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Sheep Spatial Grazing Strategies at the Arid Patagonian Monte, Argentina

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Abstract

We asked what vegetation traits influence sheep in selecting foraging paths on the range. We obtained 40 000 records of positions of six ewes (*Ovis aries*) collared with Global Positioning System receivers during several seasons in a paddock of 1250 ha at the Patagonian Monte shrublands, Argentina. We classified the vegetation through ground-truth floristic analyses and remotely sensed imagery, and overlaid the ewes' positions onto a digital map of vegetation units. For each vegetation unit, we assessed the cover of main life forms and preferred plants, the visibility range at ewe's head height, and several structural/chemical traits of dominant shrubs (leaf mass/area, lignin–phenolics–nitrogen concentration in leaves, presence of thorny stems and spiny leaves). Ewes followed diverse paths across the paddock but always selected among a limited number of vegetation units. Selected vegetation units were those with structural traits allowing wide ewes' visibility ranges and low structural antiherbivore defenses, irrespective of their local abundance, relative cover of preferred plants, or distance to the watering point. Within preferred vegetation units, ewes further selected those with high cover of preferred plants and/or reduced structural/chemical antiherbivore defenses. We concluded that sheep selectivity at our study paddock resulted from compromises among different structural/visual cues related to visual impairment, antiherbivore physical/chemical defenses, and the offer of preferred plants. In a hierarchy of decisions, the abundance of preferred plants was not a sufficient condition for a high selection of vegetation units. Monitoring animal movements within shrubby paddocks of the Patagonian Monte with high visual impairment can supply criteria to assess the relevance of nonnutritional environmental traits on grazers' decisions. This information is valuable in identifying and predicting spots of potential land degradation, and planning the distribution of flocks within paddocks in the context of sustainable management practices for shrubby rangelands.

Resumen

Nos preguntamos que atributos de la vegetación influyen la selectividad de los ovinos respecto de diferentes unidades de vegetación a lo largo de sus caminos de pastoreo. Obtuvimos 40 000 registros de posiciones de seis ovejas (*Ovis aries*) equipadas con collares con receptores de sistemas de posicionamiento global, durante varias estaciones en un potrero de 1250 ha en los arbustales del Monte patagónico de Argentina. Clasificamos la vegetación a través de análisis de muestreos florísticos de campo y de imágenes de sensores remotos y superpusimos las posiciones de las ovejas en un mapa digital de unidades de vegetación. Para cada unidad de vegetación, estimamos la cobertura de las principales formas de vida y de las plantas preferidas por los ovinos, el rango de visibilidad horizontal a la altura de la cabeza de las ovejas y varios atributos estructurales y químicos de los arbustos dominantes (masa/área de hoja, concentración de lignina, compuestos fenólicos y nitrógeno en las hojas, presencia de tallos con espinas leñosas y hojas espinosas). Las ovejas usaron diversos caminos de pastoreo a lo largo del potrero pero siempre seleccionaron un número limitado de unidades de vegetación. Las unidades de vegetación seleccionadas fueron aquellas con atributos estructurales que les permitieron un amplio rango de visibilidad y que presentaban bajas defensas estructurales antiherbívoro, independientemente de la abundancia local de plantas preferidas y de la distancia a la aguada. Dentro de estas unidades, las ovejas seleccionaron aquellos parches que ofrecieron alta cobertura de plantas preferidas y/o reducidas defensas estructurales/químicas antiherbívoro. Concluimos que la selectividad de las ovejas dentro de nuestro potrero de estudio resultó de un compromiso entre diferentes atributos que involucran indicadores estructurales/visuales relacionados con la obstaculización visual, defensas antiherbívoro físicas y químicas, y la oferta de plantas preferidas. En un orden jerárquico de decisiones, la abundancia de plantas preferidas no fue una condición suficiente para una alta selección de las unidades de vegetación. El seguimiento de los movimientos de los animales dentro de los arbustales del Monte patagónico con alta obstaculización visual podría proveer criterios para evaluar la relevancia de atributos ambientales no nutricionales sobre las decisiones de los herbívoros. Esta información es relevante para predecir focos de degradación potencial y planificar la distribución de las majadas en los potreros dentro de un marco de prácticas de manejo sustentables para las áreas de pastoreo arbustivas.

Key Words: arid shrublands, grazing behavior, grazing tactics, patch selection, visibility

INTRODUCTION

Identifying the rules of decision that herbivores use while foraging in different environments is of relevance to test ecological hypothesis related to plant–animal interactions at different scales (Judson 1994; WallisDeVries et al. 1999; Searle et al. 2006). It is also important in understanding landscape use patterns of livestock and planning for sustainable rangeland use

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