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Effect of horse grazing under different stocking rates on the selection of feeding patches

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Key words : grazing , horse , stocking rate , spatial heterogeneity , patch choice

Introduction Stocking rate is a key management variable influencing the structure and composition of pastures . In turn , the spatial heterogeneity of grassland vegetation determines the abundance and quality of food resources for the animals . While horses play an increasing role in the management of grasslands in Europe , our knowledge concerning their use of pastures under different stocking rates is limited . Therefore , during two years we analysed the seasonal patterns of patch selection by horses grazed at two stocking rates in a mesophile grassland of central France (elev . 430 m) .

Materials and methods In the high stocking rate treatment , five adult saddle horses per plot were continuously grazed over the whole grazing season , giving a stocking rate of 1000 kg/ha . Three horses grazed each plot in the low stocking rate treatment (600 kg/ha) . Six 2.7 ha experimental plots were created , so that each treatment could be replicated three times according to a randomised block-design . Each year , 24 h observations (scans at 5-min intervals) were conducted on three occasions between early June and the end of September on three animals in each group . The proportion of the different bite types in the diet (Vegetative Short [VS] : ≤ 4 cm , Vegetative Intermediate [VI] : 5 to 8 cm , Vegetative Tall [VT] : ≥ 9 cm , Reproductive or Dead grass [R/D]) and their selection (proportion of a bite type in the diet relative to its proportion in the plot) were analysed in a model for repeated measurements including the main effects of stocking rate , block , year , season , and the interactions between stocking rate and block , stocking rate and year , stocking rate and season , and year and season .

Results and discussion Horses spent a large part of their feeding time on tall vegetative patches (Table 1) . However , in agreement with the Forage Maturation Hypothesis (Fryxell , 1991) , they selected intermediate vegetative regrowth more than the shorter or taller patches ($p < 0.01$) . They also avoided tall , reproductive patches with these becoming more mature (Table 1) . Although horse selection for short and intermediate patches was not significantly affected by season , the horses spent more time feeding on short swards in summer and in autumn and increased their use of intermediate swards during the grazing season . Selection for short and intermediate vegetative patches was also more pronounced in plots grazed at the low stocking rate . Horses thus exhibited a typical patch-grazing pattern (Adler et al . , 2001) , continuously using previously grazed areas of high nutritive value . As already observed in cattle grazing fertile , mesophile swards (Dumont et al . , 2007) , this patch-grazing pattern was more pronounced at the lower stocking rate , which is expected to reinforce the spatial heterogeneity of the pastures .

Table 1 Mean proportion of each bite type included in the diet and Jacobs' selection index for horses according to stocking rate and season .

	Stocking rate (SR)		s . e .	P	Season (S)			s . e .	P	SR × S
	High	Low			June	July	Sept			P
Proportion of bite type										
VS	0.147	0.078	0.002	**	0.019a	0.159b	0.159b	0.024	***	<0.1
VI	0.293	0.218	0.018	*	0.169a	0.258b	0.338c	0.020	***	NS
VT	0.500	0.621	0.023	**	0.737a	0.453b	0.494b	0.029	***	NS
R/D	0.060	0.083	0.012	NS	0.075a	0.130b	0.009c	0.015	***	**
Jacobs' selection index										
VS	-0.03	+0.23	0.07	*	-0.05	+0.28	+0.07	0.13	<0.1	NS
VI	+0.21	+0.46	0.03	***	+0.31	+0.36	+0.35	0.06	NS	<0.1
VT	-0.09	-0.07	0.04	NS	-0.01a	+0.03a	-0.25b	0.09	**	NS
R/D	-0.36	-0.50	0.16	NS	-0.26a	-0.38ab	-0.63b	0.10	*	NS

Values within lines with different letters are different at $P < 0.05$; * , $P < 0.05$; ** , $P < 0.01$; *** , $P < 0.001$; NS , not significant For Jacobs' index , bold characters indicate bite types selected for (> 0) or avoided (< 0) (Student's *t*-test) .

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