

# 2. Breeding, physiology, feed & nutrition

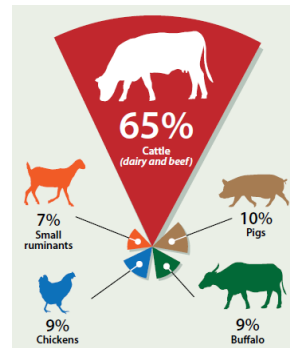
## 2b: Monogastrics

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

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### ➤ 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%**

- N<sub>2</sub>O from synthetic and organic fertilizers in feed crop production: 17%
- CO<sub>2</sub> 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%
- CH<sub>4</sub> 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