MAGIC multiscale analysis

Regional level case study:
Animal production system in Scotland

Aim of the case study: The aim of this pilot study is to illustrate a procedure for integrated multi-level assessment of the animal production system of Scotland capable of: (i) checking the level of openness of the system (dependence on imports) when used in diagnostic mode, and (ii) being used as decision support when used in simulation mode.

Innovative results

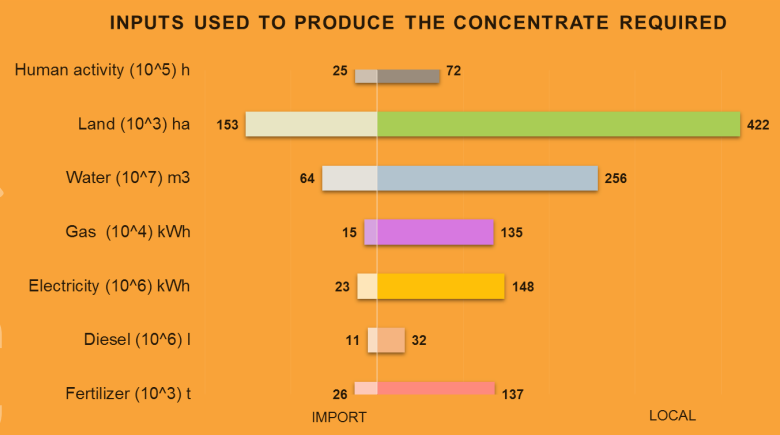
This case shows that MuSIASEM can be used to coherently integrate different types of policy relevant information – i.e. nutritional, social, environmental and economic aspects - by establishing a relational analysis over the structural and functional components of an animal production system. When used in this way, MuSIASEM establishes a relation between the consumption of food of animal origin and the biophysical resources (water, energy, soil, human labour) required to produce them.

The difference between what is required because of the domestic consumption and what is used in the domestic production can be used to estimate the level of openness of the system.
When used in diagnostic mode, with processors characterizing the expected profiles of inputs and outputs associated with the different steps of production, MuSIASEM quantifies the virtual quantities of production factors (land, water, labor, energy, fertilizer) embodied in imported (or exported) animal products.

When used in simulation mode, it uses relational analysis (the scaling of the characteristics of structural and functional processors across the different components of the animal production system) to anticipate the changes in the characteristics of the whole determined by changes in the characteristics of lower level components.

The absolute transparency of the system of accounting makes it possible to involve third parties (experts from different disciplines and stakeholders) in a discussion over the quality of the quantitative analysis. This check of the validity of the assumptions used when building the analysis boosts the credibility of the results.

Possible simulations can include changes in the factors determining: (i) the required supply – e.g. population size, mix of animal products in the diet, level of export, (ii) the actual supply – e.g. characteristics of the structural elements expressing the different functions required by the production systems, (iii) the terms of trade – e.g. changing import/export of feed and other inputs or the import/export of animal products.



Policy relevant insights

MuSIASEM, when implemented with a user-friendly software, can be used to develop participatory tools. The transparency of the system of accounting ensures that this participatory tool is very effective for the involvement of social actors in an informed deliberation over policies to be adopted (Desirability check).

The proposed methodoloy improves the understanding of biophysical resources needed for different scenarios: feasibility is the capacity of the environment to provide the required resources and to assimilate the resulting waste. Viability is the ability of Scottish society to provide the required technological tools and human resources to the animal production system in an economically acceptable way.

MuSIASEM identifies the constituent components (the functional elements needed to have an operational animal production system) and characterizes them using processors (a profile of expected inputs and outputs). Therefore, by adopting this method one can assess and compare various production systems in relation to their specific requirements of biophysical resources (relevant for the protection of the environment) and their costs and benefits for the socioeconomic system.

Thus, one can assess the level of openness of the animal production system identifying the factors determining the vulnerability of the system to internal and external perturbations.

Project website: **www.magic-nexus.eu**

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