Analytical profile “Feedstuffs”

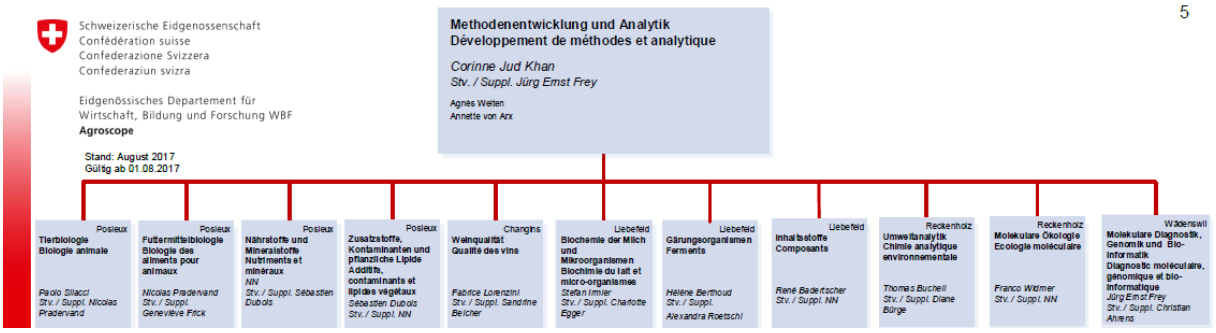
The Feed Analytics research division in Posieux (Canton of Fribourg) is the centre of excellence and innovation at Agroscope for applied feed analytics. The research division’s focus is on the feed, silage additives and products from feeding trials analytics. Feed Analytics has the following tasks:

- **analytic applied research** and **development** and **analytical services**, primarily in the context of official feed inspections Agroscope research projects, but also for other institutions such as the Institute for Food Sciences (IFS) and the Institute for Plant Production Sciences (IPS). GMO analytics of seed for the FOAG
- acquisition and performance of **own research contracts** and collaboration in other research projects
- joint **development of areas of activity, research programmes** and **research projects** within the Agroscope matrix organisation
- **scientific validation** of analytical services (peer-reviewed/practice-oriented publications, presentations, etc.)
- maintaining the **ISO:17025 certified accredited test laboratory** STS077
- planning, maintaining and extending the **range of analytical equipment** and **expertise**
- training new scientific and technical staff
- building and maintaining **national** and **international networks** in relevant specialities

To meet the needs of our areas of activity, research programmes and research projects, we undertake the following activities:

- characterisation of feedstuff samples on behalf of the official feed inspection authority
- determination of crude nutrient fractions of feedstuffs using **Weende feedstuff analysis** (water, crude ash, crude fibre, crude protein, crude fat) and fibre analytics based on the method developed by Van Soest (NDF, ADF, ADL)
- characterisation of silage additives
- molecular biology-based **detection of genetically modified organisms** in feedstuffs and seed
- evaluation of the **microbiological quality** of feedstuffs and detection of antibiotics and mycotoxins
- **microscopy-based** detection of **meat meal** in feedstuffs
- Determination of **botanical composition** of feedstuffs (included **monitoring of ragweed**)
- analysis of the **composition** of **feedstuff trial samples** (constituents, nutrients, minerals, lipids, sugar, vitamins, contaminants) and **clinical veterinary chemistry** of blood and urine
- determination of **meat quality** based on parameters such as meat colour, shear strength, pH, fatty acid profile, etc.
- **cell cultures** to improve understanding of processes and reduce animal experimentation

Organisation chart



Analytical equipment and techniques (summary)

Animal Biology:

- cryotome
- transmitted light fluorescence microscope for histological analyses
- texture analyser for measuring meat tenderness
- portable spectrophotometer for measuring meat colour
- automated clinical chemistry instruments for analysing blood and urine
- instrument for measuring blood sodium and potassium
- impedance haematology counter for haematological measurements
- homogeniser for extracting RNA from cells and tissues
- Eco Illumina real-time PCR system
- cell culture laboratory
- voltohmmeter for measuring transepithelial electrical resistance (TEER)
- equipment for Western blots, including a CCD camera for quantifying using chemiluminescence or fluorescence

Feed Biology:

- 2 Rotor-Gene real-time PCR systems
- microscopes
- ELISA plate reader
- water activity meter for measuring available water in feedstuffs (storage life parameter)
- NanoDrop spectrophotometer for determining the concentration and purity of nucleic acids
- pipetting robot for PCR assays
- biosafety cabinet and a wide range of culture media for microorganism identification

Nutrients and Minerals:

- 2 automatic incineration systems with thermogravimetric analysis
- 1 near-infrared spectrometer (NIRS) with calibrations for roughage and other materials
- 1 LC-PAD for detecting sugars
- 1 ICP-OES for detecting minerals
- 1 graphite furnace AAS system with hybrid unit for detecting trace mineral levels

- 5 semi-automatic fibre digestion units
- 2 automatic hydrolysis units for preparing samples for fat extraction
- 3 crude fat extraction systems
- 2 microwave digestion systems
- 1 automatic titration unit for measuring iodine values (and other functions)
- 1 electronic nose

Additives, Contaminants and Fats:

- 1 HPLC DAD-2D system for multi-vitamin measurement, including D3
- 1 HPLC-RI system for detecting volatile fatty acids
- 2 HPLC-DAD/FLD systems for detecting substances such as mycotoxins, vitamins and boar taint
- 1 triple quad LC-MS/MS system for detecting substances including coccidiostats
- 3 gas chromatography systems for measuring fatty acid profiles and alkanes
- 1 C/N/S analyser (Dumas method)
- 1 fully-automated KJELDAHL system with 2x20 digester blocks
- 1 calorimeter for determining the calorific value of a substance (pressure digestion in an oxygen atmosphere)
- recycling facility for used solvents

Infrastructure

- sample preparation laboratory which includes the following special rooms:
  - grinding room with a range of grinder types and ventilation system with dust extraction system
  - freeze drying room
  - separate room for preparation of pet food samples
- sample archive
- separate rooms for each individual PCR step (DNA isolation, preparing for PCR, PCR and evaluation)

General

Centrifuges, digesters, pH meters, incubators, refractometers, water baths, spectrophotometers, multiple-effect evaporators, autoclaves, densitometers, standard small-sized equipment and materials

Software

- network with an in-house server for all chromatography systems
- laboratory information and management system (LIMS) for managing samples and analyses results and reporting

Unique characteristics

- **high level of inter/multidisciplinary** (chemistry, biochemistry, microbiology, molecular biology, physical chemistry, microscopy, etc.) **expertise in feed analytics and determination of meat quality**
- **highly advanced analytical instruments**, able to meet demanding official feed inspection requirements
- **high performance analytical laboratories** featuring highly **automated processes** including automated results transmission, among other things
- **extensive experience** and **knowledge** of methods and sample matrices thanks to **excellent staff retention**
- ISO:17025 (STS 0077) certification and an established QM system guarantee **outstanding service quality**
- **direct interaction** with agronomists and **extensive analytical expertise** mean that it is usually possible to perform **custom analyses for research projects** at short notice
- **European reference laboratory** for animal proteins (EURL AP) **for Luxembourg**
- **GMO analytics of seed for the FOAG**