

HEALTH AND NUTRITION



Research to protect us from disease-spreading pests

More than 700,000 people die each year from vector-borne diseases such as malaria, Zika, Lyme disease, West Nile virus and many more. Cases of illnesses spread by mosquitoes, ticks and other vectors tripled in the United States between 2004 and 2016. Researchers at land-grant institutions are working to combat these creepy-crawlies whose bites can be a significant health threat to humans and animals.

HERE ARE A FEW EXAMPLES OF THAT WORK:

- In **Pennsylvania**, researchers are improving gene-editing capabilities to target a portion of the mosquito genome to better control vector-borne diseases. ReMOT Control (Receptor-Mediated Ovary Transduction of Cargo) is a relatively new way to modify an organism's genome. The technique delivers a desired DNA-cutting enzyme via an injection into the blood of a female arthropod. Once in the bloodstream, it can be introduced into developing eggs via receptors in the ovary and make changes in the offspring. This technology has the promise to be more efficient and less costly than current embryo-injection techniques.
- **Wisconsin** researchers found better ways to manage and reduce tick populations. In a study, "tick tubes" decreased the number of ticks by anywhere from 25% to 50% and reduced the prevalence of the Lyme disease pathogen

carried by ticks and small mammals. Tick tubes are short lengths of pipe stuffed with cotton balls coated with the insecticide permethrin. The tubes were placed near logs where small animals travel regularly. Animals who encounter the tubes take the cotton balls back to their nests. The insecticide transfers to their coats, where it repels and kills ticks.

- Entomologists have been collecting data on ticks for the past 117 years, identifying several shifts in the dominant species of ticks in **Pennsylvania**. These changes correlate with climate change and weather variability, shifts in land use that have led to habitat loss and fragmentation and changes in human and animal behavior that brought ticks and their hosts in closer proximity. Combining robust surveillance with analysis of historical datasets helps public health officials and researchers to identify high-risk areas, discover ecological trends and develop predictive models for assessing the risk of tick-borne diseases.

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