



3 Park Place, Suite 307
Annapolis, MD 21401-3722 USA

Phone: 301-731-4535
Fax: 301-731-4538

esa@entsoc.org
www.entsoc.org

ESA Position Statement on Tick-Borne Diseases

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The Entomological Society of America (ESA) strongly supports building a national strategy[i] using **Integrated Tick Management** (ITM) to better control tick populations and reduce the rapidly escalating impacts of tickborne diseases (TBD) on the health of people and animals. This commitment is critical to ensuring the health, economic security, and biosecurity of society while protecting the environment; we believe that modern entomological sciences form the basis for developing new technologies, concepts, and ITM applications for scientific investigators and practitioners, all needed to “solve the tick problem.”

In the United States, ticks transmit pathogens that cause at least 16 different human illnesses[ii]. Lyme disease, with an estimated 300,000 cases diagnosed every year, and co-infections transmitted by blacklegged ticks (*Ixodes scapularis*), can cause serious disease consequences[iii]. Direct medical costs for Lyme disease alone are estimated at \$700 million to \$1.3 billion annually, and along with associated overall indirect costs, the public health burden just for Lyme disease may be three times higher[iv]. Since 2004, seven new tickborne pathogens—two of them deemed life-threatening—have been discovered present in the United States [v]. Additionally, climate change has been linked to increasing tick populations and subsequent disease risk, as rising temperatures allow ticks to expand their range northward into previously unsuitable habitat and intensify existing populations in areas where they are already established [vi, vii]. Meanwhile, the invasive Asian longhorned tick (*Haemaphysalis longicornis*) was discovered for the first time in North America in 2017 and has since been found in nine states [viii]; in its native territory the species is known to transmit human and animal pathogens. These developments illustrate how dynamic the TBD landscape is and highlight the need for continual surveillance, education, and prevention.

TBDs also threaten livestock, pets and wildlife. Many ticks of concern and the disease-causing pathogens they transmit are not present in the United States but are potentially invaders—as the Asian longhorned tick clearly illustrates. Some are even considered high-consequence bioterrorism agents threatening livestock enterprises and food security[ix]^[x]. Currently, the annual savings to the livestock industry from excluding these ticks from the U.S. mainland exceeds \$3 billion annually, and one potential disease alone (Heartwater) could cause losses exceeding \$760 million annually[xi] if it were to become established in indigenous tick populations. Industry sources indicate that pet pharma distributed more than 120 million doses of flea and tick products in the U.S. during 2014, costing consumers more than \$1.6 billion for prevention; expenditures for TBD-related veterinary visits and treatments are unknown but likely substantial, considering that 57 percent of U.S. households own pets (77 million dogs/58 million cats)[xii].

The confluence of environmental, ecological, sociological, and demographic factors has created a near “perfect storm” leading to **more ticks in more places** throughout North America. Research and outreach efforts should be aimed at relieving the escalating health and economic burdens caused by tick parasitism and TBD in North America. Achieving this goal will require significant investment in training and research support for the existing and future generation of tick scientists.

The more recent rapid expansion of the blacklegged tick vectors of Lyme disease and co-infecting disease agents like those causing babesiosis and anaplasmosis has caught society and science in a severe “tick literacy deficit,” allowing TBDs to explode and threaten the nation’s public health and economy, and, accordingly, is the cause for significant new calls to action.

ESA actively supports policies and investments that (1) strengthen tick research and research capabilities; (2) foster education and training of professional entomologists as well as increased engagement of health professionals and citizen-scientists; and (3) encourage dynamic partnerships between universities, industry, public health departments, veterinary and agricultural professionals, and government at all levels. Specifically, we advocate for:

- ***Broad Spectrum Approaches.*** Such methods hold great promise for improving ITM[xiii] and preventing multiple TBDs. These include development of tick-protective vaccines, more effective repellents and attractants, and novel host-targeted and pheromone-assisted acaricides.
- ***Increased Ecological Surveillance and Systems Assessment.*** Temporal-spatial assessment of tick-host-landscape systems should be a priority and include evaluations of TBD risk and ITM strategies at the local level, followed by actions to suppress tick-encounter rates and prevent disease. ESA supports a sustained investment in passive and active tick surveillance programs that are readily translatable to both policy makers and the public; additionally, more public resources are needed to prevent introduction of exotic ticks at ports of entry and to build risk-mapping and habitat-assessment tools capable of providing accurate determinations of entomological risk at multiple geographic scales and in diverse ecosystems.
- ***Education and Citizen Engagement.*** While effective tick control and tick-bite prevention products and strategies exist, surveys consistently indicate inadequate use by people at risk. ESA believes new and improved systems are needed to deliver tailored messages, understand barriers to adopting prevention measures, and engage individuals on tickborne disease prevention. Improved science translation is a critical skill set for both current and next-generation tick researchers, and greatly expanding the funding for tickborne disease prevention expertise within cooperative extension programs and for local- to national-scale civic outreach holds great promise for increasing citizen engagement and empowerment.
- ***Creating and Promoting Markets for Tick Research Innovation.*** Translating tick-control technologies and promising new inventions into consumer products requires collaboration across government, industry, and research universities. Joint programs that foster dynamic partnerships between federal government, university researchers, and industry are needed to move patents off the shelf and into the field. An example may be expansion of the current Small Business Innovative Research (SBIR) program to move beyond Phase 3 research and development funding to include a Phase 4 government purchasing phase.

ESA strongly encourages development of a national strategy that minimizes the impact of tick parasitism and better manages current and future TBD. Key elements in this strategy should include a national commitment to investments that:

- 1) ***Broadly expand basic knowledge of tick biology.*** Exceptional recent advances in a broad range of scientific arenas now provide the opportunity for a much deeper understanding of ticks and tick/host relationships and the microbial agents they transmit. Increased investment in research will open avenues for discovery of novel approaches for tick suppression, ITM strategies, and reducing risk of tickborne pathogen exposure.

- 2) **Greatly enhance ecological surveillance.** Knowing where ticks are at local and regional scales can engage citizens and lead to tick-prevention actions as well as enable policy makers and city and county health officials to efficiently allocate scarce public resources for tick and disease mitigation, including external threats.
- 3) **Promote citizen engagement and education.** Such effort, channeled through cooperative extension programs and other civic-outreach avenues, should focus on understanding barriers to public adoption of prevention measures and increasing the personal relevance of prevention messages, with the goal of leading to a broad-based health education strategy for minimizing tick encounters.
- 4) **Train the next generation of scientists and specialists.** Development of research, taxonomic, and vector-management workforce capacity will increase readiness and ensure continuity of tick expertise for public protection from ticks in the future.
- 5) **Encourage commercializing and marketing of promising discoveries from tick and TBD science.** ESA strongly encourages development of government-industry-university partnerships structured to provide financial incentive for businesses to invest their capital in advanced product development, licensing, and marketing of products that will be profitable for industry as well as protect public and animal health.
- 6) **Seek greater investment in U.S.-International partnerships.** Collaboration is critical to deal with high-priority accidental and intentional tick-disease introductions.

ESA is the largest organization in the world serving the professional and scientific needs of entomologists and people in related disciplines. ESA today has more than 7,000 members affiliated with educational institutions, health agencies, private industry, and government. Headquartered in Annapolis, Maryland, the Society stands ready as a non-partisan scientific and educational resource for all insect-related topics. For more information, visit www.entsoc.org.

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