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## Qualitative and quantitative analysis of processed animal proteins adulteration by clustering of FTIR microscopic imaging data

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**Abstract** Recently, Fourier transform near infrared (FT-NIR) microscopic imaging method has been presented as a new strategy for detecting feedstuff and ingredients, such as processed animal proteins (PAPs). The FT-NIR microscopic imaging system is able to rapidly image large sample areas at high spatial resolution. It is suitable to identify processed animal proteins contamination or adulteration. The challenge is to develop and apply adequate chemometrics methods to extract information from FT-NIR imaging data. Clustering, as unsupervised classification methods, is useful to identify different components in non homogeneous data sets.

In this work, two kinds of processed animal proteins are selected, meat and bone meal, and fish meal. For qualitative analysis of the mixture of fish meal and meat and bone meal, artificial samples were used and measured using the FT-NIR microscopic imaging instrument. Fish meal contaminated with meat and bone meal at a concentration of 30%, 20% by weight respectively, were prepared for quantitative analysis. To extract classification information from FT-NIR microscopic imaging data set, three kinds of clustering algorithms, including K-means clustering, Fuzzy c-means clustering, Gaussian model-based clustering, were used. The results have shown that clustering algorithms have a great potential for analysis of FTIR microscopic imaging data of processed animal proteins.

**Keywords** clustering;FT-NIR microscopic imaging;meat and bone meal;fish meal