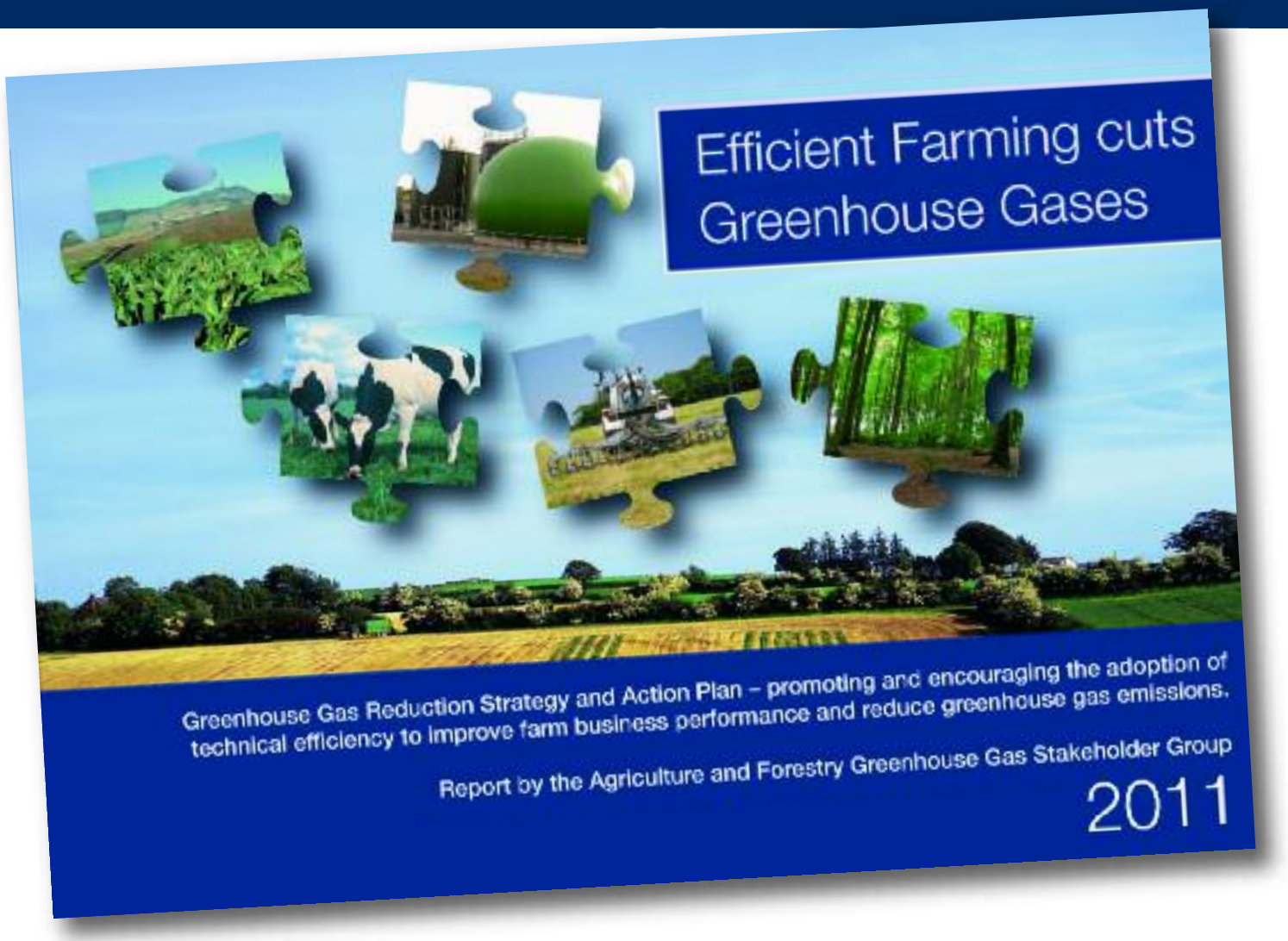
Dairy Sector

How to reduce costs and cut Greenhouse Gas (GHG) Emissions



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Introduction

Three main greenhouse gases (GHGs) are emitted by the agri-food industry:

- Carbon dioxide (CO_2) emissions from fossil fuel usage and soil disturbance when cultivating.
- Methane (CH_4) emissions from ruminant livestock and manure storage.
- Nitrous Oxide (N_20) emissions from Nitrogen (N) fertiliser, manure applications and turnover of Nitrogen (N) in the soil when cultivated.

Gas emissions are rated in terms of their Global Warming Potential (GWP) relative to the GWP of CO_2. Methane (CH_4) has a GWP 23 times greater than that of CO_2, and N_2O has a GWP about 300 times greater than that of CO_2. For comparative purposes, therefore, emissions of CH_4 and N_2O are expressed in units of CO_2 equivalence (CO_2e). For example, one tonne of CH_4 emitted is expressed as 23 tonnes CO_2e, and one tonne of N_2O emitted is expressed as 300 tonnes CO_2e.

The term carbon footprint is used to describe the total amount of CO_2 and other gases emitted when a product is produced. In general the higher the yield or the better the liveweight gain, the lower the carbon footprint per unit of production.

A unique aspect of the agri-food production system is its ability to 'lock up' CO_2 in plants, trees and soils. This is called 'carbon sequestration'. Land management practices have a large impact on the quantities of CO_2 'sequestered'.

In order to reduce GHG emissions, the agri-food industry can reduce direct emissions, substitute fossil fuels with renewable energy sources and enhance carbon sequestration.

The Efficient Farming Cuts Greenhouse Gases (EFCGG) report[1] was issued in December 2011 by an Industry and Government Partnership group. The report's Action Plan is being implemented voluntarily by industry bodies, DARD and CAFRE. AFBI's ongoing research will inform the plan as it progresses.

This leaflet provides practical suggestions which you can adopt to reduce GHG emissions from your farm and save money.

[1]*Website link: http://www.dardni.gov.uk/index/publications/pubs-dard-environmental/publications-environment-efficient-ghg-report.htm*

Implementation Themes

The 'Efficient Farming Cuts Greenhouse Gases' (EFCGG) report identified four key themes designed to reduce emissions intensity:

- **A - Better nutrient and fertilizer management;**
- **B - Better livestock management;**
- **C - Optimising renewable energy** generation and encouraging **fuel efficiency** on farms;
- **D - Better land management by locking in carbon** in plants, trees and soils.

The main greenhouse gases (GHGs) produced from dairy farming are Nitrous Oxide (N_2O) from soils, animal manures and chemical fertiliser, and Methane (CH_4) from enteric fermentation and stored manures.

The key measures that are most applicable to the Dairy sector are:

Improving Feed Efficiency

- This means grazing better quality grass and feeding better quality silage to dairy cattle to improve the energy density of the forage component of the diet.

- This will increase milk yield or reduce concentrate feed use which in turn will reduce the cost of the diet per litre of milk produced and also reduce the Methane (CH_4) greenhouse gas production per litre of milk. Alternatively, if concentrate feed use is increased, this will increase milk output and in turn reduce GHG production per litre of milk.

- Potential savings of £100 per cow per year can be achieved.

Nutrient Management Planning

- This involves using soil analysis and nutrient management calculator tools to work out how much chemical Nitrogen (N), Phosphate (P), Potash (K), Sulphur (S) and lime is required, after taking account of nutrients supplied by slurry.

- Matching nutrient supply to crop requirements will reduce fertiliser costs and also reduce Nitrous Oxide (N_2O) emissions from N fertiliser.

- Potential savings of £40 per cow per year can be achieved by applying and fully allowing for the nutrient value of typical applications of dairy cow slurry to silage swards.

Timing and Application of Slurry and Fertiliser

- Applying slurry 4-5 days before Nitrogen (N) fertiliser is spread can reduce Nitrous Oxide (N_2O) emissions by 80% compared to applying both slurry and Nitrogen (N) fertiliser on the same day.

- Spreading slurry by Trailing Shoe or Shallow Injection can reduce losses of ammonia Nitrogen (N) from the slurry and increase grass growth by 25% compared to spreading slurry by splash plate.

- This will allow fertiliser usage (and costs) to be reduced, with an associated reduction in Nitrous Oxide (N_2O) emissions.

- Use of trailing shoe technology allows a greater window of opportunity for spreading. Slurry should be applied by this method into a 2-3 week re-growth of grass, avoiding application in wet or difficult conditions. This will reduce the risk of runoff and gaseous losses.

- Potential savings of £4 per cow per year can be achieved.

On-farm Energy Efficiency

- Using more fuel efficient tractors to reduce diesel use, using more efficient vacuum and milk pumps in milking parlours, using energy efficient light bulbs, using high efficiency plate cooling systems or heat recovery systems to reduce electricity use.
- This will reduce fuel use and energy costs, as well as reducing Carbon Dioxide (CO_2) emissions.
- Potential savings of £14 per cow per year can be achieved.

On-Farm Renewable Energy

- Utilising a farm's own resources to produce a secure supply of renewable energy will reduce carbon emissions and reliance on fossil fuels.
- The availability of animal slurries may make the installation of Anaerobic Digestion systems, on a scale proportionate to the farm size, a viable option on some dairy farms, while wind turbines, solar panels and biomass boilers provide other renewable energy options.
- Potential savings vary depending on the renewable technologies installed and current energy usage. Energy Audits (matching usage to appropriate tariffs) have shown that savings of £38 per cow per year can be achieved.

Genetic Improvement

- This means breeding healthy and fertile cows which produce milk efficiently within the farm system and survive for many lactations.
- Higher yielding cows within a system will have a lower Methane (CH_4) emission per litre of milk.
- Breeding longer living cows will reduce the number of expensive replacements required and reduce Methane (CH_4) production from replacement heifers.
- Reducing replacement rates by 5% can achieve potential savings of £45 per cow per year.

Grass/Clover Production

- Establishing red clover in silage swards and white clover in replacement heifer grazing swards can naturally 'fix' Nitrogen (N) and reduce the quantity of chemical Nitrogen (N) fertiliser required to grow grass.
- This will reduce fertiliser costs and reduce Nitrous Oxide (N_2O) emissions from chemical fertiliser use.
- Potential savings of £33 per cow per year can be achieved.

Animal Health Improvement

- Working with your vet to produce a herd health plan or taking part in an eradication programme on infectious diseases.
- Testing for disease carriers such as calves persistently infected with Bovine Viral Diarrhoea (BVD).
- Improving animal performance, and increasing longevity through reducing infectious disease incidence, will increase yields and reduce replacement heifer costs in dairy herds.
- This will in turn reduce Methane (CH_4) emissions associated with the extra animals required to support high replacement rates.
- Potential savings of £38 per cow per year can be achieved if BVD is eradicated.

The actual level of savings will depend on variable factors on each farm and the efficiency savings that have already been achieved.

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