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in

Papachristou T.G. (ed.), Parissi Z.M. (ed.), Ben Salem H. (ed.), Morand-Fehr P. (ed.). Nutritional and foraging ecology of sheep and goats

Zaragoza : CIHEAM / FAO / NAGREF
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 85

2009
pages 61-65

Effects on the environment of a flock of sheep when free ranging or under the guidance of a shepherd

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Abstract. Nowadays, sheep grazing is often proposed as a means to maintain abandoned spaces of the territory. The objectives of feeding animals, optimal management of fodder resources and conservation of the pastoral value of the environment are not always compatible with the free ranging of the animals in fenced paddocks. The purpose of this study was to compare the feeding behaviour of a flock of sheep when they were free-ranging versus under the guidance of a shepherd. We determined the feeding behaviour of a herd of ewes at the beginning of gestation grazing on lowlands of the French Mediterranean littoral with or without the guidance of a shepherd. Free-ranging animals selected some feeding sites and overlooked the remainder of the paddock, producing a loss of fodder resources and a degradation of their pastoral value. The intervention of the shepherd, if it takes into account the spontaneous feeding behaviour of the animals (preferences and selection of food, social interactions, and diet composition) allows a more complete utilisation of the landscape and the forage resources available

Keywords. Feeding behaviour – Flock – Control of grazing – Environment impact.

Effets sur l'environnement d'un troupeau ovin en pâturage non guidé ou guidé par un berger

Résumé. *Aujourd'hui, le pâturage des ovins est souvent proposé comme moyen pouvant participer à l'entretien des espaces abandonnés du territoire. Les objectifs d'alimentation des animaux, de gestion optimale des ressources fourragères et de conservation de la valeur pastorale du milieu environnant ne sont pas toujours compatibles avec le libre parcours des animaux dans des parcs clos. L'étude présentée a pour but de préciser le comportement alimentaire d'un troupeau de brebis en début de gestation au pâturage sur des landes arborées du littoral méditerranéen français en libre parcours et sous la conduite d'un berger. Il apparaît que lorsque les animaux sont en libre parcours ils sélectionnent certains sites alimentaires et délaissent le reste du parc. Il en résulte une perte de ressources fourragères et une dégradation de la valeur pastorale. L'intervention du berger, si elle prend en compte le comportement alimentaire spontané des animaux (préférences et sélection des aliments, relations sociales, composition du menu, etc.) permet une valorisation plus complète de l'ensemble de la surface et des ressources disponibles.*

Mots-clés. *Comportement alimentaire – Troupeau de brebis – Mode de conduite au pâturage – Impact sur l'environnement.*

I – Introduction

Sheep grazing is often used as a means to preserve sensitive natural landscapes. Public financing is provided to reach that goal through nationwide agro-environmental measures such as the agro-environmental grazier grant (PHAE), or local actions specifically concerning landscapes listed on the "Natura 2000 list". Enclosures appear an necessary and effective solution to house and hold flocks on these patches (Blanchin, 2002). Nevertheless, there are places or periods where shepherds are still entrusted with the care of flocks, in particular when cattle breeders are not in charge of managing the land, when free access to the public has been imposed on them, or when the presence of a shepherd is deemed irreplaceable (salt meadow sheep of the Baie de Somme, Natura 2000 sites #2200346). Moreover some cattle breeders are proud to perpetuate the tradition of shepherd keeping sheep and volunteer themselves to lead the flocks to the aforementioned grazing spots (Chirat *et al*., 2006).

The major action of grazing animals in preserving biodiversity of permanent meadows is to keep and develop the variety of plants. They do so through selective defoliation according to their foods preference as well as through trampling (Rook and Tallowin, 2003). On heterogeneous grounds the results of sheep grazing can be measured on various scales as parts of the landscapes may simultaneously be over-grazed and under-grazed resulting in: (i) a decrease in vegetation and an increase of bare patches of sterile land; (ii) elimination of pasture species of high palatability, more specifically legumes and their replacement by other species less productive and palatable, mainly coarse grasses; and (iii) increased invasion of woody species and weed infestation, or increased density of unpalatable plants including exotic species.

The role played by sheep in maintaining heterogeneous zones depends on the individual choices made by the animals themselves as they look for and find the food they ingest. It also depends on the collective decisions made by the sheep as a flock to select particular feeding grounds. Sheep behaviour while grazing depends on their specific species, their biology, and their individual experience (Lécrivain, 2004).

The aim of this study was to observe the differences in the behaviour of animals while they are watched by a shepherd or left to graze by themselves on the same grounds.

II – Materials and methods

1. Experimental site

The Natura 2000 site, part of the Canet-Saint-Nazaire lagoon complex, is situated at the maritime edge of the Plaine du Roussillon (lowlands) in the administrative department of Pyrénées Orientales in the south of France. This site occupies 1872 ha, 1033 ha of which belong to the Littoral and Lake Shores Area Conservatory.

The experimental area was a grazing zone of 60 hectares which is part of the special area of preservation of the lake complex. It was situated in the delta formed by the Réart River as it flows into the Lake of Canet-Saint-Nazaire. This area was used daily by a flock of suckling sheep for about four to five hours. During the experimental period from December 2006 to January 2007, the flock was alternatively watched by a shepherd or left to graze by itself.

The grazing area (Fig. 1) was composed of lands classified as "community interest habitats" labelled Mediterranean salted meadow lands, Mediterranean salted areas bushes, respectively coded 15.5 and 16.5 in Corine Biotop (CC), on the one hand, and as CC 37 wet lowlands, CC 53 water banks belting vegetation, and CC 84 groves on the other hand. The grazing resources of the area during the winter period are composed of the winter growth of grasses, and their remnants of the previous spring growth, and of obione (*Halimione portulacoides*) that is abundant in this area.

The goal of grazing is to preserve these classified habitats. The increase in zones of herbaceous insufficiently grazed constitutes the root of the degradation in the grazing value and the progressive reduction of biodiversity. In particular, in these under-grazed zones, undesirable plants such as sugarcanes of Provence (*Arundo donax*) and reed (*Phragmites communis*) in the slightly salted areas, and Tamarisk (*Tamarix* spp.) and perennial salicornia (*Sarcocomia fructicosa*) on halo-hydromorphic grounds, begin to grow and dominate the landscape.

2. Animal management

The experimental flock was composed of 200 Roussillon red breed ewes in their second to third month of gestation. Prior to the measuring period the path to be used for the experiment was identified by the shepherd and his flock in order for them to check the grazing stocks available. From December 14th 2006 to January 20th 2007 the flock walked throughout the path with the presence of the shepherd or left to graze freely for about 4 hours every day. The monitoring of the flock was carried out by observing successive moves and noting food selection at the three levels

of Senft's scale as described by Roguet (Roguet *et al.*, 1998): feeding ground, feeding station and plant clump.

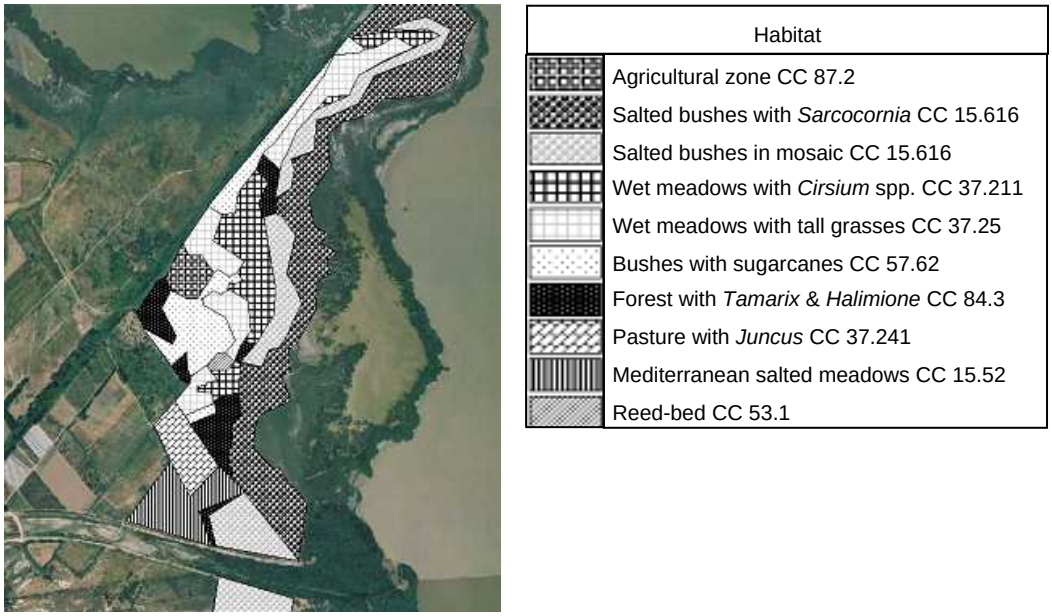

Fig. 1. Habitat of the delta of Reart River.

During the free-grazing sequences the access of the flock onto the grazing area occurred via two specific entry points, one located in the South and the other in the North so that no area is favoured – as it was closer compared to the one located further from the entry point. The choices of the grazing spots and movements of the whole flock together allowed 12 feeding grounds of an average surface of 3.6 ha approximately on which the flock stabilized in order to graze. These feeding grounds were either formed by natural boundaries (e.g. hedges, ditches) and characterized by the specificity of the plants growing on them (e.g. tamarisk bushes, salicornia, hedges of sugarcanes of Provence), or were determined by the behaviour of the flock grazing on it for at least 45 minutes prior to moving to another spot. Five of the feeding grounds (17 ha) were composed mainly of grass plants while the remaining 7 (26 ha) were constituted of thickets and groves.

During the sequences when a shepherd watched over the flock the grazing path was defined according to a two-fold goal: first and foremost, that the animals should eat their fill by grazing palatable plants; second, that the graminaceous zones was grazed so that the remnants of spring growth were reduced to a minimum.

The observations concerned the spatial distribution of the flock and the foods choices made by the ewes. The spatial distribution of the flock was checked every 15 minutes according to the location of the flock in the grazing area and the collective behaviour of the animals. The following variables were monitored:

(i) The flock is currently moving (D) *vs* the flock is stable (S).

(ii) Grazing (P) *vs* non grazing.

(iii) Scattered flock (E) *vs* regrouped flock (G).

(iv) The flock moves while grazing "alongside" (L).

(v) Slow move (l) *vs* fast move (r).

The feeding choices of the ewes were determined by using 5 experimental animals. Every 15 minutes the feeding station on which these animals were standing was checked as well as the botanical composition of their mouthfuls: (H) corresponding to grasses, (O) standing for other plants (obione). The feeding stations were characterized by the height of plant growth, divided into four classes as follows: (1) less than 5 cm high; (2) from 5 to 10 cm high; (3) from 10 to 20 cm high; (4) over 20 cm high. The first two classes mainly corresponded to the growth following heavily grazed spots, while the last two corresponded to refused zones mainly composed of coarse grasses.

All the individual data collected were bulked and the proportions of the time devoted to each variable to the total grazing time were calculated and compared between each mode of grazing with the test z.

III – Results and discussion

The number of feeding grounds used by the flock was the same, whatever the grazing mode (Table 1). When the animals grazed freely, the leading ewes looking for new plant growth forced the movement of the whole flock to the detriment of ewes still foraging in the area (Dumont and Boissy, 1999). In consequence, grasslands accounted for 50% of all sites grazed. Whenever shepherds monitored the flock they managed to change in the grazing grounds used and two thirds of them were composed of zones of thickets and tree groves. The average distance covered by the flocks under guidance was slightly superior to that covered by the flock when it grazed alone. In both cases the flock walked and grazed about half of the time (PDxx = 46%/44%). When the flock grazed by itself, the flock was regrouped 38% of the time spent in the grazing area, versus 55% under guidance. Thus showing that the animals freely grazing were submitted to fewer constraints as opposed to when the shepherd or the dog specifically influenced the diet of the ewes.

Table 1. Behaviour of the flock of ewes while grazing

Mode of control	No. of sites	Length of travel	Behaviour of flock (% total time on the grazing area)†							
			DGr	DLr	PSE	PSG	PDLl	PDLr	PDGl	PDGr
Free ranging	2.2	1613 m	6%	–	27%	17%	22%	9%	8%	7%
Guidance	2.2	1983 m	8%	1%	24%	19%	13%	3%	15%	13%

†DGr: Fast Move Regrouped flock; DLr: Fast Move Alongside; PSE: Grazing Scattered Stable flock; PSG: Grazing Regrouped Stable flock; PDLl: Slow Move Alongside while Grazing; PDLr: Fast Move Alongside while Grazing; PDGl: Slow Move Regrouped flock while Grazing; PDGr: Fast Move Regrouped flock while Grazing.

The feeds eaten by the sheep on the heterogeneous paths depended more upon the interventions of the shepherd on the food immediately available on each site than on the choice of the sites themselves. In the free-grazing mode as well as in the shepherd-monitored mode grass-type foods accounted for more than 75% of the mouthfuls eaten while the other vegetal plants (obione) accounted for 25% (Table 2). Although obione was always ingested in a similar fashion, one must note a significant difference in the choices of feeds made by the ewes on the lowlands. When self-monitoring, animals looked for spots of plants characterized by a small size (Dumont, 1996), 65% of the food ingested was composed of small grass-type plants. On the contrary, a shepherd, who also cares about preserving grasslands leads the flock to mature zones with plants higher than 20 cm which provide 26% of the total amount of food ingested, as opposed to 11% during the free grazing sequences.

Table 2. Diet composition of ewes while grazing

Mode of control	Daily diet composition (% total grazing time on each feeding station)†							
	H1	**H2**	**H3**	**H4**	**O1**	**O2**	**O3**	**O4**
Free ranging	45%[a]	20%[a]	1%[a]	11%[a]	4%[a]	1%[a]	5%[a]	13%[a]
Guidance	23%[b]	22%[a]	2%[a]	26%[b]	4%[a]	4%[b]	1%[b]	18%[a]
	***	ns	ns	**	ns	**	*	ns

†H1: grass < 5 cm; H2: 5 cm < grass < 10 cm; H3: 10 cm < grass < 20 cm; H4: grass > 20 cm; O1: obione < 5 cm; O2: 5 cm < obione < 10 cm; O3: 10 cm < obione < 20 cm; O4: obione > 20 cm.
[a,b]Means in the column with different superscript letters are significantly different at: *P < 0.1; **P < 0.05; ***P <0.01; ns: P > 0.1.

IV – Conclusions

Management of pastoral spaces cannot be satisfactory if the flock is left to graze freely because of the selective feeding behaviour of the animals. To reduce the overabundance of bushes in the environment, it is often necessary to complete the work done by the animals with mechanical interventions. Management of flocks by a shepherd allows the resources to be more fully exploited and also ensures more complete management of grazing lands. In general, when pastoral activities must be compatible with the social expectations of preserving and managing natural spaces, the presence and the knowledge of shepherds must be acknowledged and reasserted.

References

Blanchin J.Y., 2002. Conduite et cloisonnement des surfaces pastorales à l'aide d'équipements adaptés permettant de concilier un élevage productif et le multi-usage des territoires pastoraux. Réseau équipements pastoraux. Rapport final. Institut de l'élevage, Paris.

Chirat G., Cornet N., Faliph J., Himpens A., Lelaure B., Limon M. and Thill A., 2006. Identification des facteurs explicatifs et des enjeux de l'évolution des élevages pastoraux dans les Pyrénées Orientales. Rapport d'étude SIME. AGRO M, Montpellier.

Dumont B., 1996. Préférences et sélection alimentaire au pâturage. In: *INRA Production Animale*, 9(5). p. 359-366.

Dumont B. and Boissy A., 1999. Relations sociales et comportement alimentaire au pâturage. In: *INRA Production Animale*, 12(1). p. 3-10.

Lécrivain E., 2004. Le gardiennage des ovins : Des savoir-faire adaptés au comportement des animaux et à l'entretien de l'espace. Courrier scientifique du Parc naturel régional du Luberon, n°8-2004.

Roguet C., Dumont B. and Prache S., 1998. Sélection et utilisation des ressources fourragères par les herbivores : Théories et expérimentations à l'échelle du site et de la station alimentaire. In: *INRA Production Animale*, 11(4). p. 273-284.

Rook A. and Tallowin J., 2003. Grazing and pasture management for biodiversity benefit. In: *Animal Research*, 52. p. 181-189.