
ELK CONTACT PATTERNS AND POTENTIAL DISEASE TRANSMISSION

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Understanding the drivers of contact rates among individuals is critical to understanding disease dynamics and implementing targeted control measures. We studied the interaction patterns of 149 female elk (*Cervus elaphus*) distributed across five different regions of western Wyoming over three years, defining a contact as an approach within one body length (~2m). Using hierarchical models that account for correlations within individuals, pairs and groups, we found that pairwise contact rates within a group declined by a factor of three as group sizes increased 30-fold. Meanwhile, per capita contact rates increased with group size due to the increasing number of potential pairs. We found similar patterns for the duration of contacts. Supplemental feeding of elk had a limited impact on pairwise interaction rates and durations, but increased per capita rates more than two times higher. Variation in contact patterns were driven more by environmental factors such as group size than either individual or pairwise differences. Female elk in this region fall between the expectation of contact rates that linearly increase with group size (as assumed by pseudo-mass action models of disease transmission) or are constant with changes in group size (as assumed by frequency dependent transmission models). Our statistical approach decomposes the variation in contact rate into individual, dyadic, and environmental effects, which provides insight into those factors that are important for effective disease control programs.