Ruminants not Kyoto villains

Dr Gerrit van der Lingen

The New Zealand Government signed the Kyoto protocol on 22 May 1998 and ratified it on 19 December 2002. Under this Protocol New Zealand is obliged to reduce its greenhouse gas emission to 1990 levels. New Zealand's contribution to global anthropogenic (man-made) greenhouse gas emissions (AGHGE) is only 0.1 percent. AGHGE are mainly from agriculture and fossil fuel use. One of the most abundant greenhouse gases comes from ruminant animals (cattle and sheep, with a minor contribution from goats and deer), which produce methane (CH_4) through enteric fermentation. According to the MAF, 98.7 % of agricultural methane comes from ruminant enteric fermentation. Most of that gas is released into the atmosphere by burping, accounting for almost half of all New Zealand's AGHGE. To address this major contribution to AGHGE, in June 2003 the government wanted to impose a so-called *flatulence tax* on each sheep and cattle beast. This tax would have taken 8.4 million dollars out of farmers' pockets. The reaction was predictable. The farmers started a good-humoured action called FART (Fight Against Ridiculous Taxes, although, as mentioned above, most of the methane from ruminants comes from burping, a small amount only from flatulence). The farmers organised a protest meeting on the steps of parliament's buildings in Wellington. Their action was successful; the government withdrew their flatulence tax in October.

But the farmer's victory provided only a temporary reprieve. On August 28, 2008, the New Zealand Parliament passed the Climate Change Response (Emissions Trading) Amendment Bill, generally referred to as the "The New Zealand Emissions Trading (ETS) bill". In it they divided greenhouse gas emitters into several sectors; forestry, liquid fossil fuels, stationary energy, industrial processes, agriculture, and waste. These sectors will be required to start complying with the ETS bill at different times. The forestry sector will be the first off the blocks. Their starting time (retrospectively) will be January 1, 2008. Agriculture will be the last (together with the waste sector), starting on January 1, 2013. By that time, all six major greenhouse gases will be covered by the ETS bill. Those six gasses are the ones mentioned in the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

The main reason why agriculture will start late is the fact that the technology for reducing methane emissions from ruminants has not yet been developed (notwithstanding this sensible reason, the Green Party wanted agriculture to be included from day one). Many millions of dollars are now being spent on research into reducing ruminant enteric fermentation. Nationally this is being organised by the Pastoral Greenhouse Gas Research Consortium (PGGRG), whose target is "to have safe, cost-effective methane-abatement technologies to lower NZ's ruminant emissions by 20% by the end of the first Kyoto commitment period (2008-2012)."

Internationally research collaboration is organised by the Livestock Emissions and Abatement Research Network (LEARN).

There are different research approaches. One is based on the completed genome DNA sequence of cattle. A number of genes have been identified as involved in the methane production. Genetic modification may be one pathway. However, one could expect protest from environmental organisations, as such genetic modification could also modify meat and milk. The Australian CSIRO developed a “methane vaccine”, but this was shown not to be effective in reducing methane output. Other research is looking at forage plants. Some plant species may cause lower enteric fermentation. Australian scientists have also been experimenting with transferring kangaroo digestive bacteria into the rumen of cattle. Kangaroos have a similar diet as ruminants, but produce less methane.

Reducing methane emissions from ruminants has now become one of the major targets of anthropogenic (man-made)-global-warming activists. Recently, Dr Rajendra Pachauri, chairman of the UN’s International Panel on Climate Change (IPCC), called on people to give up eating meat, on the grounds that the digestive methane given off by cattle contributes more to greenhouse gases than all the world’s transport. Someone was wondering what Dr Pachaudri was going to do about the 400 million sacred cows in his homeland India. Being a vegetarian in India would not help to reduce its ruminant methane emissions. But then, India is exempt from the Kyoto Protocol.

There is something strange, unreal and incomprehensible about the concern of anthropogenic-global-warming activists over methane emissions from ruminants. To understand why this is so, we have to go back to the original anthropogenic-global-warming concerns. This was that the Industrial Revolution was made possible by the use of fossil fuels (oil, gas and coal) and limestone deposits (used for cement production). These resources were formed over millions of years, locking up carbon dioxide from the atmosphere and which are now being released in a very short time span, allegedly, as the hypothesis goes, causing catastrophic global warming.

But methane from ruminants does not come from fossil sources. Ruminants do not release carbon that has been sequestered over millions of years. The carbon involved forms a closed cycle or loop (see Fig. 1).

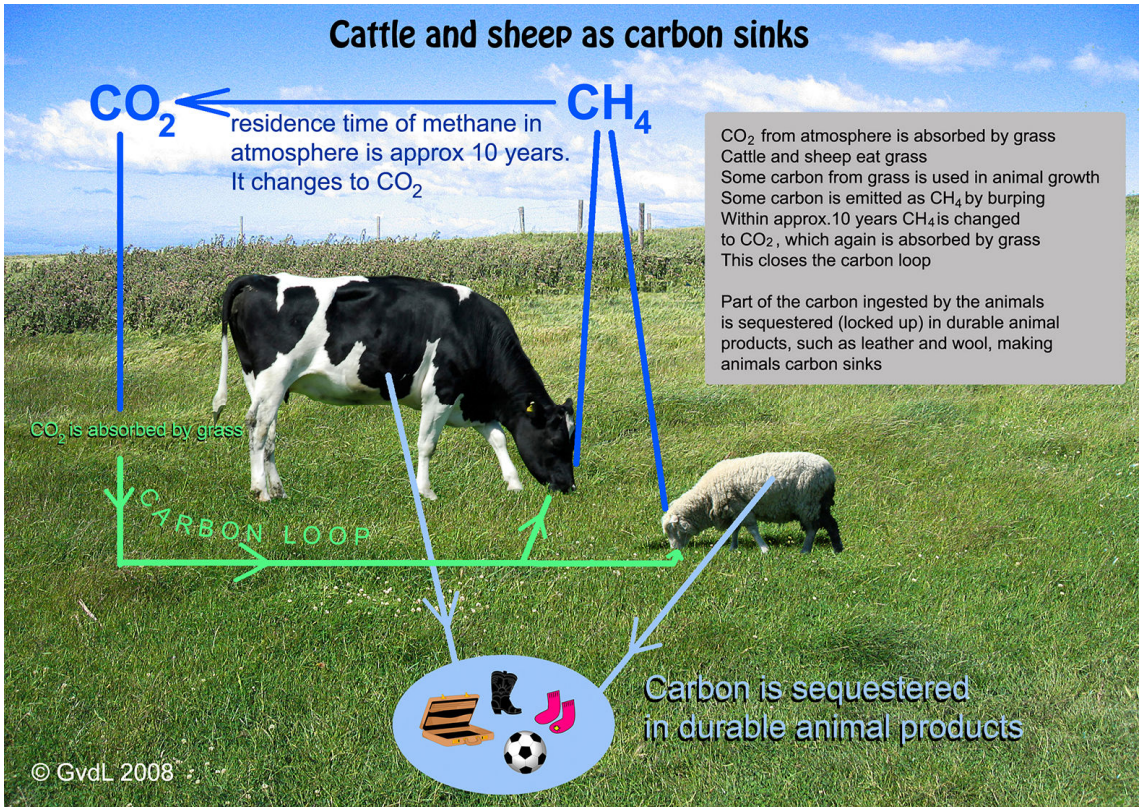

Figure 1. Schematic illustration of cattle and sheep acting as carbon sinks.

All plants, including grass, require carbon dioxide to grow. Grass is eaten by ruminants and the carbon in it is used for the growth of the animal and for milk and wool production. A small part of the carbon from the grass is used to make methane through enteric fermentation. This methane is emitted by the animals into the atmosphere. It stays in the atmosphere for only about 10 years, after which it changes back to carbon dioxide, which in turn is being absorbed by the grass, which in turn is eaten by the animals, etc. It is basically a closed loop. However, some of the carbon is incorporated by the animals into skin, wool, meat and bones. Some of those are subsequently turned into durable animal-based commodities, such as woollen garments, leather products, even bone carvings. As long as such products are not incinerated, the carbon stays locked up. It is being sequestered. Consequently, ruminants act as carbon sinks. There is therefore no justification to include ruminant methane emissions in the Kyoto Protocol obligations. Several other authors have also mentioned this inconsistency (1 – see further reading). Moreover, New Zealand seems to be the only country that is including ruminants emissions in its Kyoto calculations.

Finally, some may say that ruminant methane emissions are adding to the anthropogenic global warming while they are in the atmosphere. This can be answered as follows:

1. This would only be the case if there has been an increase in ruminants since the beginning of the Industrial Revolution. There is no hard evidence that this is the

case. Even if domestic ruminants have increased in numbers, this probably has been compensated by a decrease in ruminants in the wild, through hunting and habitat destruction. For instance, in the nineteenth century at least 40 million buffaloes were killed by humans in North America.

2. Methane stays for only a short period in the atmosphere, thus limiting its effect. If ruminant numbers stay the same, emissions and absorption will reach an equilibrium.

3. Since about 1999, atmospheric methane has stabilized. It is not known why this has happened. However, it means that any concerns about ruminant methane should also “stabilize”. However, data from Greenland ice cores spanning tens of thousands of years show that methane levels can fluctuate periodically. This of course is natural and had nothing to do with ruminant emissions. Only recently another sudden increase in methane levels was recorded. This increase happened simultaneously world-wide, baffling scientists and ruling out a ruminant cause, as there has been no sudden increase in domestic ruminant animals. As with many other aspects of climate change, our knowledge is still very limited. We also know from ice core data that methane levels have varied over thousands of years, which must have been entirely natural. The science is far from settled.

I wrote this article because New Zealand has signed and ratified the Kyoto Protocol and is therefore obliged to reduce its greenhouse gas emissions. My arguments is that the inclusion of ruminant methane emissions is based on flawed thinking in relation to the basic hypothesis, as promoted by the IPCC, which states that greenhouse gas emissions from burning fossil fuels and from cement production using fossil limestones are causing catastrophic global warming.

Fortunately, the outcome of the recent elections may change things. Because of coalition agreements with the ACT party, the National-led Government has decided to review the ETS bill. This will happen through new Select Committee hearings. This has opened the possibility of convincing the Government that methane emissions from cattle and sheep should not be part of any new emissions trading agreement, based on the reasons discussed above.

Incidentally, the IPCC hypothesis has now been thoroughly falsified (3). Moreover, the world has not been warming anymore since 1998 and has even slightly cooled since about 2002 (Fig 2). Many astrophysicists are predicting that the planet is entering a cooling phase that could last 30 to 50 years (4).

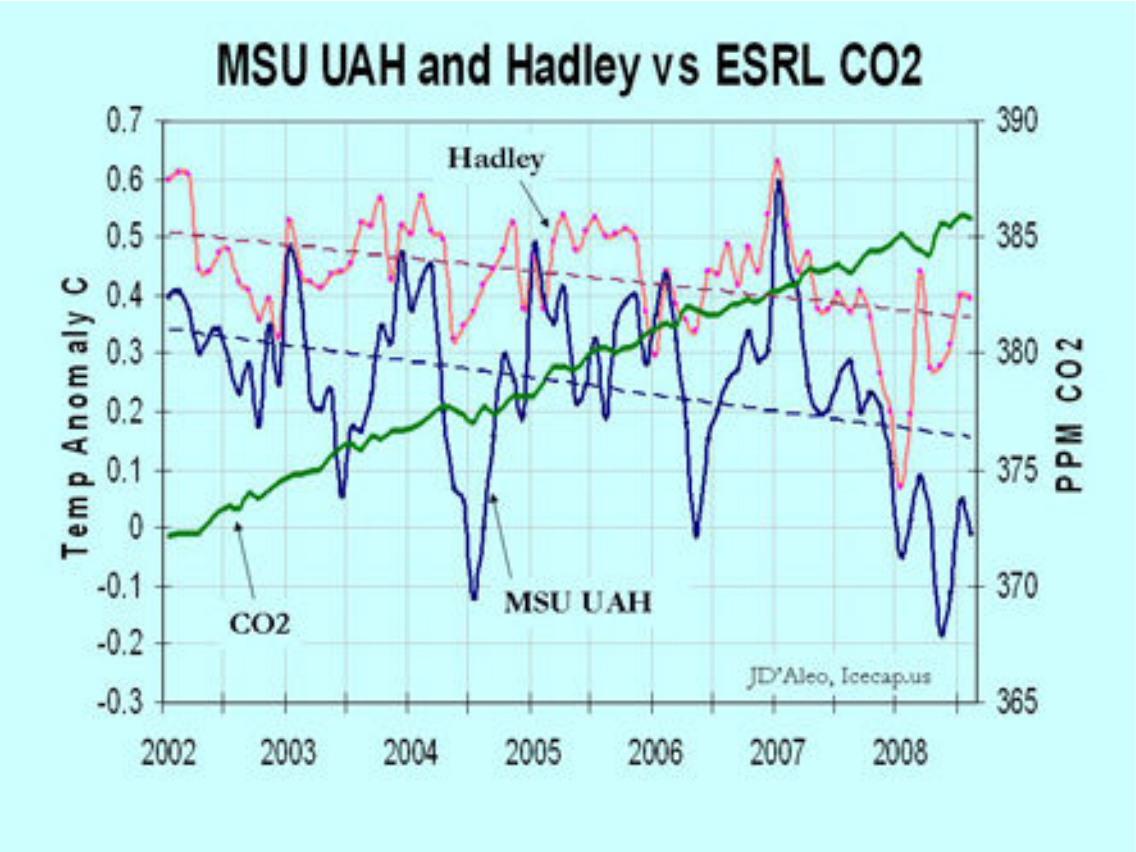

Figure 2. Two global temperature records, showing cooling since 2002, while CO_2 levels (the green line) have continued to increase. MSU UAH – Microwave Sounding Unit, University of Alabama in Huntsville; Hadley – Hadley Centre for Climate Prediction and Research; ESRL – Earth System Research Laboratory (NOAA). Source: Joseph d'Aleo (www.icecap.us).

Indications for this cooling have been accumulating, from world-wide record snowfalls and cold spells, to the sun being very quiet at the moment (most of the time there are no sunspots) and the Pacific Decadal Oscillation having entered one of its periodic cooling phases.

Further reading

(1) Gray, Vincent, 2008 (revised): The global warming scam. *www.climatescience.org.nz*.

(2) Schnell, R.C. and Dlugokencky, E. 2008. Methane. In: Levinson, D.H. and Lawrimore, J.H., Eds. *State of the Climate in 2007. Special Supplement to the Bulletin of the American Meteorological Society* **89**: S27.

(3) Singer S. Fred (Ed), 2008: Nature, not human activity, rules the climate. *Report of the Nongovernmental International Panel on Climate Change (NIPCC), Chicago, Ill. The Heartland Institute.*

(4) Clilverd, Mark. A, Ellen Clarke, Thomas Ulich, Henri Rishbeth and Martin, J. Jarvis, 2006: Predicting Solar Cycle 24 and beyond. *Space Weather, Vol. 4, S09005, doi:10.1029/2005SW000207*

Van der Lingen's CV

Dr Gerrit van der Lingen studied geology at Utrecht University in The Netherlands. His first job was working in the Amazon jungle for three years. In 1965, he came to New Zealand to join the NZ Geological Survey's sedimentology laboratory. In 1990 he became a private consultant and research associate at the University of Canterbury. From 1991 to 2002 he was involved in paleoclimate research, studying ocean sediment cores from the Tasman Sea and Southern Ocean. He has retired from paid research, but remains active as a climate change consultant, giving lectures and writing articles. He is a foundation member of the New Zealand Climate Science Coalition