Dear Mr Lumley

I refer to your e-mail dated 12 May in relation to the content of the article in the Irish Farmers Journal under the heading "A real climate change debate starts".

The facts are simple, the solutions are more complicated. The undeniable fact is that Earth is warming up, with the average global temperatures having increased by 0.85°C between 1880 and 2012. The Intergovernmental Panel on Climate Change (IPCC), a UN body of hundreds of expert scientists who assess the science of climate change, has stated that man-made greenhouse gases (GHG) are the primary cause of this warming.

The main man-made gas is Carbon dioxide (CO₂) which accounts for 76% of global emissions. However, agricultural emissions are dominated by methane (from ruminants and manures) and nitrous oxide (N₂O from fertiliser and animal deposition) and contribute to 16% and 6% respectively towards man-made warming. While there is much less methane and N₂O in the atmosphere, as outlined in IPCC reports, these gases have different capacities to trap heat. As a result, they are assessed using Global Warming Potential which compares the ability of 1 kg of each gas to trap heat over a 100 year time horizon. Using this measure, methane has 25 times the warming potential of CO₂, and N₂O 298 times higher than CO₂. These gases also remain in the atmosphere for different lengths of time. CO₂ does not break down easily and it remains in the atmosphere for several centuries. N₂O is also has a lifetime of 121 years. In contrast, the atmospheric lifetime of methane is much shorter at 12.4 years.

The Challenge
In order to address climate change, 197 countries signed up to the Paris Agreement which seeks to limit global temperature rise this century to below 2°C above pre-industrial levels. The EU has also set emissions reduction targets, with Ireland allocated a 20% reduction in emissions to 2020 and 30% to 2030. Recently the Department of Communications, Climate Action and Environment (DCCAE) published the National Mitigation Plan Consultation which aims to set out Ireland’s roadmap to reducing emissions. Teagasc has submitted a response to this consultation outlining
both the challenges and options available for emissions reduction in the agriculture and land-use sector.

Why are these Climate targets a challenge to Irish agriculture? Well, firstly agriculture accounts for one-third of national GHG emissions. Secondly, agricultural production, particularly in the dairy sector, is increasing post quota removal and Foodwise 2025 has set ambitious targets for primary production, exports and jobs.

The Footprint
Projections suggest that increases in global population and changing patterns of wealth will increase demand for dairy and meat by more than 50-80% by 2050. As a result, there are significant concerns that increasing food production will lead to increased global GHG emissions. As a result, there is currently a strong focus to reduce the carbon footprint across commodities. Comparisons of the carbon footprint of international livestock production by FAO and the EU Joint Research Council have demonstrated that the carbon footprint of dairy and beef production was the lowest in temperate grass-based systems, with the footprint of Irish produce amongst the lowest in Europe. Recent Teagasc data showed that the carbon footprint of Irish produce has been reduced by c. 15% since 1990. Similarly, the ‘Nitrogen-footprint’ of Irish produce has been reduced by c. 25%.

The Solutions
Teagasc’s strategy for reducing agricultural emissions is a) to stabilise GHG emissions, particularly methane, by enhanced efficiency measures, b) to further reduce emissions, particularly nitrous oxide, c) to offset GHG emissions with carbon sequestration from afforestation and agricultural land management and d) displace fossil fuel emissions with wood fuel and biogas.

Over the last number of years, Teagasc’s Greenhouse Gas research group has been working to develop solutions. Much of the answer lies in farm efficiency: so if we can produce food with fewer inputs, then this reduces emissions to the atmosphere and costs to the farmer. This will be achieved through adoption of measures such as dairy Economic Breeding Index (i.e. improve the genetics of our dairy cows), beef genomics (to improve the genetics of our beef herd), improved animal health, and extending the grazing season. These efficiencies will reduce the C footprint of dairy and beef and stabilise methane emissions via increased product per head. Improved nutrient management planning in combination with optimal use of slurry and legumes will help increase nitrogen efficiency and reduce nitrous oxide emissions. Other strategies can reduce greenhouse gas emissions even further. Examples include the development of novel, low-emission fertilizers, reducing crude protein in bovine and pig diets, fatty acid supplementation to reduce methane, drainage of poorly drained mineral soils and adding amendments to manures during storage. In addition, enhancing carbon sequestration and/or reducing soil C losses are key strategies to reducing sectoral emissions. This will principally be achieved through increased afforestation, reducing losses on organic soils and enhancing pasture sequestration.

As both the 2020 and 2030 GHG reduction targets are multi-year targets, the total GHG reduction will be highly dependent on rates of uptake. This means that the role of knowledge transfer (KT) and education will be more important than ever. Research of itself will not lead to emissions reductions without strong linkage to advisory and education and the involvement of farmers. Initiatives, such as the Teagasc eProfit Monitor, Pasture Profit Index, NMP online, the Teagasc/Bord Bia Farm Carbon Navigator, the Teagasc/Farmers Journal BETTER farms beef programme, the Teagasc BETTER farm sheep and tillage programmes, and the many other Teagasc-joint industry programmes, will all play vital roles in getting the message out to farmers.
In summary, CO₂, methane and nitrous oxide all contribute to climate change. There is potential to reduce the more long-lived nitrous oxide and CO₂, whilst stabilising methane in the short term. Ultimately, achieving timely and substantial levels of mitigation will require the whole sector including farmers, industry, research, advisory/education and policymakers working in concert. Effective large scale mitigation will only occur if best practice can be communicated on the ground. This will involve a closer linkage between research/analysis to the development of relevant policies and effective translation on the ground via knowledge transfer.

I hope this clarifies the matter.

Yours sincerely,

[Signature]

Professor Gerry Boyle
Director