



## Importance of cattle productivity and national performance in a greener environment

**Cara Sheridan MVB MRCVS Cert DHH, vet adviser, MSD Animal Health, discusses the impact of controlling cattle diseases on national cattle productivity, performance and greenhouse gas emissions**

In February 2017, the Minister for Agriculture, Food and the Marine, Michael Creed addressed the delegates of the Intergovernmental Panel on Climate Change (IPCC). During his speech he made reference to “the very real challenge of ensuring food security for all and preventing dangerous climate change acknowledged in the Paris Agreement”. Agriculture in Ireland contributes to 33% of our greenhouse gas emissions. We must find a way to increase our cattle productivity and national performance whilst respecting the commitment we have made through the Paris Agreement.

### BACKGROUND

In late 2015, the United Nations Framework Convention on Climate Change founded the Paris Agreement. There were 195 states including Ireland, that negotiated the agreement. The UN Intergovernmental Panel on Climate Change (IPCC) has warned of the consequences of failing to limit global temperature rises to at least 2°C when compared with pre-industrial times, highlighting that the

impacts would pose a threat to humanity and could lead to irreversible climate change. The Paris agreement is due to come into effect in 2020. As a developed country, with a quickly expanding economy, Ireland will experience profound changes as a result of the Paris Agreement. Every sector, which currently emits greenhouse gases (agriculture, transport, electricity, heat and industry) will be targeted. Ireland has its own climate change legislation – the Climate Action and Low Carbon Development Bill.

Like the Paris Agreement the legislation provides for a carbon-neutral situation by mid-century and also commits to match Ireland’s targets with those of the EU. It is beyond the scope of this article to discuss all sectors; we shall focus solely on agriculture.

Agriculture comprises an eighth of gross domestic product (GDP) in the country, however its emissions make up a third of total emissions. Greenhouse gases emissions (GHGs) consist mainly of methane from livestock and nitrous oxide due to the use of N fertiliser and slurry management in

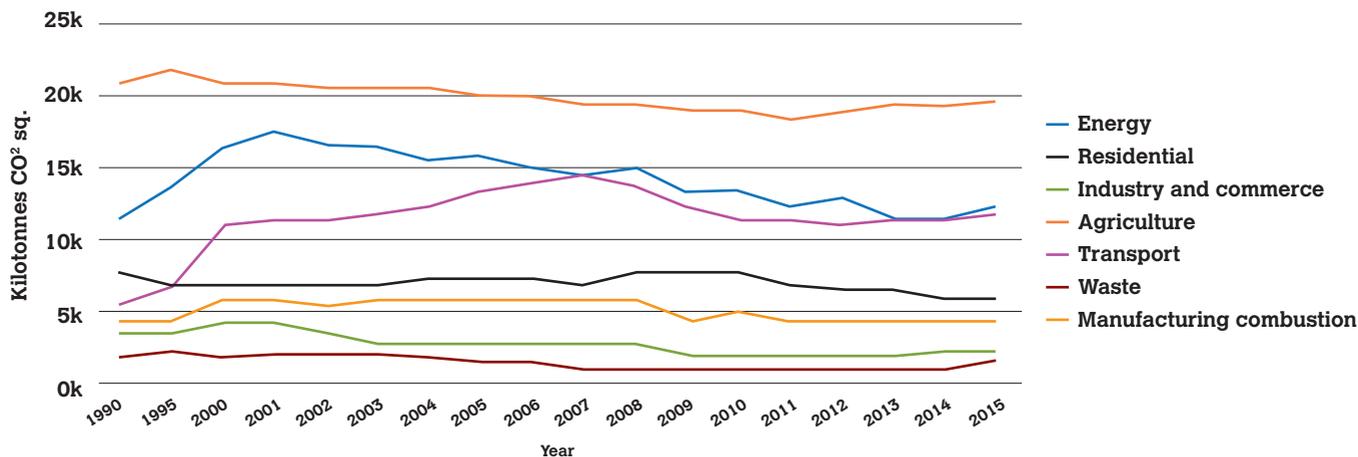


Figure 1: Greenhouse gas emissions by sector. Source EPA.

Ireland. Ruminants are the most GHG intensive livestock category with emissions of 10-39CO<sub>2</sub>e<sup>^</sup>\*kg/ meat kg compared to pig and chicken production emissions of 5.5-8.9CO<sub>2</sub>e<sup>^</sup> kg/meat kg and 3.1CO<sub>2</sub>e<sup>^</sup> kg/meat respectively (\*CO<sub>2</sub>e<sup>^</sup> = carbon-dioxide equivalent). Emissions from dairy and beef cattle account for 76% of the total agricultural methane emissions in the greenhouse gas inventories (Salisbury et al, 2013).

**FACTORS IMPACTING PRODUCTIVITY – FOCUS ON DISEASE CONTROL**

There are four pillars to efficient animal production; genetics, nutrition, management and disease control. In this article we shall focus solely on the impact of controlling cattle diseases.

Sayers et al (2015) studied the effects of exposure to *Neospora caninum*, *Salmonella* and *Leptospira interrogans serovar hardjo* on the economic performance of Irish dairy herds. In this paper, it was concluded that exposure resulted in significant financial losses for Irish dairy farmers. *Salmonella* exposure in unvaccinated herds was found to have the greatest negative effect on farm profits. Total annual profits in unvaccinated herds were reduced by €94.71 and €112.11 per cow at milk prices of €0.29 and €0.34/L respectively, as a result of exposure to *Salmonella*.

Herds positive for *Salmonella* recorded a 316kg reduction in milk yield. Exposure to either *N caninum* or *L hardjo* was associated with compromised reproductive performance. Herds positive for *N caninum* had greater rates of adult cow mortality and those positive for *Salmonella* have greater rates of calf mortality. Exposure to *N caninum* resulted in reduced annual farm profits of €12 and €12.44 per cow at the above milk prices, whereas exposure to *L hardjo* resulted in a decrease in annual farm profits of €13.78 and €13.72 per cow at each milk price. The additional cost was a result of compromised reproductive performance and an increase rate of 'carry-over cows' (O'Doherty, 2014). Vaccination for both *Salmonella* and *L hardjo* was associated with improved herd performance in the herds studied. Herds vaccinated against *Salmonella*

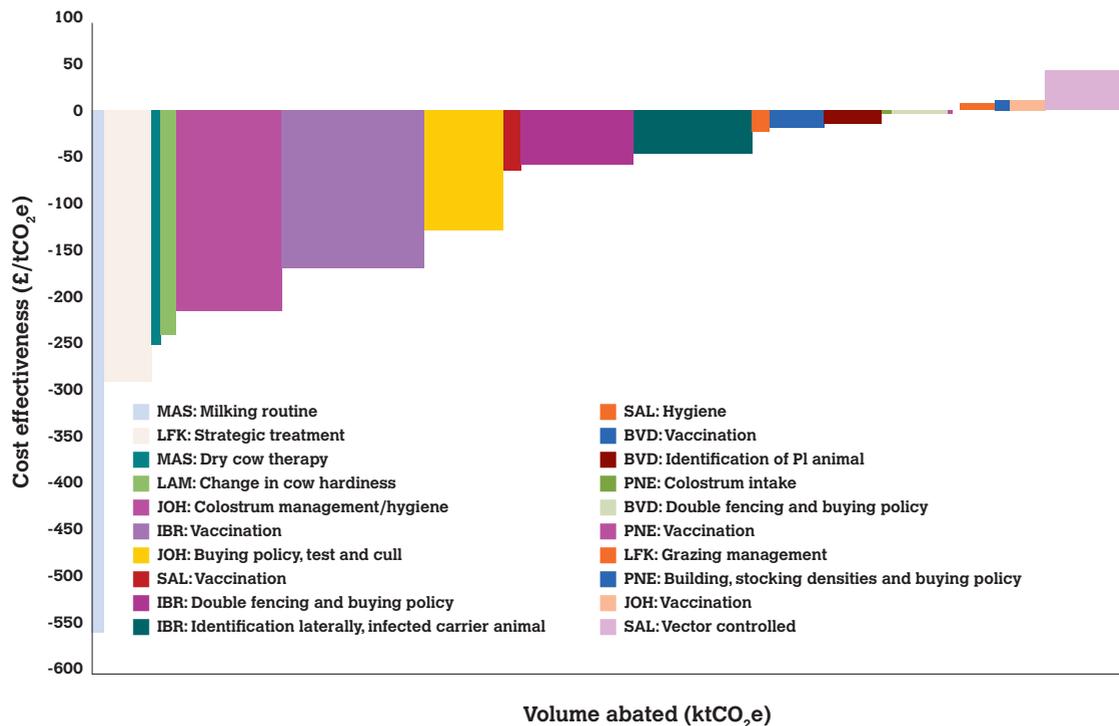
generated €84.48 and €101.89 per cow more profit at each milk price when compared with herds positive for exposure. Herds vaccinated for *L hardjo* generated €9.69 and €9.63 per cow more profit compared with exposed herds. Interestingly but not surprisingly, herds that tested negative for both *Salmonella* and *L hardjo* generated additional profit of €10.22 and €4.09 per cow respectively compared with vaccinated baseline herds.

Prior to the start of the BVD eradication programme, Animal Health Ireland commissioned the Scottish Agricultural College (SAC) to investigate two objectives; to estimate the benefit of freedom from BVD to the Irish beef and dairy sector at farm level and secondly to estimate the cost of eradicating BVD from Ireland. It is estimated that annual losses due to BVD cost the Irish cattle industry €102m annually. Richter et al (2017) stated that infection with BVD has major economic impacts. Richter looked at 15 countries, including Ireland. Direct losses due to bovine viral diarrhoea disease virus (BVDV) were found to range from USD 2.40-USD 687.80\*. Mortality, morbidity, premature culling, stillbirths, abortion, reinfection, country and study type all played a significant role in direct monetary loss calculation (\*1USD = 0.93EUR)

A seroprevalence study by Cowley et al (2011) found almost 75% of herds had evidence of exposure to IBR. A 2009 Teagasc study involving 305 Irish dairy herds, found that multiparous cows in bovine herpesvirus 1 (BHV-1) bulk-tank positive herds produced an average of 250L less milk per cow per year. Milk fat and protein were also reduced. Both Belgium and the Netherlands have recognised the importance of controlling disease caused by infectious bovine rhinotracheitis (IBR) but also the significance of obtaining Article 9 status allowing free trade with IBR-free territories.

**CONTROLLING DISEASE TO REDUCE GHG – WHAT CAN BE DONE?**

The most promising approach for methane reduction is through productivity and efficiency improvements in livestock production as this would allow methane emissions



**Figure 2: Marginal abatement cost curve (MACC) for control of cattle endemic diseases in the UK (ADAS 2015) – used to measure the cost of reducing a unit of pollution.**

to fall per unit of output (FAO, 2006). Stott et al (2010) concluded that there have been few detailed studies of the potential impact of animal health on GHG emissions but the literature suggests that there is potential for worthwhile ‘win-win’ outcomes for both farm profits and GHG emissions, with gains for animal welfare.

Statham et al (2017) speaks of the ability to improve health and productivity by reducing waste in cattle farming. The top 25% of UK dairy enterprises produce milk with a carbon footprint of over 300g CO<sub>2</sub> less per litre than farms in the bottom 25%. The reason for this: better health and reproductive performance.

Chadwick et al (2007) concluded that an increase in milk yield per cow together with a reduction in cow numbers to maintain the current level of production had the biggest impact on reduction of methane emissions in the UK. Extending the productive life of both dairy and beef cows through management and disease control along with national schemes like the BVD eradication scheme and improved reproductive performance all contribute to reduce GHG emissions.

In conclusion, the veterinary profession has a pivotal role to play in improving health both at farm and national level. Better food conversion efficacy will have a knock on effect on GHG emissions. The future of sustainable food production in Ireland is unclear, however we must all work together to secure a future for our agricultural sector whilst minimising the impact on climatic change.

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