

Rapid methods for feed safety; the *CONFIDENCE* project

Jacob de Jong, Stefan Weigel and Michel Nielen

www.confidence.eu



Contents

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 - What ?
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- Methods in CONfidence
 - Detection modes
 - Primary extraction methods
 - Sample preparation
- Method validation

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- Introduction to CON*ff*DENCE
 - What ?

CONFIDENCE in a nutshell

Chemical CONtaminants

CONFIDENCE in a nutshell

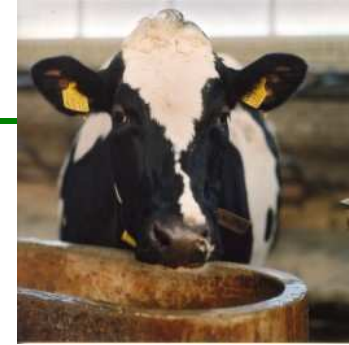
CONTaminants in *food* and *feed*:
Inexpensive DETection
for Control of Exposure



CONFIDENCE passport

- FP7 Collaborative Project first call “Food, Agriculture & Fisheries, and Biotechnology”
- Duration: May 2008 – April 2012
- 17 partners from 10 countries, representing universities, research institutes, industry and SMEs
- Budget: 7.5 Mio €
- Co-ordinator: RIKILT - Institute of Food Safety, part of Wageningen UR (NL)

The objectives



- Development and validation of new simplified inexpensive detection methods for chemical contaminants from farm to fork
- Improved exposure assessment through monitoring of selected contaminants
- Dissemination and training of new detection methods to all relevant stakeholders, to advance technology exploitation

The commodities

Food

&

Feed

- Fish/shellfish
- Cereals
- Potatoes/vegetables
- Honey
- Eggs
- Meat
- Dairy products

Fish feed

Cereal-based feed



The target contaminants

- POPs:
 - dioxin-like PCBs + metabolites
 - brominated flame retardants
 - polycyclic aromatic hydrocarbons (PAH)
- Perfluorinated compounds (PFCs)
- Pesticides: paraquat/diquat, dithiocarbamates
- Veterinary drugs:
 - antibiotics, e.g. tetracyclines
 - coccidiostats, e.g. ionophores
- Heavy metals speciation: inorganic arsenic, methyl mercury
- Biotoxins:
 - alkaloids
 - marine biotoxins
 - mycotoxins



Contents

➤ Introduction to CON*ff*DENCE

- What ?
- **Why ?**

Why *CONFIDENCE* (1) ?

- To assure chemical safety and quality in the European food supply; support of EC policies and competitiveness of food and feed industries
- To improve multi-detection (“multiplex”) possibilities, e.g. for antibiotics
- To improve inexpensive screening possibilities, e.g. for metal speciation

Why CONFIDENCE (2) ?

- To speed-up analysis for factory approval of lots



- To contribute to the assessment of risks of emerging contaminants
 - e.g. plant toxins such as pyrrolizidine alkaloids



Why *CONFIDENCE* (3) ?

- To contribute to the generation of data for exposure assessment, e.g. for PFC's:



**Perfluorooctane sulfonate (PFOS),
perfluorooctanoic acid (PFOA) and their salts**
Scientific Opinion of the Panel on Contaminants in
the Food chain

Adopted on 21 February 2008

“Due to the substantial lack of suitable analytical data, many assumptions have been made in order to derive exposure estimates.”



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The consortium

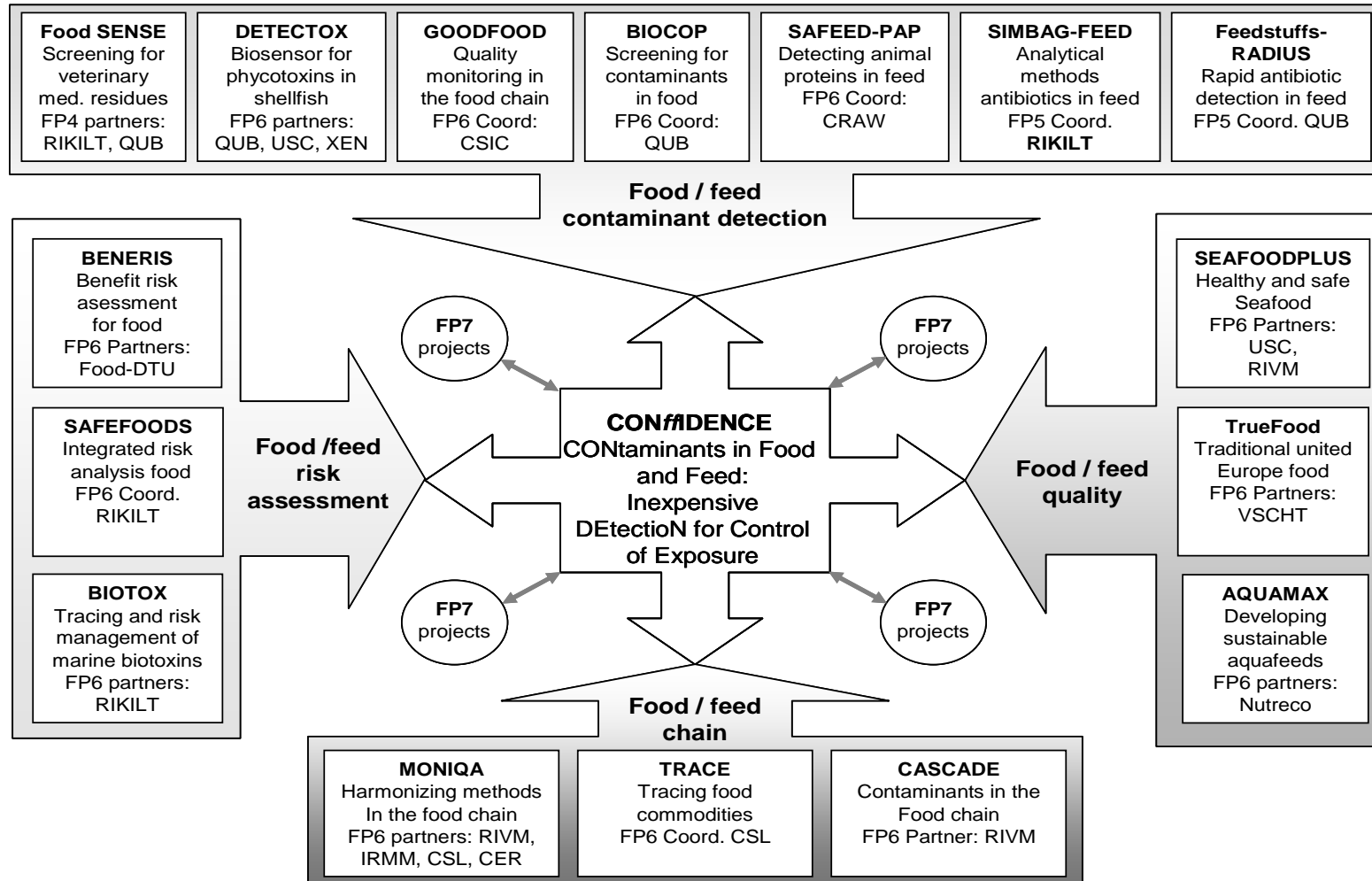


The Advisory Board

Representatives from:

- FAO/IAEA
- DG-SANCO
- EFSA CONTAM panel
- CEN committee Food analysis – Horizontal methods (CEN/ TC 275)

European approach



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- **Methods in CONFIDENCE**
 - **Detection modes**

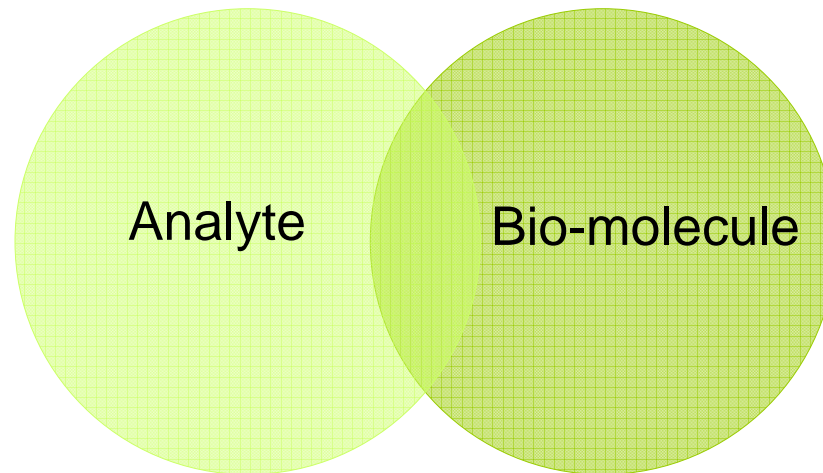
Detection modes

- Bio-analytical techniques
- Spectroscopic techniques

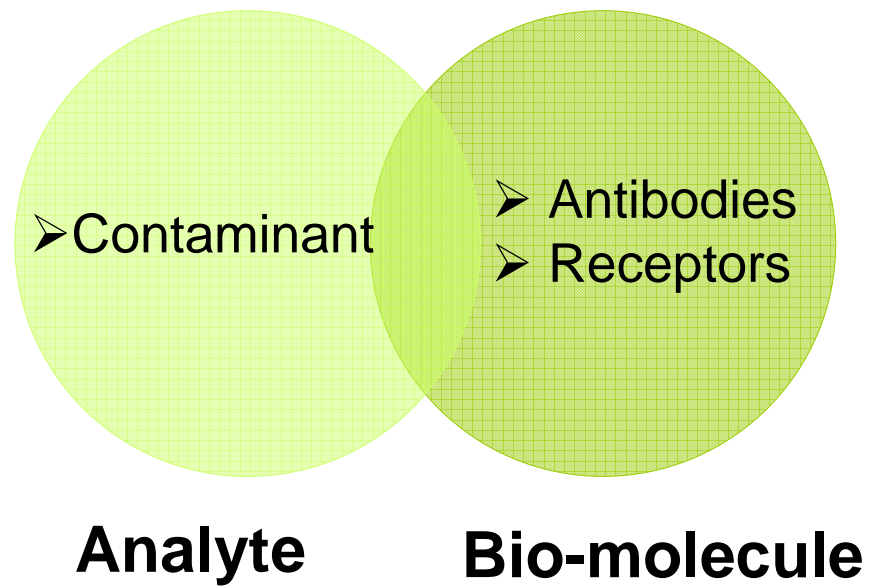
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- **Bio-analytical techniques**
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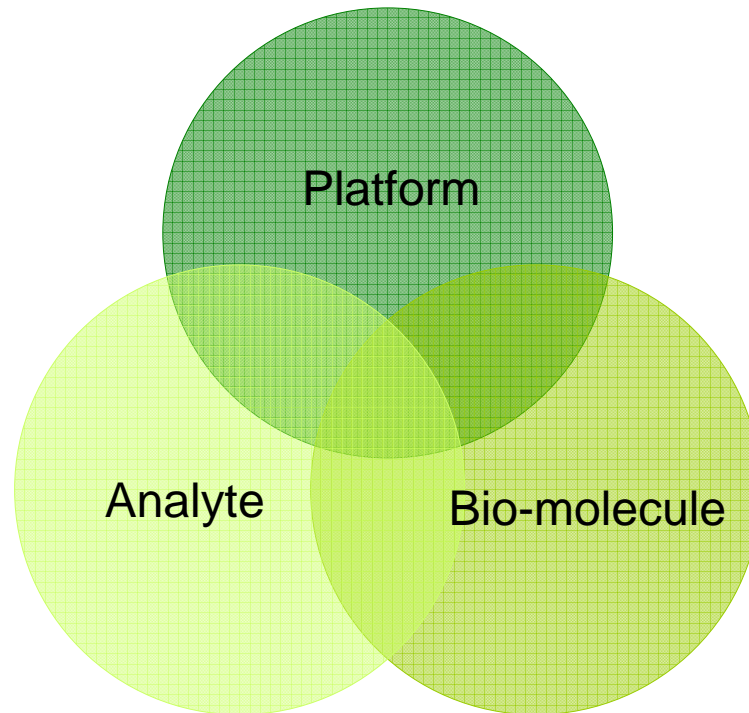
Bio-analytical detection



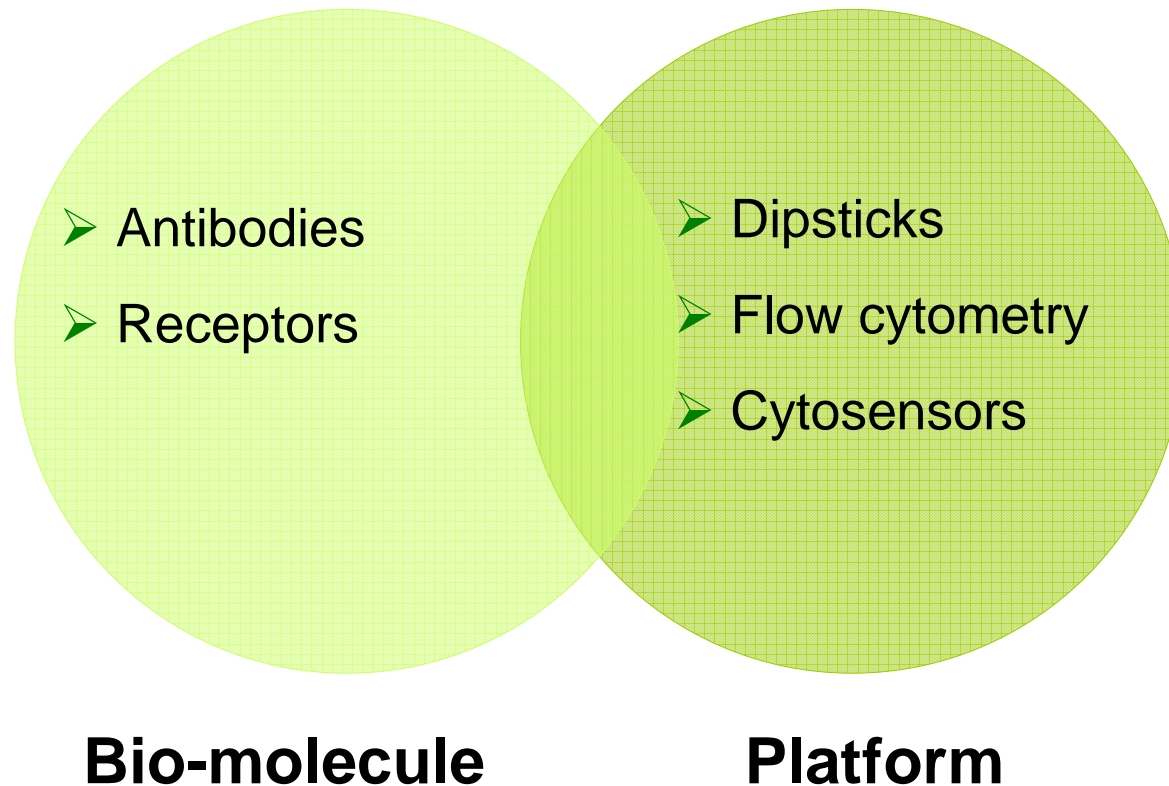
Bio-analytical detection



Bio-analytical detection

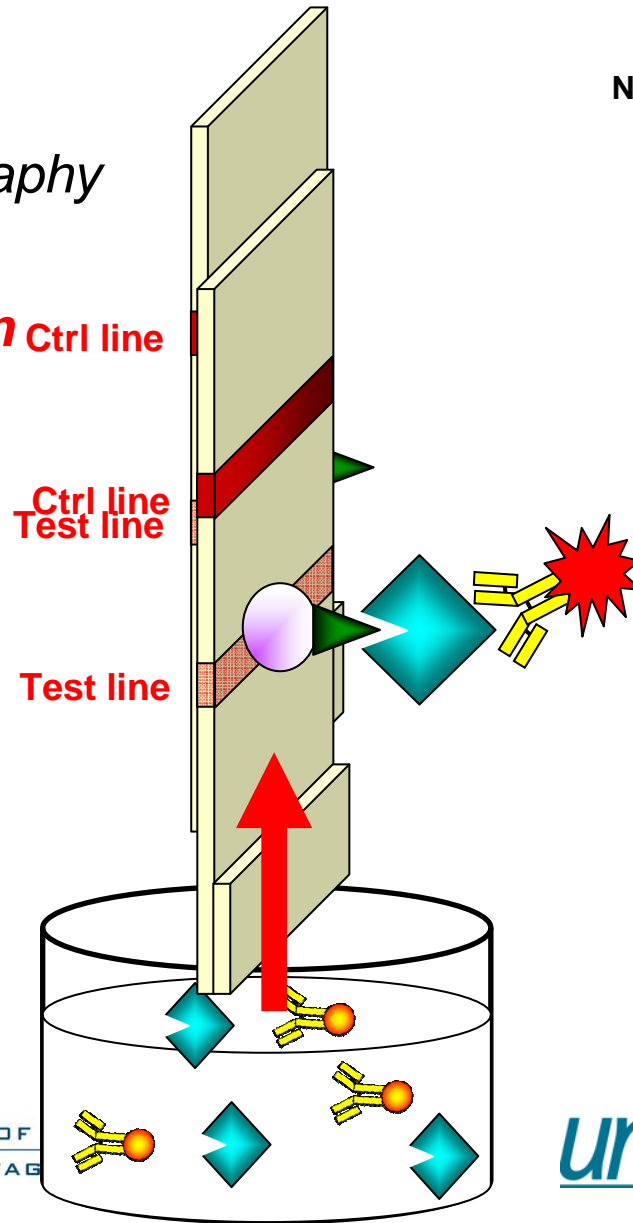


Bio-analytical detection

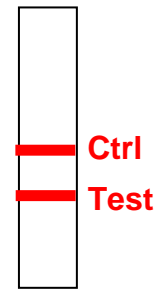


Principle of Dipstick Assay

Lateral Flow
Chromatography
Indirect
Competition Ctrl line
Dipstick
Assay



Negative test



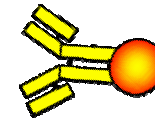
Carrier



Hapten X



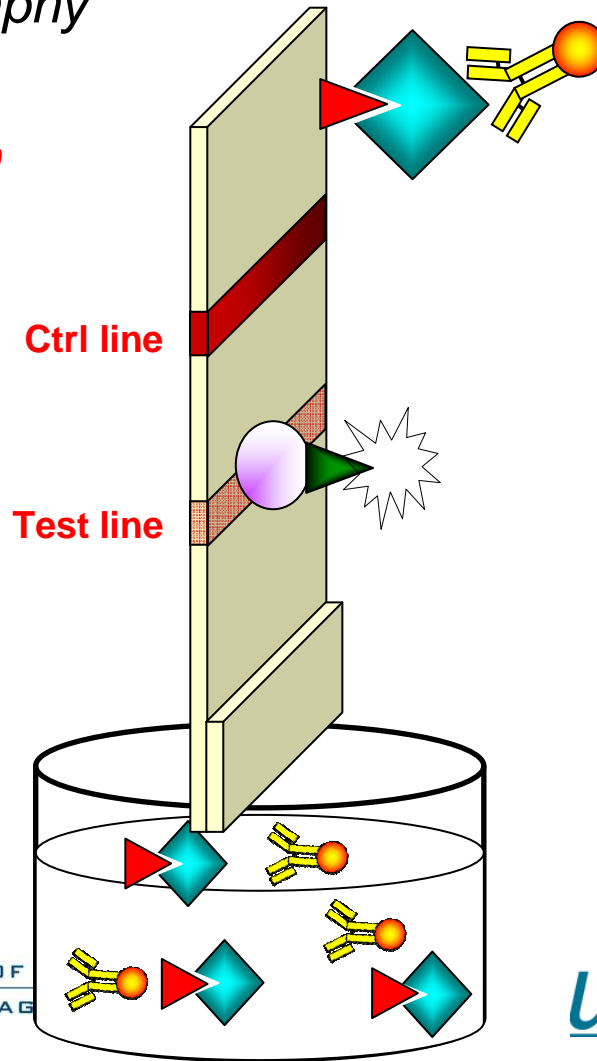
Antibody/
Receptor/
Aptamer/ } Anti-X



2nd Antibody-GOLD


Principle of Dipstick Assay

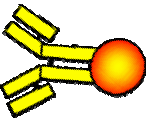
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Chromatography
Indirect
Competition
Dipstick
Assay




Carrier


Hapten X

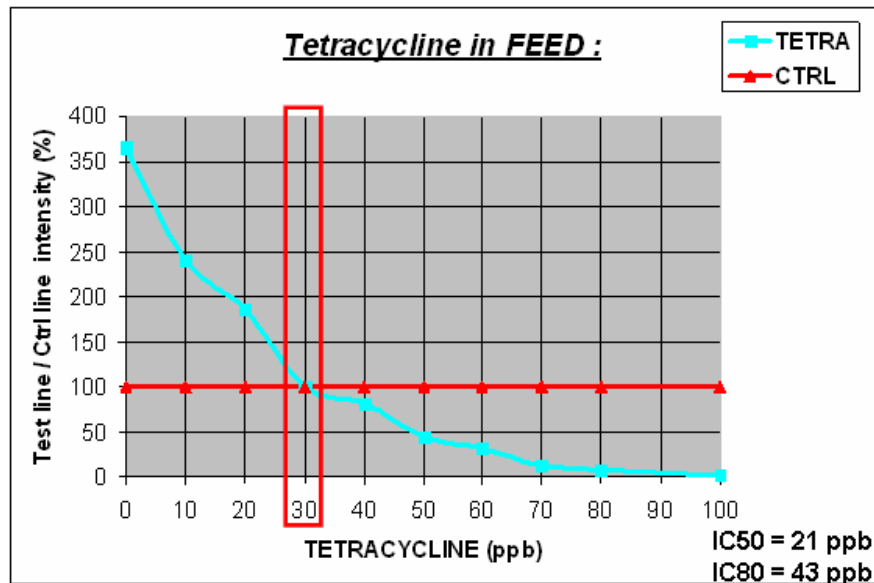
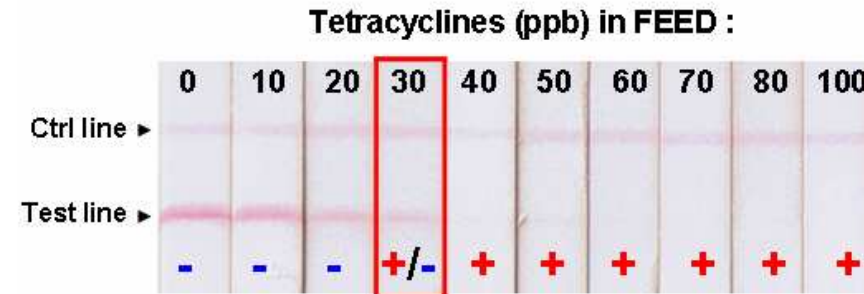

Antibody/
Receptor/
Aptamer/ } Anti-X


2nd Antibody-GOLD


Contaminant X

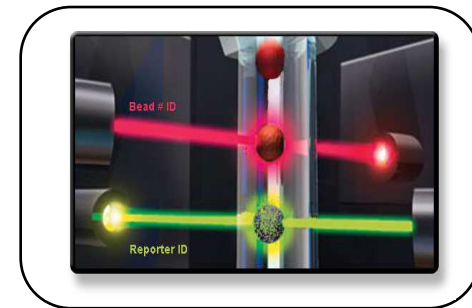
Tetracycline Tetrasensor assay for feed

- Pig **FEED** - dilution (**10x**) in buffer
- Homogenisation (2 min)
- Centrifugation (2 min)
- 200 µl of supernatant + reagents
- Test : **10 min** at **RT**



Other examples of platforms

- Cytosensors: **Heavy metal speciation**: see L3-3, Rikke Hedegaard et al.
- Flow cytometry: **Coccidiostats**: see L3-4, Ursula Vincent



Detection modes

- Bio-analytical
- Spectroscopic

Detection of ergot in cereals

Poster 38:

**Contribution to the FP7
CONFIDENCE project of
near infrared hyperspectral
imaging: detection of
contaminants**

P. Vermeulen

J.A. Fernández-Pierna

P. Dardenne

V. Baeten

Walloon Agricultural Research
Centre (CRA-W), Belgium



The NIR camera

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➤ Methods in CONFIDENCE

- Detection modes
- **Primary extraction methods**

Primary extraction methods

➤ Multi-compound & Multi-class: generic extraction methods, a challenge for e.g.

■ POP's and their metabolites



INSTITUTE OF
CHEMICAL TECHNOLOGY
PRAGUE

■ Mycotoxins



■ Plant alkaloids

rivm

➤ Rapid methods, e.g. Pressurized solvent extraction

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- **Methods in CONFIDENCE**
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Sample preparation

- **No** clean-up as far as possible
- Fast and simple clean-up, e.g.
 - Magnetic beads: integrated sample preparation for
 - Flow cytometry
 - SPE with selective sorbents: separation of organic vs. inorganic arsenic

National Food Institute
Technical University
of Denmark



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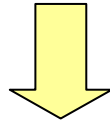
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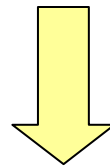
➤ **Method validation**

Method validation

Method development



In-house method validation



Validation by means of small-scale interlab studies

← Need for well characterised test materials



Acknowledgements

- All CONfIDENCE colleagues, especially:
 - Vincent Chabotteau (Unisensor)
 - Sara Stead (Fera)
 - Philippe Vermeulen and Vincent Baeten (CRA-W)
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More information

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(registration on website)

Thank you for your attention !

www.confidence.eu

