

2. Breeding, physiology, feed & nutrition

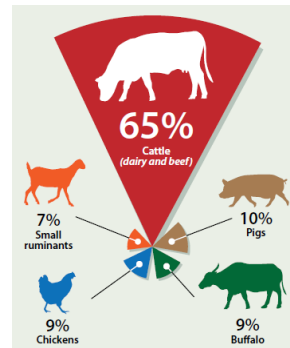
2b: Monogastrics

Moderator: Vivi Hunnicke Nielsen,

Co-moderator: Boris Vashnev

- **Greenhouse gas emissions from pig and chicken supply chains - A global life cycle assessment**

A report prepared by: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. **Animal Production and Health Division**



- **Reducing greenhouse gas emissions from livestock: Best practice and emerging options**

Livestock Research Group of the Global Research Alliance on Agricultural Greenhouse Gases and of the Dairy and Beef Working Groups of the Sustainable Agriculture Initiative (SAI) Platform.

2. Breeding, physiology, feed & nutrition

2b: Monogastrics

Moderator: Vivi Hunnicke Nielsen,
Co-moderator: Boris Vashnev



➤ Pig production

- Biggest contributor to global meat production - 37% in 2010
- Forecasted to grow by 32% (2005-2030)

➤ Chicken production

- Chicken meat accounts for 24% in 2010
- Meat demand forecasted to grow by 61% (2005-2030)
- Eggs forecasted to grow 39% (2005-2030)



➤ Globally, GHG emissions from pig and chicken supply chains are relatively low*

- Pigs: 9 percent of the livestock sector's emissions
- Chicken: 8 percent of the livestock sector's emissions

- **Emission intensities (kg GHG per kg of product) need to be reduced due to the sector's scale and rate of growth**

* FAO (2013) Tackling climate change through livestock. FAO, Rome. for a comparison between commodities and species

Pigs

- **Main emissions sources: *Pig supply chains***

- **Feed production: 60%**

- N₂O from synthetic and organic fertilizers in feed crop production: 17%
- CO₂ from the use of energy in field operations, crop transport and processing, and the manufacture of fertilizer and synthetic feed materials: 27%
- Land-use change (LUC): 13%
- CH₄ from flooded rice cultivation: 3%

- **Manure storage/processing: 27%**

- **Post-farm processing and transport of meat: 6%**

- **Direct and indirect energy: 3%**

- **Enteric fermentation: 3%**

- **Energy use**

- **Total direct and indirect energy consumption: 37%**



Chicken

- **Main emissions sources: *Chicken meat supply chains***

- **Feed production: 78% percent of emissions**

- N2O from fertilizer application: 32%
- CO2 arising from energy use in feed production: 25%
- Land-use change (LUC): 21%

- **Direct on-farm energy use: 8 percent**

- **Post-farm processing and transport of meat: 7%**

- **Manure storage/processing: 6%**



- **Main emissions sources: *Chicken egg supply chains***

- **Feed production: 69%**

- N2O from fertilizer application: 30%
- CO2 arising from energy use in feed production: 27%
- Land-use change (LUC): 13%

- **Direct on-farm energy use: 4%**

- **Post-farm processing and transport: 6%**

- **Manure storage and processing: 20%**



- **Energy use**

- **Total direct and indirect energy consumption: 41% for meat; 37% for eggs**

Focus areas

- **Feed production is the main source of GHG emission in monogastrics**
 - **Need for improved feed efficiency**
 - Highest efficiency in commercial production (compared to back yard) due to differences in breeds, feed quality and availability, and management strategies
 - Use of soybean causing LUC results in higher emission
- **Energy use**
 - FCR is also a key determinant of the energy emission intensity per kg of eggs or meat
- **Overall**
 - Improving feed conversion of the individual animal
 - Reducing LUC
 - Considering associated effects



Key Questions:

- **1) Challenges:**

What are the most urgent challenges that need to be met in order to mitigate GHG emissions within the given area of livestock production systems?

- **2) Strategies:**

What are the most promising strategies within the given area of livestock production to meet the challenges? Can the expected effects of these strategies be quantified?

- **3) Research questions:**

Which thematic research areas and what type of research and research questions will most likely contribute to meet the challenges?



Key Questions

- **1) Challenges:**

What are the most urgent challenges that need to be met in order to mitigate GHG emissions within the given area of livestock production systems?

- Reduce GHG emission related to feed production and consumption

- **2) Strategies:**

What are the most promising strategies within the given area of livestock production to meet the challenges? Can the expected effects of these strategies be quantified?

- Breeding of efficient and robust animals adapted to new feedstuffs
- Improvement of feeding strategies using new feedstuffs and ICT

- **3) Research questions:**

Which thematic research areas and what type of research and research questions will most likely contribute to meet the challenges?

- ***New feedstuffs:*** New European protein sources (European/locally produced)(legumes, grass based proteins, products from biorefineries of biomass, aquatic/marine resources, insects, annelids, former foodstuff)
- ***Breeding*** (traditional, genomic selection, NBT) for animals adapted to new feedstuff ensuring low FCR – (identification of new traits)
- Precision livestock farming including ***precision livestock feeding*** – for optimal utilization of nutrients
- Breeding and management for improved ***health and welfare (20% productivity loss du to diseases)***
- Improved reproduction and survival of piglets and chickens
- Microbiome (improvement of nutrient utilization and health and reduced emission)
- Feeding strategy for chickens in hatcheries