Global nutrition research

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The overall goal of my research is to increase the sustainability of livestock production through enhancing efficiency of production, reducing environmental impact and improving animal welfare and the quality of the product via improved feeding systems delivering bioavailable nutrients. This work encompasses basic, fundamental and applied research which has had major impact in the UK and internationally. My current research covers three main themes.

Sustainability of ruminant livestock production in the UK

(temperate grassland production systems)

1) DEFRA Sustainable Intensification Platform initiative (total £4.5 Million) is split across three interactive levels governing sustainability of food production:

- Farm
- Environment
- Industry supply chains

I am leading the study farm work package investigating the key interventions, to be applied at the farm scale, to lead towards sustainable intensification in the UK.

2) Soil to Nutrition research projects funded by BBSRC and delivered jointly between University of Bristol and Rothamsted Research. The ambition is to find:

- Sustainable solutions for ruminant livestock production in the UK
- Optimise pasture utilisation to realise the role of ruminants in food security
- The most efficient production methods of high quality animal products whilst reducing the environmental impacts

The Governments EFRA Committee's report in 'Food-Security, Production Supply and Systems' (July 2014) identified this work as essential to the delivery of the UKs food and energy security framework

Global livestock sustainability

The Global Farm Platform partnership brings together 20 international research organisations on every continent of the planet (www.globalfarmplatform.org). Developed in conjunction with Prof. Mark Eisler (University of Bristol), this partnership;

- Facilitates information flow to ascertain the most efficient systems in contrasting climatic conditions.
- Key lessons learnt from these farm platforms help inform policy makers
- Has been identified by the FAO as an exemplar to deliver collaborative research to achieve sustainable intensification of agriculture and future food security

Product quality and safety

Two BBSRC projects will develop methodologies which will enhance the quality and safety of meat products and generate intellectual property for commercialization. Project areas:

- Improvement in animal product mineral composition
- Bovine mycotoxicosis - developing diagnostic tools and improving silage quality

Nutrition research (2)

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Improved feed formulation for young piglets

The problem

- Digestibility in weaned piglets is not the same as growing pigs

The Solution and research needs

- Using cannulation of weaned piglets to examine
  - Difference among feed ingredients
  - Use of feed additives - their impact
- Measure of
  - Amino acid digestibility
  - Microbiome composition
  - Other nutrients e.g. carbohydrates

New energy system for poultry

The problem

- 1-2% saving in feed cost is worth about **£1m per month** for UK broiler industry

The solution and research needs

- Adapting the Danish Energy System from pigs to poultry
  - Digestibility values from literature
    - As needed own studies will be conducted
  - Full chemical composition of ingredients
  - Calculate the extra energy cost of excess N in poultry vs. pigs (and ruminants)

Improved calf performance by nutrition

The problem

- Too many calves are under-performing due to poor nutrition

The solution and research needs

  - Using cannulation of calves
    - Build feed table for calves for common ingredients
    - Understand interaction between nutrient and microbiome
  - Measure of
    - Amino acids digestibility
    - Microbiome composition
    - Digestibility of other nutrients and anti-nutrients