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Editorial: Sustainable sustenance

Christopher H. Knight

BreatheScience, Ayr KA7 2QW, UK

Editorial

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Author for correspondence:
Christopher H. Knight,
Email: chrisknight@breathescience.org

Not surprisingly, the terms 'sustainable' and 'sustenance' have a common etymology, since both can be traced back to the Latin verb sustinere or sustineo, meaning variously to uphold, support, tolerate or, of course, to sustain. Since the late 14th century the main use of sustenance has related to nourishment, specifically the '*action of sustaining life by food*'. Sustainable and sustainability, on the other hand, have acquired their common meaning quite recently (20th century) but have recently become so important in relation to our global environment as to have a very specific definition provided by the World Bank: the '*requirement of our generation to manage the resource base such that the average quality of life that we ensure ourselves can potentially be shared by all future generations*'. The usefulness of this definition can be questioned on the basis that the average quality of life is rather difficult to identify but is usually taken to relate primarily (or even solely) to developed countries: an online Quality of Life Index (Numbeo, 2021) includes only 3 of the 50 or so countries in sub-Saharan Africa, for instance. The interrelationships of sustainability and sustenance now begin to emerge. For very many people living in those other 47 countries, sustenance (food to survive) is the absolute priority, but is very heavily influenced by the climate change issues that sustainability is designed to address, and over which thy have little or no control. That control is exerted by the leaders of the developed world, themselves heavily influenced by you and I and our desire to enjoy warm, comfortable and varied lifestyles. A generation has now grown up with the belief that their explorable back-yard essentially extends to the far side of the world and will be just as cosy and hospitable wherever they might roam. Furthermore, that shrinking globe also ensures that everything they might desire in terms of exotic foods, designer goods and commodities is only a few mouse clicks away and will come to them at considerable pace. We are consummate consumers, and I do not exclude myself from this analysis! My dictionary defines the verb to consume as '*to destroy by wasting*' and many would argue that this is exactly what we are doing through our abundant use of natural resources. How can this generation make amends for their environmental extravagances? A simple answer that many appear to find attractive has been supplied by numerous agencies, including such august bodies as the Food and Agricultural Organisation of the United Nations: eat less meat, drink less milk. A second interrelationship between sustenance and sustainability thus emerges, driven by the recognition that methane emitted by ruminant animals is a potent greenhouse gas. The extent of this problem has been a matter of great debate in recent years, including recent articles in this Journal (del Prado *et al*., 2021; Munidasa *et al*., 2021) and I do not intend to prolong that debate. I will, however, point out a few features that I believe are both important and often overlooked. Firstly, the quantification of methane emissions and their impact is not without its problems, even when that methane is coming from a point source such as an animal, but one of the reasons that ruminants have been incriminated is that whilst belched methane *can* be measured, methane arising from diffuse aquatic environments (paddy fields, for instance) is extremely hard to even estimate. High resolution satellite imaging is beginning to address that deficiency, which may come to be good news for livestock agriculture but does not in itself solve the greenhouse gas problem (BBC, 2021b). Secondly, whilst the industrial age and it's environmental impact have been with us for around three and a half centuries, ruminants have been around (and extremely numerous) for more than one hundred million years. The idea that enteric methane may have led to the demise of the dinosaurs is not generally supported, despite modelling suggesting a production level roughly equivalent to our total global post-industrial methane generation and seven-fold higher than emissions from cattle (Wilkinson *et al*., 2012). Thirdly, if one does believe that farmed cattle pose a serious environmental threat, it is worth remembering that methane will be released every day of the animal's life (albeit at low levels initially) but whilst dairy cattle produce a high-quality food product each and every day for around half of their life, the food value of a beef animal is a one-off. Environmental impact modelling that does not take account of the nutritional value of outputs has very limited value. Fourthly, and really as an extension of this argument, it is naive in the extreme to isolate the animal from its local environment and management when assessing impact. As a simple example, cold blooded insects are extremely efficient producers of high value protein (much more so than ruminants), but to harness that ability on a commercial scale requires a very significant level of energy-intensive environmental control. Finally, and bringing us back to our starting point, recent lock-down experiences have shown us all that day-to-day life can continue without excessive use of planes, trains and automobiles, but the average

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person cannot survive for more than a few weeks without food. Please do not misunderstand me: I am extremely conscious that livestock agriculture does have a significant environmental impact and I applaud efforts to manage and minimise that impact. I am often struck by our ingenuity, whilst sometimes wondering if our efforts might be misdirected. The idea that we can routinely control the incredibly complex fauna and flora of the rumen in the same way that we can manage the animal itself always seemed ambitious to me, but near-complete reduction in methane emissions has been achieved by rather simple dietary manipulations such as seaweed inclusion (Roque *et al.*, 2019). Other marine-related management approaches seem equally far-fetched: you may recall the first floating dairy farm in Rotterdam (BBC, 2018) but now the same business-oriented source reveals that salmon farming is moving in the opposite direction, to terrestrial sites in Florida (BBC, 2021)! Again, please do not think of these as anything other than rather quaint examples of mankind's desire to harness nature to his own ends. When it comes to meeting the demands of our growing global population for milk and dairy products, whilst buffalo and small ruminants have a part to play, the bulk of production will almost certainly continue to revolve around dairy cows managed either for maximised production or minimised inputs. The environmental arguments for one or the other are not straightforward, the benefits of extensive pasture being counterbalanced by the dilution of maintenance achieved with intensification. No doubt more research will be done and more models will be constructed as we seek to further improve and develop our global dairy industries in harmony with environmental considerations. My hope in this regard is that we shall never lose sight of the fact that sustenance and sustainability are equally essential parts of a balancing act that nature is ultimately responsible for, and which we can influence but never totally master.

References

BBC (2018) The world's first floating dairy farm making waves in Rotterdam. Available at https://www.bbc.co.uk/news/business-45130010 (Accessed 26th April 2021).

BBC (2021a) The salmon you buy in the future may be farmed on land. Available at https://www.bbc.co.uk/news/business-56829129 (Accessed 26th April 2021).

BBC (2021b) Cutting methane gas "crucial for climate flight". Available at https://www.bbc.co.uk/news/science-environment-56933443 (Accessed 14th May 2021).

del Prado A, Manzano P and Pardo G (2021) The role of the European small ruminant dairy sector in stabilising global temperatures: lessons from GWP* warming-equivalent emission metrics. *Journal of Dairy Research* **88**, 8–15.

Munidasa S, Eckard R, Sun X, Cullen B, McGill D, Chen D and Cheng L (2021) Challenges and opportunities for quantifying greenhouse gas emissions through dairy cattle research in developing countries. *Journal of Dairy Research* **88**, 3–7.

Numbeo (2021) Quality of life index by country, 2021. Available at https://www.numbeo.com/quality-of-life/rankings_by_country.jsp (Accessed 24th April 2021).

Roque BM, Brooke CG, Ladau J, Polley T, Marsh LJ, Najafi N, Pandey P, Singh L, Kinley R, Salwen JK, Eloe-Fadrosh E, Kebreab E and Hess M (2019) Effect of the macroalgae *Asparagopsis taxiformis* on methane production and rumen microbiome assemblage. *Animal Microbiome* **1**, 3.

Wilkinson DM, Nisbet EG and Ruxton GD (2012) Could methane produced by sauropod dinosaurs have helped drive Mesozoic climate warmth? *Current Biology* **22**, R292–293.

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