

Spread of Lyme Disease in Virginia – David Gaines

a) Background

- 1) Increasing incidence from 2000 (1990-2015)
 - (i) Began counting Lyme cases in 1989 in middle of year
 - (ii) Case definition changed in 1995
 - (iii) Case definition changed again in 2008
- 2) Big increase in 2007
- 3) Lyme has increased in incidence and spread
 - (i) Clustering of cases occur around major highways
 - (ii) Urban and suburban areas – higher populations
 - (iii) Far fewer cases seen in rural areas
 - (iv) Most cases seen in western VA
- 4) Most cases seen in areas with higher elevations (500 ft and above)

b) Lyme disease transmission ecology

- 1) Main vector is the nymphal stage of the black-legged tick (BLT)
 - (i) Northern variant nymphs
 - (a) Feed on over 100 different species including humans
 - (b) Quest on vegetation
 - (ii) Southern variant nymphs
 - (a) Feed primarily on lizards
 - (b) Stay down in leaf litter
- 2) Location
 - (i) Prior to 1990 BLT were found only in the Coastal zone
 - (a) Behaved a lot like SV ticks
 - (b) Nymphs were difficult to find
 - (ii) Since 1990, BLT have moved southwestwards into the Piedmont and Mountain regions
 - (a) Behave like NV ticks
 - (b) Increase seen in Lyme disease
- 3) Reservoirs
 - (i) White-footed mouse
 - (a) Highly competent reservoir
 - (b) Larvae feed on small rodents
 - (c) Major role in maintaining the Lyme infection cycle in BLT
- 4) Forest environment
 - (i) Species diversity
 - (a) Competent vs non-competent hosts
 - (b) Mixture can dilute transmission of *B burgdorferi* to ticks
 - (c) Species diversity greatest in undisturbed forests
 - (d) Suburbanization often results in fragmented and disturbed forest environments
 - (e) White-footed mice often become an important species in these areas
 - (ii) Importance of deer
 - (a) Prime mating ground; unmated females do not lay viable eggs

- (b) Primary source of blood for egg production
- (c) Eliminating deer populations leads to a 99% reduction in BLT populations
- (d) Habitat
 - (i) Forest edge environments (fragmented forests have more edge)
 - (ii) Suburbanized areas tend to restrict hunting
 - (iii) Suburbs become a refuge for deer