

Modelling the impact of helminth parasite on rock partridge population dynamics

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The aim of this work was to explore the effect of helminth parasites on the population dynamics of rock partridge (*Alectoris graeca saxatilis*) that is an endangered species in the Dolomitic Alps (northern Italy). Specifically, we investigated the hypothesis that the nematode parasite *Ascaridia compar* can drive population cycles in rock partridge dynamics. In order to support this hypothesis, we compared the predictions obtained from a host-macroparasite interaction model with multi-annual empirical data of *A. compar* infection in natural host populations. Furthermore, field data suggest a potential interactions through competition between rock partridge and black grouse (*Tetrao tetrix*) that share a common spatial domain in the Alps. We hypothesized two possible interaction mechanisms: direct competition and parasite-mediated competition, also called apparent competition, and we used mathematical models as a proof-of-principle verification of these hypotheses. Outputs from the direct competition model are in contrast with field observations, while outputs of the parasite-mediated competition model qualitatively fit the observed pattern suggesting that the sharing of parasite free-living stages between the two species can trigger the competition playing an important role in the decline of rock partridge in Trentino region.