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The effect of environmental conditions in the duration of daily grazing itineraries of small ruminants in northeast Portugal

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Abstract. The production of small ruminants (sheep and goats) in Northeast Portugal is an extensive activity, mainly based on exploitation of spontaneous resources. The shepherds direct their flocks on daily grazing itineraries over different types of resources. These itineraries vary throughout the year, in both duration and locations visited. The aim of this study is to analyse the variation of the grazing circuits in relation to the environmental conditions. The time spent by flocks on each itinerary varied from 381 to 746 minutes for goat flocks, and from 300 to 921 minutes for sheep flocks, depending on the duration of daylight. Nevertheless, other environmental conditions have an important role on the pattern of grazing circuits, such as mid-day temperature and abundance of resources.

Keywords. Grazing itineraries – Environmental conditions – Daylight time – Northeast Portugal – GPS.

Effet des conditions environnementales sur la durée des circuits de pâturage quotidien de petits ruminants dans le nord-est du Portugal

Résumé. Dans la région de Trás-os-Montes et Alto Douro, au nord-est du Portugal, l'élevage des petits ruminants est une activité fortement extensive et basée sur "le pâturage de parcours". Dans ce travail, la variation de la durée des circuits de pâturage des troupeaux d'ovins et de caprins au cours de l'année est analysée. Le temps du parcours des ovins varie entre 300 et 921 minutes, et pour les caprins entre 381 et 746 minutes.

Mots-clés. Parcours – Conditions environnementales – Durée du jour – Nord-est du Portugal – GPS.

I – Introduction

In Northeast Portugal, most small ruminant production is an extensive activity based on daily movements of livestock around their villages (Castro *et al.*, 2000; Castro *et al.*, 2004). In this shepherding system, the flocks walk between 3 and 8 km, always led by a shepherd (Castro *et al.*, 2003).

The shepherd has a major role in determining the grazing itineraries: the length of journey, the resources exploited, and the feeding pattern (Rebollo, 1996). Nevertheless, some decisions about the circuit's organization are greatly influenced by the environmental conditions (Aldezabal *et al.*, 1999; Bailey *et al.*, 1996; Ganskopp, 2001), because animals are very sensitive to extremes of temperature and availability of resources (Baumont *et al.*, 2000; Mysterud *et al.*, 2007).

The objective of the study is to determine the effect of environmental conditions on the duration of grazing itineraries.

II – Materials and methods

From May 2000 to May 2001, the grazing circuits of four flocks (two of goats and two of sheep)

were monitored in the Bragança region. Each flock was observed one day a month by an operator using a GPS apparatus, from the flock's departure to its return. Fifty two grazing circuits of sheep and goats were observed. The air temperature was registered hourly along the journey.

The circuit's duration was correlated (Pearson simple correlates) with daylight time and the highest and lowest temperature registered during the day.

III – Results and discussion

The itinerary's duration is strongly affected by the period of daylight, producing a large annual variation (Fig. 1). Goat grazing itineraries varied between 746 minutes in August and 381 minutes in December; sheep grazing itineraries varied from 300 minutes around the winter solstice and 921 minutes in July (Castro, 2004).

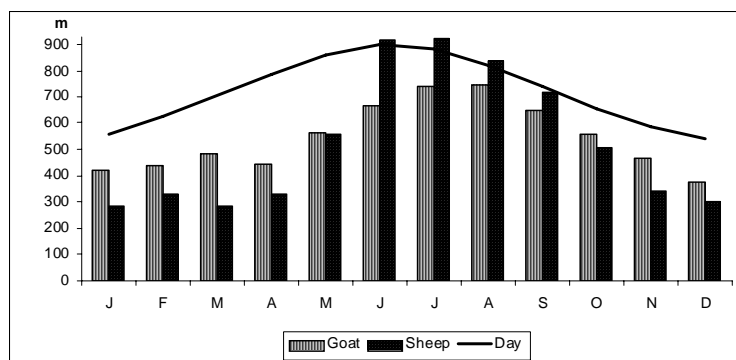


Fig. 1. Annual variation of daylight time and length of grazing itineraries.

The difference between daylight time and length of grazing itineraries (Dif) suggests different patterns in goat and sheep requirements and their management system (Fig. 2). It shows the sheep's vulnerability to high temperatures. The length of sheep summer itineraries is higher than daylight time because of the long resting time during the hottest periods of the day. It is the only period in the year that sheep itineraries are longer than goat itineraries.

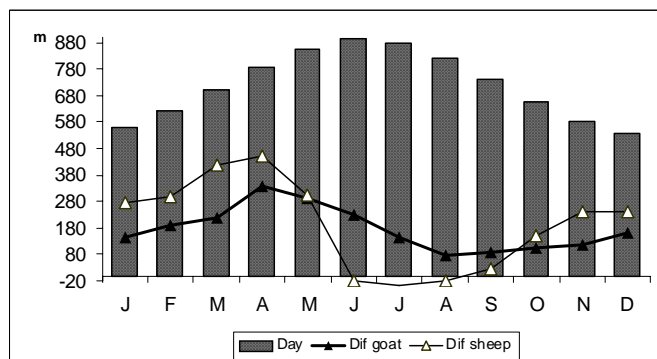


Fig. 2. Difference between daylight time and length of grazing itineraries.

The increase of difference during March and April is related to the abundance of resources and warm environmental temperature. In contrast, the increase of difference after October – a period of high feed requirements for animals – is probably related to goats' vulnerability to the cold.

IV – Conclusions

Daylight time determines the duration of grazing itineraries, in both sheep and goat flocks. Nevertheless, the abundance of feeding resources and the pattern of temperatures also play an important role in the duration of grazing itineraries.

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