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The contribution of the commons to the persistence of mountain grazing systems under the Common Agricultural Policy

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ABSTRACT

Mountain grazing systems, based since ancient times on common land, are finding it increasingly challenging to ensure their economic viability. Although marginal in productive terms, these systems are high-value natural areas that provide multiple benefits for society (e.g. biodiversity and ecosystem services). They are usually studied from an institutional or local perspective, but little is known about how mountain common land interacts with policies at a higher level, e.g. the Common Agriculture Policy (CAP) in Europe. This study assesses the contribution of the commons to the persistence of mountain sheep grazing systems in Europe under the CAP. To that end, we analyse economic and land use data on 20 farms in the mountain common grazing lands of Aralar (Basque Country, northern Spain). We find that CAP payments associated with common land account for 42% of net margin while the resources extracted from common grazing lands in the summer months provide on average 30% of annual energy requirements, which equates to 22.5% of farms' net margins. We conclude that under the current CAP the common land can play a key role in securing additional resources for the small farmers who engage in low-input traditional management practices that sustain these valuable grazing systems. The way in which existing intertwined institutions adapt to the emergence of new, higher level conditions such as the CAP will determine the future of ever-changing mountain commons.

1. Introduction

Agricultural change in recent decades has taken two opposite directions: overexploitation and land abandonment. Both produce undesirable effects on society and the environment (Agnoletti, 2014). Overexploitation occurs in well-connected areas where specialisation and economies of scale permit gradual adaptation to global markets. This leads to an intensification and simplification of production that results in unsustainable agricultural practices and degraded and fragile agroecosystems. In contrast, areas unsuitable for intensification are gradually marginalised in a process that results in the abandonment of rural settlements and agricultural activity (Agnoletti, 2014; Brouwer et al., 2008).

Common land has have fallen into this second category. Considered marginal and with low productivity, it was mainly enclosed in the 18th and 19th centuries in Europe, with ownership being privatised or passed to the state in search of greater gain (Beltrán Tapia, 2015; Iriarte-Goñi, 2002; Lana-Berasain, 2008). These lands were then further excluded from the effects of the Green Revolution and agricultural productivist policies of the 20th century (Sayre et al., 2013; Short, 2016). However, maintaining these low-input traditional practices creates multifunctional landscapes (Short and Winter, 1999) which provide quality food (Bravo-Lamas et al., 2018; Valdivielso et al., 2016) and high levels of biodiversity (Aldezabal et al., 2019); they also help maintain and develop a cultural identity (Domínguez, 2013) and deliver other ecosystems services that benefit society as a whole (EEA, 2004; Oteros-Rozas et al., 2014; Rodríguez-Ortega et al., 2014). These benefits inspired the last period of the European Common Agricultural Policy (CAP), which aims to support food production, farmers and rural economies through sustainable practices in agricultural and forest ecosystems (Horlings and Marsden, 2014; Ploeg and van der Marsden, 2008). Mountain grazing systems are of particular interest as they help maintain High Natural Value Areas in remote areas with few economic alternatives (Domínguez et al., 2012; Navarro and López-Bao, 2018).

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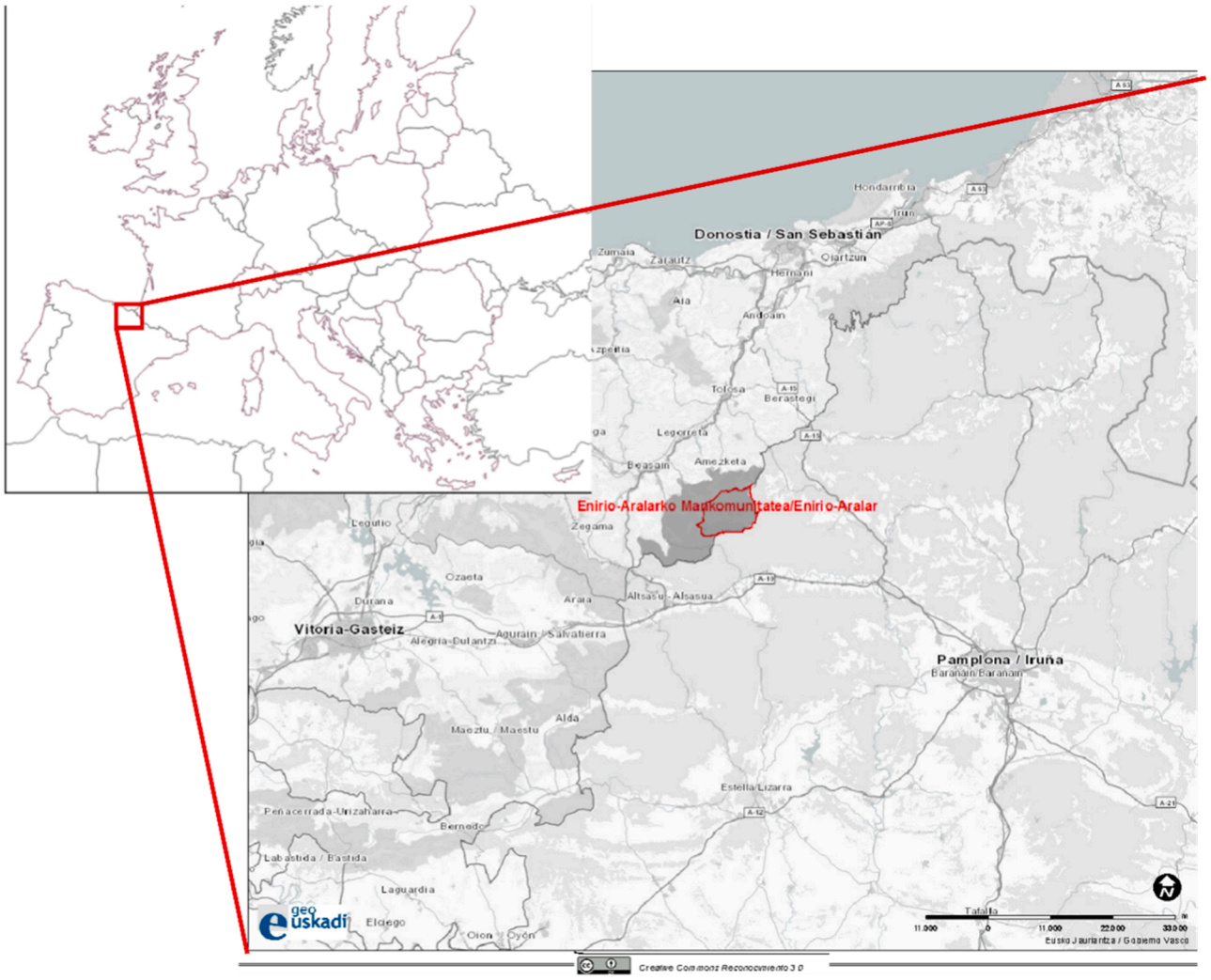

Fig. 1. Location of the Enirio-Aralar common land. Note: The shaded area is the Natural Park of Aralar in south-western Europe.
Source: GeoEuskadi, www.geo.euskadi.eus.

Table 1
CAP payments potentially associated with common grazing land for calendar year 2015 (January–December).

Pillar	Measure	Total amount (€)	CAP payments associated with common grazing lands
Pillar 1	Basic payments	95,701	farm % common grazing land[a]
Pillar 1	Greening	45,256	100%
Pillar 2	Agro-environment-climate (AEC)	71,525	100%
Pillar 2	Payments to areas facing natural constraints (ANC)	103,390	farm% common grazing land[a]

[a] On average, at farms in Enirio-Aralar common grazing land represents 62.8 ± 8.6% of total land.

However, these systems are at risk in European mountain regions (MacDonald et al., 2000; López-i-Gelats et al., 2015) as they face numerous challenges such as ageing, meagre incomes, tedious working conditions (Zagata and Sutherland, 2015) and competing land uses (Schermer et al., 2016; Barnaud and Couix, 2020).

Mountain grazing systems have been at the centre of the commons' debates since the outset, as reflected in the seminal publications by Hardin (1968) and Ostrom (1990). From an institutional point of view, much of the literature on mountain commons has centred on tensions between customary practices and environmental protection. As Berge (2006) explains, at the extremes of this tension there are two conflicting positions. One defends the exploitation of material goods such as pastures, the appropriation of which is regulated by traditional commons.[1] The other extreme focuses on resources which are not directly monetisable such as biodiversity and landscape conservation and places emphasis on environmental legislation by state and higher-level institutions for the conservation of grazing land. However, there is a strong link between traditional common land and the conservation of grazing land, as regulation of common land has prevented the overexploitation and shrub encroachment of grasslands. Currently, their role in conservation may predominate, for instance when they have been instrumental in defending land from speculative urban development (Schermer et al., 2016).

[1] In this paper the word "commons" refer not only to the common resource but to the collective that manages it.

Table 2
Generic profile of dairy sheep management in Enirio-Aralar.

Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding							■	■	■			
End of pregnancy	■										■	■
Lambing	■											■
Lactation	■	■	■	■	■	■						
On common grazing land						■	■	■	■	■		

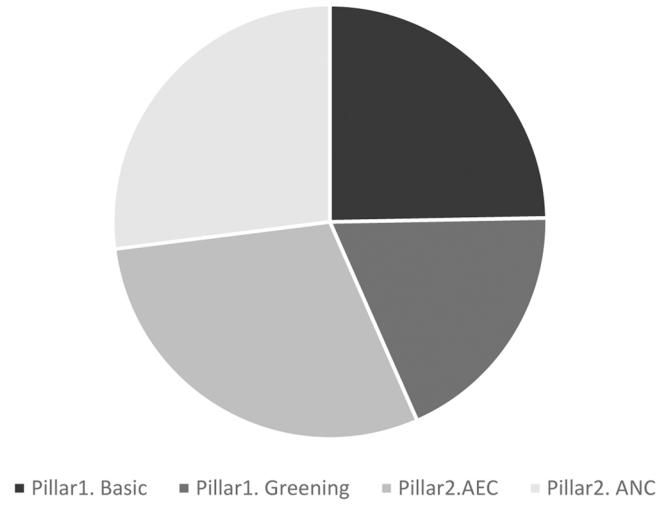

Fig. 2. CAP payments associated with common land. Pillar 1 Basic linked to land use; Pillar 1 Greening linked to pasture maintenance; Pillar 2 AEC: Agroenvironment-climate; Pillar 2 ANC: Areas facing natural constraints.

CAP payments are an example of institutional change and can be viewed as transfer payments, from society to shepherds to help their livestock grazing systems to provide multiple socio-ecological benefits for society (Domínguez, 2014; Garmendia et al., 2022). Despite there being a large body of literature on the socio-ecological consequences of the CAP, the way in which these payments interact with the commons and their joint contribution to the persistence of mountain grazing systems remains largely unexplored (Manzano and Salguero, 2018). The main difficulty is that both the CAP administration within countries and the governance of mountain commons feature many peculiarities (not always written down or available through official channels) specific to contexts smaller than countries (Salguero, 2019). This paper seeks to help fill that gap. Our hypothesis considers that under the CAP, mountain commons enable a "new" resource to be captured that contributes to the persistence of mountain grazing systems. To test this hypothesis, we analyse economic and land use data on 20 sheep farms located on the common grazing lands of Enirio-Aralar in the Basque Country (northern Spain).

2. Materials and methods

2.1. Study area: Enirio-Aralar

The Enirio-Aralar common grazing lands are in the northern part of the Aralar mountains in the Basque province of Gipuzkoa (Fig. 1). They stand adjacent to the Mediterranean-Cantabrian watershed and have a mild climate (summer monthly average 18 °C, winter monthly average 5 °C) with 1800 mm of annual rainfall. There is 3387 ha of common land, of which 2087 ha (61%) is grazing land. This mountain grazing land is approximately 1000 m above mean sea level, and constitutes the most important grazing area in the region. It has been used by local communities for centuries. The Aralar mountain region is near several densely populated towns and is a popular recreational area.

This common land is managed by the Enirio-Aralar Association, which was set up in the fifteenth century and involves 15 municipalities. In the general trend toward privatising European common land from the mid-eighteenth century onwards (Beltrán Tapia, 2015; Iriarte-Goñi, 2002; Lana-Berasain, 2008) the common grazing lands of Enirio-Aralar were declared of "public utility" and the Association survived as a commons. However, the fact that many of its uses were directly managed by the regional government weakened the Association, leaving it only with certain powers related to the management of grazing land. In 1994, the common land of the Enirio-Aralar Association and nearby areas were declared a Natural Park (Fig. 1) and included in the Natura 2000 network as a Special Area of Conservation of habitats, particularly favouring avian species (BOPV, 2015).

Since the establishment of the commons, the uses permitted have been grazing, use of the water and wood (Moraza, 2010) but new uses such as environment-related recreation have also emerged in recent years. As on other common land, the coexistence of different uses has often resulted in conflicts among the multiple users and has conditioned institutional arrangements and management for centuries (Garcia et al., 2017). In recent years, conservation interests have clashed with the interests of sheep farmers due to the construction of new trails in areas of high natural value (Andonegi et al., 2021).

Sheep farming is the main economic activity on the Enirio-Aralar common land, and is responsible for the maintenance of mountain grazing lands. The sheep population in Enirio-Aralar has remained stable at around 15,000 head for the last 20 years, which works out at less than two livestock units (LU) per ha. The traditional management of sheep on Enirio-Aralar common land is restricted to the *latxa* breed, a low-input dairy sheep with one lambing per year and a milking season in winter and spring. The sheep spend the summer season—when their energy requirements are lowest— grazing on the common land and the rest of year on privately owned or rented land in the valleys. 50 flocks have grazing permits for these lands, but only 37 of them have more than 100 sheep (average 350 head), which is the minimum threshold for economic viability, allowing for at least one full-time job. We refer to such flocks as "commercial". The rest are for home-consumption.

Some farms process latxa milk into cheese under the Idiazabal Protected Denomination of Origin (PDO), which has become highly valued in recent years. Production of this cheese in the Basque Country has increased by 50% in the last 20 years (Basque Government, 2015). Latxa holdings in Enirio-Aralar are all family run and flocks rarely exceed 500 head, so few shepherds employ external labour. The uplands are part of their life experience and they feel deeply rooted in the shepherding culture (Urzainqui Miqueleiz, 2007).

2.2. Economic data and CAP income schemes

We obtained economic data from 20 sheep farms for the calendar year 2015. These farms represent 40% of the shepherds operating in the

area and include two types of dairy producer: those who process milk into artisanal Idiazabal cheese and sell it directly to consumers (cheese-makers) and those who sell milk to cheese factories (milk-sellers). To capture the diversity of shepherds operating in the area we surveyed 8 cheese-makers and 12 milk-sellers. Of these, 7 owned between 150 and 300 sheep, 11 owned 300–500 and 2 owned more than 500. On average, both types of farm use the same amount of common grassland (35 ha per flock) and produce an average of 34,611 L of milk per annum per farm in the case of cheese-makers and 37,375 L in the case of milk-sellers.

Regarding CAP income, we consider the two pillars of the European income schemes. Pillar 1 covers traditional direct payments, while Pillar 2 promotes rural development and sustainable environmental practices. We used data from the Basque Government's Regional Payment Agency to obtain disaggregated data for Pillar 1. The Pillar 1 measures used in 2004–2013 were strongly criticised because they established premiums per head, thus encouraging farmers to increase flock numbers regardless of economic viability and environmental factors. This had the unintended consequence of making farmers more vulnerable to market fluctuations (Lorent et al., 2009) and favouring overgrazing in some cases (Hadjigeorgiou, 2011; Short, 2000). To amend this situation, CAP payments were progressively decoupled from flock size (i.e. premiums per head) and production, and coupled to land use (i.e. premiums per ha). During the CAP period from 2014 to 2020, the structure of payments from Pillar 1 changed from a single payment to a basic payment plus a "greening" complement for landscape management practices such as the maintenance of permanent grasslands. In Enirio-Aralar, the commons Association (which owns the land) distributes the grazing area virtually among the shepherds who use it, and they receive payments according to this theoretically assigned area.

We collected disaggregated data for Pillar 2 from the Gipuzkoa Provincial Government Agency. The regional government sets eligibility and conditions for receiving Pillar 2 payments. Note that in Spain there are 17 different rural development programmes, one for each of its 17 autonomous regions (Salguero, 2019). Accordingly, the measures under the framework of Pillar 2 that concern Enirio-Aralar are defined by the Basque Government and the local Rural Development Association and are regulated, co-funded and managed by the Gipuzkoa Provincial Government agency (BOG 66/2008, 2008). We considered two main measures for Pillar 2, which accounted for 95% of recent payments under this pillar to Enirio-Aralar shepherds: agro-environment-climate measures (AEC) and payments to areas facing natural constraints (ANC) (Regulation 1305/2013, 2013). Regional regulations for AEC specify that for the purpose of mountain pasture conservation, shepherds can apply for payments per ha of mountain grazing land under certain conditions, which include traditional grazing of sheep on a commercial scale. The payment amounts are re-defined each year. Specific details of AEC and ANC payments for the study year (calendar year 2015) can be found in BOG (2015a,b), respectively.

Data for Pillar 1 and 2 payments from both sources (Basque Government Regional Payment Agency and Gipuzkoa Provincial Government Agency) are not given for the calendar year but from mid-October to mid-October, so the database for 2015 includes payments from the previous CAP period and does not cover payments from October 15th 2015 onwards. In addition, the data on payment are not consistent from one year to another: some shepherds showed no payments for 2015 while others showed both single payments from the previous programming period and basic payments plus greening from the current period. This resulted in Pillar 1 subsidies for 2015 being underestimated by approximately 20% compared to previous and following years, according to the Spanish Agrarian Guarantee Fund (referred to here by its Spanish acronym FEGA). To correct that bias we eliminated single payments and estimated the missing amounts of basic and greening payments using the data available for basic payments (€86/ha, 12 farms) and for greening (€65/ha, 13 farms). We then used this average to estimate the Pillar 1 payments to all shepherds, removing the amounts received under single payments because these corresponded to the previous CAP period.

The sharing out of CAP payments for the use of common grazing land is summarised in Table 1. All subsidies in 2014–2020 reflect the size of the declared area. All farmers rent or own land in the valleys, so we adjusted the total income from basic payments (Pillar 1) and natural constraints ANC payments (Pillar 2) to show the amount of common grazing land as a proportion of the total land of each farm. The payments received from greening (Pillar 1) and AEC measures (Pillar 2) are directly related to grazing on permanent mountain pastures, all of which are located within the common area.

2.3. Grass extraction

To estimate grass extraction from the sheep farms in Enirio-Aralar we calculated the annual energy balance of an average Aralar sheep. This involved determining sheep energy requirements in milk forage units (MFU, 1 MFU is equivalent to 2859 kcal of Metabolisable Energy (EM) and to 1730 kcal of Net Energy of Lactation (NEL)) depending on the stage of production (Table A1), pasture quality and herd management (Ruiz et al., 2018).

We followed the guidelines in Ruiz et al. (2018), which adapts the tables of the Institut National de la Recherche Agronomique (INRA, 2007) to the extensively managed sheep systems used in Spain. Ruiz et al. (2018) also take into account regional diversity in management approaches and pasture endowments in Spain and provide reference values for parameters that are not normally shown in farm accounts, such as breed characteristics and parameters for lamb growth, including weight at birth and at weaning. Other average production values of the latxa breed such as weight (55 kg for ewes, 75 kg for rams) and prolificacy (1.27), come from the ARCA database of the Ministry of Agriculture, Fisheries and Food of the Government of Spain (GOS, 2019) for Spanish livestock breeds. We obtained values for lactation length (an average of 176 d for all Latxa subtypes weighted by the number of lactations) and milk fat percentage (an average of 5.4%for all Latxa subtypes weighted by the number of lactations) from the average figures for the Basque Country (NEIKER, 2010). Other herd parameters, including the number of heads, farm prolificacy and replacement rate, are drawn from the individual farm accounts.

We used the generic herd management system in Enirio-Aralar, which consists of one lambing per year (winter) and six milking months (NEIKER, 2010). The different management periods during the year, each of which has different physiological energy requirements, are summarised in Table 2. Shepherds take sheep to mountain pastures at the beginning of summer (they are allowed to go upland as from 1 June); how long they stay there varies from farm to farm, but in general shepherds return to the valleys on 1 November (Mendarte et al., 2003). For the farms surveyed, the average stay on common grasslands is 4.5 months. The model from Ruiz et al. (2018) includes a correction factor for the energy requirements of animals on pastures depending on the season and the characteristics of the terrain. Grass extraction from common land is restricted to the months that farm herds spend in the mountains. All Enirio-Aralar sheep farms follow the traditional management system, so all ewes are at a similar stage of production when the herds are on common lands and thus have similar energy requirements. We assume that during the summer grazing period 100% of the MFU calculated comes from grazing, except in the first month, when the ewes

are still lactating and shepherds provide some supplementary concentrates (Ruiz et al., 2018).

3. Results

On average, payments from the CAP account for 25% of the income and 54% of the net margin of the farms studied in Enirio-Aralar, though there are substantial differences between cheese-makers (38% net margin) and milk-sellers (74% net margin). Those payments associated with common land alone account for 19% of income and 42% of net margin (29% of net margin for cheese-makers and 57% for milk-sellers).

Fig. 2 shows the CAP payments associated with the common land broken down by measures. Payments for Pillars 1 and 2 are nearly subequal, primarily because common pastures can receive individual basic and greening payments, unlike other types of small-scale agricultural production, which have less of a territorial basis per unit of produce. For results per farm see Table A2.

Every summer, a sheep grazes on average 1.3 kg of grass DM/day (Table A3). In terms of feed autonomy, we find that in Enirio-Aralar the common grazing land provides, on average, 30% of the annual nutritional needs of Aralar's sheep farms (Table A3). More precisely, common lands supply sheep with 30% of their annual energy needs, which equates to an average annual grass consumption of 1720 kg of dry matter. This is within the range of the net primary production found for experimentally grazed and grazed exclusion plots in Aralar (Salaberria et al., 2019). This level of extraction is also consistent with the literature that states that Atlantic semi-natural grasslands have adequate height and nutritional value for livestock production until late summer (Mandaluniz et al., 2009). If the MFU obtained from common grazing land in 2015 had been replaced by hay purchased at the average 2015 price reported by farmers (€116.79/t), the cost would have been €20.2 per sheep or about 22.5% of farms' net margin. Although milk-sellers spend less time on the common grazing lands, their savings are greater (26.7%) than those of cheese-makers (19.0%) because of the low net margins of milk-sellers.

4. Discussion and conclusion

The size of CAP payments varies from one region to another, accounting for 15% of farm income in Castilla la Mancha (Spain), 21% in Bavaria (Germany), 70% in Tatra (Poland), 84% in Baixo Alentejo (Portugal) (Caballero et al., 2007), 86% in Tyrol (Austria) and the equivalent of nearly all operating costs in the French Alps (Schermer et al., 2016). In Enirio-Aralar, we find that the average payment accounts for 25% of the income and 54% of the net margin of farms. These proportions are even higher in the case of milk-sellers, whose commercial strategy of producing milk for sale to industrial plants would be very insecure if farmers could not apply for CAP funding associated with common land use.

Historically in Europe, debts have led to villagers being dispossessed of their common land and the use of credit has destabilised commons traditional systems (Gerber, 2014). In this regard, annual payments such as the CAP payments considered in this study can help farmers avoid indebtedness, enabling them to buy the inputs needed for the year and serving as collateral for short-term loans paid off at the end of the season (Ciaian et al., 2010). Used in this way, CAP payments can help protect both individual farms and commons. However, the high proportion of income provided by EU support schemes also increases the vulnerability of small farmers as their economic viability depends on uncertain higher-level policies that are outside their control. For instance, abrupt changes in eligibility criteria could lead farmers to incur debt or go bankrupt, as happened to some Mediterranean livestock farm systems when EU Regulation 1784/2018 (2018) excluded scrubland areas from pasture-related payments under Pillar 1 (Ragkos et al., 2017).

Direct payments per hectare have also been one of the causes of increased land prices, although the mechanism and size of this effect differ for each EU Member State and local region (Ciaian et al., 2010). In Spain, where owners retain land entitlements, these payments lead to higher land sale and rental prices (Ciaian et al., 2010; Góngora et al., 2019). The Enirio-Aralar commons guarantees free access for low-input livestock farmers, but elsewhere this process can make grazing systems more vulnerable as access to sufficient suitable land is the main challenge for extensive livestock systems (López-i-Gelats et al., 2016).

Direct payments per hectare may also increase part-time farming, especially in marginal areas (Ciaian et al., 2010). For instance, in Aralar part-time farming takes the form of increasing numbers of cattle and mares for meat production, which often do not have the environmental benefits associated with traditional active sheep herding systems (López-i-Gelats et al., 2016; Garmendia et al., 2022). In Enirio-Aralar the regional regulation of AEC (Pillar 2) makes a specific case for pasture conservation in the Aralar Natural Park (BOG 66/2008, 2008), taking into account that the most prevalent grassland is Jasiono-Danthonietum grassland (Aldezabal et al., 2019), which is included in the Habitat Directive and depends on sheep grazing and mowing (Halada et al., 2011). Studies in other grazing-dependent landscapes show that AEC payments should be sufficient to provide existing graziers with an incentive for continuing traditional management practices on this biodiversity-rich grassland (Short, 2000). Despite this, we find that in Enirio-Aralar AEC payments account for only 25% of the total payments linked to common grazing land. Thus, in this case AEC payments alone are not sufficient to guarantee the economic viability of farms in their current traditional fashion. By contrast, we find that by using the assigned common lands low-input small-scale producers in Enirio Aralar are able to capture a large proportion of Pillar 1 income (direct payments per ha) (see Fig. 2) and thus ensure sufficient revenues to avoid the intensification processes observed elsewhere in Europe. This seems a paradox, as the budget earmarked for Pillar 1, which covers the lion's share of CAP payments, prioritises the size of farms over other parameters such as environment protection (Navarro and López-Bao, 2018) and penalises small-scale and common agroeconomic production despite its acknowledged importance for biodiversity conservation (Lomba et al., 2014). If sustainability remains as a leitmotif for future CAP reforms, the share of funds allocated to Pillar 2 should be increased to benefit small-scale farms. Accordingly, the CAP could foster practices that benefit both environmental conservation and grass production, such as planning mountain grazing (Meuret and Provenza, 2015) or controlling native meadow weeds (Babai et al., 2015).

Regarding feed autonomy, we find that Enirio-Aralar common land provides more than 30% of the annual nutritional needs of Aralar's sheep farms, accounting for 22.5% of farms' net margins. The proportion is even higher in other European regions. For instance in Greece, 76% of the extensive mixed sheep farms and 65% of extensive sheep farms extract more than 50% of their nutritional needs from grazing municipal land (under the Greek common management system) (Ragkos et al., 2017). These findings show that producing their own grass and feed is also key for the economic viability of extensive grazing systems (see also Gaspar et al., 2008). Thus, although CAP payments outweigh grazing in monetary terms, the use and correct management of common grazing land is core for the existence of small, extensively managed flocks.

The emergence of the new external resource provided by CAP payments as currently implemented brings with it new uncertainties for traditionally managed mountain common land which have not been thoroughly studied and often show contradictory results. For instance, Sutcliffe et al. (2013) find that CAP payments in Romania have increased the private renting of common land, thus weakening the traditional common land system. But the authors stress that these findings apply only to the common grazing system of *izlaz* and are not generalisable to other common land systems in Romania. Schermer et al. (2016) find contradictory results in France and Austria: in some cases, common land systems manage CAP payments efficiently, distributing them, organising the collective purchasing of materials and even encouraging farmers to engage in collective actions. In other cases, CAP payments positively influence the economic viability of farms but also disempower the commons, as they interfere with traditional practices managed by the commons. Further coordinated studies are therefore needed to bring to light the implications of CAP payments for the governance of the commons.

Based on the economic and land use data gathered for this study, we conclude that under the CAP common lands are essential to ensure the persistence of mountain grazing systems. It provides a way of meeting a large proportion of the energy demand of mountain grazing systems and gives access to subsidies that are essential to ensure the profitability of small farming systems. The intertwined way in which existing institutions adapt to the emergence of these new conditions determined by higher-level policies will determine the future of the ever-changing mountain commons.

Conflict of interest

The authors have no competing interests to declare.

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Appendices

See Tables A1–A3.

Table A1
Calculation of energy requirements relative to the productive status of ewes.

Productive stage	Energy requirements (Ruiz et al., 2018)
Maintenance	MW (kg) = $LW^{0.75}$
Pregnancy	(0.0017 + 0.044 + 0.08)/3 = 0.0419 (MFU/day x kg LW litter)
Lactation	0.64 (MFU/day x L milk) x MP preweaning (L/day)
Milking after weaning	0.098 (MFU/day x 1% fat) x fat% x MP milking

Note: MW: Metabolic weight (kg); LW: Live weight (kg); MP: milk production (L).

Table A2
CAP payments (k€) disaggregated by measures that can be attributed to declared common land area in 2015.

Farm	% common land	Basic payments (k€)	Greening (k€)	AEC (k€)	ANC (k€)	Total (k€)
a	71	2.7	2.0	3.0	3.2	10.9
b	52	4.3	3.3	6.2	4.7	18.5
c	65	3.2	2.5	4.3	5.9	15.8
d	79	4.0	2.6	3.0	7.1	16.8
e	74	4.3	3.0	4.4	3.4	15.0
f	56	3.2	2.5	3.9	5.0	14.7
g	58	2.2	1.9	3.0	2.6	9.8
h	63	2.1	1.6	3.4	3.9	11.1
i	60	2.6	1.8	4.0	2.7	11.1
j	58	1.5	1.2	1.9	0.0	4.6
k	56	3.4	2.6	3.0	2.5	11.5
l	55	2.6	2.0	3.0	1.4	8.9
m	46	2.1	1.6	2.1	2.1	7.9
n	65	3.3	2.6	4.7	2.9	13.5
o	69	4.6	3.4	4.8	3.1	15.8
p	53	2.3	2.3	3.4	2.4	10.4
q	69	2.9	2.2	4.5	3.1	12.7
r	71	2.5	1.8	2.9	3.2	10.5
s	67	2.5	1.9	3.0	3.0	10.4
t	69	3.3	2.5	3.0	3.1	11.9
Total	**63**	59.8	45.3	71.5	65.3	241.9

Table A3
Results of annual farm grass extraction from Enirio-Aralar common land in 2015.

Farm	Annual needs (MFU/head)	% MFU from commons	Fresh-grazed grass (kg DM/day·head)	Common grass per farm (tDM/ha)	€/sheep	% grass /net margin
a	457	34.3	1.3	2.0	22.1	17.5
b	462	33.4	1.2	2.4	21.8	16.0
c	484	32.6	1.3	2.1	22.2	10.8
d	460	34.0	1.3	2.3	22.1	21.2
e	463	33.7	1.3	2.1	22.0	19.3
f	468	30.7	1.3	1.7	20.2	11.2
g	459	32.1	1.3	1.8	20.7	10.6
h	528	32.6	1.4	1.8	24.3	30.1
i	477	33.5	1.3	1.9	22.5	19.8
j	498	32.1	1.3	2.1	22.5	17.5
k	452	25.6	1.3	1.6	16.3	36.2
l	452	30.5	1.2	1.7	19.4	26.6
m	479	28.8	1.2	1.9	19.4	13.1
n	557	24.9	1.2	0.9	19.6	23.2
o	416	25.1	1.2	1.3	14.7	38.2
p	490	21.7	1.2	1.1	15.0	15.8
q	487	29.6	1.3	1.6	20.3	34.0
r	513	24.5	1.4	1.4	17.7	16.5
s	469	29.7	1.2	1.6	19.6	31.3
t	465	31.6	1.3	1.2	20.7	41.6
Average	**477 ± 30**	**30.0 ± 3.7**	**1.3 ± 0.1**	**1.7 ± 0.4**	**20.2 ± 2.5**	**22.5 ± 9.4**

Note: Fresh grass for ruminants = 0.15 MFU/kg fresh weight, Fresh grass for ruminants = 181 g DM/1 kg fresh weight (Terradillos et al., 2004).

References

Agnoletti, M., 2014. Rural landscape, nature conservation and culture: some notes on research trends and management approaches from a (southern) European perspective. Landsc. Urban Plan. 126, 66–73. https://doi.org/10.1016/j.landurbplan.2014.02.012.

Aldezabal, A., Pérez-López, U., Laskurain, N.A., Odriozola, I., 2019. Grazing abandonment negatively affects forage quality in Iberian Atlantic grasslands. Pirineos 174, e042. https://doi.org/10.3989/pirineos.2019.174002.

Andonegi, A., Garmendia, E., Aldezabal, A., 2021. Social multi-criteria evaluation for managing biodiversity conservation conflicts. Land Use Policy 109, 105658. https://doi.org/10.1016/j.landusepol.2021.105658.

Babai, D., Tóth, A., Szentirmai, I., Biró, M., Máté, A., Demeter, L., Szépligeti, M., Varga, A., Molnár, Á., Kun, R., Molnár, Z., 2015. Do conservation and agri-environmental regulations effectively support traditional small-scale farming in East-Central European cultural landscapes? Biodivers. Conserv. 24, 3305–3327. https://doi.org/10.1007/s10531-015-0971-z.

Barnaud, C., Couix, N., 2020. The multifunctionality of mountain farming: social constructions and local negotiations behind an apparent consensus. J. Rural Stud. 73, 34–45. https://doi.org/10.1016/j.jrurstud.2019.11.012.

Basque Government, 2015. Plan Estratégico Denominación de Origen Idiazabal. Gobierno Vasco y Gobierno de Navarra.

Beltrán Tapia, F.J., 2015. Social and environmental filters to market incentives: the persistence of common land in nineteenth-century Spain. J. Agrar. Chang. 15, 239–260. https://doi.org/10.1111/joac.12056.

Berge, E., 2006. Protected areas and traditional commons: values and institutions. Nor. Geogr. Tidsskr. Nor. J. Geogr. 60, 65–76. https://doi.org/10.1080/00291950600548907.

BOG 66/2008, 2008. DECRETO FORAL 66/2008, de 29 de julio, de Ayudas para la mejora de la competitividad y la sostenibilidad medioambiental de las explotaciones agrarias del Territorio Histórico de Gipuzkoa, p. 142.

BOG, 2015a. Convocatoria 2015 de las ayudas agroambientales, miércoles 11 de marzo de 2015. Departamento de innovavión, desarrollo rural y turismo. Diputación Foral de Gipuzkoa, p. 6.

BOG, 2015b. Convocatoria 2015 de las ayudas para compensar las dificultades naturales en zonas de montaña y en otras zonas desfavorecidas, miércoles 11 de marzo de 2015. Departamento de innovavión, desarrollo rural y turismo. Diputación Foral de Gipuzkoa, p. 4.

BOPV, 2015. Resolución de 28 de mayo de 2015, de la Directora de Medio Natural y Planificación Ambiental, por la que somete a información pública la designación como Zona Especial de Conservación (ZEC) del Lugar de Importancia Comunitaria (LIC) Aralar (ES2120011) del Territorio Histórico de Gipuzkoa. Dirección de Medio Natural y Planificación Ambiental. Departamento de Medio Ambiente y Planificación Territorial. Basque Government.

Bravo-Lamas, L., Aldai, N., Kramer, J.K.G., Barron, L.J.R., 2018. Case study using commercial dairy sheep flocks: comparison of the fat nutritional quality of milk produced in mountain and valley farms. LWT 89, 374–380. https://doi.org/10.1016/j.lwt.2017.11.004.

Brouwer, Floor, van Rheenen, T., Dhillion, S.S., 2008. 13. Emerging perspectives on changing land management practices. In: Brouwer, F., van Rheenen, T., Dhillion, S. S., Elgersma, A. (Eds.), Sustainable Land Management: Strategies to Cope with the Marginalisation of Agriculture. Edward Elgar, Cheltenham, p. 237.

Caballero, R., Riseth, J.Å., Labba, N., Tyran, E., Musial, W., Molik, E., Boltshauser, A., Hofstetter, P., Gueydon, A., Roeder, N., Hoffmann, H., Moreira, M.B., Coelho, I.S., Brito, O., Gil, Á., 2007. Comparative typology in six european low-intensity systems of grassland management. In: Advances in Agronomy. Elsevier, pp. 351–420. https://doi.org/10.1016/S0065-2113(07)96001-0.

Ciaian, P., Kancs, D., Swinnen, J.F.M., 2010. EU Land Markets and the Common Agricultural Policy. Centre for European Policy Studies, Brussels.

Domínguez, M., 2014. Pastos, PAC y bienes públicos: oportunidades ante el periodo: 2014-2020. Pastos 43, 6–24.

Domínguez, P., 2013. Culturally mediated provision of ecosystem services: the agdal of Yagur. In: Lozny, L. (Ed.), Continuity and Change in Cultural Mountain Adaptations: From Prehistory to Contemporary Threat. Springer, New York, pp. 377–392 (coord.).

Domínguez, P., Bourbouze, A., Demay, S., Genin, D., Kosoy, N., 2012. Diverse ecological, economic and socio-cultural values of a traditional common natural resource management system in the moroccan high atlas: the Aït Ikiss Tagdalts. Environ. Values 21, 277–296. https://doi.org/10.3197/096327112×13400390125939.

EEA, 2004. High Nature Value Farmland – Characteristics, Trends and Policy Challenges (No. EEA Report No 1/2004). Copenhagen.

Garcia, O., Etxano, I., Garmendia, E., Aldezabal, A., Gamboa, G., 2017. The contribution of commons to the viability of mountain grazing: an updated perspective under the common agricultural policy. In: Proceedings of the XVI Biennial IASC Conference: Practicing the Commons, Utrecht.

Garmendia, E., Aldezabal, A., Galán, E., Andonegi, A., del Prado, A., Gamboa, G., Garcia, O., Pardo, G., Aldai, N., Barron, L.J., 2022. Mountain sheep grazing systems provide multiple ecological, socio-economic, and food quality benefits. Agron. Sustain. Dev. https://doi.org/10.1007/s13593-021-00751-7 (In press).

Gaspar, P., Escribano, M., Mesías, F.J., Ledesma, A.R., de Pulido, F., 2008. Sheep farms in the Spanish rangelands (dehesas): typologies according to livestock management and economic indicators. Small Rumin. Res. 74, 52–63. https://doi.org/10.1016/j.smallrumres.2007.03.013.

Gerber, J.F., 2014. The role of rural indebtedness in the evolution of capitalism. J. Peasant Stud. 41, 729–747. https://doi.org/10.1080/03066150.2014.921618.

Góngora, R., Milán, M.J., López-i-Gelats, F., 2019. Pathways of incorporation of young farmers into livestock farming. Land Use Policy 85, 183–194. https://doi.org/10.1016/j.landusepol.2019.03.052.

GOS, 2019. ARCA. Sistema Nacional de Información de Razas Ganaderas. (Accessed September 2020).

Hadjigeorgiou, I., 2011. Past, present and future of pastoralism in Greece. Pastor. Res. Policy Pract. 1, 24. https://doi.org/10.1186/2041-7136-1-24.

Halada, L., Evans, D., Romão, C., Petersen, J.-E., 2011. Which habitats of European importance depend on agricultural practices? Biodivers. Conserv. 20, 2365–2378. https://doi.org/10.1007/s10531-011-9989-z.

Hardin, G., 1968. The tragedy of the commons: the population problem has no technical solution; it requires a fundamental extension in morality. Science 162, 1245–1248. https://doi.org/10.1126/science.162.3859.1243.

Horlings, L.G., Marsden, T.K., 2014. Exploring the 'new rural paradigm' in Europe: eco-economic strategies as a counterforce to the global competitiveness agenda. Eur. Urban Reg. Stud. 21, 4–20. https://doi.org/10.1177/0969776412441934.

INRA, 2007. Alimentation des bovins, ovins et caprins. Besoins des animaux – valeurs des aliments. Tables Institut National de la Recherche Agronomique 2007. Quae éditions.

Iriarte-Goñi, I., 2002. Common lands in Spain, 1800–1995: persistence, change and adaptation. Rural Hist. 13, 19–37. https://doi.org/10.1017/S0956793302000225.

Lana-Berasain, J.M., 2008. From equilibrium to equity. The survival of the commons in the Ebro Basin: Navarra from the 15th to the 20th centuries. Int. J. Commons 2, 162–191. https://doi.org/10.18352/ijc.49.
Lomba, A., Guerra, C., Alonso, J., Honrado, J.P., Jongman, R., McCracken, D., 2014. Mapping and monitoring high nature value farmlands: challenges in European landscapes. J. Environ. Manag. 143, 140–150. https://doi.org/10.1016/j.jenvman.2014.04.029.
López-i-Gelats, F., Rivera-Ferre, M.G., Madruga-Andreu, C., Bartolomé-Filella, J., 2015. Is multifunctionality the future of mountain pastoralism? Lessons from the management of semi-natural grasslands in the Pyrenees. Span. J. Agric. Res. 13, e0307 https://doi.org/10.5424/sjar/2015134-6960.
López-i-Gelats, F., Fraser, E.D.G., Morton, J.F., Rivera-Ferre, M.G., 2016. What drives the vulnerability of pastoralists to global environmental change? A qualitative meta-analysis. Glob. Environ. Chang. 39, 258–274. https://doi.org/10.1016/j.gloenvcha.2016.05.011.
Lorent, H., Sonnenschein, R., Tsiourlis, G.M., Hostert, P., Lambin, E., 2009. Livestock subsidies and rangeland degradation in central crete. Ecol. Soc. 14, 41. https://doi.org/10.5751/ES-03229-140241.
MacDonald, D., Crabtree, J.R., Wiesinger, G., Dax, T., Stamou, N., Fleury, P., Gutierrez Lazpita, J., Gibon, A., 2000. Agricultural abandonment in mountain areas of Europe: environmental consequences and policy response. J. Environ. Manag. 59, 47–69. https://doi.org/10.1006/jema.1999.
Mandaluniz, N., Aldezabal, A., Oregui, L.M., 2009. Atlantic mountain grassland-heathlands: structure and feeding value. Span. J. Agric. Res. 7, 129. https://doi.org/10.5424/sjar/2009071-405.
Manzano, P., Salguero, C., 2018. Mobile pastoralism in the Mediterranean: arguments and evidence for policy reform and its role in combating climate change. Mediterr. Consort. Nat. Cult.
Mendarte, S., Onaindia, Y.M., Amezaga, I., Albizu, I., Ibarra, A., 2003. Efecto de la orientación geográfica y el movimiento del ganado en la biodiversidad de los pastos de montaña del Parque Natural de Aralar. Pastos 33, 267–281.
Meuret, M., Provenza, F., 2015. How French shepherds create meal sequences to stimulate intake and optimise use of forage diversity on rangeland. Anim. Prod. Sci. 55, 309–318. https://doi.org/10.1071/AN14415.
Moraza, A., 2010. 600 aniversario de la Mancomunidad de Enirio-Aralar (1409–2009). Enirio Aralarko Mankiomunitatea.
Navarro, A., López-Bao, J.V., 2018. Towards a greener common agricultural policy. Nat. Ecol. Evol. 2, 1830–1833. https://doi.org/10.1038/s41559-018-0724-y.
NEIKER, 2010. Valoraciones genéticas razas latxa y carranzana. Inf. Año 2009.
Ostrom, E., 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press.
Oteros-Rozas, E., Martín-López, B., González, J.A., Plieninger, T., López, C.A., Montes, C., 2014. Socio-cultural valuation of ecosystem services in a transhumance social-ecological network. Reg. Environ. Chang. 14, 1269–1289. https://doi.org/10.1007/s10113-013-0571-y.
Ploeg, J.D., van der Marsden, T., 2008. Unfolding Webs: The Dynamics of Regional Rural Development. Van Gorcum, Assen, Netherlands, p. 262.
Ragkos, A., Abraham, E.M., Papadopoulou, A., Kyriazopoulos, A.P., Parissi, Z.M., Hadjigeorgiou, I., 2017. Effects of European Union agricultural policies on the sustainability of grazingland use in a typical Greek rural area. Land Use Policy 66, 196–204. https://doi.org/10.1016/j.landusepol.2017.04.049.
Regulation 1305/2013, 2013. European Parliament and the Council of the European Union of 17 December 2013 on Support for Rural Development by the European Agricultural Fund for Rural Development (EAFRD) and Repealing Council Regulation (EC) No 1698/2005.
Regulation 1784/2018, 2018. Commission Delegated Regulation (EU) 2018/1784 of 9 July 2018 Amending Delegated Regulation (EU) No 639/2014 as Regards Certain Provisions on the Greening Practices Established by Regulation (EU) No 1307/2013 of the European Parliament and of the Council.
Rodríguez-Ortega, T., Oteros-Rozas, E., Ripoll-Bosch, R., Tichit, M., Martín-López, B., Bernués, A., 2014. Applying the ecosystem services framework to pasture-based livestock farming systems in Europe. Animal 8, 1361–1372. https://doi.org/10.1017/S1751731114000421.
Ruiz, J., Herrera, P.M., Barba, R., Busqué, J., 2018. Situación de la ganadería extensiva en España (I): Definición y caracterización de la extensividad en las explotaciones ganaderas de España (No. 013-17-199-2). Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente.
Salaberria, A., García-Baquero, G., Odriozola, I., Aldezabal, A., 2019. Modelling aboveground net primary production (ANPP) of an Atlantic mountain grassland based on time series approach. Cuad. Investig. Geogr. 45, 551. https://doi.org/10.18172/cig.3561.
Salguero, C., 2019. Los Comunales y la Política Agraria Comunitaria (PAC). Trashumancia y Naturaleza. Madrid.
Sayre, N.F., McAllister, R.R., Bestelmeyer, B.T., Moritz, M., Turner, M.D., 2013. Earth stewardship of rangelands: coping with ecological, economic, and political marginality. Front. Ecol. Environ. 11, 348–354. https://doi.org/10.1890/120333.
Schermer, M., Darnhofer, I., Daugstad, K., Gabillet, M., Lavorel, S., Steinbacher, M., 2016. Institutional impacts on the resilience of mountain grasslands: an analysis based on three European case studies. Land Use Policy 52, 382–391. https://doi.org/10.1016/j.landusepol.2015.12.009.
Short, C., 2000. Common land and ELMS: a need for policy innovation in England and Wales. Land Use Policy 17, 121–133. https://doi.org/10.1016/S0264-8377(00)00007-7.
Short, C., 2016. Balancing nature conservation 'needs' and those of other land uses in a multi-functional context: high-value nature conservation sites in lowland England. In: Robinson, G. (Ed.), Sustainable Rural Systems. Routledge, pp. 141–158.
Short, C., Winter, M., 1999. The problem of common land: towards stakeholder governance. J. Environ. Plan. Manag. 42, 613–630. https://doi.org/10.1080/09640569910911.
Sutcliffe, L., Paulini, I., Jones, G., Marggraf, R., 2013. Pastoral commons use in Romania and the role of the common agricultural policy. Int. J. Commons 7, 58–72. https://doi.org/10.18352/ijc.367.
Terradillos, A., Arana, M.J., García, A., 2004. Alimentación del ganado. Manual práctico para explotaciones lecheras y ganadería ligada a la tierra. Junta de Andalucía. Consejería de agricultura y pesca, Sevilla.
Urzainqui Miqueleiz, A., 2007. De montes, parzonerias y parques naturales: Comunidades de montes en Guipuzkoa: las parzonerías. Universidad de Deusto, San Sebastian.
Valdivielso, I., Albisu, M., de Renobales, M., Barron, L.J.R., 2016. Changes in the volatile composition and sensory properties of cheeses made with milk from commercial sheep flocks managed indoors, part-time grazing in valley, and extensive mountain grazing. Int. Dairy J. 53, 29–36. https://doi.org/10.1016/j.idairyj.2015.09.007.
Zagata, L., Sutherland, L.-A., 2015. Deconstructing the 'young farmer problem in Europe': towards a research agenda. J. Rural Stud. 38, 39–51. https://doi.org/10.1016/j.jrurstud.2015.01.003.