Farm Accountancy to Farm Sustainability

Lessons from MAGIC for the reform of the Farm Accountancy Data Network

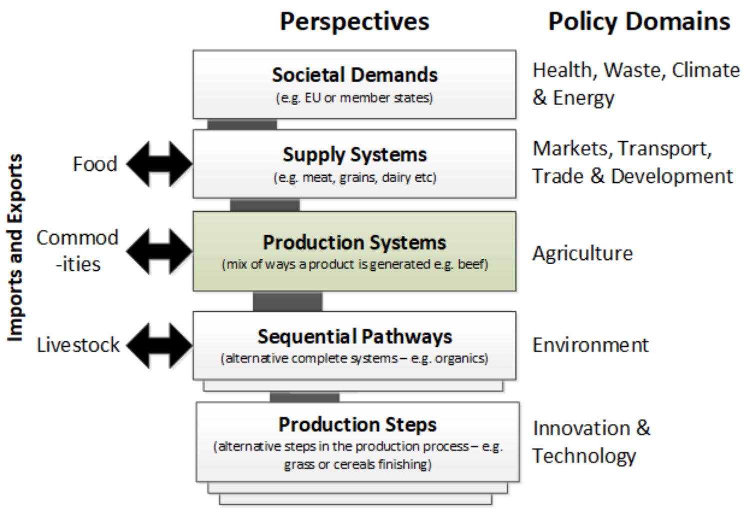
Overview

As part of the Commission's Farm to Fork Strategy[1] there is a proposal to convert the Farm Accountancy Data Network[2] (FADN) into a Farm Sustainability Data Network. The intent is:
"*to collect data on the Farm to Fork and Biodiversity Strategies*" so extending the policy monitoring function of FADN, which looked at farm incomes and the functioning of the instruments of the CAP. The ambition is also that the data will allow "*benchmarking of farm performance*". Two analyses within MAGIC made use of the existing FADN datasets to undertake sustainability appraisals of CAP[3] and the delivery of wider EU sustainability goals[4]. The insights from these analyses highlight the significant needs and challenges for the proposal to allow meaningful appraisal of sustainability issues across the agri-food systems, from farms to supply chains and societal demand.

Farm Accountancy Data Network is a dataset that provides a detailed land management characterisation for a sample of individual farming businesses across the EU. Aggregated data (e.g. by region) is available as time series from 1990. The dataset provides comprehensive financial data including subsidies from CAP measures. The dataset also has details of consumption and use of materials (such as livestock feeds) grown on farm. Detailed data on outputs per crop are available. Overall usage of land, labour, inputs (such as fertilisers) are available but other inputs and infrastructure are represented only by financial values.

Cross-scale Analysis

Farm-to-Fork recognises the need to characterise or monitor the influence of policy on "farm" sustainability across all parts of the agri-food system. In MAGIC these were formalised a five non-equivalent Perspectives. The figure below highlights the five Perspectives and associated Policy Domains within the MAGIC policy-led analyses. The Production Systems level (in green) is concerned with agriculture as a sector and it is this level where the FADN data is most comprehensive and fit for purpose.



Systems in which Production Systems nest

Farm-to-fork recognises that better understanding and shaping the behaviour within the Societal Demand and Supply levels are fundamental to the EU achieving greater sustainability (and security). In terms of material and energy use, 80% occurs between the farm gate and the fork, driven by retail and social practice[5][6].
The significance of Supply Systems is that they allow the inclusion of policies on market regulation and trade in any assessment of farm or food system sustainability. Excluding the land, water, energy, nutrient and labour used elsewhere, e.g. in imported livestock feed, may be convenient in meeting sustainability targets in the EU but ignores serious issues driven by EU consumption such as deforestation and biodiversity loss elsewhere. To monitor and evaluate the Farm to Fork strategy will mean linking FADN to other datasets (e.g. ComExt for intra- and extra-EU trade) and using cross scale analysis sustainability assessments like those in MAGIC.

Components of Production Systems

Farm sustainability policy measures in the past have mainly focused on the lower levels (Steps and Pathways) where the emphasis is on the intensity with which individual farming activities are conducted e.g. rate of fertiliser application. Here the limitations on FADN are a lack of biophysical detail and the challenge of attribution (see below). The relevant policy domain for FADN at Pathway level is Environment, since this tends to be the level at which environmental policy measures are enacted (e.g. encouraging organic production systems). Expectations of

Innovation and Technology policies, that focus on specific Steps, are that innovation and technology can square-the-circle for sustainability. These lower-level approaches tend to be less politically controversial than interventions at the higher-levels (e.g. dietary interventions for Societal Demand).

Limit 1 - Bio-Physical Data

To make FADN more valuable for sustainability assessments via Societal Metabolism Accounting, Lifecyle and other methods, more data in physical rather than financial units is needed. Representation only as financial values has specific problems for:

Crop Protection – this means it is not possible to assess which products are used, the rates per ha and their *relative ecotoxicity*;

Energy – needs to be better differentiated with the mix of *energy carriers* specified – since the *form of energy* used can be significant in determining the sustainability implications;

Machinery and built infrastructure – options for physical measures are *power capacity* and *usage* (which can be very low for crop based systems), with the need to specify the machinery used by contractors[7]. The magnitude of built infrastructure can also be represented as area differentiated by building type.

Limit 2 - Attribution Gaps

Farm-level attribution makes sense for financial analysis but for physical analysis of management within farms it would be highly desirable to be able to attribute inputs to specific systems – what is the fertilizer used on grass or crops, or which livestock use bought-in feed and which are housed? This is significant as it allows a better assessment of both the extent and intensity of environmental pressures.

Survey to Space, here the gap is between the FADN sample of businesses across a region (FADN regions equate mostly to NUTS2) and the pattern of impacts at finer granularity (e.g. a 1km grid). Any estimation impact is highly sensitive to where pressures are exerted. Smaller sample frames might be possible but will be limited by GDPR and panel recruitment issues. A spatially explicit framework of key data on **all individual farms** to allow extrapolation of the detailed FADN data in space for environmental impact purposes would be highly desirable.

Concluding Discussion

By using the FADN data within societal metabolism accounting, the MAGIC project has been able to exploit the dataset's considerable strengths and generate new sustainability insights. There are however several areas, as outlined in the limitations, where relatively modest changes in the FADN data could considerably enhance its ability to support policy development and monitoring of sustainability.

For the European Commission's Farm Sustainability Data Network proposal to be fully effective, consideration also needs to be given to how an enhanced FADN will integrate and interoperate with other EU data collection processes. As sustainability analysis is extended into wider supply chains, it is apparent that agriculture (Production Systems) is a relatively data rich environment, reflecting its long history of policy interventions. By contrast, for supply chains, data on the flows of materials and the networks of relationships are absent, with less precedent for data collection, smaller numbers of businesses and more commercial sensitivity. It is difficult to see significant progress being made in reconciling agricultural production and environmental challenges, without bridging the data gap between Farm and Fork. To that end the Farm Sustainability Data Network proposal should be a catalyst for both new data collection and new forms of analysis.

Key sources for further information

More Policy Briefs are available from https://www.magic-nexus.eu/policy-briefs

To discuss the research in this brief, please email Keith.Matthews@hutton.ac.uk

1. Commission, E., *Farm to Fork Strategy, For a fair, healthy and environmentally-friendly food system*. 2020: Online: https://ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategy-info_en.pdf. p. 23.
2. Commission, E., *Farm Accountancy Data Network*. 2020: Online: https://ec.europa.eu/agriculture/rica/.
3. Matthews, K.B., et al., *Report on the Quality Check of the Robustness of the Narrative behind the Common Agricultural Policy (CAP).* in *MAGIC (H2020–GA 689669) Project Deliverable 5.5*. 2018: Online: https://magic-nexus.eu/documents/d55-report-narratives-behind-cap. p. 65.
4. Matthews, K.B., et al., *Report on EU sustainability goals: insights from Quantitative Story Telling and the WEFE nexus. MAGIC (H2020–GA 689669) Project Deliverable 5.1, 31st July 2020*. 2020: Online: https://magic-nexus.eu/documents/deliverable-51-report-eu-sustainability-goals. p. 136.
5. Heller, M.C., Keoleian, G.A., , *Life cycle-based sustainability indicators for the assessment of the US food system*. 2000, The Center for Sustainable Systems: Ann Arbor, Michigan. p. 59.
6. Cadillo Benalcazar, J., et al., *Food Grammar*. Resource Accounting for Sustainability Assessment, ed. M. Giampietro, et al. 2014, London: Routledge.
7. Giampietro, M., *Anticipation in Agriculture*, in *Handbook of Anticipation.* , P. R., Editor. 2018, Springer: Online.

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