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Resilience in the organic dairy cattle and sheep farms and sectors

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Abstract: The increasingly uncertain agricultural context raises the question of the resilience of organic dairy farms and sectors to hazards. We aimed to assess the resilience of French organic dairy cattle and sheep farms and sectors and to characterize the drivers of and threats to resilience. We combined interviews with 36 stakeholders of the sectors in the main European countries producing organic milk, 128 farm surveys, statistical analysis of desktop data on technical and economical performances of 204 farms and simulation modelling over 6 typical farms to develop an integrated view of the issue. The combined analysis showed that despite being very different (regarding input dependency, market orientations, etc.), the organic dairy cattle and sheep farms and sectors are presently quite resilient but could be challenged by the globalization of milk markets (especially with cow milk) and climate change.

Introduction: Organic dairy farming has long been considered a niche that provided farmers with a more protected and regulated market than the conventional one. However, the rapid increase of organic production in several European countries combined with the globalization of the organic dairy market are not without risks for the sector. Moreover, farms and sectors are experiencing an increasingly uncertain and changing context due to among other things to climate change. This raises the question of the resilience of organic dairy farms and sectors to hazards and shocks. Resilience is understood as the ability of a system to absorb disturbance and reorganise while undergoing change to retain the same function, structure, identity, and feedback (Walker et al., 2004).

In the framework of the French Casdar Résilait project, we focused on the organic dairy cattle and sheep sectors. Those sectors are highly different regarding market orientations (e.g. relative amount exported), concentration of farms, etc. and accordingly, farms from those two sectors are different as well regarding input dependency, reliance on grazing, etc. We aimed to assess the resilience of those farms and sectors and to characterize the drivers of and threats to resilience to support farmers' and sector actors' strategic decisions.

Material and methods: Resilience is recognized as a highly dynamic, multi-scale and context-specific concept (Béné et al., 2016). Thus we combined a range of methods to address these different features and develop an integrated view of the issue. We conducted:

- i. Interviews with 36 stakeholders along the dairy cattle and sheep sectors in the main European countries producing organic milk to establish reference data on the current sectors and their development perspectives;
- ii. Surveys in 128 dairy cattle and sheep farms across France to collect farmers' perceptions of the evolution of their farms' resilience and to relate it with the evolution of their farming practices;
- iii. Statistical analysis of desktop data on technical and economical performances of 204 cattle farms and 63 sheep farms to assess quantitatively those farms' resilience over the period 2012-2016 and to relate it with the evolution of farming practices;
- iv. Simulation modelling over 6 typical dairy cattle and sheep farms to assess their resilience to hazards and shocks that have not been met so far but that may occur in the near future (e.g. a drop of the organic milk price, a drop of CAP subsidies for organic production).

Results:

- i. At the sector level, data was limited for the organic dairy sheep sector. However, it seems not much exposed to economic competition thanks to well-established niche markets (e.g. Roquefort DPO). Despite a growth of nearly 20% between 2016 and 2018, the development of the organic dairy cattle sector may continue, with little direct competition among neighboring European countries. Most of the actors interviewed were confident about the ever-continuing development of the demand for organic dairy products in the coming years. Major imbalances between supply and demand are not to be expected. The coming challenge was rather seen in the long-term capacity of the sector to maintain consumers' confidence in the organic dairy sector as e.g. newly-converted farms are less reliant on grazing and less self-sufficient for livestock feeding whereas organic farms were originally based on input reduction and animal welfare.
- ii. At the farm level, both types of farmers assessed very positively the evolution of their farms' resilience since their conversion to organic. Dairy cattle farmers suggested several resilience factors including a strong reliance on grazing to promote self-sufficiency for livestock feeding and thereby allow cost control, a low pressure on resources via e.g. a livestock number adapted to the productivity of the land and a diversification of products and activities. With sheep, however, resilience was more strongly related to an increase of ewe productivity. Because the milk prices are relatively higher compared to the cattle sector, farmers felt they kept increasing their benefits even when a ewe productivity increase would involve reducing the duration of grazing and increasing the farm reliance on purchased forage and feed concentrates.
- iii. At the farm level, analysis of desktop data tended to confirm cattle farmers' perceptions. The most resilient cattle farms put lower pressure on their resources (e.g. fewer hectares - 43 vs. 48 - and cows - 28 vs. 30 - per worker), were more reliant on pastures and grazing (2.8% vs 4.8% of the land dedicated to silage maize cropping), had more often a

herd of suckler cows and they had much lower mechanization costs. The same analysis applied to sheep farms however contradicted farmers' perception. The most resilient sheep farms put lower pressure on their resources (e.g. fewer hectares - 47 vs. 49 - per worker). They grew more crops to feed livestock but were less reliant on purchases (21 vs. 30 K€/year) and on contractors for field operations (4 vs 8 K€). They also had a higher equity share (56% vs. 46%).

iv. Simulations showed that cattle and sheep farms were most sensitive to milk price and climatic hazards and shocks. For example, a drop by 20% of milk prices led to reductions of farmers' income by 28% to 70% among farms. Unfavorable climatic conditions lessening fodder production by 20% had a slightly lower and manageable impact in the range 15-29%. Strategies combining an enlargement of the farm area and a de-intensification (less livestock heads per unit area) were most successful to mitigate the impacts of those hazards and shocks. In the case of unfavorable climatic conditions, reductions of farmers' income were limited to 12% by implementing these adaptations. However, they may put the workforce under pressure as they involve a larger area to manage per unit worker. In some cases, a diversification or a transformation of the farm towards a new production might have to be considered to ensure the sustainability of the farming project.

Discussion

The diversity of approaches implemented to assess the resilience of French organic dairy cattle and sheep farms and sectors showed that those farms and sectors are presently quite resilient but could be challenged by the globalization of milk markets (especially with cow milk) and climate change. In this perspective, confirming earlier findings (Bouttes et al., 2018), resilience of cattle farms increased when farmers transitioned to pasture-based grazing and self-sufficient systems. With the sheep farms and sector, this project was the first to address their resilience and the role of individual productivity of livestock appeared more crucial in promoting farm resilience as compared to cattle farms.

Despite the favourable current context for organic dairy production, it is essential to raise awareness among farmers and sector actors to prepare them to future hazards and shocks that may affect the sector. Communicating on the drivers of and threats to resilience is thus needed in the educational and advisory programs.

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