Tick Talk: Update on Theileriosis

Auburn University College of Veterinary Medicine

Annual Conference 2024

Andy Bennett, DVM

Assistant Clinical Professor, Farm Animal Services

Program Veterinarian – College of Agriculture

Alabama

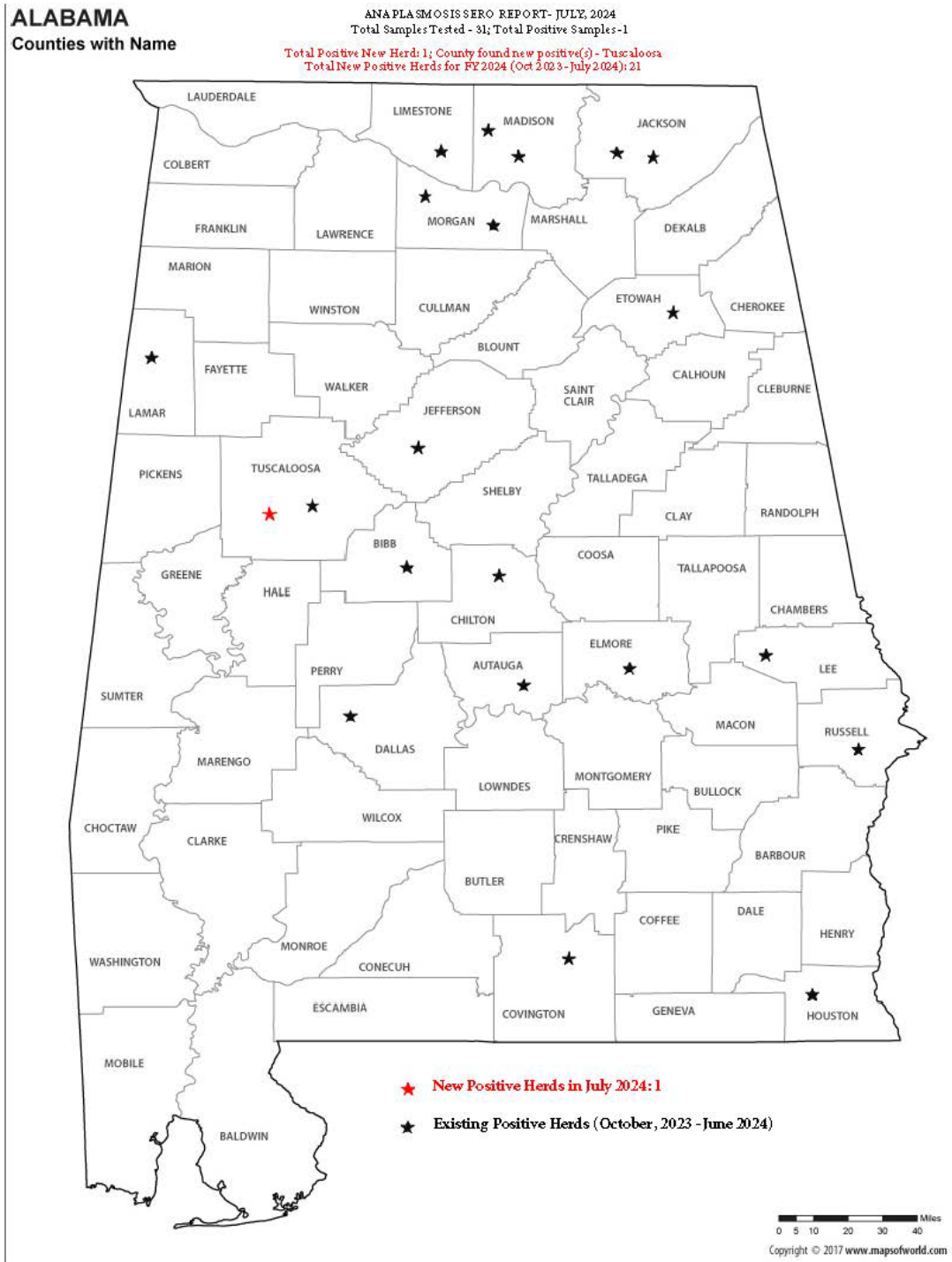
Anaplasma

- Positive herd: 10/2007-12/2008
  - Dr. Soren Rodning

- Positive herd: 10/2018-9/2019
  - TBSSVDL
  - 19 positive serologically
  - 1 positive herd (outside lab)
  - 20 total herds positive

Anaplasmosis

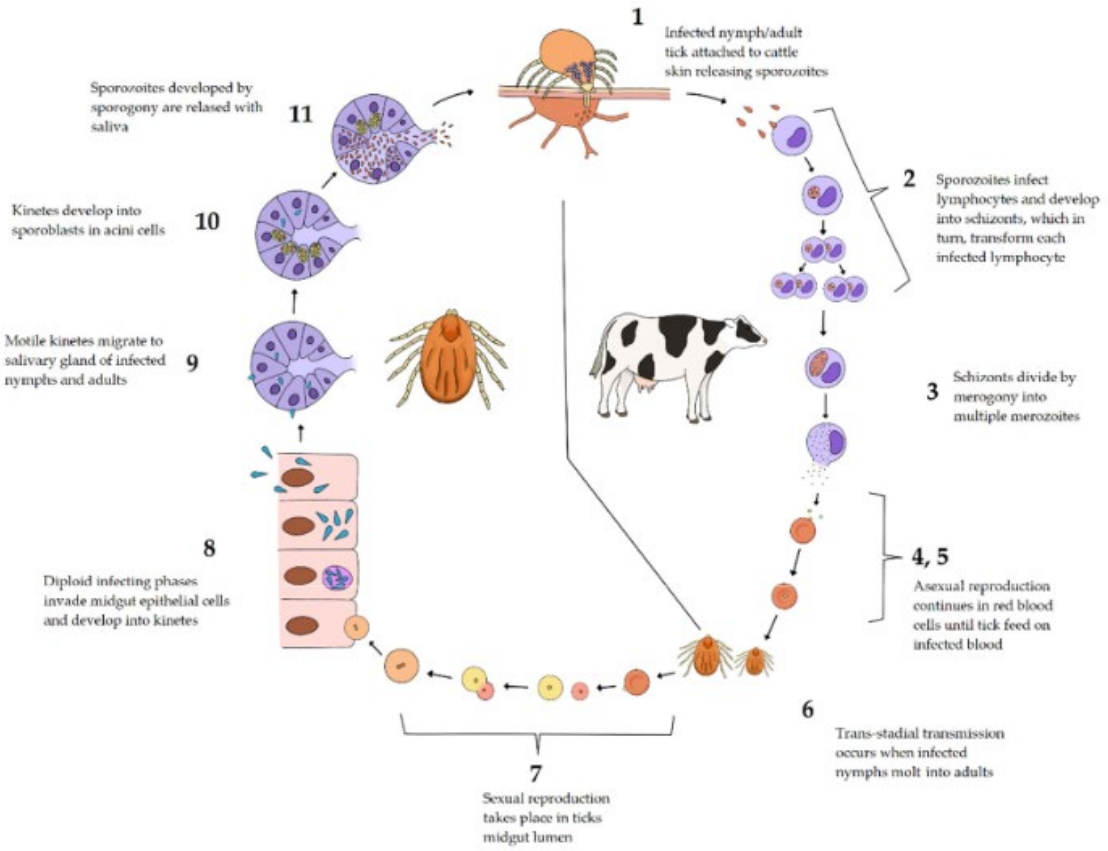
Year	Number tested	Number positive	New Positive Herds
Oct 2019 - Sept 2020	1074	106	34
Oct 2020 - Sept 2021	608	48	21
Oct 2021 - Sept 2022	1098	140	26
Oct 2022 - Sept 2023	940	123	27
Oct 2023 - July 2024	570	57	21



Theileriosis in Cattle

- Family of tickborne protozoans
- Historically in New Zealand, Australia & Japan (US)
  - T. orientalis Buffeli, Chitose, p32, & Ikeda
- Transmitted by Ixodid (hard bodied) ticks
  - Ixodes, Haemaphysalis, Boophilius, Rhipicephalus, Amblyoma & Dermacentor (Hoskins)

Theileriosis in Cattle



Babesiosis and Theileriosis in North America
Consuelo Almazán 1,*, Ruth C. Scimeca 2 , Mason V. Reichard 2 and Juan Mosqueda 1

- Eleven genotypes (Wang)
  - Virulent = *T. orientalis* Chitose & Ikeda
  - Benign = *T. orientalis* Buffeli
- Mortality of 5% - 90%
  (RA Butler – TN paper)
- Infect WBC's then RBC's
- Transplacenal transmission in cattle
  - 10% of cases

  (Dinkel et al Parasites Vectors 2021)

Theileriosis Historically in North America

Kansas (1950) *T. mutans*	Vet Parasitology 105 (2002) => Cossio-Bayugar
Texas (1975)) *T. Mutans = T. buffeli*	Vet Parasitology 105 (2002) => Cossio-Bayugar
Missouri (1999) *T. buffeli*	Engorged *Amblyomma americanum* (lone star tick)
Michigan 2000 *T. buffeli*	Maine x Angus cow -> 8 yr old

Theileriosis in North America

- Virginia 2017 => *T. orientalis* Ikeda
  - Sheep in New Jersey – Tufts
  - 6 herd deaths
- Current status
  - ALT in 19 states as of 3/2024

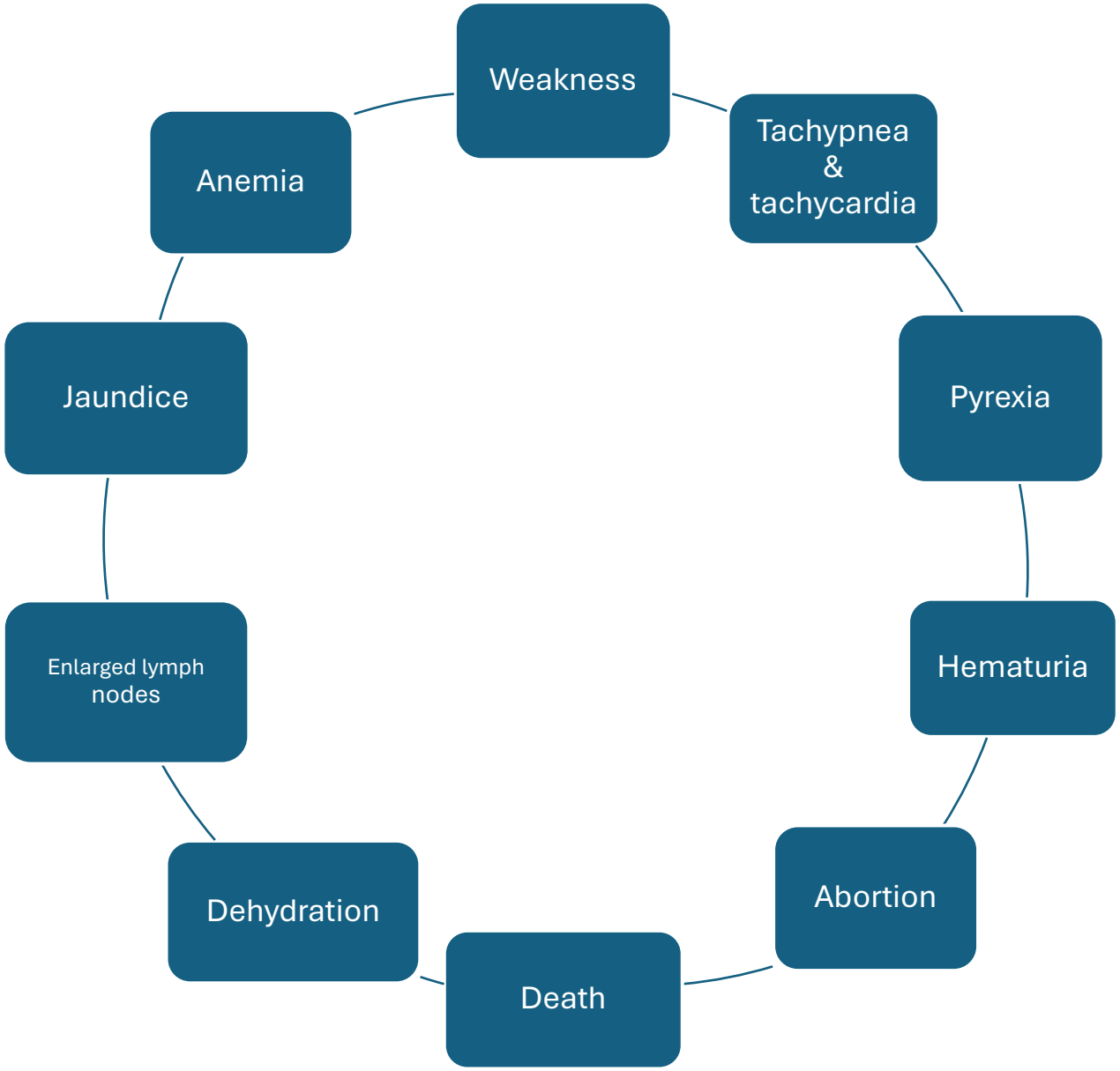
US Vector(s) of *T. orientalis* Ikeda

Haemaphysalis longicornis

Korean H. longicornis did not transmit T. orientalis Buffeli from a US outbreak

Not *Rhipicephalus microplus*

Needles, dehorners, flies, lice



Clinical disease

- Michigan cow (*T. buffeli*)
  - Depressed, jaundiced, anemia, 8 – 10% dehydration, hemoglobinureia
  - aborted 7 mo fetus @ CVM
  - BLV positive

frontiers | Frontiers in Veterinary Science

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OPEN ACCESS

EDITED BY
Camila Hamond,
Animal and Plant Health Inspection Service (USDA), United States

REVIEWED BY
Remil Galay,
University of the Philippines Los Baños, Philippines
Chengming Wang,
Auburn University, United States

*CORRESPONDENCE
Sierra R. Guynn
sguynn@vt.edu

Theileria orientalis Ikeda infection does not negatively impact growth performance or breeding soundness exam results in young beef bulls at bull test stations

Sierra R. Guynn[1]*, Scott P. Greiner[2], John F. Currin[3], S. Michelle Todd[1], Alphonce Assenga[1], Laura L. Hungerford[4†] and Kevin K. Lahmers[1†]

Design

- Two locations in VA (2020 – 2023)
- Weanling –> yearling bulls (1077 hd)
  - VA, W VA, NC, TN
- Effect on ADG, AYW & BSE
- Neg BVDV (PI) & Anaplasma
- Bled for *T. orientalis* Ikeda on arrival + at test completion
  - NN, NP, PP
- Daily observations
  - 112 d growth period post acclimation
  - Fed to gain 1.6 kg/day

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Results

- Nothing tx for *T. orientalis* Ikeda
- 10 – 20 % older bulls not sale eligible
  - poor growth, structure, illness (appx 42 hd)
- Young bulls not eligible for BSE (451 hd)
- No significant effect on ADG or AYW
- No significant difference in BSE for NN vs NP or PP
  - Location B – bulls that became positive during test were 2.4 times more likely to pass BSE vs bulls that remained negative for duration

veterinary sciences

MDPI

Brief Report

Theileria orientalis Ikeda in Cattle, Alabama, USA

Nneka Iduu [1], Subarna Barua [1], Shollie Falkenberg [1], Chance Armstrong [2], Jenna Workman Stockler [2], Annie Moye [3], Paul H. Walz [1] and Chengming Wang [3,*]

[1] Department of Pathobiology, College of Veterinary Medicine, Auburn University, Auburn, AL 36849, USA; nvi0001@auburn.edu (N.I.); szb0116@auburn.edu (S.B.); smf0076@auburn.edu (S.F.); walzpau@auburn.edu (P.H.W.)
[2] Department of Clinical Sciences, College of Veterinary Medicine, Auburn University, Auburn, AL 36849, USA; armstcl@auburn.edu (C.A.); jew0027@auburn.edu (J.W.S.)
[3] College of Sciences and Mathematics, Auburn University, Auburn, AL, USA; acm0146@auburn.edu
* Correspondence: wangche@auburn.edu

Surveillance study - Auburn

- 219 samples
  - 72 from AU LATH submissions
  - 147 from AU CVM Herds
  - Whole blood (EDTA)
- Two PCR positives
- Sept 2022 – Aug 2023

veterinary sciences

MDPI

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[3] College of Sciences and Mathematics, Auburn University, Auburn, AL, USA; acm0146@auburn.edu
* Correspondence: wangche@auburn.edu

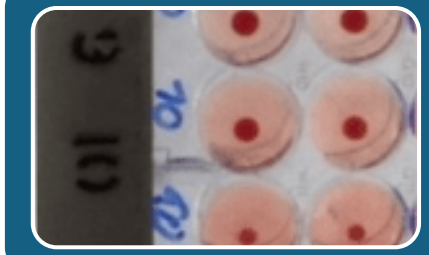
Lee Co

- Tx for bloat from grain overload
  - Normal RBC & HGB
  - Increased monocytes, WBC's & glucose
- *Haemaphysalis longicornis* not in AL at this time

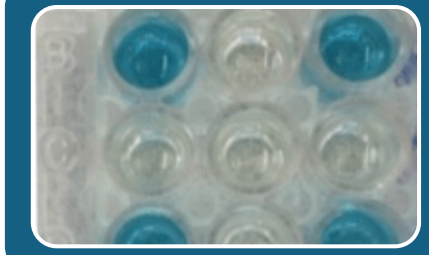
Mobile County

- 4 mo old, male calf
  - Enlarged lymph nodes, anorexia, lethargy
  - Cough, dyspnea, tachypnea
  - Pyrexia, polyurea, diarrhea
- Bloodwork = NSF
  - Low fibrinogen = prior inflammatory event

Testing Options



Compliment Fixation (CF)



cELISA

ELISA

Real-time PCR -> Dr. Wang

Thompson-Bishop Sparks Diag. Lab

- PCR for *Anaplasma & Theileria*

Treatment Options

No currently approved medications to tx in US

- Topical acaricides - permethrin-based

- No label claim in US but indications in other countries
  Isoxazolines & macrocyclic lactones (USDA – APHIS)

Land Management

Chemical

Mechanical

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Research

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Vector Control, Pest Management, Resistance, Repellents

Management of *Haemaphysalis longicornis* (Acari: Ixodidae) on a cow–calf farm in East Tennessee, USA

R.A. Butler*, R.T. Trout Fryxell*

Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN 37996, USA *Corresponding author, mail: rbutle25@vols.utk.edu; rfryxell@utk.edu

Subject Editor: Holly Gaff

Received on 21 March 2023; revised on 14 August 2023; accepted on 25 August 2023

Treated cattle – not environment
Topical acaracides
Spray + ear tags

Dragging for ticks weekly to monthly
15,062 H. longicorns ticks collected
Females only identified

Table 1. Management strategies selected by producers to reduce tick populations on farms infested with *Haemaphysalis longicornis* in East Tennessee (2019–2021). Farms 1 and 3 reduced the likelihood *H. longicornis* was present.

Variables	Farm 1	Farm 2	Farm 3
Management decisions			
Herd	Closed herd	Open	Open herd
Acaricide	Gordon's Permethrin-10 Livestock and Premise Spray in the spring	No treatment	GardStar 40% EC Permethrin Concentrate in the spring
Pasture management	Monthly brush/bush hogging (May–October)	Yearly brush/bush hogging (end of summer/fall)	Yearly brush/bush hogging (end of summer/fall)
Tick collection methods			
Sampling intensity	Frequently	Moderately	Scarcely
First sampling	Summer 2019	Fall 2019	Spring 2020

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Findings

5 tick species identified on farms

Trend the same for all tick species

Harbor ticks on tractor??

Table 2. Abundance of each tick species and life stage collected 2019–2021 from 3 farms in East Tennessee

	Farm 1			Farm 2			Farm 3	
Tick species and life stage	2019	2020	2021	2019	2020	2021	2020	2021
No. of transects	288	531	165	63	243	54	81	63
Haemaphysalis longicornis								
Larvae	2,699	1,775	0	608	1,370	321	1,872	605
Nymphs	2,074	74	12	0	2,405	803	156	16
Males	0	0	0	0	0	0	0	0
Females	181	7	0	0	73	7	3	1
Total	4,954	1856	12	608	3,848	1,131	2,031	622

> 90% annually

Increased #

68%

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A survey of piroplasms in white-tailed deer (*Odocoileus virginianus*) in the southeastern United States to determine their possible role as *Theileria orientalis* hosts

Alec T. Thompson [a,b,*], Kayla B. Garrett [a,c], Megan Kirchgessner [d], Mark G. Ruder [a], Michael J. Yabsley [a,b,c]

[a] Southeastern Cooperative Wildlife Disease Study, Department of Population Health, College of Veterinary Medicine, University of Georgia, Athens, GA, 30602, USA
[b] Center for the Ecology of Infectious Diseases, Odum School of Ecology, University of Georgia, 30602, USA
[c] Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA, 30602, USA
[d] Virginia Department of Wildlife Resources, Blacksburg, VA, 24060, USA

Wildlife Vectors

- White tailed deer commonly infected with *H. longicornis*
  - Uber service for ticks
- Harbor *Theileria sp & Babesia sp*
- ALT found on West VA deer in 2010
  - Prior thoughts 2017 New Jersey as source???

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Suggests that deer (in this study) were not suitable hosts for *T. orientalis*

Tickencounter.org

Table 1
Summary data of piroplasms in white-tailed deer (*Odocoileus virginianus*) sampled by state, year, and testing method.

State	No. of Deer Sampled	Years of Sample Collection	Piroplasm PCR[a]-RFLP[b]				*Theileria orientalis* RT-PCR	
			No. Tested (%)[a]	PCR Negative	*Theileria* sp. positive	*Babesia* sp. positive	No. Tested	No. Positive
Alabama	10	2006	10 (100%)	0	9 (90%)	1 (10%)	10 (100%)	0
Arkansas	7	2001	7 (100%)	0	7 (100%)	0	7 (100%)	0
Georgia	21	2006–2018	16 (76%)	3 (19%)	12 (75%)	1 (6%)	21 (100%)	0
Kentucky	10	2018	10 (100%)	10 (100%)	0	0	10 (100%)	0
Maryland	7	2002	7 (100%)	1 (14%)	0	6 (86%)	7 (100%)	0
Mississippi	5	2001	5 (100%)	0	3 (60%)	2 (40%)	5 (100%)	0
Nebraska	1	2018	1 (100%)	1 (100%)	0	0	1 (100%)	0
North Carolina	1	2018	1 (100%)	0	1 (100%)	0	1 (100%)	0
Oklahoma	53	2016–2018	53 (100%)	3 (6%)	49 (92%)	1 (2%)	53 (100%)	0
Texas	1	2018	1 (100%)	0	1 (100%)	0	1 (100%)	0
Virginia	416	2018–2019	162 (39%)	39 (24%)	87 (53%)	36 (23%)	416 (100%)	0
West Virginia	20	2011[a]- 2018	20 (100%)	0	20 (100%)	0	20 (100%)	0
Total	552		293 (53%)	57 (20%)	189 (65%)	47 (16[b])	552 (100%)	0

[a] Not all deer were initially screened with the Piroplasm PCR-RFLP; however, all deer were screened with the *Theileria orientialis*-specific PCR.
[b] RFLP, Restriction Fragment Length Polymorphisms.

Resources

- USDA APHIS
  - Pest Alert: Asian Longhorned Ticks (usda.gov)
  - The Asian Longhorned Tick: What You Need to Know Story Map | Animal and Plant Health Inspection Service (usda.gov)
  - Emerging Risk Notice: Theileria orientalis (usda.gov)

RURAL AMERICA

"Life is getting up one more time than you've been knocked down." – John Wayne