Title: Contrasting plant community-mediated effects of herbivore grazing on plant diseases with different life history

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Abstract

Herbivore grazing is the most extensive management form of grassland worldwide. The effects of large herbivore grazing on plant community structure and ecosystem functioning have been widely studied, whereas the impacts of grazing on plant diseases, especially under various herbivore species and for diseases caused by different pathogens, remain poorly understood. Here, we integrated a grazing experiment, and a removal experiment manipulating plant density and litter biomass, to evaluate how large vertebrate herbivores (i.e., cattle and sheep) affect foliar fungal diseases with different life history (i.e., biotroph and necrotroph), and to identify potential mechanisms underlying such grazing effects in a temperate grassland in northeast China. By measuring plant population and community-level variables, plant disease severity and microclimatic conditions, we found that cattle grazing significantly reduced pathogen load, either for biotroph or necrotroph. While sheep grazing had a positive effect on biotrophic pathogen load, but not on necrotrophic pathogen load. The SEM analysis showed that indirect pathways, including plant

community characteristics, played predominant roles in our systems, overwhelming the direct effects of grazing (e.g., consumption of spores). Moreover, litter biomass play an important role in modulating necrotrophic pathogen load, while this mechanism has not received much attention. Overall, our results demonstrate cattle and sheep grazing exert contrasting impacts on pathogen load, particularly via indirect pathways of changes in plant community, and that these effects vary across pathogen life history. This finding has important implications for leading to more effective disease management and rational grazing regimes in grassland systems.