

Predict shelf life in an accurate way

In a complex product system, a structured method is needed to predict the shelf life, taking all parameters during processing and storage into consideration. The influence of headspace volume, package volume and vitamin C concentration were investigated.

According to the European Commission (2016), food waste in the EU is around 88 million tons per year, with an associated cost estimated to 143 billion euros. Most of the food waste can be avoided by acting on the food shelf life since one of the main reasons for throwing away food is not being used before its expiry date. Food shelf life is of great interest because it can reflect food nutritional, functional, sensory and safety profile. The shelf life of a product is not always related to its real life that ends with the loss of the hygienic and/or nutritional properties, but generally corresponds to the end of its marketability when its physical and sensory features are not acceptable.

Defining the exact shelf life of food product is still a real challenge for food manufacturers because of a wide range of variables to be considered, such as formulation, processing conditions, packaging characteristics and storage conditions. Our project was collaborated with Tetra Pak AB, which contributes to protect what is good with their various innovative packages.

As for the packaging characteristics, package volume and headspace volume have big influence on the shelf life. Therefore two Tetra Recart packages were chosen to represent two sets of package volume and headspace volume. It is generally agreed that with more vitamin C retention, product can be acceptable for a longer time in terms of sensory features due to its antioxidant capacity. We found vitamin C degraded faster in the large package and less oxygen was lost. It implies when the concentration of vitamin C was the same in different Tetra Recart packages, product in large package has shorter shelf life.

The shelf life of processed fruit can be determined by the browning level of the fruit. Turning to brown means the end of shelf life from the sensory aspect. By using the tricolor metric system measurement, the a value which represents the redness or greenness in the sample turned out to be a good indicator for browning reaction. Based on the results of pineapple products stored at 30°C, the a value -3 is the threshold of the slight browning. And the corresponding vitamin C concentration to the a value -3 is 460 ppm. Thus, the vitamin C concentration might be a predictor of browning.

Aiming to identify the main factors that can influence the shelf life of processed fruit product, regression analysis was conducted by using the data from current Tetra Recart Food Database. Result here is limited and model generated needs further improvement concerning that the current database could not provide enough data for each variable and the data for shelf life is not precise.