

# Professor Barry Brook on Livestock Agriculture and Climate Change

Professor Brook is an international research leader in global ecology and conservation biology. He holds the Foundation Sir Hubert Wilkins Chair of Climate Change and is Director of the Research Institute for Climate Change and Sustainability at the University of Adelaide.

He has published two books and over 100 scientific papers on various aspects of human impacts on the natural environment and biodiversity. He has been awarded the Australian Academy of Science Fenner Medal, Edgeworth David Medal by the Royal Society of New South Wales, and the H.G. Andrewartha Medal by the Royal Society of South Australia. Professor Brook was listed by Cosmos as one of Australia's top 10 young scientists. Professor Brook emphasizes the need to recognize methane as a major contributor of greenhouse gases.

**Professor Barry Brook:** Methane is an interesting greenhouse gas; many people may not have heard of it, but it's actually the second most powerful greenhouse gas in terms of human's total contribution to climate change.

Everyone has probably heard of CO<sub>2</sub>. Methane is another greenhouse gas that has a large impact and it's especially important over shorter time periods. Methane is produced mainly by ruminant animals and also it's released from fossil fuel reserves, such as coal mines and gas fields. Those fires that we see at the top of an oil well for instance, that is the flaring of methane. So methane is actually natural gas too, that we would burn to heat water and so on.

**Professor Barry Brook:** I've done some work recently with a couple of colleagues showing that in fact Australia's contribution to global warming is more to do with methane, at least in the short term, than it is with anything else. And even more than that, it's more to do with methane produced by ruminant animals, cattle and sheep and goats for instance.

As part of their natural digestion process they produce methane; they chew the cud, they have a second stomach, and inside that stomach there's bacteria that break down cellulose in grass to release energy. That's a process that's known as an anaerobic process, so it's in the absence of oxygen and that process causes the release of methane, mostly through belching.

Now because it's such a powerful greenhouse gas, it has a disproportionate effect on climate change. But most of its impact occurs over a fairly brief period of time, ten or twenty years, almost all the methane is gone. **But if you look over that time period and for every ton of methane that's released, that's the equivalent to releasing 72 tons of carbon dioxide.**

**CH<sub>4</sub> = 72 \* CO<sub>2</sub>**

So it packs a big punch. So to put that into context, Australia's cattle industry, livestock industry, cattle and sheep, currently releases about 3 million tons thereabouts of methane per year.

**Australia's Live Stock = 3 million tons methane per year. \* 72 = 216 million tons methane**

**Australia's coal-fired power stations = 180 million tons of CO<sub>2</sub>**

Whereas our coal-fired power stations release about 180 million tons of CO<sub>2</sub>. So it sounds like coal-fired power stations contribute much more than our cattle do to global warming.

But if you think that methane packs 72 times the punch of CO<sub>2</sub> over a 20 year period, then over those next two decades you multiply three by 72. It's pretty easy to work out that our cattle and sheep industry actually contributes more to global warming than our coal-fired power stations over that period. So that is a vastly underappreciated fact in Australia.

**SupremeMasterTV:** Do you think that methane is underappreciated in our recent submissions to the government?

**Professor Barry Brook:** Yes, I think that's quite apparent. If you look at different greenhouse gases, they have a different contribution to global warming. So you need some method of standardizing them. The basic method that the Intergovernmental Panel on Climate Change (IPCC) uses is to average everything over a 100 year period.

But for methane that is actually a bit pointless, because it's almost all gone after about 20 years. So you have taken all of its short term contribution and smeared that out over 100 years to make it much less than it would otherwise be. So, if you look at these reports they will suggest it has about 25 times the impact of CO<sub>2</sub>.

**But really when it's up there in the atmosphere doing its work, it's 72 times the impact and that makes a big difference.** So I think if we want to be serious about our emissions reductions, we have to account for agricultural emissions and we have to, most importantly, account for Australia's greatest contribution in the short term too.

**SupremeMasterTV:** So if we were to have an effect on the animal agriculture, phase it out, would that buy us time with the CO2 technologies?

**Professor Barry Brook:** Yes, because methane has a very powerful effect, but a short-term effect; ironically, you can do something about it pretty quickly compared to CO2. So although it's really important right now, it's something we can really purge out of our emissions very quickly. For reasons disconnected with climate change, for instance, Australia's sheep population declined from about a 190 million to less than a 100 million since 1992.

That's had a large impact on Australia's methane emissions. It gives you an example of how quickly we can make that change, basically halved the emissions produced by Australia's sheep. There is no reason why you can't do that for cattle as well. Whereas to change over societies' infrastructure, for instance from coal-fired power stations to alternative forms of energy, whilst that needs to happen very quickly, it requires a large turnover of capital infrastructure, things which tend to be, I think, economically more intractable.

Whereas, reducing the head of cattle in Australia is something that could be done quickly, just over a couple of years and have a huge impact on our global-warming impact.

**SupremeMasterTV:** I'd like to talk to you about the review that you did with Geoff Russell. It's called, "Meat's Carbon Hoofprint." Can you tell us about that?

**Professor Barry Brook:** Yes, this was a study we did which looked at the relative impact of eating beef on a families' CO2 emissions compared to some of their other activities that most people might suspect would have a much greater contribution to global warming. The example we used was, let's say you have a large four-wheel-drive vehicle, a Ford Territory.

So that costs about 17 tons of CO2 emissions to build the thing and then to run it each week it might be about 200 grams of CO2 per kilometer driven. So, you can make the calculation on that basis, it might be 60 kilograms of CO2 a week that you're using to drive this lumbering Ford Territory around, as well as the emissions that went into producing it.

If you eat what the CSIRO, "Total Wellbeing Diet" recommends is the average weekly consumption of beef, which is somewhere between 3 to 5 kilograms, then you find that when you do the calculations for methane, even when it's using the standard, which is 25 times as powerful as CO2, and remember earlier I said that really we should be talking about 72 times as powerful. But even at 25 times as powerful, that would be releasing about 200 kilograms a week compared to 60 from your Ford Territory.

So you only need to go for about five years cutting out that meat in your diet and you've paid for the emissions of that great four-wheel drive;

that's one example. Another way to look at it is the amount of emissions produced by a kilogram of steak. That's so emissions intensive in terms of methane that it's the equivalent to four times the emissions that would be released by producing a kilogram of aluminum, which is considered incredibly energy intensive, and using a lot of electricity to actually produce that aluminum by electrolysis.

**Beef, four times more than producing a kilogram of aluminum, beef being much more of a contributor than driving a four-wheel vehicle.** These are facts which are Greatly underappreciated, so it means you need to be climate conscious about your diet, because there are some impacts in your lifestyle that will have a much greater effect on global warming than others and people don't actually understand what they are.

**SupremeMasterTV:** In relation to water that they use to grow beef. There is a lot of, water used in that regard. Can you tell us about that?

**Professor Barry Brook:** Yes, indeed, there is a lot of water that goes into producing a kilogram of beef and a lot of water also goes into producing dairy products.

Much dairy in Australia is conducted on lands that wouldn't actually be suitable for dairy except for irrigate agriculture. So this is water that is piped from the Murray and sprayed over vast areas of pasture to produce sufficiently green pastures to produce good milk. But that's the same water that's in desperately short supply in Adelaide, that's killing the Coorong, for instance, because it's not getting enough water flow.

These are being sprayed onto the green fields of Western Victoria to produce dairy. It's not actually a very sensible use of water at all. So I think people have to look at the total impact of livestock to really appreciate why they can be particularly damaging to global change. Indeed, looking further afield than Australia, to the tropics, **one of the major drivers of tropical deforestation, which in itself is responsible for about 20%, a fifth of all the human CO2 emissions, is driven by clearance of tropical forest for cattle grazing.**

So again it's a driver of deforestation, cause of CO2 emissions directly by chopping down, burning, mostly burning those trees and then once the cattle are there, producing a whole lot more methane as well.

So, there is no doubt that livestock have a long shadow and indeed that was the title of the report produced by the United Nations last year looking at the total impact of livestock on global change. It's pretty profound and it's pretty pervasive.

**SupremeMasterTV:** Do you think that our government should be doing more as regards to letting people know about how they can act as individuals to help with our planetary crisis?

**Prof Brook:** I think leaving agriculture out of the equation sends the wrong signal because it exempts a sector of society from making greenhouse gas cuts, when in fact every sector of society needs to contribute, so it's just moving the burden to other parts of society. And it's not rightfully acknowledging the impact, the environmental impact that rearing animals have on Australia. People often talk about climate change as having a long-term impact and what it's going to do by the end of the century. Yet we're observing impacts such as the loss of Arctic summer sea ice, an expansion of tropical weather systems, very intense droughts in sub-Saharan Africa and indeed in Australia.

**The sort of impacts we predicted for 20, 30, 50, 100 years off are occurring now.**

And there's also a great risk that we're going to cross what are known as tipping points in US system, where we start to get runaway climate change, or at least climate change that's greatly accelerated by changes to the Earth system.

**We're at a crucial social tipping point and a crucial environmental tipping point right now. Now is the time to take action. It's urgent.**

Video of this interview here>

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