

Public Tick IPM Working Group

September 9, 2020

Please send additions, omissions or other corrections to lmcherry@ipminstitute.org

The Working Group meets via conference call on the second Wednesday of each month at 1:00PM CT (2:00PM EST). The following notes are for September 9, 2020.

Roll

1. Ashley Kennedy, Army Public Health Center
2. Chelle Hartzler, Rollins Inc.
3. Chris Przybyszewski, US Biologic
4. Dawn Gouge, UA Cooperative Extension
5. Dr. Denise L. Bonilla, USDA - Animal and Plant Health Inspection Service
6. Dr. Kirby Stafford, Connecticut Agricultural Experiment Station
7. Jill Auerbach, Hudson Valley Lyme Disease Association
8. Jody Gangloff-Kaufmann, Cornell University
9. Joellen Lampman, New York State IPM Cornell University
10. Keith Price, Pennsylvania Department of Environmental Protection
11. Larry Scrapper, Inter-Tribal Environmental Council
12. Laura Rothfeldt, Arkansas Department of Health
13. Leah McSherry, IPM Institute of North America
14. Maria Weber, IPM Institute of North America
1. Mason Kauffman, US BIOLOGIC
15. Megan Saunders, Division of Infectious Disease
16. Monica White, Colorado Tick-Borne Disease Awareness Association
17. Robert Koethe, United States Environmental Protection Agency
18. Scott Larson, Metropolitan Mosquito Control District
19. Tim Fox, Madison Area Lyme Disease Support Group
20. William Nicholson, CDC

Agenda

1. Dr. Denise L. Bonilla of the National Cattle Fever Tick Eradication Program Coordinator/VS Entomologist will present on cattle fever tick incursions
2. Discussion of date TBD 90-minute online Tick IPM Academy session.
3. Updates, comments and announcements from the working group members

A recording of this call and presentation is available by visiting this link:

<https://transcripts.gotomeeting.com/#/s/8f9ad5522809c3463979f38998615aac7de0e820b300aebdfec996d64b82f13>

Dr. Denise L. Bonilla, National Cattle Fever Tick Eradication Program Coordinator/Entomologist, USDA/APHIS/Veterinary Services, Natural Resources Research Center, denise.l.bonilla@usda.gov

Dr. Denise L. Bonilla oversees the Cattle Fever Tick Program. Dr. Bonilla is presenting today on her involvement with controlling cattle ticks, *R. annulatus*, in Texas.

**1. Presentation: Cattle Fever, Dr. Denise L. Bonilla, Cattle Fever Tick Program
Coordinator/Entomologist**

- a. Biology of the Cattle Fever Tick (CFT)
 - i. Two species of cattle fever ticks: *R. annulatus* and *R. microplus*
 1. Formally known as *Boophilus*
 - ii. Originated from Russia/Middle East, Mediterranean Basin
 1. Entered southern US in approx. 1800
 2. First published that they were in Key West, Florida in 1912
 - iii. Vectors of Bovine Babesiosis: *Babesia bovis* and *Babesia Bigemina*
 1. Female ticks are larger than males
 2. Distinctive identifying feature: Protuberance that looks like a little tail
 - a. Only tick species where this is present
 - iv. One host ticks
 1. They will not come off their host until they have become engorged
 2. Hosts include cattle, deer, and various wildlife
 - v. Life cycle
 1. Ticks spend most of their life in the environment (87-93%)
 2. 6-9 months depending on microclimates
 3. Parasitic phase (on host) 3-4 weeks
 4. 3-6 generations a year, depending on climate
 5. Wet-dry season climates: ticks populations increase during rainy
 6. *B. microplus*: more humid
 7. *B. annulatus*: drier
- b. History and program challenges
 - i. Infestations originated in 1906
 - ii. *R. annulatus* were originally the tick that was an issue but today it's *R. microplus*
 - iii. Cattle fever ticks officially eradicated in 1943 on the mainland with the exception of permanent quarantine area
 - iv. Current infestations in Texas mostly on the west coast and southern portion of the state
 1. The southern portion of the state is mostly refuge land
 2. Most of the problems coming from this area are caused by Nilgai (*B. tragocamelus*)
 - v. Tick populations have been increasing due to climate change
 - vi. Program challenges
 1. Rio Grande River
 - a. Was a tick barrier but is now shallow enough for travel to occur across the river
 2. Mexico

- a. Cattle fever tick control/eradication efforts in Mexico have not been successful
 - i. Lack of consistent government funded resources
 - ii. Changing priorities
 - iii. Illicit/accidental movement of livestock
 - iv. Free movement of wildlife hosts across the border
 - v. Cartel/violence – allows a lot of movement of animals since the ranchers vacate their ranches, leaving their cattle to roam
 - vi. Multiple cases of pesticide resistance
 - b. Past three years, >60% of the Mexico origin bovine apprehended along the border had CFT
3. Acaricide resistance
- a. Permethrin is desirable because lack of a slaughter withholding period
 - b. Permethrin-resistant cattle fever tick populations in TX and PR
 - c. 1980s: Report of resistance to organophosphates
 - d. 1994: *R. microplus* populations detected with resistance to pyrethroids
 - e. 2002: Emergence of populations with multiple resistant to OPs, pyrethroids, and amidines in the tropics
 - f. 2007: First report of cattle fever tick resistance to phenylpazole products
 - g. 2010: First report of cattle fever tick resistance to macrocyclic lactones
 - h. 2012: Report of ticks with multiple resistance to OPs, pyrethroids, and macrocyclic lactones
4. Land use
- a. Fragmentation = changing from treatable cattle lands
 - b. Subdivided into hunting only properties, no cattle
 - c. Refuge land for wildlife increasing
 - d. Creates limited treatment options!
5. Wildlife
- a. Cattle fever ticks have wildlife reservoirs that are difficult to control and control ticks upon
 - b. No integrated tick management plan can exclude the wildlife factor
 - i. Pasture vacation no longer works
 - c. Difficulties in dealing with multiple agencies and stakeholders that have wildlife reservoirs on their land
6. Exotics/WTD in Texas
- a. 1988 TPWD survey: 164,257 animals, 67 different species

- i. 90,400 behind fences, 78,857 free range
 - ii. Nilgai, blackbuck, Aoudad sheep, fallow deer, sika deer, Axis deer
 - b. 1996: 190,000 animals, 76 spp (2/3 fenced)
 - i. Nilgai, Aoudad sheep, Wapiti, Red deer, Fallow deer, Axis deer
 - c. White tailed deer – TPWD estimates a population of 3.6 million
 - i. 2017-2018: 918,009 harvests
 - d. Nilgai
 - i. Indian antelope brought in for game hunting
 - ii. Both cattle fever ticks will feed on nilgai
 - iii. Nilgai have large home ranges (750-32,000 ha)
 - iv. Nilgai hunts/harvest on U.S. Fish and Wildlife Refuge lands
 - c. Current treatments
 - i. Cattle Fever Tick Attack Force in Texas
 1. Cooperative program with Texas Animal Health Commission (TAHC)
 2. USDA, Agricultural Research Service (ARS)
 3. USDA Tick Force (permanent and temporary quarantine zones)
 - a. Tick riders (mounted patrol officers): 60 permanents; 115 total staff; 7 work zones
 - b. On horseback patrolling approx. 10 miles of river area
 - c. 3rd and 4th generation riders
 - d. Track and apprehend stray animals; scratch for ticks; treat
 4. Port veterinarians
 5. TAHC Inspectors
 - a. Submit ticks for lab ID and ARS acaricide susceptibility profiling)
 - ii. Treatment options
 1. 14-day interval treatment dip vat/spray box treatment with coumaphos (CoRaI). Horses (and some cattle) may be hand sprayed
 2. Doramectin (Dectomax) injectable (21-28 days)
 3. Molasses (ivermectin) tubs
 4. BM-86 vaccine
 - a. Have been using the last few years in the quarantine zone
 - b. Needs to be used with another treatment option since this method works best towards for *R. annulatus*, not *R. microplus*
 - d. CFT in trade binational projects
 - i. US/MX binational CFT strategic plan
 1. Unities States-Mexico joint strategic plan for control and eradication of invasive cattle fever ticks *Rhipicephalus (Boophilus) microplus* and *R. annulatus* 2017-2021

- a. Goal 1: eradicate cattle fever ticks on livestock moving into free areas in Mexico and in international trade
 - b. Goal 2: Provide a collaboration framework to define and measure the performance of needed improvements in both the Mexican and U.S. Cattle Fever Tick eradication programs facilitate trade
2. U.S. working group of USDA (ARS, APHIS) and Binational Committee (BNC) members worked to create measurable projects based on US and Joint strategies
3. Nine projects arose:
 - a. Training
 - b. Audits/surveillance plans
 - c. Information/specimen sharing (wildlife, resistance testing)
 - d. Outreach
 - e. Binational technical committee
 - f. A review of the impact of rising pesticide resistance in *R. microplus* and *R. annulatus* on control and eradication efforts along the United States-Mexico border
 - g. Creation of a CFT buffer zone in Mexico
4. CFT Mexican Buffer Zone
 - a. Binational meetings over several years
 - b. Create a zone in MX that could be targeted with CFT treatments to reduce CFT incursions into TX
 - i. Pilot projects in Tamaulipas and Coahuila
 - ii. Will start March-July 2021
 - iii. Integrated tick management
 - iv. Will branch out into new areas if this goes well
- e. CFT eradication projects
 - i. Wildlife
 1. Aerial survey for exotics and white-tailed deer
 2. Ultraquiet nematode sprayers at wildlife (fence) crossing and deer feeders
 3. Nilgai antelope and axis deer susceptibility *Babesia bovis* infection
 4. High game fences
 - a. Higher fences make movement of cattle/wildlife less, which decreases infection rate; however, higher fences can be expensive
 5. White-tailed deer
 - a. Pasture vacation doesn't work when deer are present
 - b. Feed deer ivermectin treated corn from feeders
 - c. Zapata county project:
 - i. Cull deer

- ii. Track deer (MX)
 - iii. Tick counts
 - iv. Pathogen detection
 - v. Population genetics
 - 6. Nilgai
 - a. Difficult to treat
 - b. Ultra-quiet sprays set up at fence crossing to spray nematodes
 - c. Nilgai modeling
 - 7. National wildlife refuges
 - a. Ivermectin corn feeding to White-tailed deer
 - b. Nilgai harvests
 - c. Wildlife camera image modeling
 - d. Cattle grazing
 - i. Put cattle out in a defined area and gather them every two weeks or so and treat them for ticks
 - ii. Pesticide resistance
 - 1. Vaccine based on the P-zero (Cuban) antigen (cattle)
 - 2. Evaluation of feed-through and topical spray formulations of 3% diflubenzuron (cattle and white-tailed deer)
 - 3. CFT biocontrol. Parasitic wasps – in native range
 - 4. Combining BM86 with additional vaccine targets to improve efficacy of anti-tick vaccination and block transmission of Bovine babesiosis (cattle)
 - 5. BM86 vaccine efficacy (cattle)
 - 6. Susceptibility of *R. microplus* to nootkatone (environmental and cattle)
 - iii. New and long-lasting treatments
 - 1. Eprinomectin and BM-86 vaccine (cattle)
 - 2. Doramectin and BM-86 vaccine (cattle)
 - 3. Spray boxes and hand-held guns for electrostatic spraying of topical treatments (cattle and horses)
 - 4. Horses:
 - a. BM-86 vaccine trail at Pullman, WA (ARS)
 - b. Lavender oil as a repellent/treatment
 - c. Puerto Rico: Moxidectin dewormer paste and Essentria on naturally infected horses
 - d. Using Essentria/water for CFT on deer capes, equipment disinfection
- f. CFT research
 - i. Better understanding of CFT systems
 - 1. Economic Impact of Developing Improved CFT Treatment Options of Cattle on Infested Premises
 - 2. Population genetics of CFT in South Texas

3. Understanding the intersection between drought/media reports of violence and CFT incursions
4. Cattle fever tick outbreak fluctuations driven by tropical cyclones and solar cycles (to be submitted by PNAS)
5. Weather stations
6. Fecal analysis (tick, cattle, wildlife)
 - a. Can find tick fecal matter on animals
 - b. Can check cattle fecal matter and see what ticks have been feeding on them
7. Carrizo cane control on Rio Grande
 - a. Carrizo cane is an invasive species that can grow to 30 feet tall
 - b. Easy for animals or other people to walk to the other side of the border without being detected

Questions for Dr. Denise L. Bonilla, Cattle Fever Tick Program Coordinator/Entomologist

- a. Tom Mather –Interested in *Essentria*. Have efficacy studies been done?
 - a. Yes, there have been efficacy studies on *R. microplus* and showing about 60%-80%
 - b. Larval tick mortality is higher
 - c. Info on ARS but hasn't been published at this point
- b. Scott Larson – Interesting talk, thank you!
- c. Ashley Kennedy – Did I understand correctly that you can test cattle wildlife poop for traces of tick poop? Is this via grooming?
 - a. When ticks feed on the animals, there is a slight physiological change to the animal from the feeding
 - b. Can test for these changes in the poop of the wildlife to monitor what ticks are feeding on animal from their poop
- d. Joellen Lampman – Do nematodes work because they are one host ticks? Would they be effective against 3-host ticks?
 - a. Nematodes are great because their environmentally friendly since they're native to the environment where they're used
 - b. If you find the right nematode, it will control 3-host ticks. It just depends how host specific the nematodes really are
- e. Megan Saunders – Is the USDA looking into using any of these control methods against *H. longicornis*?
 - a. Yes, our USDA counterparts are interested in looking at some of these control methods against *H. Longicornis*. They're also looking at using these methods for additional species of ticks.

2. Discussion of date TBD 90-minute online Tick IPM Academy session

- a. The IPM Institute of North America is considering putting on a 90-minute online Tick IPM Academy and would like to ask the group if there would be interest in such a session?
 - i. Topics of interest include:
 - 1. OneHealth – Tick IPM and COVID
 - 2. Review what we've learned in the past year, new resources available and take questions on challenges people are facing
- 3. Updates, comments and announcements from the working group members**
- a. Scott Larson- FYI: <https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/tick-ipm-series/>
 - b. Ashley Kennedy – supports the 90-minute session - I think those months [December or January] are relatively "off season" for many of us so it's good timing!

These notes are for a Working Group call on September 9, 2020. Future calls will continue to fall on the second Wednesday of each month at 1 PM Central time.

The Public Tick IPM Working Group is funded by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center.