

Kin interactions and changing social structure during a population outbreak of feral house mice.

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Abstract

Populations of feral house mice (*Mus domesticus L.*) in Australia undergo multiannual fluctuations in density, and these outbreaks may be partly driven by some change in behavioural self-regulation. In other vertebrate populations with multiannual fluctuations, changes in kin structure have been proposed as a causal mechanism for changes in spacing behaviour, which consequently result in density fluctuations. We tested the predictions of two alternative conceptual models based on kin selection in a population of house mice during such an outbreak. Both published models (Charnov & Finerty 1980; Lambin & Krebs 1991) propose that the level of relatedness between interacting individuals affects their behavioural response and that this changes with population density, though the nature of this relationship differs between the two models. Neither of the models was consistent with all observed changes in relatedness between interacting female mice; however, our results suggested that changes in kin structure still have potential for explaining why mouse outbreaks begin. Therefore, we have developed a variant of one of these conceptual models suggesting that the maintenance of female kin groups through the preceding winter significantly improves recruitment during the subsequent breeding season, and is therefore necessary for mouse outbreaks. We provide six testable predictions to falsify this hypothesis.