Ecology, physiology and behaviour

Spatial and temporal behaviour of commensal rodents in livestock farming

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Rodents' spatial behaviour is a highly relevant feature in applied and basic research. Commensal rodents such as rats and house mice show diverse ecological and behavioural adaptations. Movement data can provide important insights into spatial and temporal activity patterns. In close proximity to humans, rodents can play a major role in pathogen transmission, especially in agricultural environments.

In this study, the spatial behaviour of rats and house mice on livestock farms and their potential role in pathogen transmission was investigated. Using a novel Bluetooth logger system, contact data and movement patterns of the rodents on the farms were recorded and identified. The results showed that there are differences among the commensal rodent species, i.e. black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*), in temporal activity patterns, home range size, and movements between individual stable buildings. Rat species showed typical night activity whereas house mice were active throughout day and night. House mice travelled significantly longer distances while rats occupied larger home and core area sizes. The rodents used certain preferred areas and did almost never move between buildings. While movements between different stables were rare, movements within the buildings were frequently recorded and occasional excursions to the perimeter of neighbouring buildings occurred. The probability of direct contact with livestock and their feeding stations and thus a possible transmission of pathogens seems mostly related to the rodents' resident in a particular building. The contact data showed that rats avoid encounters with other individuals outside their core areas. The social network identified clusters of contacts among individuals where pathogen transfer is most likely. The practicability of Bluetooth proximity loggers for the study of small mammal spatiotemporal behaviour could be successfully demonstrated.

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