UMR1348 PEGASE
16, Le Clos
35590 Saint Gilles
https://www6.rennes.inrae.fr/pegase

Position in animal nutrition and LCA|11 months

Title

Environmental and economic performance of pig production – link to the protein content of feeds

Job description

The INRAE PEGASE Mixed Research Unit (https://www6.rennes.inrae.fr/pegase) and the INRAE SAS Mixed Research Unit (https://www6.rennes.inrae.fr/umrsas) are looking for a highly motivated research associate. We offer a 11-month position on environmental assessment and economics of pig farms under the supervision of Dr. Jean-Yves Dourmad and Dr. Florence Garcia-Launay for the pig parts and of Dr. Aurélie Wilfart for the Life cycle assessment part, and partnership with Nicolas Martin from Ajinomoto Animal Nutrition Europe. This project is part of ongoing research on understanding the relationships between greenhouse gas emissions and profitability of pig production. The successful applicant will be integrated for a 4-month period in the LCA group of the SAS Research Unit and a 7-month period in the SysPorc group (The pig in livestock farming systems) of PEGASE research unit and will interact with Ajinomoto Animal Nutrition Europe. He/she will beneficiate from scientific environment on pig nutrition, modelling, life cycle assessment and optimization.

PEGASE is a joint research unit created in 2012 by INRAE and Agrocampus Ouest. PEGASE is the acronym for Physiology, Environment and Genetics for the Animal and Livestock Systems. Situated in Brittany, in western France, in the centre of one of the main agricultural regions in Europe, only 1h30 from Paris, PEGASE employs about 120 permanent staff and 30 temporary staff and students. PEGASE has facilities in 3 locations in the vicinity of Rennes. PEGASE conducts research on animal biology and livestock systems with the ultimate goal to improve the sustainability and the competitiveness of animal production systems. More specifically, we aim to understand how the animal and livestock systems adapt to current and future conditions and challenges.

SAS is a joint research unit created in 2000 by INRAE and Agrocampus Ouest. SAS is the acronym for Soil, Agro- and hydro-systems, Spatialization. Situated in Rennes with a secondary site in Quimper (both in Brittany), SAS employs about 80 permanent staff and 30 temporary staff and students. SAS studies the interactions between agriculture and the environment using an integrative and spatialized approach of rural areas. The main interests are water, nitrogen carbon and phosphorus cycles in cultivated landscapes, as well as multi-criteria assessment of agrosystems. Our research contributes to elaborate sustainable agricultural systems, to improve rural landscape management, to preserve natural resources such as water, soil, and atmosphere and landscape quality. UMR SAS includes experts in soil science, hydrology, agronomy, environmental assessment, animal science, bioclimatology and geomatics. It develops models and computer-based tools and runs long-term experimental facilities. It is also part of the OSUR research consortium and maintain regular collaborations with many institutions around the world.

Closing date of job offer: February 14th, 2020
Location: INRAE PEGASE is based in Saint-Gilles, 15 km from Rennes. INRAE SAS is based in Rennes (France)
Duration and period: 11-months from April 2020.
Monthly gross salary: 2033 à 2371€ according to past experience

Description of the project

Animal production faces challenges to meet the socio-economic expectation for better sustainability. Pig production is responsible for various environmental impacts related to both feed production and manure management. Economic viability of pig farms in Europe is also to some extent questionable. Volatility of prices of feed ingredients and of pork meat have serious effects on the levels of gross margin and farmers' income. Gross margin and

environmental impacts also strongly depend on feeding strategies and animal management in the different production units. Therefore, pig farms are complex systems for which the prediction of economic and environmental performances is a tricky task. They put into interaction a large number of animals of variable growing potential together with farmer's strategy, farm buildings and infrastructures. The effects of rearing factors and of the economic context on economic and environmental performance of pig farms is not obvious. Models and tools already exist to account for the complex nature of pig production systems in order to produce reliable estimations of technico-economic outputs and environmental impacts (using Life Cycle Assessment) according to the feeding strategies and shipping management in various economic contexts.

During the last decades, feed-use (FU) amino acids have been developed and proposed on the market. Incorporated into pig feeds, they allow formulation of diets balanced in amino acids at low protein content. First FU amino acids available were L-lysine, L-threonine and DL-methionine. L-tryptophan and L-valine came to the market in the years 2010-2012. A new set of FU amino acids (isoleucine, leucine, histidine) will be soon available to feed manufacturers. They will allow further reduction of crude protein content of pig feeds. However, the potential for mitigation of impacts associated to these newly available FU amino acids is not known. Therefore, a first goal of the project is to estimate the environmental gain resulting from the incorporation of these newly available FU amino acids, using Life Cycle Assessment.

The Ecocalim database developed by INRAE SAS is an LCA database dedicated to feed formulation. The base contains 179 feed ingredients and is constantly evolving to meet the demand of animal nutrition professionals. In particular, the data concerning amino acids are few and require a significant update. A first goal of the partnership is to update the Ecoalim database in regard of the feed-use amino acids life cycle inventories. It involves determining a benchmark regarding environmental performance of amino acids typically used on the French market. As a significant share of amino acids used in France are imported, the project will require data collection on amino acid production.

Current developments at INRAE PEGASE aim at producing a bioeconomic model, which allows optimisation of feeding strategies on economic and environmental criteria. Such model is an adequate tool to quantify the potential trade-off between economic and environmental criteria into various economic contexts and to estimate the economic cost of strategies for mitigation of GHG emissions. Therefore, a second goal of the partnership is to estimate the trade-off between the economic and environmental objectives according to various economic contexts.

Objectives and tasks

First objective will be to perform a Life Cycle Assessement of pig production under various scenarios of incorporation of Feed-use amino acids into pig feeds, including scenarios using newly available feed-use amino-acids. Tasks for this first mission will be :

- Construction of amino-acids inventories based on Ajinomoto industrial data and data to be collected
- Construction of scenarios used in the study (including economic scenarios, scenarios of incorporation of feed-use amino-acids, definition of formulation constraints)
- Construction of protocol for Life Cycle Assessment of pig production with feed-use amino acids
- Feed formulation for all physiological stages considered
- Life Cycle Assessment of pig production under the various scenarios considered

Second objective will be to investigate the trade-off between economic and environmental objectives of the pig-fattening unit, in various economic contexts. Tasks for this second mission will be :

- Construction of protocol for investigation of the trade-off between economic and environmental criteria
- Simulations with the bioeconomic model to investigate the trade-off between economic result and environmental

impacts

The person recruited will also have to write the report of all the activities undertaken and to write a publication from the results obtained.

To reach these objectives, the person recruited will beneficiate from models and tools already available in the research units to perform Life Cycle Assessment of feed-use amino acids and pig production systems, and to predict the effects of economic context and feeding strategies on economic and environmental performances of pig-fattening units.

The candidate

Applicants must have a Master or a phD degree or equivalent. A background in animal nutrition is expected. Experience or strong interest in Life Cycle Assessment, modelling or computing sciences is advantageous. The successful candidate is expected to have good collaborative skills and proven abilities to publish and present at a high international level.

Interested applicants should submit a CV, and a cover letter including reasons for applying by February 14th, 2020

Contact details

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