Many small-scale food processors make and sell some type of canned, shelf-stable foods, such as pickles, jams and jellies or salsa. Such products offer a great way to add value and extend the shelf life of local produce. However, processors must ensure that these products are produced in a hygienic environment and follow local and federal food safety regulations. Some of the most frequently asked questions regarding selling safe canned foods are listed below:

1. **Which regulations do I need to follow for selling canned foods?**

<table>
<thead>
<tr>
<th>Where are you <em>processing?</em></th>
<th>Regulations to follow</th>
</tr>
</thead>
</table>
   | A city or county with a food ordinance¹ | Local and state regulations  
The product will be inspected by a local inspector acting under *local* authority. |
   | A county without a food ordinance (generally less populated counties) | State regulations  
The product will be inspected by a local Public Health Agency inspector acting under *state* authority. |

<table>
<thead>
<tr>
<th>Where are you <em>selling?</em></th>
<th>Regulations to follow</th>
</tr>
</thead>
</table>
   | In Missouri | Missouri state and local food processing regulations²  
More information on regulations for specific products is listed below. Always check with the local public health inspector in the area where you are processing and selling as regulations may vary in different localities. |
   | Outside Missouri | Food and Drug Administration (FDA)³, state and local regulations  
Low-acid and acidified canned shelf-stable foods, regardless of size of operation, require a process review. |
   | Grocery stores, distributors | Missouri food processor regulations  
In addition, check with your buyer as their requirements may be stricter than government regulations. |
   | Missouri farmers markets | Missouri retail food regulations, as well as requirements of the farmers market where you are selling⁴ |

2. **Why are we so concerned about *Clostridium botulinum* in canned foods?**

   The big concern with *C. botulinum* is that it grows in the absence of oxygen, such as in canned food products. It can form heat-tolerant spores which can produce a deadly toxin of which only a few nanograms can cause paralysis and death. Temperatures of 250°F (above the boiling point of water, thus requiring pressure to obtain that temperature) are required to kill spores under neutral pH conditions.
3. Why is the acidity of food important to its safety?

Most microorganisms, including C. botulinum do not like to grow in foods that are acidic (thus having a lower pH value). A pH of less than (<) 4.6 reduces the temperature requirement to kill C. botulinum to 212°F (boiling point of water). Most fruits have a pH of 3 to 4, while tomatoes have a pH of 4 to 5. Other vegetables, beans, meat and fish have a pH of greater than or equal to (≥) 5. Lemon juice and vinegar have a pH less than or equal to (≤) 3, while pure water has a pH of 7.0.

4. How do I measure product pH?

A calibrated pH meter should be used. A good, easy-to-use pH meter can be purchased for about $100. The pH meter must be calibrated at least weekly and the product should be at room temperature when checking the pH to ensure accuracy.

5. What processing methods can I use for various types of food?

<table>
<thead>
<tr>
<th>Method</th>
<th>What it does</th>
<th>Maximum temp</th>
<th>Use for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling water bath</td>
<td>Destroys most microorganisms of concern, including yeasts and molds*</td>
<td>212°F</td>
<td>High-acid foods: home canning and commercial applications</td>
</tr>
<tr>
<td>Hot fill</td>
<td>Same as above; need to use sterilized jars</td>
<td>190°F</td>
<td>High-acid foods: requires a commercial steam kettle</td>
</tr>
<tr>
<td>Pressure canning</td>
<td>Destroys ALL microorganisms of concern, including C. botulinum spores</td>
<td>250°F</td>
<td>Low-acid foods: home canning: must use a commercial retort for selling low-acid foods</td>
</tr>
</tbody>
</table>

*Note that yeasts and molds cause product spoilage and can grow at pH of less than or equal to (≤) 4.6. If present, they can raise product pH to a level allowing C. botulinum growth.

6. Does someone need to check the safety of the canned foods that I sell?

Depending on the natural and final levels of acidity of the food product, certain foods require a “process review” by a process authority.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Characteristics</th>
<th>Examples</th>
<th>Sale requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerated canned products</td>
<td>Foods sold refrigerated and labeled as “keep refrigerated”</td>
<td>Refrigerated canned sausas, sauces, pesto, etc.</td>
<td>Monitor refrigeration. NO process review. Made in inspected facility</td>
</tr>
<tr>
<td>Fruit Jams and Jellies, Honey (shelf stable)</td>
<td>If &lt; $50,000 sales/year AND sold directly to the consumer, then exempt</td>
<td>Strawberry jam, grape jelly, honey</td>
<td>If exempt, inspected facility NOT required, but must be labeled as “not inspected”. If not exempt, inspected facility</td>
</tr>
<tr>
<td>LOW SUGAR Fruit Jams and Jellies (shelf stable)</td>
<td>Low acidiﬁcation. Must have pH tested in a laboratory.</td>
<td>Varies</td>
<td>Low acid/acidified food; BPCS, process review and inspected facility required</td>
</tr>
<tr>
<td>Jellies Made with Juice (shelf stable)</td>
<td>*these products must be tested in a laboratory for pH and water activity (a_w)</td>
<td>Varies</td>
<td>Inspected facility not required</td>
</tr>
<tr>
<td>Low Water Activity Foods (shelf stable)</td>
<td>Foods with water activity (a_w) ≤0.85</td>
<td>Chocolate sauce (sold shelf stable)</td>
<td>Monitor a_w. NO process review; Manufacture in inspected facility</td>
</tr>
<tr>
<td>Canned Beverages</td>
<td>Carbonated or alcoholic beverages</td>
<td>Beer, soda</td>
<td>NO process review; inspected facility; for alcohol, follow Mo. Department of Public Safety regulations</td>
</tr>
</tbody>
</table>

7. What is a process review?

A recognized process authority will do a careful evaluation of your product formulation, processing steps and the safety characteristics of your product. They will then provide a “scheduled process” for the product which includes the product formulation, critical control points, processing steps, storage, distribution and sales conditions which are required to keep the product safe.
8. Who or what is a process authority?
   This is a person or institution with an FDA-recognized expert who has knowledge and experience in the microbiology and processing requirements for canned foods. Food processors in Missouri can contact the MU-Food Processing & Safety laboratory to test their products (e.g., pH, water activity etc.) and for process authority services.

9. Why should I get a process review?
   It is a regulatory requirement if you are selling canned products that require a process review. The process authority can make very useful suggestions for you to improve the safety of your product, particularly if you make any changes to your process or ingredients. It also provides documentation of safety for your customers.

10. How do I get a process review?
   - Send in completed form along with a sample of product to a process authority for testing (pH and possibly aw)
   - Click here to access the analytical service and process authority request forms.
   - Also need to meet Missouri regulations, as well as FDA regulations if selling out of state
   - Someone who has attended Better Process Control School must be in the facility while processing.
   - For more information, please contact the Missouri process authority (lchannaiah@missouri.edu).

11. Where can I take Better Process Control School (BPCS)?
   The University of Missouri offers the BPCS training. Please check the "MU-Food Processing and Safety Lab" for the latest information. Other universities and other entities also offer the course in-person and online.

12. What Information do I need to submit along with a sample of my product to get a process review?
   The process authority will likely have a form to be completed. The information needed generally includes:
   - Exact formulation of product by weight
   - Precise directions for the process, including packaging to be used
   - Intended distribution temperature: Refrigerated, frozen, or shelf stable
   - Your name, address, phone number, email

13. What do I do once my process review is completed?
   - Must maintain records of relevant critical control points for every batch (pH, temperature, etc.)
   - Review approved process periodically to see if changes are necessary or have been made

14. What do I do once my process review is completed? (continued)
   The process authority will likely have a form to be completed. The information needed generally includes:
   - Exact formulation of product by weight
   - Precise directions for the process, including packaging to be used
   - Intended distribution temperature: Refrigerated, frozen, or shelf stable
   - Your name, address, phone number, email

16. Generally, if selling product directly to the consumer (such as at a Farmers Market), Retail food regulations apply and if NOT selling directly to the consumer (through a grocery store or distributor, etc.), Food Processor regulations apply. More information on both these types of regulations is available from: https://health.mo.gov/safety/foodsafety/industryfoods/retail/foodsauthority.php
21. The legal pH limit is ≤ 4.6, but for an added safety measure, process authorities will generally require a final product pH < 4.2.
22. Note that every component of the food must be ≤ 4.2 pH within 24 hours of thermal processing
23. Note that this does NOT include taking an order and shipping the product to their customer.
24. More information on labeling requirements for food products is available from: https://extension.missouri.edu/pubs/n1305
25. Water activity is a measurement of the water available for the growth of microorganisms. It is affected by moisture content, as well as salt and sugar content of the product. It ranges from 0 to 1 (distilled water is aw 1).
26. Licensing information is available from MO DPS Alcohol and Tobacco Control: www.atc.dps.mo.gov/licensing/
27. Information on Kansas State University Process Authority: https://www.kire.k-state.edu/kvafl/
28. Information on University of Kansas Process Authority:
29. Information on University of Nebraska Process Authority: http://fpc.unl.edu/lab_services

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Please note that this is the author’s best understanding of the regulations.
Please contact your local public health inspector or the Missouri Department of Health (contact info available from http://health.mo.gov/safety/foodsafety/index.php) for more information.