ROCKY MOUNTAIN SPOTTED FEVER AND THE SAN CARLOS APACHE TRIBE: RESULTS OF THE RODEO PROJECT AND BEYOND

BY: ANITA L. BROCK, MPH
THE SAN CARLOS APACHE TRIBE EPIDEMIOLOGY PROGRAM MANAGER
RMSF IN ARIZONA

- From 2002-present, over 250 cases of RMSF have been reported in Arizona
- Highest incidence in the U.S.
  + Incidence rate ~ 300 times higher than expected
- There have been 18 deaths
  + Case fatality Rate 7%,
  + 15 X higher
The primary U.S. tick vectors of RMSF:

- *Dermacentor variabilis*  
  American dog tick  
  (Western U.S., Arizona, New Mexico, California)

- *Dermacentor andersoni*  
  Rocky Mountain wood tick  
  (Rocky Mountain states, Kansas, Texas)

Maps showing the distribution of tick species across the United States.
The Brown Dog Tick (*Rhipicephalus sanguineus*) was found to be the vector of the disease.

This tick is very common and can live in and around houses.

Can remain active year round.
INCREASING NUMBER OF REPORTED HUMAN CASES IN ARIZONA

*18 Deaths 2003-2012 (7% Case Fatality Rate)
SEASONALITY OF RMSF IN ARIZONA

- Mountain community
- Desert community

Month of Onset of Cases

Count

January  | February | March  | April  | May    | June   | July   | August | September | October | November | December
---      |         |       |        |        |        |        |        |           |        |          |          
        |          |        |        |        |        |        |        |           |        |          |          
        |          |        |        |        |        |        |        |           |        |          |          

The graph shows the seasonality of RMSF cases in mountain and desert communities in Arizona. The count peaks in August for both communities, indicating a higher incidence during that month.
2012 FATALITIES

- March 9: Patient, aged 55 years, died from RMSF
- March 19: Child, aged 22 months, was transferred to tertiary care center with critical RMSF sequelae
- March 20: Child in the same household was transferred to tertiary care center and died on March 22
The RMSF Rodeo Project: 2012

- Project divided into six phases:
  - Dog population count
  - Collar and register all dogs in study area
  - Spray each home 4 times
  - Tick counts in environment
  - Spay/neuter clinic
  - Knowledge, attitudes and practices survey
- Provide data for tribe to expand reservation-wide
Selected Rodeo District: Peridot
RMSF Rodeo Timeline, 2012

Tribal Approval

Peridot Community Meeting

Tick collars, Household Registration

Spay/Neuter Campaign

Evaluate Program

Treat Yard #1

Treat Yard #2

Treat Yard #3

Treat Yard #4
FIELD TEAMS

- San Carlos Community Health Representatives
- San Carlos Animal Control
- Indian Health Service
- Arizona Department of Health
- USDA
- CDC
FIELD TEAM OBJECTIVES

1. Visit every home
2. Collar, register, tie-outs, follow up on dogs
3. Educate homeowners
4. Treat yards for ticks

Eliminate Ticks!
GOAL: Properly Timed Acaracide Treatments

Once a Summer

May

June

July

August
Yard Treatment

- Bayer Ready-To-Spray Product
- 3 Gallon Sprayers
  - Spray around the house
  - Spray dog areas
- ATVs
Tick Collars for Dogs

- Seresto ®, new pre-market tick collar provided by Bayer
  - 4.5% Flumethrin, 10% imidaclopid
  - Visible marker of treatment
  - Utility in harsh environment unknown
  - Expected to last complete season (8 months)
- Applied with tribal/owner consent
RMSF RODEO STATISTICS

- 576/582 (99%) of homes in Peridot Heights registered/participated
  - Over 1000 Seresto® collars distributed
  - 80% (95% CI: 72-88%) of enrolled households reported the grey Seresto® collar was still on all dogs at the end of the study
  - Tethers distributed to restrain dogs
  - All dogs provided tribal license and collar
  - Houses Treated 4 times (May-Aug)
- >2,800 home site visits
Tick counts on dogs: March – July 2012

Tick-count on Dogs in RMSF Rodeo, Reported as Proportion of Dogs

- **No ticks**
- **1-20 ticks**
- **>20 ticks**

**Legend**
- Registration
- May
- June
- July
Five homes registered for the RMSF Rodeo
  - Had at least two dogs at registration
Three traps set at each house prior to each month’s treatment
EVALUATION: KNOWLEDGE, ATTITUDES AND PRACTICES

- **Knowledge**
  - 95% (95% CI: 94-98%) of persons had heard of RMSF
  - 42% (95% CI: 37-47%) of persons said they knew someone who had had RMSF
  - 78% (95% CI: 74-82%) of persons stated that they knew how to remove a tick

- **Attitudes**
  - 88% (95% CI: 85-91%) would support an animal control shelter on San Carlos
  - 80% (95% CI: 76-84%) would support a complete animal control shelter (includes euthanasia)
## EVALUATION: COMPARING RODEO AND NON-RODEO AREAS

<table>
<thead>
<tr>
<th></th>
<th>Rodeo Area (95% CI)</th>
<th>Non-Rodeo Area (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>House treated for ticks in the last year</td>
<td>93% (89-96%)</td>
<td>48% (42-54%)</td>
</tr>
<tr>
<td>Currently treat dog for ticks</td>
<td>90% (84-96%)</td>
<td>70% (62-77%)</td>
</tr>
<tr>
<td>Always tie up, fence in or keep dogs inside</td>
<td>40% (32-46%)</td>
<td>28% (21-35%)</td>
</tr>
<tr>
<td>Think there should be a limit to the number of dogs a person can own</td>
<td>69% (63-74%)</td>
<td>75% (69-80%)</td>
</tr>
</tbody>
</table>
Interview team checked nearest dog for ticks

<table>
<thead>
<tr>
<th>Number of Ticks</th>
<th>Rodeo Area (95% CI)</th>
<th>Non-Rodeo Area (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>99% (98–100%)</td>
<td>37% (29–45%)</td>
</tr>
<tr>
<td>1–20</td>
<td>0.9% (0.0–2.5%)</td>
<td>32% (24–40%)</td>
</tr>
<tr>
<td>20+</td>
<td>0%</td>
<td>31% (23–39%)</td>
</tr>
</tbody>
</table>
SCAT Reservation-Wide RMSF Prevention Project, 2012

- RAVS Clinic
- Applied IHS Funding
- RAVS Clinic
- Applied HUD Funding
- Applied Freeport McMoran Funding
- Clean Up
- Two ACOS: NACA Level One
- Mobile Vet Clinics
- Treat Yard #1
- Treat Yard #2
- Treat Yard #3
- Treat Yard #4
Number of *Rh. sanguineus* ticks collected monthly in CO$_2$ traps.
The Total Number of Suspected RMSF Cases: San Carlos 2013 and 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Feb</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>March</td>
<td>106</td>
<td>34</td>
</tr>
<tr>
<td>April</td>
<td>217</td>
<td>29</td>
</tr>
<tr>
<td>May</td>
<td>118</td>
<td>28</td>
</tr>
<tr>
<td>June</td>
<td>108</td>
<td>27</td>
</tr>
<tr>
<td>July</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Aug</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>Sept</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Oct</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Nov</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Dec</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>
The Total Number of Suspected RMSF Cases: All Districts San Carlos 2012 and 2013
2012 RAVS CLINICS

- March 2012 Vaccination Clinic
  - 386 animals vaccinated
- May 2012 Spay/Neuter/Vaccination Clinic
  - 534 animals treated
  - Dogs Spayed/Neutered: 168
  - Cats Spayed/Neutered: 38
  - Dogs vaccinated: 281
  - Cats vaccinated: 47
  - Estimated savings: $158,025.00

Thank you from the San Carlos Apache Tribe
SCAT Reservation-Wide RMSF Prevention Project, 2013

1200 dogs collared and registered beginning March 2013, progressing all summer

- CDC Collar and Register Dogs Peridot: Rodeo II
- ACOs member of AZACA/Conference
- Mobile Vet Clinics
- RAVS Clinics
- Sero-Survey project

January, February, March, April, May, June, July, August

- Treat Yard #1
- Treat Yard #2
- Treat Yard #3
- Treat Yard #4
<table>
<thead>
<tr>
<th></th>
<th>Gilson Wash (n=20)</th>
<th>Bylas (n=20)</th>
<th>7 Mile (n=20)</th>
<th>Peridot (outside Rodeo area) (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Seresto Collar</td>
<td>18 (90%)</td>
<td>20 (100%)</td>
<td>18 (90%)</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>With Zodiac Collar</td>
<td>2 (10%)</td>
<td>0</td>
<td>1 (0.05%)</td>
<td>0</td>
</tr>
<tr>
<td>No Tick Collar</td>
<td>0</td>
<td>0</td>
<td>1 (0.05%)</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>No Ticks</td>
<td>19 (95%)</td>
<td>20 (100%)</td>
<td>20 (100%)</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>1 – 20 ticks</td>
<td>1 (0.05%)</td>
<td>0</td>
<td>0</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>20+ ticks</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
2013 SPAY AND NEUTER RESULTS

- **RAVS Clinics**
  - March 2013 Wellness Clinic
  - May Spay/Neuter

- **Mobile Vet Clinic**
  - From November 2012 to present:
    - 243 pets sterilized
    - 283 pets vaccinated
    - 215 Rabies vaccinated

http://www.youtube.com/watch?v=jdnCdM98oCA
RMSF Prevention Campaign Partners
SPECIAL THANKS TO:

- The SCAT Animal Control Officers
- SCAT Community Health Representatives
- Jennifer McQuiston, DVM
- Mark Miller
- Naomi Drexler
- Suzanne Todd, DVM
- Joanna Regan, MD
- Justin Gerding
- Kenny Hicks
- Stephen Pointkowski
- Tim Shelhamer
- Erica Weiss
- Michael Allison
- And many, many more.....