New report gives the lay of the land on grazing livestock's climate impact

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An international research collaboration has shed light on the impact that grass-fed animals have on climate change. Its new study adds clarity to the debate around livestock farming and meat and dairy consumption.

The newly published report dissects claims made by different stakeholders in the debate about so called 'grass-fed' beef, the greenhouse gases the animals emit, and the possibility that, through their grazing actions, they can help remove carbon dioxide from the atmosphere. It evaluates these claims and counterclaims against the best available science, providing an authoritative and evidence-based answer to the question: Is grass-fed beef good or bad for the climate?

"Grazed and Confused? Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question - and what it all means for greenhouse gas emissions" is written by Dr Tara Garnett of the Food Climate Research Network at the University of Oxford, Cécile Godde at Australia's national science agency the CSIRO and a team of international experts. The report finds that while grazing of grass-fed animals can boost the sequestration of carbon in some locally specific circumstances, that effect is time-limited, reversible, and at the global level, substantially outweighed by the greenhouse gas emissions they generate.

Lead author Dr Tara Garnett explains the key takeaways from this report: "This report concludes that grass-fed livestock are not a climate solution. Grazing livestock are net contributors to the climate problem,

as are all livestock. Rising animal production and consumption, whatever the farming system and animal type, is causing damaging greenhouse gas release and contributing to changes in land use. Ultimately, if high consuming individuals and countries want to do something positive for the climate, maintaining their current consumption levels but simply switching to grass-fed beef is not a solution. Eating less meat, of all types, is."

Published just ahead of the COP23 meeting in Bonn, the report places emphasis on the need to consider animal production and meat consumption, if we are to reach the climate goal of a 2-degree warming limit. More than laying out the bones of the grass-fed grazing dispute, the report also helps fill the knowledge gaps about emissions and sequestration, and aims to provide more nuance to the debate.

The report reflects two years of close collaboration between researchers at the Universities of Oxford, Aberdeen and Cambridge in the UK; Wageningen University & Research in the Netherlands; the Swedish Agricultural University; CSIRO in Australia and the Research Institute of Organic Agriculture (FiBL) in Switzerland. It is aimed at policy makers, the food industry, civil society and all those concerned with the future of land use, climate change, and the role of livestock in a sustainable food future.

Lead author Cécile Godde explains the focus on climate and the significance of these questions for the overall debate on land use and environmental sustainability: "'The big question' that needs answering is whether farmed animals fit in a sustainable food system, and if so, which farming systems and species are to be preferred. Of course, there are many dimensions to sustainability and this report only considers one of them - the climate question. But the climate question alone is important to explore and in doing so, this report takes us a step further towards understanding what a sustainable food system looks like."

Dr Tara Garnett adds: "When thinking about different livestock production systems there are many important aspects to consider: people's livelihoods and jobs, animal welfare, biodiversity, nutrition and food security and more. Grazing systems and grass-fed beef may offer benefits in these respects, benefits that will vary by context. But when it comes to climate change, people shouldn't assume that their grass-fed steak is a climate change-free lunch. It isn't."

Background

By now, most people are aware that our consumption and production of meat and dairy is a major contributor to climate change. The livestock sector as a whole is responsible for 14.5% of global human-related GHG emissions, making our increasing demand for meat and dairy foods extremely problematic if we are to limit global warming to below the internationally agreed goal of 2-degrees. However, both consumers and policymakers have a much looser grasp on the differences in climate impact between different types of livestock. A major source of confusion and debate is about the impact of "grass-fed" beef relative to other types of meat. Is grass-fed beef a climate villain or could it in fact, as some argue, be a climate saviour?

While scientific studies generally find that cattle and other ruminants are a source of many of our environmental and climate woes, and that grass-fed livestock are worst in terms of meat or milk output per unit of GHG emitted, an increasingly vocal opposition to this view can be heard. These stakeholders argue that the while ruminants emit GHGs, the lands these animals graze on also contain large stores of carbon; and crucially, that animals' grazing actions help reduce carbon dioxide emissions through 'soil carbon sequestration'. Inspired by ideas about 'holistic grazing management' put forward by among others, Allan Savory, some advocates of grass-fed systems even argue that if you graze cattle right, this carbon sequestration can offset all other emissions from ruminants,

and in doing so solve our climate problems.

Findings

1. The potential contribution of grazing ruminants to soil carbon sequestration is small, time-limited, reversible and substantially outweighed by the greenhouse gas emissions they generate. The ambitious claims made by advocates of grass-fed livestock about grazing as a significant mitigation opportunity are thus unfounded. While grazing livestock have a beneficial role to play in some contexts, and better management of grazing is a worthwhile objective, when it comes to climate mitigation, its potential contribution is minor. Ruminants (in both grazing and other production systems) contribute 80% of total livestock emissions - which itself totals 14.5% of human related GHGs.

Grazing management could potentially, and under very generous assumptions, offset between 20-60% of annual average emissions from the grass-fed only sector, 4-11% of total livestock emissions and between 0.6 and 1.6% of total annual human made emissions, to which of course grass-fed and other livestock contribute.

2. Rising animal production and consumption - of all kinds and in all systems - risks driving damaging changes in land use and associated GHG release. Grazing livestock produce only a fraction of global protein supply. Spread out across the globe, 1 g of protein/person/day comes from solely grass-fed animals, as compared to 32 g/person/day coming from all animal sources (Including fish), and 49 g/person/day from plant sources.

When it comes to land use, however, ruminants collectively use about a 1/4 of the earth's useable surface. Even if exaggerated claims about carbon sequestration were true, it is simply not possible to carry on eating as much meat and dairy as trends indicate and obtain it through

grass-fed systems alone (even with the additional feeding of agricultural by-products and food waste) - without incurring devastating land use change. Increasing grass-fed ruminant numbers is therefore a self-defeating climate strategy, as any sequestration is offset by emissions. Looking at the maximum allowable emissions space from all sources in 2050, consistent with the 2-degree target laid out in the Paris Climate Agreement, it is clear that with unaltered demand projections for animal products, 1/3 of the total 'allowable' emissions space will be taken up by livestock.

So, if grass-fed livestock are not a solution to ruminant emissions - could switching global meat consumption from ruminants to other species, such as chickens and pigs, be? It turns out this is not a cost-free strategy either. Rapidly growing increases in primarily intensively produced pork, poultry meat and eggs, together with intensively produced beef and milk, is driving demand for new cropland to grow feed crops. This places pressure on existing land and drives the clearance of ecosystems for new farmland. Importantly, intensive animal production systems are associated with other concerns, such antibiotic resistance and animal welfare, not explored in this report.

3. The overall impact of grazing livestock on climate change depends on the net balance of all emissions and all removals. Efforts to sequester carbon, and also to reduce methane, carbon dioxide and nitrous oxide emissions may not always align. There will be trade-offs, often highly context specific. Leaving aside any scope for sequestration from grazing, we need to halt the ongoing degradation and conversion of grasslands to croplands, to avoid losing the huge carbon stocks already stored in grasslands worldwide.

More information: Garnett T, Godde C, Muller A, Röös E, Smith P, de Boer IJM, Ermgassen E, Herrero M, van Middelaar C, Schader C and van Zanten H (2017). Grazed and confused? Ruminating on cattle,

grazing systems, methane, nitrous oxide, the soil carbon sequestration question. Food Climate Research Network, University of Oxford www.fcrn.org.uk

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