Dr Doug Edmeades: Should methane be included in the ETS?

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With methane the animal is both the source and the sink - you cannot have one without the other, says Dr Edmeades. Photo / Supplied to NZ Herald by DairyNZ
The Country

OPINION: This government intends to include all agricultural emissions in the Emissions Trading Scheme (ETS).

Federated Farmers has indicated that the full cost to agriculture will be in excess of $800 million. This prospect hangs like a "Damocles *sward*" over the sector.

Not surprisingly farmers are asking questions; what can they do to minimise their exposure? The question becomes how can they reduce their emissions of greenhouse gases - in effect carbon dioxide (CO2) and methane (CH4), because the other gases such as N2O have minimal effect.

Planting trees is a no-brainer. Trees mop up CO_2 (photosynthesis) and, providing the subsequent timber does not rot or is not burnt, much of this CO_2 is taken out of circulation – sequestered is the word.

Subtler and less understood is the role of soil in the carbon cycle. For the sake of simplicity and relevance, I will confine the following discussion to pastoral soils.

Forage plants absorb CO_2 from the atmosphere (photosynthesis), and this carbon is used mainly to form the structural components of the plant - cellulose and carbohydrate etc. When the plant senesces (dies) the carbon goes onto the soil where it is decomposed by the soil 'bugs' and much of it is ultimately incorporated into the soil organic matter (humus).

Things become a little more complex when we add the grazing animal into the mix.

Consider for example a pasture growing 10 tonnes dry matter (DM)/ha/yr. If the animal utilises 80 per cent then 2 tonnes of DM (mainly cellulose and carbohydrate rich in carbon) are returned to the soil. Some of this is oxidised to CO_2 and returns to the atmosphere, and some, (about 50 per cent), is incorporated into soil organic matter.

Thus when undeveloped soils are developed into high producing clover-based pasture they start accumulating carbon, coming originally from the atmosphere, into the soil as organic matter.

This carbon sequestration does not however go on forever. After about 20-50 years (the time depends on the soil and the climate) the soil cannot 'absorb' more organic matter – it reaches equilibrium and most NZ pastoral soil is now in this equilibrium phase. Further carbon sequestration into the soil is biologically impossible.

And this is primarily the reason why soil carbon is not considered as a factor in the ETS consideration, even though pastoral soils contain large amount of carbon.

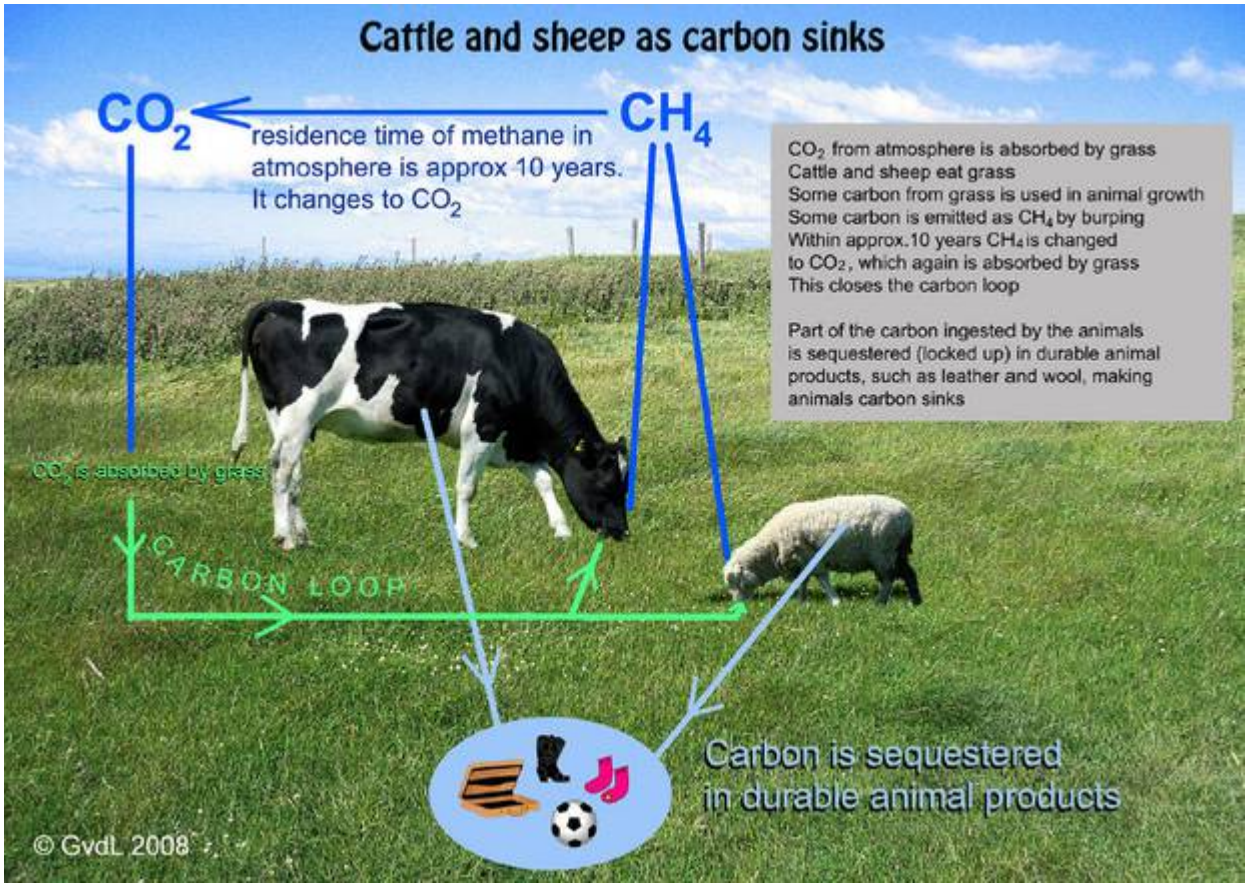
There are some lovely nuances in this. Cropping typically depletes soil organic matter giving off CO_2 in the process - should this be captured in the ETS?

Introducing irrigation changes the soil 'climate' increasing total pasture production and potentially soil organic carbon – should these farmers get an ETS credit?

The pragmatic answer to these questions is NO for the simple and sufficient reason that the changes in soil carbon over time are very small relative to the total amount of carbon in the soil. We do not have the technology to measure such small changes against this background and therefore they are not amenable to inclusion in the ETS.

If the role of the soil in the carbon sequestration cycle is murky then the issue of methane (CH4) is positively muddy.

Serious research dollars are being spent to find ways of reducing methane emissions from ruminants. In my view this is a pointless exercise because the wrong question is being asked.



Schematic illustration of cattle and sheep acting as carbon sinks. Photo / Dr Gerrit van der Lingen

Yes, ruminants produce CH4. Yes it is a greenhouse gas. Yes it may be possible to come up with interventions to reduce emissions from the animal.

BUT! Let me explain.

Methane is short-lived in the atmosphere. It hangs around for about 10 years before it is converted to CO2. For every unit of carbon the animal emits as CH4 it must ingest the same amount of carbon from its plant-based feed source, which, remember, comes initially from the CO2 in the atmosphere.

From the animals perspective every bit of carbon it emits as methane it mopped up as carbon in its feed. The animal is both the source of the carbon in methane and it is also the sink for the equivalent amount of carbon in CO2. In this sense the carbon-methane cycle: methane-to-CO2-to-forage-plants-to-animals-to-methane, is a closed cycle.

This is analogous to planting trees to mop up CO2. If we plant enough trees we can offset the CO2 from fossil fuels and if we plant the right amount we can become carbon neutral. But in this case the decision to plant trees to offset fossil fuel CO2 is voluntary.

This is not the case with methane. The methane-carbon mop is built in. The animal is both the source and the sink - you cannot have one without the other. The animal is CH4-carbon neutral.

The situation changes somewhat if the numbers of animals change. The greater the number of animals the more CH4 and hence CO2 in the atmosphere, even though the individual animal is still CH4-carbon neutral.

And guess what: the total number of Stock Units in New Zealand over the past 20 years has not increased – if anything they has declined slightly.

So should methane be included in the ETS? I think not, but be wary of falling into step with this pied piper. I am regarded as a fossil – I still believe in evidence-based policy!

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