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Testing for life




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AGRIFOOD
HEALTH AND PHARMACEUTICAL
ENVIRONMENT

Factsheet

Food Shelf Life

Shelf life or durable life is normally the amount of time that a food product, stored under appropriate conditions, retains its freshness, taste, texture, nutritional value and any other quality claimed by the manufacturer.

The manufacturer is responsible for settingthe shelflife of its product and ensuring that it will retain its characteristics during the claimed shelf life. The manufacturer will then offer a high quality product that will ensure consumer satisfaction.

Increasingly, manufacturers are required by regulatory authorities and chain grocery stores to conduct shelf life studies on their product such as refrigerated ready-to-eat products, products with long shelf life or even frozen products.

Manufacturers who have put in place a system of reference recognized by the GFSI such as BRC and SQF must prove that the shelf life of their product has been validated.

When to Conduct a Shelf Life Study?

A shelf life study can determine the aging process or spoilage of the product and help set an expiration date. However, the manufacturer must also determine if a new study is justified when a recipe, manufacturing process or packaging is modified. For example, adjustments to the level of preservatives, salt content, physical/chemical properties such as pH and water activity, change to the atmosphere in packaging should require a new validation of the shelf life. Slight adjustments to a recipe could result in major impacts on the behaviour of the product.

Shelf life can be determined on an on-going basis to ensure manufacturing process consistency and to target potential problems linked to product preservation. In fact, for some types of products the shelf life is more of a problem in the summer. Follow-up shelf life tests can be less demanding than the original validation.

HOW TO MEASURE SHELF LIFE ?

The main method used to determine shelf life is to monitor the product over time. Shelf life is the number of days between the manufacturing date and the time when the product will display the first major signs of degradation. It is advisable to maintain a safety margin.

Characteristics of the product must be identified to set the analysis parameters, in particular:

- Types of ingredients
- Formulation (pH, aw, % of salt, preservative, additives, etc.) ʃ
- Process (e.g. : thermal processing, acidification, fermentation, drying, etc.)
- Conditioning (modified atmosphere, type of material, etc.) ʃ Storage and distribution conditions.

This information will determine the type of analysis to be performed and here is a brief overview.

Microbiological: indicators or spoilage microorganisms (aerobic and anaerobic bacteria, coliforms, lactic acid bacteria, *E. coli*, yeasts, moulds, *Pseudomonas*) and pathogenic bacteria (*Salmonella, Listeria monocytogenes, E. coli O157:H7, Bacillus cereus, Clostridium perfringens, Staphylococcus aureus* and others.)

Physicochemicals : pH, water activity (aw), viscosity, salt content, humidity, free fatty acids and others.

Nutritional: vitamins, probiotics or other main components in your product.

Organoleptic (sensory evaluation): appearance, texture, colour, odour, taste, after cooking evaluation, observation, etc.

STORAGE CONDITIONS

Storage conditions are defined once the parameters and limits have been set. It is useful to factor in the actual cold chain for refrigerated products during the various distribution steps and the expected refrigeration time in consumer refrigerators where the temperature is around 7 ° C. This means that one third of a shelf life could be stored at 4 ° C and the other two thirds at 7 ° C.

The shelf life of products can also be submitted to a temperature “stress” to simulate a break in the cold chain. Apart from the temperature, other factors can also have an impact on the shelf life of a product during storage for example, exposure to light, humidity, etc.

Shelf life studies can also be conducted in parallel to measure the impact of storage conditions (e.g. : at 4 ° C and at 7 ° C, with and without any break in the cold chain, etc.)

SAMPLING

Representative sampling is required to ensure reliable results. First, shelf life studies must be conducted from normal production runs and with regular size containers. Pilot productions and laboratory tests do not represent normal production conditions. A shelf life study is specific to a product under certain manufacturing conditions.

For a rigourous interpretation of the results, product analyses should be carried out in duplicate or in triplicate and on more than one lot. Product samples can be taken at the start, middle and end of a production run.

Analyses should be carried out from a single container when the shelf life of a product is to be determined after it was opened. Shelf life can also be evaluated after thawing. Various conditions can be verified to simulate critical use scenarios to increase the confidence level in the shelf life.

OTHER METHODS

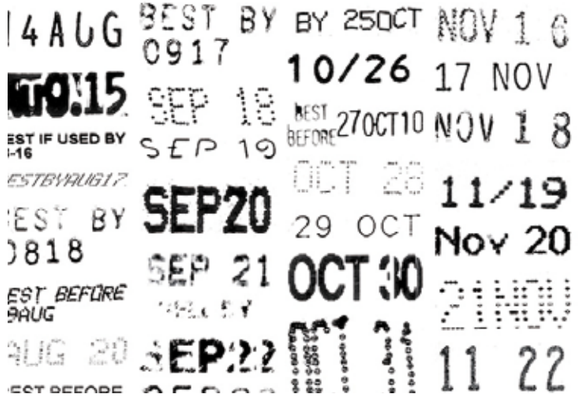
Other methods such as predictive microbiology can also be used to determine the shelf life of food. Predictive microbiology utilizes a data base to assess the growth of microorganisms in relation to the properties of an evaluation matrix (e.g.: pH, aw,

% salt) and temperature. However, microbiological modelling has limits since it does not consider a number of factors such as the manufacturing conditions specific to each plant. Furthermore, this method cannot predict the behaviour of food at the organoleptic level.

Manufacturers who hope to quickly bring to market products having a long shelf life could be tempted to fast track the shelf life study. Normally, a shelf life is fast tracked when the storage temperature is increased to accelerate the reactions leading to product aging. However, this approach is not recommended for microbiological analyses. Increasing the temperature encourages microorganism growth which would not have been present under normal conditions.

LIMITS

A shelf life study does not guarantee the safety of the product. For example, a pasteurization process must be validated and controlled to obtain a proper reduction of the targeted pathogenic microorganisms. Furthermore, favourable production conditions must be in place such as good manufacturing practices, a cleaning and sanitation program, raw material control, a calibration program and a sampling plan.



Eurofins EnvironeX provides support !

Eurofins EnvironeX consultation service will determine the ideal protocol for the shelf life study of your product. Consultants help you select the analysis parameters, frequency and storage conditions.

Consultants will do a follow-up of the analyses thus, the parameters can be modified during the shelf life according to the results obtained.

A full report including text tables, graphics and interpretation of the results of the micobiology, physical/chemical and organoleptic analyses will be submitted.

OUR ENGAGEMENT TOWARDS QUALITY

- **ACCURACY OF RESULTS**
- **RESPECTING TURNAROUND TIMES**
- **QUALITY CONTROL PROGRAMS**
- **TRAINING OF PERSONNEL TO RESPOND TO THE HIGHEST STANDARED OF QUALITY**