Value-added Food Products Concept to Commercialization

Girish Ganjyal
Food Processing Specialist
Washington State University
• Value-Added Product Development Process Overview

• Product Concept and Kitchen/Lab Scale Product Development

• Food Safety for Shelf-Stable Foods
Value-Added Product Development Process Overview
Value-added Products
Value-added Products

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Value-added Products

Ref: Google Images
Value-added Products

Ref: WA Local Stores
Value-added Products

Ref: WA Local Stores
Value-added Products

Ref: WA Local Stores
Value-added Products

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Value-added Products
Overview

RAW MATERIALS

Science

(formulations/interactions)

PROCESS

(process effects/efficiencies)

Technology

PRODUCTS

(to promote well being)

Safety & Regulations

Has to make Business Sense

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Process Overview

Product Idea → Licensed Processor → Consumer

Product & Process → Food Safety → Distribution

Business Plan → Marketing & Sales
Product Development Process

Phase I:
- Start: Strategic Plan
- Market Opportunity Assessment
- Product Definition (New Idea)

Phase II:
- Prototype Development
- Consumer Testing
- Prototype Modifications
- Scale-up and Trial Production

Phase III:
- Post Launch Evaluation

PRODUCT DEVELOPMENT MILESTONES

Start: Strategic Plan
Phase I:
- Market Opportunity Assessment
- Product Definition (New Idea)

Phase II:
- Prototype Development
- Consumer Testing
- Prototype Modifications
- Scale-up and Trial Production

Phase III:
- Post Launch Evaluation

Finish: PRODUCT LAUNCH

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Motives for New Product Development

- Financial growth
- Sales growth
- Competition
- Advances in technology
- New invention
- New regulations
- Material cost changes
- Demographic or lifestyle changes
New Product Life Cycle

- Development
- Introduction
- Market growth
- Market maturity
- Decline

New Product Failures

• Why?
  – Poor planning
  – Poor management
  – Poor concept
  – Poor execution
New Product Success

• 4 Basic Consumer Truths
  – Product needs to deliver on the concept promised
  – Advertising quantity and quality matters
  – Distribution drives sales
  – Long-term support for new brands are needed
What is Success?

Success = Defining and meeting target consumer needs and expectations × Proper packaging and preparation × Positioned correctly at the shelf and in the media × Meet corporate logistics and financial imperatives

Current Trends

• Health and Wellness
  – Clean label
  – Nutrition
  – Functional products
  – Fruits and vegetables
  – Whole grains
  – Ancient grains
  – etc

• Partially cooked meals
  – Home cooking experience

• Customization
So how do you make grandma’s recipe into a commercial success?

• Success of a food business is gained by hard work, good business management, imagination and faith in your product.

• How the product might compete in the market?

• A mom-and-pop company is not enough of a hook.

• A food product must be wholesome, somewhat nutritious and offer a consumer an experience that will provide comfort or a change of pace, something exciting.

• Repeat purchases and proper product placement on grocery shelves become critical to grow the business.

• Faulty food-business management including miscalculated marketing schemes and poor distribution are more often the demise of a food company than the merits of the food product.
Product Concept and Kitchen/Lab Scale Product Development
Concept of the Product

- Define your product
- Why should somebody need your product?
- Who will buy this product?
- Where will you market this product?
- What is in it?
- What is the identity?
Categorization of Product

- What category do you want to sell your product in?
- Refrigerated or Shelf stable
- Acid, Acidified or Low Acid
- High moisture or dry
- Organic or not
- Natural or not, etc
Ingredients and Ingredient Functionality

- List out all the ingredients used in making your product

- Initially try to make the best product you can and document everything
  - Ingredients (form, source, manufacturing info, quantities, percentages)
  - Sequence of the use of ingredients (including any pre-processing)
  - Process (steps, time of each step etc)
• Make the product a few times in your kitchen (record everything each time)

• Keep a close eye on the variability of the raw materials (This is very critical)
• Ingredients are an essential component of any product

• Ingredients serve two major purposes,
  – Functionality in the food system
  – Nutrition

• Keep a close eye on the variability of the raw materials
  (This is very critical!!!)
• Ingredients
  – Types (including detailed info of the source)
  – Components
  – Quantities (for a batch)
  – Nutritional information
  – Functionality
  – Quality
  – Pre-processing information
  – Specification sheets and all other relevant identity information
• Pre-processing details
  – cleaning, sorting, size reduction, pre-cooking, etc

  – time of treatment

  – size of the utensils/cooking pots used

  – keep very good records
• Processing
  – size of the cookware used

  – process parameters (temperatures, times, mixing, pH, water activity etc)

  – quality of the finished product before packing (pH, water activity, texture, taste etc)

  – quality after the estimated shelf life period
Kitchen Recipe

• Taste tests (Sensory evaluation)

• Evaluate the final product for its sensory attributes

• Develop an identity for the product

• Make sure to evaluate this every time you make the product to ensure consistency
FDA/USDA Regulations

- Check all the ingredients you are using in your product
- If your product needs testing, make sure to get the testing done by an appropriate authority
- Verify the classification of your product
- Make sure you have kept good records of all the ingredients and processing
Summary

Energy → Process ← Labor

Ingredients → Product → Package

Regulations → Product → Consumer Acceptance

Safety → Costing

Marketing → Distribution

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Food Safety for Shelf Stable Foods
HEAT

pH

Water Activity
Heat – Eliminate Pathogens
Shelf Stable Foods

HEAT
Water Activity


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Water Activity

While temperature, pH, and several other factors can influence whether an organism will grow in a product and the rate at which it will grow, water activity is often the most important factor.

Water activity may be combined with other preservative factors (hurdles), such as temperature, pH, redox potential, etc., to establish conditions that inhibit microorganisms.

The water activity level that limits the growth of the vast majority of pathogenic bacteria is $0.90_{aw}$, $0.70_{aw}$ for spoilage molds, and the lower limit for all microorganisms is $0.60_{aw}$.

Shelf Stable Products

Water Activity (<0.85) (preferably <0.68)

FDA CFR Title 21 Part 113/114 (110) 117 – Subpart B

Acid (Naturally Acid)  

Acidified (pH < 4.6)

Low Acid (pH > 4.6)

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Tomatoes - pH Values

Roma Tomatoes
4.34

Beefsteak Tomato
4.54

Red Roma Tomatoes on Vine
4.42

Yellow Tomatoes
4.45

Tomatillo
3.81
Peppers - pH Values

- **Pasilla**: 6.65
- **Anaheim**: 5.47
- **Jalapeno**: 5.63
- **Habanero**: 4.94
- **Serrano**: 5.59
- **Yellow Bell**: 4.91
<table>
<thead>
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<th>Description</th>
<th>pH, Average ± Std. Dev.</th>
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<tbody>
<tr>
<td>Roma Tomatoes</td>
<td>4.34 ± 0.08</td>
</tr>
<tr>
<td>Tomatillo</td>
<td>3.81 ± 0.03</td>
</tr>
<tr>
<td>Carrot</td>
<td>6.22 ± 0.03</td>
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<tr>
<td>Green String Beans</td>
<td>6.18 ± 0.06</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>6.59 ± 0.06</td>
</tr>
<tr>
<td>Broccoli</td>
<td>6.54 ± 0.04</td>
</tr>
<tr>
<td>Ginger rhizome</td>
<td>6.04 ± 0.04</td>
</tr>
<tr>
<td>Zucchini</td>
<td>6.48 ± 0.03</td>
</tr>
<tr>
<td>Cucumber</td>
<td>5.92 ± 0.03</td>
</tr>
<tr>
<td>Celery</td>
<td>5.89 ± 0.02</td>
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<tr>
<td>Garlic Bulb</td>
<td>6.16 ± 0.00</td>
</tr>
<tr>
<td>Shallots</td>
<td>5.67 ± 0.02</td>
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<tr>
<td>White Onion</td>
<td>5.56 ± 0.00</td>
</tr>
<tr>
<td>Red Onion</td>
<td>5.60 ± 0.02</td>
</tr>
<tr>
<td>Pasilla Peppers</td>
<td>6.65 ± 0.04</td>
</tr>
<tr>
<td>Anaheim Peppers</td>
<td>5.47 ± 0.02</td>
</tr>
<tr>
<td>Red Bell Peppers</td>
<td>4.75 ± 0.01</td>
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</table>
According to the Washington State Department of Agriculture, at least 250,000 and possibly as many as 1,500,000 cases of foodborne illness occur in Washington State each year.

There are various systems that are mandated by state and federal law to improve food safety.

All of these systems require careful consideration of the process, facility, personnel and protection of the final product.

All personnel must be trained, understand the principles of the food-safety plans and must follow these procedures.

Additionally, these systems require complete documentation and a recall procedure in case of contamination, mislabeling or misuse of the product.

To fully implement these systems the product must be tested for pH, water activity and microbial stability especially in the case of acidified and canned foods, which are considered “ready to eat.”
Safe Process

• Once the concept of the food product has been developed, the recipe must be evaluated to ensure that a safe process is followed.

• A “Process Authority” must be used to review the formulation and processing steps of an acidified or low-acid product.

• BPCS (Better Process Control School)
  The Better Process Control Schools (BPCS) certify supervisors of thermal processing systems, acidification, and container closure evaluation programs for low-acid and acidified canned foods. Each processor of low-acid or acidified foods must operate with a certified supervisor on hand at all times during processing.
Recent Recall

• Dukarani Food Processing Products Recalled for Botulism

February 16, 2017 by Linda Larsen

The Minnesota Department of Agriculture is issuing a consumer advisory for products made by Dukarani Food Processing because they may be contaminated with Clostridium botulinum. The toxin produced by this bacteria can cause paralysis and death. An issue with two fish- and vegetable-based sauces were identified during a routine inspection. No illnesses have been reported to date.

MDA can’t verify that the sauces were processed properly, creating a potential botulism risk. In addition, a dry sesame seed and ground fish product (Benniseed) was made through an unapproved process and with an unapproved ingredient source.

Ref: https://foodpoisoningbulletin.com/2017/dukarani-food-processing-products-recalled-for-botulism/
Homemade of Washington is recalling pickle and sauce products because they may have been improperly produced, making them a risk for Clostridium botulinum. The pH of the products is too high, according to sampling by the Washington State Department of Agriculture. Required records to support safe processing guidelines were not available.

The recalled products are packaged in clear glass bottles with metal caps. There are no lot codes or expiration dates. These products are recalled:
- Bread and Butter Pickles (16 oz./454 g);
- Icicle Pickles (16 oz./454 g);
- Pickled Beets (16 oz./454 g);
- Chili Sauce (12 oz./340 g);
- Lite BBQ Sauce (12 oz./340 g);
- Medium BBQ Sauce (12 oz./340 g);
- Hot BBQ Sauce (12 oz./340 g); and
- Horseradish BBQ Sauce (12 oz./340 g).

They were sold from small retailers and fruit stands in Chelan and Douglas counties in Washington state. You can see pictures of product labels at the FDA website.

Ref: https://foodpoisoningbulletin.com/2015/homemade-brand-pickles-and-sauces-recalled-for-botulism/
References

- Food Processor Licensing (http://agr.wa.gov/FoodAnimal/FoodProcessors/licensing.aspx)
- Food Business in New Mexico, Nancy C. Flores and Jay Lillywhite. Guide E-510
- Food Processing Industry (SHARP) - http://www.lni.wa.gov/safety/research/healthyworkplaces/food/default.asp
- Agriculture in Washington State (http://agr.wa.gov/AgInWa/)
- Washington Economy (http://www.netstate.com/economy/wa_economy.htm)
- WSU Food Processing (http://www.foodprocessing.wsu.edu/links.html)
- UGA Extension (http://www.caes.uga.edu/departments/fst/extension/EFS_SNFB.html)
- NDSU Extension (http://www.ag.ndsu.edu/foodent/entrepreneur/modules.htm)
- http://collaborate.extension.org/wiki/How_to_Start_a_Food_Processing_Business
- http://www.nyssfpa.com/
- http://county.wsu.edu/pierce/agriculture/business/Pages/default.aspx
- How to Start a Food Processing Business: http://collaborate.extension.org/wiki/How_to_Start_a_Food_Processing_Business
References


- Stage Gate Process: http://mootee.typepad.com/innovation_playground/2008/03/the-problem-wit.html

- Washington State Department of Agriculture (http://agr.wa.gov/)

- Oregon Department of Agriculture (http://www.oregon.gov/oda/Pages/index.aspx)
Food processing extension and research programs at the Washington State University are designed to assist the food processors of all types and sizes in the State of Washington, the Pacific Northwest region and the Nation.

Food processing is a combination of various sciences such as engineering, chemistry, microbiology and others. The principles of food processing involves the conversion of the agricultural raw materials into value added products for the consumers.

Our program at Washington State University is focused on assisting the value added producers in their product and process development. This includes various training programs and technical services.
Product Evaluation

Processing Shelf Stable Acidified Foods in Sealed Containers

**Disclaimer: If you manufacture and/or sell/market any other product(s) that contain cannabis as an ingredient our lab cannot assist you, even if that new product does not contain cannabis.**

Food products packaged in hermetically sealed (air tight) containers are subject to regulations equivalent to the Code of Federal Regulations, Title 21, Parts 108, 110, 113, and/or 114 (21 CFR 108, 110, 113, and/or 114). Of course, all food products also must comply with a number of other regulations including labeling, net contents, good manufacturing practices, etc.

Low acid foods have finished equilibrium pH greater than 4.6. Acid foods have a natural finished equilibrium pH of 4.6 or less. Acidified foods also have a finished equilibrium pH 4.6 or less but have a significant low acid component. Acidified foods include pickled vegetables, most salsas, and many other formulated products. Exceptions to the acidified foods regulations include carbonated beverages, alcoholic beverages, refrigerated and frozen products, and products with water activity 0.85 or less. Jams and jellies which meet the published standards of identity are exempt since their water activities are 0.85 or less.

A process authority (a person with expert knowledge in processing) determines the product classification and the processes for low acid and acidified foods. The rest of this document will address only acidified foods.
Thank You

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• CFR - Code of Federal Regulations Title 21

• This database includes:
  a codification of the general and permanent rules published in
  the Federal Register by the Executive departments and agencies
  of the Federal Government.

Title 21 of the CFR is reserved for rules of the Food and Drug
Administration.

This database contains content that is current as of April 1, 2013.
For a daily compilation of CFR and Federal Register
amendments, see the Electronic Code of Federal Regulations.
FDA/USDA Regulations

• CFR - Code of Federal Regulations Title 21

• Good Manufacturing Practices regulations (formerly 21 CFR 110 and now 21 CFR Part 1 et seq specifically Part 117 for human food good manufacturing practices), which apply to all processed food products.

• Pay special attention to the sanitation and employee practices in your processing facility and the required records.
Food Safety Systems

• FSMA Preventive Controls for Human Food (PCHF) – 21 CFR Part 117
  – This is a preventive system.
  – For more information: https://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm334115.htm.

• Good Manufacturing Practices (GMPs) – 21 CFR Part 117 Subpart B
  – GMPs are operational sanitation procedures for personnel, facility, grounds and proper maintenance of equipment.
  – These practices are basic to any food processing operation and are required by law (21CFR110.3, now 117 Subpart B).

• Good Agriculture Practices (GAPs) / FSMA – Produce Rule – 21 CFR Part 112
  – https://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm334114.htm
Value-Added Food Business in the State of Washington
Food Safety Program
Program Manager: Lucy Severs
Phone: (360) 902-1876 or Click here for more information

If you process, manufacture, store or handle any food or dairy products for wholesale or retail distribution, or if you custom slaughter or custom cut meat, you need to contact the Washington State Department of Agriculture Food Safety Program, for licensing and/or inspection information.

We inspect and analyze food products; inspect food processing, handling and storage establishments and practices; inspect dairy farms and plants; inspect eggs for quality and weight standards, set and enforce sanitary standards for egg graders; inspect refrigerated locker plants, inspect custom farm slaughterers, custom meat facilities and license and supervise dairy technicians.

The WSDA Food Safety Program:
  - Protects and reduces the risk to public health by assuring the safety of the state’s food
Food Processors
Program Manager: Lucy Severs
Phone: (360) 902-1876 or Click here for contact information

Contents
1. You need a Food Processor License if...
2. Exceptions
3. Food Processor Packets

Food Processing is the handling or processing of any food in any manner of preparation for sale for human consumption. This includes dried fruits, herbs, teas, baked goods, cider, salad mixes and many other food products which are processed for sale or distribution and food that is custom processed for another party. It also includes repacking foods that are taken from one container in an unwrapped state and transferred or repackaged in another container.

You need a Food Processor License if your process falls into the following categories:

- You cook, bake, freeze, slice, dehydrate, smoke, roast coffee beans, bottle water or repackage any type of food.
- You process/package food for someone else
- You make shelf-stable, low acid canned food i.e.; canned vegetables, canned fish, retorted pouches (vegetable or fish), bread or cake in a jar and chocolate sauce
- You further process finished dairy products (i.e. cheese cutting, flavored dairy products.
You need a WSDA Food Processor License if your process falls into the following categories:

- You cook, bake, freeze, slice, dehydrate, smoke, roast coffee beans, bottle water or repackage any type of food;
- You process/package food for someone else;
- You make shelf-stable, low acid canned food i.e.; canned vegetables, canned fish, retorted pouches (vegetable or fish), bread or cake in a jar and chocolate sauce;
- You further process finished dairy products (i.e. cheese cutting, flavored dairy products, frozen ice cream desserts);
- etc.....

State regulations for food processing are outlined in the Washington Food Processing Act (RCW 69.07).
Process Facility

• For detailed information on food processor facility requirements go to http://agr.wa.gov/FoodAnimal/FoodProcessors or call (360) 902-1876.

• To be a licensed WSDA Food Processor facility requires:
  – home processor facility;
  – bathrooms and hand wash sinks in home processor facilities;
  – processing equipment, food process and equipment cleaning sinks;
  – worktables and counters;
  – floor, wall and ceiling materials;
  – lighting;
  – ventilation;
  – water supply; and
  – refrigeration.
# APPLICATION FOR FOOD PROCESSING PLANT LICENSE

**NEW LICENSE**

Please type or print clearly

**LICENSE EXPIRATION DATE: JUNE 30**

---

**FIRM NAME:**

**APPLICANT NAME:**

**MAILING ADDRESS:**

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<th>MANAGER</th>
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</table>

<table>
<thead>
<tr>
<th>TELEPHONE NUMBER</th>
<th>EMAIL ADDRESS</th>
<th>COUNTY</th>
</tr>
</thead>
</table>

Firm operates as:

- Individual  
- Partnership  
- Cooperative  
- Corporation  
- LLC

List name and address of all partners and/or officers below:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>ADDRESS <em>(Include City, State, Zip Code)</em></th>
</tr>
</thead>
</table>

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ATTACHMENT A
Sanitation Schedule

Please list sanitation schedule and procedures for clean up of facilities and equipment.

- List the *equipment and utensils* used for processing of food.
- How the *equipment and utensils* will be cleaned, sanitized and how often.

**Briefly describe how:**
- Walls, floors, ceilings and like surfaces will be cleaned and maintained.
- Restrooms, hand washing sinks, equipment-washing facilities will be supplied and used.
ATTACHMENT B:  
Intended Type of Process

Type of product(s) to be processed:

Type of processing (circle appropriate processes)

1. **Acidified - Pickling Foods**
   A. Acidifying  
      (Adding vinegar, citric acid to a low acid food)  
   B. Pickling by Natural Fermentation

2. **Acidified - Condiments, Vinegar's**
   A. Vegetables  
   B. Vinegar (only if other products added)  
   C. Salsa (shelf stable)  
   D. Dressings  
   E. Sauces (Bar-B-Q, etc.)

3. **Acidified – Low Acid Canned Foods**
   A. Low Acid Food  
      (vegetables, mushrooms, fish, etc.)  
      1) Retortable Pouches  
      2) Rigid Metal Cans  
      3) Other (describe)  
   B. High Acid Food  
      (Fruit, tomatoes)

4. **Baking**

5. **Blending, Dry Mixing**

**NOTE:**

Low-Acid or "Low-acid food" means:  
Food with a pH greater than 4.6.(canned fish, vegetables) and water activity greater than 0.85.

Acidified Food - means:  
A low-acid food to which acid or acid foods are added to attain a finished pH at or below 4.6.(pickles) Unless an analysis shows otherwise, WSDA considers sauce, dressing, and salsa products low-acid or acidified foods. Low-acid and acidified foods present potential serious health hazards and are subject to regulations specified in Title 21 of the Code of Federal Regulations, Parts 113 and 114.

The Federal Drug Administration (FDA) requires processors of Low-acid and acidified foods to:

- Register with the FDA; (no later than 10 days after first engaging in the manufacture, processing or packing of Acidified Foods or Low Acid Canned Foods.)
- File scheduled processes for each product and container size;
ATTACHMENT C: (USE INK)
Floor Plan

Please sketch the floor plan of your operation. Include the location of sinks, floor drains (if needed), placement of equipment, doors, and restrooms. Please indicate approximate dimensions of building and rooms.
ATTACHMENT D
PROPOSED LABELING

PROVIDE A TYPED PROPOSED LABEL THAT INCLUDES THE FOLLOWING INFORMATION FOR EACH TYPE OF PRODUCT you intend to process. Place below or attach a copy of the TYPED proposed label to this sheet.

1. **Name of Product** – The common or usual name of the product must be prominently displayed such as “Pickled Asparagus”.

2. **Manufacturer and/or Distributor Name & Address** - Full business name and address must appear on the label. Required information must include your business name, address (street or a P. O. Box), City, State and Zip Code. If your business address is listed in the current phone directory then the street or P. O. Box may be omitted from the label. You may include your phone, fax or web information if desired.

3. **Net weight** - Both English and metric values are required. Example: 12 FL oz (355ml).

4. **Ingredients** – Each ingredient and any sub-component of that ingredient must be listed in descending order of predominance by weight. When a processed food ingredient is fabricated from two or more ingredients then the sub-components must be listed in parenthesis after the ingredient. Please be advised that due to their serious nature all allergens must be identified, such as: Wheat, peanuts, milk, eggs, tree nuts, soybeans, fish, crustacea (crab, shrimp, lobster), sulfites, yellow dye #5.
Labeling Processed Foods

• All processed foods sold direct to wholesale or retail must have labels on their packaging. This includes processed foods sold at farmers markets, on the Internet, to restaurants, or grocery stores.

• The State of Washington food labeling requirements are based upon the Federal Fair Package and Labeling Act of 1966.

• Labels for processed food must meet all of the below requirements:
  1. Language
  2. Product Identity
  3. Ingredient Statement
  4. Name and Address
  5. Net Weight
  6. Perishable Foods
  7. Nutritional Value Information

Contact the WSDA Food Safety Program for more information on labeling by visiting http://agr.wa.gov/FoodAnimal/FoodProcessors/packaginglabeling.aspx, emailing foodsafety@agr.wa.gov or calling (360) 902-1876.
Attachment E
Water Supply Testing Requirements

Type of water system:

City □  Municipal □  Well □  Spring □  Other Private Water Supply □

Answer the following if you are using well, spring or other private water supply
To determine the water supply testing requirements for your facility, please complete this questionnaire and refer to the requirements on the following pages:

Questions

1. Do you process bottled water or ice at your facility?
   
   If YES, your facility must comply with the Group A Water System requirements (See 2A page 9). If you process bottled water, your facility must also meet specifications outlined in Title 21 CFR, Part 129.

   If NO, go to question no. 2.

2. Is any of your facility’s water supplied from a well, spring, or other private water system?
Small Farm and Direct Marketing Handbook

Food Assistance & Regional Markets Program Manager: Kim Eads
General Phone: (206) 256-6157
smallfarms@agr.wa.gov

Table of Contents

Getting Connected
Where should you go for help with your small farm or food-related business? This section covers ways to learn about everything from classes and workshops to field days and conferences. A host of organizations, including non-profits, government agencies, schools and industry-specific groups work hard to provide these resources. This section covers how to link up with these efforts, much of it also available in Spanish and Hmong.

Running a Successful Farm Business
Like any business owner, farmers and those running farm-related businesses need to have the right licenses, pay the proper taxes, get the necessary insurance and be sure to have the financing to make their operation a success. This section covers all this as well as laws related to employees and labor.

http://agr.wa.gov/marketing/smallfarm/greenbook/
Thank You

CColes@agr.wa.gov
206-321-1124
http://agr.wa.gov/
Regulating Agencies

FDA

USDA

WSDA

WA DOH