

## Mix-Enable final project summary



### Project purpose

Multi-species livestock farming consists of keeping two or more animal species – or more generally combining different animal production units – on the same farm. It was often proposed as a solution towards higher sustainability of livestock farms but in practice although the proof of evidence was limited. This is why in MIX-ENABLE, the objective was to develop the knowledge base on organic multi-species livestock farms.

### Final project summary

We synthesized potential benefits and limitations of multi-species livestock farming for farm sustainability from existing literature. We showed that multi-species livestock farming has the potential to improve the five dimensions of farm sustainability reviewed: resource-use efficiency and conservation, animal health and welfare, productivity, profitability and human welfare; as long as locally relevant farming practices are used, especially an appropriate stocking rate during grazing.

We conducted a desktop analysis of specialized and multi-species organic livestock farms. We compared 3 farm samples from France over the period 2000-2016: farms specialized in one ruminant species (219 farms), farms with two ruminant species (44 farms) and farms with ruminants and monogastrics (17 farms). We showed that multi-species farms, especially those combining ruminants and monogastrics, tend to have a higher and more stable income (in the range 506-532 €/ha against 338-455 €/ha with a coefficient of variation in the range 43-49% against 59-80%) but create higher N surplus (in the range 32-77 kg N/ha against -3-3 kg N/ha). Overall it showed that the theoretical benefits of multi-species livestock farming often reported in the literature are not systematic.

We surveyed 127 farms to collect data on key aspects of farm structure, crop, pasture and livestock management, raw material inflows and outflows, economics and social data (satisfaction of the farmer, workload). Data on strengths and weaknesses, opportunities and threats perceived by farmers were also collected to identify the levers and barriers to the development of organic multi-species livestock farming. After cleaning and verification, data on 102 farms were organized in a database from which we showed among other things that 6 out of 86 farms that outperform their peers (based on four indicators) despite having the same

resources and constraints. They have very different sizes and enterprise combinations but all have a strong autonomy for feed and strong interactions among farm activities. They also very often practice direct sales and have set up a satisfactory work organization, both intra-farm and with local networks.

Using experimental trials, we showed that: (i) when sequentially grazing young dual-purpose steers with lambs, next to the well-established effects on lambs, no benefits but also no disadvantages for steers were observed, neither in terms of parasite egg excretion nor in daily weight gains; (ii) when co-grazing beef cattle batches and sheep flocks, mixing species seem to be profitable for sheep with no effects on cattle: all the lambs could be finished at pasture before winter whereas 10% of the lambs from the solitaire sheep flock had to be finished indoor. Lambs and ewes in mixed flock also excreted less parasite eggs; and (iii) when rearing cattle and broilers on the same pasture, losses of broiler chickens due to predatory birds were reduced.

Farm simulation modelling were conducted over four French farms surveyed using Orfee, a bio-economic model that optimizes a function of net income under market and policy variability. Simulations showed that the risk associated with 70% reduction of grassland yield was by far the highest. Three of the four farms had significant risk of negative income for the baseline situation. The reduction of stocking rate reduced variability of income in all cases, nonetheless it did not remove the probability to have very low income. The introduction of a pig enterprise and the replacement of beef with dairy did not much reduce the variability but increased income and consequently reduced farm vulnerability.

Various communication and dissemination items have been produced including an educational toolkit to stimulate students' learning on organic multi-species livestock farming:

[https://orgprints.org/id/eprint/44353/3/2021\\_Mixenable\\_Educational\\_Toolkit\\_english\\_VDef.pdf](https://orgprints.org/id/eprint/44353/3/2021_Mixenable_Educational_Toolkit_english_VDef.pdf)



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