GLOBAL RESEARCH ALLIANCE ON AGRICULTURAL GREENHOUSE GASES

GLOBAL DAIRY PLATFORM

dsf Dairy Sustainability Framework

# How Dairy Cattle Health Impacts Greenhouse Gas Emissions: Chile, Kenya & UK

(Research Progress Update)

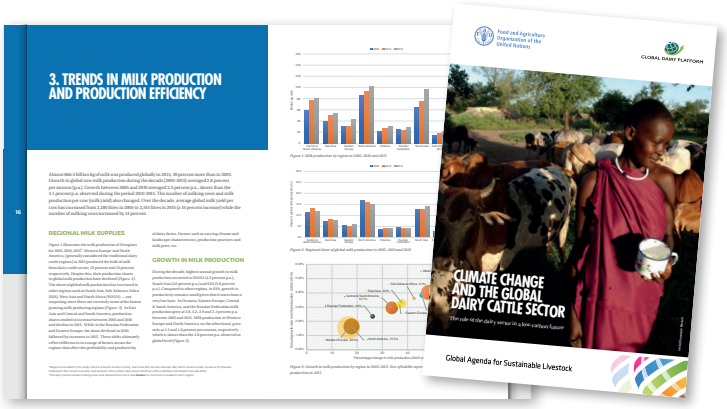
## Introduction

**In 2019, the Food and Agriculture Organization and Global Dairy Platform published a report entitled, 'Climate Change and the Global Dairy Cattle Sector'. This global review identified improved cattle health as one key action to reduce Greenhouse Gas (GHG) emissions from livestock production.**

http://www.fao.org/3/CA2929EN/ca2929en.pdf

The report showed that endemic cattle diseases have a negative effect on cattle production and productivity, and consequentially impacts on GHG emissions. This typically stems from:

- Increased mortality
- Depressed milk production
- Increased waste from treated milk that is discarded
- Diminished reproductive performance




**This new research explores:**

- The effect of proactive animal health management, using Animal Health Improvement Measures (AHIM) on GHG emissions
- The economic impact these AHIM improvements have on farmers
- How AHIM could be included in Nationally Determined Contributions (NDCs) and the necessary Measurement, Reporting and Verification to achieve this ambition.

The study applies the same methodology in the dairy sectors of Chile, Kenya and the UK.

## Dairy Cattle Health and GHG emissions

**The study focuses on three specific health and productivity challenges for dairy cattle, along with intervention actions in the three countries:**

1. **Reproductive performance**
   Infertility/failure to conceive (non-pregnant cows): **Interventions** - Early Pregnancy diagnosis; sensors and tools for heat detection and fixed time artificial insemination programmes.
2. **Single agent infectious disease**
   Bovine Viral Diarrhoea virus (BVDv): **Interventions** - Biosecurity measures and segregation; use of vaccination; testing and removal of persistently infected (PI) animals.
3. **Multifactorial or management disease**
   Mastitis in dairy cows: **Interventions** - Teat disinfection and hygiene; dry cow therapy; milking management training.

**Methodology:**

The commonly used AHIM and prevalence of the three cattle health and productivity challenges and domestic climate impacts are being reviewed using a Delphi panel methodology, based on a group of expert vets and climate specialists in each country including:

the XLVet Group, including RCVS Specialists in the UK, Defra, Cranfield University.

Consorcio Lechero, Sociedad Chilena de Buiatría and Asociación Latinoamericana de Buiatría, Instituto de Investigaciones Agropecuarias (INIA),Cooprinsem, Universidad de Concepción, Servicio Agrícola y Ganadero (SAG) and independent veterinary advisors.

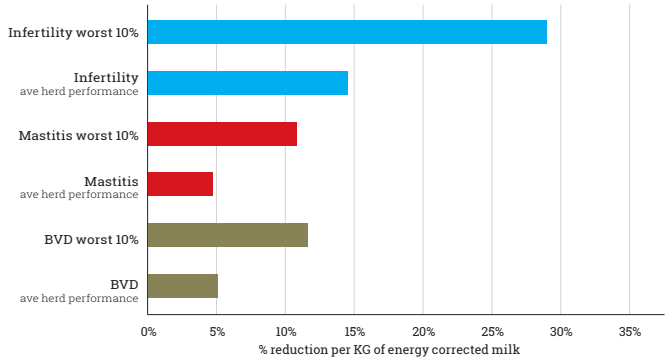
the Kenya Agricultural & Livestock Research Organization and Ministry of Agriculture, Livestock and Fisheries.

## AHIM and GHG – study results

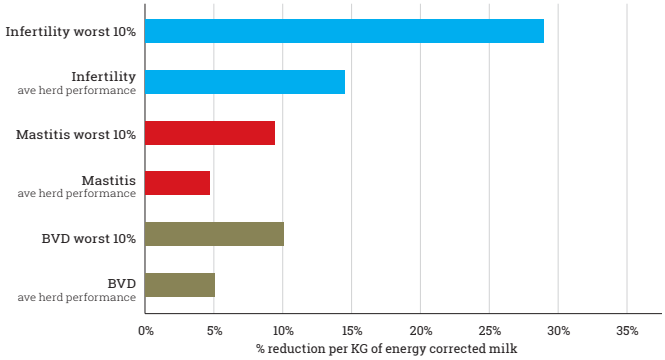
**The charts overleaf present the emissions intensity reduction potential at the 'average herd level and in the worst 10% of herds in each country by implementing AHIM for each challenge.'**

- Infertility measures represent the greatest opportunity with a potential across countries of c.30-40% reduction in GHG intensity in the worst 10% of herds,
- Single agent infectious and multifactorial/management diseases should not be overlooked as they too can contribute substantially to GHG emissions reductions.

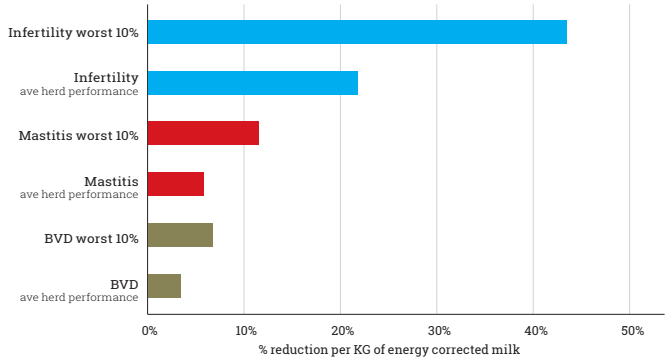
### Potential reductions in GHG intensity of milk production in the UK




### Potential reductions in GHG intensity of milk production in Chile




### Potential reductions in GHG intensity of milk production in Kenya




### Cattle health potential for reducing GHG intensity

The data are for three conditions with the average herd level potential for each and the potential for the worst 10% of herds.

| Condition | Potential reductions in GHG intensity | | |
|---|---|---|---|
| | UK | Chile | Kenya |
| BVD | 5% | 5% | 3% |
| BVD worst 10% | 12% | 10% | 7% |
| Mastitis | 5% | 5% | 6% |
| Mastitis worst 10% | 11% | 9% | 11% |
| Infertility | 14% | 14% | 22% |
| Infertility worst 10% | 29% | 29% | 43% |

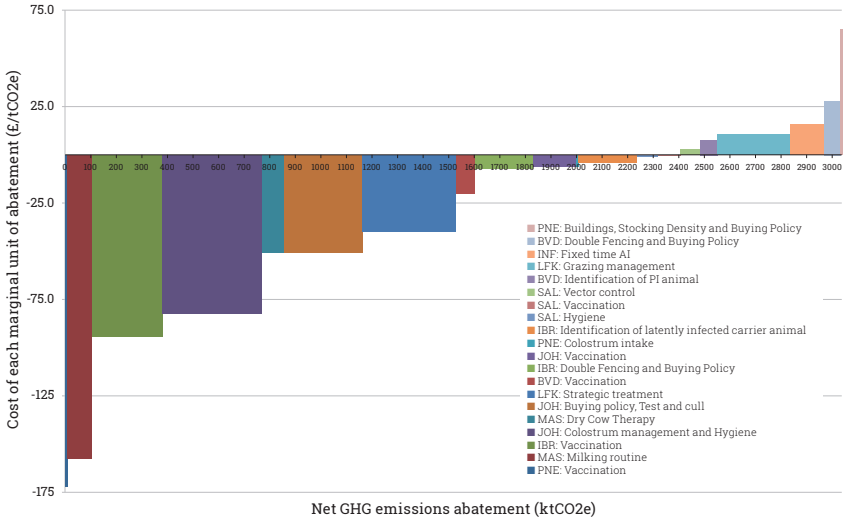
## Economics

### Farmers appreciate knowing the cost effectiveness of proactive investment in reducing GHG emissions.

Using the UK as an example, the Marginal Abatement Cost Curve (Elliot et al, 2015) provides key economic evidence. Negative columns equate to cost effective GHG abatement to the farmer.

The width of each column gives the magnitude of each AHIM. The three disease categories used in this study score well.

### Marginal Abatement Cost Curve for control of endemic disease in dairy cattle in the UK (Elliot et al, 2015)




## Cattle Health and Nationally Determined Contributions (NDCs)

### To achieve inclusion in NDCs the following are required.

- A Tier 2 or 3 GHG inventory for dairy cattle (and preferably all cattle types) is needed to address the cattle sector
- Introducing new parameters (cattle health status) will require new data that is not normally part of the GHG inventory
- The implementation of strategies to address animal health cannot rely on the inventory alone. Additional data are required to ensure the impacts of activities can be directly attributed to the activities at a farm scale
- Developing a baseline from which to measure impacts is essential so that the change resulting from the implementation of mitigation activities can be measured and verified

This study shows considerable potential for long-term and lasting cost-effective mitigation of GHG emissions in Chile, Kenya and UK dairy production through implementation of key AHIM. The potential to include these improvements in a country's NDC will be influenced by the design of its MRV system, including its GHG inventory. Work will continue in the areas of economics and in MRV system requirements in order to include cattle health interventions in NDCs.

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Project is being undertaken by RAFT Solutions and Cranfield University