Using gene drive technology to control invasive mammal species in Australia: Are we ready?

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In Australia, invasive animals have been linked to the extinctions of native wildlife, and to significant financial impacts in agricultural assets. While there are current approaches to control invasive species, these efforts are self-limiting: they require ongoing management and cost over large landscapes, and often result in the short-term suppression of local populations. New and innovative approaches are warranted. Recently, the gene editing system CRISPR/Cas9 has been proposed as a potential

genetic tool that, among other applications, could be used to bias sex-determining genes in a target species to produce males and reduce the numbers of individuals over generations. This technology has the potential to be used by wildlife managers as a non-lethal alternative to control invasive species. While regulatory control and social acceptance are components that must be addressed, there is also a need to identify knowledge and research gaps based on the currently available information for each invasive species. Here we apply a conceptual framework based to an ecological risk model within the gene drive context to identify key requirements for undertaking work on four exemplar invasive mammal species in Australia (red fox, feral cat, rabbit, black rat). This framework, if applied, would allow an evaluation of the potential effects of a gene drive within a risk context. We consider the current biological information to evaluate the knowledge gaps in preparation for a more formal assessment of the use of gene drives as an additional strategy for the control of these and other invasive species.

12th International Mammalogical Congress Perth, Western Australia 9th -14th July 2017

ABSTRACT BOOK