moisture of 30%-40%. (See p. 3)

Trichinae Control: Products containing pork must be effectively treated by either heating, refrigerating/freezing or curing to destroy live trichinae or purchase trichinae free products. These methods are available in the Title 9 CFR Part 318.10 or from a processing authority. Sausages not containing pork have no such requirement.

Drying: During the drying process, products undergo a carefully controlled and monitored air drying process that cures the product by removing moisture from the product. (Sausages not containing pork have no such requirement.)

The drying process consists of placing the product in a drying room under a relative humidity of 55-65% in a process that can last from 10 days to as long as 120 days, depending on the product diameter, size and type. The drying process is designed to produce a final product with approximately 30-40% moisture and a water activity of 0.850 or less, to ensure a safe product. Facilities must keep accurate records of the temperature and the number of days in the drying room for each product manufacturing run to help ensure product safety and consistency. The drying environment is controlled to ensure that the drying rate is slightly higher than the rate required to remove moisture from the sausage surface as it migrates from the sausage center. Drying too quickly will produce a product with a hard and dry casing. Drying too slowly results in excessive mold and yeast growth and excessive bacterial slime on the product surface.

Scheduled Process Form for Meat, Poultry, Sausage and Jerky Products

Please fill in the form to draft a scheduled process for approval, or copy the format and build your own.

Product Name _____
 Date _____
 Company Name (if chosen) _____
 Name of person responsible for product _____
 Address _____
 City, State, Zip _____
 Telephone / Fax _____

Required Analyses: Please record values for all that apply – See Required Analyses Sheet

pH _____ A_w (meat) _____
(Water Activity)

Ingredients: Remember to list by weight

	Ingredient*	Descriptors (fresh, frozen, Ground, chopped, etc.)	Weight (oz, lb, g, kg, etc.)**
1			
2			
3			
4			
5			

* If using vinegar, note the acid strength (stated on the bottle) of the brand you use. Ex: Vinegar (5%).

** **All ingredients must be weighed.** PLEASE do not assume that 1 cup = 8 oz; a cup of garlic powder weighs much less than a cup of molasses.

Please include a copy of the ingredient statement for any commercially prepared seasoning or cure mixes used.

Procedure: List ALL steps necessary to make your product.

Plate size (when grinding): _____

Casing type & size: _____

Drying procedure:

Temperature of dryer/ smoker: _____

Length of time in dryer/ smoker: _____

Maximum temperature of meat : _____

Steps in manufacturing:

1. _____
2. _____
3. _____
4. _____

This product is sold: Shelf Stable Refrigerated Frozen (please circle all that apply)
 Vacuum Packed

VII

Fish

Products

Process

Model

Introduction to Processed Fish Product Regulations

Federal Regulations (Based on 21CFR 123):

Any processor of fish - fresh, frozen or otherwise - is required to institute a Hazard Analysis Critical Control Point (HACCP) plan. In addition, each processing business must have access to at least one HACCP-certified expert for consultation, development of the HACCP plan, review of the HACCP plan, and authorization of records completed to monitor the processing system. Sanitation Standard Operating Procedures (SSOPs) must be incorporated into the processing system.

Processors of smoked or smoke-flavored fish products must include control points for *Clostridium botulinum*, the pathogen which leads to the potentially-fatal food poisoning, botulism. Processors of raw molluscan shellfish, such as oysters, scallops and clams, must address two additional food safety issues. First, the processor must verify that the shellfish used come from waters approved for harvesting by a certified shellfish control authority. Shellfish control authorities operate under federal, state, tribal or foreign governmental agencies. Secondly, the processing procedures must insure the destruction of pathogens and the appropriate documentation maintained.

Exemptions:

According to questions 3 and 13 of the *HACCP Regulation for Fish and Fishery Products: Questions and Answers*, retail establishments which process fish products and are themselves the exclusive outlet for those products, are exempt from HACCP requirements. However, if the processing establishment manufacturing fish products and sells them to a distributor or other operation where the product will be resold, the processor must meet all HACCP requirements.

The publication referred to above is available from the U.S. Food and Drug Administration (FDA) online at <http://vm.cfsan.fda.gov/~dms/qa2haccp.html#index>.

Regulating Organizations:

Fish and processed fish food products are regulated by the FDA and by various state departments and agencies. Technically, the FDA is the entity in charge of inspecting fish processing facilities. However, in many cases inspections are conducted by state branches of the FDA or by other state governmental agencies. Federal and state agencies also certify waters for shellfish harvesting. Both agency levels inspect shellfish products to verify that the raw fish ingredients originate from certified waters.

Regulations are enforced by different agencies depending on where the fish or shellfish originates and how it is processed. Many states have instituted regulations in addition to those listed above. These include special requirements for frozen fish products, imported fish and fish from ocean fisheries. **The best thing you can do** for accurate, up-to-date, location-specific information is to contact your state departments of Health, Agriculture and Markets or Fisheries. Contact the FDA for information at a Federal level.

Processing Schedule for Cold Smoked Fish

DATE
Refrigerated/ Frozen

Company
Contact
Street Address
City, State Zip
Phone
Fax

Critical Factors Minimum Water Phase Salt (WPS) $\geq 2.5\%$
--

Product Values
pH =
Water Phase Salt (WPS) =

Fish (Bluefish, Boston Mackerel, Albicore Tuna, Cod Fish, Dog Fish, Marlin Blue, Marlin White, Salmon, Sea Trout, Striped Bass, Sturgeon, Spanish Mackerel, Swordfish Whiting, Yellowfin Tuna): Raw material must be fresh with no signs of detectable spoilage and must be maintained at 38°F or less.

Thawing: Thawing of frozen food must be done at a temperature no greater than 45°F (38°F is preferred) or it may be done under cold running water or by microwave as specified in the Food Code.

Evisceration: Fish must be eviscerated in a separate area and washed thoroughly.

Brining: Mixing of fish species in brine is not allowed. Brining or dry salting, in excess of 4 hours, must take place at a temperature of 38°F or less. Salt concentration and period of time must be adequate to ensure salt penetration to give a water phase salt (WPS) of 2.5%. The determination of water phase salt must be done on the thickest piece of fish, sufficient times to meet requirements.

Cold Smoking: The fish should be so arranged as to facilitate complete smoking of all product surfaces. Smokehouse temperature should be maintained at a temperature not exceed 50°F (10°C) for a time not to exceed 24 hours; or not more than 90°F (32°C) for not more than 20 hours. The smokehouse temperature should be recorded at least three (3) times during smoking.

Sablefish: Must be smoked to a temperature of 120°F for 6 hours.

Cooling: Fish shall be cooled to 50°F within five (5) hours and to 38°F within 12 hours and maintained at that temperature until sold.

Packaging: This fish can only be sold air packaged and must be labeled in bold print "**Keep Refrigerated at 38°F or below**"

Records: Production records must be kept on each batch of fish showing the name of the product, a lot code, date processed, and container size and number of containers if applicable. A record must be kept in ink on the temperature of thawing, brining, smoking, cooling and storage of each batch of fish processed. The record must also show the duration of smoking and the name(s), address(es), and lot code(s) of initial sale.

Analysis: WPS should be determined sufficiently often to ensure that it meets or exceeds the 2.5% minimum (at least 4 times/ year) and records must be kept of this evaluation.

Processing Schedule for Hot Smoked Fish

DATE
Refrigerated/ Frozen

Company
Contact
Street Address
City, State Zip
Phone
Fax

<i>Critical Factors</i> Minimum Water Phase Salt $\geq 2.5\%$

Product Values
pH =
Water Phase Salt (WPS) =

Fish: Raw material must be fresh with no signs of detectable spoilage and must be maintained at 38°F or less.

Thawing: Thawing of frozen food must be done at a temperature no greater than 45°F (38°F is preferred) or it may be done under cold running water.

Evisceration: Fish must be eviscerated in a separate area and washed thoroughly.

Brining: Mixing of fish species in brine is not allowed. Brining or dry salting, in excess of 4 hours, must take place at a temperature of 38°F or less. Salt concentration and period of time must be adequate to ensure salt penetration to give a water phase salt (WPS) of 2.5%. The determination of water phase salt must be done on the thickest piece of fish, sufficient times to meet requirements.

Hot Smoking: The fish should be so arranged as to facilitate complete smoking of all product surfaces. Fish temperature in the smoker must reach a minimum of 145°F and be held for at least thirty (30) minutes. Temperature probes are to be inserted in the thickest portion of at least three (3) fish with the lowest temperature reading being recorded on the process record. The temperature will be recorded at least three (3) times during smoking.

Cooling: Fish shall be cooled to 50°F within five (5) hours and to 38°F within 12 hours and maintained at that temperature until sold.

Packaging: This fish can only be sold air packaged and must be labeled in bold print "**Keep Refrigerated at 38°F or below**".

Records: Production records must be kept on each batch of fish showing the name of the product, a lot code, date processed, and container size and number of containers if applicable. A record must be kept in ink on the temperature of thawing, brining, smoking, cooling and storage of each batch of fish processed. The record must also show the duration of smoking. Records must also show the name(s), address(es), and lot code(s) of initial sale.

Analysis: WPS should be determined sufficiently often to ensure that it meets or exceeds the 2.5% minimum (at least 4 times/ year) and records must be kept of this evaluation.

Note: For vacuum packing, the following conditions must be met.

1. Water Phase Salt $\geq 3.0\%$ with nitrate added for salmon, sable, shad, and chub species only
2. Water Phase Salt $\geq 3.5\%$ without nitrates (most species)
3. Water Phase Salt $\geq 17.0\%$ for shelf stable fish products

VIII

Other Product Types

The Science & Technology of Making Preserves

by Malcolm C. Bourne, Ph.D., Professor Emeritus, Cornell University

Jams, Jellies, Marmalades, Conserves, and Fruit Butters are made by boiling together fruit and sugar to give a high solids product. The methods and formulations used vary widely. Many edible products such as peppers, herbs and even edible flowers are made into preserves. We will concentrate on fruit products considered of standard formulation.

Definitions:

- Jam – a product containing both soluble and insoluble fruit constituents.
- Conserve or preserve – large pieces of fruit are present
- Butter - a smooth, semisolid fruit mixture with no fruit pieces or peels. May be spiced.
- Marmalade – are made from citrus fruits and contain some peel
- Jelly – is made from filtered fruit juice, no pieces of fruit or insoluble solids present.

In the U.S. jams and jelly products are graded as follows:

- Fancy – 50 parts fruit to 50 parts sugar
- Standard – 45 parts fruit to 55 parts sugar
- Imitation – 35 parts fruit to 65 parts sugar

All fruit butters have at least 5 parts fruit to 2 parts sugar or other sweeteners; final sugar is no less than 43%.

Ingredients

The essential ingredients of a preserve are sugar, fruit, pectin and acid.

Sugar: The final sugar content must be 65% to 69%. The high sugar content:

- | | |
|--------------------------------|------------------------------|
| 1) suppresses microbial growth | 3) helps set the pectin |
| 2) sweetens the product | 4) makes the product glisten |

Some sugar comes from the fruit, most from added sugar (common sugar is called sucrose), for example:

45 lb. Fruit @ 10% = 4.5 lb. Sugar
55 lb. Sugar @ 100% = 55 lb. Sugar
Total = 59.5 lb. Sugar

The sugar content is expressed as percent soluble solids or °Brix. It is usually measured with a refractometer. Good refractometers can be purchased for under \$150.00.

The finished product should contain some non-crystallizing sugar such as glucose and or fructose to prevent the growth of sucrose crystals in the preserve during storage or after opening. In the U.S., a portion of corn syrup is often used to replace some of the sucrose. The solubility of pure sucrose is 66% at 70°F.

Pectin: Roughly 1% of most fruit is pectin. Some fruits, such as citrus and apple, are rich in good quality pectin and make good gels. Other fruits, such as strawberry and raspberry, have poor quality pectin so pectin must be added to obtain a satisfactory gel. However, the quantity

of pectin is not as important as its setting quality.

Commercial pectin is manufactured from citrus peel or apple pomace and is sold as a dry powder. The pectin grade is the number of pounds of sugar that 1 pound of pectin will set to a gel with correct sugar content and pH level. 100 grade, 150 grade and 200 grade are the most common commercial pectins.

For home use, pectin powder is blended with acid and sugar and sold in small packets (dry form) or bottles (liquid form). Each packet or bottle is sufficient to make one kitchen-sized batch of preserve or jelly.

For viscous jams the pectin content is not important because the insoluble solids impart a thick consistency. However, these products require high fruit content, typically 50 lb. sugar to 50 lb. fruit.

Acid: The acid ‘cuts’ the sweetness of the sugar and achieves the pH necessary to set the pectin. Fruits supply some acid. Frequently an addition of fruit acid is needed to bring pH into the correct range for gel formation and for flavor purposes. Acid is essential for tropical fruits such as ripe papaya, mango and fig, which are very low in acid content. The most common acids are citric, malic, fumaric, tartaric and lactic. Use the cheapest fruit acid available.

A pH range of 2.8 to 3.3 is needed to set the gel depending on the nature of the pectin. The most common cause of gel failure is insufficient acid.

pH of mixture

3.6 – no gel
3.4 – weak gel
3.2
3.0 – good firm gel
2.8
2.6 – weak gel – syneresis may occur
2.4 – no gel

°Brix of mixture

70 – crystallization may occur
68 – good texture of jelly
66
65 – legal minimum
64
62 – weak gel
60 – no gel, viscous liquid

General Procedure for Making Preserves and Jellies

- Prepare fruit – sort, wash, peel, chop, slice, or puree as needed
- Cook fruit –
 1. If making jelly, strain to remove solids
 2. If making butter, cook until pulp is soft and then push through a food mill or sieve
 3. It is best to mix with some sugar (1 part pectin and 5 parts sugar) to prevent clumping
 4. If using dry pectin, add it to cooking fruit and simmer 1-2 minutes to dissolve.
- Add sugar, cook and stir to dissolve
- Boil vigorously until desired °Brix is reached (67-69%). The end point may be determined by:
 1. Instructions on the pectin package
 2. Use of a refractometer (most accurate)
 3. Use of a thermometer (219°-220°F)
- When the end point is reached, turn off the heat and remove the scum.
- Fill into containers while hot (above 180°F), seal and invert to sterilize lids. After a minimum of 2 minutes in the inverted position, containers may be cooled by immersion in gradually cooling water. Most glass can withstand a thermal shock of approximately 60°F without breaking. It is advisable to warm the containers before filling with hot preserves.

Boiling Preserves

Boiling of the sugar-fruit mixture causes a number of changes that range from essential to undesirable.

Essential:

- Increases the solids content by boiling out some of the water in the fruit.
- Destroys enzymes in the fruit and microorganisms on the fruit.
- Allows the sugar to penetrate into the tissue of the fruit more readily.

Desirable

* Inverts some of the sugar to help prevent crystallization during storage.

Sucrose + heat, acid => glucose + fructose
(crystallizes easily) (crystallizes with difficulty)

Undesirable

* Volatilizes fruity aromas

* Degrades pectin

* Darkens color (carmelization)

Sugar solutions + heat => caramel
(black color, strong flavor)

The best quality preserves are made when the mixture is brought to a boil as quickly as possible, boiled as vigorously as possible until the desired solids content is reached, then filled, sealed and cooled as quickly as possible.

Certified Organic Foods

Consumers are looking for high quality products made of ingredients free from additives, preservatives or other such processing aides. Since it guarantees quality to consumers, Organic Certification offers processors and farmers a valuable marketing tool.

Organically processed foods are subject to the standards released in December 2000 by the National Organic Program (NOP) (www.ams.usda.gov/nop) of the US Department of Agriculture and published as the Final Rule for Organic Standards in the Federal Register. These final regulations are similar to most standards presently used by organic producers and handlers. However, the new regulations, which will be implemented over a period of eighteen months, create a uniform code with which all producers and processors of organic products must comply.

Under the new rules local agencies accredited by the USDA will certify that production and handling practices meet the national standards. Annual on-site inspections will be conducted by certifying agents to review record keeping, farming practices, and food processing standards. Requirements for the certification of handlers/processors of organic agricultural products include:

- Description of organic handling systems - general description for operation, handling/processing procedures; facility flow chart showing movement of organic food through handling/processing; identification of all equipment, machinery, and storage areas.
- Assurance of organic integrity - provide a description of the sources of potential contamination and the measures taken to prevent it. Provide a list of individuals and businesses that co-process, sell, transport or store the products.
- Processing ingredients – list all certified organic ingredients and non-organic ingredients used in processing. Non-organic ingredients must be documented as commercially unavailable in certified organic form. All processing aides must be listed. Water use and quality must be described.
- Regulated ingredients include: wood smoke, high levels of salts and sweeteners, leavenings, flavors, colorings, preservatives, herbs and spices, thickeners, vitamins and enzyme treatments.

In addition, the Final Rule prohibits the use of genetic engineering, ionizing radiation and sewage sludge at any step in organic production and handling.

Labeling and Marketing Information

Labeling requirements are based on the percentage of organic ingredients in a product.

- Products labeled “100% organic” (excluding salt and water) contain exclusively organically produced ingredients.
- Foods labeled “100% percent organic and “organic” cannot be produced using excluded methods (i.e. genetically engineered), sewage sludge or ionizing radiation
- Products containing 95% organically produced ingredients may be labeled “organic.”
- Processed products that contain at least 70% organic ingredients can use the phrase “made with organic ingredients.”
- Pesticide residuals must be lower than 5% to meet the compliance threshold.
- Wines containing sulfites may be labeled as “Made with Organic Grapes.”
- Commercial availability provisions require handlers to use organic ingredients in “organic” products whenever possible.

Farms and handling operations that sell less than \$5,000 annually of organic agricultural products are exempt from certification. However, they must comply with all other national standards for organic products and may label their products as organic.

National Organic Program: Keith Jones, Program Manager USDA-AMS-TM-NOP, Room 2945, South Building PO Box 96456, Washington, DC 20090-6456 Telephone: (202) 720-3252
email: NOPWebmaster@usda.gov

Connecticut	New Hampshire	New York	Rhode Island
Frank Green CT. Dept. of Agriculture 165 Capitol Ave, Room 167 Hartford, CT 06106 860-713-6160	Vickie Smith NH Dept of Ag. Markets & Food P.O. Box 2042 Concord, NH 03302 603-271-3685	John Thomson NY Dept of Ag & Markets 1 Winners Circle Albany, NY 12235 518-457-7076	Dan Lawton RI Dept of The Environment Division of Ag & Resource Mkt. 235 Promenade St. Rm. 370 Providence, RI 02908 401-222-2781 ext. 4516

** Maine, Vermont and Massachusetts use the Northeast Organic Farming Association (NOFA) rules for certification. New York State defers to the certifying agencies operating in the State.

Certifying Agencies

The Demeter Association Britt Road Aurora, NY 13026 (315) 364-5617 Contact: Anne Mendenhall	Maine Organic Farmers & Gardeners Association (MOFGA) P.O. Box 2176 Augusta, ME 04338 (207) 622-3118 and (207) 622-3119	Northeast Organic Farming Association of Connecticut (NOFA-CT) P.O. Box 17 Chaplin, CT 06235 (860) 870-6935	Northeast Organic Farming Association of Massachusetts (NOFA-MA) 140 Chestnut Street West Hatfield, MA 01088 (413) 247-9264	Northeast Organic Farming Association of New York (NOFA-NY) 26 Towpath Road Binghamton, New York 13904 (607) 724-9851
Northeast Organic Farming Association of Vermont (NOFA-VT) P.O. Box 697 Richmond, VT 05477 (802) 434-4122	OCIA International 1001 Y Street, Suite B Lincoln, NE 68508-1172 (402) 477-2323	OCIA Quebec 212 Macnamee Scotstown, QC J0B 3B0 Canada (819) 657-4450	Organic Crop Improvement Association New England (OCIA-NE) 1001 Y Street, Suite B Lincoln, NE 68508- (402) 477-2323	Organic Forum International, Inc. 1280 Merkley Road, R.R. #3 Grovenhurst, ON P1P 1R3 Canada (705) 687-4826
Baystate Organic Certifiers 683 River Street Winchendon, MA 01475 (978) 297-4171	Organic Growers of Michigan 1824 66 th Street Fennville, MI 49408 (269) 543-4315	Northeast Organic Farming Association of New Jersey (NOFA-NJ) 60 S. Main Street P.O. Box 886 Pennington, NJ 08534 (609) 984-2225	D. Grosser & Associates, Ltd. 305 Madison Avenue Suite 3120 New York, NY 10165 (212) 661-0435	Natural Food Certifiers 648 Central Park Ave. Suite 136 Scarsdale, NY 10583 (845) 426-5098
Vermont Organic Farmers, LLC P.O. Box 697 Richmond, VT 05477 (802) 434-4122	Pennsylvania Certified Organic 406 South Pennsylvania Ave. Centre Hall, PA 16838 (814) 364-1344			

IX

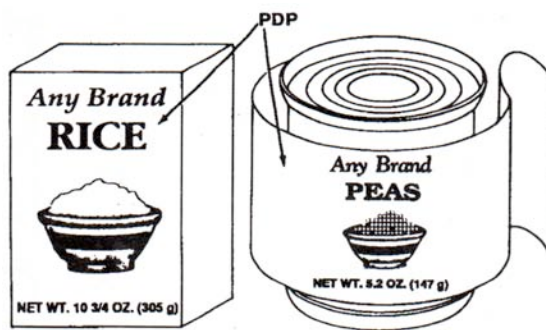
Labeling

Labeling Requirements

Label Parts, Terms, and General Information

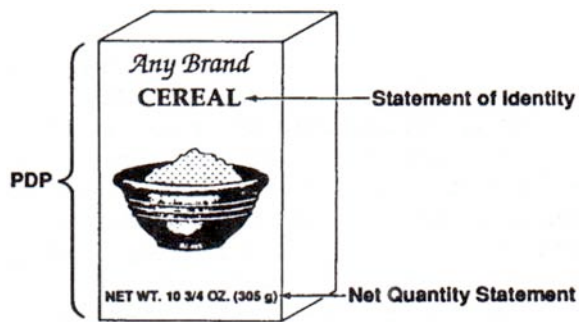
A package or commodity in packaged form means any commodity put up or packaged in any manner in advance for retail sale. This includes cellophane wrapped products kept in a closet display case, even if those products need to be weighed and priced at the time of sale.

The **Principle Display Panel (PDP)** is that portion of the package that is most likely to be seen by the customer at the time of purchase. Many food containers are designed with two or more surfaces suitable for display as the PDP. These alternative surfaces are referred to as “**Alternative Principle Display Panels**”.

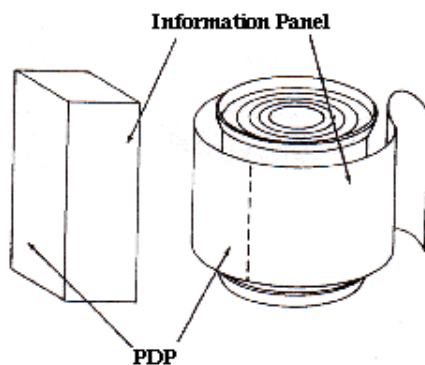


Required Information on the PDP:

- Statement of identity (what is in the package)
- Net quantity statement or amount of product

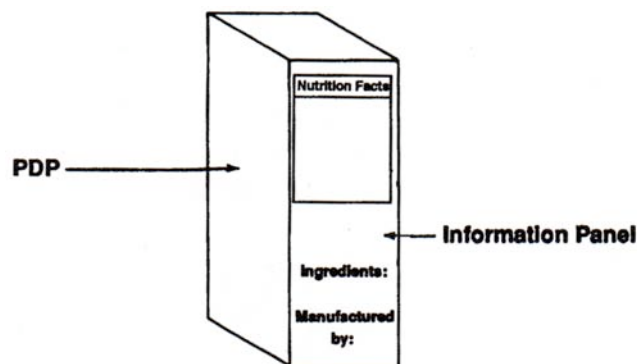


The **Information Panel (IP)** is the label panel immediately to the right of the PDP, as displayed to the consumer. If this panel is not available due to package design and construction (folded flaps, etc.), then the information panel is the next label panel immediately to the right.



Required Information on the Information Panel:

- name and address of the manufacturer, packer or distributor
- ingredient list
- nutritional labeling (when required)



Type / Language Requirements

All information on the PDP or IP must appear prominently and conspicuously: letter/numbers must be at least 1/16 of an inch in height, except for those requirements addressed below (see explanation of Net Quantity).

All required label information must appear in English. If the labeling bears any statutory information in a foreign language, all the required labeling information must appear in both the foreign language and English.

Imitation Foods

If any food product is an imitation of another, and is nutritionally inferior to that product, it must be labeled “Imitation _____”. The space must be filled in with the name of the food imitated (“Imitation Cheese”). Furthermore, the word “imitation” must be in a type of the same size and prominence as that used for the name of the food.

Nutrition Information

Information on the requirements for inclusion of nutrition information on a label should be requested from your local Food & Drug Administration office. Note that all health claims are strictly regulated. Contact your local FDA office for further information.

Other Information

General Information about the product or company can be included on the “Romance Panel”, the panel immediately to the left of the PDP.

Five Basic Label Requirements

- Identity of Food in Package Form
- Net Quantity of Contents
- Name of Manufacturer, Packer, or Distributor
- Place of Business
- Ingredient Declaration

Explanation of the Five Basic Label Requirements

Identity of Food in Package Form

1. The principle display panel of a label for a food in package form must have as one of its principal features a statement of the identity of the commodity by its common or usual name. Ex. Rice, Vanilla Wafers, Cheese
2. Where a food is marketed in various forms (grated, sliced, diced, etc.) the particular form is considered part of the identity statement. Ex. Sliced American Cheese, Grated Parmesan Cheese
3. The statement of identity must be present in bold type on the principal display panel in a size reasonably related to the most prominent printed matter.

Name of Manufacturer, Packer, or Distributor

1. Corporations: only the actual corporate name must be given, and this may be preceded or followed by the name of the particular division involved.
2. An individual, partnership or association: the name under which the business is conducted must be used.
3. A food not manufactured by the person whose name appears on the label: a qualifying phrase such as “Manufactured for _____”, “Distributed by _____”, or other expression of facts, must appear with the name.

Place of Business

The place of business must include:

1. The street address, city, state, and zip code.
2. The street address may be omitted if it appears in a current city or telephone directory.

Ingredient Declaration

1. Ingredients must be:
 - listed by their common or usual name
 - listed in descending order of predominance by weight
 - displayed on a single panel of the label
2. The name of an ingredient must be a specific name and not a collective name.
 - If the ingredient is a designated spice, flavoring or natural color, it need only be stated as spices, artificial color or artificial flavor. Colorings subject to certification (FD&C) must be listed by their specific name (example FD&C Yellow #5).
 - If an ingredient used in the product conforms to a standard of identity or is a multi-ingredient product, its ingredients must be listed on the label.
 - When blends of fats and/or oils are used, the common or usual name of each fat or oil used must be listed in parenthesis following the term vegetable shortening, animal fat, or marine oil.
 - If an individual fat and/or oil ingredient is used, not a blend, the common name of that product must be listed in the correct order of predominance.
3. No abbreviations of an ingredient's common or usual name are permitted, unless explicitly provided for in the statutes.
4. Water used in fabricated foods must be declared on the label in its order of predominance.

Net Quantity of Contents

The principal display panel of a label for a food in packaged form shall bear a declaration of net quantity of contents. This declaration must:

1. Be expressed in terms of avoirdupois pound and ounce, volume, and/or numerical count.
2. Appear as a distinct item within the lower 30% of the principal display panel.
3. Be printed in boldface print or type with letters and numbers of a size in relationship to the total square inches of the principal display panel (see table below).

<u>Area of PDP</u>	<u>Minimum Type Size</u>
5 sq. inches or less	1/16 inch (1.6 mm)
> 5 sq. inches but less than 25 sq. inches	1/8 inch (3.2 mm)
> 25 sq. inches but less than 100 sq. inches	3/16 inch (4.8 mm)

The declaration of net quantity of contents must be expressed in both US Customary System and metric measures according to the following criteria:

- Weight (pounds, ounces, etc.): expressed in ounces followed by the metric equivalent in parentheses. Ex. NET WT. 9 OZ (255 g)
- Fluid Measure (fluid ounces, pints, gallon, etc.): expressed in fluid ounces followed by the metric equivalent in parentheses. Ex. 16 FL OZ (473 mL)

References:

A Food Labeling Guide. U.S. Food & Drug Administration, Center for Food Safety & Applied Nutrition. 2nd Ed. 1999. <http://vm.cfsan.fda.gov/~dms/flg-toc.html>

New York State Food Labeling. FSI-514. State of New York Department of Agriculture & Markets. 1996.

Meat Labeling Basics

The FSIS (Food Safety and Inspection Service), a branch of the U.S. Department of Agriculture, is responsible for regulating and evaluating labels for meats, poultry and some egg products. The following information is designed to clarify key parts of the process. **It is strongly recommended that you contact the FSIS Label Review Board (LRB) when creating the label for any meat product.**

Terminology:

Amenable Products – accountable to FSIS regulations

1. red meat : products contain 3% raw or 2% cooked
2. cooked poultry: products contain at least 2% (no specification for minimum amount of raw)
3. eggs: products contain eggs that are broken and the contents processed further.

Non-Amenable Products – not accountable to regulations or accountable in different ways
(Check with FSIS Labeling Review Board)

1. Cheese spreads with < 50% meat
2. Closed face sandwiches
3. Bullion cubes
4. Dry soup mixes
5. Freeze-dried or cooked eggs
6. Egg shells
7. Egg substitutes

Marking – application of the official inspection legend. (See figure 1.).

Standard of Identity – standard form, ingredient content and composition of a product as defined by a regulatory body such as FSIS or the Food & Drug Administration.

Principle Display Panel (PDP) - That portion of the package that is most likely to be seen by the customer at the time of purchase.

Information Panel (IP) - The label panel immediately to the right of the PDP, as displayed to the consumer.

Label Considerations

Name: The product name must be acceptable to the Labeling Review Board. Call them with several possibilities and the formula for the product. They will determine which names are permitted. Generally, the name should be common or usual, truthful and descriptive. If a fanciful name is used, the standard name must be printed below it on the label.

Marking: Any meat product placed in a container must be marked with the official inspection legend. (See figure 1.) The legend must contain the inspection number for the facility at which the product was produced.



Figure 1. Examples of official inspection legends

Safe Handling Instructions: Required for all meat and poultry products that are not fully cooked or ready-to-eat. The instructions can be placed anywhere on the outside of the immediate container.

Nutrition Labeling: Nutrition labeling for single ingredient, raw products is voluntary. Small businesses are exempt from Nutrition Labeling requirements *unless they are making nutrition claims*. In all other cases, nutrition labeling on meat products is subject to the same guidelines as nutrition labeling on other products.

Placement of Information:

On the Principle Display Panel (PDP) or 20% panel of a can:

1. Product name
2. Ingredients listed in descending order of predominance
3. Inspection legend (any size as long as it is conspicuous and easily read)
4. Handling statement (if needed)
5. Manufacturer address

On the Informational Panel (IP):

1. Ingredients (if listed with address and nutrition information)
2. Nutrition Information

Label Approval Type

Meat labels are approved through the FSIS Label Review Board (LRB). There are three types of meat label approvals: Generic, Temporary and Sketch. Generic approvals do not require review by the LRB. Temporary and Sketch approvals do.

The following modifications to labels already approved by the LRB are allowed without additional approval:

- Change in label size
- Use of abbreviations
- Name and address changes
- Holiday designs
- New establishment numbers on Inspection Legends
- Changes in serving directions, net weight or punctuation
- The addition of Handling Instructions or Nutrition Labeling
- Changes in cooking instructions, open dating or recipes

Table 1. Types of meat label approval and corresponding product requirements.

Approval Type	Requirements	Required Review
Generic	• Product is amenable • Product is single ingredient or multi-ingredient with a standard of identity • Products for Federal contracts • Products not for human consumption • No special claims, guarantees or foreign language on the label. • No nutrition information stated.	None
Sketch	• Anything that is not Generic • Non-standardized product (ex. Beef Flavor) • Non-amenable products (ex. Ostrich Jerky)	Review by LRB (submit 1 label).
Temporary - mainly cover errors in label design; granted while the labels are being corrected.	• Establishment states “temporary” on the application • Limited time period (< 180 days) • Label does not misrepresent products • No potential health, safety or dietary risks • Denial causes economic hardship • No unfair competition	Company may use label without review by LRB provided the label is in the process of being reviewed.

Labeling Records

Establishments must maintain records of their labels. These records consist of the following items for each label: actual product label, product formulation, processing procedure, sketch approvals if necessary.

References:

Meat & Poultry Labeling Terms. Food & Safety Inspection Service; U.S. Department of Agriculture. Consumer Education Information. Revised 2001. <http://www.fsis.usda.gov/oa/pubs/lablterm.htm>

10 Most Commonly Asked Questions. Food & Safety Inspection Service; U.S. Department of Agriculture. Consumer Education Information. 2000. http://www.fsis.usda.gov/OPPDE/larc/Label_QA.htm

Nutrition Labels

In addition to the serving size and the number of servings per container, there are 15 required nutrient declarations for foods that are a significant source of these identified nutrients. These nutrients are calories, calories from total fat, total fat, saturated fat, trans fat, cholesterol, total carbohydrate, sugars, dietary fiber, protein, sodium, vitamins A and C, calcium and iron.

Simplified Label Format

If a food product contains insignificant amounts of seven or more of the above nutrients, then a simplified format may be used. “Insignificant amount” is defined as “that amount that allows a declaration of zero in labeling” and varies with different nutrients. The simplified format includes: serving size, number of servings per container, calories, total fat (grams), sodium (milligrams), total carbohydrate (grams), protein (grams) and other nutrients otherwise required in nutritional labeling that are present in more than insignificant amounts, and vitamins and minerals for which Referenced Daily Intakes (RDI) have been established and that are required to be added under a standard of identity.

Examples of full and simplified formats are included. There are specific guidelines for serving sizes, specific age groups, type sizes and lines separating the information. Before designing or ordering labels, get advice.

Nutrient content Claims

Before you use any words such as: free, no, high, low, reduced, light, fresh, freshly, fresh frozen, natural or synonyms of these words, check with some authoritative source on labeling to be sure that you will be correct because the regulations also cover this subject.

Label Claims

Before you make any health claims on your label such as: source of, low cholesterol, low fat, high fiber, high in vitamins A, C, calcium or whatever, check with some authoritative source on labeling because this subject is also covered in the regulations.

Prohibited are health claims: relating zinc and immune function in elderly; folic acid and neural tube defects; and omega-3 fatty acids and coronary heart disease.

Permitted are health claims relationship between calcium and osteoporosis; diets low in fat and high in fiber containing grain products, fruits and vegetables and risk of cancer and coronary heart disease; dietary fat and cholesterol and risk of coronary heart disease; dietary fat and risk of cancer, and sodium and hypertension provided that required label statements are made.

Suggestions

Do not make a nutrient content or health claim on your label unless you intend to use it as a marketing tool, and then have nutritional analysis done on your product before ordering labels.

Before you design or order new labels, seek professional advice on labeling regulations.

Nutrition Labeling Exemption

The U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) published on January 6, 1993 in the Federal Register (FR) the final food labeling regulations, which required most food products sold in the United States to carry nutrition information on their label by May 1994. The two publications cover nearly 2330 pages in the FR. The purpose of this communication is to give you an idea what is required on food labels.

Under **21 CFR 101.9(j)(1)**, a business may be exempt from the requirement of including a "Nutrition Facts" panel on its food packages if it meets the required criteria for number of employees and amount of product sold. This exemption deals only with the necessity of having the "Nutrition Facts" panel, and has no effect on the mandatory labeling information (i.e., common name of product, net contents, ingredient statement, name and address of responsible firm).

Currently, the exception applies only to a person/ business/ company with fewer than 100 employees that sells or anticipates selling fewer than 100,000 units of product per 12-month period in the United States. If, after obtaining an exemption, a company exceeds either criterion within the given 12-month period, the exemption is void and the company has 18 months to comply with the labeling regulations.

Businesses must file an annual notice with FDA that they are claiming an exemption based on number of employees and units of product. This notice must be filed at the beginning of the time period for which the exemption is claimed.

NOTE: If the person/business is not an importer and has fewer than 10 full-time equivalent employees, that person/ business does not have to file a notice of exemption for any food product with annual sales of fewer than 10,000 units. The exemption also applies to retailers with annual gross sales of less than \$500,000, or with annual gross sales of food to consumers of less than \$50,000. The number of employees is based on the average number of full time equivalent employees. (Divide the total number of hours of wages or salary paid by hours per week times weeks per year)

A "product" is a food with the same brand name and statement of identity and similar preparation methods.

A "unit" is a package or, if unpacked, the form in which the product is offered for sale.

"Company" includes domestic and international affiliates.

If any nutrient content claim (e.g., "low fat") or health claim is made, this exemption is not applicable.

Examples of Revised Nutrition Facts Panel Listing Trans Fat

Nutrition Facts		
Serving Size 1/12 package (44g, about 1/4 cup dry mix) Servings Per Container 12		
Amount Per Serving	Mix	Baked
Calories	190	280
Calories from Fat	45	140
% Daily Value**		
Total Fat 5g*	8%	24%
Saturated Fat 2g	10%	13%
Trans Fat 1g		
Cholesterol 0mg	0%	23%
Sodium 300mg	13%	13%
Total Carbohydrate 34g	11%	11%
Dietary Fiber 0g	0%	0%
Sugars 18g		
Protein 2g		
Vitamin A	0%	0%
Vitamin C	0%	0%
Calcium	6%	8%
Iron	2%	4%
* Amount in Mix		
** Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:		
	Calories:	2,000 2,500
Total Fat	Less than	65g 80g
Sat Fat	Less than	20g 25g
Cholesterol	Less than	300mg 300mg
Sodium	Less than	2,400mg 2,400mg
Total Carbohydrate		300g 375g
Dietary Fiber		25g 30g

Nutrition Facts			
Serving Size 1 cup (228g)			
Servings Per Container 2			
Amount Per Serving			
Calories 260		Calories from Fat 120	
		% Daily Value*	
Total Fat	13g		20%
Saturated Fat	5g		25%
Trans Fat	2g		
Cholesterol	30mg		10%
Sodium	660mg		28%
Total Carbohydrate	31g		10%
Dietary Fiber	0g		0%
Sugars	5g		
Protein	5g		
Vitamin A	4%	•	Vitamin C 2%
Calcium	15%	•	Iron 4%
* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:			
	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g
Calories per gram:			
Fat	9	•	Carbohydrate 4
			• Protein 4

Nutrition Facts		Amount/serving	% Daily Value*	Amount/serving	% Daily Value*
Serving Size 2 slices (56g) Servings per container 10		Total Fat 1.5g	2%	Total Carbohydrate 26g	8%
Calories 140 Calories from Fat 15		Saturated Fat 0.5g	3%	Dietary Fiber 2g	8%
		Trans Fat 0.5g		Sugars 1g	
		Cholesterol 0mg	0%	Protein 4g	
		Sodium 280mg	12%		
		Vitamin A 0% • Vitamin C 0% • Calcium 6% • Iron 6%			
		Thiamin 15% • Riboflavin 8% • Niacin 10%			

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	85g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Nutrition Facts Serv. Size: 1 package, Amount Per Serving:
Calories 45, Fat Cal. 10, **Total Fat** 1g (2% DV), Sat. Fat 0.5g (3% DV), **Trans** Fat 0.5g,
Cholest. 0mg (0% DV), **Sodium** 50mg (2% DV), **Total Carb.** 8g (3% DV), Fiber 1g
(4% DV), Sugars 4g, **Protein** 1g, Vitamin A (8% DV), Vitamin C (8% DV), Calcium
(0% DV), Iron (2% DV). Percent Daily Values (DV) are based on a 2,000 calorie diet.

Helvetica Regular 8 point with 1 point of leading

3 point rule

8 point Helvetica Black with 4 points of leading

1/4 point rule centered between nutrients (2 points leading above and 2 points below)

8 point Helvetica Regular with 4 points of leading

8 point Helvetica Regular, 4 points of leading with 10 point bullets.

Nutrition Facts

Serving Size 1 cup (228g)
Serving Per Container 2

Amount Per Serving

Calories 280 Calories from Fat 120

% Daily Value*

Total Fat 13g **20%**

Saturated Fat 5g **25%**

Trans Fat 2g

Cholesterol 30mg **10%**

Sodium 680mg **28%**

Total Carbohydrate 31g **10%**

Dietary Fiber 0g **0%**

Sugars 5g

Protein 5g

Vitamin A 4% • Vitamin C 2%

Calcium 15% • Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	85g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Franklin Gothic Heavy or Helvetica Black, flush left & flush right, no smaller than 13 point

7 point rule

6 point Helvetica Black

All labels enclosed by 1/2 point box rule within 3 points of text measure

1/4 point rule

Type below vitamins and minerals (footnotes) is 6 point with 1 point of leading

Nutrition Facts				Wheat Squares Sweetened	Corn Flakes Not Sweetened	Mixed Grain Flakes Sweetened
Serving Size 1 Box				(35g)	(19g)	(27g)
Servings Per Container				1	1	1
Amount Per Serving						
Calories				120	70	100
Calories from Fat				0	0	0
				% Daily Value*	% Daily Value*	% Daily Value*
Total Fat				0g 0%	0g 0%	0g 0%
Saturated Fat				0g 0%	0g 0%	0g 0%
Trans Fat				0g	0g [†]	0g
Cholesterol				0mg 0%	0mg 0%	0mg 0%
Sodium				0mg 0%	200mg 8%	120mg 5%
Potassium				125mg 4%	25mg 1%	30mg 1%
Total Carbohydrate				29g 10%	17g 6%	24g 8%
Dietary Fiber				3g 12%	1g 4%	1g 4%
Sugars				8g	6g	13g
Protein				4g	1g	1g
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:				Vitamin A 0%	10%	10%
Calories: 2,000 2,500				Vitamin C 0%	15%	90%
Total Fat Less than 65g 80g				Calcium 0%	0%	0%
Sat Fat Less than 20g 25g				Iron 10%	6%	20%
Cholesterol Less than 300mg 300mg				Thiamin 30%	15%	20%
Sodium Less than 2,400mg 2,400mg				Riboflavin 30%	15%	20%
Potassium 3,500mg 3,500mg				Niacin 30%	15%	20%
Total Carbohydrate 300g 375g				Vitamin B6 30%	15%	20%
Dietary Fiber 25g 30g						

Nutrient and Health Claims Basics

(Based on the Food & Drug Administration's Food Labeling Guide)

The following information addresses the most common nutrition claim and labeling questions including appropriate language and required nutrient content. The information pertains to *Individual Food Products*, not to meals, seafood or game meats. For questions about nutrition claims not covered below, visit the Food and Drug Administration's Food Labeling Guide web site at <http://vm.cfsan.fda.gov/~dms/flg-toc.html> or contact NECFE.

Types of Claims

1. *Nutrient Claims*: claims about the amount or absence of nutrients. Includes language like "Sodium Free," "Good Source of fiber," and "a low calorie food." Claims are based on amount of nutrient per serving of product.
2. *Comparative Claims*: claims regarding the amount of nutrient in a product as compared to some similar product. Includes language like "Light," "Fortified," and "More than...". Claims are based on the amount of nutrient in a product as compared to the amount usual for the product type (the amount in the "reference product").
3. *Health Claims*: claims regarding the health benefits of a food containing certain nutrients. Includes language like "healthy food" and "Diets low in saturated fat and cholesterol may reduce the risk of heart disease." Claims are based on the amount of one or more nutrients per serving of product.

General Requirements

1. If you are making *any* health or nutrient claim, you *must* include nutrition information in the form of a complete nutrition label, regardless of the size of your company.
2. Partial nutrition labels are not allowed for any reason.
3. Claims must be based on nutrients for which the FDA has established Daily Values.
4. Only serving sizes established for similar products by the FDA (21 Code of Federal Regulations 101.12(b)) are allowed.
5. Claims must conform to language approved by the FDA.
6. Voluntary nutrients must be listed on the nutrition label if a claim relies upon them.
7. The type size of the claim may be up to twice the type size of the name of the food. However, if the claim is judged to be "unduly prominent," the label may be in violation, even if the type size is in compliance.
8. The only language permitted for nutrients without established Daily Values is "contains" or "provides" and the amount of the nutrient per serving is required. For example, "Contains 3 g of omega-3 fatty acids" is permitted. If the amount is not stated, the claim is in violation of regulations.

Uniform Product Code (UPC)

By law, Uniform Product Codes are not required. However, retailers, brokers, and wholesalers may not even consider purchasing your product without a UPC on the label. For more information on obtaining a UPC, you may contact the Uniform Product Code Council. The address is Uniform Code Council, 7887 Washington Village Drive, Suite 300, Dayton, OH 45459. The telephone number is 937-435-3870 and the fax number is 937-435-7317. You may also visit their website <http://www.gs1us.org> Email address is gs1us@uc-council.org.

X Processing Facilities & Equipment

Purchasing pH Meters

More than 90% of the scheduled processes approved by NECFE require the processor to check the pH of the product before it is bottled or shipped. The pH measurement is an indication of the degree of acidity of a food product. Since pH often determines whether or not the product will be safe to consume, it is very important that pH testing be done correctly and accurately.

By law, if the product pH is less than 4.0, it can be checked with simple pH papers (often called litmus strips). Although this method is inexpensive, it has drawbacks: 1. if the product being tested is thick or highly colored, the color of the strip may not be easy to determine; 2. if the product pH is normally close to 4.0, for example 3.8 or 3.9, you may not be able to detect a formula deviation that sends the product above its safe pH level. It is therefore recommended that the manufacturer invest in a good pH meter.

Where can I get a pH meter?

The best place to purchase a meter is through a scientific supply company. A list of examples is provided at the end of the article.

How much do they cost?

pH meters prices range from under \$100 to over \$1000. Generally, good quality meters with desirable features are available for under \$300. Keep in mind that the better quality meters generally last longer and take relatively more abuse.

What should I look for in a pH meter?

Accuracy: This should be the first consideration. Accuracy is listed as a range of $\pm 0.X$ pH units. This means the meter may read so many pH units above or below the actual pH of the product. Since you will be using or loosing batches depending on the pH reading, a narrow accuracy range is important.

Considerations include:

- Inexpensive pH meters are generally less accurate (greater accuracy range).
- For food processors of products with pH between 4.0 and 4.6, a pH meter with an accuracy of $\pm 0.01 - 0.02$ pH units is sufficient and required.
- For flavored vinegars with a very low pH unlikely to get anywhere near pH of 4.0, a less expensive model with an accuracy of ± 0.1 pH units is sufficient.

Calibration: All pH meters must be calibrated (checked against a known standard) to assure accuracy. Most meters can be calibrated to at least two standards at the same time.

Calibration Standards or Buffers: You should order at least 2 buffers, pH 7 and pH 4, for your two point calibration. The pH 4 is necessary because your meter should be calibrated to a standard that is no more than 3.0 pH units from your product. Sometimes buffers are sold in sets of 4, 7 and 10. The pH 10 buffer is generally not needed in the food industry.

Electrodes: The Electrode is the part of the instrument that is immersed in the product. Since oil in a product can easily clog the electrode causing erroneous choosing the right electrodes is important. For very oily, emulsified products (such as salad dressings) where the oil isn't easy to separate, the use of an electrode with a non-clog tip (for example "sure flow") is required. For products with only small amounts of oil, those that can be tested before the oil is added, or those from which the oil can be separated, standard electrodes supplied with most meters are sufficient.

When pricing meters, make sure that you know if the model you are considering comes with the electrode or if it will have to be purchased separately. Special electrodes with non-clog tips are often more expensive, but will last longer and give better and faster results under adverse conditions.

Temperature: pH readings are effected by temperature. In order to get an accurate reading, the pH meter must be calibrated at the same temperature as the samples being tested. In most cases, this means the product should be cooled to room temperature before testing. Meters with temperature compensation are available at additional cost. The compensation works for small temperature changes, but will not work for large ones, i.e. between hot-fill (160-200°F) and room temperatures.

Shop carefully: Talk to the sales representative of the companies and ask lots of questions! You want and need an accurate, easy to use instrument, but there's no need to pay several hundred dollars to get a good one. Below is a partial list of companies that supply pH meters. For a more comprehensive list, contact NECFE.

Cole-Parmer
625 East Bunker Road
Vernon Hills, IL 60061-1844
888-409-3663
800-247-7400 (hearing
impaired)
847-247-2929 (fax)
www.foodtechsource.com

Hanna Instruments
584 Park East Drive
Woonsocket, RI 02895
800-HANNAUS (426-6287)

Empire State Scientific Co., Inc.
16 Corporate Circle
East Syracuse, NY 13057
800-724-1823
315-463-9216 (local)
315-473-8397 (fax)

Fisher Scientific
800-766-7000
www.fishersci.com

Whatman Lab Sales, Inc.
P.O. Box 1359
Hillsboro, OR 97123
800-942-8626
800-858-2243 (fax)

VWR
Philadelphia Regional
Distribution Center
200 Center Square Road
Bridgeport, NJ 08014
800-932-5000 (orders)
609-437-2600
609-467-5499 (fax)
www.vwr.com

Weber Scientific
2732 Kuser Road
Hamilton, NJ 08691
800-328-8378
609-584-7677
609-584-8388 (fax)
www.weberscientific.com

Basic Standards for Home and Commercial Kitchens

The Federal government, individual states, cities and municipalities govern the operation of food processing facilities whether home kitchens or commercial facilities. Regulations differ from state to state and are determined by the type of the food product being prepared and the processing methods used. When considering starting up a home or commercial kitchen, it is important to research which agencies regulate licensing of the product, inspection of the facility, foods allowed and not allowed to be produced in each facility, local zoning laws governing the use of the building, and building codes.

Potentially Hazardous Foods

Some types of foods may not be produced in a home kitchen, as mandated by Federal regulations. These foods are considered potentially hazardous:

- Low acid and acidified foods, i.e. potentially hazardous, packed in hermetically sealed containers must be registered with the US Food and Drug Administration (FDA). See the glossary for a definition of low acid and acidified foods.
- Meat products with more than 3% raw or less than 2% cooked ingredients in a completed product are regulated by the US Department of Agriculture (USDA).
- Vacuum packaged and any other reduced oxygen packaged products.

At the state level, contact the state Department of Health and/or the state Department of Agriculture and Markets for regulations governing home and commercial kitchens and the foods processed in them.

Many states allow non-hazardous foods such as candy, cakes not requiring refrigeration, cookies, brownies, two-crust fruit pies, breads and rolls, fruit jams and jellies, dried spices and herbs, and snack items to be produced in home kitchens. It is the producer's responsibility to contact the state regulatory agencies where the food is being produced for the rules governing home kitchen production.

Local municipal zoning and planning boards determine the scale of operations permitted in an establishment. They regulate number of employees allowed on premise and whether a second separate kitchen facility is allowed to operate on site.

Check with local building inspectors to determine what operations can take place in the kitchen chosen for food production. There are local building codes that govern volume of business in a building and egress from building, drainage issues such as back flow protection and grease traps. Commercial equipment must comply with fire codes, FDA and USDA requirements as appropriate.

Minimum Food Processing Facility Requirements for New York State

PROCEDURE	HOME KITCHEN	HOME ANNEX	COMMERCIAL
Inspection	Yes Potable water required (documented) – municipal or treated well water	Yes Potable water required (documented) – municipal or treated well water	Yes Potable water required (documented) – municipal or treated well water
Licensing	Non-potentially hazardous foods for wholesale market exempt from licensing by NYS Dept. of Agriculture & Markets (NYSDAM)	20-C License NYSDAM Separate cleaning, sanitization and hand wash facilities Fee - \$200/2 Years	20-C License NYSDAM Fee - \$200/2 Years
Inspection Agency	NYSDAM – May request review of processing procedures by recognized processing authority. Only standard kitchen appliances can be used.	NYSDAM Dept. of Health - fresh serve foods only. Kitchen held to restaurant standards (see below)	NYSDAM Dept. of Health - fresh serve foods only. Kitchen held to restaurant standards (see below)
Foods Allowed	Candy (non-chocolate), Fudge Cakes not requiring refrigeration Cookies, Brownies Two Crust Fruit Pies Breads, Rolls Fruit Jams, Jellies Spices, Herbs Snack Items Baked Goods for Wholesale Distribution	Any processed food. Low acid and acidified foods packed in hermetically sealed containers. Must register with FDA.	Any processed food. Low acid and acidified foods packed in hermetically sealed containers. Must register with FDA.
Foods Not Allowed	Cakes that require refrigeration Pies contained milk, eggs or meat products Chocolate Low acid & acidified foods	Meat products if: More than 3% raw More than 2% cooked meat ingredients – USDA regulated (see resources on next page)	Meat products if: More than 3% raw More than 2% cooked meat ingredients – USDA regulated (see resources on next page)
Zoning	Check with city/town Zoning/Planning Board. Issues: scale of operation; number of employees	Check with city/town Zoning/Planning Board. 2 nd kitchen may not be allowed on premise. Issues: scale of operation; number of employees	Check with city/town Zoning/Planning Board. Issues: scale of operation; number of employees
Building Codes	Check with local Building Inspector. Small volume business only. 25% of home devoted to business. Egress from building may be an issue.	Check with local Building Inspector. Commercial equipment must comply with Fire & Building Code. Catch basin. Structural permit for building. Back flow protection & grease trap.	Check with local Building Inspector. Commercial equipment must comply with Fire & Building Code. Catch basin. Structural permit for building. Back flow protection & grease trap.

Basic Requirements for a Small-Scale Food Processing Establishment

State of NY Department of Health (DOH) - Restaurants	NYS Department of Agriculture and Markets – Food preparation and processing
• Submit kitchen drawings before construction • Three bay sink with stainless steel drain boards or two bay sink with a commercial dishwasher • Separate hand washing/mop sink • Washable materials on walls and work surfaces • Restaurant grade, commercial tile floors- painted concrete not allowed • Commercial coolers/refrigeration • Water from non-municipal water supply must be tested quarterly. • Review DOH “Checklist for New or Remodeled Establishments” • Some locales require food worker certification.	• Kitchen requirements based on food item(s) being produced- Determined upon inspection • Easily cleanable, smooth work surfaces. • Non-absorbent, smooth and easily cleanable floors, walls and ceilings. • Review of processing procedures including hand washing, sanitizing, equipment sinks, water potability and food preparation. • Review NYSDAM Circular 951 -Pursuant to the Licensing of Food Processing Establishments.* • Circular 938 - Rules and Regulations Relating to Food Processing Establishments.* • Circular 933-Good Manufacturing Practices <i>*Circulars are available through local Dept. of Agriculture and Markets or NYSDAM, 1 Winners Circle, Capital Plaza, Albany, NY 12235, Phone 518-457-5459</i>

Regional Offices of the NYS Department of Agriculture and Market

NYS Department of Agriculture and Markets
Division of Food and Inspection Services
55 Hanson Place
Brooklyn, NY 11217-1583
212-488-4820

NYS Department of Agriculture and Markets
Division of Food and Inspection Services
900 Jefferson Road
Rochester, NY 14623
716-424-1720

NYS Department of Agriculture and Markets
Division of Food and Inspection Services
Donovan State Office Building
125 Main Street
Buffalo, NY 14203
716-847-3185

NYS Department of Agriculture and Markets
Division of Food and Inspection Services
NYS Fairgrounds – Art and Home Center
Syracuse, NY 13209
315-487-0852

United States Food and Drug Administration

Food and Drug Administration
300 Pearl Street, Suite100
Buffalo, NY 14202
716-551-4478

Food and Drug Administration
New York District Office
158-15 Liberty Avenue
Jamaica, NY 11433
718-662-5447

United States Department of Agriculture Food Safety

Inspection Service USDA- FSIS-
5 Washington Square
Albany, NY 12205
518-457-4492

Facilities, Equipment & Sanitation Division
Technical Services, MPI-FSIS
USDA
Washington, DC 20250

Small Scale Processing Equipment

Most food entrepreneurs start production with a manual operation that is labor intensive but adequate for small volumes. As demand for the product increases, the need to improve efficiency while maintaining quality becomes vital. A search for the right equipment is then necessary. Consider the following when deciding whether to buying equipment and what equipment is necessary.

Equipment & the Production Stage of the Business

The current production stage of a small-scale food business affects the type of equipment needed and the necessity of owning that equipment. The stages of the small-scale food business are listed below as they relate to equipment needs.

1. Initial market evaluation to determine the feasibility of the new food product

You have developed a product that can be produced commercially but are not yet sure about sales volume. Keep investment to a minimum; rent space and equipment. Consider manual equipment options for hand cutting, filling, and packaging.

2. Company takes off

Evaluate production demands: can you supply enough product using current procedures? Is production labor intensive? Can production steps be radically sped up by equipment? Production steps that benefit from equipment purchases include cutting, chopping, peeling, pureeing, cooking, filling, and packaging. Do you need to buy equipment or is it better to hire more personnel?

3. Solid business, ready to expand

- Evaluate the desired production volume in order to determine appropriate equipment size. In some cases, two smaller units might fit your needs better than one large piece.
- Identify the bottleneck (limiting factor in production). This should be your first equipment priority.
- Evaluate the short and long term economics of buying new versus used equipment (quality, warranty, efficiency).
- Be aware that customized equipment is much more expensive than standard units.
- Look for simplicity of operation and maintenance.
- Evaluate energy options available for energy intensive equipment such as kettles, driers and ovens.

Equipment Scale

Low volume, less than 40 pounds/day (5 gallons) - Can be done manually. Use of manual equipment such as specialized cutters may improve speed. Typically hand filled.

Food service volume, 50 to 150 pounds/day (10 to 25 gallons) - Look for restaurant and cafeteria type equipment

Food processing volume, more than 200 pounds/day (25 gallons)- Small-scale food processing equipment. Heavy duty and designed for continuous operation, equipment is made of food grade materials (stainless steel is preferred due to durability and ease of cleaning). The commercial motors are rated in horsepower, typically ¼ and higher. Due to limited demand, this equipment can be hard to find. Expect to pay hundreds to thousands per unit.

Types of Equipment

Preparation Equipment

Size reduction (cutters, grinders, slicers - basically large food processors): Continuous feed is preferred, stainless steel or plastic food contact parts, FDA and/or USDA approved for food, at least 1/2 HP. Examples: vertical cutter-mixer used to chop, mix, blend, puree, or emulsify, operates normally in batch mode; shaft type mixer/cutter used to mix, puree a fixed volume, portable.

Mixers: dough mixers from 12 to 140 quarts. Typical brand names: Hobart, Kitchen Aid, Univex

Pulper/finisher: puree fruit/vegetable, separate seeds and skin

Juice extractors (from puree): Squeezing action. Models include hydraulic plate and frame, accordion, belt press and screw press.

Peeler: abrasive type is good for round homogeneous products - the typical potato peeler.

Heating/Cooking Equipment

Kettles: steam kettles available from 0.5 to 200+ gallons. Steam is supplied or generated in place (self-contained) by electricity or gas. Preferable options include 316 stainless steel, tilting, bottom discharge with valve, and agitator. Important to cook a full load to avoid scorching.

Continuous pasteurizers: rated by flow = gallons per minute. Types include tube in shell, plate, direct steam injection, UV treatment.

Ovens: for baking and roasting. Forced convection is faster. Combination oven/steamers are available.

Fryers: 10 to 40 gallon capacity is typical.

Cooling Equipment

Refrigerators: good temperature control. Built-in temperature indicator preferred.

Freezer: blast freezer for quick chilling gives best quality but is more expensive than conventional units.

Filling/Packaging Equipment

Dry products: usually filled by weight manually or with auger type fillers.

Wet products: filled by volume or weight with a variety of fillers based on product consistency.

If the product is pumpable, filling can be done by gravity or using piston fillers. Capacity is given by the flow rate or containers per minute. Some units can be upgraded by adding extra filling heads.

Bag sealers: different types are available including manual, form-fill-seal, gas flushed, and vacuum sealers.

Tray/cup sealers: lid or film is heat sealed to container. Can be done manually or fully automated.

Steam or vacuum cappers: normally used for glass jars to decrease oxygen in headspace and to provide vacuum.

Summary: Evaluating the Options

1. Volume must justify equipment
2. Determine the most important step that limits production
3. Determine capacity needed in volume per unit of time
4. New versus used - warranty, condition, availability of spare parts and service, lease option
5. Make sure equipment meets FDA/USDA requirements - check materials and design
6. Easy to clean and service
7. Consider renting space in established kitchen - complement with your own equipment
8. Get at least 3 quotes for the same type of equipment
9. Stay alert for auctions

Purchasing Used Equipment

Buying used equipment is like buying a used car; the potential for success is dependent on the knowledge of the buyer and the reputation of the seller. The type of equipment you are purchasing can influence the companies with which you choose to deal. Understanding whom you are buying from and what you are buying at what terms is essential to any successful transaction.

Identifying Equipment Needs

Manufacturers make products of differing quality and capability. When choosing equipment and suppliers, it is critical to know both the standards to which the equipment was originally built and the level of operation your business requires. The following questions can help to determine your equipment needs:

- How often will the equipment be used
- What will the equipment be used for
- What volume or capacity do you need for processing
- How much space do you have for the piece of equipment
- Appropriate power source: electric, gas, pneumatic, steam

Finding Suppliers

To identify companies that sell the required equipment, it is recommended that you speak with other food entrepreneurs, as well as organizations, such as NECFE, who may have recent experience purchasing equipment. Based on your research, compile a list of a few local companies, as well as several from around the country, which would be worthwhile contacts. Keep in mind that:

- Local companies may have lower shipping costs.
- You can view the equipment available at a local supplier prior to purchase.
- National companies can sometimes offer a larger selection.
- Food Service (restaurant, cafeteria) suppliers may have equipment sized to meet your needs, especially for small-scale processing.
- Suppliers may rent the equipment in addition to selling it.
- Auctions may be a good place to pick up used equipment.

Questions to ask when purchasing Used Equipment

Whichever company you contact, the information requested should be the same: equipment including brand name, model number, serial number, power requirements (electric voltage and phase, gas flow needs, volume of air required, etc.) and various pictures of key areas on the specific piece of equipment being discussed

- Is the equipment made from material rated USDA/FDA food grade?
- Shipping charges (who is responsible, from where, as well as the estimated charges)
- Insurance charges while in transit
- Warranty on equipment (including when the warranty starts, what is covered)
- Right of refusal upon delivery for unacceptable equipment
- Handling equipment necessary for delivery (is a forklift required, etc.)
- Who is responsible for unloading the equipment?

Reconditioned Parts

In order to know what you are getting, it is critical to know the extent to which the equipment has been reconditioned:

- Make sure specific reconditioned items are identified
- Make sure the extent of reconditioning is stated
- Understand what is meant by “reconditioned,” i.e. washed and polished, replaced with used parts, replaced with new parts
- Are the reconditioned parts USDA/FDA food grade
- Determine additional warranty coverage for reconditioned items

Researching Equipment History

Many equipment manufacturers can and will tell you the original date of manufacture, power and equipment configuration, as well as original buyer if you have a model and serial number.

From this you can then infer:

- What has the equipment been used for
- How long the equipment has been used
- How hard the equipment has been worked
- Any modifications to the accessories, base equipment, or power needs
- How old the equipment is (will safety modifications be necessary to comply with current regulations)

Other critical information about a piece of equipment varies depending on the specific item. To identify any pertinent information it is important to know and understand the piece of equipment needed. For example, an agitator on a kettle originally sold non-agitated, or the wrong phase motor on a mixer would be suspect.

Pricing

After the basic information has been gathered, pricing should be reviewed to arrive at a *net equipment cost*. The net price includes the quoted price and several other factors, such as shipping and insurance while in transit; additional warranty on reconditioned parts; location to which equipment must be sent in order for repairs to be covered under warranty (a real problem if the shop is 1,000 miles away).

Steam Kettles in Food Processing

One of the most common food equipment pieces in small scale processing is the steam kettle. It is also used in restaurants and large institutional kitchens.

Design: The design of the steam kettle makes heating and cooking very efficient and fast. The typical kettle looks very familiar: a large container with a round or spherical bottom, reminiscent of the old cauldron. Kettles have a double wall or "jacket" covering the bottom and at least half the height of the sides, to provide space for steam to circulate, thereby heating the cooking surface. In principle, the steam kettle operates like the average kitchen double boiler.

Function: The use of steam as the heating medium has many advantages: uniform heating, rapid heat transfer and easy control of the heating rate through a steam valve. Steam can be supplied to the kettle by an independent boiler through a pressurized pipe or it can be produced in-situ for immediate use, as is the case with so-called "self-contained steam kettles". Self-contained kettles heat water with electric energy (electric steam kettles) or with gas (gas fired steam kettles) to generate steam under pressure. In all cases, the temperature of the steam is dependent on the pressure inside the steam jacket: the higher the pressure the higher the temperature. Most kettles are rated at 50 psi as the maximum pressure although some are rated lower to about 35 psi.

Options: In large food companies where boilers are standard equipment, direct steam kettles are normally preferred while small processing plants that do not have boilers can rely on self-contained kettles. A wide variety of sizes and options complement the choice: from 0.5 gallons to 200+ gallons, one piece (lift-off) or two piece covers, tilting capability, draining valves in different types and sizes, strainers, baskets and agitators for custom applications.

Material: Virtually all food steam kettles are made of stainless steel, a trade name given to corrosion resistant steel, and the number one choice material for construction of food equipment. Normally stainless steel contains no more than 0.7 % carbon and as much as 20 % chromium. There are two types of stainless steel commonly used for steam kettles: 304 and 316. The numbers designate the chemical composition of the material describing the percentage of steel (66.5 to 74 %), chromium (17 to 19 %), nickel (9 to 12 %), carbon (0.03 to 0.10 %), and molybdenum (0 to 2.5 %). Stainless steel 304 is the standard option. However, stainless steel 316 is the material of choice if you are working with high acid and acidified foods since it offers more resistance to hot acid foods for a relatively modest price increment.

Price: New steam kettles range in price depending on size, type and options starting at about \$2,000 for very small direct steam models and reaching \$20,000+ for the larger versions. It is possible to get a used kettle in good condition for a fraction of the original cost from most dealers of used food processing equipment or food service distributors. Some suppliers are listed below.

References

Imholte, T.J. 1984. Engineering for food safety and sanitation-a guide to the sanitary design of food plants and food plant equipment. Technical Institute of Food Safety, Minnesota, USA.

New Equipment

Cleveland Range, Inc.

1333 East 179th St.
Cleveland, OH 44110
800-338-2204
www.clevelandrange.com

Groen, A Dover Industries Co.

1900 Pratt Blvd.
Elk Grove Village, IL 60007-5906
847-439-2400

Lee Process Systems and Equipment

Division of Lee Industries, Inc.
P.O. Box 687
Philipsburg, PA 16866
814-342-0460
www.leeind.com

Used Equipment

Alard Equipment Corp.

6483 Lake Ave.
P.O. Box 57
Williamson, NY 14589-0057
315-589-4511

Cuyler Associates Inc.

468 Salt Rd.
Webster, NY 14580-9719
716-265-0715

Production, Packaging & Processing Equipment Co.

1450 E. Van Buren St.
Phoenix, AZ 85006-3522
602-254-7878
www.kettles.com

Keith Machinery Corp.

34 Gear Ave,
Lindenhurst, NY 11757
516-957-1200

Food Container Selection Tips - Glass

When choosing suppliers of containers for packaging products, consider the following pointers and issues as part of your purchase decision.

Choosing a Container

When deciding on a container type, first determine:

1. the type of material needed
2. the processing conditions required
3. as well as the final conditions for distribution and usage by the consumer

For example, if you are manufacturing high acid foods such as condiments, jams, jellies, vinegars, etc, the container and the closure must be able to withstand the contact with the acid for extended periods of time.

If the product needs to be pasteurized, either by hot filling or by immersion in boiling water bath, then the container and the closure must be able to withstand the high temperature for a specified period of time. Glass bottles and jars are usually used for pasteurized acid products since they provide good protection and extended shelf life. In this case, the closure is very important, as the vacuum inside the container serves as an indication of seal integrity and ensures the stability of the product. The closure is normally a coated metal cap with a special liner called plastisol to hold the vacuum. Some FDA approved food grade plastic containers can be used for hot filling but you must tell the supplier the temperatures the container will need to withstand before buying it.

Additional factors to consider are cost, product image, and compatibility with processing equipment.

Choosing a Supplier

To identify suppliers of glassware, it is recommended that you talk to other food entrepreneurs, as well as organizations like NECFE, who have regular contact with them.

Variables to consider when choosing a supplier include:

1. volume discounts
2. your available storage space
3. frequency of production runs
4. lead time a supplier needs to deliver the necessary quantity
5. customer service

Pricing

Many different companies with as many different prices often sell the same jar. There are several factors that will effect price quotes for glassware, including:

1. quantity
2. style
3. time of year
4. payment schedule
5. delivery location

Make sure you understand how each factor effects the prices when comparing quotes from various companies.

Purchasing

The following are some specific factors to consider when making purchase decisions with regard to glassware:

- quantity of a single style and size needed per production run
- number of product batches produced within a given time frame
- quantity of packaging inventory can you warehouse
- quantity of packaging inventory can you afford to warehouse
- number of different sizes and styles needed for each glass delivery
- amount of lead time required by the supplier to provide the quantity you need for each production run
- do you use enough glassware to bypass a broker and order directly from a foundry

Purchase Verifications

It is strongly recommended that you verify the following before making a glassware purchase:

- the reputation of a glass supplier with other producers similar in size to yourself
- the product being purchased:
 - is the glassware food grade
 - does the glassware need to be washed prior to use
 - is there any returned glassware in the shipment to you (if so why was it returned)
- order lead times to minimize risk of partial shipments
- shipping terms and methods
- which party is responsible for damage in transit
- that you will be able to receive the glassware as shipped (will the pallet fit through the door?)
- order quantity - how many units per case and how many cases per pallet
- customer references – ask for and check them

XI Resources

Testing Laboratories

Bureau Veritas Consumer Products Services

100 Northpointe Parkway
Buffalo, NY 14228-1884
pH, Aw, micro, nutrient-confirm only
P: 716-505-3300
F: 716-505-3301
www.cps.bureauveritas.com

Add Testing & Research

19 Addison Place
Valley Stream, NY 11580
pH, micro
P: 516-568-9197
F: 516-568-3147
www.addtestinglab.com

American Standards Testing Bureau, Inc.

40 Water St.
New York, NY 10004
PH, Aw, micro, nutrient
P: 212-943-3160
F: 212-825-2250

Ameritech Laboratories

128-17 20th Avenue
College Point, NY 11356
pH, Aw, micro, nutrient
P: 718-461-0475
F: 718-461-0187
www.ameritechlabs.com

Associated Analytical Laboratories

51 E. 42nd Street, Room 1210
New York, NY 10017
pH, Aw, micro, nutrient
P: 212-682-2544

Bacti-Chem Labs of NY, Inc.

42-15 Crescent St. Suite 411
Long Island City, NY 11101
pH, primarily spice analysis
P: 718-729-5499

Central Hudson Laboratory

118 Barnes Road
PO Box 580
Washingtonville, NY 10992-0580
Extraneous matter & (insects) analysis
P: 800-506-BUGS
P: 845-496-7584
F: 845-496-2469
www.centralhudsonlab.com

Certified Laboratory, Inc.

200 Express Street
Plainview, NY 11803
pH, Aw
P: 800-CERTLAB
P: 516-576-1400
F: 516-576-1410
www.800certlab.com

Chenango Valley Environmental Laboratory

5851 County Road 32
P.O. Box 848
Norwich, NY 13815
pH, chemistry, water testing
P: 607-334-2877

Converse Laboratory, Inc.

800 Starbuck Avenue, Suite B101
Watertown, NY 13601
pH, Aw, micro, nutrient
P: 800-427-5227
P: 315-788-8388
F: 315-788-9258
www.converselabs.com

Microbac New York

32 Ithaca Street
Waverly, NY 14892-1532
pH, micro
P: 607-565-3500
F: 607-565-4083
www.microbac.com

Krueger Food Laboratories, Inc.

45 Manning Road
Billerica, MA 01821
P: 978-667-6900
F: 978-667-6999
<http://www.kfl.com>

Life Science Laboratories, Inc.

5854 Butternut Drive
East Syracuse, NY 13057
pH, Aw, micro, nutrients, stability,
preservatives
P: 315-445-1105
P: 800-784-7447
F: 315-445-1301
www.lsl-inc.com

McAndrew Testing Laboratories, Inc.

3841 Sheldon Road
Orchard Park, NY 14127
pH, micro (state certified)
716-649-7960

Microbiology Consultants

4 Sleator Dr.
Ossining, NY 10562
914-762-1247

New York State Food Venture Center

Dept. of Food Science & Technology
Cornell University/NYSAES
630 West North Street
Geneva, NY 14456
PH, Aw, moisture
P: 315-787-2273
F: 315-787-2397

New York Testing Laboratories, Inc.

75 Urban Avenue
Westbury, NY 11590
P: 516-334-7770
F: 516-334-7720

OCL Analytical Services

35 Goshen Turnpike
Bloomington, NY 12721
Dave Kennedy
pH & Aw only on site.
P: 845-733-1557
F: 845-733-1944
www.oclanalytical.com

R & J Laboratory

1597 Route 14A
Penn Yan, NY 14527
Rosalie Ayers
pH, micro, & nutrient by contract;
cert. water testing
P: 315-536-7248
F: 315-536-7857

Shaevel & Associates Ltd.

246 Ranch Trail West
Buffalo, NY 14221
P: 716-688-6087
F: 716-689-9606

Shuster Laboratories

85 John Road
Canton, MA 02122
P: 800-444-8705
P: 781-821-2200
F: 781-821-9266
www.schusterlabs.com

pH = level of acidity

Aw = water activity

micro = microbiological assays

nutrient = nutritional analysis for labeling

NECFE does not inquire about fees.

Be sure to call before sending any samples to a laboratory.

Always label each sample with your name, phone number, sample identity or code, the date it was manufactured and the test(s) required.

This is not a complete list, nor is it an endorsement by Cornell University.

Equipment Suppliers

Beroc, Inc.
12 Oregon Street
Wilkes-Barre, PA 18702
P: 800-723-7033
P: 570-823-6788
F: 570-823-6899

Schmidt-Sparra Systems
316 Municipal Drive
Thorndale, PA 19372
P: 610-383-4252
F: 610-383-4288

Heritage Food Service Equipment
5130 Executive Boulevard
Fort Wayne, IN 46808
P: 800-458-5593
F: 800-800-4981
www.hsfe.com

Union Standard Equipment Company
801-825 East 141st Street
Bronx, NY 10454
P: 718-585-0200
F: 718-993-2650
www.unionmachinery.com

Production Packaging & Processing
Equipment Company
1450 E. Van Buren Street
Phoenix, AZ 85006
P: 602-254-7878
F: 602-254-2630
www.kettles.com

Equipment Exchange Company
10042 Keystone Drive
Lake City, PA 16423
P: 814-774-0888
F: 814-774-0880
www.eeclink.com

Alard Equipment
6483 Lake Avenue
P.O. Box 57
Williamson, NY 14589
P: 315-589-4511
F: 315-589-3871
www.alard-equipment.com

Cuyler Food Machinery & Appraisal
468 Salt Road
Webster, NY 14580
P: 585-265-0715, ext. 14
F: 585-265-1724
www.foodmachinery.com

Keith Machinery Corp.
34 Gear Avenue
Lindenhurst, NY 11757
P: 631-957-1200
F: 631-957-9264
www.keithmachinery.com

Hubert
www.hubert.com

Magnum Food Service Equipment
www.delprim.com

Groen
www.groen.com

Used Restaurant Equipment
www.schweppefoodequip.com

Kettles and Ranges
www.clevelandrange.com

Urschel Size Reduction
www.urschel.com

Hobart
www.hobartcorp.com

Robot Coupe
www.robotcoupeusa.com

Food Online

www.foodonline.com/buyersguide

Prepared Foods

www.preparedfoods.com

Food Processing

www.foodprocessing.com

Thomas Register

www.thomasregister.com

Food Master

www.foodmaster.com

Overview of Pertinent Federal Regulatory Agencies

Bureau of Alcohol, Tobacco, and Firearms (ATF)

Part of the U.S. Treasury Department

What they do:

- Regulates the qualification and operation of distilleries, wineries, and breweries
- Regulates importers and wholesalers of products containing alcohol
- Regulates labeling of products containing alcohol

Branches:

- ATF National Laboratory Center (NLC): tests new products to ensure regulated ingredients are within legal limits.
- ATF Alcohol Labeling and Formulation Branch: examines and approves all label applications for misleading information and adherence to regulatory mandates.

Contact:

Bureau of Alcohol, Tobacco and Firearms
Market Compliance Branch
650 Massachusetts Ave. N.W.
Room 5200
Washington, D.C. 20226
202-927-7970
www.atf.treas.gov

Internal Revenue Service (IRS)

Enforcement of tax laws, tax collection.

Small Business, Self-Employed Section: <http://www.irs.gov/smallbiz/index.htm>

Contact information by state: http://www.irs.gov/where_file/index.html

Seafood Inspection Program

Part of the U.S. Department of Commerce / National Oceanic & Atmospheric Administration

What they do:

- Provide voluntary inspection services to the seafood industry
- Provide HACCP plan training, development, and compliance services
- Conduct product quality evaluation, grading and certification
- PDF versions of training and educational materials are available at the website.

There is a charge for services.

Contact:

Seafood Inspection Program
1315 East-West Highway
Silver Spring, MD 20910
301-713-2355
800-422-2750
<http://seafood.nmfs.noaa.gov/>

U.S. Customs Service

Part of the U.S. Treasury Department

What they do:

- Primary enforcement agency protecting U.S. borders
- Enforce import/export laws and regulations
- Enforce public health and safety laws, intellectual property rights
- Provide a Regulatory Fairness Representative to serve the small businesses with customs regulations and penalties
- Partners with the Small Business Administration to provide training and education material on Customs regulations and law

Contact:

Office of the Trade Relations
U.S. Customs Service
1300 Pennsylvania Avenue, NW
Washington, D.C. 20229
202-927-1440
<http://www.cbp.gov>

Food and Drug Administration (FDA)

Part of the U.S. Department of Health and Human Services

What they do:

- Enforces the Federal Food, Drug and Cosmetic Act and related public health laws.
- Jurisdiction over domestic and imported food sold in interstate commerce, including shell eggs, bottled water, wine beverages with less than 7 percent alcohol , but not meat and poultry
- Sets labeling standards for food products
- Inspects and approves food products for wholesomeness and safety
- Develops codes and interpretations of regulations for use by business and state regulatory agencies.
- Develops Good Manufacturing Practices, HACCP, and other production standards
- May request a recall of unsafe food products

Branches:

Center for Food Safety and Applied Nutrition (CFSAN): Promotes public health by making sure that food is safe, nutritious and wholesome, and cosmetics are safe; food and cosmetics are honestly, accurately and informatively labeled.

Contact:

Regional FDA offices are located in the blue pages of the phone book.
FDA's Outreach and Information Center: 888-723-3366
<http://www.fda.gov>
<http://www.cfsan.fda.gov/list.html>

Food Safety and Inspection Service (FSIS)
Part of the United States Department of Agriculture

What they do:

- Conduct slaughter inspection of all carcasses at meat and poultry slaughtering plants
- Conduct processing inspection for sanitation, cleanliness, labeling and packing at meat and poultry processing facilities
- Increase emphasis on HACCP in the entire meat and poultry production chain.
- Approve meat and poultry product labels

Contact:

FSIS Food Safety Education and Communications Staff
Room 1175, South Building,
1400 Independence Ave., S.W.
Washington, DC 20250

The Meat and Poultry Hotline, 1-888-674-6854
For Technical Assistance, 402-221-7400
Hotline, 800-233-3935
<http://www.fsis.usda.gov>

State Agencies:

In many states, Specialty Food Processing is regulated by a combination of departments of Health, Agriculture, and, in some cases, Consumer Protection. Departments of State or the office of the Secretary of State handles general business regulations. Contact information for both state and local governmental agencies is in your phone book. If you have access to the Internet, try your state's home page. You can also find state-specific regulatory links and information at the NECFE website: www.nysaes.cornell.edu/necfe, or contact us by phone or email.

USDA Rural Development Offices in the Northeast

USDA Rural Development offers financial programs and business assistance to rural businesses and communities.

Southern New England Rural Development

The states of Connecticut, Massachusetts and Rhode Island are grouped under Southern New England Rural Development. Specific State offices are listed below.

Rural Development State Office

451 West Street, Suite 2

Amherst MA 01002-2999

Phone: 413-253-4300; Fax: 413-253-4347

TDD: 413-253-7068

Connecticut Offices

Norwich Service Center

238 West Town Street

Norwich, CT 06360

860-859-5218 Ext. 3004

Fax: 860-859-5223

Serving Eastern Connecticut:

Windham and New London Counties

Windsor Service Center

100 Northfield Dr. 4th Floor

Windsor, CT 06095-4729

860-688-7725 Ext. 4

Fax: (860)688-7979

Serving Tolland, Middlesex, Hartford,

Litchfield, New Haven and Fairfield Counties

Massachusetts Offices

Hadley Service Center

195 Russell Street, Suite 87

Hadley, MA 01035-9521

Phone: 413-585-1000 Ext. 4

Fax: 413-586-8648

Serving Berkshire, Franklin, Hampshire, and
Hampden Counties

Holden Service Center

52 Boyden Road

Holden MA, 01520

508-829-4477 Ext. 4

Fax: 508-829-3721

Serving Worcester, Middlesex, Suffolk, and
Essex Counties

West Wareham Service Center

15 Cranberry Highway

West Wareham MA, 02576

508-295-5151 Ext. 3

Fax: 508-291-2368

Serving Cape Cod and the Islands, Bristol,
Norfolk, Plymouth, Dukes, Nantucket and
Barnstable Counties

Maine

Maine State Office

967 Illinois Avenue,

P.O. Box 405

Bangor, ME 04402-0405

207 990-9100

Fax: (207) 990-9165

TDD/TTY: (207) 942-7331

Bangor Area Office

28 Gilman Plaza, Suite 3

Bangor, ME 04401-3550

207 990-3676

Fax: (207) 990-5092

TDD/TTY: (207) 942-7331

Raymond S. Roberts III

Rural Development Manager

Presque Isle Area Office
99 Fort Fairfield Rd.
Presque Isle, ME 04769-5015
207 764-4155/4157
Fax: (207) 762-2246
TDD/TTY: (207) 942-7331
Richard W. Ireland
Rural Development Manager

Lewiston Area Office
254 Goddard Rd., P.O. Box 1938
Lewiston, ME 04241-1938
207 753-9400
Fax: (207) 784-1335
TDD/TTY: (207) 942-7331
William F. Bailey, Jr.
Rural Development Manager

Scarborough Area Office
306 US Rte 1, Suite B-1
Scarborough, ME 04074-9774
Phone 207-883-0159; Fax 207-883-2740
William Bailey, Jr. Area Director

New Hampshire
See Vermont listing

New Jersey
Rural Development State Offices (21 offices throughout NJ)
Visit www.rurdev.usda.gov/nj for locations.

New York
Rural Development
441 S. Salina St.
Suite 357, 5th Floor
Syracuse, NY 13202-2425
315-477-6400
TDD: 315-477-6447

Vermont and New Hampshire
Vermont Rural Development
Montpelier Office Staff
3rd Floor, City Center, 89 Main Street
Montpelier, VT 05602
802- 828-6080
Fax: 802-828-6018

Pennsylvania
Community and Economic Development
Programs
State Office
Suite 330, One Credit Union Place
Harrisburg, PA 17110-2996
717-237-2189
Fax: 717-237-2196
Hearing Impaired: 717-237-2261

Rhode Island Office
Warwick Service Center
60 Quaker Lane, Suite 44
Warwick, RI 02886
Phone: 401-826-0842; Fax: 401-828-6042

State Agencies/Universities Pertinent to the Small Scale Food Producer

Connecticut

Department of Agriculture

Covers: meat & poultry production operations, shellfish regulations, milk and milk product production. List of farmers markets, agricultural statistics

Contact:

State of Connecticut Department of Agriculture

165 Capital Avenue

Hartford, CT 06106

860-713-2500

Fax: 860- 713-2514

Email: ctdeptag@po.state.ct.us

Email for Specialty Food Assistance:

marketing.ctdeptag@po.state.ct.us

<http://www.state.ct.us/doag/>

Specialty Food Assistance:

<http://www.state.ct.us/doag/business/spefdass>

Licenses & permits:

<http://www.state.ct.us/doag/permits/agpermits>

Department of Consumer Protection

Covers: Kosher foods, baked goods, bottled apple juice & cider, frozen deserts, alcoholic beverages

The Agency's Divisions include Food and Standards, Drug Control, Liquor Control, License Services, Trade Practices, Product

Safety, Real Estate and Professional and Occupational Trades and the Lemon Law Auto Dispute Settlement Program.

Licenses & permits:

<http://www.dcp.state.ct.us/licensing/food.htm>

Contact:

Department of Consumer Protection

165 Capitol Ave.,

Hartford, CT 06106

1-800-842-2649

860-713-6300

Fax: 860-713-7239

<http://www.state.ct.us/dcp>

Department of Public Health

Mainly food-service related regulations

Contact:

Connecticut Department of Public Health

410 Capital Avenue, MS#51FBP

P.O. Box 340308

Hartford, CT 06134-0308

860-509-7297

TDD: 860-509-7191

<http://www.dph.state.ct.us/>

Food Protection Program:

www.state.ct.us/dph/BRS/Food/food_protection

Massachusetts

Department of Public Health

Food Protection Program

Licensing for food processing facilities

Contact:

Department of Public Health

305 South Street

Jamaica Plain, MA 02130

617-983-6700

Fax 617-983-6770

<http://www.state.ma.us/dph/fpp/fpp.htm>

MA Dept. of Public Health Residential

Kitchen Specialist

Division of Food & Drugs

305 South Street

Jamaica Plain, MA 02130

617-727-2670

Department of Food and Agriculture

Information on farmers markets, agricultural statistics, farm market information

Contact:

Massachusetts Department of Food and Agriculture

251 Causeway Street, Suite 500

Boston, MA 02114

617-626-1700

<http://www.massdfa.org>

Bureau of Markets

Assistance for Specialty Food Producers

Contact: Bonita Oehlke

Program Coordinator

Foreign Trade, Specialty Foods

Bureau of Markets

Division of Ag Development

251 Causeway Street, Suite 500

Boston, MA 02114-2151

617-626-1753

Email: Bonita.Oehlke@state.ma.us

<http://www.mass.gov/agr>

Maine

Department of Agriculture

Division of Quality Assurance and Regulations - licensing of home Food Manufacturing

Animal Health and Industry -licensing for dairy, frozen desserts

janus.state.me.us/agriculture/animals/homepage

Contact:

Maine Department of Agriculture

90 Blossom Lane

28 State House Station

Augusta, ME 04333-0028

207-287-3871

Fax: 207- 287-7548

<http://www.maine.gov/agriculture>

University of Maine – Department of Food Science & Human Resources

Extension work, may assist with product approval & testing.

Contact:

Dept. of Food Science & Human Nutrition

University of Maine

5735 Hitchner Hall

Orono, ME 04469-5736

Phone: (207) 581-1621

Fax: (207) 581-1636

<http://www.fsn.umaine.edu>

Extension Contact:

Mahmoud El-Begearmi

University of Maine

Cooperative Extension

5717 Corbett Hall, Room 303

Orono, ME 04469-5717

207-581-3449

Fax: 207-581-3212

Email: mahmoud@umce.umext.maine.edu

Department of Health and Human Services

Eating and Lodging Program

286 Water Street

11 State House Station

Augusta, Maine 04333-0011

www.maine.gov/dhhs/eng/el

New Hampshire

Department of Agriculture, Markets and Food

Contact:

New Hampshire Department of Agriculture, Markets and Food

PO Box 2042

Concord, NH 03302

Telephone: 603-271-3551

Fax: 603-271-1109

<http://www.state.nh.us>

Department of Health and Human Services

Bureau of Food Protection

Licensing and inspecting retail foodservice establishments including: restaurants, grocery stores, caterers, mobile food units, bakeries, and home food manufacturers/processors. Also approves plan reviews for new and remodeled food service establishments. Acts as the State Shellfish Sanitation Control Authority for the commercial sale and processing of shellfish.

Contact:

Food Protection Section

29 Hazen Drive

Concord, NH, 03301-3857

(603) 271-4589

1-800-852-3345 ext 4589 (in state)

Fax: (603) 271-4859

Email: foodprotection@dhhs.state.nh.us

<http://www.dhhs.state.nh.us/index.nsf?Open>

University of New Hampshire – Department of Animal & Nutritional Sciences

Extension, may assist with product approval & testing

Extension Contacts:

Catherine Violette – Extension Specialist &

Specialist, Food and Nutrition

University of New Hampshire

Cooperative Extension

129 Main Street,

219 Kendall Hall

Durham, NH 03824

Tel: 603/862-2496

Fax: 603/862-3758

Email: catherine.violette@unh.edu

Charlene Baxter

University of New Hampshire

Cooperative Extension System

59 College Road,

Taylor Hall

Durham, NH 03824-3587

Tel: 603/862-2485

Fax: 603/862-1585

Email: charlene.baxter@unh.edu

New Jersey

Department of Agriculture - Division of Dairy & Commodity Regulation

Commodity-based marketing projects for potatoes, wine, blueberries, apples, etc.

Licenses milk dealers, milk processing plants, and retail stores.

Contact:

NJ Department of Agriculture

Division Marketing & Development

Al Murray, Director

John Fitch Plaza

PO Box 330

Trenton, NJ 08625-0330

609-292-5575

Fax: 609-984-2508

Department of Commerce

Business licensing for tax status, type of business, etc.

Contact:

New Jersey Commerce & Economic Growth Commission

20 West State Street

P.O. Box 820

Trenton, NJ 08625

<http://www.state.nj.us/njbiz/>

Licenses and Certification Hotline:

609-777-2642 or (toll-free, in state) 800-533-0186

Department of Health and Senior Services: Food and Milk Program

Regulates food safety and provides information to consumers and the food industry. Activities include: license and inspect wholesale food, milk and shellfish establishments, enforce food safety laws, provides consumer information issues, Public Health Advisories assists in the investigation of food borne outbreaks, oversees the voluntary Food Manager certification, issues export certificates

Contact:

Program Manager: Richard Ritota

New Jersey Department of Health & Senior Services

Food & Milk Program

PO Box 369

Trenton, New Jersey 08625-0369

609-588-3123

Rutgers, the State University of New Jersey – Department of Food Science

Extension, food safety, product approvals

Contact:

Department of Food Science

65 Dudley Rd., Cook College

Rutgers University

New Brunswick, NJ 08901-8520

732-932-9611

Fax: 732-932-6776

<http://foodsci.rutgers.edu/>

Extension Contact:

Dr. Don Schaffner, Ph.D.

Department of Food Science

65 Dudley Rd., Cook College

Rutgers University,

New Brunswick, NJ 08901-8520

Tel: (732) 932-9611x214

Fax: (732) 932-9611x263

Email: schaffner@aesop.rutgers.edu

New York

Department of Agriculture & Markets

Covers: Food safety, food labeling, licensing, Farmers Markets, agriculture statistics. For information on New York Agriculture & Markets regions, contact the main office below or NECFE.

Contact:

Department of Agriculture & Markets
Division of Food Safety & Inspection
10 Airline Drive
Albany, NY 12235
1-800-544-4501

<http://www.agmkt.state.ny.us/>

Cornell University – Department of Food Science & Technology

Extension, Partner site for the NECFE

Contact:

NECFE
Food Research Lab
630 W. North Street
Geneva, NY 14456
315-787-2273
Fax: 315-787-2397
Email: necfe@cornell.edu

Pennsylvania

Department of Agriculture

Bureau of Food Safety and Laboratory Services
Permits and licensing for food processing facilities of all types including dairy, maple, home processing facilities, etc. Also food safety and inspection services.

Contact:

Bobby McLean
Bureau Director
2301 North Cameron Street
Harrisburg, PA 17110
717-787-4315

For a list of regional offices, visit:
<http://www.agriculture.state.pa.us/>

Center for Entrepreneurial Assistance

Web-based service offering an entrepreneur's guide to starting a business in Pennsylvania

Contact:

Department of Community and Economic Development
400 North Street, 4th Floor
Commonwealth Keystone Building
Harrisburg, PA 17120-0225
866-466-3972
800-280-3801
www.newpa.com

Department of State

Regulates types of business registrations.

Contact:

Richard House, Director
Corporation Bureau
206 North Office Building
Harrisburg, PA 17120
717-787-1057
888-659-9962
www.dos.state.pa.us/corps

Department of Revenue

Register Business for tax purposes. Various bureaus and offices handle business activity dependent on business type.

Contact:

717-787-1064
<http://www.revenue.state.pa.us>

Pennsylvania State University – Department of Food Science

Extension work, dairy, assistance with product approval, food safety testing

Contact:

Luke LaBorde
Pennsylvania State University
Penn State Coop. Ext. Service
119 Borland Lab
University Park, PA 16802
814-863-2298
Fax: 814-863-6132
Email: lf15@psu.edu

Rhode Island

Department of Agriculture

Listing of farmers markets, food processors, and regulations governing eggs, vegetable sales.

Contact:

Steve Volpe

Rhode Island Department of Agriculture

235 Promenade Street

Providence, RI 02908-5767

(401) 222-2781 ex. 4501

Fax: 401-222-6047

<http://www.dem.ri.gov>

Department of Health

Mainly food service oriented information and regulation. Regulations impact food safety.

Contact:

Ernest Julian

Rhode Island Department of Health

3 Capitol Hill

Providence, RI 02908

Phone: 401-222-2231

TTY: 1-800-745-5555

Fax: 401-222-6548

<http://www.health.state.ri.us>

University of Rhode Island – Department of Nutrition & Food Sciences

Outreach in areas of food safety, seafood

Contact:

College of the Environment and Life Sciences

Department of Nutrition & Food Sciences

106 Ranger Hall

Kingston, RI 02881

401-874-2253

Fax: 401-874-5974

Extension Contacts:

Lori Pivarnik

University of Rhode Island

Food Science & Nutrition Research Center

530 Liberty Lane

West Kingston, RI 02892

Fax: 401-792-2994

Martha S. Patnoad

University of Rhode Island

CE Service

East Alumni Avenue

Kingston, RI 02881-0804

Tel: 401-874-2960

Fax: 401-874-4017

Vermont

Department of Agriculture, Food and Markets

Meat inspections, maple dealer/processor licenses, egg and poultry inspections, seal of quality program, agricultural development programs.

116 State Street, Drawer 20

Montpelier, VT 05620-2901

802-328-2410

Dairy Section: (802) 828-2433

Consumer Assurance: (802) 828-3458

Agricultural Development: (802) 828-3829

<http://www.vermontagriculture.com>

Department of Health

Division of Health Protection - Food safety information and evaluation

Contact:

Vermont Department of Health

108 Cherry Street

Burlington, VT 05402-0070

Food & Lodging - (802) 863-7221

<http://www.healthyvermonters.info>

University of Vermont – Center for Food Science

Extension, Research.

Contact:

NECFE

200 Carrigan Building

Nutrition & Food Sciences

University of Vermont

Burlington, VT 05405-0044

802-656-8300

Fax: 802-656-0001

Northeast Farm Bureaus

American Farm Bureau Federation
600 Maryland Avenue SW
Suite 1000W
Washington, DC 20024
P: 202-406-3600
F: 202-406-3602
www.fb.org

Connecticut Farm Bureau
775 Bloomfield Avenue
Windsor, CT 06095-2322
P: 860-298-4400
F: 860-298-4408
www.cfba.org

Maine Farm Bureau
4 Gabriel Drive
Suite 1
Augusta, ME 04330
P: 800-639-2126
P: 207-622-4111
F: 207-623-3371
www.maine farm bureau.org

Massachusetts Farm Bureau Federation, Inc.
466 Chestnut Street
Ashland, MA 01721-2299
P: 508-881-4766
F: 508-881-4768
www.massfarmbureau.com

New Hampshire Farm Bureau Federation
295 Sheep Davis Road
Concord, NH 03301
P: 603-224-1934
F: 603-228-8432
www.nhfarmbureau.org

New York Farm Bureau, Inc.
P.O. Box 5330
159 Wolfe Road
Albany, NY 12205
P: 518-436-8495
F: 518-431-5656
www.nyfb.org

Rhode Island Farm Bureau
2227 Plainfield Pike Rear
Johnston, RI 02919
P: 401-647-3750
F: 401-647-0410
rifb.fb.org

Vermont Farm Bureau
2083 East Main Street
Richmond, VT 05477
P: 802-434-5646
F: 802-434-6309
www.vtfb.org

References

1. Code of Federal Regulations. Title 21 part 114. Office of the Federal Register, National Archives and Records Administration. 2000.
2. Fleming, Henry P. and Ralph N. Costilow, *Acidified Foods: Principles of Handling and Preservation*, 2nd Edition. Pickle Packers International, Inc., 1997.
3. Downing, Donald L., *A Complete Course in Canning*, 13th Ed., CTI Publications, Inc. 1996.
4. Hall, Stephen F., *From Kitchen to Market: Selling your gourmet food specialty*, Upstart Publishing Company, 1996.
5. *Thomas Food Industry Register*, Roth Young, 2000.
6. *Growing Your Own Specialty Food Business*, a publication of The New York State Small Business Development Center at Ulster Community College, 651 Ulster Avenue, Kingston, NY
7. White, Gerald B. and Wen-fei L. Uva, *Developing a Strategic Marketing Plan for Horticultural Firms*, Department of Agricultural, Resources and Managerial Economics, College of Agricultural and Life Sciences, Cornell University, Ithaca, NY

Glossary

Account - a collection of financial information, grouped according to customer or purpose, including: expenses, dates, names, and purchase amounts and payment types. A written record of an account is called a statement.

Accounts payable - amounts that your business owes as evidenced by invoices or other documents. Invoices paid by check or cash as they are incurred are generally not run through accounts payable. Only outstanding items, which will be paid at a later date are generally included in accounts payable.

Accounts receivable - amounts owed to your business that you expect to receive.

Acid Food – Product with a natural pH of 4.6 or below. Ex. tomatoes, citrus fruits, rhubarb, peaches, grapes, cherries, apples.

Acidified Food – low-acid foods that have their pH lowered to 4.6 or less by the addition of acids or acid foods. Ex. pickles.

Antioxidant – Chemical approved for the control of oxidation (rancidity) in food products. USDA approved antioxidants include: BHT, BHA, propyl gallate. Regulations limit concentration to 0.003% for individual chemicals, 0.006% for combinations.

Assets - Generally describes cash, accounts receivable, investments, and fixed asset accounts.

Botulism – acute food poisoning caused by the bacterium *Clostridium botulinum*. Foods with a pH higher than 4.6 are susceptible to the growth of this and other harmful microorganisms.

Brine – a salt solution.

°Brix – a measure of the density of a solution, expressed in degrees Brix. The °Brix of a solution = the percent Sucrose of the solution at room temperature.

Buffer – a mixture containing both a weak acid and a weak base capable of absorbing additions of either strong acid or strong base with little corresponding change in pH. Buffers are used for calibrating pH meters.

Business Plan – an ever-evolving document which specifies the type of business being run, the goals for the business, detailed plans for achieving those goals, and research-supported reasons why the business should pursue a particular direction.

Canning – process by which a food product is enclosed in a sterilized container totally impervious to microbes and heated until all microorganisms inside the container are killed. Food products may be “canned” in cans, jars, or some plastic pouches.

Capital - Represents the value (on paper) of the ownership of the business. Includes an account that records the net profit/loss at the end of the year.

Chart of Accounts - lists all the existing accounts, segregated into major groups called "Assets," "Liabilities," "Capital," "Income," and "Expenses." The list usually includes: the account number, the title of the account, and a description of the information recorded in the account.

Cold Smoked – Product is smoked in a relatively cool smoking chamber and not cooked. Product not considered shelf-stable requires maintenance of at most a 41 degree F. internal product temperature during smoking.

Controlled Atmosphere Packaging - active system that continuously maintains the desired atmosphere within the package (agents that bind oxygen or compounds that emit a gas are incorporated in the package).

Cook-chill - process that uses a plastic bag filled with hot cooked food from which air has been expelled and which is closed with a plastic or metal crimp (similar to hot-filled).

Critical Control Point (CCP) – a point in the process of manufacturing a food (raw material, location, practice, procedure) at which one or more factors can be controlled to minimize or prevent hazard. (see HACCP)

Electrode – The part of the pH meter which, when immersed in a product sample, senses electrical potentials which are then converted to the pH measurement for that sample.

Equilibrium pH - the final pH measured in an acidified food after all the components of the food have achieved the same acidity

Expense - Record the cost of doing business. Generally divided into groups representing the costs of producing products or service, administrative or overhead costs, and other items, such as depreciation.

HACCP – Hazard Analysis Critical Control Point system based on science and logic, which identifies hazards in food production and establishes preventative measures for their control. A plan outlining this system for a food production process is called a HACCP plan.

Hot Smoked – cooking and smoking cycles are combined. Smoking process takes place during the early portion of the cook cycle. Specific time/temperature requirements apply depending on the type of meat being hot smoked.

Income - Record various types of income, often segregated by type of product or service, as well as interest income, etc.

Information Panel (IP) – Label panel immediately to the right of the principal display panel. Nutritional labeling, ingredient listing and manufacturer information are displayed here.

Jerky – vary greatly. Typically prepared from strips of lean muscle cut with the muscle fiber grain. Seasoned with marinade or rubbed with salt & pepper mixture. Shelf-stable, ready-to-eat. USDA regulated moisture protein ratio max. of 0.75 : 1.

Kippered Meats - similar to jerky but with a moisture protein ratio of 2.03 : 1 or lower. Not shelf-stable without further controls such as vacuum packaging or heat processing.

Ledger – the physical set of records, either manual or computerized, that represents the accounting for your business. Includes revenues, expenditures, accounts receivable and accounts payable, inventory and fixed assets. A General Ledger contains recordings of all business transactions that have happened during the course of a taxable year.

Liabilities - Describes accounts recording how much you owe to others. Includes accounts payable, payroll tax and benefits liabilities, short-term loans or notes, and long term loans or notes.

Liquid Smoke – Any USDA approved smoke that has been distilled onto a liquid carrier for application to a food product.

Low Acid Food - food (other than alcoholic beverages) with a pH between 4.6 and 7.0. *Does not refer to foods with a low pH.* Ex. most vegetables, meat, milk, some tropical fruits, fish, eggs.

Marketing Plan – document outlining marketing strategy for a product including marketing goals and methods for achieving those goals with reference to the aims of the business as a whole.

Modified Atmosphere Packaging - gas flushing and sealing or reduction of oxygen through respiration of produce or microbial action - one time modification of gaseous composition inside the package

Moisture/Protein Ratio (MPR) – The percent moisture of a product divided by the percent protein of a product. Most often used in meat product analysis to determine product safety and shelf-stability.

Net Quantity – Actual weight of food contents of a package.

Pasteurization – a heat treatment of food given for a short duration at a temperature generally below boiling point. Designed to kill those microorganisms living in a food, which will harm consumers. Does not kill all living organisms. Usually combined with refrigeration of final product.

pH – the measure of the acidity of a sample

pH Meter – tool used to measure the pH of a sample. pH meters come in a variety of prices and accuracies. To request information on purchasing pH meters, [click here](#).

ppm – parts per million. Used to describe the concentration of one ingredient in another. Ex: 156 ppm of nitrites in 100 lbs. of meat.

Prague Powder (“Curing Salts”) – A salt-based carrier of meat curing chemicals. When used correctly, 4oz. of formulation salt can be substituted for 4oz. of Prague Powder, providing the exact 156 ppm maximum “cure” to 100 lbs. of meat.

Principal Display Panel (PDP) – portion of the package most likely to be seen by customers at the time of purchase. Statement of identity and net quantity are must be displayed here.

Process Authority – based on regulations, a person or institution with expert knowledge and experience to make determinations about the safety of a food process and formulation. A Process Authority is required to maintain product confidentiality.

Quality – food quality is the result of three major components: appearance (size, shape, color); flavor (taste on the tongue, odor in the nose); texture (how product feels in the hand, in the mouth as it is chewed, or how it pours).

Reduced Oxygen Packaging (ROP) - any packaging procedure that results in a reduced oxygen level in a sealed package. Includes Vacuum packaging, controlled atmosphere packaging, etc.

Sausage, Dry – (moisture protein ratio max. range of 2.25-3.7 : 1) fermented sausage which undergoes a moisture loss of up to 25% of the total. Final water activity ranges from .85-.91. Typical pH ranges from 4.7-5.0. Many are shelf-stable due to low water activity. Ex. Pepperoni, Salami

Sausage, Fermented – a class of chopped or ground meat products that, as a result of microbial fermentation of sugar, have reached a pH of 5.3 (although 4.6-5.0 is more typical) and have undergone a drying/aging process to remove 15-35% of the moisture.

Sausage, Semi-Dry – (moisture protein ratio max. range of 1.6-2.3 : 1) fermented sausage which undergoes a moisture loss of up to 15% of the total. Final water activities range from .90-.94. Generally smoked/cooked prior to consumption. Require refrigeration. Ex. Summer sausage, thuringer, cervelat.

Scheduled Process – a detailed procedure for a single product issued by a recognized Process Authority that includes formulation, critical control points, processing steps, and storage, distribution and selling conditions/restrictions.

Shelf life – the length of time between packaging and use that a food product remains of acceptable quality to the user.

Shelf-Stable – foods considered non-perishable at room temperature for an acceptable period of time (generally weeks or months).

Sous Vide - vacuum packaging of raw or partially cooked foods, followed by pasteurization to reduce the microbial load and rapid refrigeration/freezing - reheating before consumption is required.

Vacuum Packaged (VP) – food is placed in an airtight package and all the air removed prior to sealing to prevent growth of microorganisms.

Value-Added Food - Food to which value has been added through special growing, processing or packaging techniques.

Water Activity (a_w) – a measure of the moisture available for microbial growth in a product. Measurements range from 0.00 (dry) to 1.00 (pure water).

Water Phase Salt - a measure of percent salt based on an analysis of the water phase of the tissue of a product, as opposed to the percent salt based on an analysis of the surface of a product. Used primarily in the fish industry.