

An Update on Ticks and Tick-borne Disease in Ohio

Association of Ohio Health Commissioners

Timothy McDermott DVM
Assistant Professor, Extension Educator, Franklin County
Adjunct Faculty, Dept. of Veterinary Preventative Medicine
Mcdermott.15@osu.edu

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Counties

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- ANR
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Myth #1 – Ticks are only active in summer.

- Ticks take one to three years to complete their life cycle depending on species and are active all year long.

Myth #2 – Ticks prefer the woods.

- Some tick species such as American Dog Tick and Gulf Coast Tick prefer open habitat such as pasture and field.

Myth #3 – Takes a day to transmit disease.

- The disease transmission time varies depending on tick species, life cycle stage and what the disease is.

Ticks of medical importance



Common ticks found in Ohio

From left to right: blacklegged tick nymph, blacklegged tick female, blacklegged tick male, American dog tick female, American dog tick male, lone star tick female, lone star tick male.

- **American Dog Tick**
- **Black Legged Tick**
- **Lone Star Tick**
- **Gulf Coast Tick**
- **Longhorned Tick**

American Dog Tick – *Dermacentor variabilis*



Larva



Nymph



Adult Male

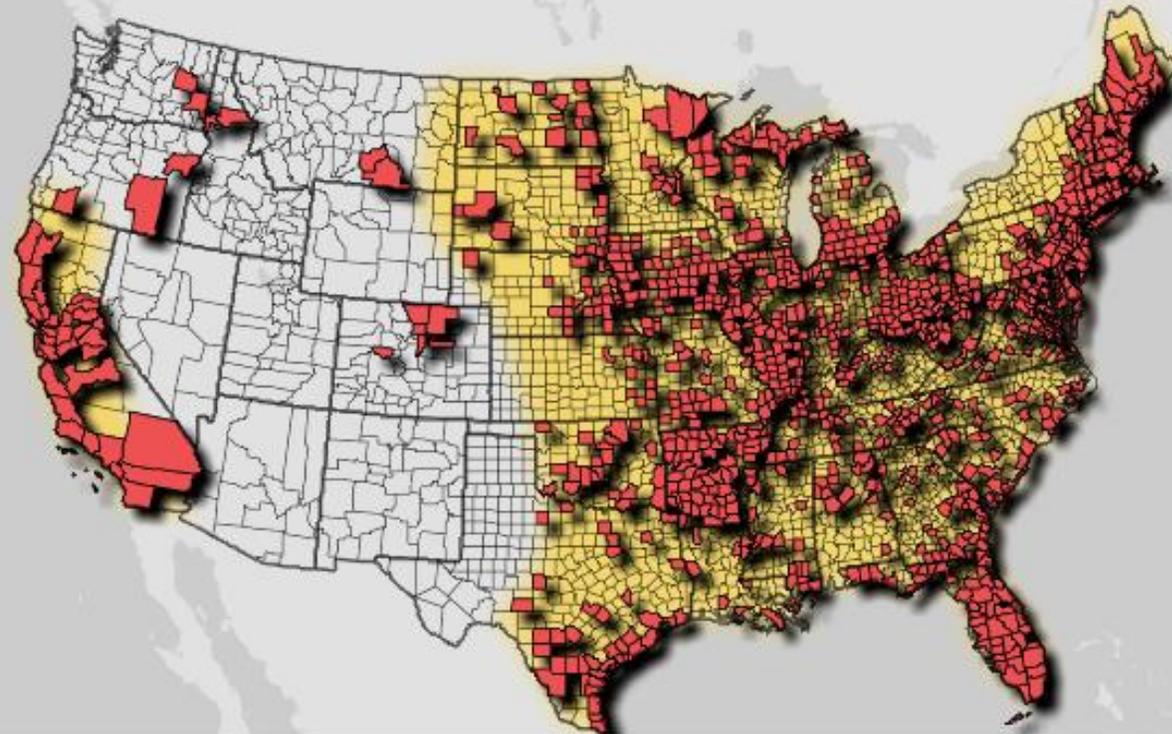


Adult Female



American Dog Tick Surveillance

Dermacentor variabilis - Estimated and Established Distribution



A ticking time bomb hidden in plain sight

[SUKANYA NARASIMHAN](#)  , [DURLAND FISH](#), [JOAO H. F. PEDRA](#)  , [UTPAL PAL](#)  , AND [EROL FIKRIG](#)  [Authors Info & Affiliations](#)

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 9,344



Abstract

The deer tick transmits nearly half of the known tick-borne pathogens in the United States, and its expanding geographic range increases the risk of human infection. To decrease the abundance of and infection risk from deer ticks, approaches that include vaccines for human use and for animal hosts are desired.

Black Legged (Deer) Tick – *Ixodes scapularis*



Larva



Nymph



Adult Male

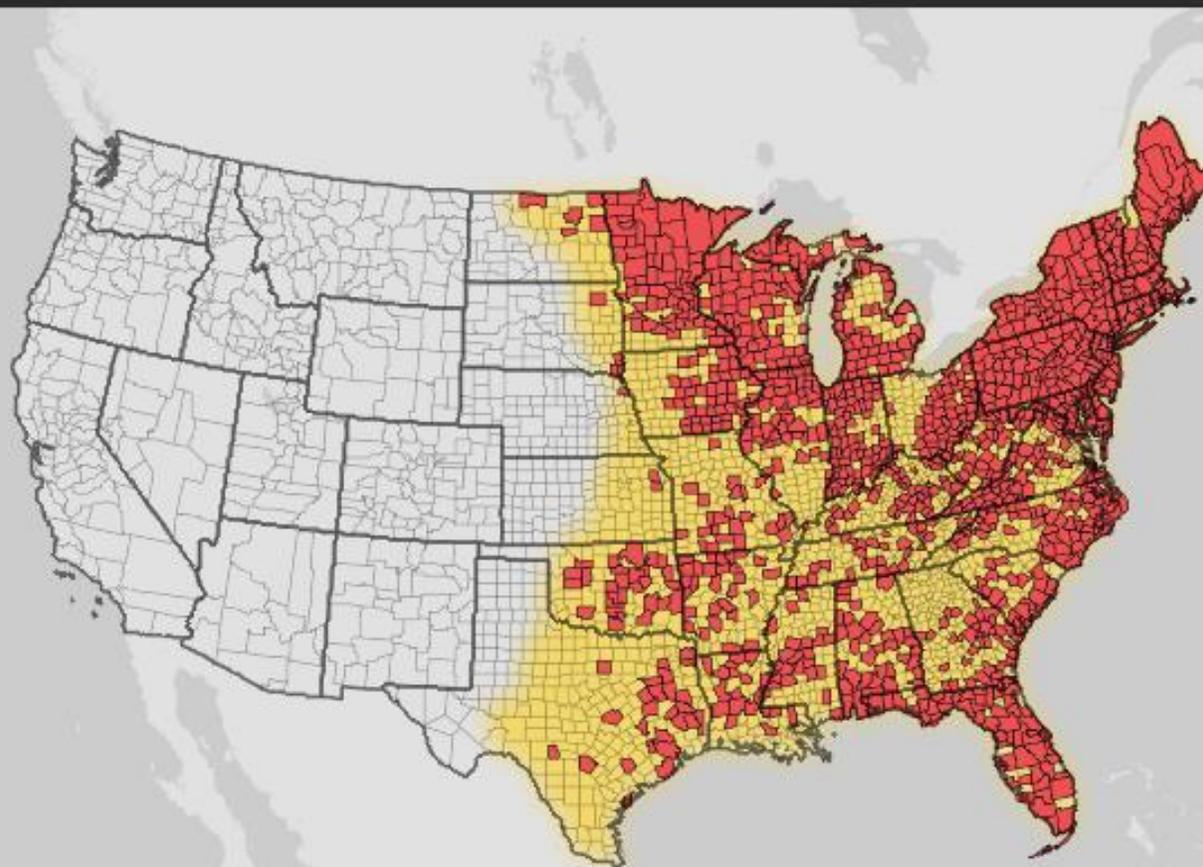


Adult Female



Blacklegged Tick Surveillance

Ixodes scapularis - Estimated and Established Distribution



Lyme Disease Pathogen (*Borrelia burgdorferi*) in Blacklegged Ticks (*Ixodes scapularis*) in Ohio, 2019-2022



- No ticks tested – 27 counties
- One or more ticks tested; pathogen not detected – 23 counties
- One or more ticks tested; pathogen detected in at least one tick – 38 counties

Estimated Distribution of Blacklegged Ticks (*Ixodes scapularis*) in Ohio, 2010-2023



- No record (no ticks identified to date) – 5 counties
- Reported (1 to 5 ticks identified within the same year) – 22 counties
- Established (6+ ticks or 2+ life stages within the same year) – 61 counties

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Based on testing conducted by the Centers for Disease Control and Prevention and by the Ohio State University. **NOTE** – Pathogen detection in ticks does not necessarily correlate to risk of infection in people or animals.

Last updated: 1/18/2024

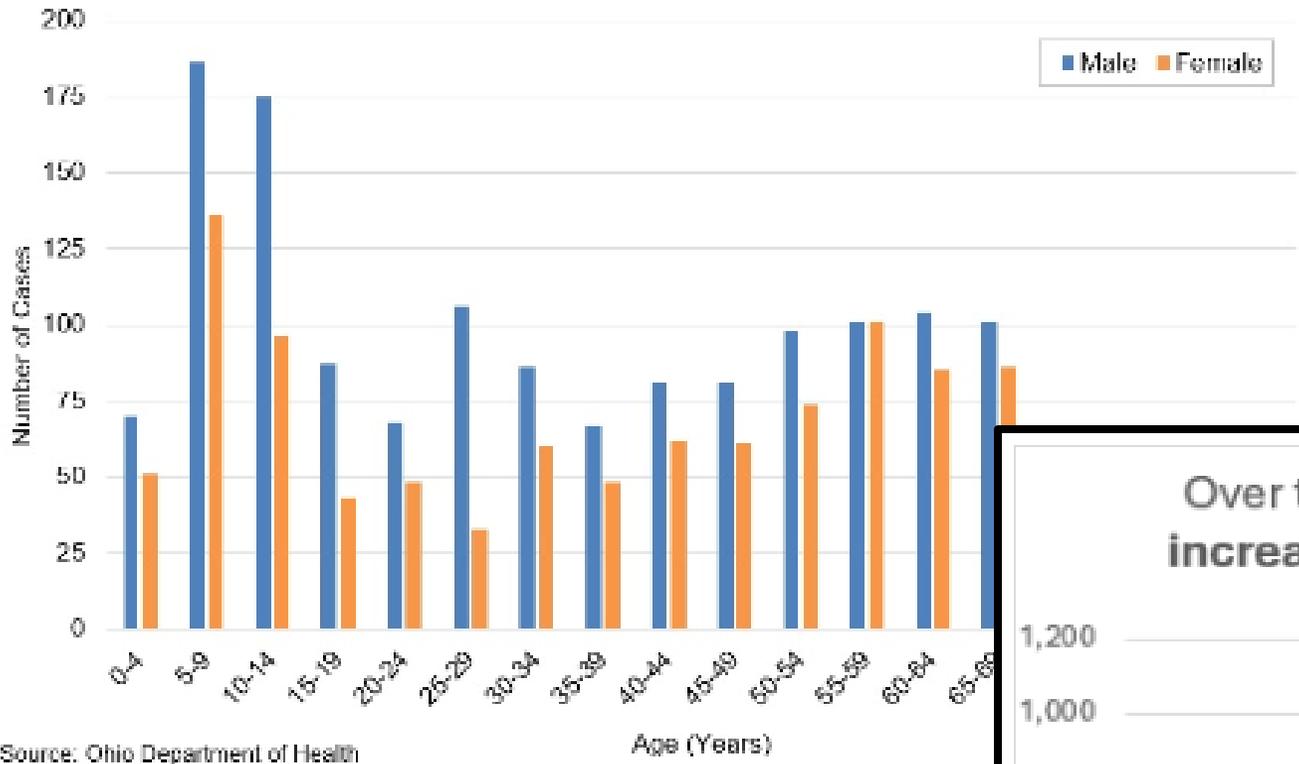


Based on identification records from both passive and active surveillance conducted by the Ohio Department of Health, the Ohio State University, local health agencies, private laboratories, published research, and other sources.

Last updated: 1/18/2024

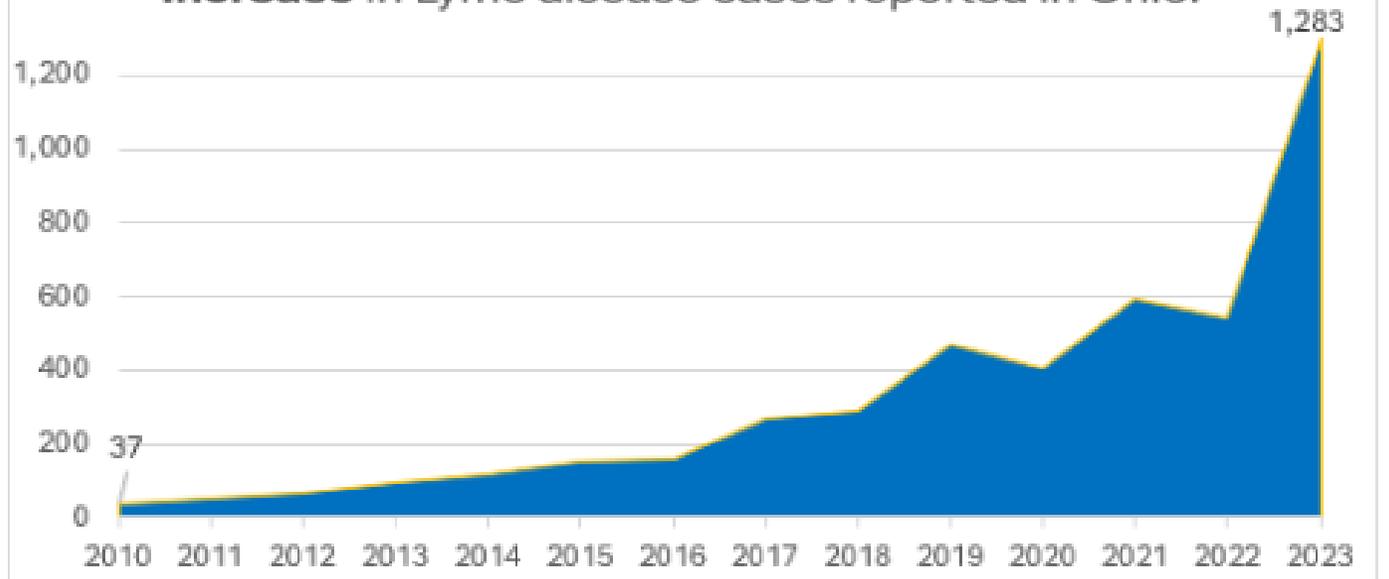


Lyme Disease by Age and Sex, Ohio, 2012-2021



Source: Ohio Department of Health

Over the past 13 years, there has been a **35-fold increase** in Lyme disease cases reported in Ohio.



Source: Ohio Department of Health.



Nearly 10% of people in North America - about 50million people - have had tick-borne illness Lyme disease, new study finds

- Scientists estimate about 50million people in North America have previously been infected with the tick-borne illness Lyme disease
- Meta-analysis was based on blood data from studies involving 150,000 people
- Globally up to 14.5 percent were estimated to have caught Lyme disease
- Highest proportion of cases were in Central Europe, followed by Eastern Asia

Deer Ticks account for 97% of tick-borne disease in the US.

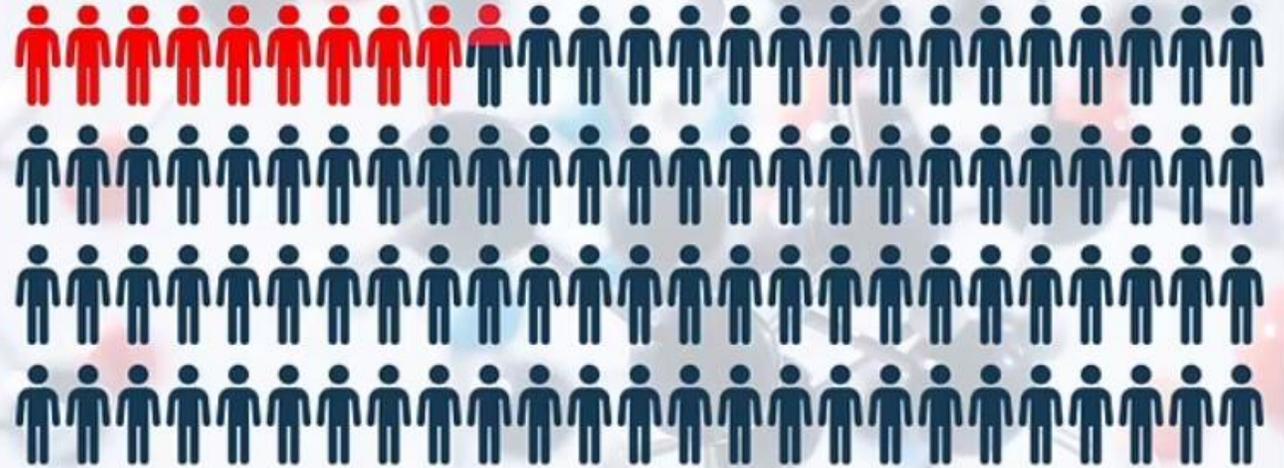
<https://news.yale.edu/2023/10/18/racing-defuse-ticking-public-health-time-bomb>

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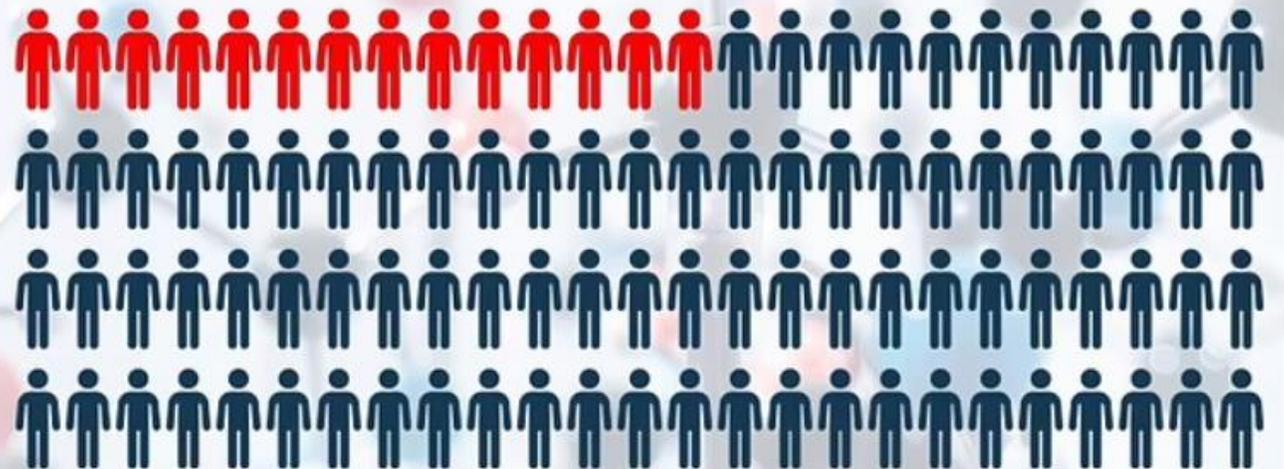
HAVE ALREADY HAD LYME DISEASE, STUDY SUGGESTS

HAD LYME DISEASE  HAS NOT HAD LYME DISEASE 

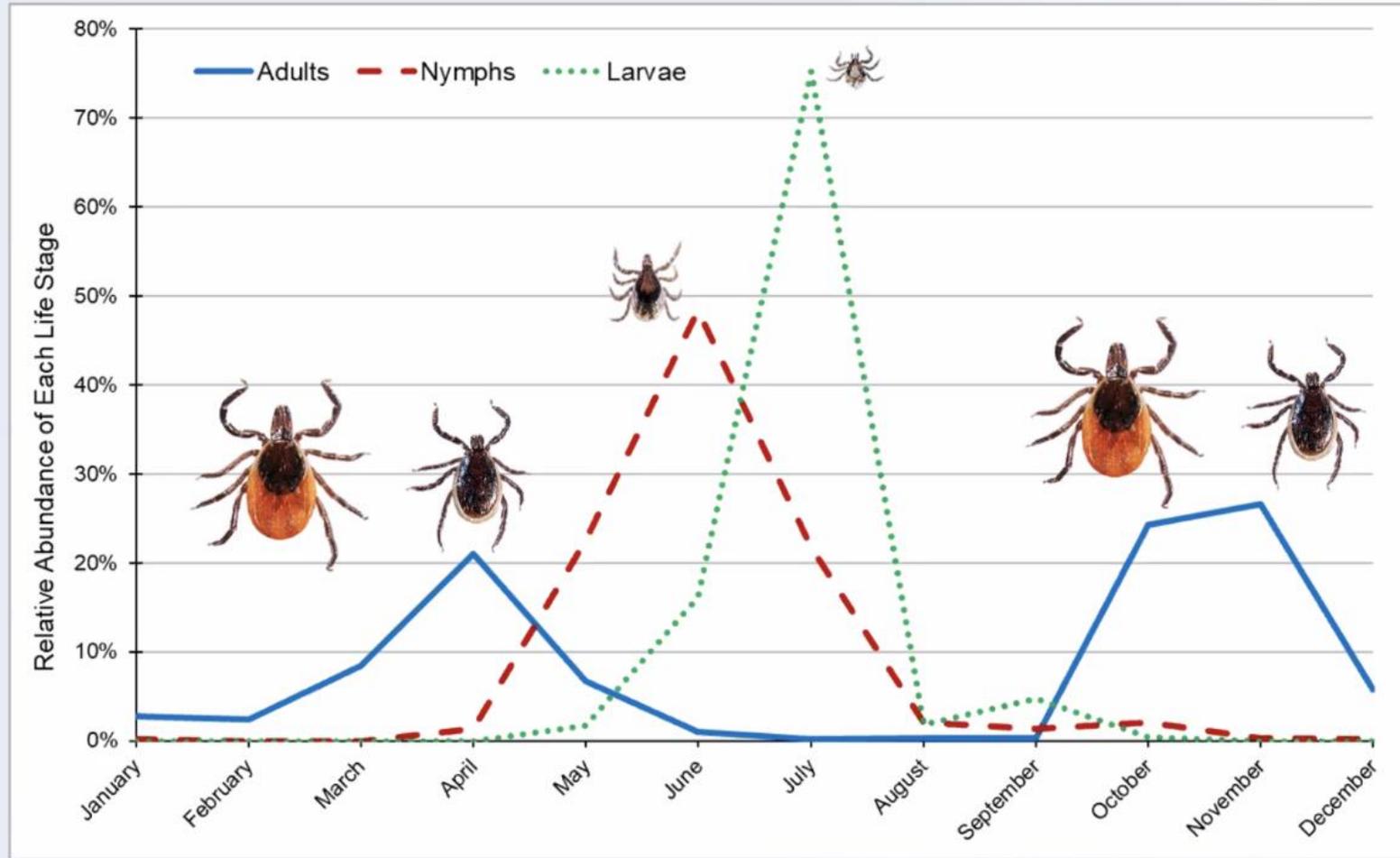
NORTH AMERICA: 9.4/100



WORLD: 14/100



Blacklegged Tick Seasonality



Lone Star Tick – *Amblyomma americanum*



Larva



Nymph



Adult Male

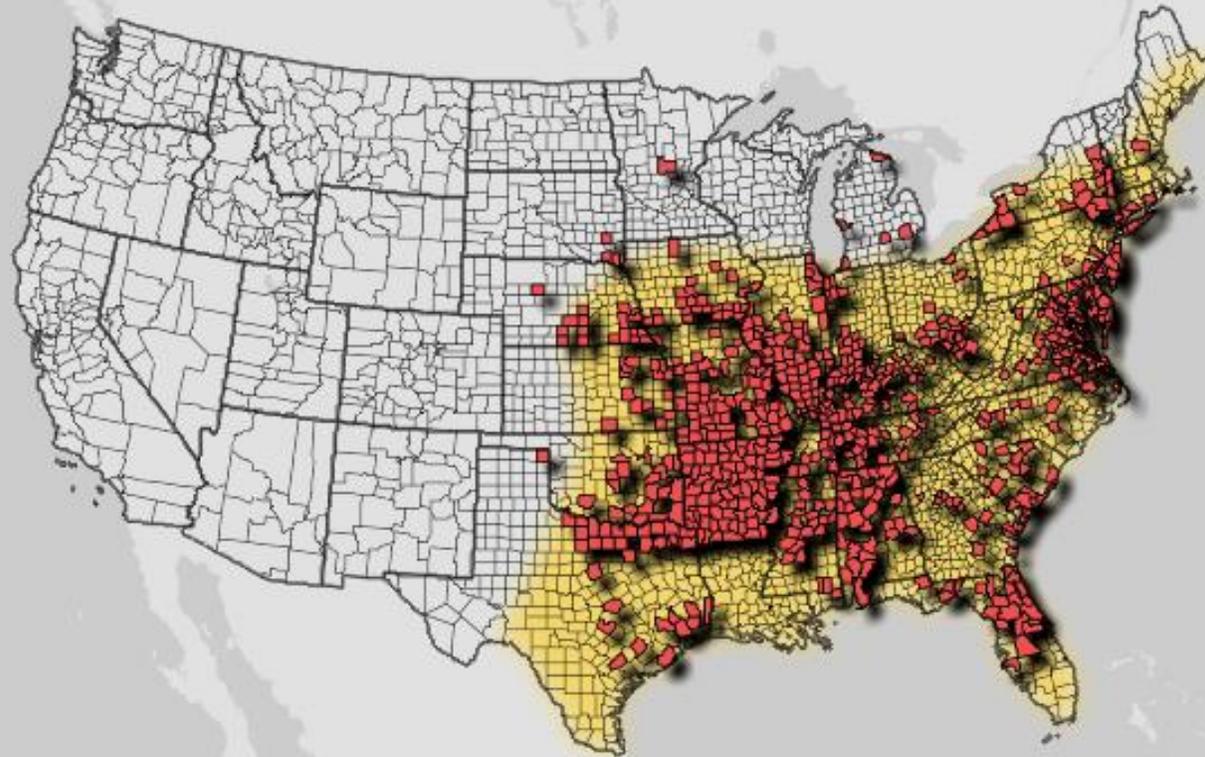


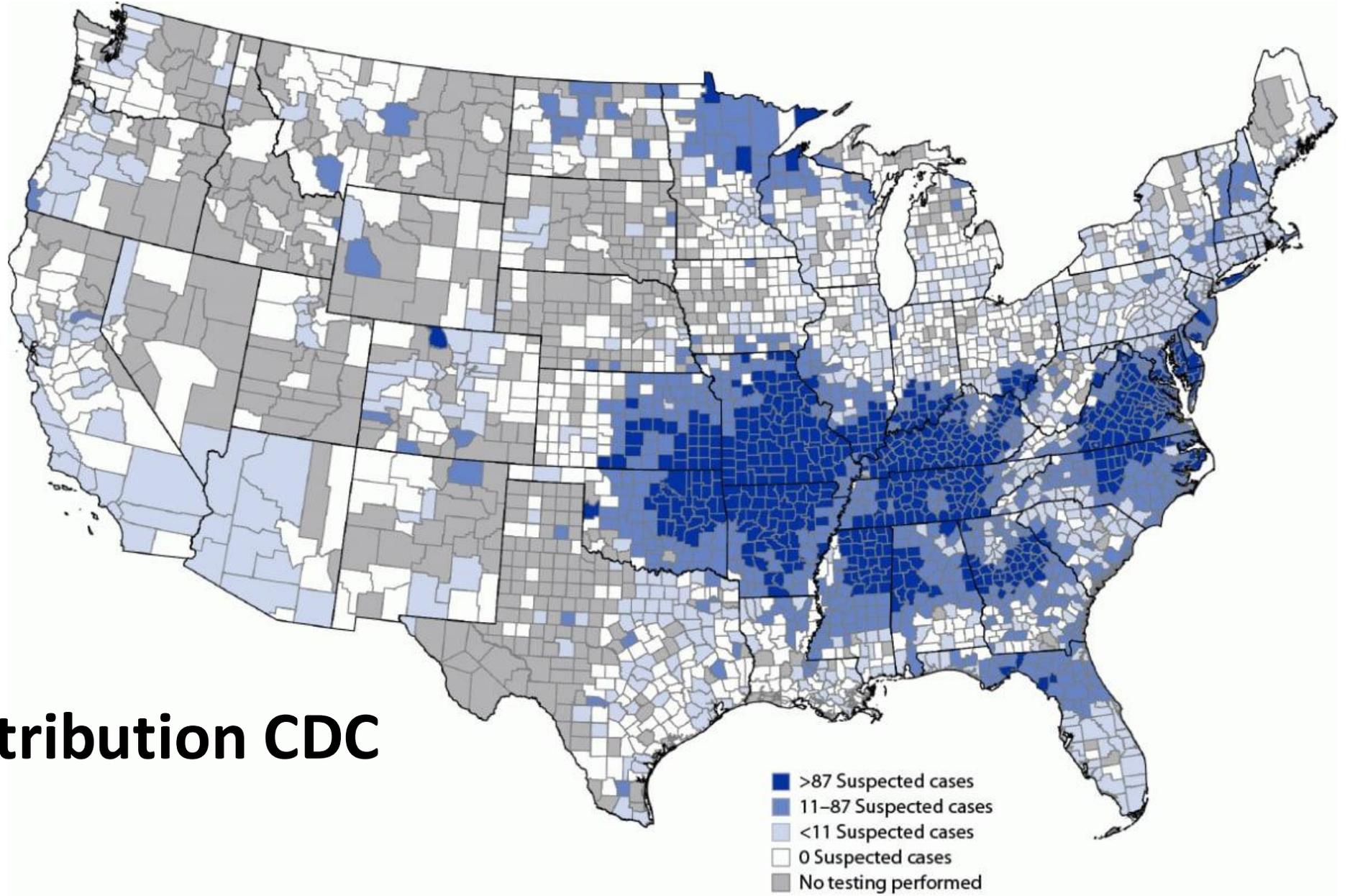
Adult Female



Lone Star Tick Surveillance

Amblyomma americanum - Estimated and Established Distribution





Apha-gal Distribution CDC

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Long Horned Ticks

Characteristics of Note:

- Vector multiple pathogens
- Wide host range
- Parthenogenetic reproduction
- Potentially rapid life cycle



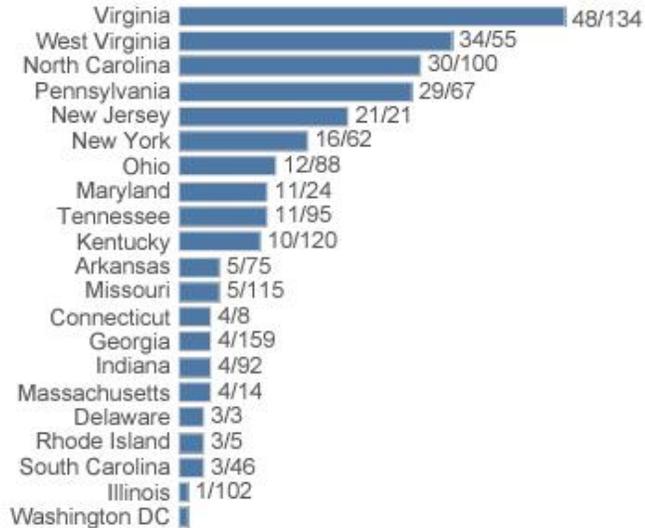
National *Haemaphysalis longicornis* (Asian longhorned tick) Situation Report

As of July 31, 2024

Haemaphysalis longicornis (Asian longhorned tick), an exotic East Asian tick, has never previously established a population in the United States. It is a known serious pest of livestock in the Australasian and Western Pacific Regions where it occurs. It is an aggressive biter and frequently builds intense infestations on domestic hosts causing great stress, reduced growth and production, and severe blood loss.

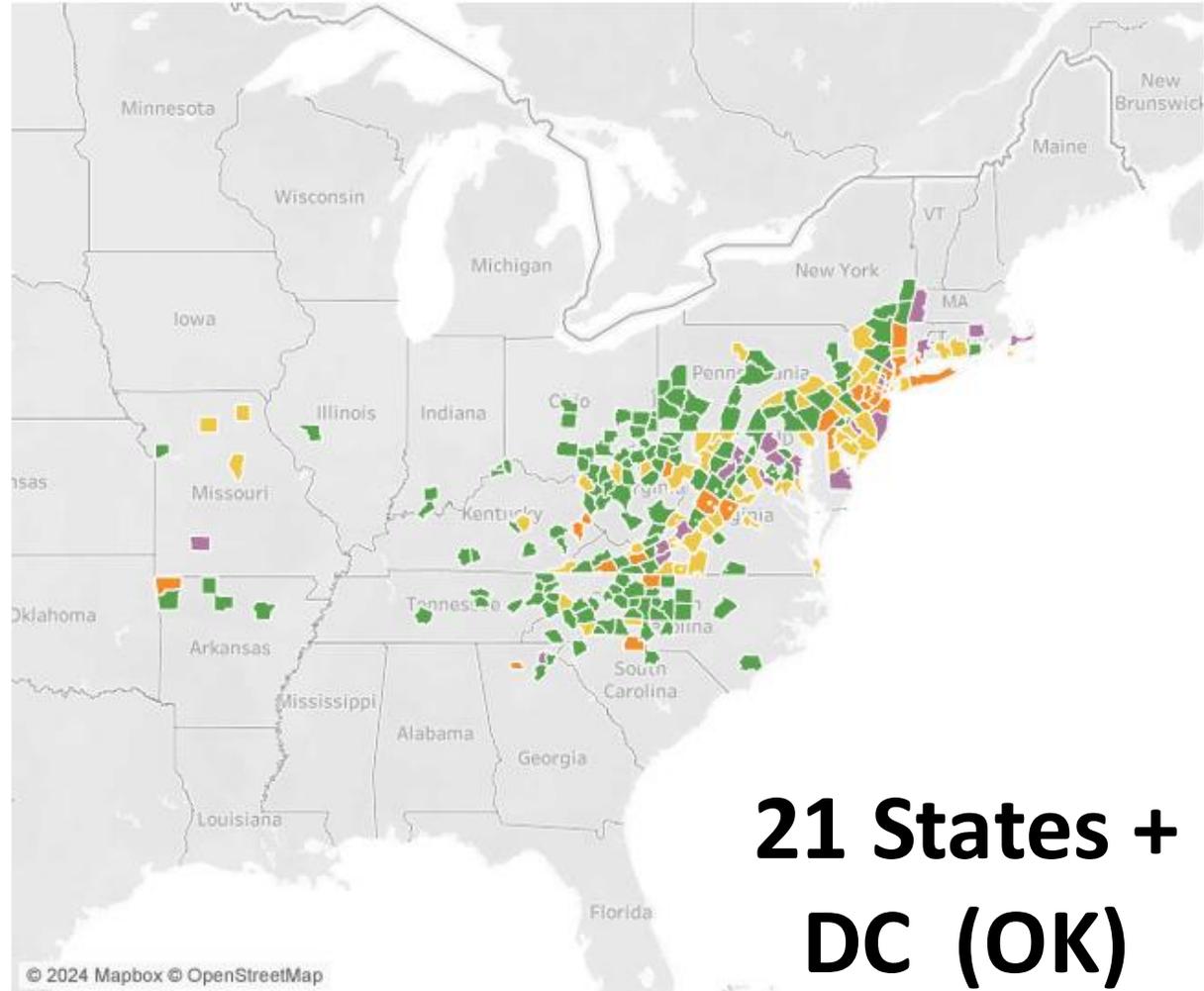
The tick can reproduce parthenogenetically (without a male); as such, a single fed female tick can create a population. It is also a known/suspected vector of several viral, bacterial, and protozoan agents of livestock and human diseases. This three-host tick can spread pathogens among a diverse host range, on which it feeds side-by-side with other tick species. The detections detailed here are the first reports of this tick out of quarantine in the United States.

States with confirmed local Asian longhorned tick populations with number of counties in each state. (# of confirmed counties / total # of counties)



Type of identification*

■ Molecular and NVSL
 ■ NVSL
 ■ Molecular
 ■ Taxonomic



**21 States +
DC (OK)**

Source: National *Haemaphysalis longicornis* (Asian longhorned tick) Situation Report As of July 31st, 2024, USDA

US field collected LHT with pathogen positives:

- PCR positive ticks:
 - *Theileria orientalis* Ikeda type
 - *Borrelia burgdorferi* (Lyme dz.)
 - *Anaplasma phagocytophilum*
 - Bourbon virus
 - *Babesia microti*

Pathogens transmitted laboratory:

- *Rickettsia rickettsii* (RMSF)
- *Theileria orientalis* Ikeda
- Heartland virus
- Powassan virus
- **NOT**
 - Lyme , *A. phag*, Tularemia

Allergy EUROPEAN JOURNAL OF ALLERGY
AND CLINICAL IMMUNOLOGY 

Brief Communication |  Full Access

Haemaphysalis longicornis tick bites are a possible cause of red meat allergy in Japan

Y. Chinuki , K. Ishiwata, K. Yamaji, H. Takahashi, E. Morita

LHT and bovine health



- Heavy infestations of LHT cause distress (anemia, etc.) that can lead to decreased production and growth, aborted or still births, and death
- LHT bite can transmit *Theileria orientalis* (Ikeda type) causing bovine theileriosis leading to severe anemia, lethargy, weakness, and death.

(Dinkel et al 2021; Thompson et al 2020)

Monroe County farm infestation in 2021

- July 5-7 Producer in Monroe finds **cattle deceased** & covered in ticks, buries them
Tall, un-mowed rental pasture ~25 acres with 18 cattle. No history of movement.
- Aug 16 Neighboring homeowner complains of LHT-infested turf



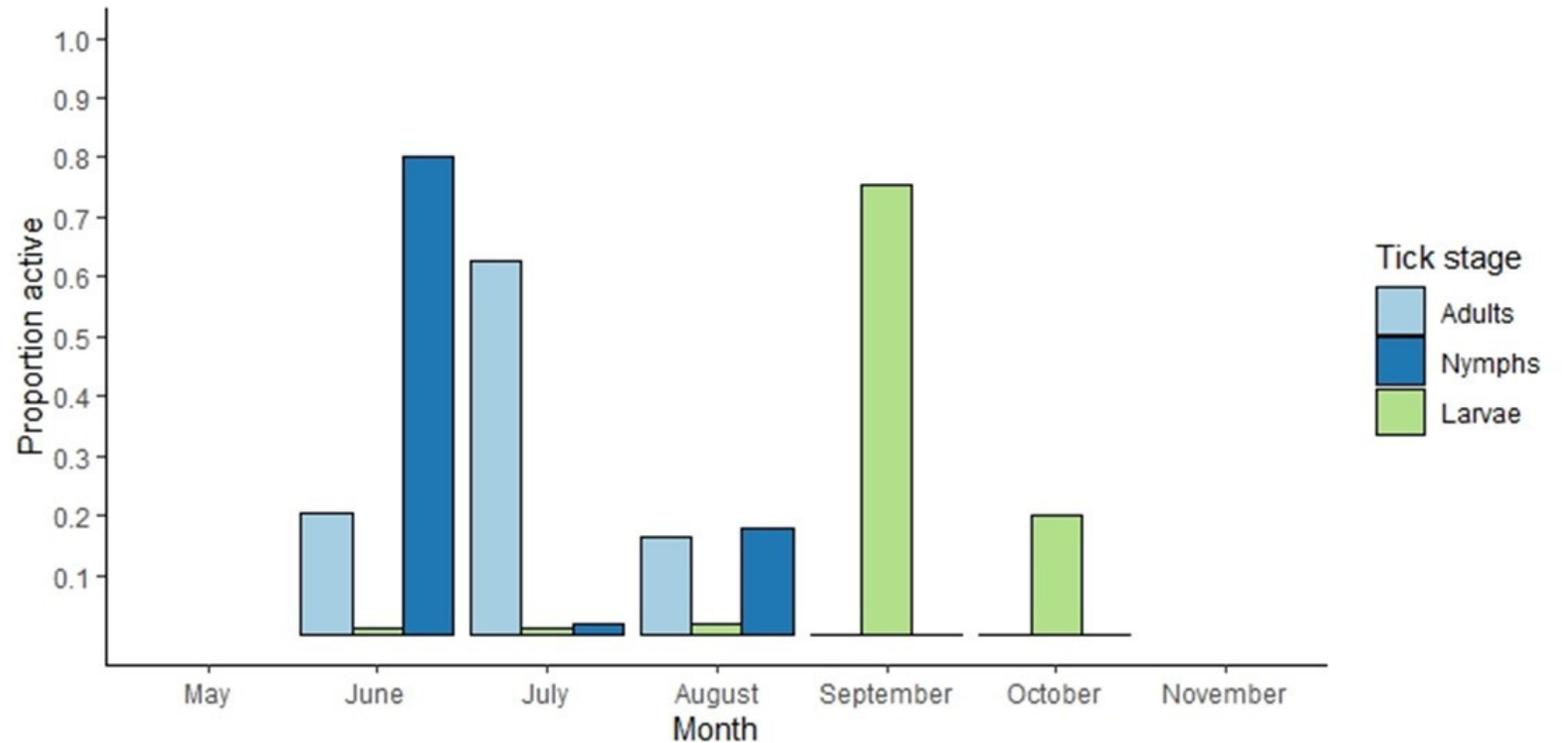
9,287 larvae, nymphs, and adults collected!

Monroe: 7/2021

Morgan: 7/2022

Belmont: 7/2022

-All three farms still had larval tick activity noted from tick dragging as of October 16th.



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April 2023: Gallia

<https://www.nature.com/srep/>

Potential Spatial Distribution of the Newly Introduced Long-horned Tick, *Haemaphysalis longicornis* in North America

R. K. Raghavan¹, S. C. Barker², M. E. Cobos³, D. Barker⁴, E. J. M. Teo², D. H. Foley⁵, R. Nakao⁶, K. Lawrence⁷, A. C. G. Heath⁸ & A. T. Peterson³

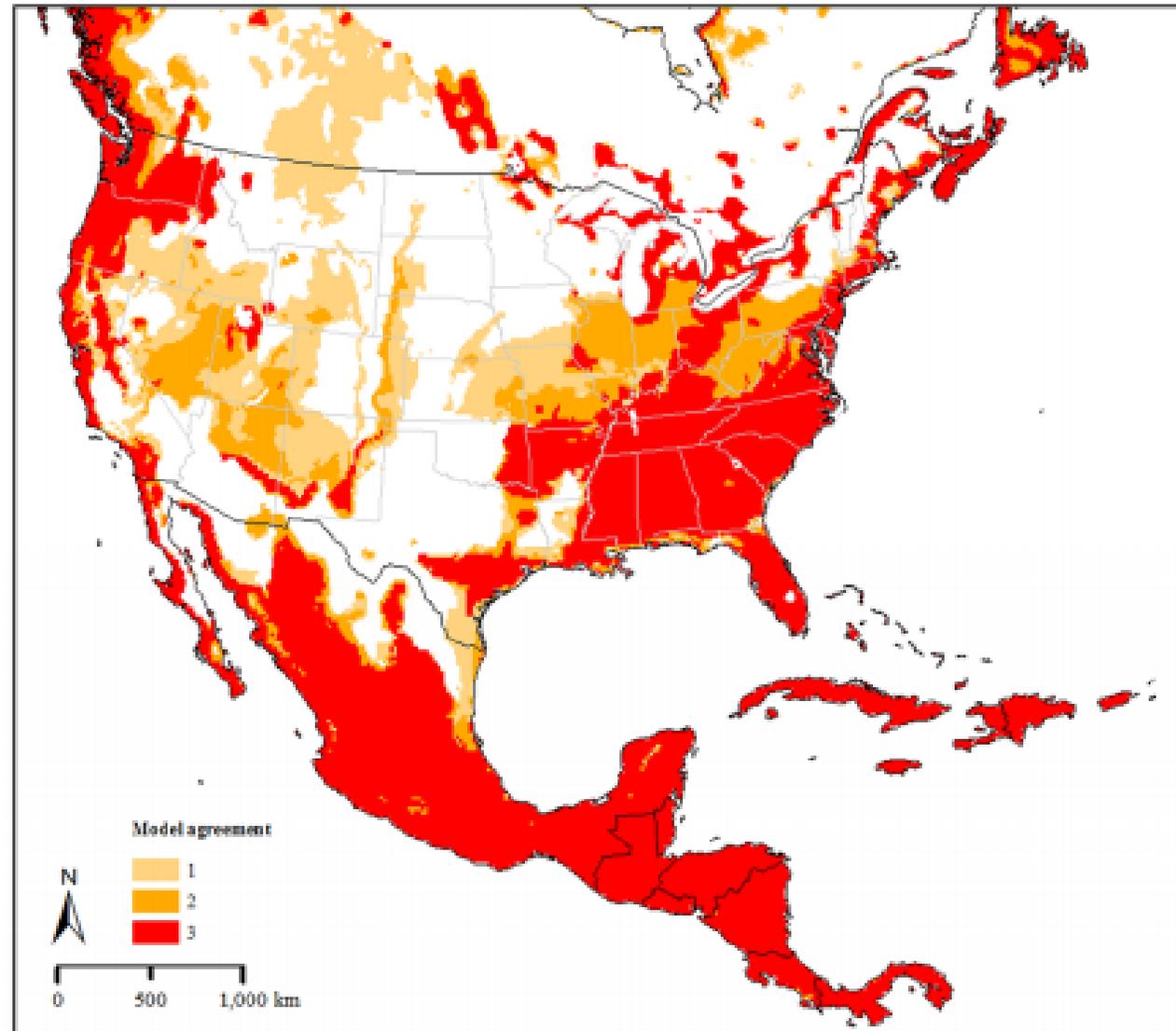


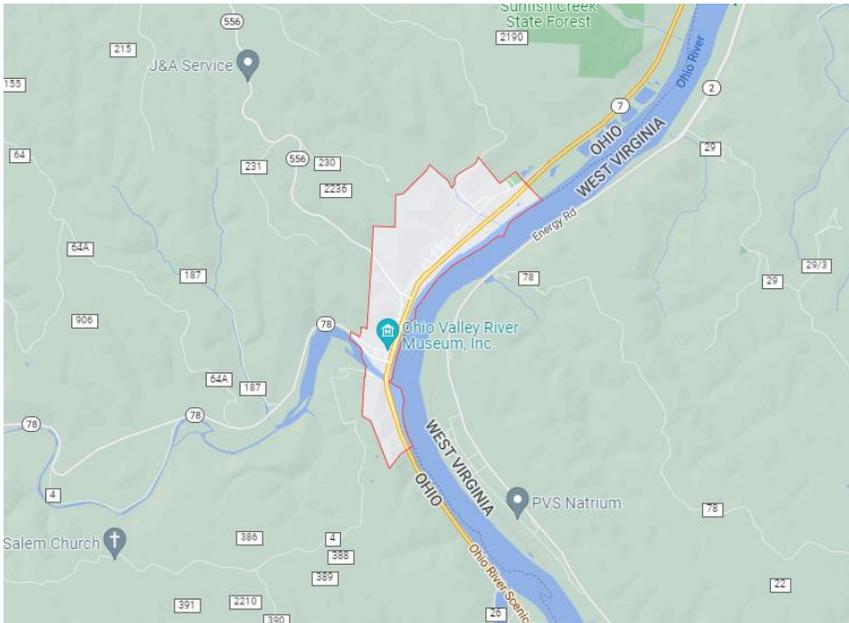
Figure 2. Predicted suitable areas for *Haemaphysalis longicornis* across North America. 1, 2, and 3 represent areas that were predicted to be suitable for the establishment of *H. longicornis* in North America by one, two and three models, respectively. Darker areas represent progressively higher agreement between the models.

September 2022:

ADDL had its first PCR-positive for *T. orientalis*.

Animal: Crossbred bovine, female, 8-10 years old.

Location: Clarington, OH.



Clinical history:

- 4-day history of epistaxis from right nostril.
- Lost about 150 lbs. during this time and milk supply dried up.
- Pale mucous membranes and thin blood on exam.
- The rDVM sent serum and blood for duplex PCR for *Anaplasma marginale* and *Theileria orientalis*.

Results: The cow was tested for *Anaplasma marginale* (Neg.) and *Theileria orientalis* (**Pos.**)

| Ohio Distribution of <i>Theileria orientalis</i> | | | | | |
|--|-------------------|-----------------|------------------|------------|--|
| Date | Location City | Location County | Number +/-tested | Percentage | Reason for Test |
| 9/15/22 | Clarington OH | Monroe | 1/1 | 100 | nasal discharge, weight loss, pale mucous membrane |
| 11/2/22 | Freeport OH | Harrison | 1/1 | 100 | weight loss, pale mucous membrane |
| 11/17/22 | Bucyrus OH | Crawford | 4/5 | 80 | nasal discharge, fever |
| 2/24/23 | Scio OH | Harrison | 1/1 | 100 | muscle weakness, pale mucous membrane |
| 3/30/23 | Sardis OH | Monroe | 1/2 | 50 | routine |
| 4/27/23 | East Rochester OH | Columbiana | 6/7 | 85.7 | imported calves from WV |
| 7/6/23 | Quaker City OH | Guernsey | 1/1 | 100 | muscle weakness, nasal discharge, fever |
| 7/20/23 | Clarington OH | Monroe | 1/1 | 100 | fever, behavior change |
| 08/08/23 | Beallsville OH | Monroe | 1/1 | 100 | Muscle weakness, diarrhea, neighboring farm had positive |

Add:
Belmont Co.
Carroll Co.
Greene Co.
Adams Co.

Ohio ADDL has identified 5 Ohio counties with *T. orientalis* using PCR (Crawford, Columbiana, Harrison, Guernsey, and Monroe). In addition, ViTALS (Virginia) also identified positives in Adams, Tuscarawas, and Carroll counties.

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The whole herd submissions have come mostly from West Virginia for surveillance and diagnostic, and the Ohio submissions have been generally single or small groups for diagnostic.

Animal ALHT prevention & control

Acaricides for animals

Cattle – pyrethroids (best) and organophosphates effective (Butler et al 2021)

- Dogs – isoxazoline class drugs effective (Oda et al 2019)
- Cats – fluralaner (Bravecto) new label claim



Swift action to control & monitor ALHT in the environment should be taken whenever they are found!

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Environmental LHT control?

Habitat management

- Keep grass and weeds short – Cattle?
 - **Frequent bush hogging also not practical**
- Haylage and baleage *might* be ok?
 - **Conditions not compatible with ALHT survival**
- Management Intensive Grazing
- Fire?





RESEARCH PAPER



Pilot study of Ixodes ricinus ticks preference for human ABO blood groups using a simple in vitro method

Alena Žáková^{1,2}, Jan Janeček¹ ✉, Helena Nejezchlebová¹, Hana Lya Kučerová¹

▼ [More details](#)

Ann Agric Environ Med. 2018;25(2):326-328

> DOI: <https://doi.org/10.26444/aaem/85167>

Most = A
Least = B

Clinical trials

[Clinical trials](#) of new vaccines for Lyme disease are currently underway. Valneva and Pfizer have developed a Lyme disease vaccine candidate, VLA15, that is currently in Phase 3 human trials. VLA15 is a multivalent, protein subunit vaccine that targets the outer surface protein A (OspA) of *Borrelia*. This vaccine is designed to protect people against North American and European strains of the Lyme disease bacterium.



A Pill That Kills Ticks Is a Promising New Weapon Against Lyme Disease

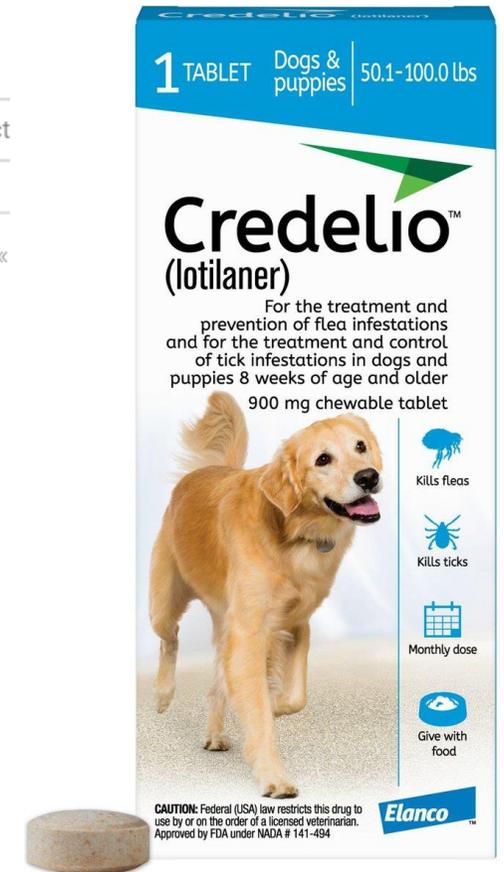
Your pets can already eat a chewable tablet for tick prevention. Now, a pill that paralyzes and kills ticks has shown positive results in a small human trial.

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Tarsus Announces Positive Topline Results from Carpo, a Phase 2a Proof-of-Concept “Tick-Kill” Trial Evaluating TP-05 (lotilaner) for the Prevention of Lyme Disease

Feb 22, 2024

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Acquired Tick Resistance: The Trail is Hot

[Sukanya Narasimhan](#),¹ [Cheyne Kurokawa](#),¹ [Melody DeBlasio](#),¹ [Jaqueline Matias](#),¹ [Andaleeb Sajid](#),¹ [Utpal Pal](#),² [Geoffrey Lynn](#),¹ and [Erol Fikrig](#)^{1,3}

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INTRODUCTION

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Ticks are obligate hematophagous ectoparasites distributed worldwide and serve as vectors of human and animal diseases ¹. The focus of this review is on Ixodid or hard ticks, one of three families within the suborder Ixodida that includes about 700 species ². Ixodid ticks are vectors of numerous human and livestock diseases ³. Since the bite of a tick is the only route of natural transmission of tick-borne pathogens, several strategies have been explored over the last few decades to prevent getting bitten by ticks. Acaricides, a first-line strategy used to control tick

One Health



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Collaborating



To achieve the best health outcomes for people, animals, plants, and our environment



Environmental Health



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Animal Health



<https://onehealthtrust.org/projects/indiazoosystems/>

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Your guide to ticks, mosquitoes, and other biting pests.

What's Bugging You?

- Ticks
 What ticks live in Ohio, how to prevent bites, and other helpful information to keep you safe.
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- Mosquitoes
- Bed Bugs





What's New [View more posts >](#)

Ohio Vector-Borne Disease Update: August 17, 2023



Ohio Vector-Borne Disease Update: July 27, 2023

Ohio Vector-Borne Disease Update: June 22, 2023

Ohio Vector-Borne Disease Update: January 9, 2023

Ohio Vector-Borne Disease Update: October 24, 2022

Contributors
For the full list of researchers working on ticks and other biting pests at The Ohio State University, [click here](#).

Introducing The Bite Site



kx.osu.edu/bite