

Department OF **HEALTH**

House Agriculture and Rural Affairs Committee

Hearing on Deer Damage and Related Issues

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Good Morning Chairman Hershey, Chairman Daley and Members of the House Agricultural and Rural Affairs Committee. My name is Dr. James Logue, Acting Director of the Bureau of Epidemiology for the Pennsylvania Department of Health. On behalf of Secretary of Health, Calvin B. Johnson, I thank you for inviting the Department to speak about how deer populations can have an affect on human health, mainly through the presence of deer ticks that can cause Lyme disease.

What is Lyme Disease?

Lyme disease is a multi-system, multi-stage, inflammatory illness that typically has an incubation period from seven to 14 days, but can be as short as 3 days or as long as 30 days.

Symptoms include a characteristic rash (erythema migrans), accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, myalgia, and arthralgia. In its early stages, the disease is readily cured with oral antibiotics; however, untreated or inadequately treated infection may progress to late-stage rheumatologic or neurological complications requiring more intensive therapy.

Lyme Disease in the Commonwealth

The Pennsylvania Department of Health (Department) tracks and monitors all confirmed human cases of Lyme disease in order to focus its public awareness/education and outreach efforts. The Department has been tracking cases of Lyme disease since 1987 when it was first added to the list of reportable diseases. Cases are counted by the year of onset of symptoms, which may be several years before they are reported to the Department. Only cases that meet the Centers for Disease Control and Prevention's (CDC) surveillance case definition are counted. The case definition requires both presence of the characteristic rash or laboratory confirmation and one or

more late manifestations of the disease affecting the cardiovascular, musculoskeletal or nervous systems. Please also feel free to reference the packet of information that has been provided to you for a more detailed clinical explanation of the case definition. The statewide incidence of Lyme disease has increased from 0.3 1 new cases per 100,000 people in 1987 to 28.43 new cases per 100,000 people in 2004, which is the last year for which the Department has complete data. The highest rates of Lyme disease are found in Southeastern Pennsylvania, with Chester County having the highest five-year average incidence rate of 157.67 per 100,000 people. Other counties with relatively high rates of Lyme disease are Berks, Bucks, Cameron, Elk, Montgomery and York.' Included in your packets is a spreadsheet with Pennsylvania Lyme disease incidence data, in addition to maps of incidence rates and risk by county, the distribution of deer ticks in the United States, and a graph of Lyme disease incidence in Pennsylvania by region from 1980-2004.

Prevention - the First Line of Defense

The first line of defense against Lyme disease and other tick-borne illnesses is to identify the risk factors associated with the disease (presence of vector ticks) and to take proper precautions to avoid contracting the disease (limiting exposure to vector ticks or wearing preventative clothing). Individuals most at risk of exposure to ticks are those individuals who live or work in residential areas surrounded by woods or overgrown brush infested by vector ticks. In addition, persons who participate in recreational activities away from home such as hiking, camping, fishing and hunting in tick habitat, and persons who engage in outdoor occupations, such as landscaping, brush clearing, forestry, wildlife and parks management in endemic areas may also be at risk of contracting Lyme disease. For such individuals, the best way to avoid and protect against initial or prolonged exposure of a tick bite is to implement personal protective measures. These measures include: wearing appropriate clothing, tucking in pant legs and taping the areas where pants and socks meet, walking in the center of trails to avoid overhanging brush; checking for ticks after leaving potentially tick infested areas and promptly removing any ticks detected; or avoidance of tickinfested

areas, if possible. Early diagnosis and treatment prevents late-stage complications. To further deter the presence of vector ticks in and around personal properties, the CDC also recommends constructing physical barriers to discourage deer from entering the property and landscaping with deer-resistant plants. The CDC also recommends against feeding deer on or around the property.

Education IS Prevention

The Department provides education on Lyme disease to local communities through its state health centers located across the state, partnerships with its CountyMunicipal Health Departments and usual media outlets (TV, newspapers, radio, etc) to promote behaviors that can prevent tick bites. In addition, the Department collaborates with the Pennsylvania Department of Conservation and Natural Resources to disseminate information at all campsites, parks and public outdoor gathering facilities, areas known to have larger populations of vector ticks. The CDC is also a good resource to learn about cutting edge research and treatment of Lyme disease, which can be accessed at www.cdc.gov.

Conclusion

While deer populations have the potential to directly impact human health, mainly through the contraction of Lyme disease, it is important to identify the risk factors associated with the disease and educate the public to use precautionary measures to protect against ticks being present on the body. I thank you for this opportunity to share information with you about Lyme disease. I will be happy to answer any questions the Committee might have at this time.

Centers for Disease Control and Prevention Surveillance Case Definition

Lyme Disease

Clinical Case Definition:

Erythema migrans: For purposes of surveillance, EM is defined as a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing. A solitary lesion must reach at least 5 cm in size. Secondary lesions may also occur. Annular erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as EM. For most patients, the expanding EIVI lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mild stiff neck, arthralgia, or myalgia. These symptoms are typically intermittent. The diagnosis of EM must be made by a physician. Laboratory confirmation is recommended for persons with no known exposure, *or*

At least one **late manifestation**, as defined on the next slide, *and* laboratory confirmation of infection

Laboratory Criteria for Diagnosis:

Isolation of *Borrelia burgdorferi* from clinical specimen, *or*

Demonstration of diagnostic levels of IgM and IgG antibodies to the spirochete in serum or CSF, *or*

A two-test approach using a sensitive enzyme immunoassay or immunofluorescence antibody followed by Western blot is recommended.

Late manifestations:

include any of the following *when an alternate explanation is not found:*

Musculoskeletal system: Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, *sometimes* followed by chronic arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. Additionally, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.

Nervous system: Any of the following, alone or in combination: Lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Encephalomyelitis must be confirmed by showing antibody production against *B. burgdorferi* in the cerebrospinal fluid (CSF), demonstrated by a higher titer of antibody in CSF than in serum. Headache, fatigue, paresthesia, or mild stiff neck alone are not criteria for neurologic involvement.

Cardiovascular system: Acute onset, high-grade (2nd or 3rd degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

LYME DISEASE IN THE COMMONWEALTH OF PENNSYLVANIA

Introduction

Lyme disease is a tick-borne zoonosis caused by infection with the spirochete,

Borrelia

burgdorferi. The number of annually reported cases of Lyme disease in the United States has

increased about 25-fold since national surveillance began in 1982, and a mean of approximately

12,500 cases annually was reported by states to the Centers for Disease Control and Prevention

(CDC) from 1993 - 1997. In the United States, the disease is mostly localized to states in the

northeastern, mid-Atlantic, and upper north-central regions, and to several counties in northwestern California. In Pennsylvania, cases are scattered throughout the Commonwealth

(Figure 1) with the highest incidence of disease being located in the eastern parts of the state,

with a total of 34940 cases reported since 1980. From 2000-2004, an average of 3229 cases were reported to have had their onset each year.

Lyme disease is a multi-system, multi-stage, inflammatory illness. In its early stages, the disease

is readily cured with oral antibiotics; however, untreated or inadequately treated infection may

progress to late-stage rheumatological or neurological complications requiring more intensive

therapy. The first line of defense against Lyme disease and other tick-borne illnesses is

avoidance of tick infested habitats, use of personal protective measures such as repellents and

protective clothing, and checking for and removing attached ticks. Early diagnosis and treatment

prevents late-stage complications.

Lyme Disease Vaccine

A Lyme disease vaccine using recombinant *B. burgdorferi* lipidated outer surface protein A

(rOsp A) as immunogen (LYMErix™, SmithKline Beecham Pharmaceuticals) was licensed in

1998. In February 2002, LYMErix™ was removed from the market by Glaxo Smith Kline who

cited poor sales volume as the reason for this decision.

Clinical Features of Lyme Disease

Lyme disease most often presents with a characteristic rash, erythema migrans, accompanied by

nonspecific symptoms such as fever, malaise, fatigue, headache, myalgia, and arthralgia. The

incubation period from infection to onset of erythema migrans is typically 7 to 14 days but may

be as short as 3 days and as long as 30 days. Erythema migrans is observed in 85% or more of

patients with early symptomatic infection; however, a small proportion of infected individuals

have no recognized illness (asymptomatic infection determined by serological testing), or

manifest only non-specific symptoms suggesting viral illness, such as fever, headache, fatigue,

and myalgia.

Lyme disease spirochetes disseminate from the site of inoculation by cutaneous, lymphatic and

blood-borne routes. The signs of early disseminated infection usually occur days to weeks after

the appearance of a solitary erythema migrans lesion. In addition to multiple (secondary) erythema migrans lesions, early disseminated infection may be manifest as disease of the nervous system, the musculoskeletal system, or the heart. Neurologic manifestations include lymphocytic meningitis, cranial neuropathy (especially facial nerve palsy), and radiculoneuritis. Musculoskeletal manifestations may include migratory joint and muscle pains with or without objective signs of joint swelling. Cardiac manifestations are rare but may include transient atrioventricular blocks of varying degree. *Borrelia burgdorferi* infection in the untreated patient may progress to late disseminated disease weeks to months after infection. The most common manifestation of late disseminated Lyme disease is intermittent arthritis of one or a few joints, usually large, weight-bearing joints such as the knee. Less frequently, patients develop chronic axonal polyneuropathy, or encephalopathy, the latter manifested by subtle cognitive disorders, sleep disturbance, fatigue, and personality changes. Infrequently, Lyme disease morbidity may be severe, chronic and disabling, especially if the disease is treated late. An ill-defined post-Lyme disease syndrome occurs in some persons following treatment for Lyme disease. Lyme disease is rarely, if ever, fatal.

Treatment

Lyme disease can usually be treated successfully with standard antibiotic regimens. Early and uncomplicated infection, including infection presenting with isolated cranial nerve palsy, almost always responds satisfactorily to treatment with orally administered antibiotics. Parenteral antibiotics are generally recommended for treating meningitis, later stage neurologic Lyme disease, and complicated Lyme disease arthritis. Late, complicated Lyme disease may respond slowly or incompletely, and more than one antibiotic treatment course may sometimes be required to eliminate active infection. A minority of patients have persistent or recurrent symptoms following appropriate antibiotic therapy ("chronic Lyme disease", cpost-Lyme

syndrome). These symptoms may be due to causes other than persisting infection.

Populations at Risk of Lyme Disease

Most *B. burgdorferi* infections are thought to result from peri-residential exposure to ticks during property maintenance, recreation, and leisure activities. Thus, individuals who live or work in residential areas surrounded by woods or overgrown brush infested by vector ticks are at risk of getting Lyme disease. In addition, persons who participate in recreational activities away from home such as hiking, camping, fishing and hunting in tick habitat, and persons who engage in outdoor occupations, such as landscaping, brush clearing, forestry, and wildlife and parks management in endemic areas may also be at risk of getting Lyme disease.

Assessing the Risk of Lyme Disease

An individual's risk of developing Lyme disease depends on each person's likelihood of being bitten by tick vectors infected with *B. burgdorferi*. This likelihood is primarily determined by the density of vector ticks in the environment (which varies by place and season), the prevalence of *B. burgdorferi* infection in vector ticks, and by the extent of person-tick contact, which is related to the type, frequency, and duration of a person's activities in a tick infested environment.

The assessment of risk should first consider the geographical distribution of Lyme disease. The areas of highest Lyme disease risk in the United States are concentrated within a few northeastern and north-central states. The risk of Lyme disease differs greatly not only between regions, states and counties, but even within counties and townships. However, there are insufficient data available at the State level to make these risk determinations at the local level.

Therefore, this document treats the risk within any particular county as uniform. Local health departments may have access to more detailed information about the distribution of Lyme disease risk within a given county. In those cases, the local risk assessments should be used rather than the cruder county-level assessments in this document.

A classification of overall Lyme disease risk for the counties in Pennsylvania is shown in Figure 2 and Table 1.

The second step in determining Lyme disease risk is to assess the individual's activities. High risk activities are those that involve frequent or prolonged exposure to the habitat of infected ticks at times of the year when the nymphal stages of these ticks are actively seeking hosts (April-July). Typical habitats of Ixodes ticks are wooded, brushy, or overgrown grassy areas that are favorable for deer and the tick's rodent hosts. Various recreational, property maintenance, occupational or leisure pursuits that are carried out in tick habitat may be high-risk activities.

When in highly endemic areas, individuals can reduce their risk of Lyme disease by avoiding tick infested habitat. If exposure to tick infested habitat cannot be avoided, individuals may reduce their risk of infection by applying repellents, wearing protective clothing, and regularly checking for and removing attached ticks.

Individuals who are unlikely to seek medical care for early manifestations of Lyme disease may be at increased risk for Lyme disease complications. Morbidity from Lyme disease can be significantly reduced by detecting and treating the infection in its early stages, since early and correct treatment almost always results in a prompt and uncomplicated cure.

† Counties were classified into risk categories as follows:

1. Counties with a five-year average incidence of **24** 0 per 100,000 population were considered "high risk."
2. Additional counties with established populations of *I. scapularis* ticks (as reported by CDC) from 1907-1996. (See Figure 3 for the distribution of *I. scapularis* ticks in the United States.) were classified as "moderate risk."
3. Counties with reported, but not established tick populations were considered "low risk."
4. Counties with neither established nor reported tick populations were classified as "minimal or no risk."

Lyme Disease Risk Classification

Persons at High Risk:

- a. Reside, work or recreate in areas of high risk (see map and list) during Lyme disease transmission season (April to September) AND
- b. Engage in activities that result in frequent or prolonged exposure to tick

infested habitat.

Persons at Moderate Risk:

- a. Reside, work or recreate in areas of high risk during Lyme disease transmission season (April-September) **AM**
- b. Are exposed to tick infested habitat, but whose exposure is neither frequent nor prolonged.

Persons at Moderate Risk:

- a. Reside, work or recreate in areas of moderate risk during Lyme disease transmission season (April-September) **AND**
- b. Engage in activities that result in frequent or prolonged exposure to tick infested habitat.

Persons at Low Risk:

- a. Reside, work or recreate in areas of moderate risk during Lyme disease transmission season (April-September) **AND**
- b. Are exposed to tick infested habitat, but whose exposure is neither frequent nor prolonged.

Persons at No Risk:

- a. Do not reside, work or recreate in areas of high or moderate risk during Lyme disease transmission season (April-September) **OR**
- b. Do reside, work or recreate in areas of high or moderate risk during Lyme disease transmission season (April-September) **BUT** have minimal or no exposure to tick infested habitat.

Prevention of Lyme Disease

1. Prophylactic antibiotic use following tick bite

A study published in July 2001 in the *New England Journal of Medicine* showed that **a single**

200 mg dose of the antibiotic doxycycline, largely prevented early Lyme disease. The antibiotic

had to be **given within 72 hours after a deer tick bite**. This study was conducted in Westchester

County, New York, where there is a very high incidence of Lyme disease (0.5-1%). Of those

who received doxycycline, 30% developed minor side effects (primarily nausea and vomiting).

They also found that the only people likely to develop Lyme disease after tick bites were those

who had been bitten by deer tick nymphs² which had been attached for 72 hours or more (and

were thus engorged with or full of blood). Of those who had an engorged nymphal deer tick

attached for at least 72 hours, 25% of those who did not receive antibiotics developed erythema

migrans, the bull's eye rash typical of Lyme disease.

Non-pregnant, non-nursing adults and children over the age of eight in Berks, Bucks,

Cameron, Chester, Elk, Montgomery and York Counties who remove an engorged deer tick

nymph should consider taking doxycycline within 72 hours after removal of the tick. If the tick

was not engorged, there's no need for antibiotics. Bites from larval or adult deer ticks are not an

indication for preventive antibiotics.

Anyone bitten by a tick should watch the area where the tick was attached for the next month or

so. If a rash develops at the site from which the tick was removed, or if an erythema migrans like

rash develops elsewhere on the body at any time, consult a physician. If a physician diagnoses

erythema migrans, antibiotics can be prescribed to treat early Lyme disease. Lyme disease is

nearly always easily cured by a 10-day to two-week course of oral antibiotics if caught early

(when the rash appears).

2. Other protective actions

The risk of being bitten by an infected tick can be greatly decreased by using the following

precautions:

Use insect repellent containing low concentrations (10 to 30%) of diethyltoluamide (DEET)

on clothing and exposed skin (not face):

Apply DEET sparingly on exposed skin, do not use under clothing.

Do not use DEET on the hands of young children; avoid applying to areas around the eyes and mouth.

Do not use DEET over cuts, wounds or irritated skin. Wash treated skin with soap and water after returning

indoors; wash treated clothing.

Avoid spraying in enclosed areas; do not use DEET near food.

Avoid tick-infested areas;

Wear light colored clothing so ticks can be spotted more easily;

Tuck pant legs into socks or boots, and shirts into pants; ■ Tape the areas where pants and socks meet;

There are four stages in the life cycle of the deer tick: egg, larva (which cannot transmit Lyme disease),

nymph, and adult.

Table 1 :

High Risk

Adams

Berks

Bucks

Butler

Cameron

Centre
Chester
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Elk
Lancaster
Lebanon
Lehigh
McKean
Monroe
Montgomery
Montour
Northampton
pew
Philadelphia
Pike
Potter
Sullivan
York

Lyme Disease Risk Classification of Pennsylvania Counties

Moderate Risk Low Risk

Blair Allegheny
Clarion Armstrong
Erie Cambria
Mercer Crawford
Wayne Fulton
Huntingdon
Jefferson
Lackawanna
Lawrence
Luzerne
Lycoming
Mifflin
Northumberland
Schuylull
Union
Warren
Washington
Westmoreland
Minimal or No Risk
Beaver

Bedford
Bradford
Carbon
Fayette
Forest
Franklin
Greene
Indiana
Juniata
Somerset
Snyder
Susquehanna
Tioga
Venango
Wyoming

Highest risk (100+ per 100,000 5-year average incidence rate)

Very high risk (50-99.99 per 100,000 5-year average incidence rate)

<50 per 100,000 5-year average incidence rate