Different forms of Crop-Livestock Integration. Analysis in the South of France

Martine Napoleone, Arnaud Dufils, Charles-Henri Moulin, Jacques Lasseur

Seminar communication FAO-CIHEAM– Meknes, 2019, « *Efficiency and resilience of forage resources and small ruminant production to cope with global challenges in Mediterranean areas*". Published in "Options méditerranéennes, 2021, series A, N°125.

Different forms of Crop-Livestock Integration

Analysis in the South of France

M. Napoléone[1], A. Dufils[2], C.H.Moulin[1], J.Lasseur[1]

Author for correspondence: martine.napoleone@inra.fr

1: URM Selmet (Mediterranean and tropical livestock systems), place Viala, 34000 Montpellier, France
2: INRA – Ecodevelopment research unit, Domaine Saint Paul, Site Agroparc, 84914 Avignon Cedex 9, France

Abstract: Reconnecting crops and livestock is an important way of contributing to agro-ecological transitions on the scale of Mediterranean production systems and territories. This is a particularly important challenge in the Mediterranean area because of the marked specialization of territories, with cash crops in low-lying areas and on the coast, and livestock farming in inland regions, which are often in decline. There are various forms of Crop-Livestock Integration (CLI). Using some specific examples, we will present various forms of CLI (reconnecting the crop system and the livestock system on the farm; local-level arrangements between neighbours; partnerships between winegrowers or arborists and breeders; cooperation between stakeholders on a regional scale, and so on). We will study the conditions for their implementation, the changes brought about in the activities concerned, and the potential performance and prospects offered by these forms of CLI for the development of livestock and territories in the Mediterranean area.

****

Résumé : Reconnecter culture et élevage est un levier important pour favoriser des transitions agro écologiques à l'échelle des systèmes de production et des territoires méditerranéens. En zone méditerranéenne, cet enjeu est particulièrement important du fait de la spécialisation marquée des territoires : cultures de vente en plaine et en littoral, élevage dans les arrières pays souvent en déprise. L'Intégration Culture-Elevage (ICE) peut prendre différentes formes. A partir d'exemples concrets, nous présenterons diverses formes d'ICE, (remise en connexion du système de culture et du système d'élevage dans l'exploitation ; organisations à l'échelle locale entre voisins ; collaboration entre viticulteurs ou arboriculteurs et éleveurs ; coopération entre acteurs à l'échelle régionale,…). Nous étudierions les conditions de leur mise en œuvre, les changements induits dans les activités concernées, les performances potentielles et les perspectives offertes par ces formes d'ICE pour le développement de l'élevage et des territoires en zone méditerranéenne.

1. Introduction

The agricultural modernization policies implemented in France since the 1960s have resulted in specialization or even the disconnection of arable and livestock farming at the scale of production systems and territories. In the French Mediterranean area, the segmentation of space is particularly marked: we find intensive monoculture on the agricultural lowlands and largely pastoral livestock farming in the foothill areas in decline.

In this kind of context, Crop-Livestock Integration (CLI) is one of the key approaches for making the agro-ecological transitions and reinforcing the sustainability of activities in the territories (Mischler et al., 2019). However, it is difficult to implement because the sectors and advisory bodies have become so specialized that there are a number of socio-technical barriers (Geels, 2007).

Now is a good time to design LCI projects. Society's reappraisal of intensive agriculture, the evolution of food systems, the increasing focus on environmental issues and the climate emergency all raise questions about the future direction of arable and livestock farming.

Some pioneering initiatives are gradually emerging. Some concern a single farmer and farm, while others involve several farmers pooling their land. There are also mutually agreed arrangements between, for example, a mountain livestock farmer and a lowland farmer and, more rarely, projects rolled out on a regional scale.

In this document, we analyse four situations where arable and livestock farming have been reconnected in the South of France: two at farm level, involving the crop growers and livestock farmers only, and two at the scale of a natural park area or a municipality, involving a range of stakeholders.

We compare these contrasting situations to see what we can learn about the conditions in which these projects emerge, to identify some of their limitations, and to discuss how they can contribute to the agro-ecological transitions.

2. Some original ways of reconnecting crop and livestock farming

A small herd grazing in an orchard

Seeking to reduce chemical treatments in their orchards, some farmers have acquired a small grazing herd to control certain pests and diseases such as voles, codling moth and scab (Dufils, 2017; Rey and Coulombel, 2008).

Some make use of temporary grazing on their plots. The herd is brought in to graze as soon as possible after the harvest, to eat up and break down as much fruit and leaf matter as possible, as these are potential sources of inoculum; the herd then leaves the orchards as bud burst approaches. In this system, the arborist has other areas – meadows, mountain pastures or wooded areas – where their herd can feed in spring and summer.

Some arborists keep their herd in the orchard for as long as possible. Almost permanent grazing outside of harvest and lambing periods offers more room for manoeuvre, with the length of time the herd is present and how often it returns to a problem plot adjusted to increase the effects of the ewes on the orchard's main pests and diseases.

The presence of the herd is an additional factor to be considered in terms of the type of work to be done in the orchard. The additional work involved with livestock farming includes managing grass resources, using mobile pens to rotate grazing under the trees, observing the animals to see when grass resources become insufficient, and protecting tree bark from damage. Livestock farming also implies more time constraints (e.g. during the lambing period) and different regulatory and health constraints. It also calls on different networks (e.g. veterinarians, sheep shearers, slaughterhouses, etc.) to the arborist's usual set of contacts. The animal's place in the orchard will thus largely depend on what services the arborist expects and their interest in livestock farming, but is also closely linked to their ability to develop their production system and acquire new skills.

Reverse transhumance based on mutual agreement between a winegrower and a livestock farmer

Conditions for emergence: The agricultural systems involved – viticulture on large estates in the Var, and sheep farming for meat in the southern Alps – have undergone significant changes in recent decades (Garde et al. 2014, Dupré et al., 2016).

In viticulture, there is renewed interest in the winter grazing of sheep among the vines, prompted by the growth of certified organic wine markets and a marketing approach aiming to promote winegrowing as integrated with other activities in rural areas. The aim is to minimize plant growth between rows using grazing rather than herbicides, while giving wine a pastoral image associated with 'natural values'.

In sheep farming, there has been a sharp increase in herd sizes in the mountainous area of the Southern Alps, caused by a search for economies of scale and public incentives since the 1990s. However, on some farms, this has been limited by the capacity to build up sufficient forage stocks for winter feeding. To overcome this, livestock farmers in the mountains bring their herds down to the low-lying coastal

areas in winter, to graze on moorlands and in forest areas. They often work hand-in-hand with the public authorities to help limit the summer fire risk.

These areas are close to the wine estates, which has led to the development of winter grazing among the vines, on the basis of mutual agreements between the two types of farmer. These agreements require (i) the provision of large areas of pastureland, suitable for the size of the herd; (ii) grazing on small plots, managed using mobile pens moved as and when necessary when work is carried out in the vineyard. They involve just two parties: the manager of the vineyard estate and the livestock, farmer, in a relationship of subordination: the constraints of livestock farming must not hinder the flexibility required for work in the vineyard. Large herds with limited livestock productive objectives are the best type of partner for this kind of Crop-Livestock Integration.

Synergies between arable farming and livestock breeding on the scale of a regional natural park area

Animals and crops have been farmed together in various ways throughout agricultural history. Today, as agriculture evolves towards more sustainable production, arborists are choosing to let ewes graze among their fruit trees. As in our first example, their main aim is to manage grass cover differently and to improve the control of certain pests and diseases while reducing phytosanitary and fertilizer inputs. In the Alpilles Massif, some arborists have joined up with 'herbassier'[1] shepherds to bring their large herds to graze in dense fruit-farming areas from the end of the harvest until bud break the following spring. This informal arrangement benefits both parties, providing access to grass resources for the herd and maintenance of the grass cover in the orchard (Ducourtieux et al., 2012).

With its role in territorial management, the Alpilles Regional Natural Park is making use of this practice to encourage new connections between crop farmers and livestock breeders as part of a multi-partnership project, with the aim of reducing agricultural inputs to protect the area's rich bird life. This initiative has a clear sociological objective to bring together stakeholders from different sectors who rarely mix otherwise. However, one of the challenges will be to coordinate with other users of the area (elected officials, hunters, walkers, etc.) over the long term, while maximizing synergies with livestock breeders already present in the territory, in forest areas or in annual crop-growing areas.

Synergies between mountain areas and low-lying plains on a regional scale

As part of a call for projects launched by the Ministry of Agriculture in 2012 to support collective actions encouraging agro-ecological transitions, local councillors of a coastal town in the South of France (Claira) and livestock farmers in the Pyrenees foothills (Canigou) have launched a pioneering project to farm abandoned plots on the urban fringe to i) diversify agriculture in low-lying areas, and ii) increase the fodder self-sufficiency of farmers from the foothills. (Napoleone et al, 2018; pleinchamp.com, 2017)

The town has recruited a land coordinator to convince landowners to lease out their fallow land free-of-charge (one or five-year lease). Five livestock farmers have set up business together (with SARL limited liability status) and work together to cultivate the land. The land coordinator oversees the system to ensure consistency between the various parties' actions. Other stakeholders (hunters, other farmers, residents, etc.) are involved in the project in a formal or informal way. Over five years, the five farmers have cultivated a total 100 ha and are now fully self-sufficient. The spatial distribution of cultivated land within the municipal area is discussed and agreed on by the various stakeholders. It includes cultivated areas designed to encourage biodiversity (10% of the surface area, i.e. 10 ha, spread across the territory). Hunters and hunting and wildlife groups are consulted when deciding where to locate these areas. The scheme has built real social dynamics in the town, where there is much good feeling for the project. It has reshaped the urban fringes and ensures support for small-scale mountain livestock farmers.

[1] A 'herbassier' is a sheep farmer with no land of their own, who moves their herd from the coast to the mountains following the various levels of vegetation.

This system involves various parties. Starting with private property (the fallow land), a resource that benefits the community on the territorial scale is gradually developed, enabling i) agro-ecological dynamics in the lowland area (e.g. cultivating legume crops), and ii) support for livestock farming activity in the foothills.

3. Discussion

Conditions for emergence

As they challenge the agricultural models, many farmers start to question their production methods and seek new ways of reducing inputs, which is in line with consumer expectations about farming practices and the quality of agricultural products. These situations arise from a sense of dissatisfaction or a need to shift towards a more ecological approach. They also occur when stakeholders involved in different activities come together. Even though they may have different concerns, they are all interested in the benefits of Crop-Livestock Integration and the synergies their cooperation can bring to their particular situations.

Considering a CLI situation over the long term

The herd is sometimes seen as the key to action, opening the way for a reduction in the number of chemical treatments or machine operations by farmers or other stakeholders in the low-lying areas. They can therefore focus on the constraints and objectives specific to their farm or territory. However, letting a herd graze on a particular type of plot at a particular time, or growing legume crops in low-lying areas must also be compatible with the work involved in livestock farming and how the livestock system is organized. If the transitions are to be sustainable and viable in the long term, grazing must not be reduced to a form of 'environmental service provision'. Crop-livestock complementarity, which reconnects two specific functions – crop production and livestock production –, must be considered as a complex system, with its own rules and constraints. In every case, knowledge must be acquired and operations (livestock farming and cultivation) need to be coordinated on the basis of mutual understanding.

Private property and common interest

When the debate occurs on a territorial level (e.g. regional natural park, municipality), it is no longer merely about the economic arguments (such as reducing inputs or increasing the value of market goods) and private property, but a question of incorporating livestock into a mechanism that generates a common resource. We can certainly consider the territory, the landscape and the environment as common goods. Livestock farmers manage a set of plots (usually private) spread across a territory, thus making a beneficial contribution to the community at an intermediate stage between the private and State levels. (Ostrom,...). In this context of a declared common good, governance issues arise, involving an array of stakeholders, and imply the implementation of multi-level coordination.

Livestock farming generates agro-ecological dynamics in areas of intensive cultivation

Regardless of the scale considered, livestock farming helps set agro-ecological transitions in motion. At farm level, grazing reduces chemical treatments and other operations in orchards and vineyards. On a large territory scale, it enables crop diversification, for example with the introduction of legumes or permanent grasslands, improving the fertility of soils degraded by decades of intensive monoculture (e. g. vines).

4. Conclusion

We can conceive a variety of ways of reconnecting crop farming and livestock farming. CLI is of clear interest in the Mediterranean area. Despite the specialization of territories and activities, it offers some valuable opportunities for improving fodder self-sufficiency for herds, reducing phytosanitary inputs for crops, and sparking agro-ecological dynamics within territories. However, there is no turnkey model. Although some of them (e.g. winter transhumance) are based on traditional methods, all these systems are pioneering. The various parties involved therefore need to embark on a step-by-step learning process to secure the sustainability of these new forms of arable and livestock farming.

References

Ducourtieux C., Dugat JP., Joliet V., Jousseins C., 2012. *Des vergers, des vignobles, des brebis, des hommes.* Institut de l'Elevage.

Dufils, A. (Author of correspondence) (2017). *Associer arbres fruitiers et élevage ovin, une pratique ouverte au*

plus grand nombre. Arboriculture Fruitière (715), 17-20.

Dupré L;, Lasseur J., Sicard J., 2017. *Production sociale de l'herbe et inscription territoriale des éleveurs ovins pastoraux des Alpes du Sud*. Espaces et sociétés, 170 (3), 157-172

Garde L., Dimanche M., Lasseur J., 2014. *Permanence et mutations de l'élevage pastoral dans les Alpes du Sud.* Revue de géographie alpine 102 (4)

Geels, F.W., Schot J., 2007. *Typology of sociotechnical transition pathways.* Research Policy 36.

Mischler et al, 2018, *Caractériser les complémentarités entre cultures et élevage et accompagner les changements de systèmes agricoles vers des performances et une résilience accrue*. Summary to be published. 3R seminar, Paris

Napoléone M., O. Gravas, A. Rouquette, R. Cittadini, E. Campoy, 2019, *L'élevage et les friches au cœur de complémentarités entre littoral périurbain et arrière-pays. L'exemple du projet Fricato en Pyrénées Orientales,* Innovations Agronomiques 72 (2019), 107-119.

Ostrom E., 2010, Gouvernance des biens communs - Pour une nouvelle approche des ressources naturelles Revised by: Laurent Baechler, 301 pages, Deboeck supérieur

plein champ website:http://www.pleinchamp.com/vigne-vin/actualites/du-vin-aux-ovins-ou-comment-reconvertir-des-friches-viticoles-en-cultures-fourrageres

Rey J.B., Coulombel A. *Cohabitation dans le verger*. Alteragri_88. 2008, no. 88, p.30-31

To quote this text: M. Napoléone, A. Dufils, C.H.Moulin, J.Lasseur, 2021, *Different forms of Crop-Livestock Integration - Analysis in the South of France*, in "Efficiency and resilience of forage resources and small ruminant production to cope with global challenges in Mediterranean areas", Edited by Lopez-Francos A, Jouven M, Porqueddu C., Ben Salem H., Keli A., Araba A., Chentouf M., Option méditerranéennes, series A, N°125, 309-314