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A kilogram of beef is responsible for more greenhouse gas emissions and other pollution than driving for 3 hours while leaving all the lights on back home.

This is among the conclusions of a study by Akifumi Ogino of the National Institute of Livestock and Grassland Science in Tsukuba, Japan, and colleagues, which has assessed the effects of beef production on global warming, water acidification and eutrophication, and energy consumption. The team looked at calf production, focusing on animal management and the effects of producing and transporting feed. By combining this information with data from their earlier studies on the impact of beef fattening systems, the researchers were able to calculate the total environmental load of a portion of beef.

Their analysis showed that producing a kilogram of beef leads to the emission of greenhouse gases with a warming potential equivalent to 36.4 kilograms of carbon dioxide. It also releases fertilising compounds equivalent to 340 grams of sulphur dioxide and 59 grams of phosphate, and consumes 169 megajoules of energy (*Animal Science Journal*, DOI: 10.1111/j.1740-0929.2007.00457.x). In other words, a kilogram of beef is responsible for the equivalent of the amount of CO_2 emitted by the average European car every 250 kilometres, and burns enough energy to light a 100-watt bulb for nearly 20 days.

The calculations, which are based on standard industrial methods of meat production in Japan, did not include the impact of managing farm infrastructure and transporting the meat, so the total environmental load is higher than the study suggests.

Most of the greenhouse gas emissions are in the form of methane released from the animals' digestive systems, while the acid and fertilising substances come primarily from their waste. Over two-thirds of the energy goes towards producing and transporting the animals' feed.

Possible interventions, the authors suggest, include better waste management and shortening the interval between calving by one month. This latter measure could reduce the total environmental load by nearly 6 per cent. A Swedish study in 2003 suggested that organic beef, raised on grass rather than concentrated feed, emits 40 per cent less greenhouse gases and consumes 85 per cent less energy.

"Methane emissions from beef cattle are declining, thanks to innovations in feeding practices," says Karen Batra of the National Cattlemen's Beef Association in Centennial, Colorado. "Everybody is trying to come up with different ways to reduce carbon footprints," says Su Taylor of the Vegetarian Society in the UK: "But one of the easiest things you can do is to stop eating meat."