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Abstract: By summarizing research projects performed over the past 10 years on grasslands in cattle production, we seek to understand the way of farming with grassland and cattle farmers' way of thinking about it. Based on the combined perspective of sociologists and animal scientists, the cross-analysis we realized reveals that the local context is the main element necessary to understand grassland management practices on livestock farms. Many groups of drivers influence how farmers develop their perceptions about forage services, think about forage production and practice it (i.e., "forage rationales"): (i) soil and climate conditions, (ii) professional network and (iii) existence of networks bringing together farmers and other stakeholders to discuss grassland issues. From the diversity of production contexts, we reveal different perceptions that livestock farmers have about the services that grasslands provide mainly at farm scale: animal production, economic, agronomic, ecological and environmental. The structuring of these perceptions outlines an array of forage rationales in which grasslands have a relatively central place in cattle production. Finally, we show that the farmer's rationale can evolve over time due to debates with peers and non-agricultural stakeholders. This leads us to discuss how evolution of livestock farmers' grassland rationales and practices can be supported, and finally to formulate recommendations for maintaining grasslands.

Keywords: grassland; sustainability; cattle farming; farmers' perception; forage systems; forage rationales

Citation: Petit, T.; Sigwalt, A.; Martel, G.; Couvreur,S. The Place of Grasslands in Cattle Farmers' Perceptions of Forage Production: Useful Insights of 10 Years of Empirical Research on Grasslands. *Sustainability* **2022**, *14*, 12309. https://doi.org/10.3390/su141912309

Academic Editor: Teodor Rusu

Received: 10 August 2022
Accepted: 22 September 2022
Published: 27 September 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

Grasslands are a major habitat, covering 40% of the land area on Earth [1] and supporting a wide range of biodiversity in Europe [2]. The generic definition of grasslands given by UNESCO—"land covered with herbaceous plants with less than 10 percent tree and shrub cover"—covers a wide variety of types depending on the geographic location, soil type and the forms and degrees of human intervention used to manage them. In Europe, several grassland types are traditionally distinguished [3]: rangeland, moors and marsh grassland, which have low productivity and are only grazed; permanent pastures, which consist of cultivated grasslands more than five years old, whether grazed or mown; temporary grasslands, which are cultivated grasslands grazed and mown, aged 5 years or less, with either grasses alone (single- or multi-species) or mixtures of legumes and/or dicotyledons; "artificial legumes grasslands", composed of legumes alone and only mown. In 2020, the total area of grasslands in France represented no more than 12.8 million ha (i.e., 43.3% of agricultural area) [4]. However, this area has decreased since the 1970s.

Since 1945, European agricultural policies, while aiming at meeting the food requirements of its population, led to a concentration of production, farm specialization and an

increase in work productivity, what occurred concurrently with a decrease in the number of farms and an increase in their mean size. Grassland area has varied among regions depending upon livestock farmers' interest in adopting forage intensification techniques offered by agricultural advisory services. On plains in particular—on which this article focuses—the introduction of maize silage in cattle diets led to a strong decrease in the use of grass, fodder roots and tubers crops to feed animals (beet for example). From the 1980s to the 2000s, the productivist agricultural model was called into question, and grasslands, as a multifunctional agronomic object, were increasingly considered for their multiple functions in cattle farming sustainability. Research initiated during the 2000s [5] showed that they are beneficial with regard to both zootechnical and economic aspects at the farm scale [6–8] and, more broadly, to environmental externalities [9–13]. Nevertheless, their areas continued to decrease, albeit more slowly. Since 2000, successive reforms of the European Union's Common Agricultural Policy (CAP) have shown the will to make compliance with certain environmental norms the conditions for obtaining public aid, to slow the disappearance of extensively managed grasslands. In the plains, the continuing concentration of production zones, the farm size increase, and cattle farmers' search for ways to increase their farms' competitiveness could make way for farm management strategies that may or may not favor grass production.

As agricultural landscape results from interaction between human activities and nature, farming systems pattern at regional scale are partly affected by local biophysical and socioeconomical drivers [14]. Recent studies have underlined that to understand agricultural landscape, research has to go deeper into the understanding of farming system [15,16]. On the other side, while agricultural landscape arises from farming systems existing at local scale, Methorst et al. [17] have shown that farmers of the same agricultural context differ in perception of opportunities for farm development at farm scale. Thus, we hypothesize that to understand how grasslands contribute to the agricultural landscape, and thus their maintenance, it is necessary to understand locally the roles that farmers give them in their production strategy.

Our first hypothesis is that the maintenance of grasslands is thought out by the livestock farmer at farm scale [18]. The anthropologist approach developed by Darré [19], which has been adapted to agronomy and animal sciences [20], suggests that agricultural practices can be studied through the system of rationality of the farmers and their reasons to act. Doing this, Darré asserts that in this system of rationality discussed locally in professional groups, there is an interdependency between perceptions and practices: representations determine practices, and practices determine representations. Accordingly, and based on farmers' knowledge and knowledge practices [21], the place of grasslands is determined by the perceptions of services and roles that farmers give them in the execution of their production strategy. In our paper, we called forage rationale the combination of perceptions that a farmer has of the different grassland roles/services: animal production, agronomic, economic, work, ecological, and environmental.

Our second hypothesis is that farmers perceptions and practices about grasslands are mainly influenced by their knowledge based on a personal background in terms of farming experience and on the local context (pedoclimatic conditions, socio-economic context). In line with the farming-style approach defined as 'a distinctive and valid way of farming that is shared by a large group of farmers' (considering the connections between economic, social, political, ecological and technological drivers to explain the way farmers think and manage the farm) [22,23], we are questioning which drivers contribute to the maintenance of grassland at farm and local scale. Moreover, Goulet, in line with Darré et al. [20], showed that these farmers' perceptions are related to discussions they have with peers who share or not the same perceptions, advisors, stakeholders, but also with people outside the agricultural world (family, neighbors, etc.). These perceptions, as explained before, can thus be understood both as ways of thinking and as practical standards to carry on a profession; they are therefore at the heart of how farmers perceive forage production and grassland roles in the forage production. Therefore, to understand reasons for their maintenance, our research focuses on the farmers' perceptions of grasslands and their local dialogic interactions about them.

2. Materials and Methods

2.1. Research Projects and Agricultural Contexts

We performed a cross-analysis of the results of 5 empirical research projects conducted in the period 2010–2018 (Table 1 and Figure 1), focusing on the place of grassland in farming systems and farmers' perceptions about it. All these studies are dealing with a large diversity of agricultural contexts in relation to soil conditions, regulations, economic support for production, territorial planning policies, research and development, and livestock sector. Each research project was based on field surveys of cattle farmers supervised by the authors (n = 173).

The cross-analysis was performed, on one hand, to valorize available quantitative data on farms' description and, on the other hand, to analyze qualitative data issued from interviews lead with farmers.

Table 1. Main research projects described in this article.

Project Name	Survey Date	Farmers Surveyed	Research Objective	Articles Used
Praiface	2010	43 (dairy)	Study technical and sociological drivers of farmers' adhesion to a contracting agro-environmental measures for low-input forage systems	Couvreur et al. 2019 [4]
Marais Poitevin	2011	66 (dairy, beef, other)	Identify relations between practices and perceptions of marsh grasslands on farms of the Marais Poitevin region	Baron et al., 2010 [24] Couvreur et al. 2019 [4]
Valherb	2014	15 (dairy)	Study relations between evolution of the place of grasslands on farms and forage rationale of cattle farmers	Martel et al., 2016 [25] Sigwalt et al., 2016 [26] Petit et al. 2017 [27] Petit et al. 2019 [28]
Tramix	2013	20 (dairy, beef)	Study the potential for introducing more permanent grasslands, and its drivers, in the framework of green and blue corridors	Bertier, 2015 [29] Couvreur et al. 2016b [30] Thareau et al. 2016 [31]
Maraîchine	2018	25 (beef)	Identify relations between livestock-production practices and perceptions of the Maraîchine breed of cattle in marsh grasslands areas	Couvreur et al. 2019 [4]

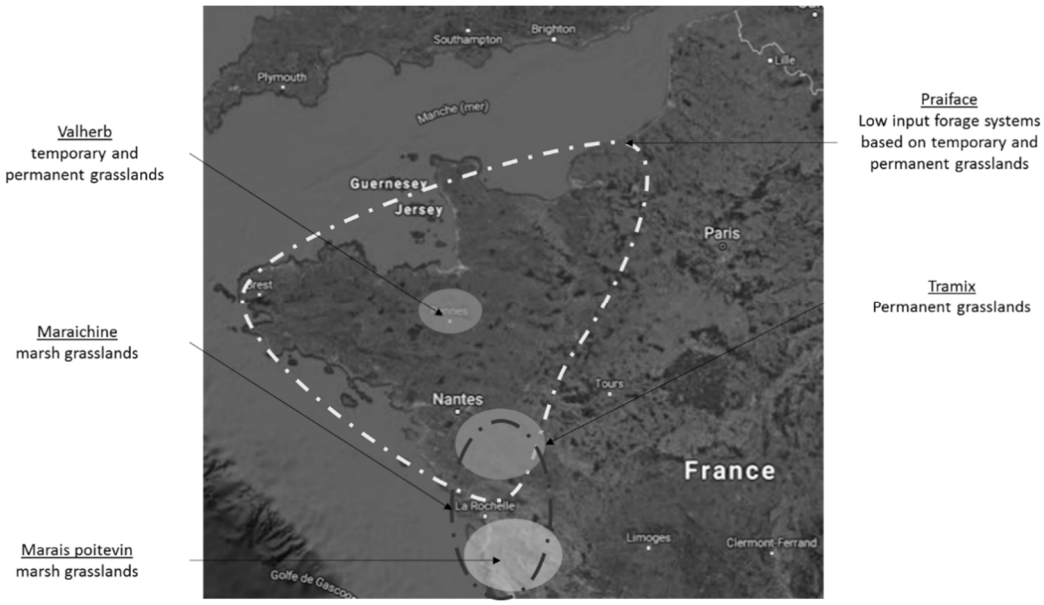


Figure 1. Studies areas for each project and type of grasslands studied.

2.2. Quantitative Analytical Method

To characterize the farming systems across the various studies, we have performed a Multiple Factor Analysis (MFA) on two groups of variables. The first concerns variables regarding the farms size and land use (AWU, UAA, % Grassland/Forage area, % Permanent grassland/Forage area). The second group concerns the level of animal production, the types of animals reared (dairy cows, suckling cows, young bulls, steers, heifers, calves, ewes) and the stocking rate. Then, we have realized a Hierarchical Clustering on Principal Components to create farming systems groups independent of the studies.

2.3. Qualitative Analytical Methods

Our work aimed to identify elements based on data that were collected in response to a variety of research questions. It mainly represents results already published (Table 1), and sometimes we have mobilized raw data. In the project reports, files and research papers we had, we thus selected results related to the roles of grasslands, even if the studies' analyses extended beyond this theme.

First, we gathered and analyzed data about production contexts in terms of soil, climate, social (urban/rural territory, professional farmer groups, stakes and stakeholders) and economic dimensions that may influence decisions of livestock farmers.

We aimed at highlighting common and specific drivers to explain grassland uses.

Then, we focused our analysis on the cattle farmers' perceptions and how they use certain drivers of their production contexts. We then used the qualitative data issued from the surveys with farmers. These ones have been led with semi-directive interviews led by the authors (Table 1) and based on specific interview guides developed for each project but with common parts dealing with how farmers perceive grasslands and grassland services in their farms. In this paper, we analyzed farmers' perceptions of services that grasslands provide through a transversal and thematic analysis as follows: animal production, agronomic, economic, work, ecological, and environmental [32]. Then, we illustrate through 2 projects the various forage rationales of livestock farmers, as the combination of the production contexts in which farmers act and of the farmers' perception of grassland services.

3. Results and Discussion

After describing the material and methods we have used, we will develop the results according to the following plan: (i) contextual elements (pedoclimatic, agricultural and social) related to grasslands, (ii) rationales about grassland uses and the services provided, and (iii) evolution and changes into rationales among farmers groups.

3.1. Farming Systems of the Sample

Based on the MFA and HCPC treatments, we have identified nine types of livestock farms across the five studies) (Appendix A). Each of them rely on various grassland types (permanent, temporary, marsh grasslands) and can be described as follows:

- NoLiv (n = 8): No livestock activity but a presence of natural grasslands in cereal farms for the production of hay resold to other farms
- Small SucklingLiv and Grass (n = 35): Small farms (UAA and Annual Workforce Unit (AWU)). These are essentially suckling cattle farms (possibly with a small herd of suckling ewes, or even horses) on grass-based forage systems only (essentially permanent natural grasslands). The fattening concerns essentially calves under the mother and oxen. The size of the herd and the stocking rate are low.
- CropsLiv (n = 32): Livestock farms of fairly large structural size in which a strong cereal activity is developed (more than half of the UAA). A cow–calf system of medium size valorizes permanent or natural meadows. A fattening system for young bulls or dairy cows may be present, explaining the average share of grass in the Fodder Production Area (FPA).
- SucklingLiv (n = 41): Cow–calf and fattening cattle farms of average size, sometimes associated with a small dairy cow or dairy goat farm (in relation to the overall population). A major part of UAA is FPA cultivated with a fairly large share of temporary grasslands and corn silage. The stocking rate is high.
- DairyLiv (n = 21): Dairy cattle farms of average size, sometimes associated with a small suckling cattle system. A large part of the UAA is cultivated, mainly for corn and temporary grasslands. The stocking rate is average.
- GoatLiv (n = 5): Dairy goat farms sometimes associated with fattening or dairy production. We observe a higher number of AWU than in the first five groups. Fodder crops (mainly permanent grassland and corn silage) have an average place in the crop rotation. The stocking rate is high.
- BigDairyLiv and Crops (n = 8): Specialized dairy cattle farms of large structural size (UAA, labor force, dairy system) with a high cereal production (half of the UAA) and a forage system strongly based on corn silage. The grasslands are 2/3 permanent.
- BigSucklingLiv (n = 17): Cow–calf and fattening cattle farms with a large structural size (UAA, UTH, suckling system) to which a dairy system is sometimes associated. Nearly 80% of the UAA is dedicated to forage production with a significant share of corn and temporary meadows. The stocking rate is high.
- BigSucklingLiv+ (n = 5): Cow–calf and fattening cattle farms with a very large structural dimension (UAA, UTH, suckling system). They are very similar to the farms of cluster BigSucklingLiv but are nevertheless distinguished by a larger share of grassland (mostly permanent) in the FPA and a higher stocking rate.

The different clusters created highlight the diversity of farming systems in terms of grassland use on the farms observed among the study areas (Table 2). This diversity is present in all the areas, but it is reflected in different representations of each type. NoLiv is the only farming system found in only one case study. This first result therefore illustrates the link between farming system and local context. Thus, it seems justified to characterize the local contexts to understand the place of grasslands in cattle farmers' perceptions of forage production.

Table 2. Distribution of farms according to the clusters and the study areas.

Project Name	No Liv	Small and Grass	Crop Liv	Suckling Liv	Dairy Liv	Goat Liv	BigDairy Liv and Crops	Big Suckling Liv	Big Suckling Liv+
Praiface		5	1	29	5	1		1	1
Marais Poitevin	8	15	22	5	3	4	4	6	3
Valherb				4	9		1	1	
Tramix			2	4	3		3	7	1
Maraîchine		15	7		1			2	

3.2. Contextual Elements of Farms Related to Grasslands

In each project, characteristics of soil and climate, agricultural context and social context of the target regions were collected (Appendix B). Here, we describe the characteristics that livestock farmers could use to construct their perceptions of grasslands.

3.2.1. Soil and Climate Context

The climate, soil type and topography are drivers that determine the agronomic potential and added value of fields as shown by Andrieu et al. [33] and Pfimlin et al. [34]. In the projects we analyzed, the existence of slopes; zones that are floodable, wet and inaccessible by agricultural machines; and fields with low agronomic potential often contribute to the presence of essentially natural or permanent grasslands. In contrast, when the agronomic potential, climate conditions and field accessibility are good, they may lead to the development of areas of temporary grasslands that often compete with cereals or annual forage crops [27]. However, these elements are not sufficient to predict the relative area of grasslands in each of these situations. Indeed, in a context of low agronomic potential, the surveys showed that grasslands can be unwanted and, if abandoned, can become relatively woody fallow land in accordance with Gellrich et al. [35]. In contrast, good agronomic potential may allow intensification, which may have contributed to decreasing [12] or maintaining grassland areas [28]. Finally, climate change can cause contrasting changes, from increasing grassland area in order to decrease stocking rates, to converting grasslands to annual forage crops or cash crops, with all animal feed being purchased as shown by Van Tilbeurgh et al. [36] and Ghahramani et al. [37]. In this way, the local soil and climate context defines the potential for the type of grassland, its uses and thus the services supplied. The expression of this potential can be explained by drivers besides soil and climate.

3.2.2. Agricultural Context

The productive atmosphere of a region, through professional and advisory groups, influences cattle farmers' rationales [38,39]. In our projects, we have confirmed that grasslands can be the object of many forms of support, which differ in their objectives, the development stakeholders concerned and the methods of advice [25,40,41]. This can result locally in personal advice from a single advisor but may extend up to a wide variety of networks for sharing experiences (Sustainable Agriculture Network, Center for Initiatives to Support Agriculture and the Rural Environment, groups for technical and economic improvement of farms, organic production groups, milk inspection organizations). In specific situations, grassland advice may form part of the support aiming to mediate between environmental/ecological objectives and technical/economic performance [26].

Another component of the agricultural context is the type and diversity of the production chains and markets in the region. Thus, the presence of chains that add value to products from grassland-based farms (e.g., organic agriculture, "Bleu-Blanc-Cœur" production (a chain with increased nutritional and environmental quality), cooperation

between a dairy-farmer cooperative and a regional natural park to promote grass-based milk production [4]) seems to be a factor that favors the presence of grasslands, due to the existence of product specifications that include grasslands. In the same way, short production chains that favor direct exchanges between livestock farmers and consumers provide the potential to develop practices that include grasslands, which consumers appreciate [28,42,43]. In contrast, when the dominant agricultural chains in a region turn toward cereals or putting large volumes of milk on international markets [25], the place of grasslands may be questioned, especially from an economic and productive viewpoint.

In all of our studies, the role of public policies emerged as a potential factor influencing the presence of grasslands on farms. Several authors have already highlighted effects of successive policies: support for modernization in the 1970s and its role in intensifying production [44,45], establishment of direct aid for ruminant production favoring the maintenance of forage areas [34] or of agro-environmental measures for low-input forage systems, but also, in parallel, establishment of quotas that favored cereal crops (sold or used to feed another animal production system) [46] and, more recently, "greening" of the CAP that favored grassland species [45]. Regulations at more local scales (e.g., agro-environmental and climate measures (AECM), urban planning, territorial consistency plan (TCS), watershed) were also cited regularly in these projects [24,29]. Not all of these potential mechanisms, some of them recent, attempt to stimulate action in the form of payments. They are supported mainly by stakeholders from outside agriculture and focus on issues not directly related to the economic viability of farms. Their effects on how livestock farmers perceive grasslands can thus be questioned [47].

3.2.3. Societal Context

In the societal dimension, we consider the nature of neighbors (from the agricultural professional environment or related to urban areas and non-agricultural activities) and other socio-economic activities in the region (e.g., other types of agricultural production, other stakeholders involved in grassland management).

The nature of neighbors (rural vs. peri-urban) influences livestock farmers' perceptions of effects of their practices on the environment and thus of the role that grasslands may play [48]. In a peri-urban context [27] but also near a natural park or in a TCS [30], we show that the presence of networks bringing together livestock farmers and non-agricultural stakeholders who discuss grasslands can help clarify debates among peers about the multi-functionality of grasslands, especially their landscape, heritage and tourist values. Nonetheless, this result may be qualified when the ecological advantages of grasslands are emphasized by environmental organizations (e.g., Bird Protection League, Coastal Conservatory of a marsh region), which livestock farmers sometimes accept with difficulty.

In conclusion, the local context that allows researchers to understand how livestock farmers perceive grasslands is the result of a large number of drivers, some of them extending beyond the local scale (e.g., public policies) and acting over the long term (e.g., existence of production chains). These drivers combine in a specific way in each region: (i) soil and climate conditions, (ii) the professional networks (i.e., chains adding value to agricultural products, advisory groups, agricultural cooperatives) and (iii) the existence of networks bringing together farmers and other stakeholders (e.g., communes, organizations, consumers, neighbors) who discuss grassland issues. The greater the diversity of these groups of drivers, the greater their impact on the expression of viewpoints and the emergence of forage perceptions and rationales.

3.3. Locally, a Variety of Forage Rationales Exist, Differing in the Perception That Livestock Farmers Have about Services That Grasslands Provide

The previous section described contextual drivers that farmers use to develop their perception of grasslands. Nonetheless, farmers' perceptions of grasslands also depend on their experiences. The following section examines four points: (i) elements of famers'

experiences that can explain their perceptions of grasslands; (ii) elements distinguishing livestock farmers' perceptions of services that grasslands provide; (iii) examples of forage rationales developed from these perceptions and related to experiences and contextual drivers; (iv) examples of combinations of forage rationales in two regions.

3.3.1. Personal Path of Livestock Farmers and Perception of Grasslands

Livestock farmers' personal paths are a driver that all of the projects analyzed. The elements highlighted included evolution of the family unit, the origin of the livestock farmer (agricultural or non-agricultural), economic events and structural evolution of the farm, all of which can change perceptions of grasslands [49]. Some livestock farmers emphasized the role of grasslands in their systems in response to an economic crisis that they had experienced when following more conventional production methods. We also observed that the younger farmers emphasize grasslands. In analyses of paths of livestock farmers [28], we revealed the importance of change in the workgroup (e.g., retirement of parents) in orienting production systems toward grasslands. In contrast, trends of increasing farm size and field dispersion reinforce the image of the complexity of managing a system based on grass production. Finally, positive perceptions of grasslands were held in particular by livestock farmers involved in nature movements strongly attached to conservation of natural spaces in a region through agricultural activities (as also shown by Lamarque et al. [50]).

3.3.2. Perceptions of Grasslands Distinguished by the Services Provided

All livestock farmers had perceptions of animal production and agronomy dimensions that focused on (i) spatial distribution of grasslands (e.g., concepts of "grassland" plots and "crop" plots) and the roles they are given (e.g., nearby grasslands for grazing, distant grasslands for mowing); (ii) the type of cropping as a function of the perceived agronomic value of the soil (i.e., grasslands on average soils, cereals on good soils); (iii) grazing as the main function of grasslands for reasons related to balanced rations (e.g., energy/protein) for animals, animal welfare, economics and work; and iv) ways in which grasslands are used defined by the type of animal raised.

- Perception of animal production related to the role given to animals in production rationales

Certain livestock farmers, although having grasslands in their system, consider them incompatible with silage maize for animal production (e.g., a forage without enough energy content, too high fill values to manage, and decreasing the interest in growing silage maize). Other livestock farmers see grass at most as a potentially interesting forage but of limited use for animals. Maize silage secures the ration (in part against climate risks but also energetically) and supports ruminant production while being simple and relatively risk free to produce (in the face of climate and economic risks). Livestock farmers with large areas of marsh grasslands may also have this perception, since it reduces grassland use to a form of picking forage with low feed value. In contrast, beef farmers but also dairy farmers seek to capitalize on the behavior of animals that remain productive on grass-based rations. For these livestock farmers, grasslands, whether natural or cultivated, must remain at the center of ruminant feeding. It is in this way that livestock farmers define species richness and diversity as advantages for the flexibility of the forage system and its nutritional quality (e.g., energy/nitrogen balance, feed self-sufficiency). Certain livestock farmers of local breeds (e.g., Maraîchine) also consider its influence on meat quality. It would be useful to complete the analysis in a future work with the farmers' perception on forage quality according to the process used to harvest (silage, hay, grazing, etc.) which is another dimension of the relation between forage and animal production rationale. Nonetheless, research performed in these projects show a continuum between these contrasting perceptions, without a direct relation to the proportion of grass in animal rations, particularly in the perceptions that connect the advantages of grass and maize forages.

- Economic perceptions related to objectives of revenue sources and ideas about work

The place of grasslands in forage systems is strongly associated with the way that farmers perceive their revenue sources. In all projects analyzed, farmers that aim to optimize profit, decrease production costs, decrease inputs (including irrigation) and decrease labor place grazed grasslands at the heart of their reflections because they allow farmers to avoid suffering from economic risks [6,51–53]. According to them, the species diversity of grasslands is a source of flexibility in the face of climate risks. For these livestock farmers, producing grass signifies accepting to produce only what one can (e.g., reaching quotas is not an end in itself) but also to avoid increasing farm size and investments using loans, which could damage the economic viability of the production system (in accordance with Duru et al., [53]). Other livestock farmers producing grass do not share this perception. For them, hedgerows and canals require a large amount of work time and cost without sufficient economic return (despite the existence of AECMs in some regions). Livestock farmers who opt for production strategies that aim to optimize production volumes, economies of scale, a source of revenue from selling cereals and investment are characterized by strong criticism of grasslands due to their low and too-variable productivity (i.e., yield, nutritive value, revenue) per ha compared to that of cereals. These livestock farmers thus indirectly indicate the risk associated with managing a grass-based forage system, as Frappat et al. [54] mention: many decisions and adaptations to make from day to day in a context of high uncertainty in the forage stock and thus the ability to feed the animals. These results align with those observed by Frappat et al. [54], who emphasize that the value of the profession, associated with the production volume and how it is obtained, is a major criterion that distinguishes livestock farmers, as a function of the place that they give to grasslands in their statements.

The vision of the profession also strongly influences the perceptions of grasslands. Livestock farmers seeking free time, whether with their families or for off-farm activities, or wishing to remain closer to nature and less often on the tractor consider grasslands as simple to manage [55]. Some of them also consider grasslands a source of intellectual fulfillment, leading them to redesign their management practices continually [28]. Other authors also showed that some livestock farmers thus associate grasslands and grazing as a way to take a walk [36]. In contrast, some livestock farmers seek to intensify the work factor, considering it more important than domestic and social life. They describe grasslands as complex to manage, restrictive and requiring too much work given its profitability per ha [28].

- Perceptions of the agronomic role that are positive but rarely mentioned

Only few livestock farmers with large areas of grasslands mentioned the latter's agronomic roles. Their statements, besides mentioning the difficulty in keeping grasslands "healthy" (i.e., productive and containing a low percentage of undesirable plants) longer than 3–4 years, favor grassland: (i) managed organically, they are crops naturally adapted to a local area and (ii) their presence in crop rotations improves soil life, increases yields and health of the following crop, covers the soil and, thus, decreases risks of erosion and/or nitrate leaching.

- Perceptions of ecological and environmental roles related to the type of grassland on the farm

Livestock farmers with a large proportion of natural grasslands on their farms perceive grasslands in three ways according to the latter's heritage value. The first, the least common, can be considered naturalist- and heritage-oriented, since the livestock farmers give grasslands a strong role in landscape maintenance, living conditions and local biodiversity. They are close to groups of farmers who develop collective management of biodiversity at farm and landscapes scale, as observed by Duru et al. [53] and Sabatier et al. [47]. For them, livestock farming produces and preserves this service. The second group of livestock farmers never mention this function. In the third, livestock farmers refer to grasslands as a subject of pressure from (i) society, through depending on aid that restricts

how the grasslands can be managed, but also (ii) other farmers, in the form of collective regional management of resources of ecological importance (e.g., water in coastal marshes).

Livestock farmers who have a large proportion of cultivated grasslands on their farms consider that these grasslands can increase the environmental performance of production. Except for a small minority of livestock farmers who combine grasslands/synthetic fertilization/pesticides in agricultural practices that maximize yield, the other farmers separate into two populations. The first mention rarely or not at all a relation between grasslands and their environment. The second mention a strong interest in grasslands to decrease the use of inputs that constitute risks for the environment and human health, close cycles, decrease soil erosion and contribute to a cultivated and functional biodiversity (e.g., wildlife habitat). Finally, we note that certain environmental advantages very well documented in the scientific literature, such as carbon sequestration by grasslands [55], are never mentioned in their statements. In the same way, farmers do not connect global warming, associated climate change, and the effects on grassland management (productivity, grazing management, etc.) and services (CO_2 sequestration, biodiversity, etc.) [55].

In conclusion, in relation to the very rich literature on ecosystem services provided by grasslands [56], the way in which farmers talk about them most often boils down to points of view on supporting and provisioning services (production of biomass, milk or meat, N-cycle, economic consequences) at the farm level. This highlights a difficulty for them in measuring the importance of maintaining their grasslands and associated practices in order to contribute to other services expected by society, whether regulating or cultural, and especially on a scale beyond the farm. Political or sectoral initiatives (payment for environmental services) could help them to better identify the multitude of services that their grasslands can provide at wider scale, and thus maintain them.

3.3.3. Combinations of Perceptions That Lead to Contrasting Forage Rationales

The perceptions detailed above, associated with experiences and the ways that farmers adopt the drivers of their production context, combine into different forage rationales. To illustrate the diversity of rationales observed in the projects analyzed, we present three contrasting examples.

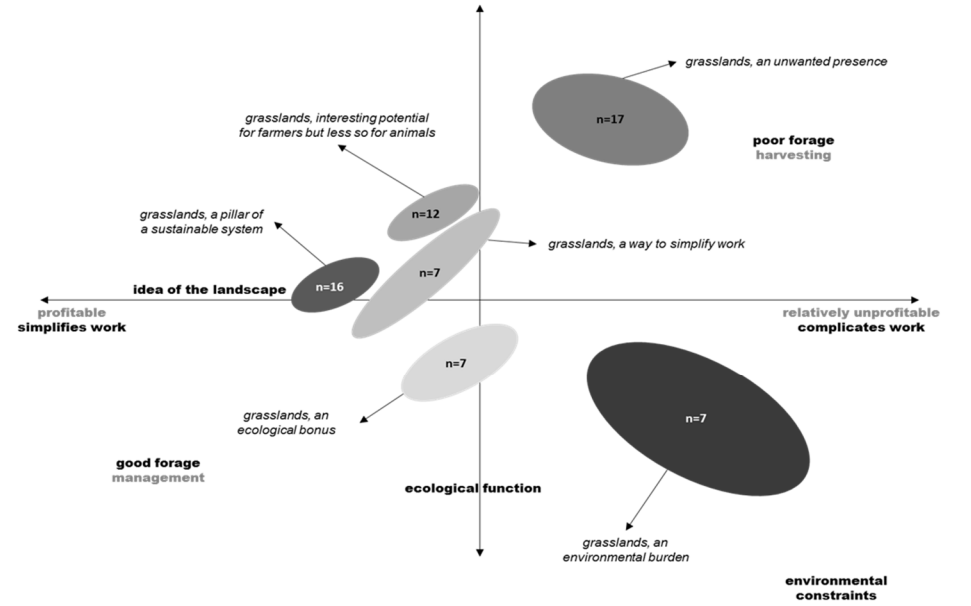
The first, from analysis of perceptions of marsh grasslands among farmers in a marsh region, groups mainly beef farmers, identified as livestock farmers for whom "grassland is an unwelcome presence". These livestock farmers wish to market all the animals produced on their farm, using workshops seeking to intensify animal performance (e.g., young bulls). Crop-livestock farmers, they often compare the agronomic and economic potentials of their fields. They seek external advice, especially about the forage system, and rarely refer to environmental dimensions of grasslands. They consider marsh grasslands as less profitable than cereals and as having less feeding value than other forages. They are content to put animals with low productivity on these grasslands (i.e., harvesting). They do not wish to spend time on areas with low profits.

The second groups beef farmers considered "sensitive to nature" and "marsh managers". They consider the region in which they produce as a source of biodiversity (e.g., plant and animal), heritage (e.g., landscape, water management) and agricultural work. Animals from a local breed are thus considered as tools for managing this landscape. They must be rustic, easy to raise and adaptable to dynamics of the available forage resources. Animal products must keep the region going economically via direct sales. These livestock farmers, set up outside a family context, often have several occupations and are engaged in organizations that promote local heritage. They consider marsh grasslands as central to their farms for three reasons: (i) their ecological richness must be preserved, (ii) their plant diversity is a source of forage flexibility and feed value for animals, and (iii) they require few operations and are thus simple to manage, requiring relatively little work time or technical activities.

The third, from a region characterized by good soils and a large amount of dairy production, groups dairy farmers identified in the study as "flexible optimizers". They currently seek to optimize their milk production by exploring paths already tested by their peers. Their workload is higher than that of other farmers, and they seek to decrease it to have more time for activities outside of work. Having started farming with their parents, they questioned certain practices when their parents retired. Consequently, they remain present in traditional professional networks (e.g., peers, extension) while exploring some specific alternatives (e.g., overall approach to production). For them, regulations and society raise questions that do not frighten them because they lead them to communicate and envision changes in practices. They thus consider grasslands to optimize their forage system. Silage maize is no longer a guarantee of progress in production, unlike grasslands. They thus use practices observed among more grassland-based livestock farmers and strengthen the role of grasslands in their production rationales. As sources of animal production and economic optimization, grasslands are managed as a forage crop (e.g., cultivated mixed grasslands, fertilized, short-to-medium duration).

3.3.4. Regions That Interweave Combinations of Different Rationales

The forage rationales that can be analyzed in a region depend greatly on contextual drivers, farmers' experiences, and farmers' networks among peers and with other regional stakeholders [57]. It thus appears difficult, as some authors suggest [55], to define classifications of livestock farmers that are completely independent of their local socio-economic and socio-ecological environment. Consequently, the way in which grasslands are perceived and cultivated is specific to a given region. We illustrate this for two contrasting regions (Figures 2 and 3).



A burden due to environmentalists: Grasslands perceived as relatively unprofitable, related to environmental questions and not sufficiently supported economically.

Unwelcome presence: Grasslands perceived as not profitable or productive enough or of low forage value. Grass-based forage production by default, without any defined management and for animals with low nutritive needs.

More environmental: Grasslands perceived as a natural and ecological advantage for maintaining the landscape. Grassland management considered simple or as requiriring relatively little time.

A way to simplify work: Grasslands perceived as a way to simplify work and decrease daily obligations, without any other utility mentioned.

Potential for farmers but little potential for animals: Grasslands perceived as a way to simplify work and profitability but with low nutritional value (at best a maintenance forage).

Pillar of a sustainable system: Grasslands perceived as a pillar of the system because they produce large quantities of good-quality forage at low cost, simplifying and descreasing work, and playing a strong ecologival role.

Figure 2. Diversity of representations of marsh grasslands in the Marais Poitevin region [16]. Figure is based on a sample of 66 farmers' perceptions.

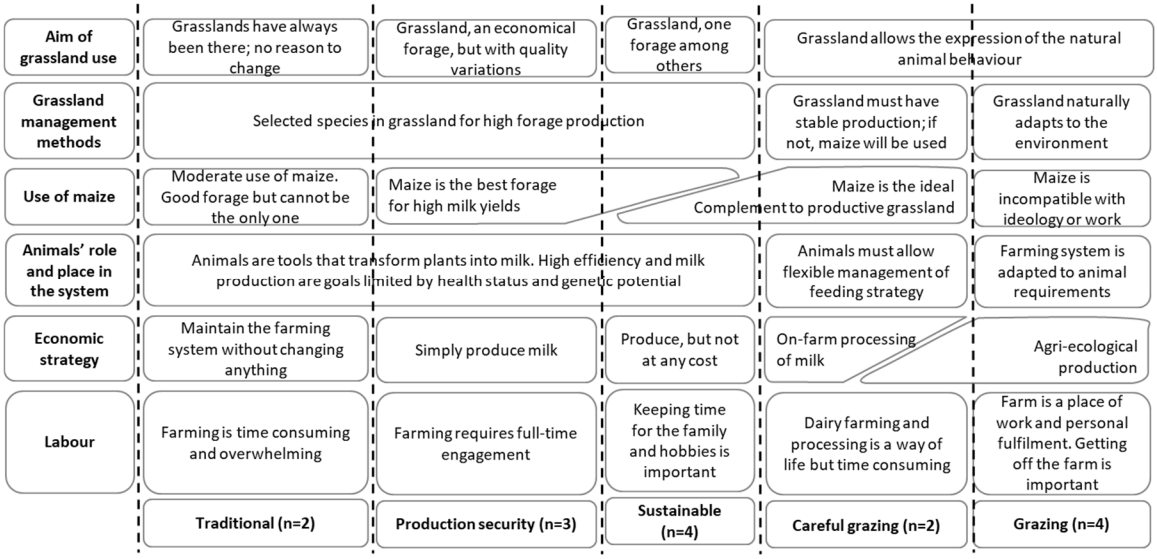


Figure 3. Diversity of forage rationales north of Rennes from a sample of 15 dairy cattle farms [20]. The rationales, at the bottom of the figure, are derived from the combination of grassland perception at different levels.

The Marais Poitevin is characterized by the dominance of natural marsh grasslands, restrictive soil and climate conditions, dominance of beef farming, presence of production chains with high economic value (cereals), little advice about grasslands (or advice provided by stakeholders such as a natural park or the Bird Protection League) and strong ecological and tourism concerns (Natura 2000 zone, AECM). In this context, we have shown that farmers' rationales could be organized through three main dimensions that were deeply at the heart of how farmers perceive their farm management: economic and social services of grasslands at farm scale; quality of grass forages for animal nutrition; ecological functions.

The north of Rennes territory is characterized by a soil and climate context favorable to temporary crops and grasslands, strong specialization in dairy production marked by a variety of markets, strong and varied local advice about grasslands and close proximity to an urban zone. In this area, our analysis has structured the farmers' rationales through six dimensions which were structuring how farmers perceive forage production and farm management: grassland use, grassland management, maize silage, place and role of animals, economic rationale and relation to the work.

The dimensions and rationales that emerge in these two contexts partially overlap and refer to issues beyond the productive dimension. For example, in relation with the context specificities, grasslands, accordingly with the unwanted aspect for farmers, can be neglected in Marais Poitevin (Figure 2, "unwelcome presence" type) while Flexible optimizers farmers from north of Rennes consider it as a valuable crop suitable for forage production which has to be well managed (Figure 3). However, we highlighted common rationales in these two territories such as grasslands, considered as a pillar of a sustainable system in Marais poitevin (Figure 2), which is close to the Fullfilled graziers rationale from the north of Rennes (Figure 3).

This illustration also highlights that understanding of issues and the ways to support livestock farmers' in their use of grasslands makes sense locally, often going beyond advice in the form of a technical package [32,58].

3.4. Forage Rationales That Interact and Are in Motion in a Region

The projects analyzed in this article reveal the existence of several forage rationales developed by livestock farmers, influenced mainly by the regions in which the latter work (Section 1) and the perceptions that they construct (Section 2). The rationales described

previously, however, are not rigid; the concepts on which they are based evolve in the face of regional socio-professional and socio-economic changes [57] according to the knowledge and farmer experience sharing [59]. Two of the projects which had different methodological approaches show this [28,31].

3.4.1. Conditions That Favor Debate about Forage Practices at the Regional Scale

As highlighted by Thomas et al. [21] about knowledge flows among farmers, the co-existence at a relatively small spatial scale of several ways to think about and manage grasslands seems to provide conditions that favor debate among livestock farmers about the place and use of grasslands on farms. It is also necessary that local dynamics allow for this discussion by involving, among others, a variety of local stakeholders [60]. In the projects analyzed, two situations of local dynamics were revealed, expressing changes in professional norms regarding forages.

The first focuses on the social and economic complexity of a region which combines urban and agricultural activities and infrastructure. The existence of networks promoting conventional or alternative production models, existence of informal professional groups formed from relations among neighbors, as well as social interactions with non-professional social groups tend to challenge livestock farmers about their practices (Section 2, Table 2). Depending on the production models they develop, livestock farmers are either emboldened in their production practices, in line with new expectations and issues of agriculture, or challenged about the gap between their practices and societal demands. This is particularly true of the livestock farmers identified as Flexible optimizers (Figure 3). They have perceptions about the uses and roles of grasslands that lay between those who consider grasslands the pillar of the forage system (i.e., Fulfilled graziers, also identified as grazing farmers by Duru et al., [53]) and those who consider grasslands as suppliers of a forage of little interest for animal production, especially in systems seeking high levels of production per animal ("productive managers seeking security") [28].

The second focuses on debate among farmers in the same zone of hedgerows and grasslands, in a framework applying a policy of green and blue corridors at the scale of a political planning of territorial organization (TCS). Organization of workshops for group reflection among farmers helped the latter support the issues of green corridors, led to mutual understanding of roles of grasslands on members' farms and produced common knowledge and references, especially about grassland-based systems. For this reason, perceptions related to revenue sources, production and work organization rapidly appeared in the debates, emphasizing the relative lack of leeway in the short term, thus requiring reflections about change over the long term, in the spirit of maintaining a dynamic of collective exchanges and learning [31].

3.4.2. Types of Changes in Forage Practices at the Farm Scale

Once placed in a favorable context (e.g., coexistence of rationales, interactions among various stakeholders), forage rationales are debated and modified by professional groups. For forage rationales, this movement is based on evolution of the perceptions of grassland functions (Section 2). Some of the projects analyzed here illustrate well the movement that drives forage rationales in the agricultural profession. Through the multiple social networks in which they evolve (e.g., conventional or alternative farming groups, agricultural model supported by society or not, formal or informal work groups), livestock farmers may be led to observe, discuss and become inspired by forage practices developed on other farms. This is particularly true for the livestock farmers identified as Flexible optimizers [28], who historically evolved in professional groups that defend a production model based mainly on intensifying animal, area and work drivers and that tended not to favor use of grasslands. Nonetheless, the socio-economic context of the 2010s pushed them to reconsider their profession and practices in order to respond to new economic and societal issues. For this reason, on their farms, they adapt grassland practices (e.g., multi-species grasslands, longer rotations, increasing the ways to use grassland forages)

observed among livestock farmers with more grass-based forage rationales, in a process of hybridization (Figure 4) [61]. This rationale, which is intermediate in the continuum of grassland use, thus seems to have been fed by exchanges and collective construction of knowledge in an intensive dairy region.

Likewise, the projects analyzed showed that putting farmers together around a common objective (i.e., green and blue corridors) could lead to exchanges and pooling of experience and practices having to do with the entire production system. This observation, which echoes the literature [62], shows that sharing among peers is a mechanism necessary for changing production rationales, especially those about grassland use. This project indicates potential ways to accompany farmers toward more agroecological types of production in which grasslands have an important place [41].

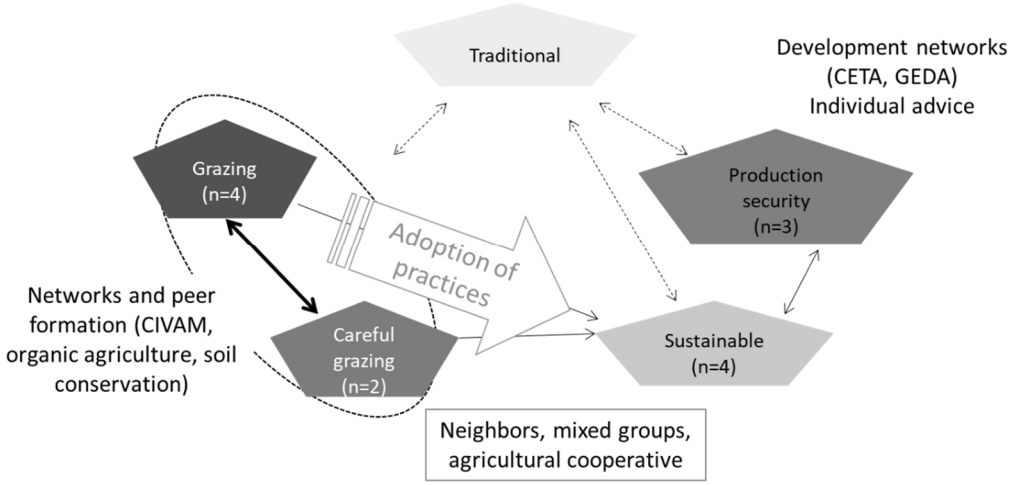


Figure 4. Exchanges and movements within the set of forage rationales (North of Rennes).

Finally, forage rationales change according to two main types of dynamics [63]. Firstly, a complete redesign, as a breakthrough innovation, after calling into question all ways to think about and manage grasslands on farms (e.g., types of grasslands, rotations, species, breeds, production objectives). This dynamic mainly refers to farmers who evolve towards rationales giving a large place to grasslands in their farming systems such as Fullfilled and Moderate graziers from north of Rennes or grasslands considered as pillar of sustainable system in Marais Poitevin. The second dynamic is an evolution of production systems by searching for efficiency or introducing practices that come from changes on the fringes of certain perceptions developed by livestock farmers under a step-by-step innovation process. This evolution is largely favored in a context of multiple stakeholders where farmers are challenged and called into question. In the north of Rennes territory, the Flexible optimizers illustrate it well with their adaptation of grassland practices through the process of hybridization (Figure 3).

4. Conclusions

The characterization of forage rationales, based on empirical research, illustrates that in same contexts a wide range of combinations of perceptions of grasslands services appears. Thus, we have confirmed that a farming system designed by farmer, observed through the place and use of grasslands, can be explained by their system of rationality [20]. The forage rationales that combine positive perceptions draw on a wide array of services (including environmental and ecological issues) provided; the latter are often shared by agricultural and non-agricultural stakeholders in multiple networks. At the regional scale, grassland maintenance on farms seems to be presently associated with their ability to meet expectations of various local stakeholders at least at two scales: farm and landscape (sometimes dairy or meat chain). This precondition may allow the emergence and

coexistence of a variety of rationales as long as networks, professional or non-professional, exist [21]. They form the cornerstone enabling livestock farmers to debate production models and the roles that grasslands play within them; it also questions their practices and how these could evolve. As grasslands management is multilevel, multiactor and multifunction based [32], these results confirm the importance of combining three conceptual frameworks (farming system models with a sociological approach [20]; socio-ecological system models [64], and socio-technical systems models [57]) to understand forage rationales, their combination at local scale and their ability to evolve [57] towards agroecology.

Doing that, our work calls the concept of farming style into question. In the basic definition given by Van der Ploeg [23], it is "a way of farming shared by farmers". The grassland services perceived by farmers show that it is not easy to characterize a generic grassland farming style, due to the various drivers and scale involved in their maintenance. Rather than thinking of a farming system involving grassland use as a style of farming shared only by farmers, it invites farmers to develop a farming style shared and discussed by farmers and other actors to provide sustainability at all scales. Thus, in terms of grassland development, support and advice cannot only be based on the animal-production and economic dimensions, as is often provided. While livestock farmers mention it in their statements, it is certainly not sufficient for grassland maintenance. Generalist technical tools were developed to teach livestock farmers about their leeway and decision rules to improve management of an economic resource while decreasing risks. An example is the development of a manuscript tool co-developed by farmers and advisers to manage grass resource at spring (grazing management and grass forage production). Nevertheless, these tools have not always resonated with others. The same holds true for tools that assess forage systems [54], which may have found their limits by focusing too much on technical dimensions without considering sociological drivers. Indeed, it seems necessary to consider broader forms of advice and support, based on ecosystem services, particularly for agronomic, environmental, and work-related dimensions. Because of their multifunctional character, there is no single way to maintain grasslands on livestock farms. The local context orients the characteristics of this multifunctionality and, thus, the possible paths for maintaining grasslands on livestock farms. Support of livestock farmers at local scales must thus be reflected upon in collaborative structures persuing two objectives: (i) allowing debate between stakeholders and farmers to share issues related to grassland maintenance and (ii) co-designing ways to maintain grasslands adapted to the diversity of production systems and ways of thinking about them [32,58]. These structures can take a variety of forms and objectives depending upon the context: (i) rely upon the many pre-existing networks (among peers and/or other stakeholders) to promote hybridization of knowledge and practices [21] and (ii) set up structures for sharing regional issues among stakeholders who communicate rarely, with the goal of initiating multi-stakeholder local dynamics that go beyond rationales of relatively undiversified agricultural systems.

Author Contributions: Conceptualization, T.P., A.S., G.M. and S.C.; methodology, T.P., A.S., G.M. and S.C.; software, S.C. validation, T.P., A.S., G.M. and S.C.; formal analysis, T.P., A.S., G.M. and S.C.; investigation, T.P., A.S., G.M. and S.C.; writing—original draft, T.P., A.S., G.M. and S.C.; writing—review and editing, T.P., A.S., G.M. and S.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Types of Farming Systems Present in the 5 Studies Areas

Table A1. Types of livestock farms encountered across the five studies areas

	No Liv	Small and Grass	Crop Liv	Suckling Liv	Dairy Liv	Goat Liv	BigDairy Liv and Crops	Big Suckling Liv	Big Suckling Liv+	*p*
Number of farms	8	35	32	42	21	5	8	17	5	
Structural characteristics										
UAA, ha	91 a	97 a	167 b	75 a	83 a	121 ab	216 b	189 b	346 c	<0.001
Crop area, ha	81 bc	20 a	93 c	14 a	27 a	64 ac	115 c	42 ab	62 ac	<0.001
Forage area, ha	11 a	77 b	75 b	61 ab	56 ab	57 ab	99 bc	147 c	284 d	<0.001
% Forage area/UAA	11 a	82 d	47 b	82 d	69 cd	59 bd	49 bc	79 d	84 d	<0.001
Maize silage, ha	0 a	1 b	11 ac	10 bc	20 ce	17 bcd	41 f	30 def	42 df	<0.001
% Maize/Forage area	0 a	1 a	14 bc	16 c	34 d	20 bcd	40 d	20 c	15 ac	<0.001
Grasslands, ha	11 a	76 c	64 bc	51 ac	37 ab	41 ac	62 ac	118 d	236 e	<0.001
% Grasslands/UAA	11 a	81 e	39 b	69 de	47 bc	48 bcd	31 ab	64 cd	68 ce	<0.001
% Grassland/Forage area	100 bd	99 d	86 bc	84 c	66 a	80 abc	63 a	80 c	82 acd	<0.001
Permanent grasslands, ha	11 ab	70 c	57 bc	22 a	11 a	31 ac	38 ac	73 c	196 d	<0.001
% Permanent grasslands/Grassland area	100 d	91 d	88 cd	43 ab	34 a	70 bd	63 bc	58 b	73 bd	<0.001
Temporary grasslands, ha	0 a	6 a	7 a	29 b	26 b	9 ab	24 abc	45 c	40 bc	<0.001
Nb AWU	1.1 ab	1.1 a	1.8 bc	1.3 a	2 bc	2.8 cde	3.9 df	2.9 e	4.4 e	<0.001
Number of animal production	0 a	2 c	1.6 bc	2 c	1.4 b	2 bcd	1.6 bc	2.7 d	2.2 bcd	<0.001
Stocking rate, Livestock unit/Forage area	0 a	0.8 b	1.3 c	1.7 c	1.4 c	1.7 bc	1.3 bc	1.7 c	1.9 c	<0.001
Animal production										
% farm with suckling cows	0	86	84	95	14	20	0	100	100	
Number of suckling cows (overall population)	0 a	33 ac	44 cd	55 d	3 b	4 bc	0 a	112 e	282 f	<0.001
Number of suckling cows (farm concerned)	0	38	52	58	20	22	0	112	282	
% farm with fattening	0	54	37	72	5	20	25	88	100	
Number of fattened animal * (overall population)	0 a	7 a	9 a	21 a	0 a	9 a	14 a	82 b	146 c	<0.001
Number of fattened animal * (farm concerned)	0	12	23	29	5	45	55	93	146	

% farm with dairy cows	0	6	25	19	95	20	100	29	0	
Number of dairy cows (overall population)	0 a	0 a	14 ab	6 ab	53 c	14 ab	103 d	19 b	0 a	<0.001
Number of dairy cows(farm concerned)	0	3	56	34	56	70	103	65	0	
% farm with dairy goat	0	6	0	2	0	100	0	0	0	
Number of dairy goat (overall population)	0 a	2 a	0 a	4 a	0 a	340 b	0 a	0 a	0 a	<0.001
Number of dairy goat (farm concerned)	0	30	0	150	0	340	0	0	0	
% farm with ewes	0	23	3	0	0	0	0	0	0	
Number of ewes (overall population)	0	40	2	0	0	0	0	0	0	0.006
Number of ewes (farm concerned)	0	175	60	0	0	0	0	0	0	
Overall Livestock Unit	0 a	56 ab	85 bd	100 cd	68 bc	77 acd	133 d	237 e	497 f	<0.001

* young bulls, steers, heifers, calves. a, b, c, d, e, f: significantly different (least-square means test) at $p < 0.05$.

Appendix B. Agricultural Contexts of the Research Projects Territories

Table A2. Agricultural Contexts of the Research Projects Territories.

Name of the Study//Criteria	VALHERB/ Area of Rennes-Betton (n = 12 Retired Farmers + n = 26 Livestock Farmers)	PRAIFACE/Area of Cholet (n = 43 Livestock Farmers)	MARAIS POITEVIN (n = 70 Livestock Farmers)	TRAMIX/Territory of the SCOT Yon et Vie- La Roche sur Yon (n = 68 Farmers + n = 20 Livestock Farmers on the Municipality of Les Lucs-sur- Boulogne)	MARAICHINE/Atlantic Marshes of West France (n = 25 Livestock Farmers)
Pedoclimatic characteristics	- Very good physical and chemical soil fertility - Very good accessibility to agricultural machinery - Good soil bearing capacity except in flooding areas (near the Vilaine river)	- Two distinct areas: watersheds of Ribou-Verdon and of Rochereau, geographically close and with the same pedological characteristics - Tempered oceanic climate zone. A little more rain and days with rainfall over 5	- Marshal context with 2 types of marshes: wet and dry - Drying soils in summer - Flooding plots in winter (sometimes with difficulty to access) - Canals surrounding plots are used as fences and to water the livestock	- Municipality part of a mixed farming and livestock farming area, in an historical hedged countryside - Crop mosaic with grasslands and cultivated plots in equal proportions - Important hydrographic network, hilled countryside; plots near the river banks are often steep and difficult to mechanize	- Four disjointed marshes zones with varied characteristics: Marais poitevin, Marais breton, Marais de la Seudre, Marais de Rochefort - Tempered oceanic climate with high rainfall during fall and winter, and intense drought periods in summer

	- Favorable climate to plant growth during spring and summer - Summer drought risk - Low topographic variability, some valley bottoms	mm in the Rochereau watershed	- Tempered oceanic climate zone, with high sunshine at summertime	and therefore used as permanent grasslands	- Soils composed of 30 to 60% clay with a high proportion of sodium compared to limestone: low structural stability, soils covered by permanent grasslands - Other soils with higher limestone content are cultivated with cereals. - The Poitevin marsh is divided into two zones: the wet marsh (1/3 of the surface) and the dry marsh (2/3 of the surface). - All marsh areas have a large number of habitats and protected species.
European and national regulation context	- Introduction of milk quotas in 1984 - Agricultural pollution control plan and uphold of associated standards - Greening of the CAP in 2010 - No specific territorial agri-environmental measures	- Areas classified as nitrate-vulnerable areas - Proposition of SFEI agri-environmental measures to farmers (total of 22 contracts) - The contracting rate is the principal difference between these 2 zones - The contractualization impulses few or	- Proposition of agri-environmental measures (AEM); - 2 perceptions of AEM: either seen as a constraint without any economic advantage, and driving to an over-presence of grasses due to late mowing OR positive perception (for suckling cows' farmers)	- Proposition of territorial agri-environmental measures for grasslands with ecologic issues (such as wet grasslands) implying practices such as late mowing and no fertilization	- Marais breton and Marais de Rochefort recognized as ZNIEFF (zone of floristic and faunistic value) and IBA (Important Bird Area)

			no practices change for livestock farmers already in a farming system corresponding to the ecological specifications - Economic more than environmental motivation	
Economic support for production	- Support to agricultural modernization in the seventies - Financial support to beef cattle production (suckling cows and young bovine males) and to extensification in the 90s - Single farm payments implemented in the 2000s - Basic payment rights and greening in the 2010s (including green payment for permanent grasslands) - Nowadays—Financial support from the French state within the framework of Common Agriculture Policy			- Compensatory allowance for permanent natural handicaps (ICHN) given to farmers who ask for it in low-productive areas; average aid of 70 EUR/ha - Other possible financial support if farmers maintain a minimum rate of permanent grasslands in relation to the Useful Agricultural Area of their farm, or if they have Surfaces of Ecological Interest - Territorial agri-environmental measures aiming to maintain an environmentally friendly agriculture with plot maintenance practices

Political context about land-use planning	- Land reparcelling during the 1970s and 1980s - No regional natural park - No water development and management scheme - Less than 5% of the area concerned by a water drinking protection area - No nitrate-vulnerable zone - Local Plan for Urbanism and Local Plan for agriculture (2010) to maintain a peri-urban agriculture - Schema of Territorial Coherence (SCOT) (including green and blue belt policy) adopted in 2015		- Land-use planning of marshes since Middle Age - Intensified soil drainage in the sixties - Livestock farming specialization and decline in the nineties - Rise in environmental issues - Presence of the Regional Natural Park of the Marais Poitevin	- Existence of a Schema of Territorial Coherence (SCOT) on 23 municipalities, i.e., 800 km2, organization that originates a study about green and blue belts network - 67% of the SCOT territory is valorized by agriculture: 569 farms with an average useful agricultural area of 96 ha, and of which at least 90% have a livestock production - Presence of a Local Urbanism Plan (PLU) on the municipality of Les Lucs-sur-Boulogne	- Artificial lands gained from the sea that can only be maintained thanks to an agricultural economic activity - Presence of the Regional Natural Park of Marais Poitevin on the Poitevin marsh zone
Agricultural support organizations and discussion places	- Proximity of INRAE (Formerly INRA: National Institute for Agricultural Research) (research on grasslands) - Several agricultural development groups	- The contractualization of agri-environmental measures is highly supported by the local institutions such as the Chamber of agriculture (extension services), the Urban community of Cholet, and	- High support to grassland via advice actions given by the Bird Protection League (LPO) and by the Regional Natural Park of Marais Poitevin, but these organisms' advice is perceived by local farmers as non-proper because it is too ecology-oriented	- Chamber of agriculture at the department level - presence of a farmers' group called CIVAM (Center for Initiatives et de Valorization of agriculture and rural areas; associative status) at the department geographic level, to which one farmer is contributing	- Presence of INRAE1 via the experimental unit of St Laurent de la Prée, which works—among other subjects—on valorization and preservation of littoral marshes by livestock farming

	(CETA, RAD and CIVAM, GEDA, 1 group on organic farming) - Little advice on fodder and grassland by milk recording organization and by Chamber of agriculture extension services - Rise of private advice organizations in the 2010 years	- the farmers of Ribou-Verdon association	- Presence of a group of farmers—called CIPRAM—working on the valorization of marshes grasslands	- presence of a machinery use cooperative (CUMA) at the municipality level, of which 1 farmer is president, and 18 farmers are members	- Presence of a livestock farmers' association for the conservation and the valorization of the Maraîchine breed
Dynamics of livestock's sectors	- Historical cider production, then uprooting of the apple-trees in the fifties and dairy specialization - Large diversity and segmentation of cereal production - Large diversity of actors in the downstream dairy sector (3 cooperatives and 3 private compagnies, of which 3 are for organic milk) - High added value and high valorization dynamic by the downstream actors of the dairy sector - Rise of on-farm processing and short		- Move of the dairy farmers to cereal production with intensive rationales for animal or crop production - Suckling cows' farmers with low-intensive production rationales for animal or crop production, younger and more qualified	- Territory which is part of the first French department for beef cattle production (including young bovine males) - Poultry sector also highly developed; presence of several agro-industrial companies which ensure the slaughter, packaging and marketing of the major part of the local production	- The beef valorization goes through direct sales, thought by 15 livestock farmers among 25 as the only means to valorize the meat; and via long supply chains, perceived as a low-rentability valuation (export to Italy for fattening) - Creation in 2021 of a short supply chain on the Marais Breton territory by about 20 livestock farmers, the Bird Protection League (LPO) and 2 local organic food cooperatives - Maraîchine breed is little known, even locally by the beef sector actors,

	supply chains (on-farm selling, farmers' shops, farmers' and consumers' associations—AMAP) - High rise in organic farming since the beginning of 2000 - Presence of fodder drying cooperative near the area since the 1970s				and in competition with beef cattle from breeds with better beef conformation
City proximity and potential relations with non-agricultural actors	- Close proximity with the city of Rennes, urban community of 600 000 inhabitants	- Drinking water abstraction zone for the city of Cholet	- Rural area of which a part presents a high touristic potential (wet marshes of Green Venise)	- Rural municipality far from La Roche sur Yon - One farmer is an elected municipal official of the municipality of Les Lucs-sur-Boulogne	- Rural areas

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