
****CONTACT NETWORKS AND MORTALITY PATTERNS SUGGEST PNEUMONIA-CAUSING PATHOGENS MAY PERSIST IN WILD BIGHORN SHEEP**

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Efficacy of disease control efforts is often contingent on whether the disease persists locally in the host population or is repeatedly introduced from an alternative host species. Local persistence is partially determined by the interaction between host contact structure and disease transmission rates: relatively isolated host groups facilitate pathogen persistence by slowing the rate at which highly transmissible pathogens access new susceptibles; alternatively, isolated host groups impede persistence for pathogens with low transmission rates by limiting the number of available hosts and forcing premature fade-out. Here, we use long-term data from the Hells Canyon region to investigate whether variable host contact patterns are associated with survival outcomes for 46 cohorts of bighorn sheep (*Ovis canadensis*) lambs subject to recurrent pneumonia outbreaks. We build social contact networks for each lamb cohort, and quantify variation in lamb mortality attributable to populations, years, and groups. We then refine estimates of chronic carriage rates in ewes, and disease-induced mortality rates in lambs, by finding parameters for the disease process that produce lamb mortality rates similar to those observed when simulated on the observed host contact networks. Our results suggest that summer lamb hazards are spatially structured at the subpopulation level: 92.5 percent of the variation in lamb hazards during pneumonia outbreak years was attributable to sub-population-level groups, whereas 1.7 percent and 5.6 percent were attributable to year and population, respectively. Additionally, the posterior distribution generated by our disease transmission model suggests that pneumonia-causing pathogens may persist locally in bighorn sheep populations, even during apparently healthy years.