ID # 08-03

MOUNTAIN PASTURES STRUCTURE AND ITS RELATIONSHIP WITH GRAZING

I. ALBIZU[1], S. MENDARTE[2], G. BESGA[1], I. AMEZAGA[3] and M. ONAINDIA[2]

[1]NEIKER, A.B., Berreaga, 1. 48160 Derio, Bizkaia

[2]Dpto. de Biología Vegetal y Ecología. Universidad del País Vasco. Apdo. 644. 48080, Bilbao

[3]Dpto. Ciencias del Medio Natural. Universidad de Navarra. Arrosadia, s/n,Pamplona

Abstract

The present work aims toward an approach to mountain pastures as a system of relationships in which it is needed to point out those environmental factors that reflect more clearly their structure and potential productivity. This initial step of pasture tipification is important as a previous activity before the planning and management of protected areas because these areas support an intensive pastoral activity. In order to achieve this objective a field study was conducted in two areas in the Gorbeia Natural Park (Bizkaia): Arraba and Aldamiñape, located at 900-1100 masl. In each pasture four plots were selected according to orientation (north/south) and slope (<10%/>10%), and botanical composition and potential yield determined, as well as the pasture rejected by the livestock at three different times (june-august-november). Besides the herbage biomass yield data were related to grass height. It is observed that the topographical factors studied do not have a clear effect on potential yield at the different areas; however, there is a clear seasonality, being august the period with the highest herbage biomass production. Analyzing the data of herbage rejected by the livestock it

is noted a differential livestock distribution on the pasture through the grazing time, being the area of Aldamiñape facing north and with >10% slope the area with the highest grazing pressure, which in turn is the area with a highest cover degree by *Agrostis curtisii*, an species of low nutritional value.

Keywords: communal grazing lands, herbage biomass, botanical composition, grass height

Introduction

With the publication of the European Directive 75/268/CEE about "mountain areas" one of the first specific frames for these areas of great fragility and remarkable multifunctional character is developed. In the Basque Country Autonomous Community their importance is noticeable when it is taken into account that cover 85% of the land surface, what provides an idea of the topographic and climatic constraints, which in turn limit the activities of the agricultural sector, which is strongly based upon livestock production. This study is located in the communal grazing lands of the Gorbeia Natural Park (Bizkaia). Livestock use of these pastures comprises 2.730 units of cattle, 950 mares and 12.000 sheep.

The objective of this study was to establish the effect of slope, orientation and grazing on the distribution and abundance of the herbaceous species, and to estimate herbage biomass and pasture height. With all this information it is intended to characterize different mountain areas and to propose grazing schemes according to the ecological potentials and the needs of the livestock owners. In summary, to achieve a sustainable management, with a greater equilibrium between use and conservation of the pastures, allowing for the revitalization of these areas of extensive use.

Material and Methods

The study was performed in 1997 in two communal pastures located in an altitudinal gradient between 900-1100 masl: Arraba (UTM 4767/516) y Aldamiñape (4767/520) in Bizkaia (Spain). Potential vegetation on this area is basofilus beech forest, whose management by felling the trees and burning has allowed for the establishment of a mountain pasture dominated by *Agrostis capillaris* and *Festuca* gr. *rubra*. Average temperature is about 10.5º C and yearly rainfall is in the range between 2000-2100 mm (Ortubay, 1995). Both pastures are quite similar with regard to surface (about 50 ha), topography, lithology in which pasture soils have developed (calcareous material), vegetation (typically mountain pasture) and grazing use (mainly sheep, followed by cattle and horses, during the period which goes from may till November, approximately).

Four areas were selected at each pasture according to orientation (north/south) and slope (< 10%/>10%). In August floristic composition was determined by random throwing of a square (50x50 cm), three transects of 10 throwings each one. At each throwing species present and cover were recorded. Besides, at each zone two exclusion cages were placed to determine herbage biomass at three times: at the beginning of the grazing period (june), at the peak of herbage production (august) and at the end of the grazing period (november). Exclusion cage samplings consisted in cutting the grass inside the cage to estimate offered herbage biomass and outside to estimate pasture rejection by the livestock.

Results and discussion

Herbage biomass offered at the pastures studied on calcareous material is 2,824 kg DM/ha/year in Aldamiñape and 2878 kg DM/ha/year in Arraba. These values are quite similar to those of siliceous pastures in nearby areas even though the dominat species are not the

same (Albizu *et al.,* 1996). It is noted the stocking pressure because the values of the offered biomass and livestock rejection are significantly different throughout the grazing period.

To determine animal behaviour with regard to the different factors controlled: orientation and slope the data form the last control (november) are used. In Table 1 are shown the biomass offered (similar for the different zones) and the herbage rejections (different) by the livestock. These differences show up a livestock pressure and a grazing behavoiur that are different at the different zones. Aldamiñape has a higher herbage rejection than Arraba, likely due to a lower stocking rate, same as the north facing slope is grazed less than the south one, and the zone of slope>10% than the zone of slope <10%. Taking into account the type of extensive grazing performed, the differences in herbage rejections can be thought of as due to stratification in the use of the pasture by the bovine and ovine cattle. The cattle tends to use zones of lower slope than the sheep, in such a way that the utilization of the grazing resources is different in the space (Oregi and Marijuan, 1998).

To compare botanical composition at the different zones more frequent species and species with a higher cover are considered: *A. capillaris*, *F. rubra* and *T. repens*, besides *A. curtisii*, species very abundant in nearby siliceous pastures. The species *A. capillaris* is significantly influenced by the orientation, with a higher cover at the south. *T. repens* cover is higher in south slopes and slopes <10%. *A. curtisii*, a low value pastoral species, it is found in Aldamiñape in the north slope zone with the higher slope, which coincides with the zone of lower stocking pressure (Fig. 1).

Botanical composition contributes to understand the movement of the livestock within the pasture. For example, livestock preference for the south sloping zones may be related to the higher cover of *T. repens* in these zones. Sheep moves preferentially in zones of higher slope as compared to cattle, and as it is more selective for *T.repens* causes the cover of this species to decrease. The low stocking pressure in the north slope of Aldamiñape with the

higher slope is associated with the high cover of a species of low nutritive value as it is *A. curtisii*. *Festuca* gr. *rubra* and *A. capillaris* which are species of good nutritive value in these high altitude pastures, stand well the stocking pressure given that their cover are important in the zones more heavily grazed.

Herbage biomass offered equals after the winter because in at the beginning of the spring there are not significant differences in the herbage offered in the different zones studied. However, botanical composition tens to be different at the different zones.

It is concluded that the slope and the orientation have not been the determinant factors with regard to the offered biomass in the studied pastures. Throught the stay of the livestock in the mountain zones of preferential grazing are detected, that is, lower slope and south facing zones, which is related with higher cover percentages of species of important nutritive value at these high altitude pastures.

This different behaviour does not affect to the pasture offered in the spring,being this homogeneous in the whole zone, but likely contributes to establish differences in the botanical composition which are mantained and tend to exclude the livestock from these areas. This shows up the importance of the livestock for the maintenance and improvement of these type of pastures.

References

Albizu, I., Zubiaur A., Rodríguez M., Besga G., Domingo M. and Onaindia M. (1996). Estructura y productividad de pastos naturales y mejorados en el Macizo de Gorbea en Bizkaia. Actas de la XXXVI Reunión Científica de la SEEP, La Rioja, Spain, pp. 217-220.

Oregi, L.M. and Marijuan S. (1998). Actividad del vacuno en pastoreo en el Macizo del Gorbea, datos preliminares. Actas de la XXXVIII Reunión Científica de la SEEP, Soria (Spain), pp. 377-380.

Ortubay, A. (1995). Relación clima-vegetación en la Comunidad Autónoma Vasca. Ph.D. Dissertation. Dpto. de Industria, Agricultura y Pesca. Servicio Central de Publicaciones del Gobierno Vasco, 504 pp. Vitoria, Spain.

Table 1 - Herbage biomass offered (Biomass D) and livestock rejection (Biomass F) in the third cut (november) of year 1997 considering location, orientation and slope.

	Location		Orientation		Slope	
	Aldamiñape	Arraba	North	South	<10%	>10%
	$\bar{X}$ ± SE					
Biomass D (kg DM/ha)	727±122	845±47	876±266	666±156	746±126	825±43
Biomass F (kg DM/ha)	313±85**	109±39**	270±65*	129±75*	108±37**	314±86**

** ($p<0,001$) * ($p<0,05$)

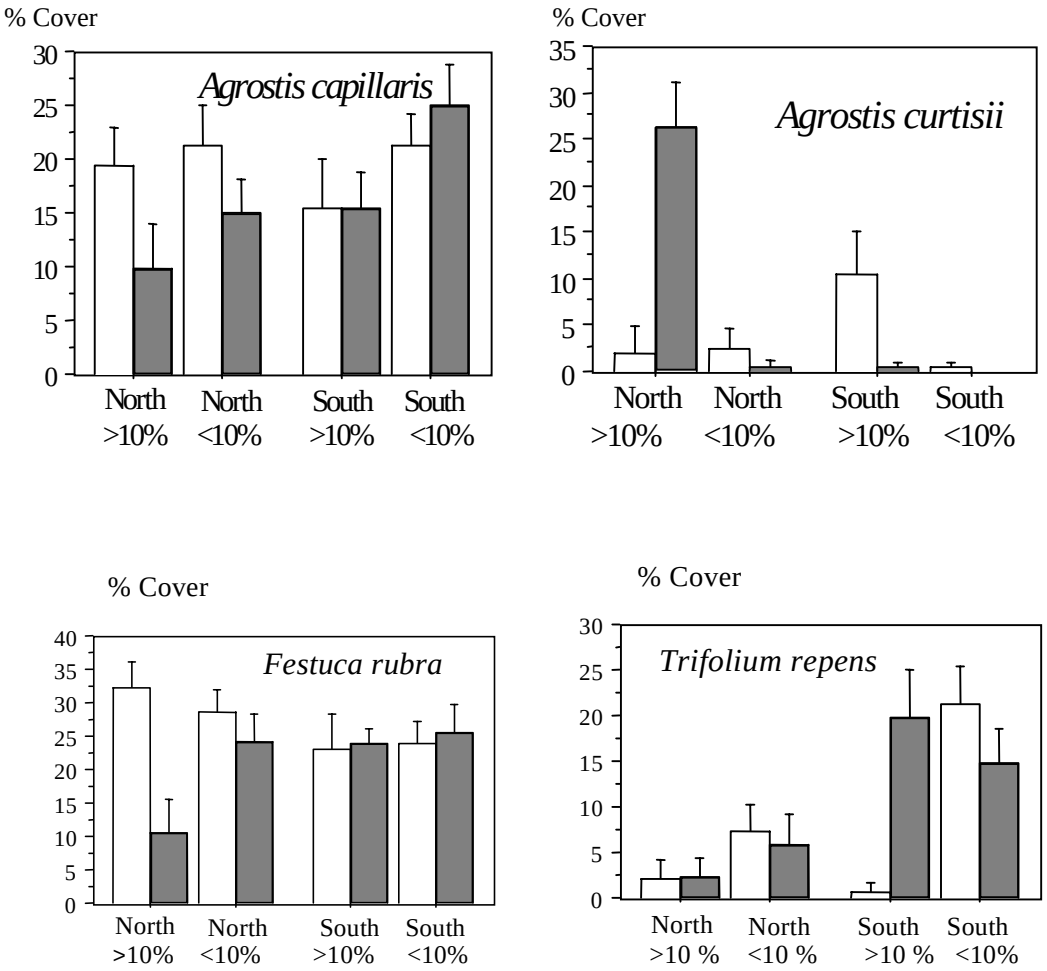

Figure 1 - Average and standard error of the percentage cover of the most abundant species with regard to orientation and slope in the studied pastures: ☐ Arraba y ■ Aldamiñape