

# Near infrared spectroscopy as screening method to detect mycotoxins in total mixed rations and ingredients

A.Soldado, V. Fernández-Ibáñez, A. Martínez-Fernández, S. Modroño-Lozano, F. Vicente and B. de la Roza-Delgado.

Department of Animal Nutrition, Grasslands and Forages. Regional Institute for Agro-Food Research and Development (SERIDA). Asturias. SPAIN. broza@serida.org



## INTRODUCTION

The establishment of fast and non-destructive analytical methods for quality and safety control of raw final rations and their ingredients is being demanded to avoid toxic substance presence in animal nutrition. Raw materials included in animal feeds can be contaminated pre or after harvest, because mycotoxins synthesis is dependent on temperature, moisture or fungi activity as major factors. The presence or absence of aflatoxin B1 (AFB1), zearalenone (ZEN) and ochratoxin A (OTA) in total mixed rations (TMR) and their ingredients was studied using Near-infrared spectroscopy (NIRS)

## OBJECTIVE

To identify and characterise some wavelengths for a Near Infrared Reflectance system that can form the basis of a commercial sorting device or inspection instrument to provide the detection of toxic metabolic in animal feeds.

## MATERIALS AND METHODS

### NIRS INSTRUMENTS

- FOSS-NIRSystems 6500  
Range: 400 - 2500 nm  
Scan mode: log (1/R)
- FT-NIR PE Spectrum One NTS  
Range: 1112-2500 nm  
Scan mode: log 1/R



- A** Ingredients: AFB1  
Semiquantitative test
- B** MYCOTOXINS ANALYSIS  
AFB1; OTA; ZEN

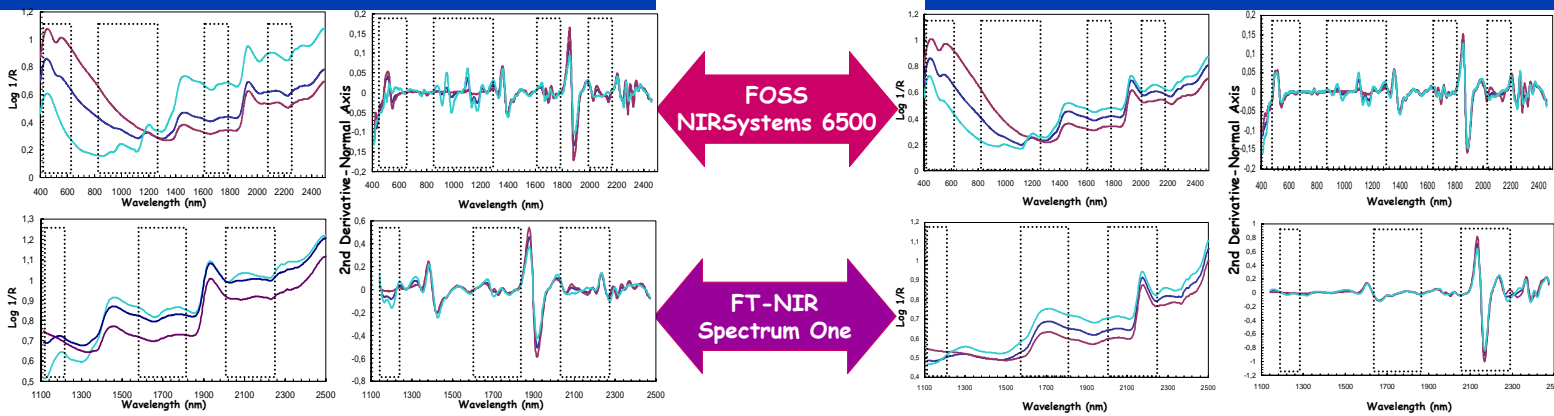
Total Mixed Rations  
HPLC-MS

Chemometrics: wavelength selection by using WinISI 1.5 software.

### AFB1 - MAIZE

### RESULTS

### AFB1 - BARLEY

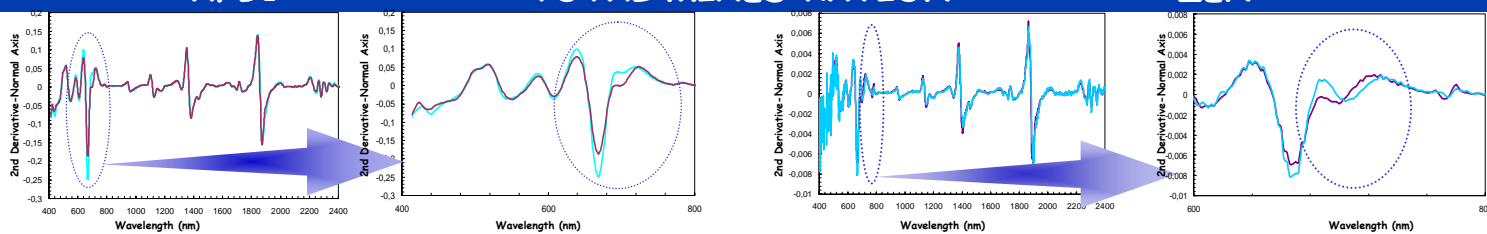


NIR spectra of samples with variable AFB1 concentration : (-) negative; (+) between 20-50 ppb and (+) up 50 ppb

### AFB1

### TOTAL MIXED RATION

### ZEN



NIR spectra of TMR: AFB1 & ZEN presence (+), absence (-)

## CONCLUSIONS

**Ingredients:** NIRS spectra show clear differences when AFB1 content is increased. The specific bands are defined as the "fingerprint region" for this fungal infection and can be related with absorption bands in these wavelength ranges: 480-600nm; 870-1200nm; 1750-1800nm and 2020-2190nm

**TMR:** For a spectral classification to identify fungal infection, the best wavelengths are located in the region that approaches the band at  $\approx 720\text{nm}$  and  $\approx 770\text{nm}$  for AFB1 and ZEN respectively.

