Title: **Authentication of organic and conventional chicken eggs by chromatographic fingerprint profiling and chemometric methods.**

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Date: January 2019

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The use of sophisticated instrumental techniques in food industry area is growing due to the consumer concern about food safety and authenticity. High performance liquid chromatography (HPLC) has been used to obtain chromatographic fingerprints of egg samples. Chemometric methods, including principal component analysis (PCA) and partial least squares-discriminant analysis (PLS-DA), were able to evaluate the egg classification and the egg aging study. The aim of the study was to develop an HPLC-UV chromatographic fingerprint profiling method to achieve the egg sample classification and the egg aging study. Eggs samples were purchased from a supermarket in Barcelona and different classes and brands of eggs were obtained. For the egg sample classification a total of 106 egg samples were studied, including 12 organic egg samples (O), 41 free-range egg samples (FR), 39 deep litter indoor housing egg samples (DL) and 14 cage farming egg samples (CF). For the egg sample aging study, a total of 84 egg samples (cage farming eggs with the same size and belonging to the same brand) were employed. The HPLC-UV method in combination with PLS-DA is a suitable strategy to achieve egg sample classification according to the egg class (O, FR, DL and CF), to differentiate between manufacturer brands and to distinguish between egg sizes. This strategy is also able to evaluate the aging process on egg samples and can be proposed as a future quality system to evaluate the freshness of eggs.

Keywords: chemometric methods, egg aging study, egg samples, egg sample classification, food authenticity, food industry, food safety, high performance liquid chromatography.