A brief introduction to

Sustainable futures for the Costa Rica dairy sector: optimising environmental and economic outcomes (*SusCoRiDa*)

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PRIFYSGOL BANGOR UNIVERSITY

CATIE
Solutions for environment and development
Soluciones para el ambiente y desarrollo

ROTHAMSTED RESEARCH

SusCoRiDa project

- Global Challenge Research Fund Foundation Award
- Funded by the UK Biological and Biotechnology Research Council (BBSRC) Ref: BB/P023150/1

- Started: May 2017 – November 2019

- 2 new post-doctoral researchers

  Claudia Arndt (CATIE)

  Andre Mazzetto (Bangor Univ)

Project team

- Dave Chadwick (PI) – Nutrient management and diffuse pollution
- David Styles – Life Cycle Assessment (carbon, nutrients)
- Robert Brook – Agriculture and Rural Development
- Andre Mazzetto – Life Cycle Assessment
- Tom Misselbrook – Ammonia and GHG emissions
- Claudia Arndt – Dairy Nutrition and GHG emissions
- Eduardo Somarriba – Livestock and Environment
- Claudia Sepulveda – Agroecology

SusCoRiDa Costa Rica Project partners

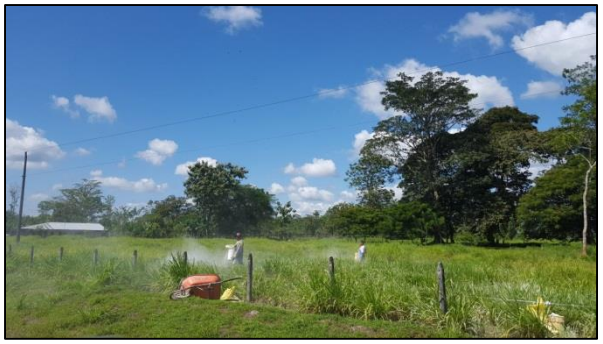
CATIE: Centro Agronómico Tropical de Investigación y Enseñanza

INTA: Ministry of Agriculture Research Division

Cooperativa de Productores de Leche Dos Pinos R.L

Background

- Costa Rica has 45 - 50,000 livestock farms
- 1.5 million cattle – increased by 14% over two years (2011-13)
- Employ about 12% of the Costa Rican workforce
- Occupy over 30% of the country
- Livestock account for 23% of Costa Rica greenhouse gas emissions
- The dairy sector is facing reduction in import tariffs
- Many livestock farms are poorly managed
  - Low quality pastures
  - Slow growth rates of stock
  - Too much fertilizer applied



- This project builds on previous CATIE-Bangor University collaboration

Aim of project

- To develop sustainable futures for food production in the tropics, using the Costa Rican dairy sector as a case study.

- More specifically, in this multi-disciplinary, multi-actor, proof of concept project we will:
  - integrate measurements and existing data
  - model a range of scenarios of sustainable intensification practices at farm-scale
  - propose promising pathways of sustainable intensification for the dairy and wider land use sectors in Costa Rica that balance socio-economic and environmental outcomes.

Objective 2 Determine what is already known

- Collection of existing data:
  - trends in livestock numbers
  - sectoral GHG emissions
  - energy, water, nutrient inputs & outputs
  - tree-pasture-livestock interactions
  - livestock genetic changes
- Determine the robustness and suitability of data for models to be developed during the project

Objective 3: measurement protocols

- Establish best protocols for measuring:
  - GHG and NH_3 emissions to the atmosphere
  - nitrate and phosphate losses via leaching
- Commence with Finca CATIE
- Apply these protocols to a pilot sample of three commercial farms along a gradient of intensification
- Train Costa Rican technicians and scientists in:
  - Environmental measurements listed above
  - C footprinting, Life Cycle Assessment and farm scale modelling

Objective 4: farm-scale modelling

- Calculate environmental and economic balances for the CATIE farm and three dairy farming systems (and their products)
- Model effects of new management practices and technologies that would be representative of trends in intensification
- Explore other sustainable intensification strategies
- For example, CR Livestock NAMA advocates:
  - improved fertilization plans
  - implementation of rotational grazing
  - live fences and adoption of silvo-pastoral systems
  - pasture improvement

Objective 5a: model sector/national scale

Use measured and modelled data to -

- Scale up and assess potential trade-offs and synergies for specific dairy development pathways between:
  - Environmental goals (reduction of GHG, NH_3 emissions and nutrient losses) and,
  - Productive/economic goals in terms of -
    - dairy productivity,
    - rural employment,
    - improved resource efficiency,
    - improved farm household livelihoods
- Use findings to advise key actors; e.g.
  - Ministry of Agriculture
  - Ministry of Environment & Energy
  - National Milk Chamber (CNPL)

Via stakeholder groups and final project workshop

Objective 5b: identify business models

- Work with the Costa Rican dairy sector (CNPL, Dos Pinos, others)
- Identify potential business models (reflecting sustainable management practices)
- Use a value chain approach
- Also considering governance and investment security

Objective 6: building a legacy to the *SusCoRiDa* project

- Develop this capacity building project into a broader and longer lasting legacy
- **Train researchers, technicians and extension officers in environmental measurements** and farm scale modelling
- Work with key industry and policy stakeholders (via a stakeholder group)
- Plan how this exemplar project could be rolled out to other sectors and other Central American countries

Deliverables

By the end of the project, we should have:-

- Improved understanding of the environmental impact of dairying and options for improvement
- **New data on ammonia emissions and nitrate and phosphate leaching**
- Data collated about other GHG emissions (from other studies)
- Data on farm economics (collected ourselves and from other studies)
- Models of the environmental and economic balances for the farms studied (using the above sources)
- Based on data collected and modelled, environmental recommendations scaled up for wider use in Costa Rica
- Business models for dairy and (maybe) dual purpose farms in Costa Rica
- A longer lasting legacy encompassing trained technicians and researchers, environmental and business models for use by wider stakeholders including industry groups, Government ministries, (hopefully) further projects
- Publications in the international journal and regional Spanish sectors

Muchas gracias

Thank you

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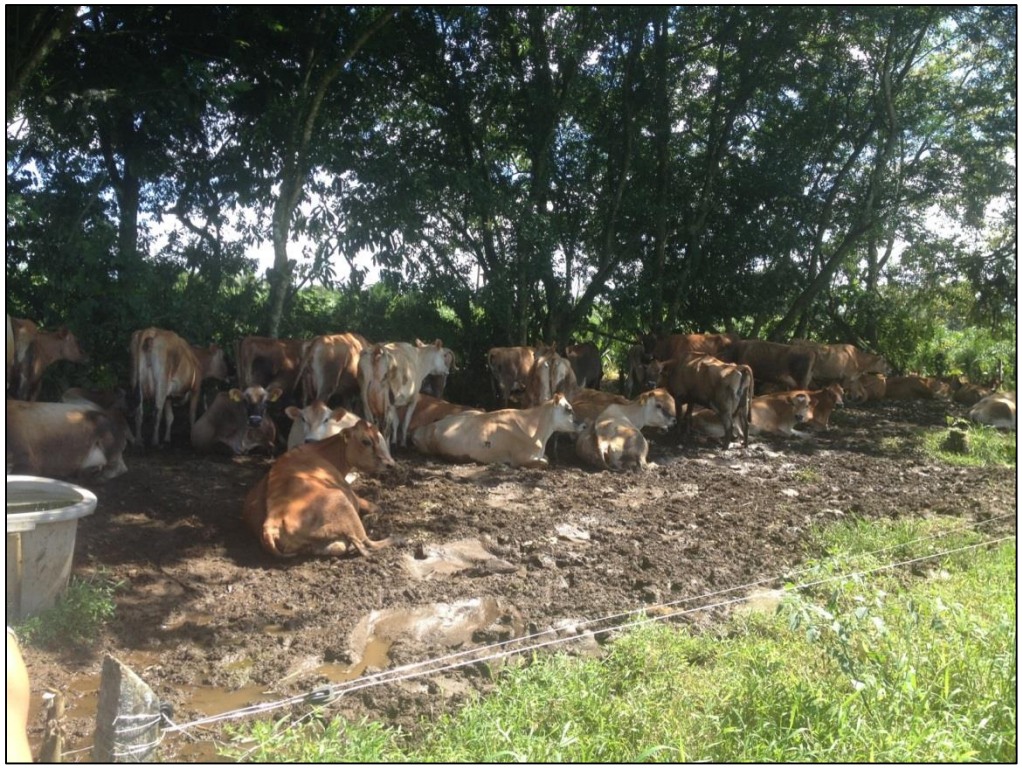

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