Determination of Shelf-Life in cereal snack of dried apples using Principal Components Analysis (PCA).

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Shelf Life is a key factor in research and food development. Usually, the shelf-life determination is performed by measurement of quality attributes in conjunction with a data analysis and mathematical model fitting. Optionally, accelerated ageing methods under extreme conditions could be used. However, the shelf life determination becomes difficult when multiple attributes must be studied simultaneously as the natural and complex spoilage process of the food.

A relative new approach to explain these situations is the multivariate models application, specifically those models based in Latent Projection, like Principal Components Analysis (PCA) because of their prosperities to incorporate experimental variables and interaction in all-in-one model. Thus, the aim of this research was assess shelf life of a new snack-cereal product apple-based, using univariate method versus PCA multivariate method.

The study was carry out in samples of the product packed in multi-laminated bags, and incubated at 18°C, 25°C and 35°C for 18 months. Quality attributes considered were: Aw, humidity, SO₂ content, organoleptic attributes and CIELab color. Data were modeled by univariate degradation kinetics and multivariate analysis (PCA) according the method proposed by (Pedro and Ferreyra, 2006). All computes were performed by SIMCA-P+ 12 and Excel 2003.

Multivariate model retained 2 Principal Component explaining 83.1% of variability (PC 1: 68% and PC2: 16.2%). PCA ordered the samples based on the time through PC 1 and the temperatures profiles of storage by PC 2.

Thus, for the treatment of 18°C, contribution is mainly explained by attribute Aw, while at 25°C, the color variables of and SO₂ content acquired greater importance. At 35°C the greatest contributions were associated with moisture and texture, at final incubation times. The above, would imply that model reflected in terms of variability, biochemical phenomena associated with the deterioration of the product.

A first order kinetic degradation model showed the better goodness of fit for all storages conditions. Thus, shelf-life was 18.2 months for storage to 18 °C, 18.1 months at 25 °C and 15.5 months at 35 °C. Comparing this value with the obtained by univariate kinetics a difference of a few weeks in estimating was detected.

MALST methodology could estimate simultaneously deterioration of quality attributes of the product, showing the interactions that occur between them.

REFERENCES.