# Submission in Response to the Victorian State Government's Summit Paper "A Climate of Opportunity"

## *Is There Anything That I Can Do? Yes, Modify Your Diet!*

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**(Update No. 2)**

# Contents



**Please Note:** This version of the paper represents an update of previous versions, dated 4 & 5 July, 2008. The key amendment since 5 July, 2008 is a clearer account of the land area utilised for cattle and sheep grazing. Please see pages 9 & 24.

# 1. Introduction

Professor Ross Garnaut, who prepared “The Garnaut Climate Change Review” interim report for the Federal, State and Territory Governments of Australia, was recently reported as saying that humanity will probably lose the fight against climate change.[1]

He said, "An observation of daily debate and media discussion in Australia could lead one to the view that this issue is too hard for rational policy-making in Australia. The issues are too complex, the vested interests surrounding it too numerous and intense, the relevant timeframes too long. Climate change policy remains a diabolical problem."

Also, "There is a chance - just a chance - that Australia and the world will manage to develop a position that strikes a good balance between the costs of dangerous climate change and the costs of mitigation. The consequences of the choice are large enough for it to be worth a large effort to take that chance, in the short period that remains before our options diminish fatefully."

I welcome the Victorian Government’s initiative in establishing the “Climate of Opportunity” summit, and inviting submissions from members of the community. However, I’m concerned that the Government may not be willing to undertake measures that would offend certain powerful interest groups. Inaction to that extent would ensure that any other efforts to deal with our environmental problems would fail.

We simply do not have time to accommodate groups whose interests would prevent us from dealing with a threat of this magnitude.

The key points of this submission are, firstly, that the most significant contribution that we as individuals can make in our efforts to overcome climate change and Australia’s other pressing environmental problems is to adopt a completely or predominantly plant-based diet, reducing or avoiding consumption of meat and dairy products. Although fish and other seafood should also be avoided in order to cease the devastating impact of industrial fishing on our oceans, this submission does not address that issue any further.

Secondly, governments and others need to inform the community of the environmental benefits to be derived from an appropriate diet. If the Victorian Government is willing to advertise to encourage us to adopt beneficial practices in regard to electrical and water consumption, then it should also be willing to do the same in regard to dietary choices, as the environmental benefits of dietary change would be many times greater than the benefits to be derived from the other measures mentioned.

If we were under threat from another country, we'd do whatever it took to protect our homeland. The potential consequences of climate change may be more difficult for many people to comprehend than the threat of a foreign invasion, but they require urgent action from each and every one of us.

This submission is structured so as to respond to various aspects of the “A Climate of Opportunity” summit paper for which dietary choices are relevant. Those aspects are specified individually, and then followed by information which supports the case for an appropriate diet to be adopted.

## 2. Executive Summary

**Global Warming and Other Problems:**

- The livestock sector has been recognised as one of the major causes of land degradation, air pollution, water pollution, loss of biodiversity and climate change. Moving away from animal-based diets will help overcome these potentially catastrophic environmental problems.

- The Chairman of the UN's Intergovernmental Panel on Climate Change (IPCC) has said that the Panel's 2007 report highlighted the importance of lifestyle changes. In that context, he stated, "Please eat less meat - meat is a very carbon intensive commodity."

- Animal industries are responsible for over 30% of total greenhouse emissions in Australia.

- One of the greatest sources of methane worldwide is animal agriculture. Over a 20 year period, methane's potency as a greenhouse gas is 72 times that of CO2. On the other hand, a benefit of methane is that it breaks down in 9-15 years. Considering these two factors in combination shows that reducing methane emissions now will have a far more significant benefit for climate change than anything we do in relation to CO2, for which the benefits could take more than 100 years to materialise.

- Left to unchecked growth, cattle and sheep grazing will have a bigger impact on climate during the next 20 years than all our coal fired power stations combined.

- A reduction in meat consumption would be a major factor in enabling Australia to meet its Kyoto Protocol obligations, and potentially going well beyond them.

**Water Consumption:**

- Household direct water consumption for Victoria only represents around 8% of the State's total water consumption. The agriculture industry is responsible for 66%, whilst dairy farming accounts for 34%.

- Most Victorian household water consumption is indirect consumption through purchases, with food contributing the largest share. Accordingly, modifying food choices can have a far more significant effect on water consumption than actions taken in and around the home, with significant benefits for our river systems.

- Much of the enormous expenditure on new water-related infrastructure projects, along with the environmental and other consequences of such projects, could potentially be avoided or reduced if consumers modified their diets.

**Pricing:**

- We need to ensure that we allocate our resources in an economically rational manner, in accordance with efficient market practices. This would be achieved by ensuring that input prices allow for externalities, i.e. consequences of the production and delivery process that are experienced by parties who are not directly involved in the transaction. Such pricing should reflect all the environmental costs associated with producing and delivering goods and services.

**Informing the Community:**

- Whilst the Victorian Government has been willing to spend money on advertisements that encourage us to turn off electrical appliances and take shorter showers, it has said little, if anything, about the dramatic effect of our food choices on the environment. This must change; the Government must help to inform the community.

## 3. Commentary

**Extract 1 from "A Climate of Opportunity" Summit Paper:**
**Increasing Our Knowledge of Climate Change**

This Summit Paper puts forward 10 strategic directions for action to be taken to achieve the Victorian Government's goal of reducing emissions and adapting to the impacts of climate change.

Those directions include:

- Increasing our knowledge about climate change impacts and adaptive needs and possibilities, including:
  - Where are the largest gaps in our climate change knowledge in Victoria?
  - What are the sources of information on the impacts of climate change that you are aware of and use?
  - What changes, limits or risks are we, as a community, prepared to accept to minimise future risks?
  - What is needed in your community for people to change their everyday practices to reduce climate change impacts?
- Supporting Victorian individuals and communities to get active on climate change.

Victoria has already made significant progress in the global effort to tackle climate change, including helping Victorians reduce their household energy use through the internationally recognised 'Black Balloons' awareness campaign.

**Comments in Relation to Extract 1:**

**Key Point from this Section:**

If people are unaware of the impact that their diets have on our fragile planet, then they are not armed with the means to save it. The Victorian Government must extend its climate advertising to include that aspect, which would have, for any given level of consumer responsiveness, far more significant environmental benefits than its previous water-saving or "black balloons" campaigns.

Whilst the Victorian Government has been willing to spend money on advertisements that encourage us to turn off electrical appliances, it has said little, if anything, about our food choices.

Meanwhile, Meat & Livestock Australia (MLA) was named the 2007 advertiser of the year at the Australian Writers & Art Directors awards, for its work in promoting red meat sales, both domestically and internationally[2].

Some of MLA's advertisements have featured the internationally renowned actor, Sam Neill, in what appears to have been a fine example of his chosen craft.

In 1999, the former Labor Premier, Steve Bracks, said that one of the features that would distinguish his government from that of his predecessor was leadership that (amongst other traits), *"credits the people of this state with the intelligence to make their own judgements".*[3]

The government needs to inform the people of the state about the enormous impact that their food choices have on the environment. No one could validly complain if well-informed

consumers decided to purchase fewer meat and dairy products for environmental reasons. After all, efficient markets rely on decision-makers being well informed.

For a more thorough accounting of the impact of diet on climate change and water consumption in Victoria and Australia, see the responses under ‘Extract 4’ and ‘Extract 5’.

**Extract 2 from "A Climate of Opportunity" Summit Paper:**

**Intergovernmental Panel on Climate Change**

- In 2007, the Intergovernmental Panel on Climate Change – which is a collective of the world's pre-eminent climate change scientists – released its Fourth Assessment Report on the state of knowledge on climate change.
- This report found that warming of the global climate system is now unequivocal and that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in atmospheric greenhouse gas concentrations as a result of human activities.
- The IPCC's report warned that unless we change our behaviour, global temperatures could rise on average between 1.1°C and 6.4°C by 2100.

**Comments in Relation to Extract 2:**

**Key Point from this Section:**

The truth may be too inconvenient for Al Gore, but the Chairman of the IPCC has said, "Please eat less meat - meat is a very carbon intensive commodity". (The IPCC was the joint winner of the Nobel Peace Prize with Mr Gore.)

- Media Extract from January, 2008[4]:
  - The 2007 report of the Intergovernmental Panel on Climate Change (IPCC) highlighted "the importance of lifestyle changes," Chairman Dr Rajendra Pachauri said.
  - "This is something that the IPCC was afraid to say earlier, but now we have said it."
  - A vegetarian, the Indian economist made a plea for people around the world to tame their carnivorous impulses.
  - "Please eat less meat - meat is a very carbon intensive commodity," he said, adding that consuming large quantities was also bad for one's health.
- The IPCC was a joint winner, with Al Gore, of the 2007 Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change".[5]
- For a more thorough accounting of the impact of diet on climate change, see the response under 'Extract 4'.

**Extract 3 from "A Climate of Opportunity" Summit Paper:**
**Soil, Land, Waterways & Biodiversity**

Some of the significant programs under way include:

- $14 million in a world-first scheme called ecoMarkets to give farmers new incentives to protect:
  - the health of our soil;
  - the health of land;
  - the health of waterways; and
  - biodiversity;
- a Green Paper to address climate change impacts on:
  - land health; and
  - biodiversity

**Comments in Relation to Extract 3:**

**Key Points from this Section:**

The livestock sector has been recognised as one of the major causes of land degradation, water pollution and loss of biodiversity. Moving away from animal-based diets will help overcome these potentially catastrophic environmental problems.

- The UN's Food & Agriculture Organization (FAO)[6] says livestock production is one of the major causes of the world's most pressing environmental problems, including (in addition to global warming and air pollution):
  - loss of biodiversity;
  - land degradation; and
  - water pollution
- Some key points from the FAO on biodiversity are as follows:
  - According to the Millennium Ecosystem Assessment (MEA) Report (2005b), the most important direct drivers of biodiversity loss are habitat change; climate change; invasive alien species; overexploitation; and pollution.
  - Livestock play an important role in the current biodiversity crisis, as they contribute directly to all these drivers of biodiversity loss, at the local and global level.
  - Livestock-related land use and land-use change modify or destroy ecosystems that are the habitats for given species.
  - Terrestrial and aquatic ecosystems are affected by emissions into the environment (nutrient and pathogen discharge in marine and freshwater ecosystems, ammonia emissions and acid rain).
  - The sector also directly affects biodiversity through invasive alien species (the livestock themselves and diseases for which they may be vectors) and overexploitation, for example through overgrazing and pasture plants.

- Australian ethicist and Princeton University Professor, Peter Singer, and co-author Jim Mason, have commented as follows on land degradation[7]:

  - The desire to create grazing land for cattle and sheep has been a major factor in clearing forest and bushland all over the world.

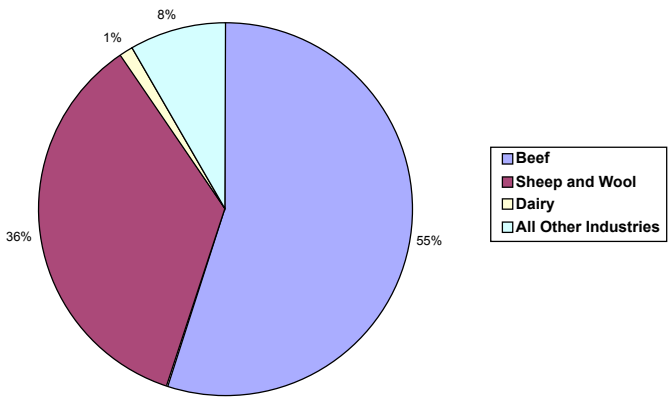
  - In Australia, since European settlement, 13 per cent of the land has been completely cleared of native vegetation, mostly for grazing animals, and a much larger area has been severely damaged by grazing.

  - According to the World Resources Institute[8], overgrazing is the largest single cause of land degradation, world-wide. Much of this degradation occurs in the semi-arid areas used for cattle and sheep grazing in countries like Australia and the United States. Cattle are heavy animals with hard hooves, big appetites, and a digestive system that produces a lot of manure. Turned loose on fragile, semi-arid environments, they can soon devastate a landscape that has not evolved to cope with them.

  - Professor Michael Archer (cited by Singer and Mason), Professor of Biological Sciences and Dean of the Faculty of Science at the University of New South Wales, and a former director of the Australian Museum, has pointed out that Australian agriculture contributes about 3 per cent of the country's gross domestic product, but degrades over 61% of Australia's lands.

- The Balancing Act Report by the CSIRO and the University of Sydney shows that 92% of the total land degradation in Australia is due to the beef, sheep and dairy industries. The other 132 economic sectors were responsible for the remaining 8%.[9]

**Figure 1: Land Disturbance in Australia (%)**




- According to the Australian Bureau of Agricultural and Resource Economics (ABARE), *"Beef production is widespread across Australia. In northern Australia, production is based mainly on native pastures on large properties; in the southern states, smaller properties with a high degree of pasture improvement predominate. Extensive grazing by sheep and cattle occupies approximately 60 per cent of the rangelands, which in turn represent about 80 per cent of Australia's land area".*[10] Accordingly, grazing, with all its destructive qualities (and after allowing for grazing which occurs outside the rangelands), almost certainly occurs across more than 50% of the continent.[i]

[i] For a map based on ABARE's definition of the rangelands, please see http://affashop.gov.au/PdfFiles/g_Ch_2_Rangelands_Maps_5aug04.pdf, which shows that grazing in all of Victoria, most of New South Wales, around one third of Queensland and portions of Western Australia and South Australia is additional to the figures referred to above.

- Livestock's ability to create desert from once-fertile land is outlined as follows[11]:

  - Internationally, severe problems of soil compaction, erosion and decreased soil fertility are being experienced in many cattle-farming areas. These include the American West, Central and South America, Australia and Sub-Saharan Africa. The United Nations Environmental Programme (UNEP) estimates that 20 per cent of the world's grazing lands have been significantly degraded since 1945, with the pace of destruction increasing.

  - Desertification, where land is no longer capable of sustaining food production, affects roughly 50 million acres of the world's available agricultural land every year, with overgrazing (particularly of beef cattle) a leading cause.

  - In many parts of the famed American West, overgrazing from the Great Plains to the Pacific Ocean has ground down native grasses and trampled streams. (Much of the destruction is subsidised by more than $100 million of public money.) 3.2 million cattle are grazed on public lands covering 254 million acres in 17 western states. A 1999 investigation by a local newspaper, The San Jose Mercury News, summarises the environmental impact:

    *'The lifeblood of the arid West, streams, make up only 1 per cent of the acreage in the 11 Western-most states. Yet scientists say at least 70 per cent of wildlife there depends on them for survival... Largely because of cattle, only 36 per cent of streams surveyed by the Bureau of Land Management on its public lands in the Lower 48 states are classified as "proper functioning" or healthy... Severely overgrazed streams have trampled banks and little vegetation. Murky, warm water is choked with sediment, algae and manure.'*

  - Comparable desertification is also occurring in many poverty stricken areas of the world, where effects on the rural poor are most critical. Larger livestock populations, partly created by subsidised feed concentrates from wealthier nations, are degrading land in many areas, including 'the semi arid Sahel, West Asia and North Africa, and the Southern Cone of the Americas'.

- Some points to note in relation to water pollution are as follows:

  - The FAO's summary comments in relation to water indicated that the sector *"is probably the largest sectoral source of water pollution, contributing to eutrophication, 'dead zones' in coastal areas, degradation of coral reefs, human health problems, emergence of antibiotic resistance and many others."*[6]

  - American journalist Jim Motavelli has provided a stark example of the disastrous effects on waterways of intensive farming practices. He has stated:

    *"The much-publicized 1989 Exxon Valdez oil spill in Alaska dumped 12 million gallons of oil into Prince William Sound, but the relatively unknown 1995 New River hog waste spill in North Carolina poured 25 million gallons of excrement and urine into the water, killing an estimated 10 to 14 million fish and closing 364,000 acres of coastal shellfishing beds. Hog waste spills have caused the rapid spread of a virulent microbe called Pfiesteria piscicida, which has killed a billion fish in North Carolina alone"*[12].

  - In December 1997, the U.S Senate Agricultural Committee released a report stating that livestock raised for food, produce 130 times as much excrement as the entire human population of the country, roughly equivalent to five tons per annum for every US citizen.[13] In that year, cattle, pigs, chicken and turkeys produced an estimated 1.36 billion tons of solid waste, 90% of which was from cattle[14]. On that basis, it's little wonder that spills such as the New River incident occur.

- With 17,500 beef farms, 13,000 sheep and lamb farms, 450 pig farms and 200 chicken farms in Victoria[15], the potential for water pollution and other significant environmental mishaps would appear to be significant.

- Agriculture in the United States, much of which now serves the demand for meat, contributes to nearly three-quarters of all water-quality problems in U.S. rivers and streams, according to the Environmental Protection Agency[16].

- With the inherent inefficiency of meat as a food source (refer to comments under Extract 6) and the resultant massive increase in crop production beyond what would otherwise be required, our oceans are also suffering. For example, the MSNBC news service in the United States reported as follows in December, 2007:

  *"The nation's corn crop is fertilized with millions of pounds of nitrogen-based fertilizer. And when that nitrogen runs off fields in Corn Belt states, it makes its way to the Mississippi River and eventually pours into the Gulf, where it contributes to a growing 'dead zone' — a 7,900-square-mile patch so depleted of oxygen that fish, crabs and shrimp suffocate. . . . Fertilizer causes explosive growth of algae, which then dies and sinks to the bottom, where it sucks up oxygen as it decays. This creates a deep layer of oxygen-depleted ocean where creatures either escape or die."*[17]

  The problem has been exacerbated by competing demands for crops to be used for the production of biofuels, due to the rapid increase in oil prices.

- Australia is not immune to such problems, and has already experienced (for example) widespread outbreaks of toxic algae in our waterways.

- Similarly, the Australian Government's Great Barrier Reef Marine Park Authority has stated, *"80% of the land adjacent to the Great Barrier Reef World Heritage Area supports agricultural production, primarily beef cattle grazing and intensive cropping agriculture."*

- *"Beef cattle grazing is the largest single land use with approximately 4,500,000 cattle grazing in the Great Barrier Reef Catchment (Department of Primary Industries & Fisheries 1993). Grazing land management has resulted in extensive clearance of vegetation and with over-stocking, particularly during drought conditions has caused widespread soil erosion and the export of eroded material, with its associated nutrients, into the Great Barrier Reef World Heritage Area."*

- Also, *"Fertilisers and pesticides are taken up by the crop but a significant portion applied to the land ends up in coastal waters. Poor agricultural practice results in soil erosion and the discharge of sediments, nutrients and pesticides into rivers, estuaries and eventually the Great Barrier Reef World Heritage Area."*[18]

**Extract 4 from "A Climate of Opportunity" Summit Paper:**

**Greenhouse Gas Emissions**

The Victorian Government takes seriously the challenge of climate change and its responsibility to lead Victorian efforts to reduce our greenhouse emissions by 60 per cent by 2050 compared to 2000 levels. The challenges [include the need to] drive significant greenhouse gas emission reductions.

**Victoria's Emissions Profile – Primary Production**

Emissions associated with the production and distribution of electricity, petroleum fuels and natural gas are allocated to the end use sectors of the economy (where the energy is finally used). In each sector (apart from primary production) energy use makes up the largest portion of emissions. The contribution of the energy sector to Victoria's total greenhouse gas emissions is larger than that in the rest of Australia. This reflects the state's use of brown coal for the generation of electricity, and also explains why Victoria's per capita emissions from energy use are above the Australian average. Primary production's share of emissions is 12.4%.

Twenty-one activities across six sectors of the economy have now been identified. These activities are commonly referred to as emission reduction 'wedges' when they are represented as a graph. The 21 'wedges' explored include Agriculture, i.e.:

- Livestock efficiency - changes to animal production of methane by varying diet and breeding programs
- Soil management - reducing emissions from animal urine and soil strategies

**Comments in Relation to Extract 4:**

**Key Points from this Section:**

- Based on a study by the CSIRO and the University of Sydney, animal industries are responsible for over 30% of total greenhouse emissions in Australia.
- Assuming that current consumption practices continue, cattle and sheep will have a bigger impact on climate over the next twenty years than all our coal-fired power stations combined.
- For a sector with that level of impact to grow unchecked would totally undermine any attempt to reduce our overall emissions.
- A reduction in meat consumption would be a major factor in enabling Australia to meet its Kyoto Protocol obligations, and potentially going well beyond them.

**United Nations Food & Agriculture Organization (FAO)**

In addition to land degradation, water pollution, loss of biodiversity and air pollution (refer to comments in relation to Extract 3) the UN's Food & Agriculture Organization (FAO) says livestock production is one of the major causes of global warming. It has stated that the livestock sector is "responsible for 18% of greenhouse gas emissions measured in CO2 equivalent. This is a higher share than transport". [6]

**How Much Greenhouse Gas Do Animal Industries Generate?**[19]

The author of an article entitled *"Climate Change – The Ultimate BBQ Stopper"* has reported that information contained in an analysis of the Australian economy by the CSIRO and the University of Sydney (refer to the Balancing Act report below), shows that animal industries are responsible for more than 30% of greenhouse emissions in Australia.

The analysis was based on a 100 year global warming potential ("GWP") of 21. This means that, measured with a time horizon of 100 years, methane is 21 times more potent as a greenhouse gas than CO2.[ii]

However, he cites IPCC figures to confirm that, over a 20 year period, methane is 72 times more potent than CO2.[20] As methane breaks down much faster (9-15 years)[21] than CO2 (generally more than 100 years), its GWP is higher for shorter periods than for longer ones.

These findings show that the contribution of animal industries to greenhouse emissions is much more significant over a 20 year period than reported in studies that are based on a 100 year GWP, such as the Australian Greenhouse Office's "National Greenhouse Gas Inventory 2005" (refer below), or the FAO's report (as referred to on the previous page).[6 & 22]

Further details are outlined below.

- **Australia's National Greenhouse Gas Inventory 2005**

- Australia's net greenhouse emissions in 2005 were 559.1 million tonnes of carbon dioxide equivalent ("CO2-e").

- The major contributors were stationary energy (coal and gas plants), transport and agriculture.

- Agriculture produced 87.9 Mt of CO2-e emissions or 16% of net national emissions.

- These figures demonstrate why there is a strong focus on changing the mechanisms for producing electricity. Since stationary energy generation is responsible for 50% of total emissions, many argue that we should tackle that problem first. For example, it is suggested that we need to look for ways to generate 'clean coal' or that we gradually change to wind, wave and solar technologies. (Nuclear is also being considered.)

- There is merit in examining certain cleaner technologies for energy generation, but they all come at considerable cost.

- **An Alternative Approach: "Balancing Act – A Triple Bottom-Line Analysis of the Australian Economy"**[9]

- To properly account for the CO2-e emissions, we need to ask what we do with the energy which, according to the National Greenhouse Inventory, is the most significant contributor. The answer is that we use it in industry, in agriculture and in domestic homes. In order to properly break out the use of energy within Australia, and determine which industries use how much when all their inputs and outputs are taken into account, another kind of economic report is required.

- The CSIRO and the University of Sydney have produced such a report, entitled *"Balancing Act – A Triple Bottom-Line Analysis of the Australian Economy".* The report

[ii] The emissions of different gases can be aggregated by converting them to carbon dioxide equivalents (CO2-e). They are converted by multiplying the mass of emissions by the appropriate global warming potentials (GWPs). GWPs represent the relative warming effect of a unit mass of the gas when compared with the same mass of CO2 over a specific period. For methane, the GWPs used by the UN's Intergovernmental Panel on Climate Change (IPCC) are 21 for 100 years and 72 for 20 years. The FAO (refer to previous page) used a GWP of 23 for the 100 year time horizon.

analysed 135 sectors of the Australian economy, focusing on environmental, social and financial indicators.

- This report shows that when end-use is considered, animal industries are responsible for over 30% of total greenhouse emissions in Australia, as follows:

| Industry Sector | Mt CO2-e | Percent |
|---|---|---|
| Beef Cattle | 122.50 | 23.60 |
| Sheep & Shorn Wool | 23.90 | 4.61 |
| Dairy Cattle & Milk | 8.80 | 1.70 |
| Pigs | 1.30 | 0.25 |
| Commercial Fishing | 0.68 | 0.13 |
| Meat Products | 0.68 | 0.13 |
| Other Dairy Products | 0.59 | 0.11 |
| Poultry & Eggs | 0.58 | 0.11 |
| **Total** | **159.03** | **30.64** |

- **How Does Animal Agriculture Compare to Coal-Fired Powered Stations?**

- The animal industries' main contribution to greenhouse emissions is methane, which (as indicated earlier) is 72 times more powerful a greenhouse gas than CO2 over a 20 year period. Because of its potency and its relatively rapid breakdown, action on methane will have a far more significant benefit for climate change than anything we do in relation to CO2. In other words, the period before we see the benefits from reducing methane emissions will be much shorter, and the results much more significant for any given quantity, than for CO2.

- While atmospheric concentrations of CO2 have risen by about 31% since pre-industrial times, methane concentrations have more than doubled.

- Whereas human sources of CO2 amount to just 3% of natural emissions, the amount of methane produced from all human sources (including animal-based agriculture) equals 150% of the amount produced from natural sources, i.e. a 60/40 split.[23]

- One of the greatest sources of methane worldwide, and easily the most significant source in Australia, is animal agriculture. Australia's cattle and sheep produce about 3.2 megatonnes of methane per annum. 3.2 megatonnes times 72 is 230; hence the 3.2 megatonnes of methane is equivalent to 230 megatonnes of CO2.[iii]

- This shows that our cattle and sheep (assuming there is no change in our consumption habits) will have a bigger impact on climate during the next 20 years than all our coal-fired power stations combined, which together produce only about 180 megatonnes of CO2 per annum.

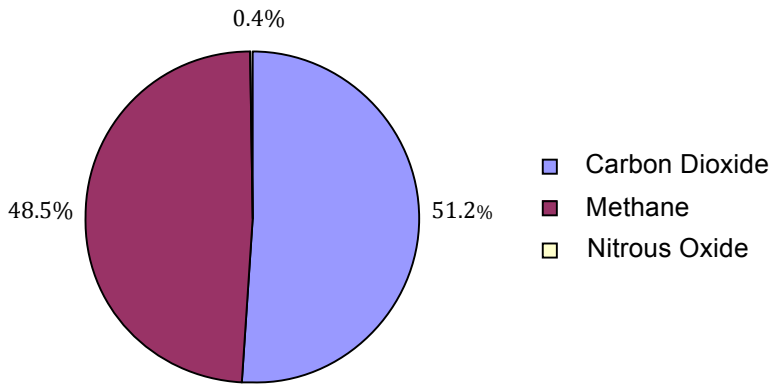
- For such a sector to grow unchecked would totally undermine any attempt to reduce our overall emissions.

[iii] The figure of 3.2 was obtained from the Australian Greenhouse Office's (AGO's) "National Greenhouse Accounts 2005", which indicated (p. 3) that the Agriculture sector "is the main contributor of methane" with 3.2 Mt. The breakdown of figures on p. 17 of the accounts indicates that the methane emissions from Agriculture are almost exclusively animal-related. In converting from methane volumes to the CO2-e figure of 67 Mt CO2-e, the AGO has used the 100 year GWP of 21. Converting at the 20 year GWP of 72 gives a CO2-e figure of 230 Mt.

- **Comparative Contribution to Greenhouse Emissions**

- The comparative contribution to greenhouse emissions can be displayed as follows:

**Figure 2: Contribution to Total CO2-e Emissions 2005 (assuming a 20 year period)**




- **The Kyoto Protocol**

- These findings confirm that a reduction in meat consumption would be a major factor in enabling Australia to meet its Kyoto Protocol obligations, before even considering the enormous benefits of measures such as reforestation of land which is currently used for grazing or other animal-related activities.

**Additional Comments on the "Balancing Act" Report**

- In a 2005 article on the Balancing Act report, The Canberra Times stated, "Market prices for beef do not reflect the full environmental costs of production . . . and the Aussie meat pie certainly contributes its share to climate change and land clearing."[24]

- Also, "Instead of being influenced by high-powered advertising, celebrity endorsement, habit or cheapness, we should be making choices based on minimising our contribution to land degradation, excessive water use and climate change."

- The article quoted the leader of the team that prepared the report, CSIRO researcher, Dr Barney Foran, as saying, "'We need to be a lot better educated about what we buy. It's our consumption that drives the economy. We cannot blame governments all the time, when we are part of the equation."

- The article cited the report itself by stating, "One of the insights emerging from this analysis is that the prices consumers pay for primary production items do not reflect the full value of the natural resources embodied in their production chains." It quoted Dr Foran as saying, "We should be paying more for products that have a high environmental account balance. The consumer should be expected to pay a realistic price for food so that we play a part in fixing up the bush, instead of sitting in town and wringing our hands about it."

**How Does Meat Consumption Compare to Driving a Car?**

- Gidon Eshel and Pamela Martin of the University of Chicago have calculated that if an American were to reduce meat consumption by just 20 percent, it would be equivalent to changing their car from a standard sedan like a Toyota Camry to a hybrid model, like the Toyota Prius.[16]

- Similarly, a study last year by the National Institute of Livestock and Grassland Science in Japan estimated that 1 kilogram of beef is responsible for the equivalent amount of CO2 emitted by the average European car every 250 kilometres and burns enough energy to light a 100-watt bulb for nearly 20 days.[16]
- Fish can also be a problem. The University of Chicago study found that a strict vegetarian diet turned out to be the most energy-efficient, followed by poultry and the average American diet. Fish and red meat virtually tied as the least efficient. Pamela Martin has stated, "Fish can be from one extreme to the other. Sardines and anchovies flourish near coastal areas and can be harvested with minimal energy expenditure. But swordfish and other large predatory species require energy-intensive long-distance voyages."[25]

- Martin and Eshel's research also indicated that plant-based diets are healthier than the alternatives. They have stated, "The adverse effects of dietary animal fat intake on cardiovascular diseases are by now well established. Similar effects are also seen when meat, rather than fat, intake is considered. To our knowledge, there is currently no credible evidence that plant-based diets actually undermine health; the balance of available evidence suggests that plant-based diets are at the very least just as safe as mixed ones, and most likely safer."[24]

**International Health Experts Call for a Reduction in Meat Consumption**[26]

- Writing in the medical journal The Lancet, a team of international health experts led by Australian National University professor Tony McMichael has warned that the world's growing appetite for meat is increasing greenhouse gas emissions, as vast areas of rainforest are bulldozed for grazing land and as more sheep and cattle burp.

- They want people in wealthy countries to more than halve their daily meat intake (particularly red meat) over the next 40 years to stop emissions rising even further, with the long-term goal of cutting average meat consumption worldwide to 90 grams a day by 2050.

- In its article on the Lancet report, The Age newspaper in Melbourne provided the following breakdown of greenhouse gas emissions resulting from livestock:

| | |
|---|---|
| - Deforestation and desertification | 35.4% |
| - Manure | 30.5% |
| - Methane emissions, mainly burping | 25.0% |
| - Artificial fertilisers | 3.4% |
| - On-farm fossil fuel use | 1.2% |
| - Other | 3.6% |

**Pricing**

- We need to ensure that we allocate our resources in an economically rational manner, in accordance with efficient market practices. This would be achieved by ensuring that input prices allow for externalities, i.e. consequences of the production and delivery process that are experienced by parties who are not directly involved in the transaction. Such pricing should reflect all the environmental costs associated with producing and delivering goods and services.

**Extract 5 from "A Climate of Opportunity" Summit Paper:**

**Sustainable Water Use**

Other areas Victoria is working to reduce emissions and address the impacts of climate change include promoting sustainable water use.

**Water Efficiency & Infrastructure**

The Victorian Government is delivering on a long term plan to improve water efficiency and build water infrastructure. Even so, climate change will increase the challenge of securing water for Victoria's industries and regions.

**Comments in Relation to Extract 5:**

**Key Points from this Section:**

- Household water consumption for Victoria only represents 8% of the State's total water consumption. The agriculture industry is responsible for 66%, whilst dairy farming alone accounts for 34%.
- Most Victorian household water consumption is indirect consumption through purchases, with food contributing the largest share. Accordingly, modifying food choices can have a far more significant effect on water consumption than actions taken in and around the home, with significant benefits for our river systems.
- *"Certainly the water efficiency of vegetable production is startling*." – Melbourne University researchers.
- Much of the enormous expenditure on new water-related infrastructure projects, along with the environmental and other consequences of such projects, could potentially be avoided or reduced if consumers elected to modify their diets.

**Victoria's Water Consumption**[27 & 28]

- Household water consumption for Victoria in 2004/05 represented 8% of the State's total water consumption.
- The industry with the highest share of water consumption was the agriculture industry, with 66%.
- The largest water user within the agriculture industry was dairy farming with 52% of total agricultural water use, which is equivalent to 34% of the state's entire water consumption.
- The animal agriculture sector accounted for around 50% of the state's total consumption.
- More details are contained on the following page. Although a breakdown of farm usage figures was available for 2005/06, the most recent available information on overall consumption was from 2004/05, so that year has been used for all the charts. This approach has not materially affected the results.

**Figure 3: Victorian Water Consumption 2004-05**

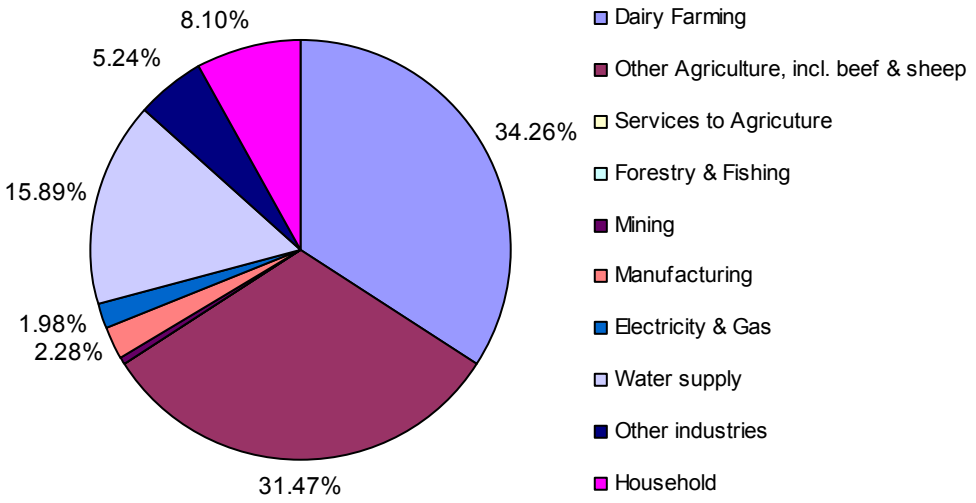



**Figure 4: Water Used on Victorian Farms 2004-05**

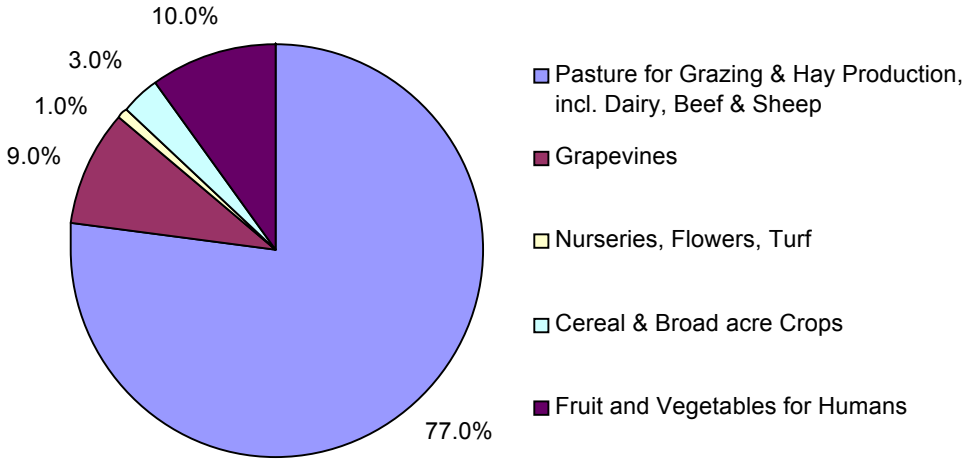
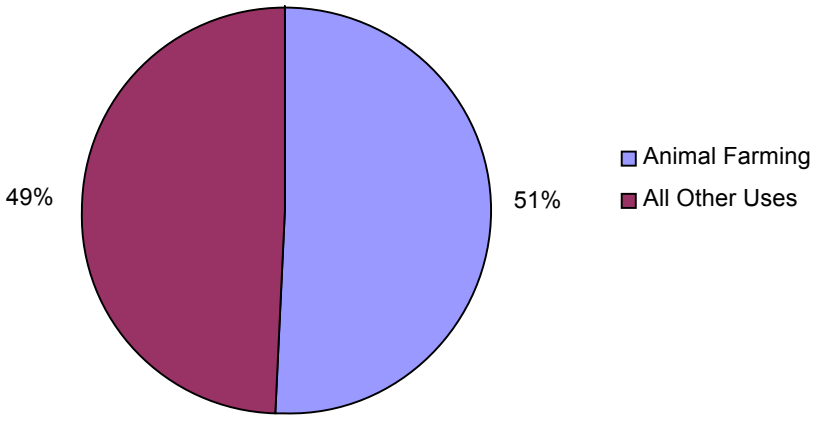



**Figure 5: Animal Farming's Share of Victorian Water Consumption 2004/05**



**Per Capita Water Use**[29]**:**

- Barney Foran (who was quoted earlier in relation to the Balancing Act report) has said in his role as an analyst at the Australian National University, that Australians must address their per capita water use.
- He said that when you factor in the water used to make products such as food, drink, clothing and newspapers, the average Australian consumes roughly six to eight times more water than is recorded on their domestic water meter, with more affluent Australians consuming twice as much as less affluent ones.

**Murray Darling Basin**[30]**:**

- . . . a 2004 study by CSIRO[31] shows (p 73) that the dairy industry's extraction of water from the Murray-Darling basin grew from 2,500 gigalitres in 1996-97 to 4,200 gigalitres in 2000-01. To put this figure in perspective, all the towns and cities in Australia use about 2,300 gigalitres per year.
- That 4,200 gigalitres was 35 per cent of all the Murray-Darling Basin water.
- The 2005 report Balancing Act . . . put the beef and dairy industry's water use at 6,700 gigalitres based on 1995 data (and that is only counting "extracted" water).
- [Rachel] Nowak mentioned Graeme Pearman saying that we need to consider the impacts of our population of 21 million people. Our population is 21 million people plus 28 million cattle, and it's the cattle that dominate our water use.
- Additional Comment (not in this published letter): The information contained in the letter indicates that the beef and dairy industries consume nearly 3 times the amount of water that's used in all Australian towns and cities combined.

**Water Footprint of Nations**[32]**:**

- A global study of the "water footprints of nations", by international water experts Arjen Hoekstra and A. K. Chapagain, found that Australian households held the world's worst record for water consumption, despite our industry and farmers being relatively efficient.
- Published in January in the journal Water Resources Management, the study found that Australian households had a "water footprint" equivalent to 341,000 litres per person per year. Out of 21 countries, only Canada came close, with the average person there consuming the equivalent of 279,000 litres per year.
- The global average was found to be 57,000 litres.
- Add water used for farm and industrial production, and Australia's annual water footprint "the water used domestically and internationally to produce everything we consume" balloons to about 1.4 million litres per person, the 14th worst out of 21 nations.
- The study said that a nation's water footprint depends on how much and what is consumed, weather conditions and farm practices.
- Rich countries such as Australia and the United States tended to have big footprints because of the large amount of meat and industrial goods consumed, while countries like China are relatively efficient.
- It said it took an average of three years before a cow is slaughtered to produce about 200 kilograms of boneless beef. In that time, the cow consumes roughly 1,300 kilograms of grains, 7,200 kilograms of roughage (pasture and hay), 24,000 litres of water for drinking and 7,000 litres for servicing. All up, it takes almost 16,000 litres of water to produce a single kilogram of beef.
- Additional Comment (not in this published article): The study also found that it takes 1,000 litres of water to produce 1 litre of cow's milk and 1,800 litres of water to produce 1 kilogram of soy beans. As 1 kilogram of soybeans will produce 10 litres of soy milk[33], and as water consumption in processing is very much lower than other stages of the production

cycle[34], it would appear that cows' milk requires many times more water to produce than soy milk.

**Melbourne's Food Consumption and the Murray-Darling Basin's Water Supply[35]:**

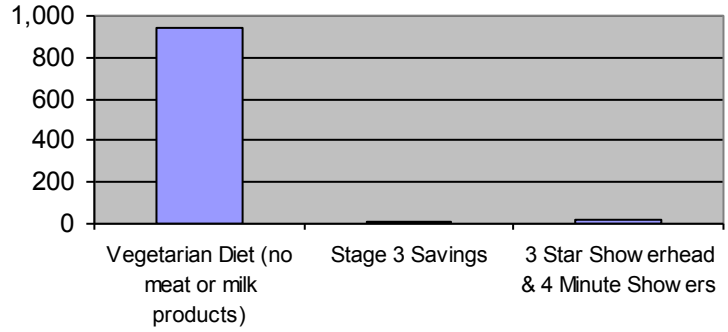
- Associate Professor Brian Finlayson of the University of Melbourne, commenting on research by Ian Rutherfurd (refer below) has said that if the people of Melbourne wanted to make a big contribution to the national water budget rather than just their own catchment system, they could do this by changing their diet.
- Associate Professor Rutherfurd, then of the School of Social and Environmental Enquiry at the University of Melbourne, had made this point at a recent seminar at the university. He pointed out that the water used directly in Melbourne households is only one-ninth of the total. Most of the water we use at home is virtual water, embodied in the food we eat.
- He also stated that if Melbourne residents changed their diets towards eating more vegetables and away from meat and dairy products, this would have a significant impact on water at the national scale. Given the importance of the Murray-Darling Basin in supplying food to Melbourne, that would lead to significant savings of water there.

**City People Eat Rivers[36 & 37]:**

- 90% of the water consumed in households in Melbourne is embodied in the production of the food that comes into the house. In one sense, urban food consumers are also consuming rivers.
- Small changes in food choices could potentially lead to water savings that dwarf the savings that can come from changes in direct water consumption. Thus, river condition is, to some extent, a consequence of decisions made in urban supermarkets. The authors believe that this is an empowering observation.
- Urban people, far from being isolated from the environment, make critical decisions about rivers, every day, in their consumption choices.
- The authors suggest four ways that consumers can dramatically reduce their indirect water consumption: waste less food; select comparable products that use less water; substitute types of food that use more water for types that use less; and become a vegetarian.
- A vegetarian diet can save households up to 35% of their total water usage. That is 13 times the volume of water that would be saved by not watering the garden. The environmental benefits of vegetarianism have been made for many years, and Renault (2003)[38] suggests that an animal product based diet may need 10 times more water than a vegetarian diet. Certainly the water efficiency of vegetable production is startling.
- Based on the estimated water consumption of the average Australian household compared to a vegetarian household (i.e. no meat or milk products) as presented by the authors, subsequent calculations (not included in the research papers) indicate that the average Australian could save 2,592 litres per day, or 946,000 litres per annum, by changing to a vegetarian diet.
- That figures compares extremely favourably to the 17 litres per person per day (6,205 litres per person per annum) that was saved in Melbourne under Stage 3 water restrictions between 2005 and 2006[39].
- It also compares extremely favourably to the 20,000 litres per annum saved by using a 3 star showerhead and limiting showers to 4 minutes.[40]

- The comparison can be viewed graphically as follows:

**Figure 6: Comparative Water Savings ('000 litres per annum)**




- To focus water saving efforts on those aspects of lifestyle which generate the minimum possible returns is at best unwise and at worst, cynical.

**Eat the Right Food and Help Save Australia's Water[41]:**

- In 1997, Professor Wayne Meyer, then Program Leader for Sustainable Agriculture in CSIRO's Land & Water division, said the heavy demands falling on the nation's water resources mean there must be greater scrutiny of how Australia uses its water.
- The biggest users of water are meat and wool; growing a kilogram of beef requires 50,000 to 100,000 litres while a kilogram of clean wool takes 170,000 litres.[iv]
- If drainage and delivery losses are taken into account, these numbers are higher still, Dr Meyer said.
- "People are often amazed at the volumes of water used for food production while others, like irrigated commodity groups, rally to defend and justify their use of water. This debate is welcome, because it heightens public awareness of the need for sensible use of our limited resources."
- Professor Meyer said it is important to take into account the total water used, whether from rainfall or irrigation. This focuses attention on the water losses which occur through evaporation or drainage below the plant's roots.
- "If Australia is to have an open and fully-accountable water system - i.e. water priced fully, with no hidden subsidies - the choice of crops which can be grown will be governed by the relative costs and returns for different enterprises."
- The CSIRO scientist said Australia must eliminate unnecessary and unproductive losses of water and direct our research efforts to decreasing the amount of water lost for each kilogram of protein produced.
- Additional Comment (not in the press release): Professor Meyer's approach of using rainfall within his calculations seems valid when one considers that utilisation of the land for grazing or feed crops would prevent it from being returned to natural vegetation (including forests) or used for other environmentally beneficial purposes.

[iv] A typical backyard pool holds around 50,000 litres.

**Exports**

- Dairy and meat products were the highest value food exports from Victoria in 2007, with 34% ($2.16 billion) and 22% ($1.39 billion) respectively of total food and fibre exports. [42]

**Pricing**

- As with other products, we need to ensure that we allocate our water resources in an economically rational manner, in accordance with efficient market practices. This would be achieved by ensuring that prices (including export prices) allow for all externalities, including the environmental costs associated with each input.

**General**

- Although researchers have utilised varied approaches to measuring the amount of water embedded in food products, with different results, there is no doubt that food production is a significant user of water. Beef, in particular, involves an extraordinarily high level of water usage relative to most other products, whilst wool's water requirements are higher still.
- Much of the enormous expenditure on new water-related infrastructure projects, along with the environmental and other consequences of such projects, could potentially be avoided or reduced if consumers elected to modify their diets.

**Extract 6 from "A Climate of Opportunity" Summit Paper:**

**Another Perspective**

The Garnaut Climate Change Review has noted that while Australia may be the developed country with the most to lose from climate change, it has a number of advantages that means we are well placed to seize the opportunities presented by climate change [including the view that] Australia's livestock industries are less emissions intensive than competitors in the Northern hemisphere.

**Comments in Relation to Extract 6:**

**Key Points from this Section:**

Although the Garnaut report has suggested that Australia's livestock sector may be less greenhouse intensive than some of its foreign competitors, when compared to plant-based alternatives, livestock production is incredibly potent and destructive. To compare Australia's livestock production favourably to its Northern Hemisphere competitors offers little comfort.

In any event, market pressures appear likely to cause our farming practices to intensify in line with those competitors.

- Much of the impact of livestock production on climate change results from the grossly inefficient nature of meat as a food source for humans. That inefficiency causes far more grain to be produced with the world's limited resources, with resultant environmental impacts, than would be the case if our nutrients were derived directly from plant sources.

- Peter Singer and Jim Mason have stated, *"In her 1971 classic 'Diet for a Small Planet', [Frances Moore] Lappé calculated that it took 21 pounds of grain to produce one pound of beef. . . . Since then, beef producers have improved their efficiency, but when we take into account the fact that only about half the weight of a steer is boneless beef, 13 pounds of grain are required to produce that single pound of beef."*[43]

- The following table demonstrates some of the inefficiencies involved in meat production[44]:

| Product | Gross Energy Output (MJ) per Hectare | Number of People Fed per Hectare |
|---|---|---|
| Cabbage | 105,000 | 23 |
| Potatoes | 102,000 | 22 |
| Rice | 88,000 | 19 |
| Corn | 76,000 | 17 |
| Wheat | 70,000 | 15 |
| Pork | 14,000 | 3 |
| Rabbit | 13,000 | 3 |
| Milk | 9,000 | 2 |
| Lamb | 7,000 | 2 |
| Chicken (corn-fed) | 7,000 | 2 |
| Beef | 5,000 | 1 |

- Though some 800 million people now suffer from hunger or malnutrition, the majority of corn and soy grown in the world feeds cattle, pigs and chickens.[16]

- One result of this inefficiency is that forests are transformed into either grazing land for cows or fields to grow crops for grain-fed stock, as indicated by the following comments

from the UN's Food and Agriculture Organization[6], *"Expansion of livestock production is a key factor in deforestation, especially in Latin America where the largest amount of deforestation is occurring – 70 percent of previously forested land in the Amazon is occupied by pastures, and feedcrops cover a large part of the remainder."*

- Earlier this year, the President of Brazil announced emergency measures to halt the burning and cutting of the rain forests for crop and grazing land. The government said that in the previous five months alone, 1,250 square miles, or 320,000 hectares, had been destroyed.[37]

- It could be argued that the lower proportion of grain-fed beef in Australia than in some other countries, results in less greenhouse intensive meat production. The production of feed-crops for grain-fed cattle (including requirements for fuel and fertilizer) contributes significantly to greenhouse emissions. On the other hand, grain-fed animals (which are predominant in the United States) emit less methane through belching and flatulence than their grass-fed brethren.

- In any event, Australia's proportion of grain-fed beef as a percentage of total beef production appears to be increasing.

- According to Meat & Livestock Australia,[45] *"During 2005, Australia's feedyard capacity exceeded one million head — the highest level on record. Grainfed beef now accounts for one third of Australia's total beef production, over 1.5 billion pounds."*

- A key issue for Australia may be the increasing Westernisation of the Asian diet, including meat. The Japanese (and possibly others) generally prefer the more "marbled" or fatty meat, which grain-fed cows provide, and our exporters will be keen to respond to that demand by increasing the amount of grain-fed beef produced.

- According to the Australian Embassy in Japan in 2004, *"With the increased demand for Australian grainfed beef over the past few years, Australia's capacity to grain feed cattle has continued to increase. However, at the moment Australia's feedlots are only at about 70% utilisation. With improved grain supplies and an increase in demand for grainfed beef, Australia has the ability to increase it's [sic] grainfed production and supply to Japan."*[46]

- A striking example of the growth in grain-fed beef production is the recently established Grassdale feedlot in Queensland.[47] Some key points are as follows:

  - It takes three trucks a total of 10 hours to deliver the 400 tonnes of grain consumed daily by 35,000 head of cattle on Grassdale, eventually to become one of Australia's biggest feedlots.

  - The facility has been designed to hold nearly 50,000 head in shaded yards that cover 40 hectares where most of the cattle are fed for 100 days before slaughter.

  - However, the farm cannot produce the amount of grain needed for the facility, according to manager Ben Maher. "We are using 400 tonnes of grain a day which currently is sorghum that is sourced from around the Darling Downs which produced a good crop this summer,'' he said. "When that supply is exhausted we will look to wheat.''

- As well as the problem of direct emissions, massive tracts of land used by the beef, sheep (including wool) and dairy industries (refer to comments under Extract 3) are degraded. Additional problems arising from such usage are as follows:

  - The extensive land use by the beef, sheep and dairy industries prevents us from using such land for the single most effective sequestration technology available, reforestation.

- In addition to reforestation, we could add carbon to the soil of our land to be used for non-animal agriculture, a technique known as ‘Terra Preta’ farming. Improving the carbon content of our soils has the potential to sequester even more carbon per hectare than growing a tropical forest from scratch.

- When compared to plant-based alternatives, livestock production is incredibly potent and destructive in terms of greenhouse emissions and other problems. To compare Australia’s livestock production favourably to its Northern Hemisphere competitors offers little comfort to Australians.

## 4. Conclusion

In Victoria, people are encouraged to be passionate about Australian Rules Football. For much of the year, the sport dominates the media and is often the main item of discussion around office coolers and school playgrounds.

However, such passion in relation to issues like diet and climate change is usually met with responses that range from amusement or bemusement to hostility.

It's time that the people of this state and beyond channelled their energies into responding to this great environmental challenge.

In many ways, not much effort is required. This paper is intended to alert the government and the community to the impact of diet on the environment, with the aim of encouraging a change in eating habits in respect of those who are not already on a wholly or significantly plant-based diet.

Such a change does not need to be drastic or unsatisfying, as the world of vegan eating is delicious and nutritious.

Widespread adoption of such an approach would provide massive economic benefits through reduced health costs, reduced fuel imports, improved tourism and carbon credits, partially resulting from reforestation of areas that are currently used for grazing and feed-crop production. It would also enable us to go beyond our Kyoto Protocol obligations.

There are many resources available to assist with the transition, and a good starting point is Vegetarian Network Victoria, whose web site address is www.vnv.org.au.

I trust this submission has been informative and motivating. My only aim is to help in some way toward saving this magnificent planet and all forms of life that are fortunate enough to inhabit it. We are merely custodians, who are obliged to pass it on in good condition to those who follow.

## Acknowledgments

I am very grateful to Wayne Meyer, currently Professor of Natural Resource Science, University of Adelaide and Ian Rutherfurd, Associate Professor, Department of Resource Management and Geography, Graduate School of Land and Environment, University of Melbourne for kindly explaining various aspects of the approaches that they have adopted in their research into the water content of food.

I am similarly grateful to Bruce Poon for his generous assistance and willingness to share his extensive knowledge in regard to the effects of diet on the environment.

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