

# FIGHTING FOOD FRAUD WITH VISUM: COCOA COMES CLEAN.



## A portable NIR analyser to detect counterfeit cocoa in routine quality control

- Detection and quantification of counterfeit raw materials and quantification of quality parameters
- Accurate measurements even through plastic bags
- Portable device to be used in the warehouse or exterior
- Very easy to use with intuitive user interface and touch screen



## VISUM PALM: quality control of raw material in place by detecting the “Unknown”

The globalization of the food supply opens many opportunities for fraud, which involves both economic and food safety issues. Therefore, detection of fraud and adulteration of incoming raw material is crucial for food processing companies.

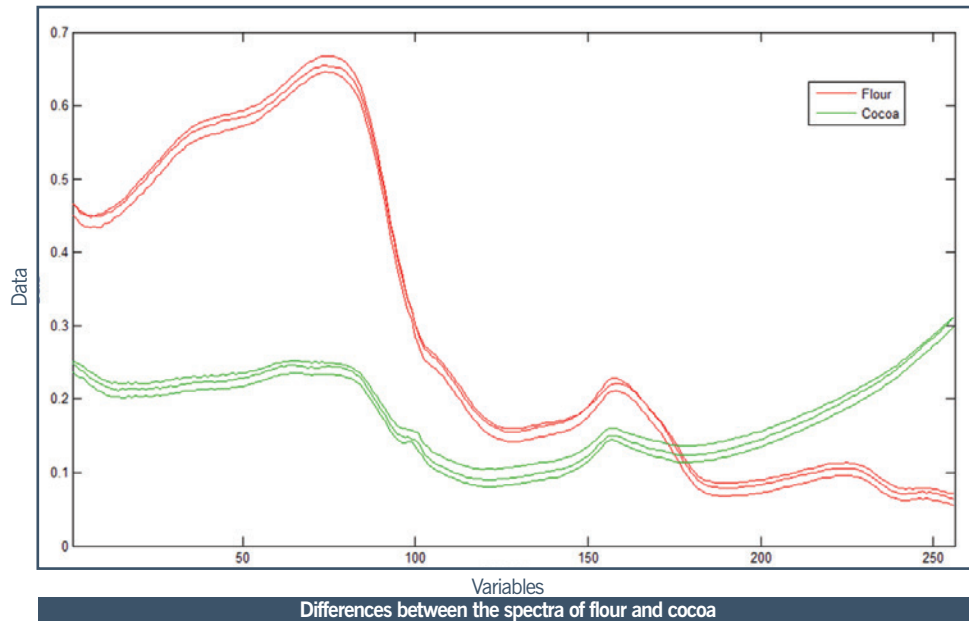
Cocoa powder has been reported as one of the 25 food ingredients most adulterated according to a database of food ingredient fraud issues from publicly available references ([www.foodfraud.org](http://www.foodfraud.org)) [1]. Furthermore, recent cocoa powder adulterations in Europe have reported samples containing up to a 20% less cocoa compared to values claimed on

labelling [2]. Cocoa products can be adulterated with a range of adulterants, including arrowroot, grain flours, chicory powder, peanut shell, soybean flour, and other materials.

Classical analytical methods for testing cocoa powder, such as liquid chromatography, are time consuming and complicated. Near-Infrared (NIR) spectroscopy offers the advantage of rapid, non-destructive analysis and easier routine operation.

## Case study

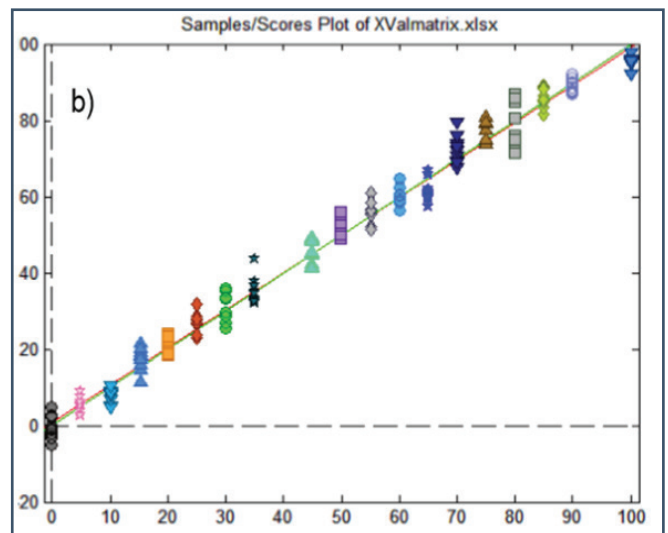
The spectra of a number of plastic bags with cocoa powder adulterated with different proportions of wheat flour (from 0 to 100%) were acquired with the **VISUM PALM** analyser directly through the bag. Differences in the “NIR spectral fingerprint” of the two products are clear. However, the naked human eye cannot detect these differences.



With the acquired spectral data, a chemometric model was developed to determine the weight percentage of flour present in each bag. The model was integrated in the **VISUM PALM** allowing the device to detect and quantify in just few seconds the percentage of adulterant (flour) present in the cocoa powder with an accuracy of 3.5%.



Counterfeit cocoa samples packaged



Correlation between predicted by the model and real flour percentage

## Conclusions

**VISUM PALM** is able to detect flour adulteration directly in cocoa powder bags with an accuracy of 3.5% in less than 5 seconds. Moreover, NIR technology allows to establish a “chemical fingerprint” of the pure product, so future adulterations can be detected.

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