

# ANIMAL LIBERATION

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*LETTERNAME*  
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5th May 2007

CC: All Scientific Advisory Committee Members

Dear *GREETING*,

## **Australia's Biggest Climate Forcing**

The World Wildlife Fund has a website section designed to help people reduce the impact of their lifestyle on global warming:

<http://wwf.org.au/ourwork/climatechange/reduceyourimpact/>

There is plenty of reasonable advice about reducing car usage, using energy efficient light globes and so on. But the biggest single thing a person can do to reduce their contribution to global warming is curiously absent.

The Australian Greenhouse Office (AGO) 2002 report "End Use Allocation of Emissions"[1] (see table on next page) calculated that 51.7 kg of emissions are produced per 1 kg of beef carcass. This means that if a couple on the CSIRO high red meat diet<sup>1</sup> drives a 2 tonne gas guzzling 4WD 200km per week, then — at 300 gm/km — the car will generate 60 kg of emissions weekly but the 2.8 kg of beef (which they could eat on that diet) would be responsible for 144.7 kg. Even after we factor in the emissions produced in building the 4WD, the "meat emissions" will soon outweigh the vehicle emissions.

Please notice that the figure of 144.7 kg for a couple on the CSIRO diet is wrong. Why? Because the 51.7 kg is the emissions for a kilo of carcass. Because the edible meat is generally only 60-70% of the carcass, the emissions on the CSIRO diet are actually much higher.

<sup>1</sup> The CSIRO *Total Wellbeing Diet* has sold some 700,000 copies and a second volume was launched late last year.

Table S5 All sources emissions intensity for selected commodities.

Commodity	Emissions intensity (tonnes CO <sub>2</sub> e/tonne of commodity produced)		
	1990	1995	1999
Wheat <sup>a</sup>	0.7	0.4	0.4
Other grains <sup>a</sup>	0.7	0.5	0.4
Sugar <sup>a</sup>	0.2	0.2	0.2
Wool <sup>a</sup>	18.7	19.0	18.1
Beef <sup>a</sup>	79.9	58.8	51.7
Sheep meat <sup>a</sup>	14.6	15.0	14.4
Pig meat <sup>a</sup>	3.9	3.6	3.6
Cement, lime, etc <sup>b</sup>	1.0	0.9	1.0
Steel	3.6	3.1	3.1
Aluminium	23.4	21.4	20.0
Other non-ferrous <sup>b</sup>	18.9	20.3	17.2

Source: Appendix E

a Excludes energy.

b Average for all products in group—not enough data to disaggregate.

But because a large component of these emissions is methane, I will show below that this AGO estimate of the emissions due to beef is actually an underestimate.

## How does WWF choose its campaign focus?

Australia isn't the United States or Europe. It has far more cattle than people, and over 5 sheep for each person. There are only 20 million people but 28 million cattle and 100 million sheep. The US, by comparison has 300 million people and about 100 million cattle and about 65 million sheep. Furthermore most of our cattle and sheep are grass fed and can produce 3 times more methane than feedlot animals[Harper].

This has profound implications for the profile of Australia's greenhouse emissions. However, most environmental organisations have a campaign focus that seems derived from somewhere else.

Australian Greenhouse Office figures confirm that over the next 20 years, methane emitted from Australian livestock this year will have a bigger global warming impact than all the carbon dioxide emitted from all our coal fired power stations. I will give the figures below, but first a little analysis of the WWF website in relation to a few key terms is interesting. Here are the results of searching the WWF web site for some key terms:

### Sample of WWF Website References

Term	Hits	Some articles
coal	78	"Clean energy future", "What is climate change", "Research shows coal fired power is Australia's top greenhouse polluter"
ruminant	0	
methane	2	The future with "climate friendly cows" producing 20% less methane
cows	1	as above
cattle	9	Only 3 references are relevant — Amazon deforestation due to cattle

As you can see, “coal” is a hot topic, and rightly so. The web page about coal fired power being our top greenhouse polluter was done back in 2003. It was wrong then and it is still wrong. Methane gets one small mention and cattle get a mention in relation to Amazon deforestation — but no mention in relation to deforestation in Australia. The table below comes from the same AGO report and shows that deforestation (called “land clearing” in the table) for cattle generated 96 mega tonnes of emission in 1990. The deforestation emissions due to beef dropped to 55 mega tonnes by 1999 (the time period of the report — the AGO are currently working on an updated version of this report).

So why is WWF telling people to reduce their driving, and not telling them to modify their diets?

Table 5.11 Direct and indirect biosphere emissions from livestock (1990).

	Emissions (Gg CO <sub>2</sub> -e)				Share of category (%)	Share of total (%)
	Cattle	Sheep	Other	Total		
Enteric	40 480	23 631	270	64 382	97.2	37.1
Manure management	602	–	1 266	1 868	2.8	1.1
<b>Total direct</b>	<b>41 082</b>	<b>23 631</b>	<b>1 537</b>	<b>66 250</b>	<b>100.0</b>	<b>38.1</b>
Share of direct (%)	62.0	35.7	2.3	100.0	–	–
Deposition on pasture	2 457	2 315	38	4 810	4.5	2.8
Soil disturbance	2 891	1 550	–	4 441	4.1	2.6
Fertiliser use	77	–	–	77	0.1	0.0
Land clearing	96 221	–	–	96 221	89.6	55.4
Savanna burning	3 640	1 951	–	5 591	5.2	3.2
Pasture improvement	-2 417	-1 296	–	-3 712	-3.5	-2.1
<b>Total indirect</b>	<b>102 869</b>	<b>4 521</b>	<b>38</b>	<b>107 428</b>	<b>100.0</b>	<b>61.9</b>
Share of indirect (%)	95.8	4.2	0.04	100.0	–	–
<b>Total</b>	<b>143 952</b>	<b>28 152</b>	<b>1 575</b>	<b>173 678</b>	<b>–</b>	<b>100.0</b>
Share of total (%)	82.9	16.2	0.9	100.0	–	–

Source: Appendix D.

But, while you ponder that question, let me get back to methane. I want to display the numbers that support my claim above that livestock are Australia’s biggest greenhouse polluters, but I want to say much more than this. **Methane reduction provides a rare opportunity to actually roll-back global warming.** It isn’t just me saying this — NASA’s director of research at the Goddard Institute, James Hansen, has been saying it for about 7 years. Lets see why.

## Methane’s impact on warming

Please forgive me if I tell you things that you already know, but the WWF website seems unaware of this information, so perhaps you are not aware of it also.

Methane is often said to be 21 times more potent as a greenhouse gas than CO<sub>2</sub>. This isn’t quite accurate. The inaccuracy is absolutely critical both globally and particularly for a country like Australia with 28 million cattle and 100 million sheep.

If you pump a tonne of methane into the air it breaks down in 10 to 15 years, whereas CO<sub>2</sub> stays around for a hundred or more. During that decade or so the

methane has a massive impact on climate. The IPCC calculate that the relative potency of methane to CO<sub>2</sub> is 72 over a 20 year period. The usual figure of 21, as used by the AGO, is for a 100 year period. Here is the relevant table from the recently published IPCC[2] WG1 report:

**Table TS.2.** Lifetimes, radiative efficiencies and direct (except for CH<sub>4</sub>) global warming potentials (GWP) relative to CO<sub>2</sub>. (Table 2.14)

Industrial Designation or Common Name (years)	Chemical Formula	Lifetime (years)	Radiative Efficiency (W m <sup>-2</sup> ppb <sup>-1</sup> )	Global Warming Potential for Given Time Horizon			
				SAR <sup>†</sup> (100-yr)	20-yr	100-yr	500-yr
Carbon dioxide	CO <sub>2</sub>	See below <sup>a</sup>	<sup>b</sup> 1.4x10 <sup>-5</sup>	1	1	1	1
Methane <sup>c</sup>	CH <sub>4</sub>	12 <sup>c</sup>	3.7x10 <sup>-4</sup>	21	72	25	7.6
Nitrous oxide	N <sub>2</sub> O	114	3.03x10 <sup>-3</sup>	310	289	298	153

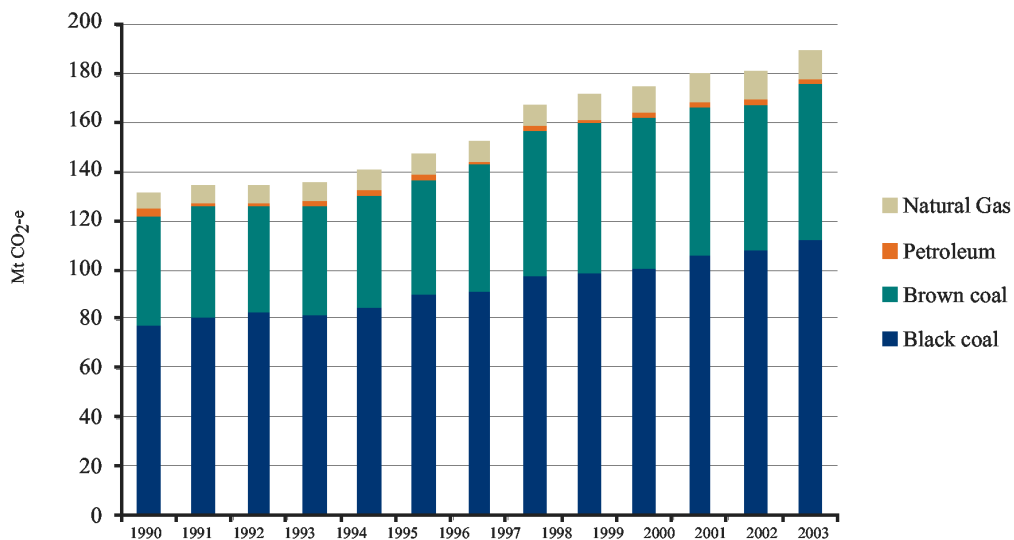
The difference between the figure of 25 in this table and the figure of 21 used by the AGO isn't important, but the 20 year factor of 72 is very important.

There are two reasons why this factor is absolutely critical in any discussion of global warming and what to do about it.

1. Australia's cattle and sheep produce about 3 megatonnes of methane per annum[3]. 3 megatonnes times 72 is 216. Hence the 3 megatonnes of methane is equivalent to 216 megatonnes of carbon dioxide which shows that our 28 million cattle and 100 million sheep will have a bigger impact on temperature during the next 20 years than all our coal fired power stations which together produce only about 180 megatonnes of carbon dioxide.

Here are figures for coal fired (and other) power stations<sup>2</sup>from the AGO inventory[3]:

Figure 6: CO<sub>2</sub>-e emissions from electricity generation by fossil fuels, 1990–2003



Even if you use the more normal figure of 21, the impact of the methane is massive — 3 times 21 is 63, which is more than the 43.7 mega tonnes of carbon dioxide produced by our passenger vehicles[4].

Note that livestock are the source of additional greenhouse emissions apart

<sup>2</sup> This graph is from the 2004 Greenhouse Inventory, which is rather more detailed than the just released 2005 inventory.

from methane — fuel is used to transport animals to market, to cool the refrigerated distribution chain from abattoirs to consumers. The calculations become messy because significant amounts of power from power stations are also part of the meat production chain. But my claim that livestock will have a bigger 20 year impact on temperature than our coal fired power stations is clearly true.

2. Most people don't realise that cutting CO<sub>2</sub> emissions (even a miraculous instant cessation) **will have no effect on global warming for a very long time (decades)** — the oceans act like a huge flywheel and temperature increases are already “in the system”. The only way anyone has suggested to stabilise temperature in the short term is to reduce methane. This will have an immediate effect and is why NASA's James Hansen has called for a 40% reduction in anthropogenic methane — here is a quote explaining his reasoning[5] (for more detail, see the original paper):

*“Consider the following gedanken [thought] experiment. Case A: CO<sub>2</sub> increases by an amount ( $\approx 16$  ppm) that causes a climate forcing of  $+0.25$  W/m<sup>2</sup>, whereas CH<sub>4</sub> decreases by an amount (0.5 ppm) that causes a climate forcing of  $-0.25$  W/m<sup>2</sup>. Case B: CO<sub>2</sub> decreases so as to cause a forcing of  $-0.25$  W/m<sup>2</sup>, whereas CH<sub>4</sub> increases to cause a forcing of  $+0.25$  W/m<sup>2</sup>. Cases A and B both yield no net forcing and thus no tendency for a climate change. However, case A has practical advantages. One advantage of case A is that CO<sub>2</sub> is removed from the atmosphere at a faster rate. Stated differently, the climate is in equilibrium (no warming) with a larger anthropogenic CO<sub>2</sub> source. The larger amount of CO<sub>2</sub> in the air in case A causes the ocean and biosphere to remove CO<sub>2</sub> at a higher rate. Atmospheric CO<sub>2</sub> is greater in case A than in case B, but climate forcings are identical.”*

To put the quote in context, Hansen is not actually suggesting that allowing CO<sub>2</sub> to increase is a good thing but that there is a way to stabilise temperature in the presence of the increases in CO<sub>2</sub>. Such increases are inevitable for some time given the current global lethargy.

Hansen is more than “just another climate scientist”, over the past 30 years he has done an astonishing quantity of high quality climate research. If you don't know him, then check his work on the NASA GISS website.

But — getting back to methane — we already have an example of how reductions in other gases can have an immediate impact on global warming. *New Scientist* (10th March 2007) describes a study[6] which points out that the radiative forcing<sup>3</sup>reduction due to the Montreal protocol restrictions on CFCs was actually larger than the Kyoto protocol could deliver if all its targets were met:

*“Another way to quantify the effect of Montreal is to look at how much CO<sub>2</sub> emissions would have to be cut to achieve the same effect. By 2010, says Velders, the protocol will have prevented the equivalent of between 9.7 and 12.5 gigatonnes of CO<sub>2</sub> being pumped into the atmosphere every year. If all countries meet their Kyoto targets by 2012, the equivalent of*

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<sup>3</sup> “Radiative forcing” is the instantaneous impact on temperature, rather than an effect averaged over some arbitrary time period.

only about 2 gigatonnes of CO<sub>2</sub> per year will have been saved.”

James Hansen made almost the same point back in 2004 in the paper I cited earlier.

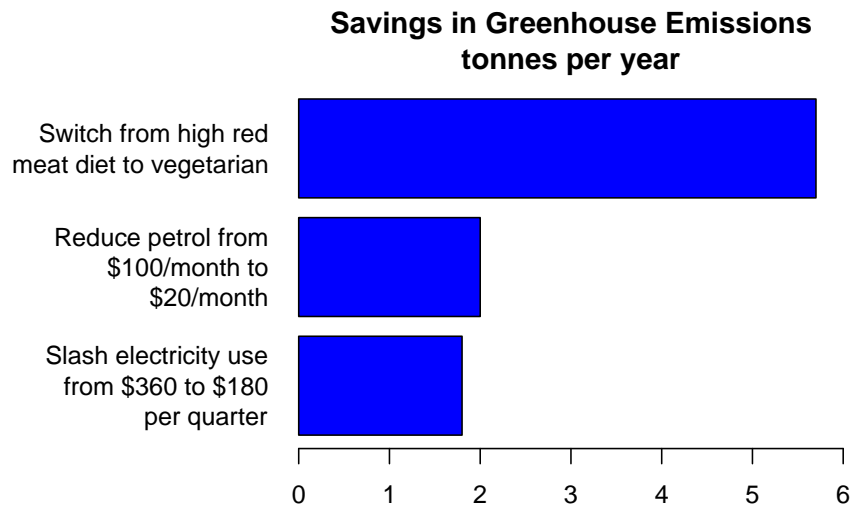
**None of which means we don't have to worry about CO<sub>2</sub>. We must reduce CO<sub>2</sub> emissions. But while this is happening we must reduce methane to stabilise temperature while we wait for the effects of any CO<sub>2</sub> reductions to kick in.**

## The impact of diet on greenhouse gas emissions

The Australian Conservation Foundation (ACF) is the only major environmental group to pay any attention to the impact of diet on global warming. This is an inescapable consequence of the ACF having an eco-footprint calculator on its website<sup>4</sup>. The calculator was put together by Dr Chris Dey and his team at Sydney University and is heavily based on the *Balancing Act* report[7].

A little experimenting with the calculator will allow you to check, for example, the effect of 200 gms of red and processed meat per day, as allowed by the CSIRO *Total Wellbeing* diet book. This diet book is outselling *Harry Potter* in Australia and was recently launched in the US. It has singlehandedly led to an upsurge in red meat sales in Australia.

A little experimentation with the calculator should enable you to verify the values in the following chart. For example the difference between 14 serves of red meat per week (each serve is 60-100gms — I'll use the average of 80gms) and no serves is 5.7 tonnes of emissions annually.



So 14 serves at 80gms per serve is 1120gms/week which would be 7.4 serves of 150gms; and 5.7 tonnes divided by 7.4 is 770 kg for each serve of 150gms.

I note in passing, that the “help panel” on the ACF calculator red meat section gives a figure for 150gms of red meat at just 300Kg. I have written to the ACF about this inconsistency. The higher figure of 770 kg per 150 gms/wk is more consistent with the 51.7 kg CO<sub>2</sub><sup>eq</sup> per kg figure given earlier from the 2002 AGO report[1]. It is

<sup>4</sup> <http://www.acfonline.org.au> and select the Eco-Calculator link.

to be expected that the AGO figure is lower because it doesn't include any downstream processing of the meat. In any event, the AGO figure works out at about 600 kg/yr of emissions for each edible portion of 150gms/week. Incidentally, the greenhouse intensity of aluminium (sometimes called "solid electricity") comes in at 20 (kg CO<sub>2</sub><sup>eq</sup>/kg). Note that the calculated greenhouse intensity of beef would be even higher if the 20 year impact multiplier of 72 was used for the methane component in the beef emissions.

## Global issues

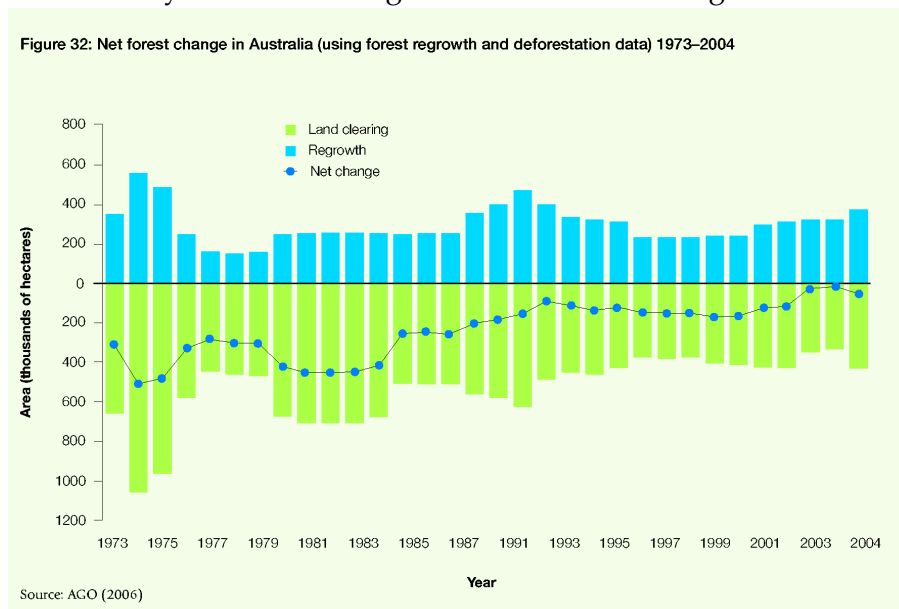
The global impact of livestock on the environment in general and on global warming in particular has been detailed recently by the United Nations report *Livestock's Long Shadow*[8].

Here is a quote from the report's Executive Summary:

*"Livestock now account for about 20 percent of the total terrestrial animal biomass, and the 30 percent of the earth's land surface that they now pre-empt was once habitat for wildlife. Indeed, the livestock sector may well be the leading player in the reduction of biodiversity, since it is the major driver of deforestation, as well as one of the leading drivers of land degradation, pollution, climate change, overfishing, sedimentation of coastal areas and facilitation of invasions by alien species."*

You are probably aware that the only reason that the Howard government can claim to be meeting its Kyoto targets is because of the reduction in land clearing. Land clearing here, as elsewhere is primarily driven by meat production. The 2002 AGO report mentioned earlier, looked at the emissions during the 1990s[1] and allocated almost all emissions due to land clearing in that decade to the beef industry.

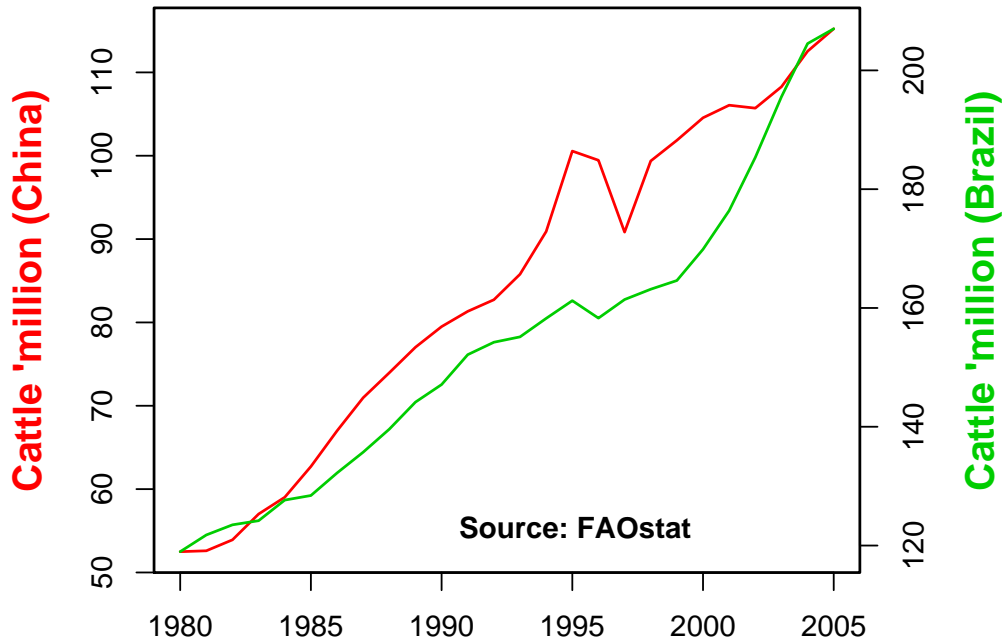
Livestock has always driven clearing. Consider the following chart:



I won't go into detail, but it is obvious from the size of the average annual clearing in Australia over many decades, that the relatively small amount of land used for cropping, mining and towns, isn't a big factor. Much land used for cropping isn't for direct use by people anyway. After subtracting exports in 2005, for example,

people ate about 2 million tonnes of cereals and livestock ate 10 million tonnes.

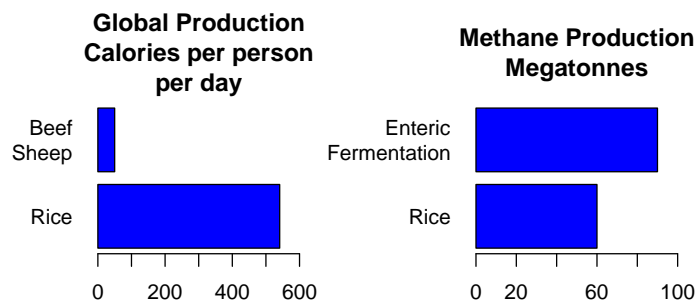
Globally the situation is similar. Brazil is knocking down the Amazon to supply beef to itself and other South American countries and to grow soy for the European intensive livestock industry. Chinese consumption of beef is also booming. Here is a chart of the cattle population growth in both countries.



What happens as the Chinese reduce rice consumption and increase beef consumption?

Rice and beef both produce methane during production, does it really make any difference whether people eat one or the other? Yes, it does.

Consider the following chart. The UN FAO figures used to produce this chart show that the world currently (2005) produces 541 calories of rice per person per day and 49 calories of beef/sheep per person per day. Nevertheless the methane produced by livestock is 90 Tg/yr compared with just 60 Tg/yr for rice[9]. Clearly, any major dietary shift from rice to beef would lead to a large and dangerous methane increase. Just as clearly, any shift away from beef to grains would lead to large methane reductions. These will lead to faster and deeper reductions on radiative forcings than any reduction in CO<sub>2</sub> emissions.



## Summary

I don't know your views on tackling global warming. Clearly, cleaner energy generation strategies are required, but I suspect the optimal way out of the mess will be for countries like Australia — with heavy methane burdens — to look first at methane reduction. Livestock reduction is *comparatively* simple. Since 1990 the Australian sheep population has declined from a peak of around 173 million (1991) to the current figure of about 100 million. This decline has been driven by economics and not global warming, but it shows that rapid reductions in animal numbers are possible. They could be even faster and involve less hardship to farmers if the process was planned as a matter of deliberate policy rather than being market driven.

The 20 year impact of the 1/2 mega tonne reduction in methane due to 70 million fewer sheep is about 36 mega tonnes CO<sub>2</sub><sup>eq</sup> — equivalent to taking 80% of our passenger vehicles off the road. Unfortunately, half of that reduction was lost due to an increase in cattle.

On the other hand, our Government's approach to methane seems to be (via the CSIRO and its *Total Wellbeing diet*) to encourage its production in an expanded beef industry.

Expanding the beef industry in a warming world is bizarre and shows that people's emotive attachment to beef and to BBQs is triumphing over what science is telling us is imperative for the planet.

I urge you as a member of the WWF Scientific Advisory Committee to recommend to the WWF that it undertake — as a matter of urgency — a campaign advocating the reduction in red meat production and consumption in Australia.

Yours sincerely,

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