

Benefits and limits of farm animals to control herbage mass, pests and weeds in orchards: a review

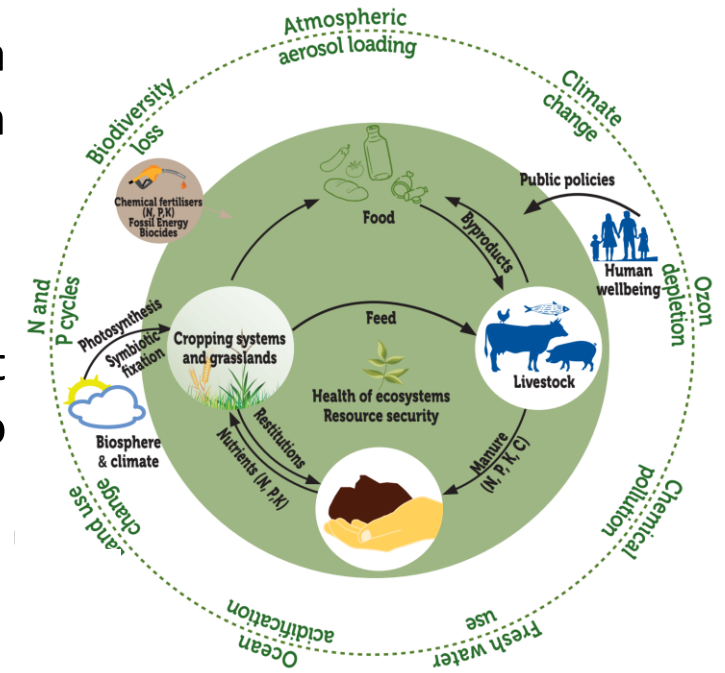


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Background of the study

- Exploring synergies between livestock and crop sectors is seen as a promising way towards a more sustainable and circular European agriculture (ATF and Plant ETP, 2019, 2020)
- Initiatives aimed at reconnecting livestock and crop production at different scales are emerging, but remain scattered, making it difficult to assess and disseminate them
- The four GIS on agricultural sectors led by INRAE (Avenir Elevages, Grandes Cultures, Fruits et PIClég), in collaboration with ACTA and the thematic network on mixed-crop farming (RMT SPICEE), have joined forces to carry out a project focusing on the reconnection between crops and livestock (<https://www.gis-avenir-elevages.org/Livestock-Farming-Future-Who-are-we/REVE-REconnexion-Vegetal-Elevage>)



Context and objectives

- One of the levers of the agroecological transition is the diversification of systems, in particular by reintroducing animals into systems specialized in field crops or arboriculture
- In this study, we focus on the introduction of animals into fruit and vineyard plots
- One of the assumed benefits of introducing animals into the plots is the control of herbage mass and weeds and the management of pests through biological regulation
- But animals can also cause damages on soil and vegetation

→ **Make a comparative synthesis of the benefits and limits of different animals (small and large herbivores, poultry, pigs) to control herbage mass, weeds and pests in vineyards and orchards**

Methods : 66 documents collected

- 23 Scientific publications
- 18 Technical publications or deliverables from R&D projects
- 23 Testimonies in in professional journals and in social media
- 2 Interviews conducted with ongoing experimental projects

→ *Geographical distribution :*
France (40), EU (9), Rest of the world (17)



« Chickens in orchards »,
MIRAD project



« Rabbits in orchards »,
LAPOESIE project






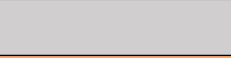



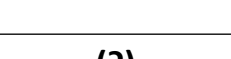
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Methods : analysis of the documents

Construction of a matrix of the effects of animal species on orchards and vineyards:

- Ruminants (sheep, cows, goats)
 - Poultry (chickens, geese, guinea fowl, ducks)
 - Pigs
 - Rabbits
 - Equines (horses, donkeys)
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- Herbage mass and grass cover
 - Pests (rodents, insects and other invertebrates)
 - Pathogens
 - Auxiliary species
 - Risks of damages to trees and soil

	Very positive effects (only benefits mentioned)
	Positive effects (benefits mentioned but not systematic)
	No effects
	Negative effects (disadvantages mentioned but solutions proposed)
	Very negative effects (disadvantages mentioned but no solutions proposed)
	Unknown effects
	No data available
(?)	Hypothesis to be confirmed

Numbers correspond to the number of documents

Grass cover management

Sheep, cows, geese, chickens, rabbits, are interesting species for herbage management

- Sheep: a traditional and effective solution, provided that the risk of damage is kept under control
- Cows: animals traditionally used in high-stem orchards or coconut plantations
- Geese: herbivorous poultry that are easy to introduce
- Chickens or guinea fowl: a possible solution, but may result in bare soil
- Rabbits: an innovative way of managing grass cover in orchards



Photo : © INRAE - Sara Bosshardt

Goats and pigs: not recommended animals for managing grass cover because of the damage they cause to trees and soil respectively



Des cochons de race Kunekune labourent un vignoble de Cramant, village de Champagne, le 22 février 2023. ©AFP

Benefits for pest and disease management

Rodent management

- Destruction of rodent galleries by trampling: the most frequently reported mechanism

Direct or indirect action by animals on insects or other invertebrates

- Some animals (poultry) are heavy consumers of larvae, insects or mollusks

The introduction of animals into orchards also plays a prophylactic role

- The consumption or trampling of dead leaves or fruit that has fallen to the ground helps to reduce scab inoculum
- Eating low branches or pruning them limits the spread of disease.

Major knowledge gaps

Animal species that have not been studied much, yet seem interesting

- Poultry: some knowledge of hens, chickens and geese, but very little is known about other species (guinea fowl, ducks, turkeys).
- Rabbits: could be an avenue, but what about outlets in the industry
- Equine ?

Mechanisms that are still poorly studied or understood

- Little is known about the impact on diseases, which is difficult to assess and quantify. Yet farmers are asking real questions on this subject.
- Impact on auxiliary species is unknown

Conclusion

- Many fruit and wine growers are motivated to introduce animals, but are concerned about damage on trees and soil
- Introducing animals can be a solution for managing weed, pest and diseases and lead to reduction of chemical treatments
- However, not all species can be equally used and mechanisms of pest and disease control remain largely unknown
- The use of animals to maintain perennial (or annual) crops requires skills in animal management and raises a number of organizational issues between livestock farmers and crop producers

Thank you for your attention !



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the stand of GIS
Avenir Elevages (N°9)

