

Technologies:

In vivo experiments with broilers

Experimental facilities for contract research and academic experiments

Facilities

- unit 1: 36 pens with 20 broilers each
- unit 2: 8 pens with 20 broilers each (e.g. as a thermoneutral control unit)
- administering additives in both feed and water
- multi-phase feeding system
- roxcell minimax feeder pans
- metabolism cages for collection of fecal digesta
- controlled room temperature and humidity
- lab-scale setters for egg incubation trials
- connected climate and eggshell sensors, weighing scales and camera's
- collaboration with a commercial farm for large scale field trials



Research focus

Animal performance

- evaluation of growth
- feed and water intake
- feed efficiency
- heat stress response (e.g. panting, body temperature)
- carcass composition and meat quality

Egg hatching

- egg weight dynamics
- eggshell temperature
- breakout losses
- hatching window
- chick quality and activity
- early feed intake

Diet quality

- digestive kinetics
- nutrient digestibility
- nutrient excretion
- nutrient accretion

Animal health

- bone mineralization and breaking strength
- footpad dermatitis
- gut health and enteritis
- meat myopathies

In vivo experiments with pigs

Experimental facilities for contract research and academic experiments

Facilities

- 32 pens with 6 weaned piglets each
- dry feeders suited for meal, pellets and crumble
- administering additives in both feed and water
- multi-phase feeding system
- auxiliary feed mixers with a capacity of 25, 250 and 500 kg
- controlled room temperature
- connected climate sensors and camera's
- collaboration with a commercial farm (sows, weaner pigs and grower-finisher pigs) for large scale field trials



Research focus

Animal performance

- evaluation of growth
- feed and water intake
- feed efficiency
- weaning stress response

Field trials

- sow prolificacy and lactation efficiency
- farrowing duration and colostrum intake
- piglet milk replacer and creep feed intake
- carcass weight and lean meat percentage

And more

- digestive kinetics
- nutrient digestibility
- gut health
- diarrhea incidence

Precision feeding and animal monitoring

Experimental facilities for contract research and academic experiments

Facilities

- 10 pens with 10 weaned piglets each
- fully automated electronic feeder stations, suited for pellets
- multi-phase feeding system
- electronic weighing stations
- electronic drinking stations
- controlled room temperature
- connected climate sensors and camera's



Research focus

High-resolution assessment of dynamic responses in:

- individual body weight
- individual feed and water intake
- individual feed efficiency
- individual weaning stress response

And more

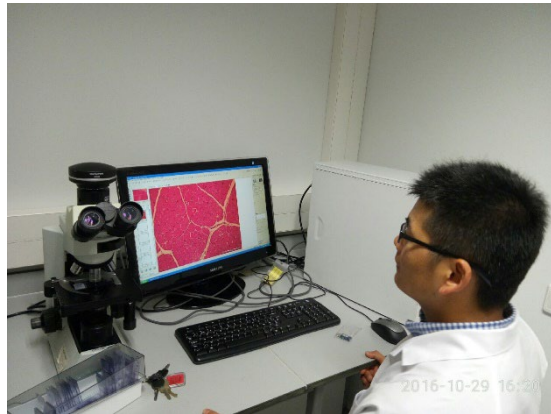
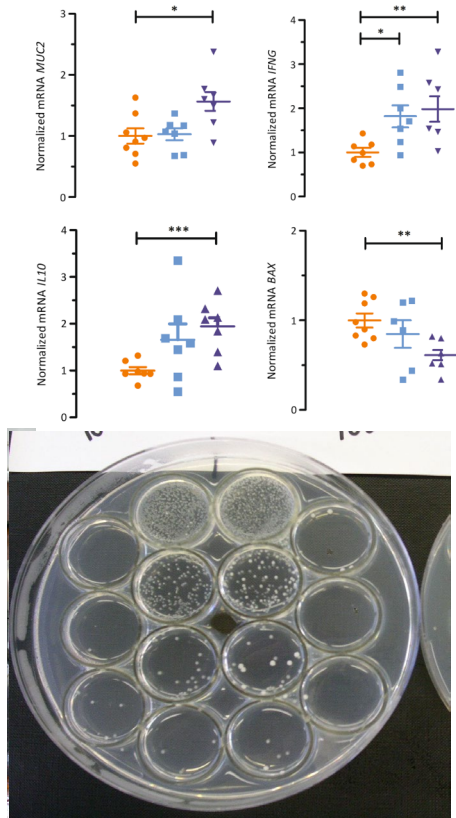
- digestive kinetics
- nutrient digestibility
- gut health
- diarrhea incidence

Gut health evaluation

Technologies for contract research and academic experiments

Technologies

- ring-plate technique using selective media
- next-generation sequencing
- histological staining and microscopic assessment
- GC and GCMS for analysis of organic acids
- HPLC, spectrophotometry and fluorometry for wide range of applications
- RT-PCR for gene expression
- ELISA for protein expression



Research focus

Host

- histomorphology
- digestive enzyme activity
- gut permeability
- pro- and anti-inflammatory cytokines
- tight junctions proteins
- cell proliferation and apoptosis markers
- acute phase and heat shock proteins
- antioxidant and redox system
- immunoglobulins
- growth and stress hormones
- blood hematology and metabolites
- fecal biomarkers for inflammation

Microbiota

- Enumeration for *Escherichia coli*, Coliforms, Lactobacilli, Streptococci and total anaerobic bacteria.
- taxa relative abundance and density
- short-chain and branched-chain fatty acids,
- lactate and ammonia

Feed

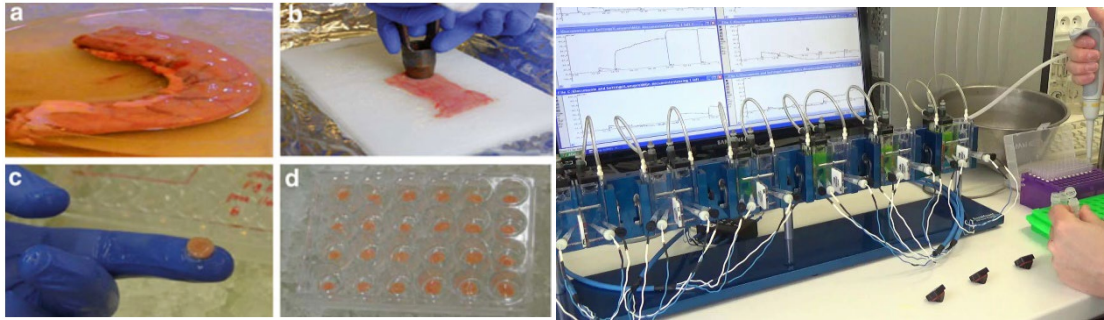
- dry matter and pH
- proximate analysis
- macro and micro nutrients
- indigestible markers
- organic acids
- short, medium and long-chain fatty acids
- essential oils
- NSP fractions and monomers,
- N-fractionation
- antigenic factors and mycotoxins

Ex vivo gut models

Technologies for contract research and academic experiments in pigs and broilers

Technologies

- in vitro batch incubation simulating conditions in saliva, stomach, duodenum, jejunum ileum, caecum and colon
- Ussing chambers
- intestinal tissue explant model
- everted sac model



Research focus

Mucosa

- paracellular and transcellular permeability
- mucosal absorption and excretion of specific compounds
- the transepithelial electrical resistance and short-circuit current
- production of cytokines and chemokines
- gene expression, and immunohistochemistry

Digesta

- nutrient digestibility
- product stability
- antimicrobial activity
- influence of pH, enzymatic digestion, mucosal digestion and microbial fermentation

Applications

Development of novel feed additives

Our wide range of in vitro, ex vivo and in vivo technologies, combined with a good understanding of the digestive system, allows us to tailor to your needs in product development. The use of antimicrobial feed additives is an important research area of our group and has played a great role in the history of the laboratory. Since the ban on the use of feed antibiotics as antimicrobial growth promoters in the EU in 2006, different additives and nutritional approaches have been investigated in vitro and in vivo to reduce the microbial load in the foregut of young piglets after weaning and to improve nutrient use and gut morphology and physiology. Our group was the first to report on the beneficial effects of medium-chain fatty acids in this respect (Dr N Dierick and Prof J Decuyper). Current efforts focus on new applications and formulations of medium-chain fatty acids and antimicrobial essential oils such as thymol and cinnamaldehyde.

Oxidative stress is considered to interfere in several metabolic disorders in farm animals and contribute to non-optimal production and impaired product quality. We aim at understanding animal and dietary factors that determine the oxidative status of tissues and animal products. Special interest has been recently given to oxidative stress in the gut of newborn and weaned piglets. Ways to mitigate the offset of radicals and improve gut barrier function by natural antioxidants is under study. Another area of research is heat stress as an inducer of oxidative stress in the finishing broiler. In all cases, special interest goes to the understanding of the metabolism of glutathione, the major endogenous antioxidant in animal tissues.

Characterization of complete diets and novel feed ingredients

A core competence of our lab is to perform diet analysis, to evaluate the digestive properties of feedstuffs (e.g. fecal and ileal digestibility of nutrients) and to assess the kinetics of a compound in the digestive tract. This is because increasing feed digestion and nutrient efficiency is of paramount importance for cost-effective animal production and for reducing emissions, contributing to sustainable production. The addition of enzymes to feeds for improving the digestibility or reducing the anti-nutritional effect of the fibre, fat and protein fraction may be very useful in this respect, and has been an intense area of research in our group. Novel feed sources, e.g. insect material or seaweeds, are also very topical to enhance sustainability of feed production. In collaboration with other research groups, we have investigating the potential of the Black Soldier Fly as feed ingredient.

Young animal nutrition and early life interventions

Maternal nutrition may affect vitality of young animals and also performances and body composition later in life. We looked at the potential benefits of adding n-3 fatty acids in the diet of sows towards their reproductive performance, and vitality and fatty acid composition of their offspring. Maternal probiotic and fructo-oligo saccharide supplementation is being studied as well, including the long term effects on the offspring. In broilers on the other hand, we focus our research efforts on studying the development of the digestive track in relation to early feeding and on farm hatching.

EFSA efficacy trials for feed additives

Lanupro can act as your trusted partner in performing well-designed experiments in pigs and broilers that meet EFSA guidance on the assessment of the efficacy of feed additives. Our laboratory is experienced in running studies with gestating and lactating sows, weaned piglets, grower-finisher pigs, and broilers, serving the purpose of seeking legislative approval. Understanding the critical nature of intellectual property, we are fully prepared to sign non-disclosure agreements to ensure the confidentiality and security of your data.

Precision feeding and animal monitoring algorithms

Whether you're looking to convert raw data into meaningful insights, need assistance in designing a custom statistics pipeline, or want to extract models from your data that can be used for decision-making, Lanupro can assist you in these steps. Central to our methodology are a selection of R and Python packages, known for their academic rigor, performance and open-source nature. This allows our clients to freely explore and integrate the codebase without incurring any costs or licensing fees. Lately, sensor and video data are becoming increasingly prevalent in animal research, necessitating more sophisticated and flexible approaches, especially as these datasets grow in size. Navigating the complexities of big data requires specialized expertise in artificial intelligence (AI). Lanupro has experience with a wide range of machine learning and deep learning models. We are open to collaboration, offering support to harness the full potential of your data, regardless of its size or type.