TOPICAL ACARICIDES DEER

Kirby C. Stafford III, Ph.D.
Chief Scientist, State Entomologist
CT Agricultural Experiment Station
New Haven, CT

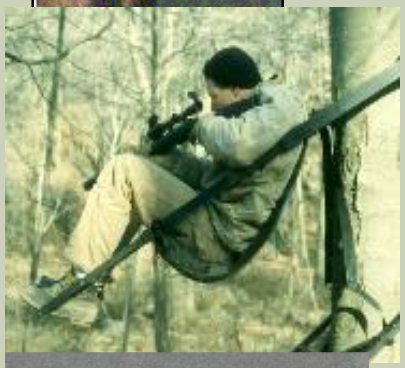
Tick IPM Symposium
Washington, D.C.
May 16, 2016

PROBLEMS ASSOCIATED WITH AN OVERABUNDANCE WHITE-TAILED DEER

- Ecological degradation
- Vehicle collisions
- Agricultural damage
- Home landscape/garden damage
- Decline in herd health
- Lyme disease & other tick-borne illnesses

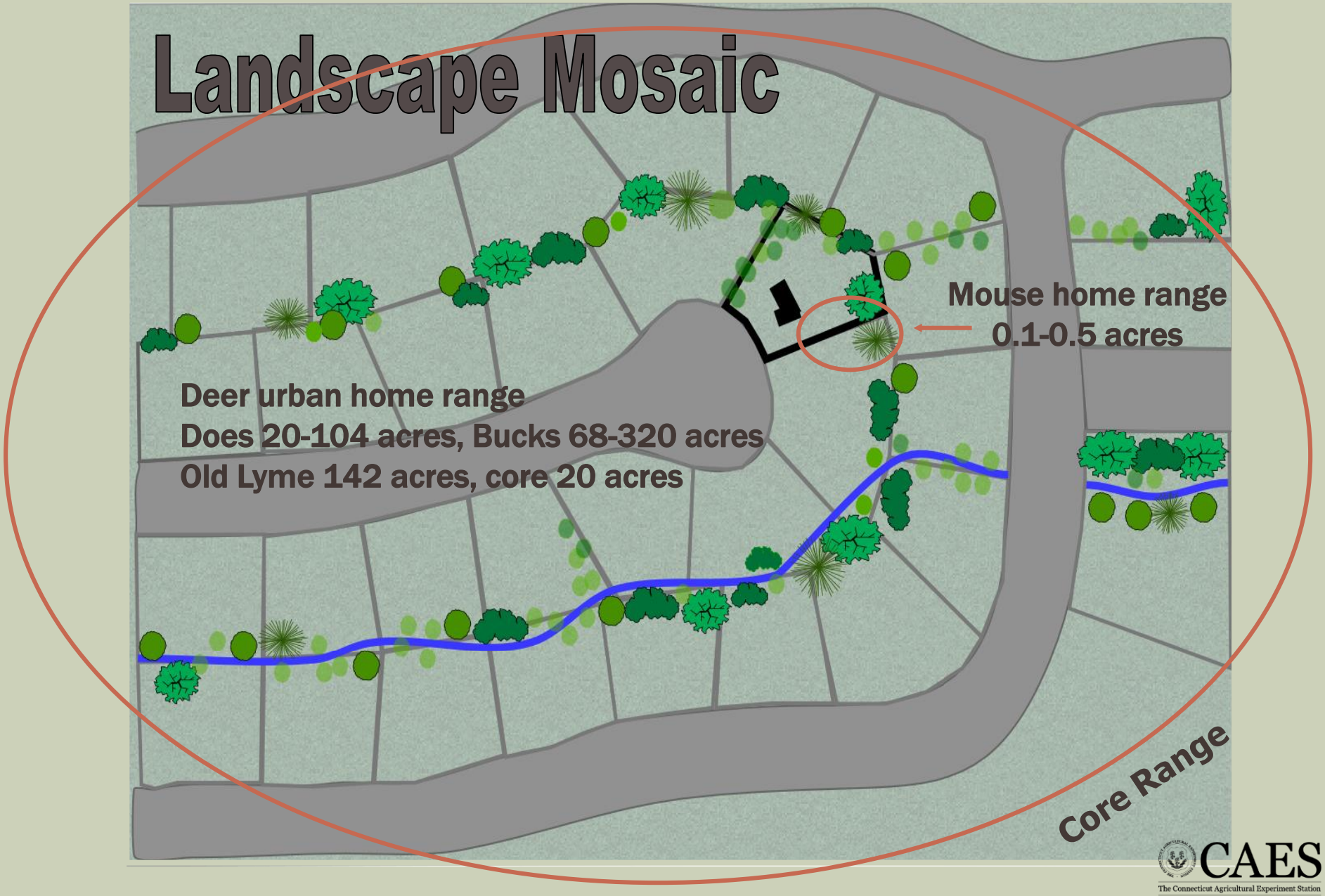
CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

MANAGEMENT OPTIONS FOR WHITE-TAILED DEER FOR TICK CONTROL



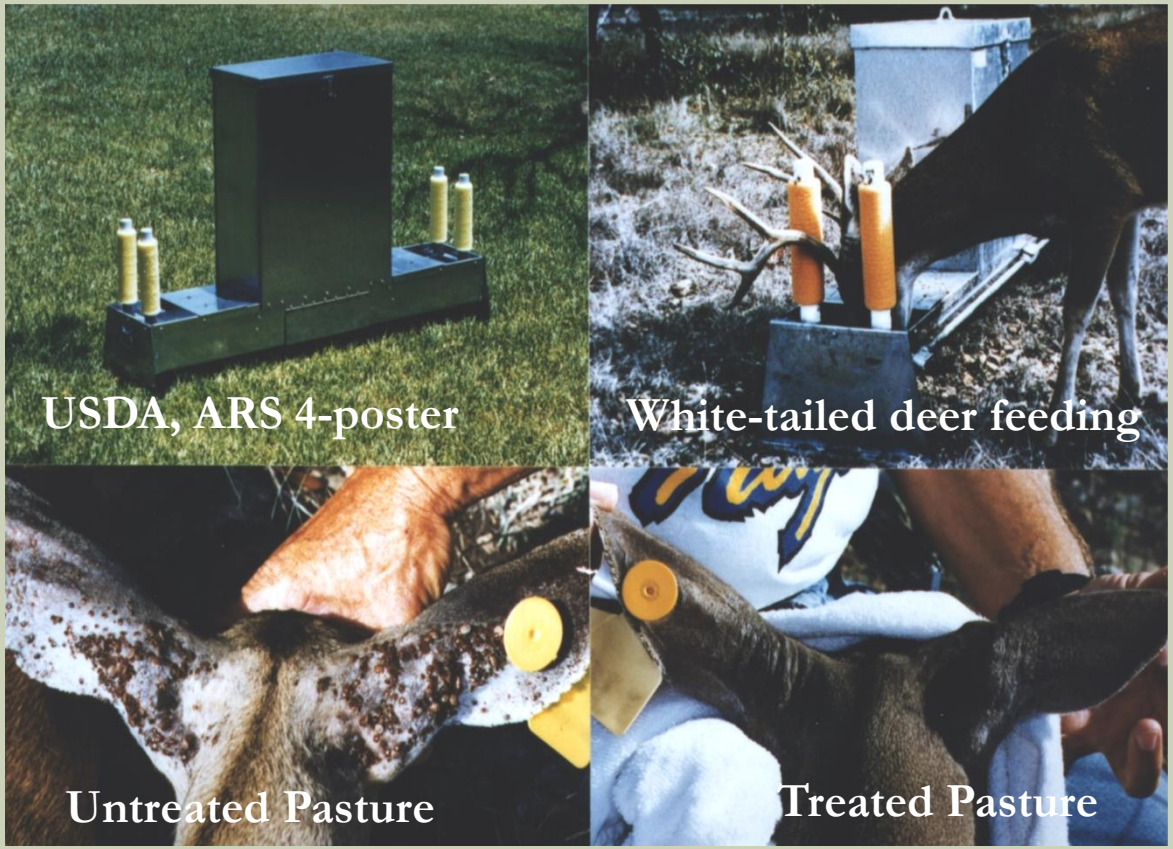
- Reduction deer abundance
  - Use of regulated hunting
  - Controlled hunts
  - Use sharpshooters
- Exclusion
  - Use fencing and repellents
- Treatment deer
  - Systemic ivermectin-medicated feed
  - Topical acaricides
  - Amitraz-collars
  - Anti-tick vaccines

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875



CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

DEVELOPMENT PASSIVE TOPICAL TREATMENT WHITE-TAILED DEER



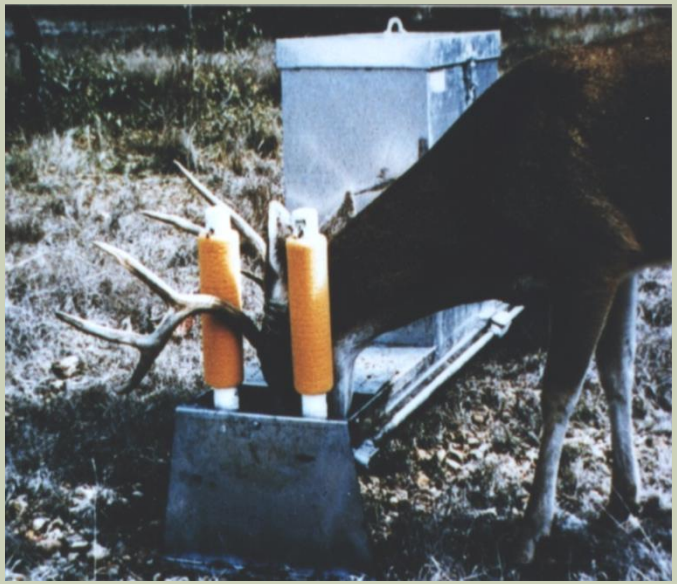
USDA Photo

- Deer populations Texas exploded
- Deer major alternate host for cattle fever ticks
- Confounding eradication program
- Ivermectin corn technology
- ARS-patented 4-poster device topical application acaricides

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

FIRST PERMETHRIN 4-POSTER *IXODES SCAPULARIS*, 1995-1998

- Goddard Space Center, MD (2.55 km^2)
- Control Patuxent Wildlife Research Center, MD (10.1 km^2)
- Both sites fenced and enclosed. Used 10% permethrin on rollers of the 4-poster self-treatment station
- Results
  Year 2: 100% control ticks on deer.
  Year 3: Reduction questing adult, nymphal & larval ticks by 91-100%
  Reduction larval and nymphal ticks on mice by 70-95%



Solberg, V. B. et al. 2003. J. Vector. Ecol. 28(1):117-134.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

NORTHEAST AREA-WIDE TICK CONTROL PROJECT

VBZD Special Issue. 2009. Vol. 9(4).

- Determine efficacy Point-Guard (2% amitraz) applied to white-tailed deer by the USDA-ARS 4-poster for control *Ixodes scapularis* and *Amblyomma americanum*.
- Five states
  1. Old Lyme, New London Co., CT
  2. Naval Weapons Station Earle, NJ
  3. Bedford, Westchester Co., NY
  4. Narragansett, Washington Co, RI
  5. Loch Raven, Baltimore Co., MD
     also BARC, Beltsville, and Gibson Island, MD.
- Study ran 1997-2004

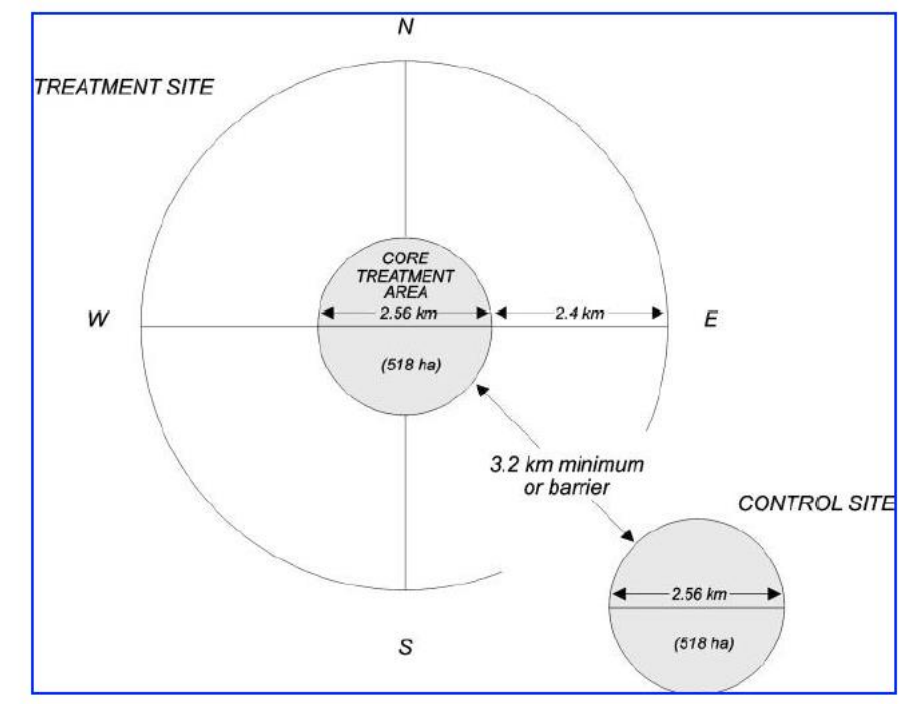
CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

USDA Northeast Area-wide Tick Control Project Leaders

- **John E. George, Ph.D., J. Mathews Pound, PhD., and J. Allen Miller, Ph.D.** (retired), USDA, ARS, Knipling-Bushland US Livestock Insects Research Laboratory, Kerrville, TX
- **Durland Fish, Ph.D.** (retired), Yale School of Medicine, New Haven, CT
- **Gary A. Mount, Ph.D.** (retired), USDA, Gainesville, FL
- **Kirby C. Stafford III, Ph.D.**, CT Agricultural Experiment Station, New Haven, CT
  Anthony J. DeNicola, Ph.D., White Buffalo, Inc., Hamden, CT
- **Terry L. Schulze, Ph.D.**, Contractor, Perrineville, NJ
  Robert A. Jordan, Ph.D., Wildlife Consultant, Edison, NJ
- **Thomas J. Daniels, Ph.D.**, Fordham Univ. Calder Ecology Center, Armonk, NY
- **Thomas N. Mather, Ph.D.**, University of Rhode Island, Kingston, RI
  Mathew C. Nickolson, Ph.D., University of Rhode Island, Kingston, RI
- **John F. Carroll, Ph.D.** (retired), USDA, ARS, LPSI, Beltsville, MD

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

STUDY DESIGN & RESULTS



VBZD Special Issue. 2009. Vol. 9(4).

- 23-25 feeders each site
- Core area 518 ha
- Used 2% amitraz
- During the study, maximal significant ($p < 0.05$) efficacies against nymphal blacklegged and lone star ticks at individual sites ranged from 60.0 to 81.7 and 90.9 to 99.5%, respectively.

  The major environmental factor that reduced efficacy was the occurrence of heavy acorn masts, which provided an alternative food resource for deer.

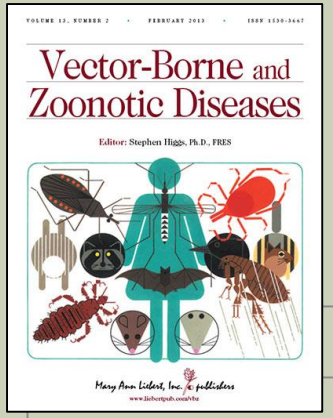
CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Deer Feeding at a 4-poster in Old Lyme, CT

Point-Guard
(2% amitraz)

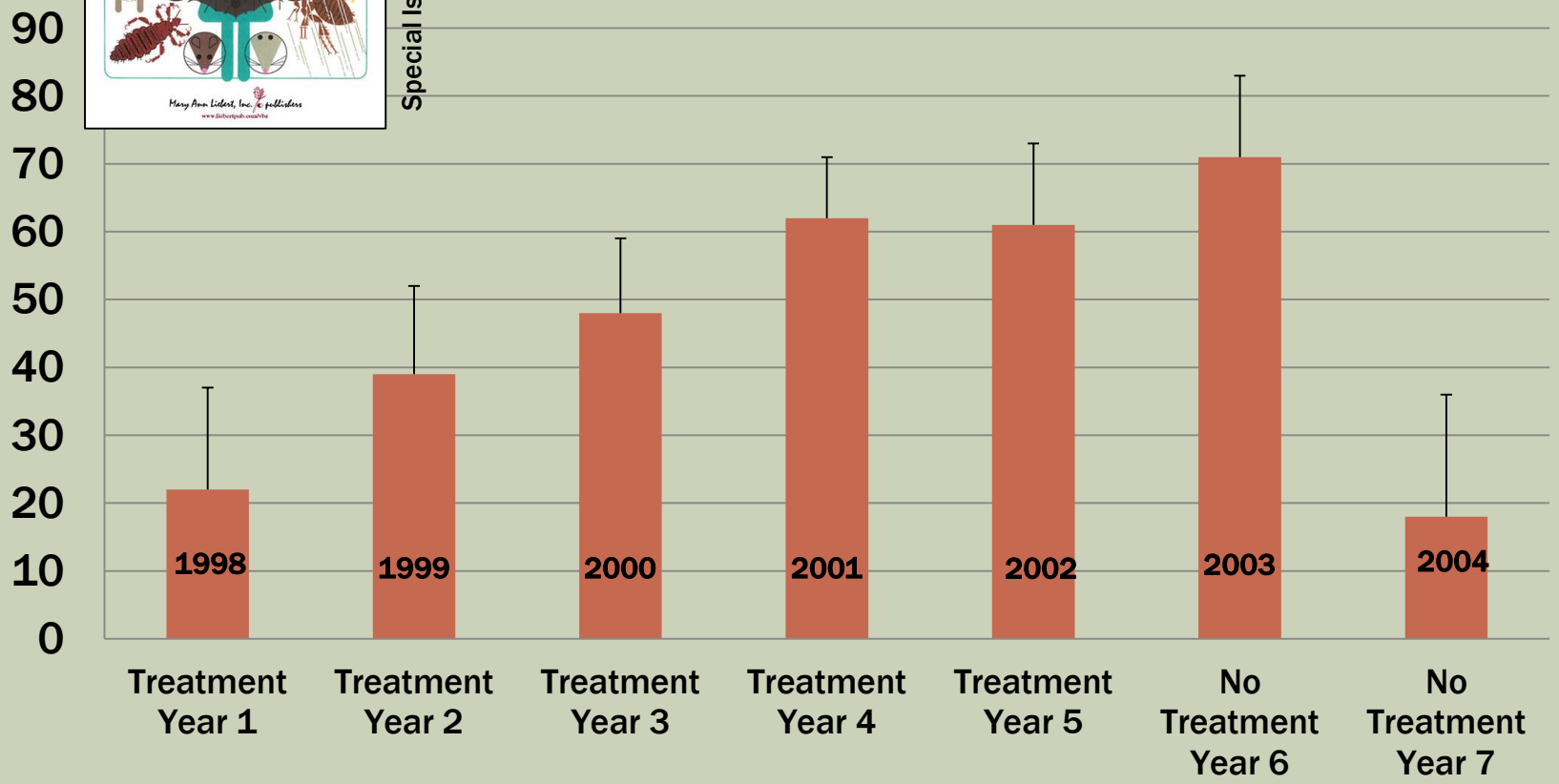
CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

META-ANALYSIS PERCENT CONTROL



Special Issue. 2009. Vol. 9(4).

71% control *I. scapularis* nymphs by 6th year
Entomological risk reduced average 68% (84% most sites)



During the study, maximal significant ($p < 0.05$) efficacies against nymphal blacklegged and lone star ticks at individual sites ranged from 60.0 to 81.7 and 90.9 to 99.5%, respectively. The major environmental factor that reduced efficacy was the occurrence of heavy acorn masts, which provided an alternative food resource for deer.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

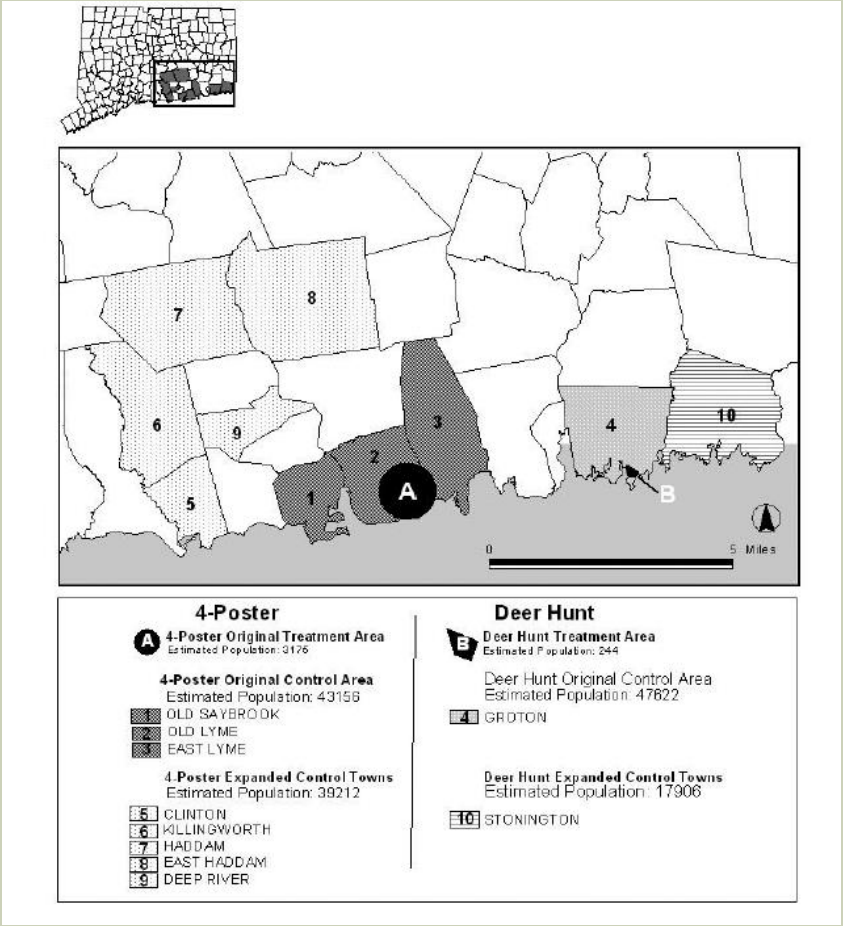
DEER-TARGETED ACARICIDES IMPACT ON LYME DISEASE

EVALUATION OF DEER-TARGETED INTERVENTIONS ON LYME DISEASE INCIDENCE IN CONNECTICUT

Jennifer M. Garnett, MPH
Neeta P. Connally, PhD
Kirby C. Stafford, III, PhD
Matthew L. Cartter, MD, MPH

Public Health Reports / May–June 2011 / Volume 126

Original treatment vs. control town
Lyme disease reduction, P = 0.04



CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Commercial 4-poster

- 4-POSTER™ TICKICIDE Y-Tex Corp., Cody, WY (10% permethrin, EPA Reg. No. 89039-7).
- Approved by EPA summer 2003 for restricted use on white-tailed deer with 4-poster
- 4-poster manufactured by Dandux Outdoors, a subsidiary of J.C. Daniels, Inc., Maryland.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

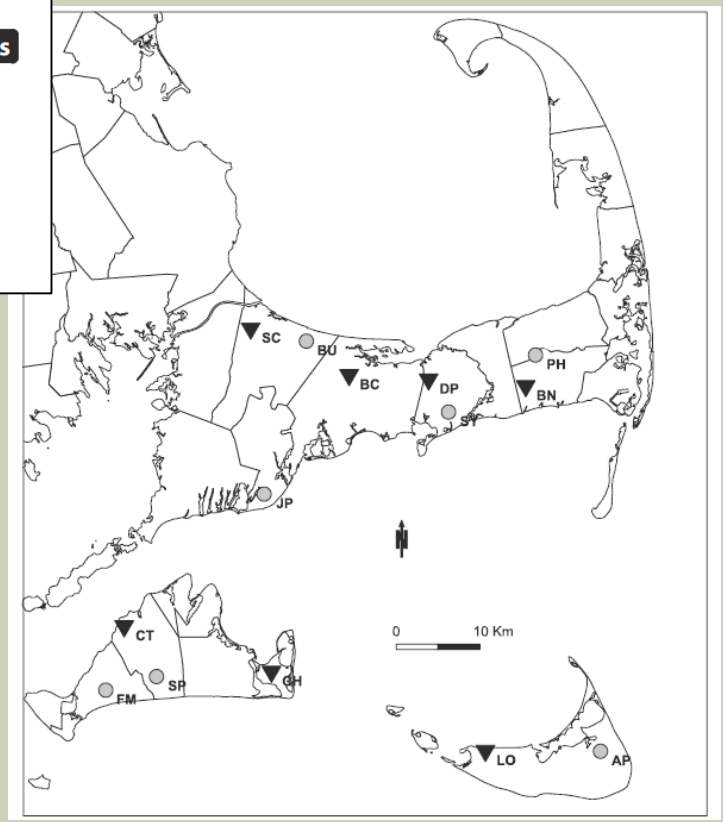
Grear *et al. Parasites & Vectors* 2014, **7**:292
http://www.parasitesandvectors.com/content/7/1/292

Parasites &Vectors

RESEARCH **Open Access**

The effectiveness of permethrin-treated deer stations for control of the Lyme disease vector *Ixodes scapularis* on Cape Cod and the islands: a five-year experiment

- **Forty-two 4-posters at 7 treatment sites with 7 control sites.**
- **Cape Cod, Martha's Vineyard, Nantucket**
- **Blacklegged ticks reduced only 8.4%, possibly due to lower density deployment and landscape and mammalian community characteristics.**



Locations of treated sites (triangles) and controls (filled circles)

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Nantucket – Fawns and some does can feed without touching the rollers…very narrow necks. Note, sometimes rollers get bent over making them ineffective…springs need to be stronger. This can reduce effectiveness of the station for days or weeks…we service them every 2 weeks.

Pictures provided courtesy Larry Dapsis

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Bruno

Cape Cod – Raccoons sometimes sit or lean back against the rollers. A number of the cape stations were loaded with 300# of corn from mid-Sept to mid-Nov…mostly consumed by raccoons based on imagery.

Pictures provided courtesy Larry Dapsis

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

CORNELL 4-POSTER DEER AND TICK STUDY, 2008-2010

Lone Star nymphs on deer ear Suffolk Co. NY
Photo courtesy Moses Cucura

- 4-posters
  Shelter Island (2 areas, n = 60 locations)
  Fire Island (n = 8 locations)
- Control or reference site
  Village of North Haven (NH)
- Feeding dominated by deer, raccoons, squirrels and birds
- Tick abundance at Shelter Island was significantly lower compared to reference site
- By 2010, 72-85% reduction both tick species, *I. scapularis* and *A. americanum*.

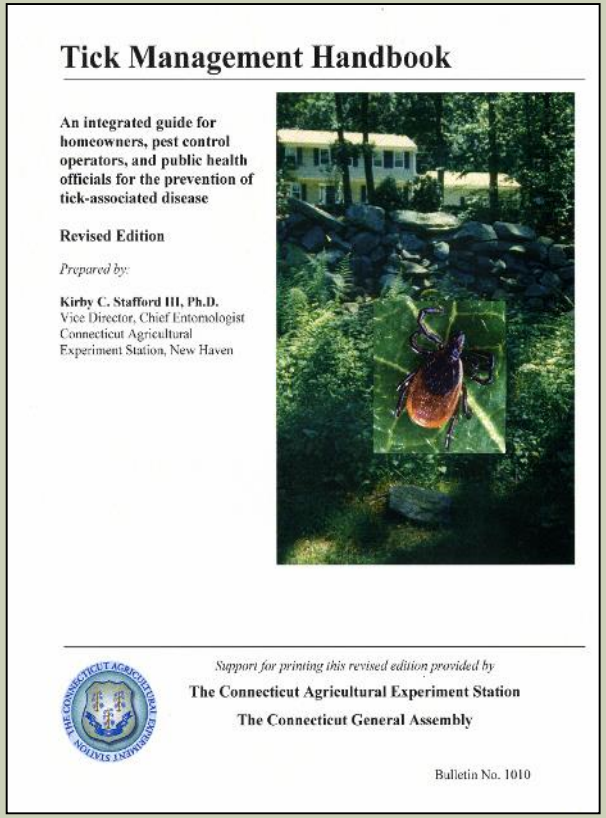
Curtis, Walker, and Gilrein. Report Shelter & Fire Island 4-poster Deer and Tick Study. May 2011.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

CONCLUSIONS

- Treatment of white-tailed deer with topical acaricide can provide effective control *Ixodes scapularis* and *Amblyomma americanum* on the animals
- 4-poster technology can reduce host-seeking tick abundance
- Some data suggest use can potentially impact human LD
- Many issues include:
  1. Adequate access to the devices or coverage
  2. Dominant animal monopoly
  3. Non-target animal use
  4. Maintenance of corn and pesticide on the rollers
  5. Servicing labor, broken or bent rollers
  6. Alternative food sources (i.e., acorns) that decrease usage
  7. Label restrictions on placement (i.e., distance from homes and children).

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875



www.ct.gov/caes

Contact information:

Dr. Kirby C. Stafford III

CT Agricultural Experiment Station

123 Huntington Street – Box 1106

New Haven, CT 06504

(203) 974-8485

Kirby.Stafford@ct.gov

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875