P.31.- Infrared Spectroscopy: an innovative solution to identify animal constituents in feed

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The target of our research has been the developing of a method for the detection of bone fragments in animal feed with an improved efficacy with respect to the official one, based on optical microscopy observation. To this aim, we used IR Spectroscopy, in both NIR (1000-4000 cm-1), where the vibrational features of bone collagen are observed, and MIR (4000-400 cm-1), where the vibrational absorptions due to the mineral part of bone tissues fall. As for NIR spectroscopy, a microscope Autoimage was employed, allowing the recording of the spectrum, in diffuse reflectance mode, of single objects of micrometric size, as the bone fragments possibly present in animal feed are. In the MIR range, the spectra of the single bone fragments were recorded by using a single reflection ATR cell.

The recognition of bone fragments among other constituents was made treating their vibrational spectra by a mathematics algorithm based on least-squares resulting from the comparison between the spectrum of unknown sample and spectra of reference materials. By setting a 95% level of similarity as acceptance threshold, good results were obtained in the detection of bone fragments mixed with vegetable and mineral particles.

Moreover, EC legislation prohibits the addition of transformed animal proteins to cattle for bovine and the addition of bovine meal for all animal breeding, but permits the use of meals of different animal species as fish for several animal breeding (non ruminants). Thus, besides the animal/non animal recognition, it is very important to distinguish bone tissues of different zoological origin. In this respect, Principal Component Analysis (PCA), Principal Components Regression (PCR) and cluster analysis (carried out by using a soft independent modelling of class analogies-SIMCA) were used. About 25 spectra of bone tissue (single fragments) of different zoological origin were considered, and the best separation between the spectra of bone fragments from different animal species was obtained with PCR and cluster analysis.

Keywords

Vibration spectroscopy, feed, bone fragments, PCA.