



Defining and measuring agricultural sustainability

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Science for Sustainable Agriculture

We urgently need a more consistent and science-based approach to defining and measuring what we mean by sustainable agriculture, argues Dr Julian Little.

A recent article on The Breakthrough Institute website, entitled [Measuring What Matters](#), summed it up perfectly:

“To really shrink agriculture’s considerable environmental footprint, we need a new model of agricultural sustainability, one that replaces an antiquated practice-based system with an outcome-based one, directly rewarding better environmental performance.”

The article notes that new digital, AI and sensor technologies are rapidly improving our ability to monitor sustainability parameters such as greenhouse gas emissions, soil and water quality, air pollution, nitrate levels, fertiliser use and methane emissions at farm level. Increasingly, this means that the ‘actual’ sustainability footprint of different farming or food production systems can be accurately and reliably measured.

The article suggests that a shift to objective farm-level metrics might challenge certain preconceptions:

“The mere possibility of discovering that many forms of conventional, industrial agriculture perform well on environmental metrics could be a frightening prospect for some, as it would leave exposed deeper roots of their beliefs about how we should be feeding ourselves.”

But it would establish a consistent, evidence-based approach to defining and measuring what is meant by sustainable agriculture, and in doing so provide the basis to move on from some of the labels and prejudices which often characterise the debate. Even when that uncovers some uncomfortable truths.

“If the specific set of practices entailed in organic farming actually delivers benefits, an outcomes-based system would reward it. But it would equally reward any other combination of practices, be they organic, regenerative, conventional, or some hybrid.”

In its launch [prospectus](#), Science for Sustainable Agriculture has called for the adoption of meaningful, science-based metrics for sustainable agriculture. There is an urgent need to embed farm-level data and sustainability metrics at the heart of a policy agenda focused on securing the optimum balance between food production, resource use and environmental impact.

Access to metrics capable of objectively and consistently monitoring that balance will be essential to set targets and measure progress for sustainable efficient production, to develop coherent R&D programmes, to understand and disseminate advice on best practice throughout the industry, and to provide meaningful information to consumers relating to the sustainability impact of their food choices.

Disappointingly, however, the UK lags behind other countries in its collection and use of farm-level data. While our food processing and retail sectors have made significant progress to benchmark and drive improvements against key sustainability criteria, the agricultural sector is characterised by vast silos of data - on-farm and in research institutes - which have not yet been properly integrated or exploited.

Sharing data does not come easily to UK farmers. There remains a large number who, suspicious of how data might be collected, stored and shared without any benefit to themselves, essentially disenfranchise themselves from the emerging benefits of digital agriculture. Perhaps the recent formation of an independent [British Farm Data Council](#) to formulate a gold standard in data governance can help raise those trust levels to the point where more farmers are prepared to engage in sharing their on-farm data.

Farming businesses generate large amounts of data relating to input use, productivity and farm management systems. Increasing use of IT, satellite technology and automated data collection provides new opportunities for collation and analysis of farm-level data.

But the critical point remains that no centralised system currently exists for industry-wide sharing or analysis of this information.

Defra has funded a significant body of work on sustainability indicators and metrics as part of its 2014-18 Sustainable Intensification Research Programme, including the prototype development of a farmer-friendly data and benchmarking dashboard allowing producers to assess and compare their performance against key indicators and against a weighted average of their peers.

However, according to the researchers involved, this work appears to have been quietly shelved and forgotten. Meanwhile Defra has indicated its support for the Sustainable Food Trust's Global Farm Metric.

This is a puzzling policy decision without apparent explanation or scientific basis.

Not only is the Sustainable Food Trust an activist, openly pro-organic NGO which actively campaigns against potentially beneficial farming tools such as gene editing, and to this day peddles unscientific anti-GMO propaganda such as the widely discredited 2013 Seralini rat-feeding study, but the Global Farm Metric model itself is not based on science, and is skewed towards less productive, more extensive farming systems by favouring a whole farm, or area-based, approach to measuring resource use and environmental impact.

Speaking in September 2021 at a meeting of the APPG on Science & Technology in Agriculture, leading scientists evaluating the sustainability impact of different farming systems, including conservation scientist Professor Andrew Balmford of the University of Cambridge, and economist Professor Paul Wilson of the University of Nottingham, who led the metrics work as part of the Defra Sustainable Intensification Research Programme, indicated that, to be meaningful and robust, sustainability metrics must focus on measuring resource use and environmental impact per functional unit of output (ie kilograms, litres, bioavailable calories), not per area farmed.

Logically, it would make sense for the Sustainable Food Trust's area-based Global Farm Metric to be submitted to a process of independent scientific scrutiny and validation by recognised academic experts in the field.

The Government's recent [Food Strategy](#) document made rather vague and unmet commitments to explore the development of metrics for sustainability and to "provide consumers with the information they need to make more sustainable, ethical, and healthier food choices and incentivise industry to produce healthier and more ethical and sustainable food."

Given the importance of metrics underpinning the scientific and evidential basis for a range of strategic policy decisions and objectives, the Government must urgently commit to the development of robust metrics for sustainable agriculture, grounded in science, and drawing on the considerable body of work already funded by Defra as part of the Sustainable Intensification Research Programme.

A failure to do so would not only do a big disservice to UK agriculture, but would also undermine confidence in the Government's assertion that it takes evidence-led policy decisions based on the best available scientific information.

Dr Julian Little is a member of the Science for Sustainable Agriculture advisory group. A Fellow of the Royal Society of Biology, Julian has worked in plant science and food production for over thirty years. He holds a first degree in biochemistry and a PhD in molecular plant pathology. After a successful career in a number of crop protection and seed companies, he now helps a range of individuals and organisations improve their communications and public affairs activities in relation to scientific research and innovation in agriculture.