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# Perspectives, opinions, and perceptions of pastoralists on their sustainability: the case of the Pyrenean region of Pallars in Spain

Antonio Lecegui<sup>1,2,\*</sup>; Berta Vidal-Mones<sup>1</sup>; Feliu López-i-Gelats<sup>3</sup>,  
Elsa Varela<sup>1,2,4</sup>

<sup>1</sup> Center for Agro-Food Economics and Development (CREDA-UPC-IRTA), Castelldefels, Spain

<sup>2</sup> Institute of Agrifood Research and Technology (IRTA), Caldes de Montbui, Spain

<sup>3</sup> University of Vic-Central University of Catalonia (UVic-UCC), Vic, Spain

<sup>4</sup> Forest Science and Technology Centre of Catalonia (CTFC), Solsona, Spain

\*e-mail: [antonio.lecegui@irta.cat](mailto:antonio.lecegui@irta.cat)

**Abstract.** Traditional small-scale livestock farming activity in the Spanish Eastern Pyrenees is nowadays influenced by market globalization trends as well as regional factors such as nature protection regulations and tourism. This study addressed pastoralists' perspectives, opinions, and perceptions regarding the challenges that threaten their sustainability. We carried out a face-to-face survey with 103 pastoralists in Pallars (Catalonia) during 2018. The stagnation in sales' prices of products was considered the biggest challenge and one of the underlying causes of the farms' low financial profitability. Pastoralists also pointed out the highly burdening bureaucracy, the lack of generational turnover, and the difficult coexistence with wildlife as important problems undermining the livestock sector in the region. Although most participants positively considered their increasingly valued role in the conservation of biodiversity, their perception of protected natural areas was mostly negative. Respondents reported a total of 613 conflicts with wildlife during the previous year. Wild boars were the species most frequently mentioned for damaging meadows, crops, and infrastructures, causing road accidents, and disease transmission. Vultures were held responsible for attacks on flocks while deer species were signalled for fodder competence. These results confirm the multiple adverse menace factors of pastoralism and highlight the urgent need to establish favourable policies that involve local actors in decision-making processes to overcome these obstacles.

**Key words:** Mountain farming, global change, protected areas, wildlife, conservation, socio-ecological systems.

**Perspectives, opinions et perceptions des pasteurs sur leur durabilité: le cas de la région du Pallars dans les Pyrénées**

**Résumé.** L'activité traditionnelle d'élevage à petite échelle dans les Pyrénées-Orientales espagnoles est aujourd'hui influencée par les tendances de la mondialisation du marché ainsi que par des facteurs régionaux tels que les réglementations de protection de la nature et le tourisme. Nous avons réalisé une enquête auprès de 103 pasteurs du Pallars (Catalogne) en 2018. La stagnation des prix de vente des produits y est considérée comme le plus grand défi et l'une des causes sous-jacentes de la faible rentabilité financière des exploitations. Les pasteurs ont également souligné la lourdeur de la bureaucratie, le manque de renouvellement des générations et la difficile coexistence avec la faune sapant ce secteur d'activité. La plupart considèrent positivement leur rôle de plus en plus valorisé dans la gestion de l'environnement, mais leur perception des zones naturelles protégées est majoritairement négative. Ils ont signalé 613 conflits avec la faune au cours de l'année précédente. Le sanglier est l'espèce la plus citée, elle endommage les prairies, les cultures, les infrastructures, cause des accidents de la route et la transmission de maladies. Les vautours sont tenus pour responsables des attaques contre les troupeaux tandis que les herbivores se disputent le fourrage. Ces résultats confirment les multiples facteurs de menace négatifs du pastoralisme et soulignent le besoin urgent d'établir des politiques favorables qui impliquent les acteurs locaux dans les processus décisionnels pour surmonter ces obstacles.

**Mots-clés.** Agriculture de montagne, changement global, aires protégées, faune sauvage, conservation, systèmes socio-écologiques.

## I - Introduction

Pastoral communities constitute key components of the mountain social-ecological systems whose historical interaction with nature influence the production of ecosystem services to society (Walker et al., 2004). Mountains are hotspots of cultural and biological diversity, play an essential role in the hydrological cycle and are iconic elements of the landscape. In Europe, mountains cover 36% of total area, of which, 49% belong to the Natura 2000 Network Sites and 33% are High Natural Value (HNV) agricultural land (European Environment Agency, 2010). Indeed, a broad range of target conservation habitats and species rely on, or are associated with low-intensity farming for its maintenance, especially with grazing practices (Halada et al., 2011).

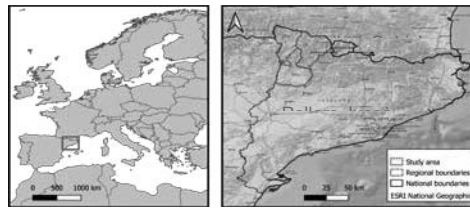
However, many of these semi-natural habitats are threatened by simultaneous trends of land use intensification and abandonment patterns influenced by political and socioeconomic transformations in recent decades (Anderson and Mammides, 2020). Small-scale extensive farming systems are in decline due to the reduced viability of their productions that are labour intensive and find it difficult to compete and differentiate in the global markets. Furthermore, context-specific drivers do also operate at regional level. For example, in the Pyrenees, the coexistence between pastoralists, tourists and wildlife could be conflictive while pastoralists also face technical and management challenges at farm level.

The uncertainty and the multiple obstacles that hamper the sustainability of pastoralists in European mountain areas compromise socio-economic and environmental goals with relevance in rural development, food production and nature conservation. Therefore, it is necessary to broaden scientific knowledge to understand the driving factors leading to the current situation. While much effort has been done in the scientific and technical study of these changing dynamics, less attention is focused on pastoralist's points of views. This study aims to explore pastoralists' perspectives, opinions, and perceptions on their own sustainability in the Pyrenees and test the influence of the geographical location to perceive these challenges.

## II - Material and methods

### 2.1 Study area

The study was undertaken in Pallars Jussà (PJ) and Pallars Sobirà (PS) counties in Catalonia, in the Spanish Mid-Eastern Pyrenees (**Fig. 1**). This mountainous territory is characterised by a rugged orography and harsh climate that host a great wildlife population including many target conservation species such as bear (*Ursus arctos*), grey wolf (*Canis lupus*) and the four European vultures. The main economic activity has traditionally been based on small-scale farming with sheep, goats, cows and, more recently, horses herds moving to mountain pastures in the summer and falling to the valleys in winter. However, farming has undergone many difficulties and changes in recent decades causing the decrease in farms numbers while increasing livestock heads. The economy is shifting towards the tertiary sector driven by the establishment of a dense network of protected areas and multiple tourist claims (i.e. ski resorts, cultural museums). These changes threaten the sustainability of this ecosystem and its public benefits.



**Fig. 1.** Localization of Pallars counties.

## 2.2 Data collection and analysis

Within the PACTORES project, we surveyed 103 pastoralists (47 in PJ and 56 in PS) through in-depth face-to-face interviews between May and July 2018 to characterize farming systems in Pallars. While the information gathered was broad and addressed key technical, management and socio-economic characteristics of farms, here are reported the results about the opinions, perceptions and attitudes towards their main challenges, regulations of protected areas and wildlife conflicts. Specifically, the questions asked were:

1. What do you think are currently the more important challenges that livestock in the region must overcome to continue? (Respondents should choose four items from a list).
2. How do you consider the impact of protected natural areas on mountain livestock? (Answers were presented in a five-point Likert scale ranging from very negative to very positive. Don't know option was also included)
3. What do you think about the fact that the role of livestock as a conservation of biodiversity/nature is increasingly valued? (Answers were presented in a five-point Likert scale ranging from very negative to very positive. Don't know option was also included)
4. What do you think about the expansion of new ungulates that there were not present a few years ago? (Answers were presented in a five-point Likert scale ranging from very negative to very positive. Don't know option was also included)
5. Could you indicate the incidents with wildlife in the last 12 months and the species of fauna you believe is responsible? (Respondents were allowed to name any number of incidents)

We applied a descriptive statistical analysis through frequency distributions to describe the information of the complete sample and cross-tabulations to examine differences between the two administrative counties (Pallars Sobirà and Pallars Jussà). Fisher's exact test was used to identify significant relationships for dichotomous variables whereas Pearson chi-squared test was carried out for variables with more than two categorical levels.

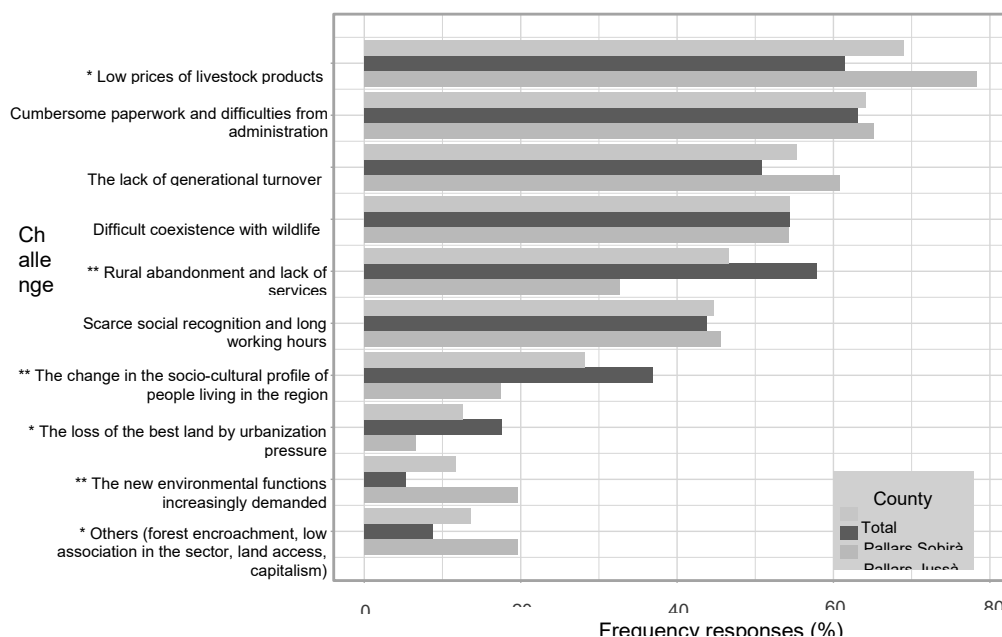
## III - Results and discussion

### 3.1 Prioritization of challenges

The first question revealed that the low sales prices of products were considered the biggest challenge and one of the underlying causes of the farms' low financial profitability, which is consistent with previous studies in the Mediterranean (**Fig.2**; Ruiz et al., 2020). Unlike these studies, farmers perceived the highly-burdening bureaucracy as the second limitation, which is a differentiating aspect in the Pyrenees (Morales-Reyes et al., 2017). This special dissatisfaction with the administration could be linked to the important role of communal property regimes and the top-down establishment of protected areas regardless of the opinion of local actors (Beltran and Vaccaro, 2010). The lack of generational turnover was considered the third limitation and the main farm internal factor although it could be motivated by the low socio-economic attractiveness of the sector. Therefore, it is not surprising that the fifth challenge was related with the coexistence with wildlife. This prioritization of external challenges from markets and policies beyond the control of pastoralists indicates their unfavourable position to

face their main obstacles and highlights the need to generate participatory solutions among stakeholders (Belanche et al., 2021).

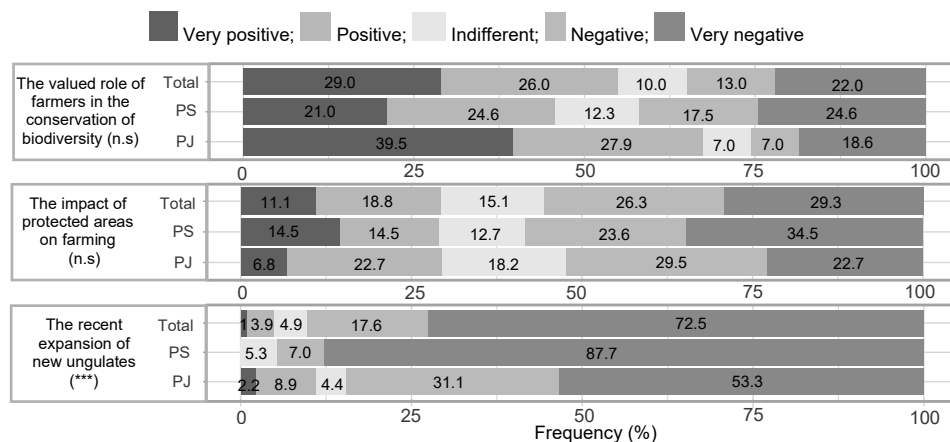
Our study also revealed differences in the perception of challenges between the two nearby territories. Pastoralists in the most mountainous region, PS, perceived more relevant the rural abandonment, the change in the socio-cultural profile of people living in the region, inexperienced to live with livestock and the loss of the best land by urbanization pressure. On the other hand, pastoralists in PJ highlighted the low sales prices of livestock products, the new social and environmental functions increasingly demanding to the sector and other challenges related with the lack of association networks among farmers. These geographical differences are possibly due to the counter-urbanisation demographic trends in PS (López-i-Gelats et al., 2009) and the higher production and intensification in PJ with more dependence on supplementary feedstuff and hence sensitiveness to the volatility of inputs prices.



**Fig. 2.** Prioritization of the challenges that livestock in the region must overcome to continue. Significance between countries according to Fisher's Exact Test: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ .

### 3.2 Perceptions and opinions on protected areas

The impact of protected areas on the livestock sector was perceived negatively or very negatively by more than half of the respondents in both counties (**Fig 3**). The negative perception about the expansion of new ungulates was also overwhelming in our survey and was substantially worse for respondents in PS where protected areas are more widespread. In contrast, pastoralists positively considered their increasingly valued role in the conservation of biodiversity and nature, which offers a great opportunity to encourage their participation through the implementation of payment schemes that could support the economic viability of farms, improve their social recognition while increasing the success of conservation policies.



**Fig. 3. Attitudes towards protected areas.** Significance between Pallars Sobirà (PS) and Pallars Jussà (PJ) according to Pearson chi-squared test: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ ; n.s. not significant.

### 3.3 Incidents with wildlife

The compilation of the complaints about incidents in the last 12 months with wildlife revealed a conflictive and unstable relationship between pastoralists and the growing populations of wild fauna due to the improvement of their habitats for land abandonment and management policies in protected areas. Consistent with other studies (Storie and Bell, 2015), wild boars prompt the most negative attitudes among farmers and were identified as the first responsible of damages caused on meadows, crops, infrastructures, road accidents, and disease transmission (**Table 1**). Besides, deer species were signalled for fodder competence. These damages represent important economic expenses to farmers and erode trust in public administration raising contestation towards the conservationist discourses. For instance, pastoralists usually complain about the strict sanitary controls to which they are subjected, while wild fauna is the main responsible for the spread of infectious diseases.

In a territory where predators like bear and more sparsely wolf coexist, it was remarkable that the most signalled species for attacks on the herd were avian scavengers such as vultures. In the absence of precise data on livestock predation and taking into account that the majority of investigated evidences are caused by domestic dogs, this negative perception on vultures could be explained by the lack of carrion availability in the field, changes in husbandry practices, the increase of vulture's population and the social magnification of the problem (Margalida et al., 2021). Nonetheless, this incipient conflict could trigger the use of illegal poison leading to unwanted effects for target conservation species. Therefore, reconciling livestock production and wildlife conservation would be crucial for the sustainability of both. Finally, while guard dogs and fencing grazing areas are expensive but successful preventive strategies, long-term solutions should be based on precise information and promote local participation to be effective.

**Table 1.** Complaints about the type of incident with wildlife and the animal hold as responsible in the last 12 months.

Incident	PJ	PS	Tot.	Sig	Incident	PJ	PS	Tot.	Sig
<b>Damage to land</b>	<b>91.3</b>	<b>96.5</b>	<b>94.2</b>	<b>n.s</b>	<b>Attacks on flocks and predation</b>	<b>43.5</b>	<b>66.7</b>	<b>56.3</b>	<b>**</b>
Wild boar	89.1	84.2	86.4	n.s	Vultures	23.9	43.9	34.9	**
Fallow deer	0.0	47.4	26.2	**	Fox	32.6	33.3	33.0	n.s
Red deer	4.3	40.3	24.3	***	Bear	0.0	14.0	7.8	**

Roe deer	8.7	33.3	22.3	**	Wild boar	6.5	0.0	2.9	*
<b>Fodder competence</b>	<b>63.0</b>	<b>94.7</b>	<b>80.6</b>	<b>***</b>	Eagle	2.2	0.0	0.9	n.s
Roe deer	39.1	47.4	43.7	n.s	Wild dogs	2.2	0.0	0.9	n.s
Red deer	19.6	56.1	39.8	***	<b>Roads accidents</b>	<b>30.4</b>	<b>43.9</b>	<b>37.9</b>	<b>n.s</b>
Fallow deer	10.9	56.1	35.9	***	Wild boar	21.7	19.3	20.4	n.s
Wild boar	19.6	45.6	34.0	*	Roe deer	10.9	17.5	14.6	n.s
Others	0.0	14.0	7.8	*	Fallow deer	0.0	8.8	4.8	**
<b>Damage to facilities</b>	<b>52.2</b>	<b>86.0</b>	<b>70.9</b>	<b>***</b>	Red deer	0.0	3.5	1.9	n.s
Wild boar	34.8	64.9	51.5	**	Others	0.0	3.5	1.9	n.s
Roe deer	21.7	36.8	30.1	*	<b>Disease transmission</b>	<b>6.5</b>	<b>21.0</b>	<b>14.6</b>	<b>**</b>
Red deer	13.0	42.1	29.1	**	Wild boar	4.3	8.8	6.8	n.s
Fallow deer	6.5	47.4	29.1	***	Fox	0.0	8.8	4.9	*
Others	0.0	3.5	1.9	ns	Roe deer	4.3	5.3	4.9	n.s
					Red deer	0.0	1.7	1.0	n.s
					Fallow deer	0.0	1.7	1.0	n.s

Others: herbivores such as male ibex, mouflon, and hare. Significance between Pallars Sobirà (PS) and Pallars Jussà (PJ) according to Fisher's Exact Test: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$  and n.s. not significant.

## IV - Conclusion

The debate on the sustainability of pastoralism in Pallars is broad and complex. In a global change context, pastoralists operate under changing conditions with multiple and interconnected constraints that give rise to diverse perceptions. External difficulties associated with markets and policies revealed the weakness position of pastoralists to face their main challenges while accenting the necessity to develop favourable policies for increasing their sustainability. We found that the relevance of the challenges was influenced by the geographical location. Pastoralist in the high mountainous region were threatened by rural abandonment and tourism opposite tends whereas in the medium mountainous by technical and management issues.

The opinions expressed about the relationship between grazing, protected areas and wildlife were conflictive, which stresses the importance of promoting dialogue between stakeholders (farmers, administration, conservation groups etc.). In turn, pastoralists agreed in their social recognition for biodiversity conservation, which could facilitate their participation in Payment for Ecosystem Services schemes to maintain grazing in protected areas. Likewise, the implementation of incentives could be a successful regional action for reinforcing the economic viability in farms and build social empowerment through participation and engagement to address these challenges.

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