

Denyer, J.L. (2005): Interactions between rabbits, plants and soil and their consequences for chalk grassland and chalk heath vegetation communities

Herbivory and soil nutrient availability are key determinants of plant community structure, composition and ecosystem processes. Often these are studied in isolation, yet interactions between them and are likely to be a major influence in many grazed semi-natural plant communities. In this thesis, interactions between rabbits, plants and soil, and their consequences for the structure, composition and productivity of chalk heath and chalk grassland plant communities were investigated. Using field-based experiments, the impact of both herbivory and soil nutrients on plant communities, and the influence of plant community structure and soil nutrients on herbivore feeding choices, was studied.

Feeding trials showed that rabbit foraging choices occur at several different levels. At the level of choice within a species, rabbits preferentially grazed plants grown in higher soil nutrient conditions. Choices between species depended on relative palatability and may also have been influenced by plant neighbours. Rabbits were attracted to patches with clearly visible plants, irrespective of their palatability, but the position of plants within a rabbit's feeding ground also affected patch choice.

Plant community composition, above and below ground biomass and soil were surveyed within long-term exclosures, which excluded large and small herbivores progressively, on a heterogeneous chalk-heath site. Herbivory was found to reduce the dominance of species such as *Ulex europaeus*, allowing underlying soil patterns to be expressed in the vegetation, thus creating distinct vegetation communities. Vegetation sensitivity to changes in grazing pressure was linked to soil fertility and soil pH. In areas of low fertility and calcareous soil, rabbit grazing alone could maintain species-rich vegetation; whilst in more acidic areas of higher fertility, rabbit grazing alone could not prevent the invasion of woody species. In these areas, large herbivores facilitated rabbit feeding by maintaining vegetation at a height that they were able to graze.

On chalk grassland, nutrient inputs from cattle urine were found to increase plant growth. However, rabbits preferentially grazed patches with nutrient additions, thus reducing the overall impact of soil nutrients on plant biomass. Where herbivore pressure was high, vegetation could not respond to nutrient addition, and rabbits were less selective due to a shortage of available forage.

It is well known that rabbits contribute to patterns in plant community composition. However, this multi-level study showed the important role of soil properties, interactions with other grazers and the structure of plant communities in determining the impacts of rabbits on plant community structure, composition and ecosystem processes.