

UMR Herbivores

Sustainable farming systems Team (COMETE)

Make ruminants green again: How can sustainable intensification and agroecology converge for a better future?

Sustainable intensification and agroecology are two frameworks that promote ways to reconcile natural resource management and food production in the long term. They have been seen as complementary steps away from industrial livestock systems towards their necessary transition. However, some authors have stated that agroecology cannot co-exist alongside the expansion of neoliberal agricultural models, and would not need to be combined with any other approach to feed the world's population. We analysed sustainable intensification and agroecology in an historical perspective, which revealed that sustainable intensification is an efficiency-oriented perspective, while agroecology promotes system redesign. Although underpinned by different values pertaining to food consumption patterns, social equity, the role of technology and our relationship with nature, our view is that we should not be locked into a single approach, as sustainable intensification and agroecology could converge for a better future.

Livestock farming systems provide multiple benefits to humans: protein-rich diets that contribute to food security, employment and rural economies, capital stock and draught power in many developing countries, and cultural landscape all around the world. Despite these positive contributions to society, livestock is also the centre of many controversies as regards to its environmental impacts, animal welfare and health outcomes related to excessive meat consumption. There are different ways to achieve livestock farming sustainability that include frameworks such as sustainable intensification (SI) of agriculture and agroecology (AE). The first option calls for increasing the production of animal proteins from existing farmland, without further encroachment into remaining natural ecosystems, as many agricultural lands are assumed to not reach their full production potential. Agroecology promotes a range of context-specific ecosystem-based principles that stimulate natural processes to reduce dependence on chemical inputs and cut production costs. Sustainable intensification and AE are thus two frameworks that promote ways to reconcile natural resource management and food production in the long term. They have been seen as complementary steps away from industrial systems towards the necessary transition of livestock production systems. However, some authors state that agroecology cannot co-exist alongside the expansion of neoliberal agricultural models and does not need to be combined with other frameworks to feed the world's population.



Our aim was not to enter this type of controversy but rather to review the potentials of sustainable intensification and agroecology to design sustainable ruminant systems. We analysed SI and AE in an historical perspective, which revealed that SI is an efficiency-oriented perspective, while AE promotes system redesign in a way they benefit from functional diversity and provide ecosystem services. In this perspective, ruminant farming is more than just the production of meat and milk, so that a simple functional property (for instance, GHG emissions expressed in kg CO₂-eq/kg product) is an inadequate measure of system performance. Historically, SI sees the increase in animal protein demand as inevitable and therefore focuses on increasing production efficiency. Agroecology appears more open to dietary shifts towards less animal protein consumption to rebalance the whole food system. Within SI, new technologies provide a foundation for the transition towards more efficient and intensified systems. For us, the key issue for making digital science part of the agroecological transition is that it remains at a low cost and is thus accessible to smallholder farmers. Finally, AE and SI historically did not pay the same attention to the social dimensions of sustainability. Sustainable intensification and AE could however converge for a better future. Food-system transformation perspectives and attention on social justice have been recently integrated into the SI framework. As no space is available for agricultural land expansion in many world areas (e.g. in South and South-East Asia), local production from agroecological systems also requires an increase in the productivity of ruminant systems. Intensification of agroecological systems should however be achieved differently than what occurred in industrial systems, by considering context specificities and farmer knowledge. Applying SI to industrial systems could be seen as a green-washing strategy, because it leads only to a weak form of ecological modernisation. Conversely, identifying first the key ecological processes to be optimised, is more likely to lead in the direction of a strong form of ecological modernisation assumed here to be more desirable.

Within the UMRH Comete team, we are aiming to provide references on the economic, environmental and social performances of agroecological livestock farming systems and integrated crop-livestock systems. PhD thesis of Louise Forteau (dir. B. Dumont, G. Fleurance from IFCE and G. Bigot from Irstea) aims to analyse the multi-performance of mixed horse-beef cattle systems in comparison to specialised saddle-horse systems. Faecal egg counts have confirmed the dilution hypothesis leading to a decrease in horse parasite burden in mixed grazing systems. PhD Thesis of Lucille Steinmetz (dir. B. Dumont, P. Veysset within MixEnable EU project) aims to represent fluxes and interaction networks in organic mixed-livestock systems. The objective is to analyse whether functional redundancy and a more complex interaction network increase system resilience. Opportunities offered by different forms of diversity are also quantified in mixed farming systems from Auvergne region in PSDR4 project new-DEAL led by B. Dumont and H. Rapey (Irstea).

Valorisation

This review article was presented during the opening plenary session of the 10th International Symposium on Herbivore Nutrition, entitled Herbivore nutrition supporting sustainable intensification and agroecological approaches. It was also presented in 2018 at the Agroecology Summer School jointly organized by Agreenium and WUR, and during a workshop on Sustainable livestock Production at WUR. In 2019, we plan to present it at the 6th International Symposium on « Farming System Design » in Uruguay.

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