Population monitoring and management

Immigration predictors of wild house mice for potential population management using the *t*-haplotype

Goedecker, Caspar[1*]; Gonzalez, Ellen[1]; Manser, Andri[1]; Lindholm, Anna K.[1]

[1] University of Zürich, Institute for Evolutionary Biology and Environmental Studies, Zürich, Switzerland
* caspar.goedecker@uzh.ch

DOI: 10.20315/evmc.2025.055

House mice (*Mus musculus domesticus*) are one of the major mammalian pest species worldwide. As an invasive species they cause massive damage to local flora and fauna especially on islands. Half of the large-scale eradication attempts using rodenticides have been unsuccessful so far. The efficiency of rodenticides is limited by the accessibility of the habitat and reduced by the increasing number of species that are developing resistance to rodenticides. In addition, their use is raising major concerns regarding animal welfare including the risk of non-target effects. An alternative approach to managing large, isolated populations are genetic biocontrol methods. One of them could be an inherited sterility method using a selfish genetic element, the so-called *t*-haplotype. Homozygous males carrying this gene are fully sterile while heterozygous males transmit *t* to up to 95% of offspring rather than the expected Mendelian rate of 50% due to gene drive. However, despite the theoretical possibility of such a management method, some key question regarding its implementation remains unanswered. Populations of wild house mice are closed, and the migration of individuals is rare. Therefore, a crucial question is the extent to which animals can be translocated into an existing population, and what individual traits improve translocation success.

In this study, we conducted enclosure experiments on a wild strain of house mice where four animals (*t*-carriers and wildtypes) were released into established populations of ten individuals. We measured the social interactions of released mice with the resident population and gave the animals a possibility to leave the experiment via a water barrier. Immigrants were also tested in behavioural assays for exploration and anxiety. This allowed us to quantify the ability to settle in the population as a function of sex, genotype, and behavioural traits. We found no effect of genotype, but a general advantage of females (67%) over males (11%) in integration into a population. Further, less anxious females were more likely to stay. In general, we found individuals with more social contacts within the first 7 days remained until the end of the experiment. These results suggest that more social and less anxious individuals are more likely to be integrated into an existing population. For this reason, the selection of more social animals could increase the probability for success with such a management method.