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**Title: Assessing grazing impact: Indicators of grazing pressure in Montados**

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**Abstract:**

Pastures are not evenly grazed, mainly as a consequence of irregular livestock spatial distribution and grazing behaviour. Even in homogeneous pastures, ruminants select distinct areas for resting and grazing. Furthermore, when grazing they adopt patchy locations, moving across the pasture and pausing for feeding, selecting among plants and layers along the foraging path. As a result of this particular behaviour, grazing pressure is uneven within a paddock. In Montado’s grazing systems, where paddock size average can reach 100 ha using a single gross measurement or indicator (e.g. stocking rate) to asses grazing effects on a ecosystems may bias the results. Thus, when assessing ecosystem disturbances due to grazing intensity it is critical that sampling methods take grazing behaviour into account.

We report on an experimental farm level approach for measuring grazing impact at paddock scale, through a set of indicators that could be used to develop a practical index of grazing pressure.

We used a stratified sampling method, defining locations inside a paddock with hypothetically contrasting grazing intensities (high and low grazing pressure strata). Criteria used for the stratification were based on livestock location preferences (reported by stakeholders) crossed with locations of watering points and gates. Random sampling of a set variables (e.g. biomass availability, nutritive value, dung counting) were performed for each locations within a 50 m transect. The approach stresses the need for proxy variables of grazing pressure and underlie the difficulty of estimate grazing pressure at this scale based only on livestock density data and dung counting. According to our results, overall tree regeneration, tree density and shrub diversity showed good performance through a non-parametric Wilcoxon-Mann-Whitney test (p < 0.05). In this sense, we used these variables, along with the livestock density and the spatial distribution of dung to define spatial gradients of grazing pressure through principal component analysis.

For ecological disturbance studies assessments using grazing intensity strata enable comparisons of grazing pressure within and between paddocks. The disparity between grazing strata proves useful as a measure of patchiness of pasture. However the gain of the approach depends on the differences among stratum averages and may not be of relevance for specific species (e.g. birds surveys). For the purpose of future livestock impact assessment protocols, measures of sward characteristics should be performed as they are a better indicator of grazing intensity then the frequently used dung counting.