

The New Zealand Government is asking for feedback on its Zero Carbon Bill. The following is a summary of my thoughts on how methane produced by ruminants is treated according to the IPCC.

SOME THOUGHTS ON THE PRODUCTION OF METHANE BY RUMINANTS

INTRODUCTION

I am a sheep farmer in South Canterbury

THE CARBON CYCLE

In the early 1960s I was at high school – while there I remember learning about the carbon cycle – it was either part of general science or chemistry. Then, in the latter half of the 1960s I attended both Lincoln and Massey Universities – once again we were lectured on the details of the carbon cycle – this was part of either the Biology, Botany or Soil Science courses.

In relation to ruminants (sheep and cattle) I was taught that plants in the pasture they grazed fixed carbon from CO₂ in the atmosphere by the process of photosynthesis. When this pasture was grazed carbon from the plants was then released back into the atmosphere as methane, CH₄, and that this methane was, over a period of time, then converted (by oxidation) into CO₂ and H₂O.

So all the carbon released as methane into the atmosphere, which is then oxidized to CO₂, was originally sourced from the atmosphere by the action of photosynthesis.

Some of the carbon captured (photosynthesis) by the pasture plants ends up within the organic matter (humus) within the soil and this store of carbon may build up or be reduced at certain times. [[So, for example, if I decided to convert to dairying I would first have to increase drastically my pasture growth so I could supply the additional feed needed for dairy cows and it is quite likely, under these circumstances, that the soil organic matter would also increase over time.]]

But over time (allowing for fluctuations over the seasons of the year) the amount of carbon added to the atmosphere will equal the amount of carbon that had been captured from the atmosphere by photosynthesis.

This means that, over time, ruminant animals have absolutely no effect on the amount of CO₂ in the atmosphere – any carbon sheep and cattle release into the atmosphere was originally sourced from the atmosphere. There is absolutely no build up of CO₂ in the atmosphere from the presence of ruminants. There is no way they can cause a build up of CO₂ in the atmosphere as all their carbon released is first sourced from the atmosphere – no “new carbon” is produced in this part of the carbon cycle.

Any build up of CO₂ in the atmosphere is explained by the burning of fossil fuels (petroleum, natural gas and coal) which release carbon that has been stored underground for millions of years.

A LOOK AT METHANE

Now methane is described as a greenhouse gas and many people like to blame ruminant animals for the production of much of New Zealand’s greenhouse gases. Let me just discuss this for a moment.

As I said methane (CH₄) is converted back to carbon dioxide (CO₂) and water (H₂O) by the process of oxidation. I’ve read various estimates of the rate that this occurs – these estimates seem to vary from as low as 4 years to as much as 50 years (most estimates seem to be about 12 years) – but the important point to note is that all seem to agree that the oxidation occurs at a uniform (steady) rate. What this means is that as methane is added to the atmosphere (*enteric fermentation* is the process by which livestock produce methane via digestion) so methane is also being oxidised – so if the total ruminant population in NZ were to stay exactly the same the total pool of methane they have produced will stay exactly the same size. The ruminants in NZ are not adding to the total methane in the atmosphere. As some is produced (*enteric fermentation*) and equal quantity is removed (oxidation).

TO SUMMARISE

So let me summarise (1) the ruminants in NZ are not adding to the total CO₂ in the world even if they increase in numbers (2) If the total ruminant numbers in NZ were to stay the same then the total pool of methane they produce will stay exactly the same. [[I know that there is research going on in NZ to lower the production of methane per individual animal – I’ve not allowed for any effect that this may have in the future.]]

IPCC USING GROSS METHANE EMISSIONS

The next question is – why are ruminant livestock in NZ being blamed for so much of NZs greenhouse gas emissions [2015 figures – agricultural emissions 47.9% of NZ’s total; with 73.1% of this being due to gross methane emissions]?? [73.1% of 47.9% equals 35% – I have seen other higher figures mentioned.]

This is a question that I and a huge number of other farmers (and others) have been wondering for a long time. From doing a lot of reading over the last few weeks I believe I’ve found out.

There has been a lot written on this subject in the NZ farming papers that arrive every week in our mailboxes.

In the June 25, 2018 edition of the Farmers Weekly in the letters to the editor (p 24) a farmer wrote in discussing the treatment of methane. The next week in the same paper (2 July, 2018. P26) Dr Tim Mackle (Chief Executive DairyNZ) wrote a rebuttal explaining “[NZ’s Greenhouse Gas Inventory has to follow the same rules the entire world has to follow when recording and reporting our emissions. A group of international experts has agreed on how methane must be treated and](#)

therefore NZ's domestic policies have to be aligned with this agreed accounting methodology when we report internationally on our progress" He does agree that the [pasture/ruminant] "carbon cycle is closed" and that "methane remains in the atmosphere for a comparably short time".

Now from doing a lot of further reading I understand that this reference to "agreed accounting methodology" means that soil and pasture carbon levels are not taken account of, as the level of carbon in them is not increasing or decreasing from the level at a start date [[this was written in reference to the ETS scheme so I am guessing that this is based on the IPCC recommendations]]. This contrasts with the ETS being given for the growing of new forests where none existed previously.

This means that the carbon absorbed from the atmosphere by pasture plants (photosynthesis) cannot be taken account of in any ETS scheme because there is no increase in the total amount of carbon in the pasture/soil. [So the net effect of zero is used]

But the same rule does not apply to the carbon added to the atmosphere – where again there is no increase in the total CO₂ and methane present in the atmosphere – in this case the gross effect of methane is used. Surely this is rather hypocritical!!

This rather begs the question – why did NZ sign up for the IPCC accord if it means that the total gross emissions of livestock methane/CO₂ [gross effect] are taken into account but the fixing of the same amount of carbon by pasture plants is ignored [net effect]. Surely these rules need changing.

Surely we had representatives in Paris who understood the carbon cycle, knew that ruminants were not adding anything to the total pool of CO₂ in the atmosphere and could see that the rules we were signing up to were implying our livestock are responsible for a high percentage of our greenhouse gas emissions (when they are not).

With accounting rules like these I think President Trump might have had the right idea in pulling out of the accord. (I should point out that I am definitely not a "Trump fan", but in this case he may have got something right.) (Also I am sure it wasn't because of how methane was accounted for that he pulled out.)

I did read somewhere that it is only NZ (and I think someone mentioned Uruguay) that has ruminant GHG as such a high proportion of its total – so maybe no other country was worried about this "false accounting".

PUBLIC RELATIONS

In trying to make sure that I had my facts correct I've done quite a bit of reading. I've noted that many of the utterances I've read from members of the New Zealand Agricultural Greenhouse Gas Research Centre are very good at criticising the amount of greenhouse gases that ruminant livestock produce but never seem to mention the "carbon cycle" or "photosynthesis". Nor do they mention that the total level of CO₂ doesn't increase because of them or that the pool of methane is stable with stable stock numbers.

This trait of being very selective in the scientific facts discussed gives the general public a very bad opinion of farmers in general – but maybe that is what you want!!

YOU ARE WANTING COMMISSIONERS

In my reading I have noted that three contributors to our weekly farming papers do understand the facts about the carbon cycle and photosynthesis – Dr Doug Edmeades, Dr Jaqueline Rowarth and Prof Keith Woodford. The first two of these have doctorates in Soil Science so it is understandable that they understand the carbon cycle.

I see that you are contemplating establishing a Climate Change Commission and are wondering what expertise these commissioners should have. I would suggest that if you were to select one of these three (better still all three) then you would have scientific advisors with a more balanced view of what is happening. [[I've never met any of these three so I have no idea if they would even want the job.]]

A CONCLUDING REMARK

It appears to me that a natural process (the carbon cycle in relation to pasture and ruminants) that has been occurring for millions of years without doing any harm has suddenly be demonised by inventing an "accounting system" that is applied in a completely different manner to one side of the carbon cycle (carbon fixed in pasture/soil treated as having a net effect) to the other (carbon released by ruminants treated as having a gross effect).

Is this really an acceptable scientific research practice??

Thank you for bearing with me

Roger Lundie,