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Validation of a NIRM method for animal detection in feed:results of a collaborative study

A.Boix, J.A.Fernandez Pierna, V.Baeten, C.von Holst

Introduction

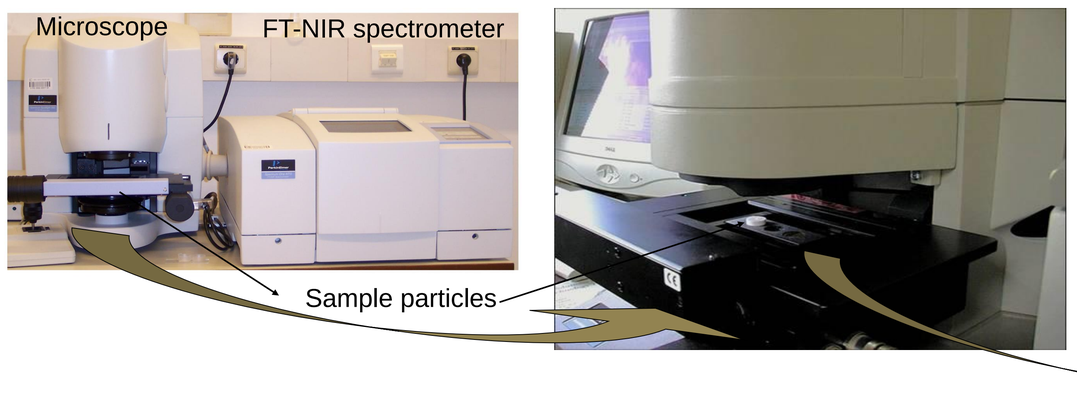
The ban on the use of processed animal protein (PAP) in feed for farmed animals (i.e. feed ban) led to a significant reduction of the number of BSE cases in Europe. A partial lift of the feed ban while maintaining a high level of prevention is possible when certain conditions are met, among them, the development and validation of method for the detection of presence of species-specific animal proteins in feed.

Microscopic evaluation is the only method for official control in Europe however its sensitivity for detecting terrestrial PAP decreases in the presence of fishmeal. Near Infrared Microscopy (NIRM) has proved to be a powerful tool for the detection of banned PAP in feed achieving the same detection limit as the official method.

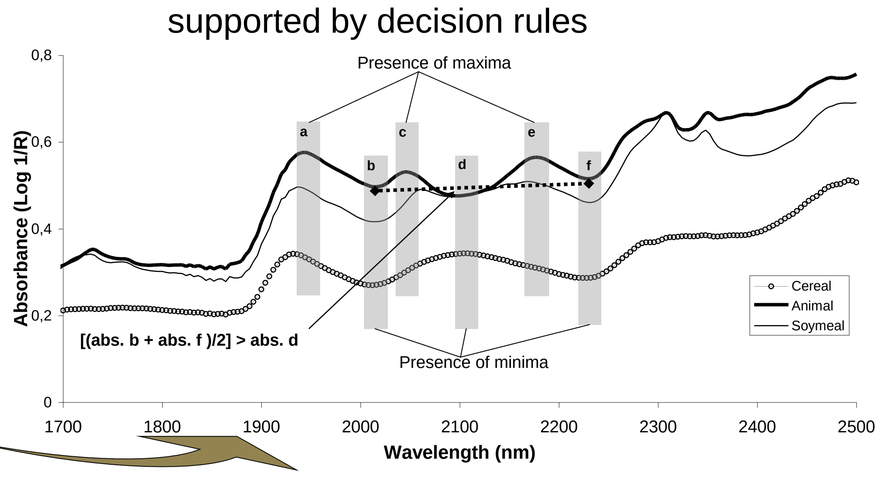
A collaborative study has been conducted in the frame of the Safeed-PAP project to validate a NIRM method for the detection of animal presence.

The method

NIR spectra of individual particles
fingerprints based on the chemical composition



Discrimination animal – vegetable
based on visual observation of the spectra
supported by decision rules



The method delivers qualitative results: presence/absence of animal particles in feed.
Laboratories reported on: number of particles analysed — number of spectra classified as animal per sample

Target: animal particles.
Test materials: 8 blind samples: compound feeds containing -or not- PAP (entire sample and sediments)

Results

Sediments

0,5% Terrestrial PAP

Spectra	Positive spectra	Animal (%)
610	183	30.0
640	301	47.0
864	212	24.5
600	102	17.0
636	340	53.5
661	180	27.2
600	149	24.8
4611	1467	32.0

0,1% Terrestrial PAP

Spectra	Positive spectra	Animal (%)
610	20	3.3
610	12	2.0
644	40	6.2
645	36	5.6
928	9	1.0
928	10	1.1
600	25	4.2
600	37	6.2
624	31	5.0
611	25	4.1
605	30	5.0
615	33	5.4
600	19	3.2
600	8	1.3
9220	335	3.8

Blank

Spectra	Positive spectra	Animal (%)
610	0	0.0
624	0	0.0
750	**3**	**0.4**
600	0	0.0
604	0	0.0
607	**1**	**0.2**
600	0	0.0
4395	4	0.1

Entire samples

1% Terrestrial PAP + 1% Fishmeal

Spectra	Positive spectra	Animal (%)
610	4	0.7
609	11	1.8
901	2	0.2
600	2	0.3
627	8	1.3
606	4	0.7
600	2	0.3
4553	33	0.8

1% Terrestrial PAP

Spectra	Positive spectra	Animal (%)
610	2	0.3
610	1	0.2
635	4	0.6
685	3	0.4
717	**0**	**0.0**
725	2	0.3
600	**0**	**0.0**
600	2	0.3
688	3	0.4
649	6	0.9
600	3	0.5
605	3	0.5
600	3	0.5
600	4	0.7
8924	36	0.4

Blank

Spectra	Positive spectra	Animal (%)
610	0	0.0
588	0	0.0
810	0	0.0
600	0	0.0
643	0	0.0
608	0	0.0
600	0	0.0
4459	0	0.0

Each row corresponds to one laboratory except for materials containing 0.1 % and 1% Terrestrial PAP that were sent as blind duplicates so two rows correspond to one laboratory.

One laboratory excluded from the evaluation for major deviation from the protocol.
Results from 6 EU laboratories and 1 laboratory from China were considered for the evaluation.

	0.1 % Terrest (sed)		0.5 % Terrest (sed)		1 % Terrest		Blk (sed)		1 % Terrest + 1 % Fish		Blk	
n	14		7		14		7		7		7	
	CP	FN	CP	FN	CP	FN	CN	FP	CP	FN	CN	FP
	14	0	7	0	12	2	7	2	7	0	7	0
SE (%)	100		100		86				100			
SP (%)							78				100	

Sensitivity (SE) : ability to identify positive = CP / (CP+FN) *100
Specificity (SP): ability to identify negative = CN / (FP+CN) *100

CP = correct positive
FP = false positive
CN = correct negative
FN = false negative

Conclusions

- A NIRM method for the detection of animal products in feedingstuffs has been successfully validated via a collaborative study.
- The target of 0.1% PAP in feed is achieved in sediments (100% SE). These results are in line with the performance of the European official method.
- The sensitivity of the method in the entire samples -no sedimented- is between 1% and 2%.

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Contact

Ana Boix
European Commission • Joint Research Centre
Institute for Reference Materials and Measurements
Tel. +32 014 571227 • Fax +32 014 571787
E-mail: ana.boix-sanfeliu@ec.europa.eu

irmm Institute for Reference Materials and Measurements