The Potential Cost of Discrimination in Diet Selection by Grazing Herbivores

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Introduction While the general patterns of diet selection by grazing herbivores have been frequently discussed in the literature, very little is known on the effect of the local abundance and assemblage of plant families on their subsequent defoliation by the animals. In diverse pastures, where several plant species coexist on a small spatial scale, diet selection will partly depend on the discrimination abilities of the animals. The ability of sheep to discriminate between ryegrass and white clover has been demonstrated using an indoor test (Edwards et al., 1997). Here, we propose a sward-based method to study the selection of white clover by cattle and sheep in a pluri-specific grassland, according to whether it can be easily distinguished within the sward or not. This leads us to discuss the potential cost of discrimination processes in the diet selection of grazing herbivores.

Materials and methods This experiment was conducted in 2006, on six plots grazed since 2005 at the same low stocking rate by either sheep (5 ewes on 1100 m^2) or cattle (2 heifers on 2200 m^2) in a rotational grazing system, with five rotations per year (April, May, July, Sept. and Nov.). Plant community of the experimental plots was moderately diversified (15-20 plant species per plot) and white clover represented 6% of the vegetation on a volume-basis when measurements began. We indirectly estimated the selection of clover by using 20 fixed grids distributed over the six plots using a stratified sampling based on clover abundance (high: 40% *vs.* low: <20%) and local assemblage (mainly grasses+clover *vs.* forbs+grasses+clover). The grids (60 x 80 cm) were composed of 48 square units (10 x 10 cm) within which we recorded before and after each of the last four grazing rotations, the abundance of clover as the proportion of covered surface, using a visual note ranging from 0 to 6. Clover abundance at the grid scale was analysed by using the mixed procedure of SAS and a model accounting for the effects of initial abundance, assemblage, herbivore species and rotation number as the repeated factor.

Results and discussion This sward-based method confirms that both sheep and cattle actively select clover in diverse pastures. Sheep exerted a stronger selection pressure on clover than did cattle ($p=0.02$) as shown by an average of 50% lower proportion of clover in grids grazed by sheep over the grazing season. This is consistent with the selection of higher quality foods by the small ruminants and their greater ability to graze selectively. In May, consumption of clover was greater in grids where it was initially abundant ($p=0.03$), with smaller differences after July between grids with initially high or low clover abundance (Figure 1a). The local assemblage also affected the evolution of clover in grids. Clover depletion tended to be greater when associated mainly with grasses than when associated with both forbs and grasses ($p=0.09$) (Figure 1b).

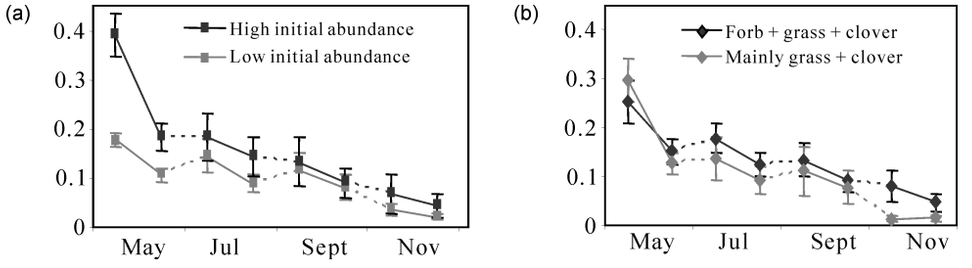

Figure 1 *Evolution of clover proportion through grazing rotations (before and after each one) according to (a) its initial abundance and (b) local assemblage.*

This result observed in both sheep and cattle (herbivore species x assemblage: $p=0.7$) may partly result from the difficulty of grazing herbivores to discriminate between clover and forbs when closely mixed due to more similar morphological traits compared with grasses.

These results suggest that the selection pressure on white clover would be greater when it is more easily distinguished into the sward, whether due to higher local abundance or to less similarity with associated plant types, based on either morphological or nutritional traits.

Reference

Edwards, G.R., Newman, J.A., Parsons, A.J., Krebs, J.R., (1997). Use of cues by grazing animals to locate food patches: an example with sheep. Appl. Anim. Behav. *Sci*. 51, 59-68.