

A carbon friendly beef enterprise – is it possible?

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There are many misconceptions surrounding the contribution of livestock to climate change. The United Nations publication, 'Livestock's Long Shadow' (1), resulted in calls from around the world for reduced meat consumption on the basis that livestock were a major contributor to greenhouse gases. Concerns have also been expressed that meat consumption has a detrimental effect on human health.

The reality is that both the carbon footprint and dietary effects of beef are determined by how it is produced.

The United Nations report (1) suggested that livestock contribute 18% of global greenhouse gas emissions, a figure higher than all the world's transport sectors combined. It has since been acknowledged that the calculations were seriously flawed (2, 3), due to the inclusions of many indirect factors such as clearing Amazonian rainforest for crop and pasture production.

American Meat Institute president and chief executive officer J. Patrick Boyle noted that according to the Environmental Protection Agency, livestock contributed only 2.8% to US greenhouse emissions in 2007, a figure that had remained relatively constant since 1990 (3).

In Australia, it has been widely promoted that livestock are a significant contributor to atmospheric methane and that global methane levels are rising. However, there is no scientific data to suggest that methane emissions from ruminant sources are increasing. Indeed, it would seem there has been **no clear trend to changes in global methane levels, from any source, over recent decades.**

The increase in global methane levels from 1930 to 1970 was due to emissions from the production, transmission and distribution of natural gas (4). There was a tenfold increase in the use of natural gas through the 1960s and 1970s. The source of many of the natural gas emissions, such as leakages from the Trans-Siberian pipeline, have since been rectified (4). Measurements over the last 25 years show concentrations of atmospheric methane are merely exhibiting natural variation, with no significant trends in any direction (Fig.1).

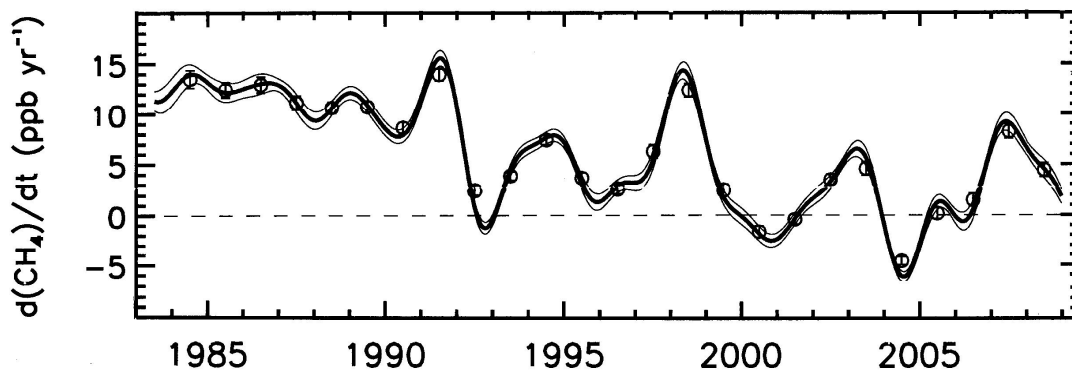


Fig. 1. Variations in annual change in atmospheric methane concentration from 1983 to 2009, from Dlugokencky et al (2009). Measurements are in parts per billion per year (5).

There is no scientific basis for selectively targeting ruminants for a 'methane tax'. The evolution of the rumen as an efficient way of digesting plant material evolved around 90 million years ago. It seems extraordinarily inappropriate to interfere with this natural process.

Ruminants including buffalo, goats, wild sheep, camels, giraffes, reindeer, caribou, antelopes and bison existed in greater numbers prior to the Industrial Revolution than are present today. There would have been an overwhelming accumulation of methane in the atmosphere had not sources and sinks been able to cancel each other over past millennia.

Recent research undertaken by Professor Mark Adams, Dean of the Faculty of Agriculture at Sydney University, has found that biologically active soils can oxidise the methane emitted by cattle carried at low stocking rates (6). This is due to the activity of methanotrophic bacteria, which utilise methane as their sole energy source (7). Soil methanotrophs counter the effects of methanogens, the bacteria that combine carbon and hydrogen, reducing acidosis in the rumen.

Methane emitted from livestock has a very short cycle, that is, it is generally recycled rather than moving to the upper atmosphere. Industrial emissions, on the other hand, are far more likely to enter the stratosphere. We see a similar trend with water vapour, which has a short cycle if transpired by pasture (much of it returning overnight as dew), but a long cycle (moving to the stratosphere) if evaporated from bare earth or emitted from industrial sources.

Additionally, a complete life-cycle analysis reveals that appropriately managed rotationally grazed perennial grasslands, where atmospheric carbon is sequestered in soil as stable humus, result in more carbon sequestered than emitted, easily compensating for the methane produced by livestock.



Fig. 2. The dark coloured carbon sequestered around the roots of perennial grasses is readily observed in light coloured soils. (Photo Christine Jones)

When the carbon footprint of fuel, fertiliser, herbicides and pesticides are factored in, plus erosion, water-quality decline and emissions of carbon dioxide, water vapour and nitrous oxide, conventionally produced soybeans (or other sources of non-animal protein) are less environmentally friendly than well-managed livestock grazing. Indeed, the fastest and most economical way to restore soils that have been degraded by conventional annual cropping systems is through the use of appropriately grazed perennial pastures.

The sooner the completely illogical 'eat vegan' and 'natural methane is a problem' issues are resolved, the better.

It is important to note however, that that not all beef has the same carbon footprint, or 'foodprint'.

The amount of energy required per unit of protein produced by grain finished beef is around twice that for pasture finished beef (8). This is due to the high energy requirements for fertiliser-intensive grain production coupled with transportation of both the feed and the livestock to the feedlot.



Fig. 3. Grass finished beef requires only half the energy per unit of protein than grain finished beef (8). (Photo Patrick Francis)

The gap between grass finished and grain finished widens even further when we take CO₂ production into account. Grass finished livestock merely recycle carbon (2, 9), as do all living things, including people. It is not possible for any animal to add 'new' carbon to the atmosphere. CO₂ emissions for grain-fed beef, however, can be high, due to the fossil fuel required for the production, distribution and application of synthetic fertilisers for grain production, loss of carbon from conventionally managed agricultural soils and transport.

There are also many compelling human health reasons for a return to pasture finished beef. Omega-3 and omega-6 fatty acids are regarded as 'essential fatty acids' because they cannot be manufactured by the body. It is important that these fatty acids be consumed in balance. Western diets high in cereal foods and/or vegetable oils such as sunflower, safflower, corn, soybean, peanut - and margarines and salad dressings made from these oils - often contain 10 to 20 times more omega-6 than omega-3, a trend that has been linked to increased risk of obesity, heart disease, dementia, depression, learning disorders, auto-immune diseases, diabetes, liver damage and cancer (10, 11). Fats high in omega-6 can promote tumour growth while fats high in omega-3 can block it.

The omega-3 fatty acid DHA occurs in significant levels in grass. Recent research has shown that grass finished beef has a more balanced omega-6 to omega-3 ratio than grain finished beef. This

finding suggests that many of the health concerns associated with red meat consumption relate principally to grain finished beef. In addition to a better balance of omega fatty acids, grass fed beef has 3 to 5 times more conjugated linoleic acid (CLA) than grain fed beef. As little as 0.5% CLA in the diet has been shown to have powerful anti-cancer effects (12).

Omega fatty acids are well balanced in butter, cream and cheese. These high quality animal fats are indispensable to our physical and mental well-being. The brain, for example, is composed primarily of fat. Diets low in saturated fat can lead to depression and other mental disorders (10). Cholesterol, which is not a fat, but a sterol found in animal protein, is vital for the function of cell membranes. Recent studies have linked low cholesterol levels with certain diseases and an increased risk of infection (10). Cholesterol is also important for inactivating heavy metals such as lead, mercury and cadmium.

Conclusion

A carbon friendly beef enterprise is more than possible. It is essential. Appropriately managed grazing is a potent tool for soil carbon sequestration, oxidisation of methane, improvement of nutrient cycles, enhancement of soil water-holding capacity, restoration of biodiversity, catchment health and landscape function. But above all, beef producers are food producers. Grass finished beef provides healthy, minerally dense food containing an excellent balance of essential fatty acids.

Angus Australia are to be congratulated on the launch of Angus Pure, pasture fed, hormone-free, antibiotic-free, quality beef. It is not only carbon friendly, but consumer friendly too.

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