Pathways of sustainability in organic mixed livestock farms are based on local embeddedness: case studies in France and Belgium

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Key words: mixed livestock systems, territory, diversification, sustainability

Abstract

Mixed livestock farms, through the diversity of productions and potential synergies among animals, are possibly robust and resilient models of livestock farming. Sustainability of livestock systems highly depend on the degree of self-sufficiency, and the type and intensity of ecosystem services and disservices delivered to the territory. Achieving such sustainability goals in livestock systems is a challenge, for which mixed livestock systems (MLS) can be good candidates.

This article presents an analysis of territorial embeddedness of MLS through the lens of the diverse resources that MLS mobilize: natural spaces, feed sources, genetics (local breed), local knowledge, specific commercialization channels (direct sales, farmers' shops), support from local stakeholders (environmental managers, public authorities, citizens) and local agricultural networks. Based on farm surveys in 12 farms in South of France and 16 in Belgium, we identified the strategies and practices of local embeddedness of MLS. We assessed qualitatively the environmental, economic and social performances of the surveyed systems and elaborated models of MLS and their role in their territory.

We discuss the benefits of MLS for their territory, their complementarity and condition of coexistence with other types of farms, their potential development in other contexts and the possible pathways of improvement.

We conclude that developing MLS can be a promising way to produce livestock in a sustainable way, but under several conditions. Notably, farmers in MLS should be supported for work management, financial capacity of farms and skill acquisition.

Introduction

Diversification in organic cropping systems is well-documented and stated as a principle of agroecology (Soussana et al. 2015). In livestock systems, agroecological principles rely on the diversity of feed sources, the adaptation of animals and practices to the local ecosystems and the recycling of by-products in a rationale of circular economy (Thomas et al. 2014). Mixing animal species in Mixed Livestock Systems (MLS) can be a promising option for organising complementarities at farm level. This article presents a characterisation of MLS types according to their embeddedness in the local territory. It is obtained from farm surveys in organic farms in the South of France and in Belgium, conducted within the CORE Organic MIX-ENABLE project. We present the strategies developed by mixed livestock farmers to adapt to the resources available in their territory, resulting in different MLS types. Then we present and discuss the resulting performances and we raise questions about the sustainability of such farming systems.

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Material and methods

Surveys were conducted in organic livestock farms in the Languedoc area, the South of France and Wallonia, South of Belgium, on a total of 11 and 16 farms, respectively. The Languedoc area is characterized by a strong wine industry mainly located in lowlands and by specialised livestock farms in mountainous regions. The main sustainability issues are: the decreasing number of farms in agropastoralism and extensive livestock farming; degradation of biodiversity and grazing resources by encroachment; and adaptation to climate change. In Wallonia, the UAA represents 40% of the Walloon area. Between 1990 and 2015, the number of farms declined by 55.8%. Northern Wallonia specialises in the production of cereals and industrial crops. In the south, grasslands (mostly permanent) dominate. Diverse livestock systems exist depending on the regions.

Surveys covered: (i) the farm structure, history and determinants of mixity; (ii) the practices and average performances regarding efficiency of use and conservation of natural resources, animals' health and welfare, farm productivity and profitability, work organization and farmer satisfaction; and (iii) the degree of integration in local territory, based on the explanation of farmers' relationships with the territory. The farm typology is built qualitatively upon these three items. We characterize MLS in their relation with the territory, using Therond et al. (2017) conceptual framework of agricultural models.

Results

Farm structures and strategies

The combinations of animal species are well distributed (Fig. 1), with a high share of combinations of ruminants with monogastrics: 11/16 in Wallonia, 8/11 in Languedoc, even more if taking into account the often smaller enterprises on farms. Dairy or meat orientations do not seem to influence the type of combinations.

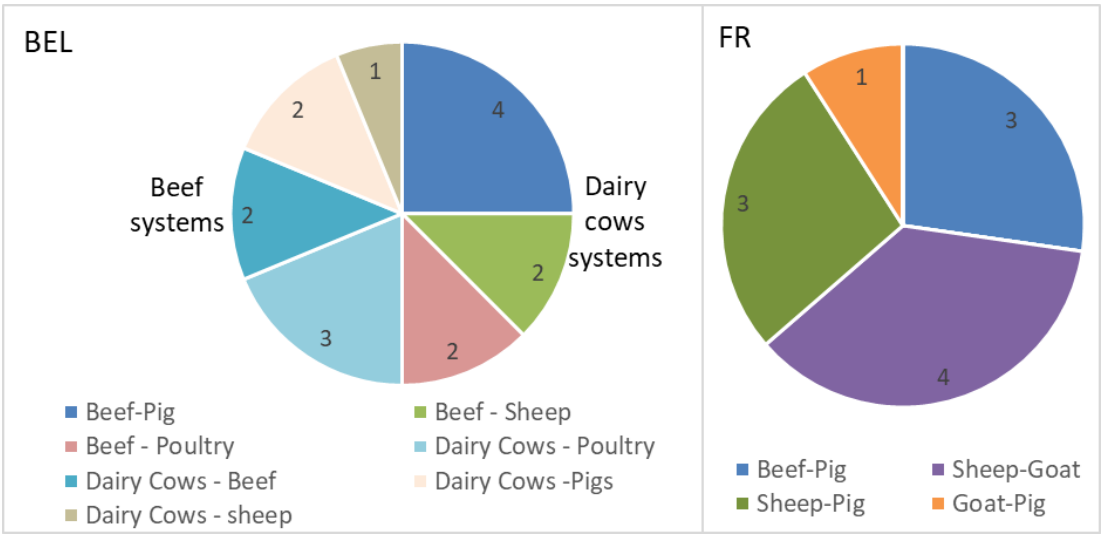

Figure 1: Main species combinations in mixed livestock farms in Wallonia (left) and Languedoc (right). Other species might be present on the farms but only the two main ones are presented here.

Reasons underlying mixity are: 1) organisation of work: introduction of a new animal production to bring additional income for a new farmer or be able to hire workers; 2) technical complementarities: using lactoserum from milk production to feed pigs, grazing complementarities between species (e.g. cows, ewes and horses), production of manure to fertilize lands, or

protection against predators (e.g. pigs and ewes); 3) combination of “production-oriented” (e.g. dairy cows) and “service-oriented” (e.g. rustic sheep) species to manage land of high ecological value; and 4) commercial complementarities to sell diverse products on farm or on open air markets: cheese from dairy ewes or goats, pig meat or sausages, sometimes mixed products.

Farm types, territorial embeddedness and mobilisation of biodiversity

Mixed farms in Languedoc and Wallonia present three profiles, determined by the opportunities and constraints of their territory (access to land, local resources), the strategies and motivations of farmers resulting in different levels of mobilization of biodiversity and territorial embeddedness (Fig. 2).

Type 1 gathers mixed crop-livestock farms producing part of their feedstuffs and cereals for human consumption. They correspond to the most “intensive” one, with conventional animal breeds, a higher stocking rate than the other types, and low level of self-sufficiency in fodder and integration between animal productions. Farmers in this type look to increase their production. Some combine organic and conventional productions on different enterprises (e.g. organic goats and conventional pigs). They combine direct sales and long supply chains, especially for cereals but sometimes also for animals, e.g. lean lambs sold to resellers. Diversification and organic conversion are answers to some economic difficulties, what Lamine et al. (2014) describes as “maintaining of the structure in a sector crisis context”.

Type 2 gathers mainly dairy producers, with semi-extensive practices based on traditional and rustic animal breeds, often including: diversification (multiple animal species such as goat, ewes, pigs and poultry), with medium stocking rate; a share of arable land in which they grow productive temporary grasslands and feed crops such as cereal-legumes associations; and co-grazing of animal species. The milk is processed into cheese and sold directly. Consequently, these farms require lot of human work, so hire workers and host students. Most of the farmers in this type raise ethical and activism motivation behind their practices. This type is similar to “rationalisation after a hyper diversification” (Lamine et al., 2014). The rationalisation of the production corresponds to the optimisation of the practices (e.g. irrigation of grasslands, animal selection to increase their productivity) to ensure the economic performances and the remuneration of workers.

Type 3 gathers the most extensive farms, based mainly on rangelands and natural areas. Stocking rates are very low and it can be explained by the wide quarried surface (up to 1000 hectares). They mostly produce meat, though two farms produce meat and milk. Farms are located in a rough, mountainous environment experiencing long winters and low productivity of land with very little arable land. Farmers strategies to adapt are to have a limited level of species diversification (often only two species); and develop high quality products, sold in short supply chains. Farmers are often rewarded contracts with local organisations for land management and nature conservation. Mobilisation of biodiversity is high because of an adapted use of natural resources and very few exogenous inputs. Local breeds are important, some breeders received public subsidies and support of researchers to maintain the rare breed. Some developed a labelled wool supply chain, and some host tourists or nature-based activities.

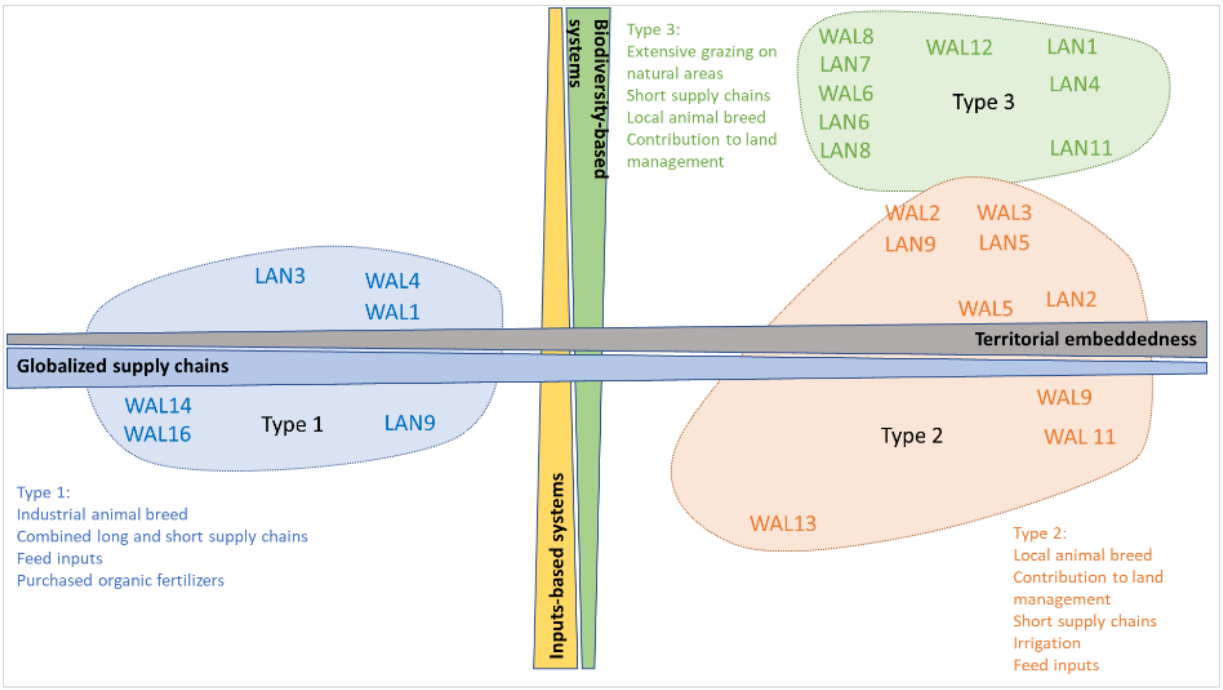

Figure 2: Embeddedness of farm types in territory and mobilisation of biodiversity in the production process. Adapted from Therond et al. 2017. WAL: Wallonia; LAN: Languedoc.

Farm performances and sustainability

The observed performances are summarised in Figure 3. The performances are quite contrasting, with a trade-off appearing between productivity (high in type 1) and natural resources conservation (high in type 3). In Belgian type 2 for example, natural resource conservation is a slightly higher priority than in type 1 (where it remains an important challenge), but the productivity is lower so the overall efficiency is the same. Health and animal welfare appear good in almost every system, illustrating the interest of MLS farmers for this aspect and often their good skills for this. Farm productivity is low in French type 3 due to their very harsh, low potential productive areas, and good in types 1 located mostly in plains on productive lands. Profitability is high for French types 2 and 3 benefitting from niche markets and often high subsidies linked to Less Favoured Areas and for management of Natura 2000 areas. It is medium for all Belgian types, either because of the added value of processing products (type 3), the optimised use of by-products and self-sufficiency (type 2), or the high productivity (type 1). There is a sharp contrast between work organization and farmers' satisfaction. Types 1 and French type 2 have too heavy workload whereas types 3 and Belgian type 2 manage to organize work satisfactorily.

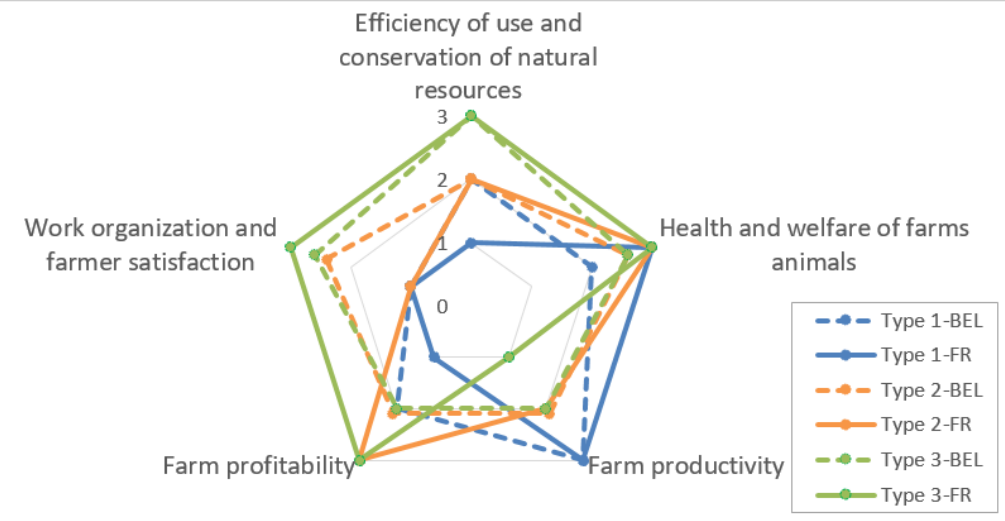

Figure 3: Performances of farm types for the selected sustainability indicators. Ratings are qualitative and represent the average of each type: 1: Low; 2: Medium; 3: High.

Discussion and perspectives

The three types of MLS show a coexistence in the farms' strategies to adapt to their environment, constraints and dynamics. The mixity appears to be a strong lever for managing such adaptations and provides various sets of performances. However, we notice the difficulties experienced by many farmers: economic issues and workload mainly. The most performant MLS appear to be those who are not the most productive in quantity but rely on innovative agroecological practices and often niche markets and a complementary income such as public subsidies or tourism activities. We can thus consider MLS as "sociotechnical niches" (Geels et al. 2004), which can be promising examples of agroecological transitions, including a criticism of the standardised and specialised dominant livestock systems and examples of alternatives. At the same time, those models seem difficult to generalise considering their specificities and the work hardness. To some extent, we can consider that MLS contribute to the agroecological transition by adopting innovative practices along the chain, by contributing to the territory dynamic and by developing adaptation capacities linked with their environment. This research proposes a qualitative analysis of MLS types. It is a first step in the understanding of these promising systems and a possible pathway for the redesign of livestock systems towards sustainability and new challenges such as climate change.

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