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Why and how farmers manage mixed cattle–sheep farming systems and cope with economic, climatic and workforce-related hazards

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Research Paper

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Abstract

Combining cattle and sheep on the same farm can be a promising way for farmers to face uncertainties and produce in an agroecological manner. Previous studies showed benefits of mixed-species grazing on animal health and pasture use. However, few studies have examined how farmers truly manage the two species on their farms and why. The purpose of this study was to explore this issue by surveying 37 farmers who combined meat sheep and beef or dairy cattle on their farms. We chose a systemic and comprehensive approach to the functioning of mixed-species livestock farming systems (MSLF) by considering all dimensions of the system influenced by mixing species (i.e., system configuration, grazing, marketing of products, work and adaptive capacity) and by considering the farmers' viewpoints. The benefits of mixing species that farmers mentioned concerned economic stability and optimal use of grassland resources. Although farmers usually mentioned workload as a disadvantage, the facts are not so clear, and mixing species also benefits work. Farmers cited the pleasure of varied work and the flexibility of work organization. We identified four types of combining cattle and sheep on pasture that express a gradient of the interaction between the two species (from no to high interaction) and are influenced by field configuration (grouped or scattered) and cattle production (dairy or beef). Regarding work organization, ways to combine the two species concern distribution of work required for each species among workers (versatility or specialization) and over the year. Three modes of temporal organization of the work required for each species, which corresponded to different strategies for organizing animal-production cycles, the availability of labor and the willingness to use resources, were identified. To adapt their farm to climatic, economic and workforce-related hazards, farmers used mechanisms related to the combination of the two species: modifying the ewe/cow ratio, breeding periods, worker versatility, grazing management and allocation of resources between species. Our study showed the interest of a systemic and comprehensive approach to MSLF that are promising for the agroecological transition but poorly documented. In particular, it highlighted the need to consider work as part of the system to be configured, managed and adjusted along with the other parts and not simply as a set of constraints.

Introduction

Agroecology reinstates the value of agrobiodiversity in livestock farming systems (Dumont *et al.*, 2018). By increasing on-farm animal and plant diversity, farms can reduce their sensitivity to environmental disturbances and strengthen their adaptive capacity (Darnhofer *et al.*, 2010; Magne *et al.*, 2019; Dumont *et al.*, 2020). Farms with two animal species take advantage of possible synergies and complementarities between species due to differences in their behavior, feed requirements, susceptibility to disease and parasites, seasonality and duration of production cycles and products (Tichit *et al.*, 2004; Martin *et al.*, 2020). The literature highlights advantages of combining cattle and sheep on the same farm, such as improving grassland use (quantity, quality and floristic diversity), increasing lamb growth (d'Alexis *et al.*, 2014; Fraser *et al.*, 2014; Jerrentrup *et al.*, 2020), reducing parasitism (Marley *et al.*, 2006; d'Alexis *et al.*, 2014) and reducing farm inputs. This farm diversification is known as a way to reduce economic risk (Sanderson *et al.*, 2013; De Roest *et al.*, 2018; Diakité *et al.*, 2019; Dardonville *et al.*, 2020). However, these mixed-species livestock farming systems (MSLF) require specific work organization, which is often highlighted as being complex and difficult (Dumont *et al.*, 2018; Martin *et al.*, 2020), but without being investigated completely. Previous studies have focused on one element of MSLF (e.g., parasite or grazing management), but comprehensive and systemic analysis of the functioning of these systems that considers how farmers organize temporal and spatial interactions among different farm components is lacking (Hendrickson *et al.*, 2008; Martin *et al.*, 2020). To fill this gap, the objectives of this study were to understand