



# Shelf Life and pH Testing

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## Summary

A product's shelf life or safe storage time of a product, is affected by a number of variables, including intrinsic parameters, such as pH and moisture content, and extrinsic parameters, such as environmental factors. Understanding these variables is key to producing a consistently high-quality and safe food product.

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## Key Issues

Shelf life encompasses several facets of food quality including safety, nutritional value, and sensory properties. Shelf life affects food quality, which in turn influences the consumer's buying decisions.

For many food companies, the ability of a food to retain its overall quality from the processing line, through distribution and marketing, and finally to the consumer, is the result of intensive studies to predict the shelf life of a food.

Creating a product with a predictable shelf life demands various processes and controls by the food manufacturer. The natural shelf life of some foods is extended only for short periods (fresh apples, for example, coated with wax contribute to a longer shelf life), whereas the shelf life of other foods is extended dramatically (canned fruits and vegetables, as well as aseptically packaged foods, typically have shelf lives of many years).

Many factors contribute the shelf life of a food product, including both intrinsic and extrinsic factors.

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## Definition of Terms

**Shelf life:** is the time frame over which a food product can be relied upon to retain its quality characteristics.

**Shelf life determination:** can be done either with or without specialized equipment. In its simplest form, food processors determine shelf life through "real time" studies--i.e., observing the changes in food as it occurs under normal storage conditions. Laboratory testing allows processors to accelerate quality degradation by applying heat and cool down periods under



carefully monitored conditions. Shelf life determination that might take months or years to determine under "normal" conditions, might take only weeks or months under lab conditions.

Intrinsic parameters: are those factors that are an integral part of a food's physical makeup, including water activity, pH, moisture content, and anti-microbial agents. Canned tomatoes, for instance, which have a low pH (and are considered highly acid), have natural properties that contribute to a long shelf life.

Extrinsic parameters: are those factors that can be controlled or changed to influence a product's shelf life, including temperature, time, relative humidity, presence of gases, and other environmental factors. Vacuum packaged foods, for example, depend upon the absence of oxygen to extend the shelf life of many fresh and processed foods.

pH control: is a common method used to extend the shelf life of products. pH is a scaled measure of the acidity or alkalinity of a food: the lower the pH, the higher the acidity. Most bacteria that contribute to food spoilage do not prosper in acidic conditions. Pickled foods, for example, are made shelf stable by the addition of some type of acidifying agent, such as lemon juice or vinegar.

Water activity: refers to the amount of unbound or "free" water in a system available to support biological and chemical reactions. Generally speaking, the lower the water activity, the less viable are those microorganisms that contribute to food spoilage. Peanut butter, which has a long shelf life under non-refrigerated conditions, is a common food that has low levels of "available" water.

Preservatives: belong to a class of food additives that extend shelf life by inhibiting microbial growth, or by minimizing the destructive effects of oxygen, metals, and other factors that may lead to rancidity. Common preservatives include nitrites (used extensively in processed meats), sodium benzoate (often added to soft drinks), sorbic acid (dairy products), calcium and sodium propionates and sorbates (mold inhibitors used in baked goods), and common table salt.

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## **Print Resources**

Reference Guide for Kansas Food Processors: Call 785-296-3737 to order.

Starting a Shared Use Kitchen Incubator (available through the National Business Incubator Association's bookstore. Visit their web page at [www.nbia.org](http://www.nbia.org))

Kansas State Resource Guide Call 785-296-3737 to order.