Potential Large-scale Removal of Invasive Wild Pigs Using Toxic Bait

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ABSTRACT: Invasive wild pigs (*Sus scrofa*) are a widely distributed and destructive invasive species throughout parts of North America, Australia, South America, Africa, and many island nations (Barrios-Garcia and Ballari 2012). The invasion of wild pigs is associated with extensive agricultural, ecological, and control costs (Hone 1995, Pimentel et al. 2000, Pimentel 2007). Wild pigs are expanding in distribution and population density throughout the United States and Australia (Bevins et al. 2014, Lewis et al. 2017, Snow et al. 2017b). These increases are attributed to intentional and accidental introductions by humans (Spencer and Hampton 2005, Barrios-Garcia and Ballari 2012), high reproductive potential (Mayer and Brisbin 2009), lack of predators (Bevins et al. 2014), human alterations to the landscape that improve suitability for wild pigs, and the adaptability of wild pigs to occupy a variety of landscapes and opportunistically feed on many food items (Seward et al. 2004). An international effort to develop an acute and humane toxic bait for invasive wild pigs is underway to assist in curtailing their expansion (Snow et al. 2017a). We evaluated the ability to expose a population of wild pigs to a simulated toxic bait (i.e., placebo bait containing a biomarker, rhodamine B, in lieu of the toxic ingredient) to gain insight on potential population reduction. We used 28 GPS collars and sampled 428 wild pigs to examine their vibrissae for evidence of consuming the bait. Overall, we found that (74.1%) of wild pigs tested were positive for RB from consuming the RB bait. These wild pigs were sampled from an average distance of 0.61 km (SE = 0.04) from the nearest bait sites. We estimated that 91% of wild pigs within 0.75 km of bait sites (total area = 16.8 km^2) consumed the simulated toxic bait, exposing them to possible lethal effects. Bait sites spaced 0.75-1.5 km apart achieved optimal delivery of the bait, but wild pigs ranging ≥3 km away were susceptible. Use of wild pig-specific bait stations resulted in no non-target species directly accessing the bait. Most of the collared wild pigs visited >1 bait sites during the final night with biomarker deployment, leading to two relevant conclusions. First, the 18-day baiting strategy for locating, and accustoming wild pigs to the placebo bait and bait stations, was adequate for overcoming neophobic tendencies of wild pigs. Secondly, the spacing of the bait stations (i.e., 1 bait site per 0.75 km^2) was adequate for exposing all wild pigs in between bait sites to the bait, and may have been expanded to expose more wild pigs. This study demonstrated the potential for exposing a large proportion of wild pigs to a toxic bait. Bait sites should be spaced 0.75-1.5 km apart, and closer will provide better efficacy. Approximately 18 days of coordinated pre-baiting should be sufficient for accustoming wild pigs to using the wild pig-specific bait stations and readily consuming a novel bait. Toxic baits may be an effective tool for reducing wild pigs especially if used as part of an integrated pest management strategy. Investigation of risks associated with a field-deployment of the toxic bait is needed.

KEY WORDS: biomarker, feral swine, Integrated Pest Management, pesticide, *Sus scrofa*, toxicant, wild boar, wild pig, wildlife damage management

Proc. 28th Vertebr. Pest Conf. (D. M. Woods, Ed.)
Published at Univ. of Calif., Davis. 2018. P. 114.

LITERATURE CITED

Barrios-Garcia, M. N., and S. A. Ballari. 2012. Impact of wild boar (*Sus scrofa*) in its introduced and native range: a review. Biological Invasions 14:2283-2300.

Bevins, S. N., K. Pedersen, M. W. Lutman, T. Gidlewski, and T. J. Deliberto. 2014. Consequences associated with the recent range expansion of nonnative feral swine. BioScience 64:291-299.

Hone, J. 1995. Spatial and temporal aspects of vertebrate pest damage with emphasis on feral pigs. Journal of Applied Ecology 32:311-319.

Lewis, J. S., M. L. Farnsworth, C. L. Burdett, D. M. Theobald, M. Gray, and R. S. Miller. 2017. Biotic and abiotic factors predicting the global distribution and population density of an invasive large mammal. Scientific Reports 7:44152.

Mayer, J., and I. L. Brisbin, editors. 2009. Wild pigs: biology, damage, control techniques and management. Savannah River National Laboratory, Aiken, SC.

Pimentel, D. 2007. Environmental and economic costs of vertebrate species invasions into the United States. Pages 2-8 *in* G. W. Witmer, W. C. Pitt, and K. A. Fagerston, editors. Managing vertebrate invasive species: proceedings of an international symposium. USDA/APHIS/Wildlife Services, National Wildlife Research Center, Fort Collins, CO.

Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. BioScience 50:53-65.

Seward, N. W., K. C. VerCauteren, G. W. Witmer, and R. M. Engeman. 2004. Feral swine impacts on agriculture and the environment. Sheep & Goat Research Journal 19:34-40.

Snow, N. P., J. A. Foster, J. C. Kinsey, S. T. Humphrys, L. D. Staples, D. G. Hewitt, and K. C. VerCauteren. 2017a. Development of toxic bait to control invasive wild pigs and reduce damage. Wildlife Society Bulletin 41:256-263.

Snow, N. P., M. A. Jarzyna, and K. C. VerCauteren. 2017b. Interpreting and predicting the spread of invasive wild pigs. Journal of Applied Ecology 54:2011-2021.

Spencer, P. B., and J. O. Hampton. 2005. Illegal translocation and genetic structure of feral pigs in Western Australia. Journal of Wildlife Management 69:377-384.