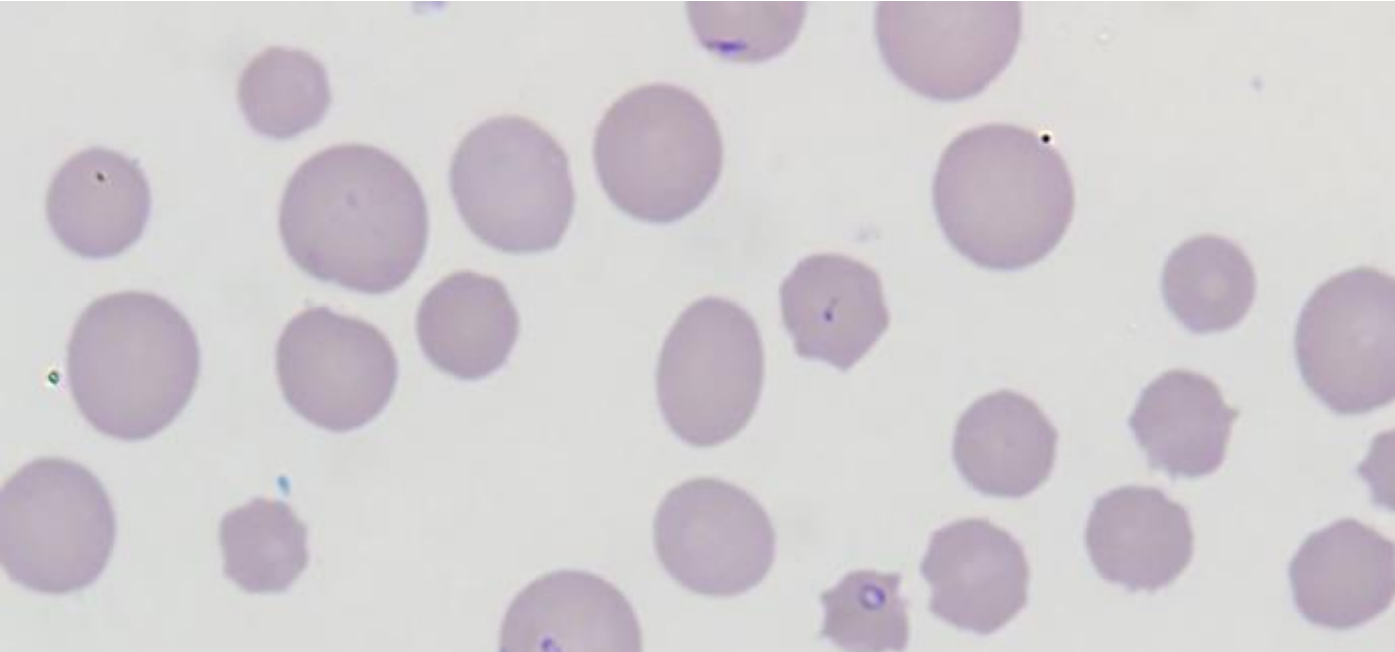


Effects of subclinical *Theileria orientalis* Ikeda genotype infection on average daily gain ratios and a satisfactory rating in the breeding soundness exam in bull test stations in Virginia.

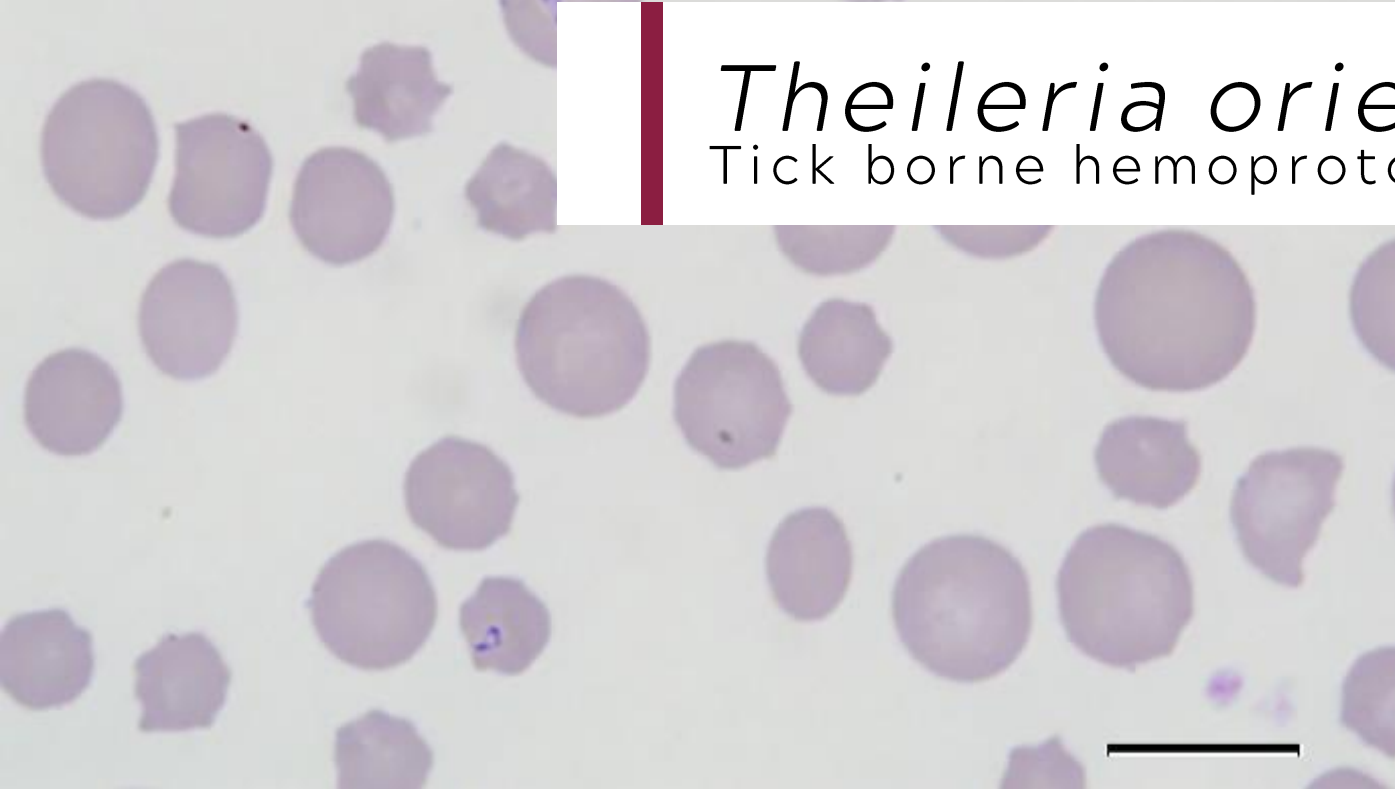
SIERRA R. GUYNN; PHD, DVM, DACVPM
SEPTEMBER 23, 2022





Theileria orientalis Ikeda

Tick borne hemoprotozoan



Photomicrograph from blood smear of an infected animal. There is evidence of a regenerative response to anemia (anisocytosis and polychromasia) and intracellular piroplasms within erythrocytes.
Credit - Oakes, et al 2019

THE TICK: *HAEMAPHYSALIS LONGICORNIS*

(THE ASIAN LONG HORN TICK)

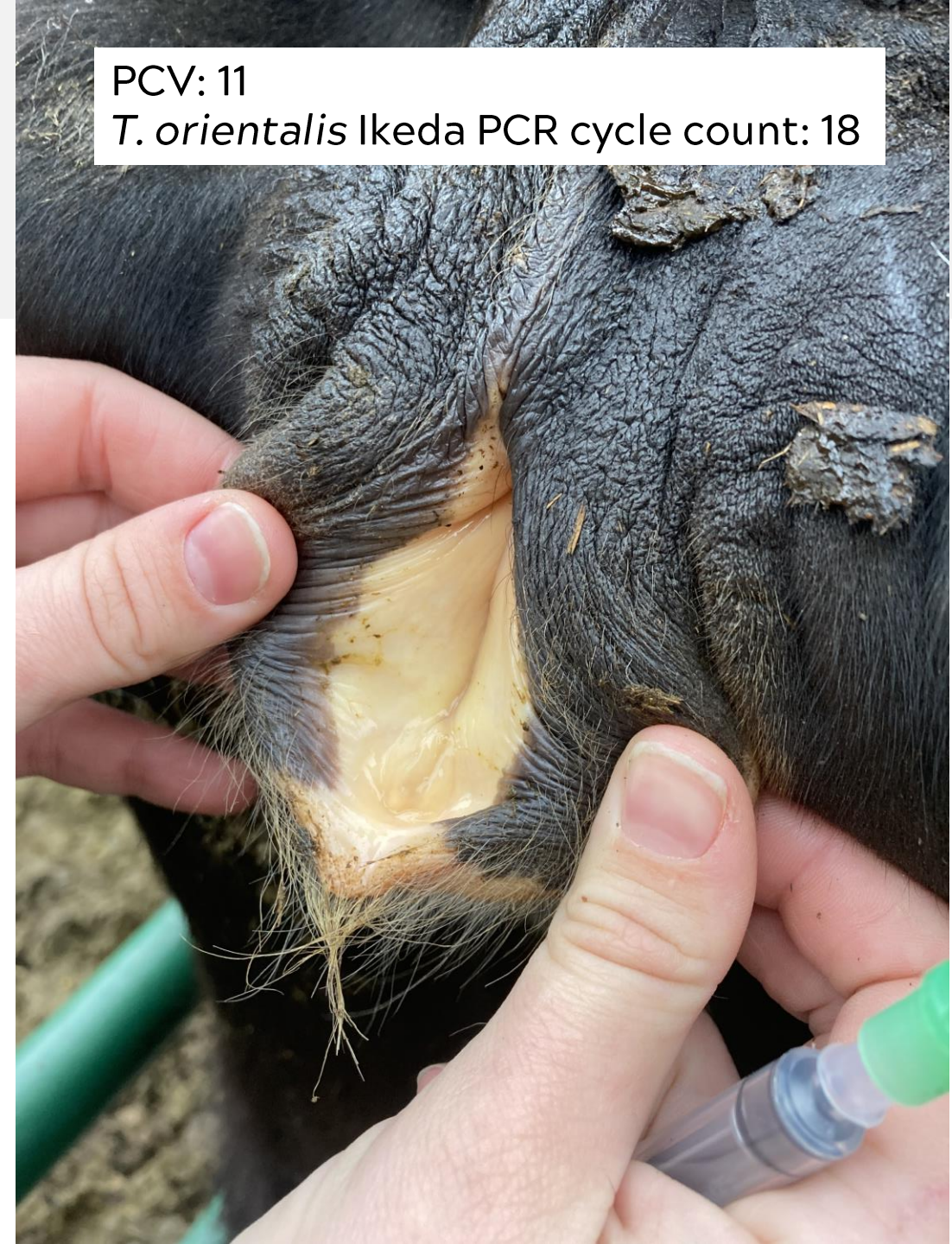


Photograph of two *Haemaphysalis longicornis* nymphs identified on May 10, 2018 at the index farm for the *Theileria orientalis* Ikeda genotype investigation. Credit: KK Lahmers

- Biology of *H. longicornis*
 - Parthenogenetic reproduction
 - Aggressive biter
 - “Swarming” - cause intense infestations
- First “discovered” in the US in 2017 on a sheep in New Jersey, has now been found in 17 states [2].
- Primary biologic vector of *T. orientalis* Ikeda in New Zealand, Japan [3] and the United States [4, 5].

THEILERIOSIS OR BOVINE INFECTIOUS ANEMIA

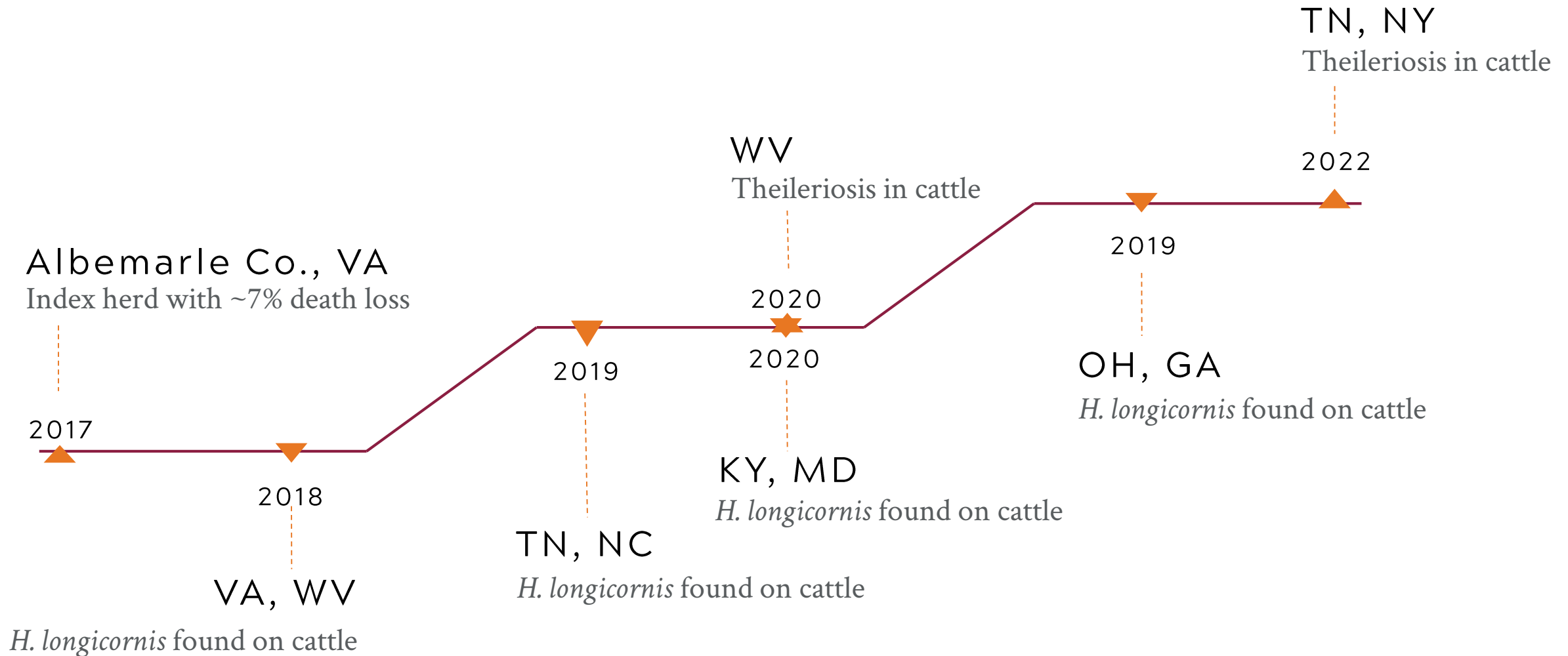
- Acute
 - Clinical signs: anemia, icterus, ill-thrift, abortion and death [1, 3, 6]
 - Production effects: decreased milk production [7], decreased libido in bulls [8], decreased live weight gain in bulls [9] and decreased weight gain in weaned calves [10].
- Persistent sub-clinical infections
 - Negative effects on reproduction [11] and decreased ADG in suckling calves [12].
 - Uncertain about whether persistent infection can be protective or whether acute symptoms can recrudesce in times of stress.



PCV: 11

T. orientalis Ikeda PCR cycle count: 18

HISTORY OF *T. ORIENTALIS* IKEDA & *H. LONGICORNIS* IN CATTLE IN THE US



Virginia Bull Test Stations

Virginia Beef Cattle Improvement Association

Department of Animal & Poultry Sciences

Virginia Tech, 364 Litton Reaves Hall (MC 0306)

Blacksburg, VA 24061

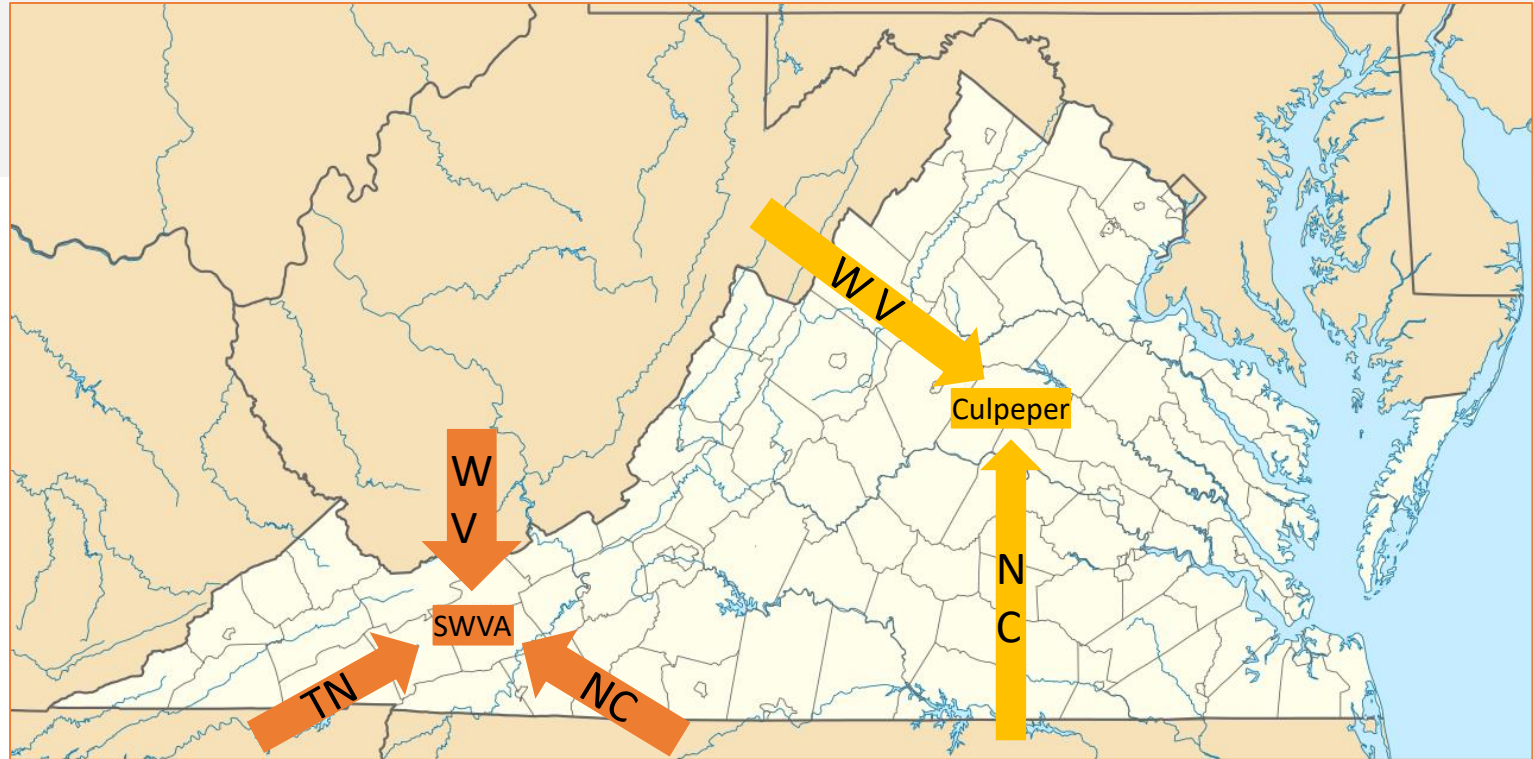
Phone: (540) 231-9159 -- Fax: (540)231- 3010

Scott Greiner, Educational Advisor



TWO BULL TEST STATIONS

- Culpeper
 - July to November
 - Senior bulls only
- Southwest VA
 - October to February
 - Junior & Senior bulls



Junior bulls - no Breeding Soundness Exam performed

METHODS

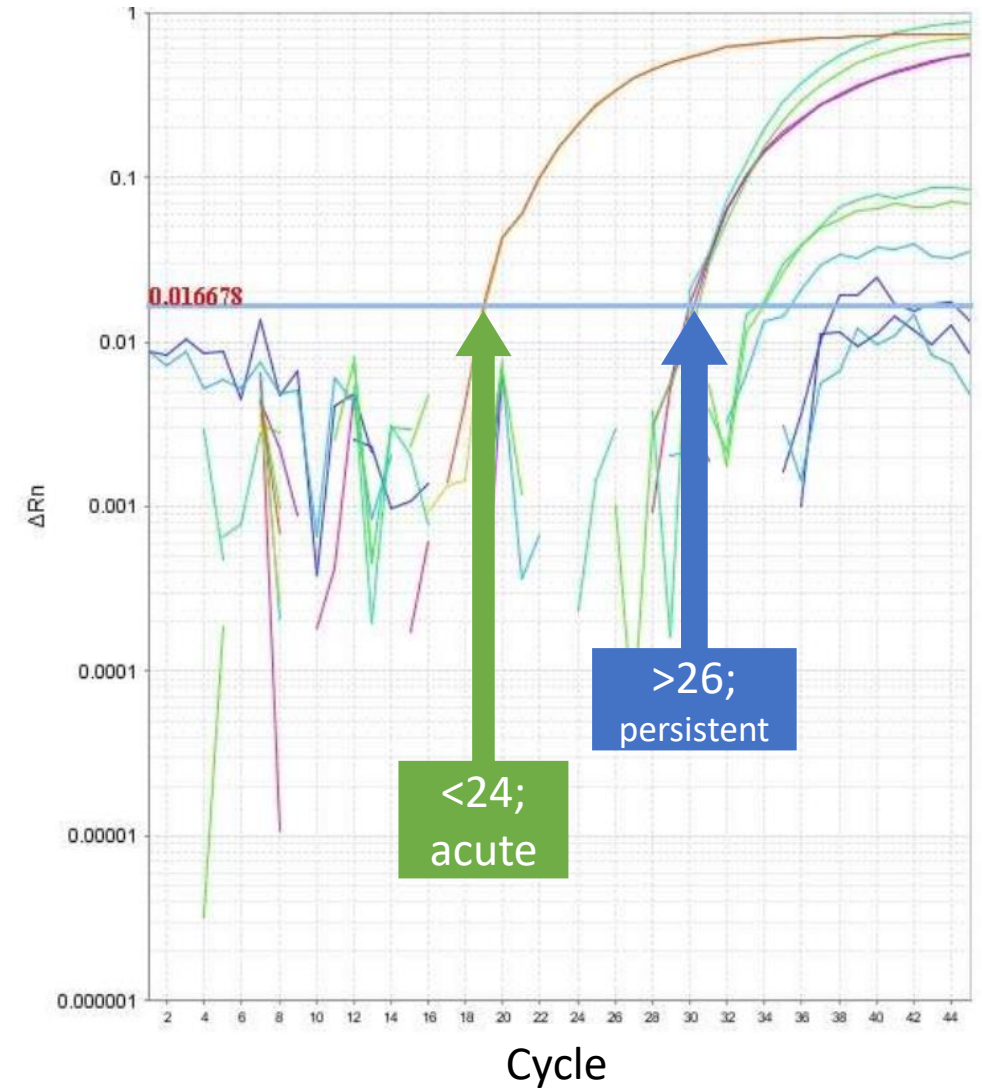
BULL TEST



Blood collected
(except 2020)
SC measured (all)
Weighed

Weighed @ day
1, 56, 84

Blood collected
SC measured (Jr)
BSE performed (Sr)
Weighed



THE DATA

Average Daily Gain ratios

- Multiple breeds with varying numbers of each breed per test site and year
- Using ratio's allowed to normalize to test station and year

Breeding Soundness Exam

- Scrotal Circumference
- Motility - VG, G, F, P
- Morphology > 70% normal with less than 20% primary
- Satisfactory or unsatisfactory

AVERAGE DAILY GAIN RATIOS

Theileria orientalis Ikeda results OFF TEST

Test Station	Age	Negative	Positive	p value
Southwest Virginia (2020, 2021, 2022)	Juniors	99.4 ± 16.1 (n=169)	102.1 ± 14.2 (n=130)	0.25
	Seniors	100.5 ± 22.1 (n=90)	101.4 ± 18.0 (n=145)	0.76
Culpeper (2021)	Seniors	98.8 ± 13.5	100.6 ± 13.3	0.50

What if became *T. orientalis* Ikeda positive during test?

Test Station	Neg → Neg	Neg → Pos	p value
Southwest Virginia (2021, 2022)	98.6 ± 19.5 (n=195)	100.8 ± 20.2 (n=92)	0.90
Culpeper (2021)	98.8 ± 13.5 (n=41)	100.3 ± 15.3 (n=28)	0.68

BREEDING SOUNDNESS EXAM

Southwest Virginia Bull Test 2021 & 2022 Seniors ONLY

		Disease	
		Unsatisfactory BSE	Satisfactory BSE
Exposure	<i>T. orientalis</i> Ikeda pos	31	62
	<i>T. orientalis</i> Ikeda neg	39	62

Relative Risk of a Satisfactory BSE when *T. orientalis* positive
= 0.86, 95% CI [0.59, 1.26]

Culpeper Bull Test 2021

		Disease	
		Unsatisfactory BSE	Satisfactory BSE
Exposure	<i>T. orientalis</i> Ikeda pos	21	56
	<i>T. orientalis</i> Ikeda neg	13	28

Relative Risk of a Satisfactory BSE when *T. orientalis* positive
= 0.86, 95% CI [0.48, 1.53]

FURTHER RESEARCH

- Some interesting data within the Junior bulls at SWVA looking at scrotal circumference growth
 - Needs further exam and elucidation
- Differences in breeds?
 - Need more numbers/bull test years to compare
- Differences in illness or longevity
 - Need more numbers and time to compare
- Tons of epidemiologic studies looking at acquisition of Theileriosis during bull test
 - Working on...

CONFLICT OF INTEREST DISCLOSURE

I have no relevant financial interest, arrangement or affiliation with any company or organization.

QUESTIONS?

- Thank you to all my collaborators!



John F. Currin DVM, DABVP



Scott P. Greiner PhD



Kevin K. Lahmers DVM, PhD, DACVP



S. Michelle Todd MS

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