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Utilisation of mountain pastures by dairy ewes: Eastern Basque Country situation

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SUMMARY – Sheep location around mountain massifs and upper areas of Atlantic valleys, with densities above 115 sheep/km², reflects the close relationship existing between sheep production and mountain pasture utilisation. This is favoured by the availability of communal areas in these mountains, which take up more than 15% of the total surface of the Basque Country. The mountain pasture utilisation lasts 4 months (124 ± 22 days), between May and December, when mating and/or most of the pregnancies take place. Sheep are managed in a free-range system. Night resting areas are located on hill summits, which determine that animals graze preferentially the sloping areas nearby. This is favoured by ewe grazing behaviour that takes place early in the morning and during the evening. Under the current context, with an increasing presence of cows and mares, conflicts of interests may arise between animal species. Therefore, communal areas need to be used rationally and management plans will have to be defined based on the existing knowledge of animal behaviour. Inclusion of methodological approaches that allow taking into account multiple goals, such as participatory research and modelling, is considered to be compulsory in this task.

Key words: Sheep, mountain, utilisation, behaviour.

RESUME – *“Utilisation des pâturages de montagne par les brebis laitières : La situation du Pays basque oriental”. La distribution du cheptel ovine laitier dans les massifs montagneux et les vallées atlantiques, avec des densités supérieures à 115 brebis/km², est représentative de la relation entre la production ovine et l'utilisation d'estives. Cette utilisation est favorisée par l'existence des pâturages communaux, lesquels représentent plus de 15% de la surface totale. Ces pâturages sont utilisés pendant une moyenne de 4 mois (124 ± 22 jours), entre mai et décembre, incluant les périodes d'accouplement et de gestation. Dans ces zones, l'élevage sans gardiennage provoque une concentration des activités de pâturage des brebis dans les versants, sous l'influence des points de repos nocturnes, et la localisation des périodes de pâturage le matin et le soir. L'augmentation de la pression de pâturage dans les zones de montagne, avec l'augmentation des vaches et juments, avec des comportements spatiaux différents, est un risque pour ces pâtures et les systèmes d'élevage. Il est nécessaire de développer des systèmes de gestion de ces zones, basés sur les connaissances de l'utilisation par les animaux, mais avec la prise en compte de méthodologies telles que la modélisation ou la recherche participative, lesquelles permettraient de considérer plusieurs objectifs.*

Mots-clés : Brebis, utilisation d'estives, comportement.

Introduction

Despite the limited economic importance that sheep production represents for the Basque Country, a highly industrialised and populated area of 7300 km² region and 301 inhabitants/km², its real importance can be better evaluated in terms of social and environmental terms. On-farm milk transformation is protected by the Idiazabal cheese AOC (Appellation d'Origine Contrôlée), which means the possibility to offer an interesting added value to the production and making this activity more profitable. This production is based on autochthonous sheep breeds well adapted to the local conditions by means of a traditional livestock system, in which mountain utilisation (transhumance) plays an important role. The present work stated the mountain utilisation by dairy flocks and sheep grazing behaviour, which are included in the study of the influence of transhumance on both the production system and the evolution of mountain pastures.

Materials and methods

Seventy farms included in the Dairy Sheep Breeders Association were directly surveyed in relation to their utilisation of mountain areas. The methodology used has been described by Ruiz (2000).

The use of mountain pastures was studied in Austagarmin, a 210 ha management unit placed between 1030-1190 m a.s.l. within the Natural Park of Gorbeia (Bizkaia). One control was done every fortnight from June to September from three fixed points (Fillat, 1991), resulting in a total of eight controls. They consisted in recording every 30 minutes during daylight hours the total number of present animals per species (sheep, cattle and mares), their activity and location in each one of the 9 zones previously defined according to slope and orientation.

During the same period, one of the flocks present in the area was periodically monitored to survey sheep behaviour, up to a total of five controls. Two controllers, each one placed at one extreme of the flock, recorded every 15 minutes during daylight the activity of a minimum of 20 animals (grazing, displacement, stand resting, or lying down). The situation of the flock was also registered over a map of the area (1:10000) and digitalized afterwards. Bite rate (n/min) was also recorded periodically for more than 1 minute (Blanch *et al.*, 1995).

Results and discussion

The Basque Country is divided into two basins by a west-east oriented mountain range. The Atlantic basin at the north consists of alternative lower mountain ranges and deep valleys running towards the cantabric coast at the north. This is an abrupt area with an average slope over 30%, and more than 1200 mm/year rainfall. The Mediterranean basin is a highland plateau placed at the south, with an average altitude above 500 m a.s.l. crossed by several mountain chains and rainfall ranging between 800 and 1200 mm/year. More than 46% of the total surface has been considered as objective 5b areas, being more suitable for livestock or forest purposes than for agriculture. In addition, 12% of the territory is protected for environmental purposes, and involves to a great extent the communal ranging areas.

Dairy sheep population, around 300,000 ewes, is mainly located in the Atlantic basin and mountain zones (Fig. 1), above the line which defines the southern limit of the wet Europe (Creus *et al.*, 1999), the area with more than 1000 mm rainfall/year. The studied farms have on average a 9.4 ha owned surface, but also rent 15.2 ha: quite a limited surface for about 295 ewes. As a consequence, flocks have to depend very much on communal mountain pastures. In fact 88% of the analysed flocks used them between 85 and 190 days every year.

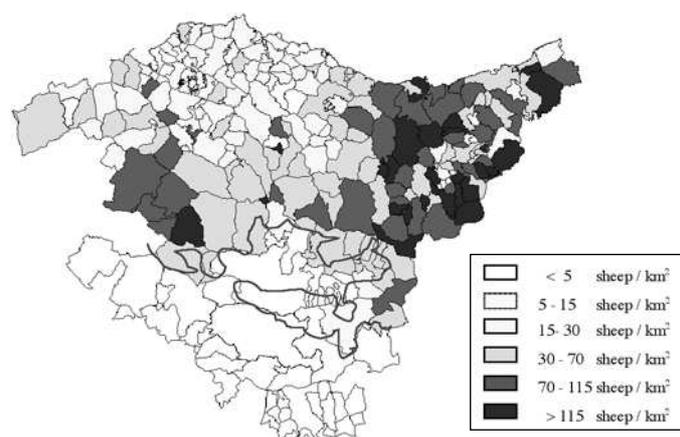


Fig. 1. Dairy sheep population distribution in the Basque Country.

The production system is characterised by a lambing season in winter, and a milking period extended until June-August. As in other systems (Capillon, 1985) the heterogeneity of flocks that can be found is quite high, and four typologies have been defined according to the lambing schedule. Flocks with earlier

and more scattered lambings show a longer milking period to the detriment of a shorter mountain utilisation (Table 1).

Table 1. Mountain utilisation, fertility and milking length of different groups of flocks

Group of flock	% of flocks using mountain pastures	Length of mountain period (days)	Fertility (%)	Length of milking period (weeks)
Group 1	92	153 ± 37	73 ± 1.0	23 ± 1.0
Group 2	92	143 ± 34	76 ± 1.0	26 ± 2.2
Group 3	81	118 ± 29	80 ± 1.0	32 ± 2.0
Group 4	90	127 ± 33	80 ± 1.1	33 ± 1.6

The percentage of flocks using mountain pastures is similar to that obtained on previous studies, which estimated the practice of trashumance in 92% of the flocks (Urarte *et al.*, 1989) under the Breeding Programme. The improvement in milk yield attributed to the work done in genetics is estimated in around 3% a year (Ugarte *et al.*, 2002). So the utilisation of communal pastures does not seem to exert a significant negative effect on the success of the Breeding Programme.

During the stay in mountain areas, the surveyed flocks showed an average horizontal displacement of 3052 ± 943 m and a vertical movement of 477 ± 163 m. Sheep showed a bimodal grazing pattern: early in the morning and in the evening. The morning grazing period was shorter (2 h 55' ± 55' vs 4 h 40' ± 50') and bite rate was lower (48 ± 1.6 vs 53.2 ± 1.0 bouts/min.) than in the evening. Both are separated by a resting period (5 h 55' ± 1 h 40') during the central hours of the day. However the resting span was quite variable throughout the mountain period depending on the weather conditions, and decreased as daylight shortened (Table 2). The longer and more intense grazing in the evening has already been described previously and related to the higher sugar contents of the plants (Penning, 1992) due to the photosynthetic activity accumulated during the day.

Table 2. Time devoted to different activities and distances covered during the controls

Activity	Date of the control				
	28/06	20/07	10/08	05/09	28/09
Grazing	7 h 05'	6 h 20'	7 h 05'	8 h 05'	7 h 10'
Morning	1 h 55'	1 h 25'	3 h 50'	2 h 40'	2 h 25'
Evening	5 h 10'	4 h 55'	3 h 15'	5 h 25'	4 h 55'
Resting	6 h	8 h	7 h	3 h 50'	4 h 40'
Walking	1 h 25'	1 h 30'	0 h 55'	0 h 40'	0 h 50'
Displacement (km)	3.90	3.95	2.26	1.85	3.40

Such a grazing activity is carried out in quite regular daily circuits, as stated by Blanch *et al.*, (1995), partly conditioned by the night resting points (Savini *et al.*, 1995). These points are located at the top of the mountains and remain quite constant throughout the stay in the communal areas. As a consequence, the areas grazed by ewes are preferentially located on the sloping areas nearby, while beef cattle graze on flat areas. This implies a stratification of the surfaces used by the different species, with a negative correlation between beef and sheep stocking rates ($r = -0.77$, $p = 0.07$). This stratification, probably related to animal weight (Aldezabal *et al.*, 1993), shows the importance of managing the ratio between species in order to favour a more regular use of mountain areas.

As a consequence of milk quotas, the population of beef cattle has increased in 88% between 1990 and 1999 (Dept. of Agriculture and Fisheries, Basque Government, 1991-2000). As many of this cattle are also reared based on a trashumant system, the pressure on mountain pastures has increased. In addition, as beef and mares are taken up earlier (may), sheep might be displaced to less grazed areas, which could also be contributing to the observed stratification.

The reduction on Body Condition score (BCs) observed in ewes during the mountain period (Oregui *et al.*, 2001) could be influenced by such spatial utilisation, and results in a delay in matings and a reduction in lambing rate (Oregui *et al.*, 2003).

Despite the negative implications that grazing on mountain pastures exert on farm productivity, their use has a great importance on production: the system has integrated them as a resource compatible with improvements even in genetics. Nowadays the increase in grazing pressures on these areas and the reappearance of the wolf after several decades poses serious questions about the future. Therefore, the continuity in the utilisation of mountain pastures requires the development of grazing management plans based on the existing technical knowledge, including new methodologies such as modelling or participate research, together with legal and sociological issues.

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