Farming practices to reduce greenhouse gases

Dr Frank O'Mara opened the final session of the day with a reminder of the global importance of grasslands and pastoral meat and milk production. To feed the growing population, humankind would need to "sustainably intensify" and produce more food from the land already farmed.

Current research underway around the world is aiming to decouple agricultural GHGs emissions from this increasing food production. Dr O'Mara showed that there are already big differences in the amounts of food energy produced and accompanying GHG emissions in different regions of the world, therefore adopting existing best practices was an important part of the solution.

"If we are to achieve things never before accomplished, we must employ methods never before attempted". This quote from Francis Bacon opened Dr Pierre Beukes presentation in which he described a 5-point plan to decrease GHGs and increase profitability from NZ dairy farms. He argued that the timing of on-farm decisions was key: "the difference between an average farmer and a good one is a couple of days". Dr Robyn Dynes then delved into sheep and beef farming. Her model studies indicate that opportunities for improvement depend on how farms are currently performing, with the biggest gains possible for farms that are not currently high performers. One of Dr Dynes' key points was that lower ewe replacement rates have contributed to decreasing GHG emissions intensity per kg output, and farmers should be aiming to keep their ewes as productive as possible for as long as possible.

Dr Stewart Ledgard presented an overview of Life Cycle Analysis (LCA) with a focus on the dairy industry. The LCA process has a product focus but a whole system perspective. It can be very valuable in identifying hot spots and how to address them. To date, most carbon footprinting has been carried out on the "average" farm, but researchers are now starting to look at farm-to-farm variability. Early analysis has shown that most variability can be explained by differences in management practices rather than the physical locations of farms. Dr Ledgard reminded delegates that LCA is a valuable tool to ensure new mitigation approaches result in an overall reduction in total GHG emissions and not just trading off one environmental issue for another.

Any farm model, inventory or life cycle analysis is only as good as the models used to understand emissions. It was therefore fitting that Dr David Pacheco provided the final science presentation of the day, focussing on modelling methane emissions from the rumen. Dr Pacheco's team have developed new equations to model rumen function and their work feeds into that of other researchers working in the methane mitigation space to ensure specific interventions can be reflected in whole farm models and to predict farm-level emissions. While the work was challenging, he reminded the audience that rumen methanogens have evolved to provide a valuable service and are not there just to annoy humankind!

Chair: Dr Peter Kuikman *(Alterra, Wageningen UR)*

- Pastoral agriculture's contribution to food and environmental goals: Dr Frank O'Mara *(Teagasc)*

- Improved farming practices: a cost effective method for GHG reduction: Dr Pierre Beukes *(DairyNZ)* & Dr Robyn Dynes *(AgResearch)*

- How life cycle assessment (LCA) can help farmers to decrease GHG emissions: Dr Stewart Ledgard *(AgResearch)*

- An improved enteric methane model: Dr David Pacheco *(AgResearch)*