Changing Distribution of Ticks and Tick-borne Agents
Clinician Outreach and Communication Activity (COCA) Webinar
Thursday, December 7, 2017
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Planners have reviewed content to ensure there is no bias.
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At the end of this COCA Call, the participants will be able to:

• Describe some of the drivers that have resulted in the increase and geographic expansion of tick populations in North America.

• Identify regions where certain tick-borne infections are likely to emerge or increase in prevalence, and describe strategies to prevent infections in individuals and communities.

• List specific examples that highlight the recognition of new tick-borne agents and the spread of established tick-borne infections.
Today’s Presenter

Susan Little, DVM, PhD, DACVM (Parasit.)
Regents Professor of Parasitology
Oklahoma State University
CHANGING DISTRIBUTION OF TICKS AND TICK-BORNE DISEASE AGENTS

SUSAN E. LITTLE, DVM, PHD, DACVM (PARASIT.)
OKLAHOMA STATE UNIVERSITY
Drivers for tick populations

Climate/seasonality
Habitat
Wildlife populations
Lifestyle of pets and people
Brown dog ticks (*Rhipicephalus sanguineus*)

Indoor premise infestations difficult to eradicate
- Expect 6 months of environmental treatments
- Risk for boarding kennels, groomers, dog day care, etc...
- Recommend routine tick control for all dogs in shared housing environments

Transmit *Rickettsia rickettsii* and...
- Other spotted fever group *Rickettsia* spp.
- *Ehrlichia canis* (dogs)
- *Babesia vogeli* (dogs)
- *Hepatozoon canis* (dogs)
Brown dog ticks \textit{(Rhipicephalus sanguineus)}

Climate/seasonality

- Survives well in high temperature, arid environments
- Indoors and immediately around homes and kennels
- Increased activity and breeding when temperatures increase
  - thrives during extremely hot weather, drought tolerant
- Can be found anywhere there are dogs

Habitat: home/yard/kennel

Wildlife: not involved

Lifestyle

- Multi-dog households
- Dogs in contact with other dogs and not on tick control
Brown dog ticks – home infestation
Diversity of ticks
Ticks and tick-borne infections

Diverse array of tick species
  ◦ higher tick populations
  ◦ expanding geographic distribution

Complex biology, phenology, and feeding habits
  ◦ *Ixodes scapularis*
  ◦ *Amblyomma americanum*
  ◦ *Dermacentor variabilis*
  ◦ *Rhipicephalus sanguineus*

Transmit wide variety of tick-borne pathogens
  ◦ viral, bacterial, protozoal, helminth

Comprehensive tick control remains best way to minimize the risk of infection
Distribution of ticks

Deer ticks / black-legged ticks

*Ixodes scapularis*
- wooded areas around homes
- widespread distribution
- northeastern/midwestern populations intense and expanding

Timing of activity
- Adults in cooler months (October – February)
- Nymphs in warmer months (May – June)

Transmit Lyme disease, and...
- Anaplasmosis
- Human babesiosis
- Ehrlichiosis (*E. muris*)
- Powassan virus
Deer ticks (Ixodes scapularis)

Climate/seasonality
- Adults in fall/winter, survive cold very well
- Nymphs and larvae in warmer months
- Susceptible to desiccation

Habitat
- Wooded environment; shelter from understory

Wildlife
- Deer are key, cornerstone host for adults
- Rodents, small mammals for immatures
  - Lizards in southern US

Lifestyle
- Outdoor access
Lyme disease spreading
Lyme disease spreading
Number of human cases increasing

Transmission risk for dogs increasing

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Diversity of ticks
Lone star ticks

*Amblyomma americanum*
- wooded areas around homes
- widespread and growing distribution
- intense populations, aggressive feeders

Timing of activity
- Adults in spring and summer (February-June)
- Nymphs in summer and fall (May – September)

Transmit ehrlichiosis agents and...
- RMSF agent and other *Rickettsia* spp.
- STARI agent (southern Lyme disease-like illness)
- Cytauxzoonosis
- Suspected in Heartland virus & Bourbon virus
Lone star ticks (Amblyomma americanum)

Climate/seasonality
 ◦ Warm, humid environment
 ◦ Adults emerge in early spring
 ◦ Very susceptible to desiccation

Habitat
 ◦ Wooded environment
 ◦ Needs shelter from understory

Wildlife
 ◦ Deer are key, cornerstone host
 ◦ Birds for immature stages

Lifestyle
 ◦ Outdoor access
Lone star ticks

Intense populations
Lone star tick habitat?
American dog ticks, wood ticks

_Dermacentor variabilis_ & _Dermacentor andersoni_
- tall, grassy areas; fields and meadows
- throughout most of United States

Timing of activity
- Adults in warmer months
- Nymphal activity varies

Transmit RMSF and...
- other SFG _Rickettsia_ spp.
- Anaplasmosis, Ehrlichiosis
- Tularemia
American dog ticks (*Dermacentor variabilis*)

Climate/seasonality
- Warmer times of year
- Adults emerge in late spring - summer

Habitat
- Grassy, meadow environment
- Edge of trails

Wildlife
- Medium size mammals for adults
  - Fox, raccoon, coyote, bobcat
- Rodents for immature stages

Lifestyle
- Outdoor access
Gulf Coast ticks

*Amblyomma maculatum*
- Historically in coast areas along Atlantic and Gulf of Mexico
- Also common in grass prairies

Timing of activity
- Adults and immatures in warmer months
- Seasonal peaks vary with geography

Transmit *Rickettsia parkeri* and...
- Hepatozoonosis (dogs)
- Heartwater (ruminants)
Gulf Coast ticks (*Amblyomma maculatum*)

**Climate/seasonality**
- Warmer times of year
- May be active in “winter” months in southern part of range

**Habitat**
- Mowed fields, early to mid-succession fields with open canopy (similar to *D. variabilis*)

**Wildlife**
- Medium and large mammals for adults
  - Deer, cattle, coyotes, swine
- Rodents and birds for immature stages

**Lifestyle**
- Outdoor access
Tick Challenges

Geographic expansion
  ◦ Habitat change
  ◦ Increasing temperature and humidity

Increased abundance
  ◦ Presence of ideal environmental conditions
  ◦ Ample wildlife reservoir hosts

Very little ability to limit tick reproduction
Tick myths and misperceptions

Misunderstandings about lifestyle and habits of ticks

- Seasonal timing of activity
- Stages likely to feed on people and pets
- Relative risk of infestation
- Pathogen transmission risk and ease of managing disease

Many consistently underestimate risk of tick infestations on pets

- Particular concern for cats
Seasonal timing of activity

- **southern US**
- **northern US**

- Brown dog ticks
- Lone star ticks
- American dog ticks
- Black-legged ticks
Immature and adult ticks
Severity of Disease
How long must tick feed to transmit?

- *Borrelia burgdorferi*
- *Anaplasma phagocytophilum*
- *Ehrlichia canis*
- *Rickettsia rickettsii*
- *Babesia canis vogeli*
- *Cytauxzoon felis*
- Viral pathogens
More than just tick control

Vaccination key for canine protection, but...

Prevent pets from roaming

Limit tick habitat
- Remove leaf litter, burn debris
- Barrier between wood & yard

Exclude/discourage wildlife
- Remove debris close to home where rodents may nest

Treatment of wildlife
More than just tick control
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