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## POPULATION DENSITY, GROUP SIZE OR SOMETHING IN BETWEEN: EFFECTS OF A VARIABLE SOCIAL STRUCTURE ON PARASITE TRANSMISSION

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Critical to our understanding of disease dynamics and effective disease control strategies is the relationship between host density and parasite transmission rates. To accurately describe this relationship, it is important to measure host density at the scale in which transmission is occurring. In social species, for example, transmission may be more related to group size than the population as a whole. But when aggregation patterns vary in size across space and time, our ability to quantify the density-transmission relationship may depend on measuring density somewhere in between population density and group size. To address this issue, we examined elk (*Cervus elaphus*) populations in western Wyoming that have been exposed to the bacteria

(*Brucella abortus*) that causes brucellosis. We measured elk density at multiple scales ranging from population density to group size, and evaluated the functional relationship between density and brucellosis seroprevalence. Our study found that low elk density did not explain why *Brucella* had not effectively invaded several populations. However, in populations with multiple years of seropositive test results, the rates of increase in seroprevalence saturate with increasing elk density regardless of the density measure used. The different densities were poorly correlated with one another, and therefore high elk densities at broad scales did not guarantee high elk densities at fine scales, but both may be important to the transmission of *Brucella*. This suggests that reducing or altering elk density may not effectively reduce transmission.