Near Infrared Spectroscopy as tool for quality control in food and feed business:

Some technical aspects and applications
NIR Applications for Food and Feed
in September 2005 the Act reforming the food and feed law took effect. (§64 LFGB)

authorities carry out regular controls and upon suspicion, take samples for examination in official laboratories. In Germany, this duty is assumed by the competent authorities of the Federal States (Bundesländer)

network of official food monitoring
to control manufacturers, importers, carriers and retailers by uniform standard procedures (official methods within §64 LFGB)
authorities control of meat and sausages
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§ 64 LFGB working group (experts from inspection authorities of federal states and private laboratories) was installed in end of 2011

26 laboratories performed ringtests on sausage samples in 2012 for protein, moisture, fat

§64 Reference methods were applied:
Water (ASU L06.00-3)
Protein (ASU L06.00-7)
Fat (ASU L06.00-6)

Aim is to promote NIRS to become official method in §64 LFGB
Comparison of Büchi NIR results with official §64 methods

Abb. 1: Vergleich W/EW-Quotient (Keule) zwischen der § 64-LFGB-Methoden und der NIR-Messung
Fig. 1: Suckling pig (leg): comparison of the w/p-ratio between § 64 LFGB methods – NIR
NIRFlex N-500

- modular design/ flexible solutions
- swappable measurement cells
- unique FT-NIR polarization interferometer
  - robust (shock resistant) and longterm stable
- Easy calibration transfer,
  Precalibrations for Food and Feed customers
- Flexible integration in company networks
  SQL server solution, LIMS, NIRAnywhere
- customer-friendly maintenance concept
  double lamp module, easy-to-exchange
NIRFlex N-500 modularity

- Petri Dish
- Vials
- Tablets
- XL (e.g. Bags)

Solids

Fiber Optic SMA

Fiber Optic Liquids

NIRFlex N-500 Polarization Interferometer

Fiber Optic Solids

Solids Transmittance

2013-03-27_cra-w NIR platform
Christoph Luehr, Buchi
Premium Pet Food Producer

Matrices
Animal and vegetal  Raw materials
Liquids: aroma / oil
Finished Products (kibbles)

Analyses
Moisture, Protein, Fat, Ash
Total Fiber, Starch, …

NIR Implementation
Company switches gradually from old monochromator based NIRS to FT-NIRS
100 % of raw materials and finished products are controlled with NIRS
Key Features of network design/set up

• master – client solution using the same calibrations without the need for standardization or adaptation at the local client FT-NIR systems

• ring tests on a regular basis

• remote data management via network

• automated backups and archiving

• optimized network traffic by transferring data “deltas“

• data safety by licenses and encrypted data

• efficient calibration development by experts / knowledge bundling
Ring test results

Easy transferation of calibrations without need for standardization and usage of correction factors
NIRMaster Ingress Protection: Solutions for production sites

IP54

IP65

With high performance built-in industrial PC

5 = Dust protected
4 = Splashing Water protected

6 = Dust tight
5 = Water jets protected
NIRMaster: Easy-to-clean hygienic design
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Feed market
Feed mixer/ Feed mills

- Monitor incoming grain & ingredients
- Provide information for proper binning
- Optimize mixes and blends
- Analyze in-process products
- Optimize processing, milling, feed performance
- Analyze co-products
- Ensure meeting your customer specifications
Büchi NIR Autosampler

Key Features

• robust design, reliable operation

• compact, small footprint, up to 80 samples per run

• compatible with standard cups

• parallel preparation of the next run

• high ingress protection class (IP 65) for operation in dusty environment (IP 65)
NIRMaster + Autosampler
NIR in the process

Know what goes into the process
  • Last minute adjustments to decrease safety margins

Tighten tolerances
  • Optimize additives
  • Optimize drying/water addition

Detect errors rapidly
  • No reworking decreases downtime
NIR-Online – Solution

• Diode array (350 – 1750 nm) plus CCD camera
• Ex protection (Dust: 20/21/22 and Gas: 0/1/2)
• High speed (1 scan / 10 ms)
• No moving parts (except int. reference)
• Secondary backup lamp
• Compact design in IP 65
• Large measurement spot (approx. 3 cm)
• Non contact measurement possible (at conveyor belts)
Compatibility with

Evonik Degussa NIR Network

Capable instruments

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Thank you for your attention !!