

# UMR Herbivores

## Sustainable farming systems Team (COMETE)

### Special issue in INRA Productions Animales on the roles, impacts and services provided by European livestock production

The collective scientific assessment on the role, impacts and services provided by European livestock production has addressed the multiple consequences related to the production and human consumption of animal products (cattle, small ruminants, pigs and poultry) for the environment and climate, inputs, markets, direct and indirect employment, and for a variety of social and cultural issues. The aim of analysing bundles of services is to chart the coexistence and interactions between the various services and impacts provided by livestock farming. These have been represented with an integrated graphical tool, the barn, which is a powerful means to highlight the diversity of livestock farming, and to share knowledge and view points among stakeholders in a simple yet informative way. Eighteen barns have been built so far, and are discussed in a special issue of INRA Productions Animales that has a pedagogical interest for teaching and livestock extension services.

Livestock production and the consumption of animal products have received extensive coverage both in the media and research over the past decade. An influential report published by the Food and Agriculture Organization (FAO) in 2006, 'Livestock's Long Shadow' framed the debate in terms of a tension between food security objectives and the damaging environmental and climate impacts associated with livestock production. Here, we conducted a critical review of the state of scientific knowledge on the role, impacts and services associated with European livestock production. Accordingly, the French ministries responsible for Agriculture and the Environment, in collaboration with the French Environment and Energy Management Agency (ADEME), requested INRA to undertake a collective scientific assessment addressing the multiple consequences related to the production and human consumption of animal products (cattle, small ruminants, pigs and poultry) for the environment and climate, inputs, markets, direct and indirect employment, and for a variety of social and cultural issues. Using a broad analytical overview as a starting point, the review proceeded by identifying the bundles of services, i.e. sets of ecosystem services that appear together repeatedly across sites and/or through time, associated with livestock production in contrasted areas. Acknowledging the services provided by livestock farming should not hide the need to weight these services against their negative impacts. Interactions among services and impacts makes it possible to identify trade-offs and options for European livestock production.

We first used two simple and widely available criteria to map livestock production areas across Europe: livestock density (in LU per hectare of UAA) and the proportion of permanent grassland (sensu largo i.e., including rangelands) within Utilised Agricultural Area (UAA). These two criteria allow accounting for the variability of bundles of services as they are related to all main system characteristics: animal species, feeding strategy, manure management, etc. Based on Eurostat data for 2010, we distinguished and mapped six types of livestock production areas. Bundles of services and impacts have then been represented with an integrated graphical tool, the barn, derived from the socio-ecological literature. It illustrates in a simple yet informative way how livestock farming interacts with its physical, economic and social environment along five interfaces (inputs, environment and climate, markets, direct and indirect employment, and society) and provides bases for comparing livestock production areas. Eighteen barns have been built so far, and are discussed in a special issue of INRA Productions Animales that has a pedagogical interest for teaching and development.

In this special issue, we show that the barn could be used for cross-comparisons of services and impacts across livestock production areas, and also for multi-level analysis of services and impacts of livestock farming within a given area. For instance Label Rouge chickens in Brittany and Pays de la Loire represent 70% of French Label Rouge chicken production, and provide a very different bundle of services compared to the dominant livestock farming regime of these regions. Information for the five interfaces relies on available quantitative assessments from the literature or datasets, and on expert-knowledge for more qualitative factors, such as social and cultural ones. The 'barn' can also inform local stakeholders or policy-makers about potential opportunities and threats to the future of livestock farming in specific production areas. It has already been used as a pedagogical tool for teaching the diversity of services and impacts of livestock systems across Europe and is currently developed as a serious game for encouraging knowledge exchange and sharing worldviews between stakeholders.

In the Fourme de Montbrison PDO area, the 'barn' was used for the first time as serious-game in October 2018 on a large stakeholder panel from this territory thanks to a collaboration with UMR Territoires (Dernat et al., 2019, Proc. 24th European Seminar on Extension and Education, Acireale, Italy). It facilitated the PDO actors' recognition of their natural, technical, economic and institutional environment. It also helped establish a collaboration between stakeholders that provides for their individual representations and leads to a more global and unified view of their territory. The objective of building alternative scenarios for the future of this PDO production area was achieved and this exercise proves the operability of the 'barn'.

#### Valorisation

The full report, synopsis, and short summary of the collective scientific assessment are available on INRA homepage: <http://institut.inra.fr/Missions/Eclairer-les-decisions/Expertises/Toutes-les-actualites/Roles-impacts-et-services-issus-des-elevages-europeens>  
Data from the typology of European livestock production areas (doi:10.15454/O78MYF) and the special issue of INRA Productions Animales (<https://productions-animales.org/issue/view/264>) are also available in open access.

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