ATB
Leibniz-Institut für Agrartechnik
Potsdam-Bornim e.V.

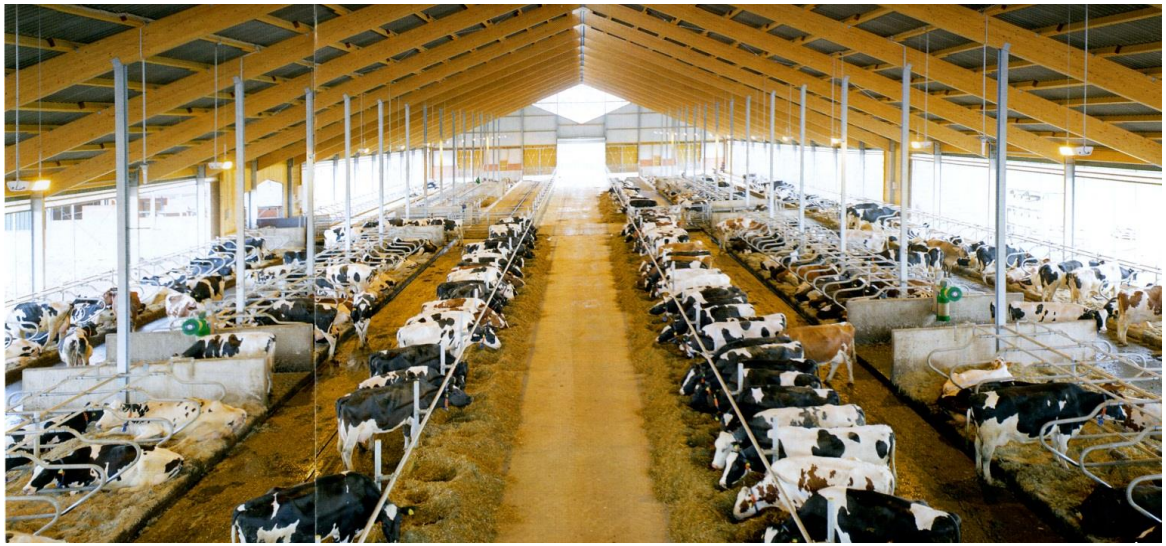
AARHUS
UNIVERSITY

Freie Universität Berlin
Fachbereich Veterinärmedizin
Institut für Tier- und Umwelthygiene

Joined up methods for good N management:

Theme 2: Housed livestock, manure storage, manure processing

TFRN-12 Meetings, June 29-30 2017, Aarhus



Barbara Amon and
Nicholas Hutchings

Leibniz-Gemeinschaft

Theme 2 worked on

- Livestock feeding
- Livestock housing
- Manure storage
- Manure treatment

Livestock feeding:
Adapt N content in the diet to the animals´ needs

- Improve N retention, decrease N input
  - Data on reduction of N excretion are available
- Breeding can also be a measure, but more research needed
- With cattle:
  - Consider possible side effects on methane emissions
  - Priority should be given to conversion of roughage to high value products
  - region specific concepts are required
- With pigs:
  - Feeding is well developed
  - Further reduction leads requires used of artificial amino acids

Summary of mitigation

- **reduce N content in the animal diet**
  - pigs: phase feeding already widely implemented
  - cattle: high roughage in the diet – find a compromise, region specific diets and levels of productivity

Livestock housing:
Keep as much N in the system as possible

- Give overall guidance and refer to other existing guidance documents for the details (e.g. BREF)
- Less information available on cattle systems compared to pig and poultry
- Detailed information on NH_3 available, much less detail on N_2O
- Divide measures into short / medium / long term measures
- Give guidance on pros and cons of slurry versus FYM and explain the processes that happen in the whole chain
- Open questions:
  - Ventilation
  - Whole systems analysis of air scrubbers
- Outside yard: possible conflict between emissions and animal welfare

ATB

Summary of mitigation

- reduce N content in the animal diet
- **livestock houses: cool, clean, manure store outside**
  - Most measures applicable to new houses
  - Effectivity less well researched, esp. in naturally ventilated houses

Manure Storage:
Keep as much N in the system as possible

- Short to medium term measures are available
- Effects of covers and natural crust were discussed:
  - Effect depends on climate conditions
  - Effects on N_2O and CH_4 are uncertain

Manure Treatment:
Increase fertiliser value of the N in the manure

- Short to medium term measures are available
- Discussion on a range of manure treatment options
  - Anaerobic digestion, separation, acidification, advanced treatment plants
- Connection with the application group (theme 3) is essential to make best use of the improved N value

Summary of mitigation measures

- reduce N content in the animal diet
- livestock houses: cool, clean, manure store outside
- **manure storage and treatment: covered store, low dry matter content, high NH_4 content**
  - Raise awareness for low cost covers
  - Manure treatment incurs costs

Concepts for integrated nitrogen management need

1. Detailed understanding at process level:
   - assessment of emissions from naturally ventilated barns and from new, animal friendly housing systems;
   - development of mitigation measures esp. for NVB;
   - interaction between climate change and heat stress / animal behaviour / emissions;
   - interaction between low protein diets and N and GHG emissions;
   - life cycle assessment: grass based dairy feeding versus low protein dairy feeding;
   - feed and manure additives for improved N use efficiency;
   - manure treatment for maximum N use

Concepts for integrated nitrogen management need

1. Detailed understanding at process level
2. Consideration of:
   - various forms of nitrogen
   - all stages of the manure management chain
   - interaction with animal welfare issues
   - interaction with GHG emissions
   - interactions with landscape issues

Concepts for Best practices addressing environmental needs

1. Detailed understanding at process level
2. Consideration of pollutants and interactions:
3. **Development of flexible concepts for environmental improvement**
   - Climate and site specific conditions vary across Europe
   - Three columns of sustainability must be considered
   - Conflicts of interest must be addressed
   - Concepts must be flexible and targeted for the specific region

Concepts for best practices addressing environmental needs

1. Detailed understanding at process level
2. Consideration of pollutants and interactions
3. Development of flexible concepts for s… tensification
   - Climate and site specific cond… ross Europe
   - Three columns of sust… t be considered
   - Conflicts of inte… ddressed
   - Concepts… ble and targeted for the specific region

No „One fits all solution“

Suggestion

- Guidance document on measures and their pros and cons
- Offer flexible tools for mitigation measures that can be adapted to local conditions
- Strive at closing the science-policy gap
- Discuss implementation barriers with farming community