

Health service provided by grasslands diversity: farmers perceptions and strategies in 4 French regions

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Abstract

Animal health service from grassland is a potential response to animal health management. We aimed to identify how farmers perceive and use the grassland's health service in relation to the floristic diversity. To this end, comprehensive interviews were carried out with 30 farmers located in four regions characterized by different types of grasslands: plain area mainly with temporary grasslands; plain area mainly with permanent grasslands; mountain area mainly with permanent grasslands. A typology of farmers according to their management strategies of grassland diversity has been built. Three groups were identified: 1) One grassland by service, where farmers have several grasslands, each providing a specific service (n=10), 2) One grassland for multiple services, where farmers look for multiple services through one diversified grassland (n=10), 3) Single service grassland where farmers use grassland only for the feed service (n=10). We have shown that management strategies are consistent with the link they perceived between grassland diversity and animal health (totally convinced (n=14), looking for evidence (n=8) or not convinced at all (n=8)).

Keywords: grassland diversity, animal health, farmer's perception

Introduction

Through their diversity, grasslands provide a wide range of services that meets multiple challenges faced by agriculture: limiting erosion, regulating water flows, filtering pollutants; preserving floristic, faunal and microbial biodiversity, carbon sequestering; and providing landscape benefits (Bengtsson *et al.*, 2019). Beyond these services, grasslands can be useful for animal health management. They provide balanced forage, particularly when grazed. The flora, through its diversity, can be a source of metabolites, such as carotenoids, phenolic compounds, and vitamins, which are produced by grassland plants (Poutaraud *et al.*, 2017 ; Maxin *et al.*, 2020). The polyphenols, through their scavenging capacity, can contribute to reduce oxidative stress and inflammation in several animal species. Condensed tannins enhance antiparasitic activity (Hoste *et al.*, 2005). Despite references that suggest potential roles of grasslands to manage animal health, there is few knowledge about how farmers are using grassland and plant diversity for animal health management. We aimed to study farmers' perceptions of the link between grassland diversity and animal health and the link with the forage system. Our hypothesis is that farmers connecting grassland diversity and animal health manage the forage system in such a way as to make use of this health service.

Materials and methods

In 2023, we interviewed farmers from 30 farms (12 dairy cattle farms, 7 beef cattle farms, 3 ovine farms and 8 farms with multiple ruminant productions) selected in 4 areas in France: Pays de la Loire (PDL, n=7), Indre (n=9), Auvergne-Rhône-Alpes (AURA, n=5) and Haute-Saône (HS, n=9). These areas have a high proportion of grasslands in the utilized agricultural area (UAA), a diverse range of production systems, and a range of climates (continental, oceanic, and continental to mountain) and agronomical potentials. The average UAA of the sample was 137 ha (SD ± 58 ha) with 89% of forage area (SD ± 12 %) and 58% of grassland

(SD \pm 29 %). Comprehensive interviews were carried out with open-ended questions to i) collect data about the farm, the animals, the grassland diversity management and ii) to access to the farmers' perceptions about the link between grassland diversity and animal health. The discourses have been recorded, transcribed then analyzed to qualify the farmers on their grassland use for animal health services. Next, the discourse was analyzed using comprehensive sociology. The lexical fields used by farmers regarding grassland management and animal health were identified. Differences in lexical fields made possible to classify the farmers according to their perceptions and the spontaneity with which they talk about the use of grassland for animal health and their knowledge or expectations on this subject.

Results and Discussion

The analysis of the expected services and the management of the diversity at farm scale led to three profiles showing that farmers' management strategies are consistent with the link they perceived between grassland diversity and animal health (**Erreur ! Source du renvoi introuvable.**). The 1st one, "One grassland by service" (n=10), groups farmers looking for multiple services through grassland diversity. They have several grasslands, each providing a specific service. Health service is provided by a "pharmacy grassland" used at specific moments. This group gathers "convinced farmers" (n=6), speaking spontaneously about health services of grassland and giving examples of health effects of plants, molecules or phenological stages and farmers "looking for evidence" (n=4), thinking that diversity can be useful for animal health but lacking knowledge and trying to explain it by comparison to human health. The 2nd one, "One grassland for multiple services" (n=10), gathers farmers searching for multiple services of grassland through one diversified grassland. Animals benefit from health service of this grassland through rotational grazing and stored forage. This group gathers "convinced farmers" (n=8) and farmers "looking for evidence" (n=2). The 3rd one, "Single service grassland" (n=10) gathers farmers using grassland only for the feed service, given by one type of grassland. This group gathers mainly farmers that are "not convinced" and hardly speak of the link between grassland diversity (n=8) and few farmers "looking for evidence" (n=2).

Farmers managing diversity as "One grassland for multiple services" work with permanent grasslands (70% of the UAA) to benefit from its multiple services. It can be explained locally by the existence of tools or advice developed to manage grassland diversity. For example, mountain farmers, who use natural grassland typologies to address the furniture of multiple services (Schils *et al.*, 2022), are among those who are convinced that their practices enhance the health service of grasslands (e.g. AURA region). Conversely, the use of temporary grassland is more important in "One grassland by service" management (52% of the UAA). It can be explained by the hilly context observed in HS, Indre and valley area in AURA that force them to deal with various agronomical potentials. Diversified permanent grasslands are considered as less productive and poor but ideal for dried cows, young animals or for "medicinal" service. Highly productive multispecies temporary grasslands are sown for a protein-rich forage production. Finally, farmers in the "Single service grassland" are not characterised by the type of grassland they use nor by the region. They adapt their forage system to their local conditions only focusing on the feed production. Doing that they pass by the other services that grasslands can provide at farm scale. As shown by Di Blasi *et al.* (2023), our study has not shown any effect neither of the size of the livestock nor of the level of animal intensification on the perception of health services of grasslands.

Conclusion

While studies highlight that species could be useful to deal with animal health issue, part of the farmers are waiting for health service from the diversity of their grasslands. Those

perceptions are associated with grassland diversity management at farm scale, partly impacted by the agronomical potential and the tools and advice available for farmers. To promote health service provided by grasslands, researchers and advisors would have to produce local references according to the different ways to manage grassland's diversity at farm scale.

Table 1 : Grasslands' diversity management strategies and perceived link between grassland diversity and animal health. (%PG : average part of permanent grasslands)

		Convinced	In search of evidence	Not convinced	Total
One grassland by service	n=	6	4	/	10
	AURA	1/5	2/5	/	3/5
	HS	3/9	/	/	3/9
	Indre	2/9	1/9	/	3/9
	PDL	/	1/7	/	1/7
	% PG	41%	58%		48%
One grassland for multiple services	n=	8	2	/	10
	AURA	2/5	/	/	2/5
	HS	2/9	1/9	/	3/9
	Indre	2/9	1/9	/	3/9
	PDL	2/7	/	/	2/7
	% PG	69%	73		70%
Single service grassland	n=	/	2	8	10
	AURA	/	/	/	/
	HS	/	/	3/9	3/9
	Indre	/	1/9	2/9	3/9
	PDL	/	1/7	3/7	4/7
	% PG		34%	61%	56%
Total	n=	14	8	8	30
	AURA	3/5	2/5	/	5
	HS	5/9	1/9	3/9	9
	Indre	4/9	3/9	2/9	9
	PDL	2/7	2/7	3/7	7
	% PG	57%	56%	61%	58%

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