Classifying Your Food as Acid, Low-Acid, or Acidified

All foods are not created equal. Some are naturally high in acid, some are only slightly acidic. Some foods contain an abundance of free moisture, while others are very dry. These characteristics contribute not only to the way a food looks, feels, and tastes, but also to the ability of microorganisms to survive and grow. As a food entrepreneur, you should be aware of how ingredients in your product make the food look, feel, and taste; as well as how the ingredients create environments for microorganisms like bacteria, yeast, and molds to survive and grow.

Clostridium botulinum and Canned Food

In canned foods, the most important safety concern is the ability of a bacterium known as *Clostridium botulinum* to grow within the food product. Under certain conditions, *Clostridium botulinum* can survive and grow inside of a sealed container of food and produce a deadly toxin. If the toxin is ingested, the consumer may suffer from botulism which can be fatal. The food processor can avoid this devastating scenario by understanding the properties of the food products they are canning and following a process developed specifically for their food product by an expert in the field. One of the first steps in ensuring safe food is understanding how a food product should be classified.

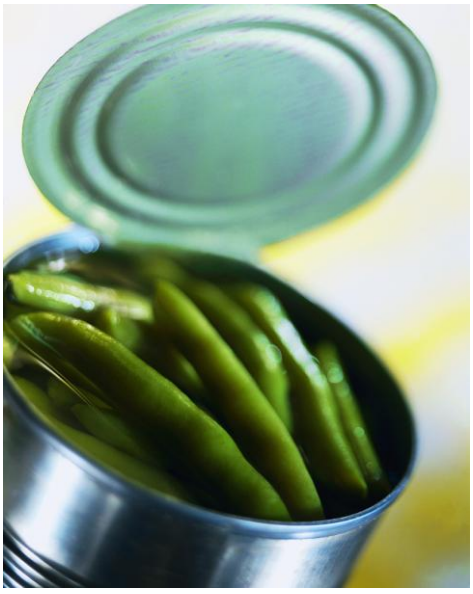
Canned food samples are prepared to be tested for the toxin produced by *Clostridium botulinum*. Photo courtesy of the Center for Disease Control and Prevention (CDC).

Determining Classification

If you plan on making and selling canned foods, it is important to know the amount of acid that is present in the food (pH) and the amount of moisture available to microorganisms (a_w). These parameters will determine how the food product should be classified, and the classification of the food is what determines how it will be regulated. The food will be classified depending on the pH value of the food relative to the pH value 4.6, and the a_w being equal to or less than 0.85. The three classifications are **acid foods**, **acidified foods**, and **low-acid foods**.

Acid foods are those that have a natural pH of 4.6 or below. Most (but not all) fruits are considered acid foods. Acid foods are exempt from the Acidified Foods (21 CFR 114) and Thermally Processed Low-acid Foods Packaged in Hermetically Sealed Containers (21 CFR 113) regulations, but processors must still comply with Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food (21 CFR 110) regulations.

Acidified foods are low-acid foods that have had acid(s) or acid foods added to them. The finished equilibrium pH of these food products must be 4.6 or below, and the a_w greater than 0.85. Commonly acidified foods include beans, cucumbers, cabbage, artichokes, cauliflower, puddings, peppers, and tropical fruits, and these products are often called "pickles" or "pickled". Acidified food producers must follow regulations outlined in 21 CFR 110 "Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food", 21 CFR 114 "Acidified Foods", and 21 CFR 108.25 "Emergency Permit Control".



Low-acid foods are those that have a pH of greater than 4.6, meaning that they contain low amounts of acid. In order to be classified as a low-acid food, the a_w must be greater than 0.85. Examples of low-acid foods include meats, most vegetables, most starch based foods, and most protein-heavy foods. Canning low-acid food creates the dangerous environment necessary for the growth of *Clostridium botulinum*. Therefore the regulations for processing and selling low-acid canned foods are more extensive than for the other food categories. Low-acid canned foods are regulated by 21 CFR 110 "Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food", and 21 CFR 113 "Thermally Processed Low-Acid Foods Packaged in Hermetically Sealed Containers". Processors of low-acid canned foods must have a great deal of knowledge of thermal processing, microbiology, and how to deal with process deviations. Because A) the risk for processing and selling low-acid canned foods is high,

B) cost associations for equipment needed for safely processing low-acid canned foods are high, and C) knowledge of complex processing protocols is great, it is not recommended that small food businesses and start-up food entrepreneurs engage in the processing and selling of low-acid canned foods. Home-based processing of low-acid canned foods for retail sale is prohibited.

The Role of Water Activity in Classifying Foods

Water activity may be a critical factor in determining the classification of the food product. The amount of moisture in the product is <u>not</u> the same as water activity. Water activity is the amount of free moisture in a product, meaning the water in the product that is not bound to salt, sugar, protein, or other elements in the food. For example, water has an a_w of 1.0 (the highest on the scale), but soy sauce has an a_w of approximately 0.80. Although soy sauce is a liquid and contains a high amount of moisture, the water activity is much lower than water. This is because soy sauce is very salty, and the salt acts to bind a large amount of the water in the product, reducing the amount of free moisture available for microorganisms to use for growth and survival. When the a_w of a product is 0.85 or lower, the water activity is considered low enough to control the growth of potentially harmful microorganisms. Therefore, food products with an a_w of 0.85 or less are exempt from 21 CFR parts 108.25, 108.35, 113, and 114 regardless of their pH.

Decision tree for food classification and relevant canned foods regulations.