Chapter 6
A Fresh Look at Livestock Greenhouse Gas Emissions and Mitigation

Robert Goodland
World Bank Group, USA

ABSTRACT

The gravest environmental impact of food production is the impact of its greenhouse gas emissions; that's because of the uniquely diverse, unprecedented, and irreversible risks that it involves. According to the International Energy Agency, atmospheric carbon must be reduced significantly by 2020 or else the world may not be able to avert uncontrollable climate change. This chapter compares the most recent assessment of livestock and climate change by livestock specialists employed by the United Nations' Food and Agriculture Organisation with assessment of livestock and climate change by two World Bank Group environmental specialists, Robert Goodland and Jeff Anhang. It is explained how the only pragmatic way to reverse climate change before it is too late is to replace a substantial amount of today's livestock products with better alternatives.

INTRODUCTION[1]

Jeff Anhang and I have estimated that the lifecycle and supply chain of livestock products are responsible for at least 51% of human-induced GHGs (Goodland & Anhang, 2009), which means that the only pragmatic way to reverse climate change by 2017 as needed is to replace at least 50% of today's livestock products with better alternatives. Our assessment began when we analysed some significant gaps that we found in a 388-page report by the UN Food and Agriculture Organization, or FAO. That FAO report was called *Livestock's Long Shadow* (Steinfeld et al., 2006), and it estimated that 18% of human-induced GHGs are attributable to livestock products – much less than our figure of 51%, but still a significant amount.

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GREENHOUSE GAS EMISSIONS

We are approaching tipping points for climate change. It is important to have some understanding of food's contribution to greenhouse gas emissions and possible future scenarios.

Climate Tipping Points

Greenhouse gas (GHG) reductions have conventionally been sought in the replacement of fossil fuel infrastructure with renewable energy infrastructure. While that replacement is surely desirable, it has both long and complex product-development cycles and capital-intensive requirements. Indeed, sufficient renewable energy infrastructure to stop climate change is now projected to take at least 20 years and US$18 trillion to develop according to the International Energy Agency (IEA, 2011b). The IEA (2011a) and the Intergovernmental Panel on Climate Change (IPCC) (Spotts, 2012) have projected that climatic tipping points may be reached by 2017 or by 2020 at the latest, making later GHG reductions ineffective.

Climatic tipping points are fearsome. For example, the National Academy of Sciences published a new study that 1,700 American cities – including New York, Boston, and Miami – will be locked into some amount of submersion from rising sea levels as a result of climatic tipping points, unless expensive new dykes and levees can hold back the rising waters (Goldenberg, 2015).

Flooding is only one dire adverse impact expected from climate change. Another is drought – as a key aspect of climate change is that volatility will increase, so swings between one adverse impact and another will become increasingly wide. Increasing swings between flooding and drought can be expected to affect agriculture more than any other industry, as agriculture is worked on outdoors to an extent that's unique among all industries.

Another dire impact of climate change is global warming. For example, a one degree Celsius rise in temperature above optimum in a growing season causes a 10% decline in grain yields (Brown, 2011). This is already happening in some regions. Yet as conservative an organization as PricewaterhouseCoopers has warned of a possible six degree Celsius rise in global temperature this century (PwC, 2012) – that's a 10.8° Fahrenheit rise – which implies a 60% decline in agricultural outputs.

Unfortunately, climatic tipping points can no longer be avoided by constructing the amount of renewable energy infrastructure that would be required. The amount of renewable energy infrastructure needed to avert climatic tipping points projected to be reached by 2017 could have been constructed in time – if construction had started when the Kyoto Protocol was adopted in 1997. That was supposed to happen through the process that required each country that subscribed to the Kyoto Protocol to reduce GHG emissions in each year after the protocol came into force in each country. Instead, with only a few exceptions, GHG emissions ended up rising each year in each country that signed the Kyoto Protocol.

Food Future Scenarios

Now, there seems to be only one remaining pragmatic way to reverse climate change before it's too late – and that's by taking quick and large-scale actions in the realm of food, agriculture, and forestry. If the analysis by Jeff Anhang and me is correct in estimating that at least 51% of human-induced GHGs are attributable to livestock, then replacing 50 to 85% of today's livestock products with better non-animal based alternatives by 2017 could fully achieve the objective of the Kyoto Protocol and avert catastrophic climate change. According to our calculations in 2009, the amount of replacement needed would be more

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