Bovine Anaplasmosis

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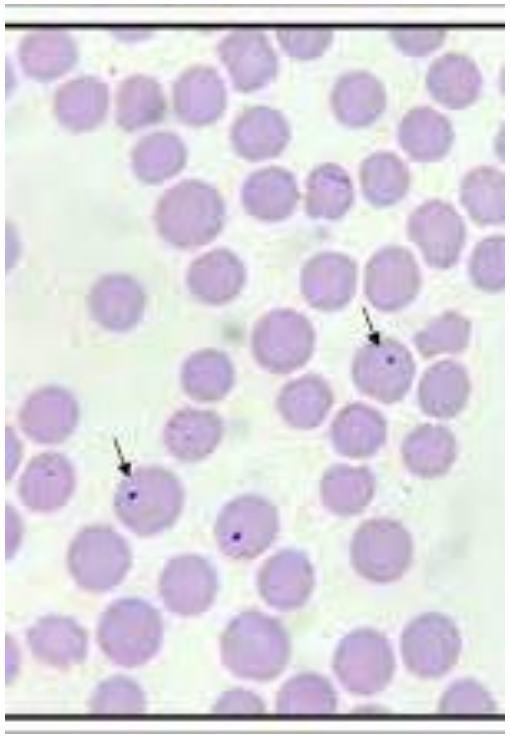
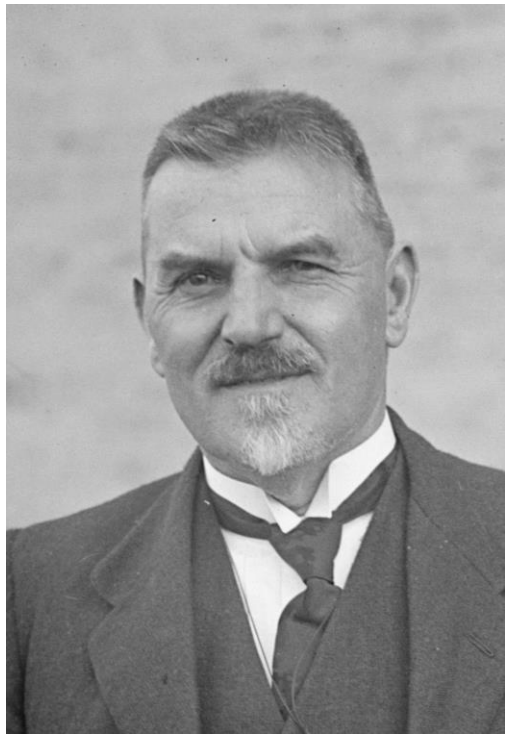
Background



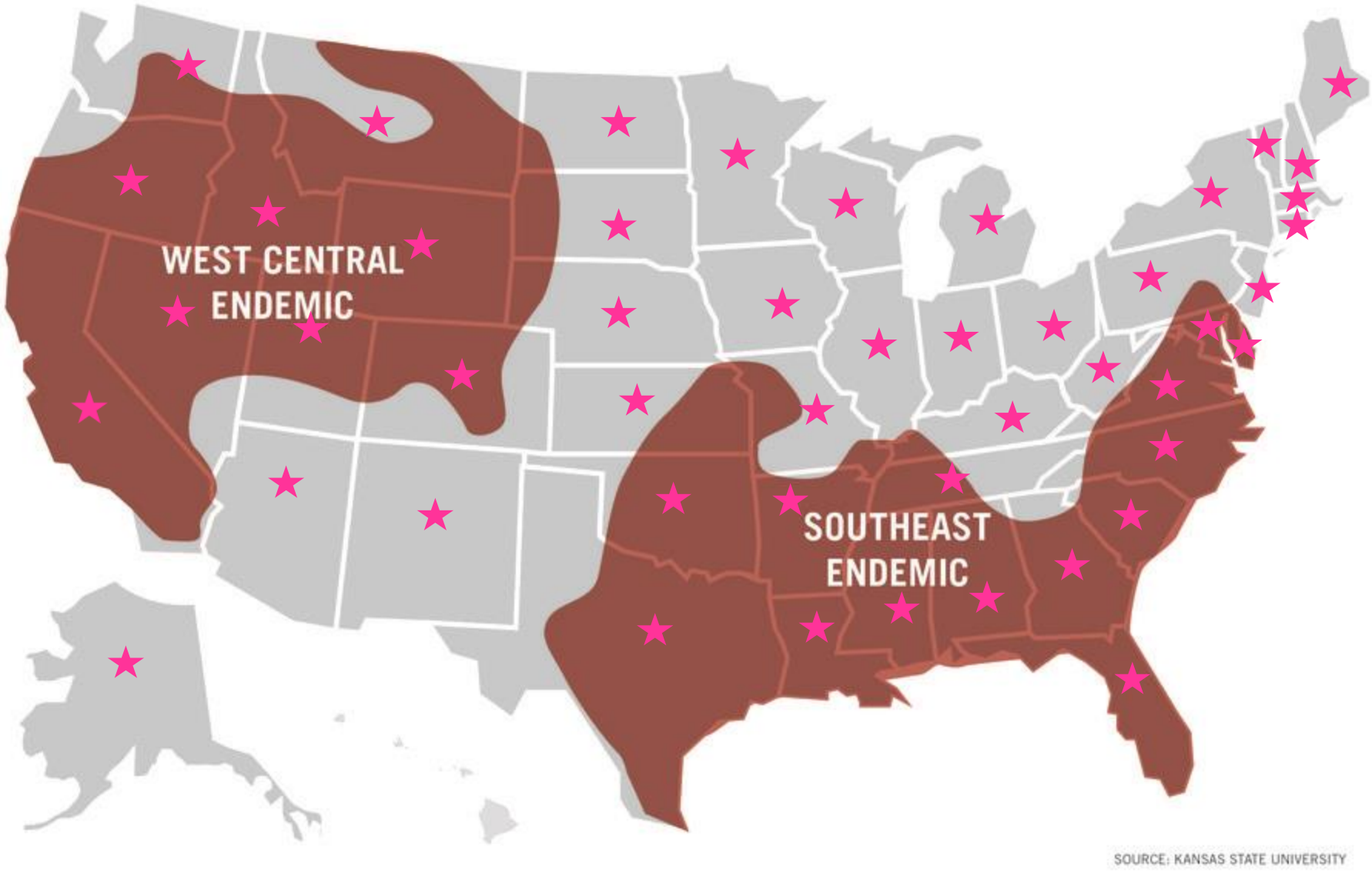


- Blood borne parasite
- Theiler, 1908
- Anemia through phagocytosis of RBC
- Fever, Anorexia, Jaundice, Production losses, Death

Introduction

Anaplasma marginale

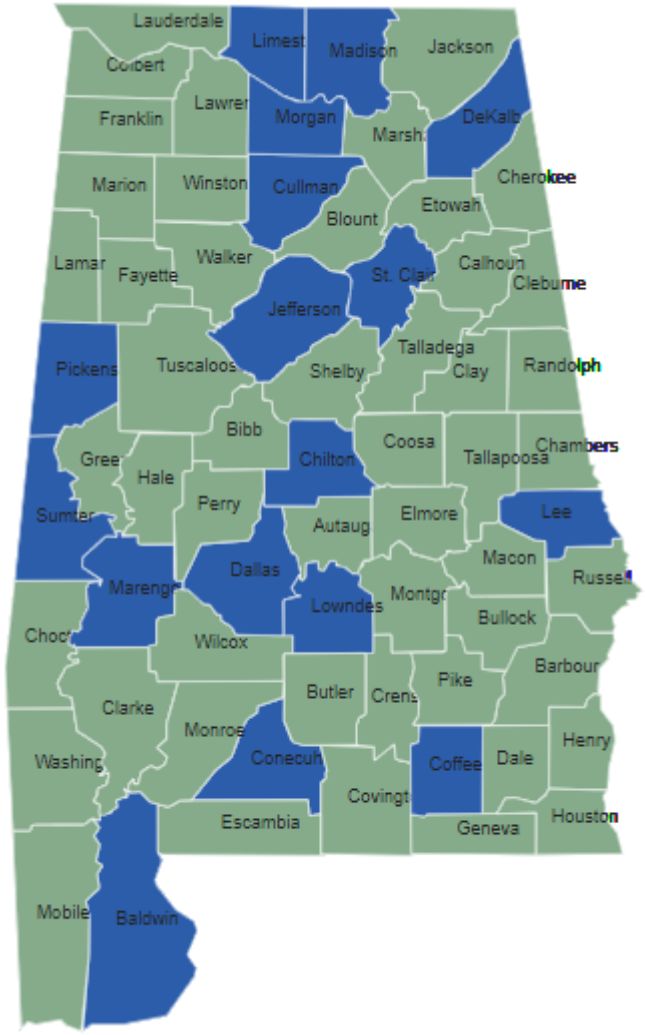
- 1st described in USA 1925 in Kansas
- production losses
  - calf crop: -3.6%
  - cull rate: +30%
  - mortality rate: 30%
  - persistent infections
- Cost to the U.S. Beef Industry
  - estimated losses of over $300 million/yr
  - $400/ clinical animal


WEST CENTRAL
ENDEMIC
SOUTHEAST
ENDEMIC
SOURCE: KANSAS STATE UNIVERSITY

Bovine Anaplasma Seroprevalence

Southern United States 1973 McCallon
2-24%

Lousiana 1984 Hugh-Jones et al.
5.6%



Rodning et al. 2010

cELISA (Se 95%, Sp 98%)

68 Herds

- 12-1263 hd

31 counties

7,524 samples submitted

1% seroprevalence

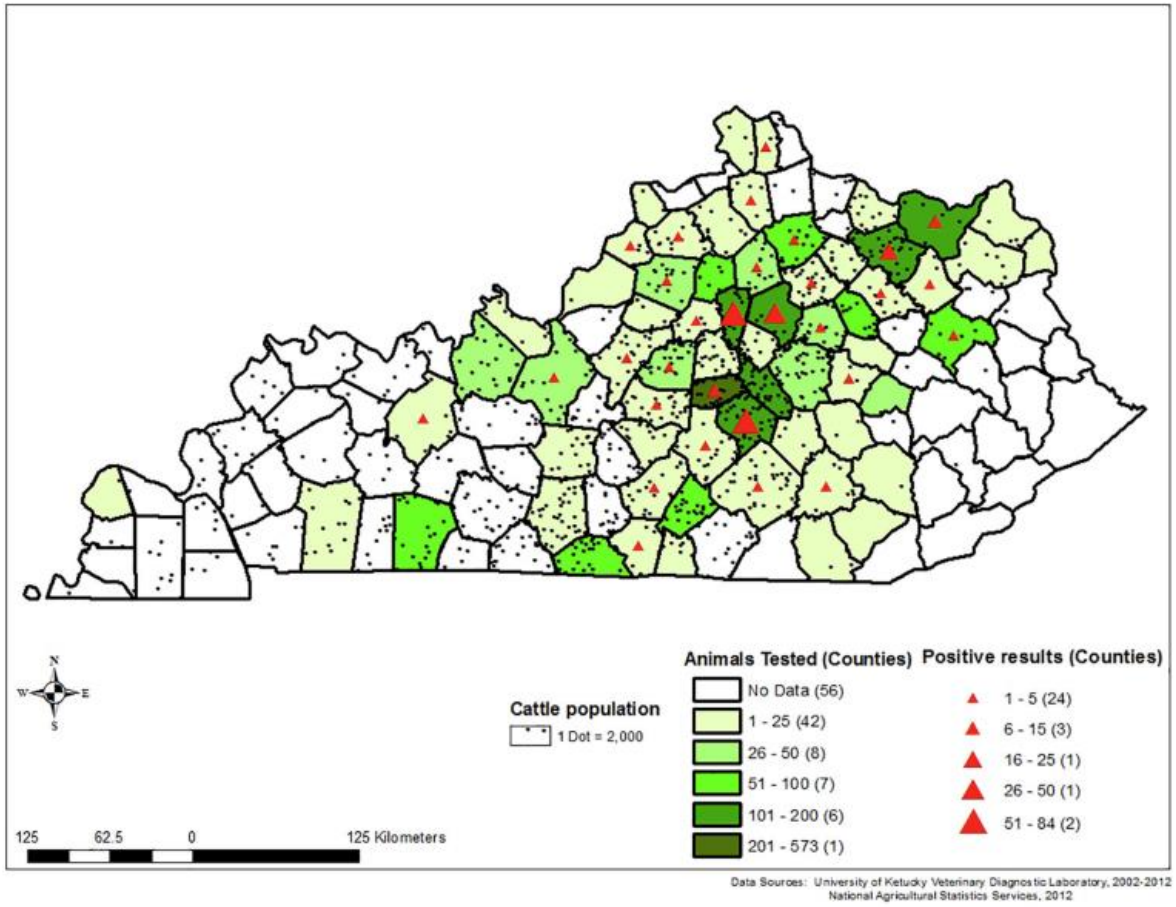
AAVLD Data
18.8% positive

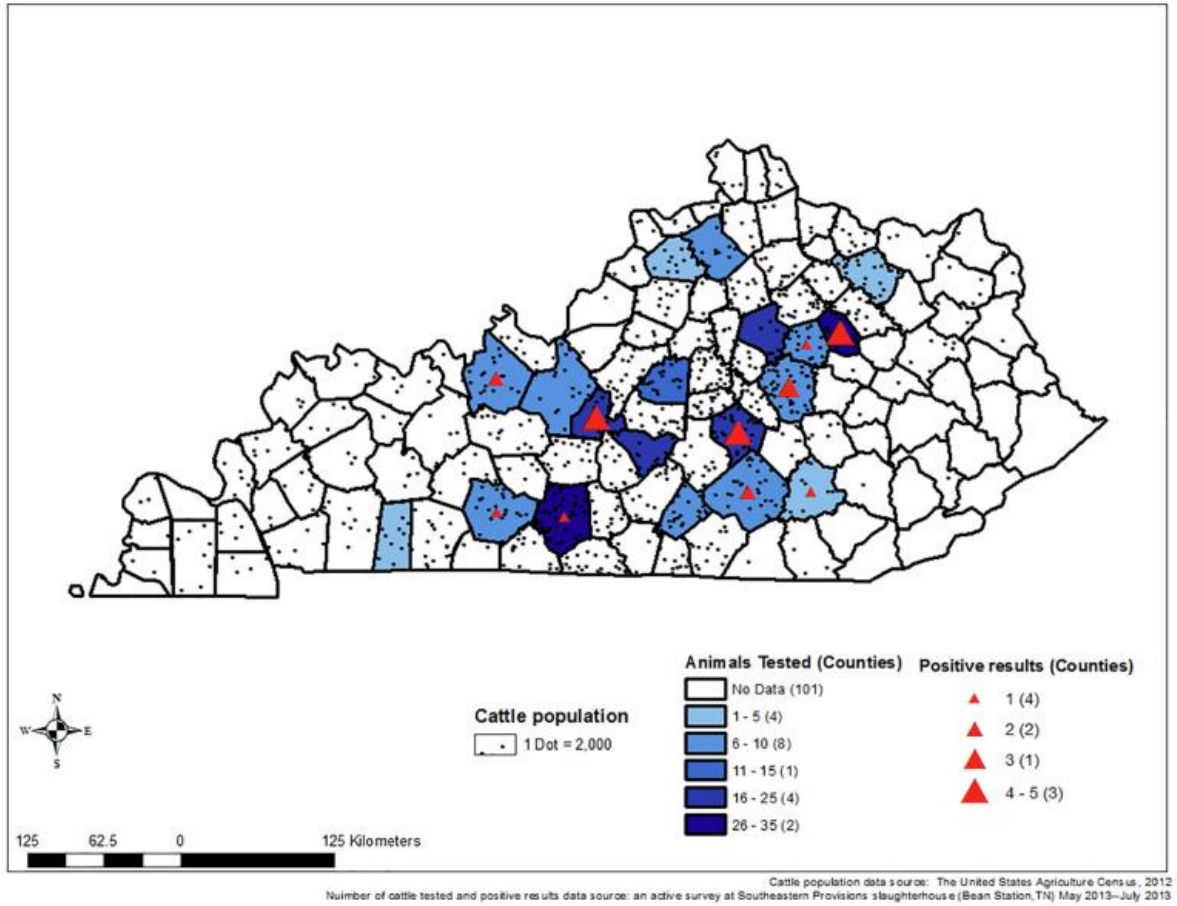
Slaughterhouse Data
13.5% prevalence

State	AAVLD % +	Current %	1973 %
AL	7.9%	9.0%	10%
AR	16.8%	15.8%	19%
FL	-	19.5%	10%
GA	-	4.6%	-
KY	10.6%	10.7%	5%
LA	-	20.8%	18%
MS	27.6%	29.1%	24%
MO	-	33.8%	13%
NC	10.9%	6.2%	12%
OH	-	9.1%	2%
SC	5.1%	10%	15%
TN	56%	10.5%	12%
TX	15.6%	5.3%	16%
VA	-	1.3%	3%

Whitlock et al. 2014

KY Prevalence Study 2018





Okafor CC et al. 2018

KY Prevalence Study 2018

Prevalence: 9.44%

Risk factors:

- adults vs juveniles
- Angus vs Holstein
- individual vs pooled samples
- summer vs other season

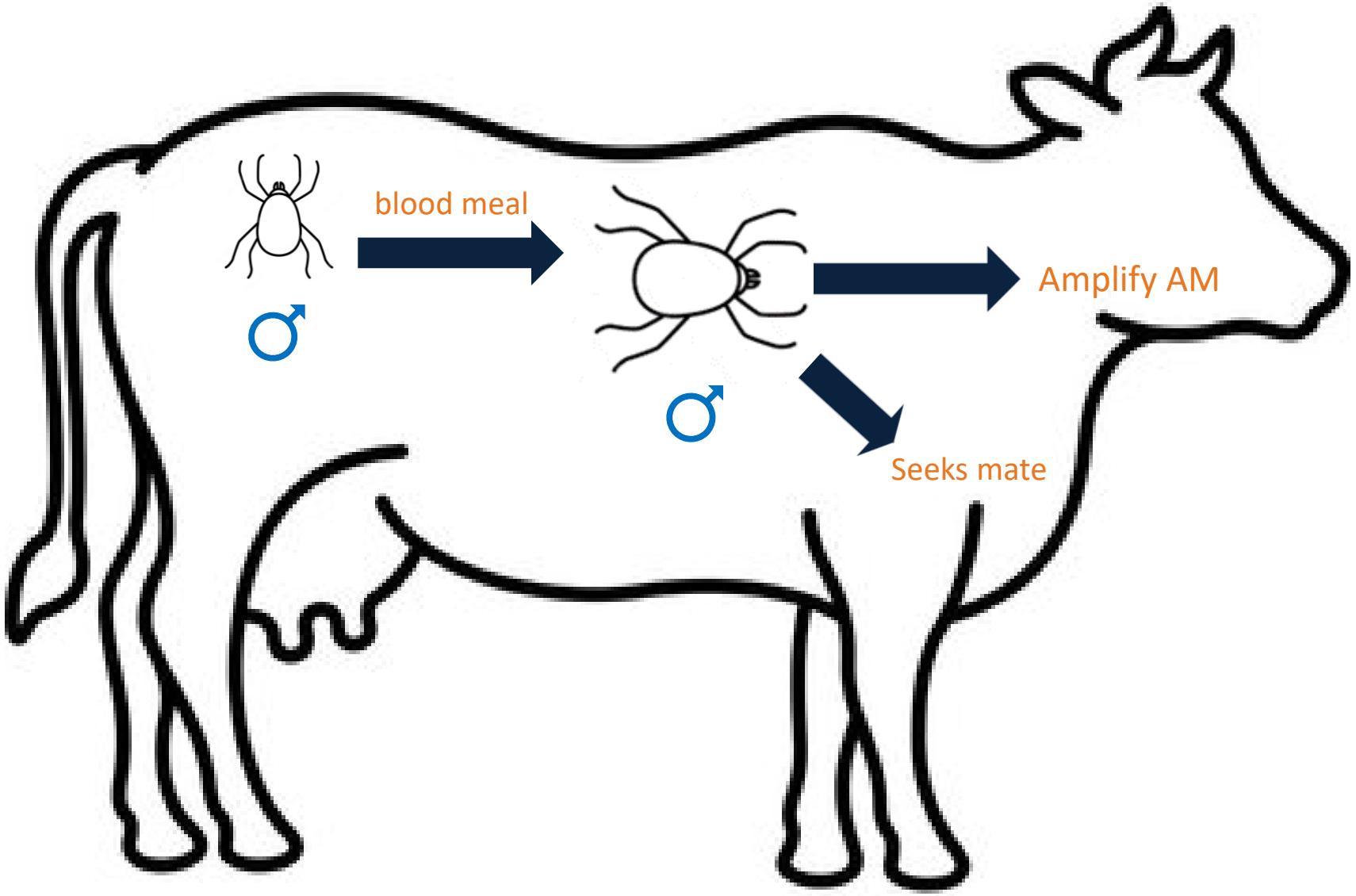
Okafor CC et al. 2018

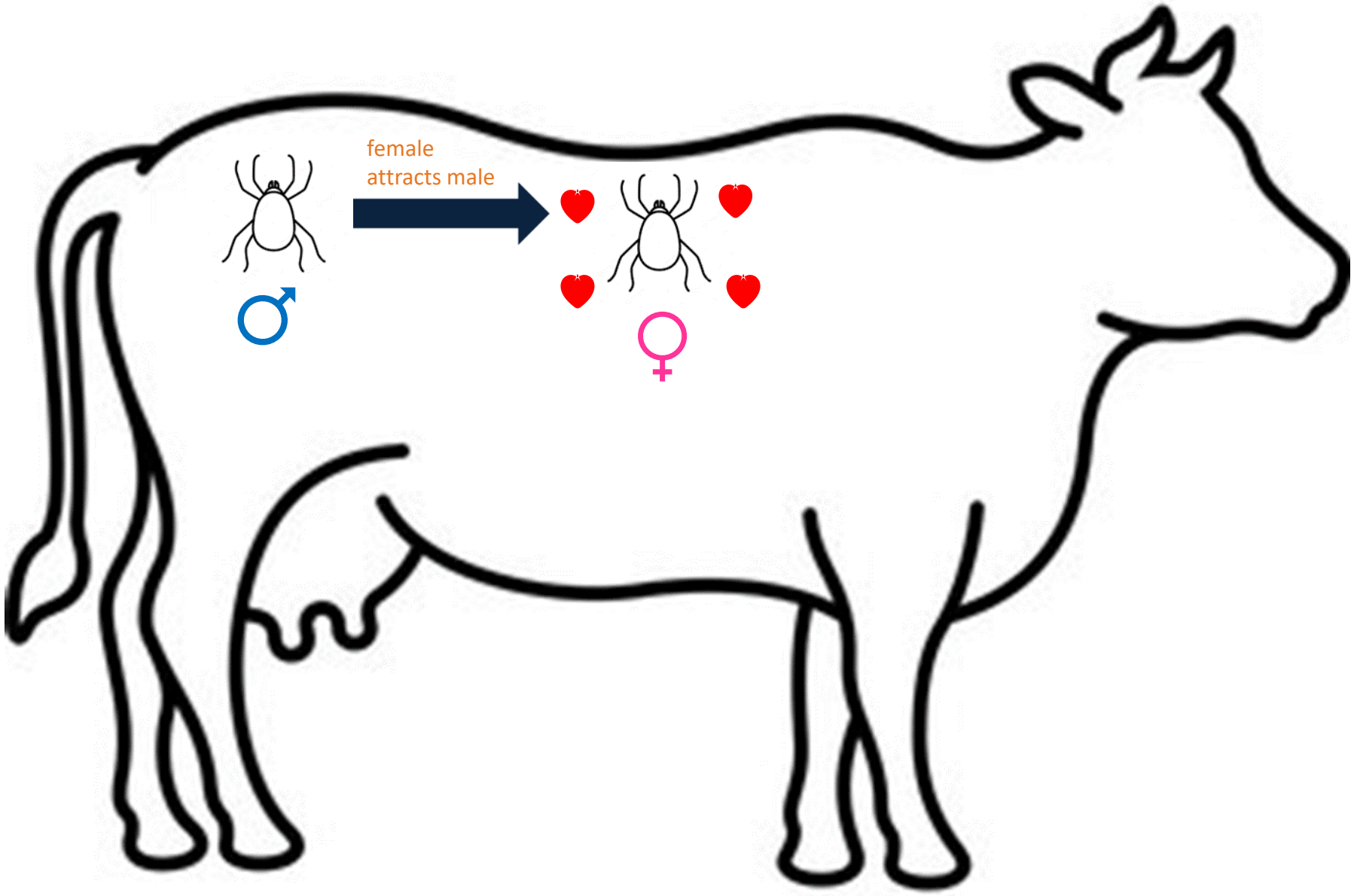
How did my herd acquire Anaplasmosis?

Biological transmission
- *Dermacentor spp* ticks

Mechanical transmission
- biting flies/mosquitos
- blood contaminated fomites

Vertical transmission
- *in utero*


blood meal
♂
♂
Amplify AM
Seeks mate

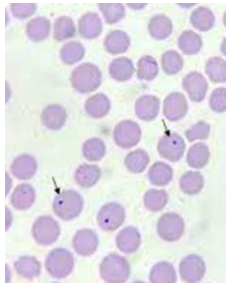

female
attracts male
♂
♀

Role of Flies in Anaplasmosis Transmission

Stable Fly- *Stomxys calcitrans*

Horse Fly- *Tabindae*

Pathogenesis



Fever, anemia, jaundice, anorexia, infertility

3-10 Weeks

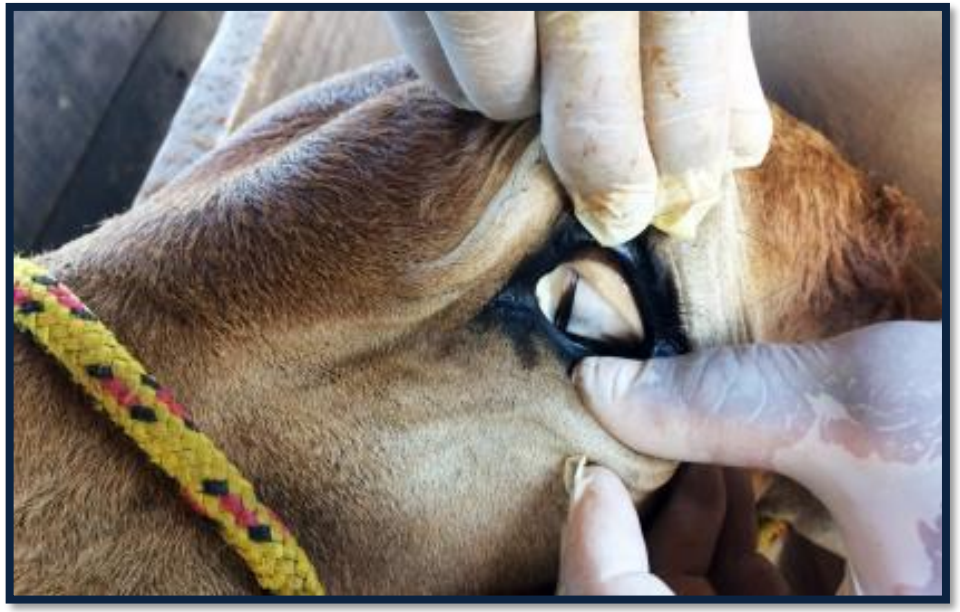
Infection → Prepatent Period → Acute Infection → Persistent Infection

Disease Characteristics

- young cattle (< 1 year of age) resistant to clinical disease
- peripartum period- disease more severe
- seasonal disease
  - vector season
  - fall after 6-8 weeks of exposure

Clinical Signs of Anaplasmosis

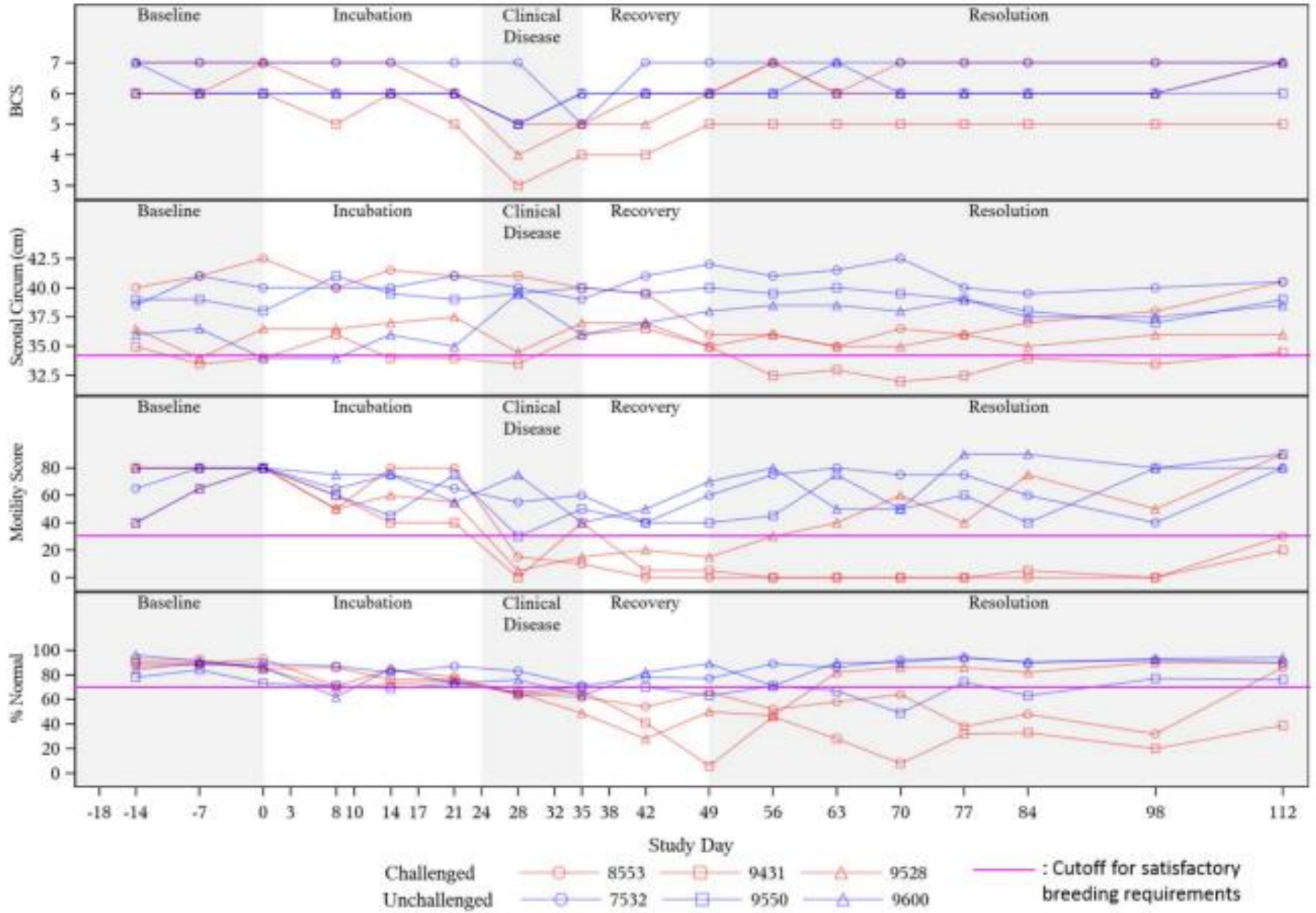
- Fever
- Anorexia
- Constipation
- Anemia
- Icterus
- Abortion
- Subfertility in bulls
- Ataxia
- Death

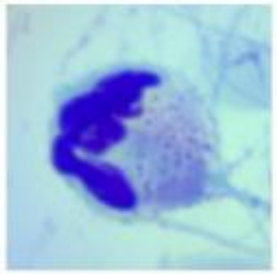


RESEARCH Open Access

Satisfactory breeding potential is transiently eliminated in beef bulls with clinical anaplasmosis

Anne C. Lovett[1,2], Emily J. Reppert[2], John R. Jaeger[3], Qing Kang[4], Macy R. Flowers[1], Naemi P. Bickmeier[1], Tippawan Anantatat[1], Shannon C. O'Day[1], Chance L. Armstrong[5] and Kathryn E. Reif[1*]


Baseline
Incubation
Clinical Disease
Recovery
Resolution
BCS
Scrotal Circum (cm)
Motility Score
% Normal
Study Day
-18 -14 -7 0 3 8 10 14 17 21 24 28 32 35 38 42 49 56 63 70 77 84 98 112
Challenged
Unchallenged
8553
9431
9528
7532
9550
9600
: Cutoff for satisfactory breeding requirements

Head Abnormalities	A. 	B. 	C. 
Midpiece Abnormalities	D. 	E. 	F. 
Tail Abnormalities	G. 	H. 	I. 
Other Cells	J. 	K. 	L. 

Conclusions

Results confirm that clinical anaplasmosis reduce breeding soundness especially in endemic areas

100% of infected bulls anemic & febrile at peak

- lost body condition during study

100% of infected bulls did not pass BSE after peak

100% of infected bulls experienced reductions in scrotal circumference, sperm motility, and morphology

Challenges with Anaplasmosis

- Subclinical carriers serve as a reservoir for disease
- Iatrogenic spread of disease
- *in utero* transmission
- Treated cattle still become carriers of disease
- No approved treatments for elimination of persistent infections
- No USDA approved vaccine

Outbreak Risk Factors

- Disease status unknown for the herd
- New additions to herd of unknown disease status
  - leasing bulls
  - show cattle
- Management & Environmental factors favor transmission
  - needles, rainfall, ticks, biting flies

Control of Anaplasmosis

Endemic herds

↓

medicate herd with Oxytetetracyline

- control of clinical cases/stabilize

↓

Pulse feed CTC 21 d on/21 d off (May-Oct)

↓

Vaccinate?

Goal = Endemic stability within herd

FDA Veterinary Feed Directive

Medicated animal feeds such as chlortetracycline medicated feeds may only be used as specifically indicated by the FDA and only under the direct supervision of a veterinarian

Control Measures

Biosecurity

Testing

- PCR, cELISA

Vaccination

- University Products LLC (Baton Rouge, LA)
- killed product
- $$$
- will be carriers following vaccination
- decrease in clinical disease

CTC pulsing

Fly Control


Questions
armstcl@auburn.edu