

NEW JERSEY MOSQUITO CONTROL ASSOCIATION, INC.

The Use of Sentinel Chickens for St. Louis Encephalitis
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ABSTRACT. Sentinel chicken flocks consisting of 10 birds each, were utilized to monitor SLE virus in New Jersey during 1980 and 1981. Results from the first 2 years have shown the technique to be both accurate and economical. Plans are being formulated to continue the effort in the future.

INTRODUCTION

St. Louis encephalitis (SLE) is a mosquito-borne virus disease that is widely distributed in the continental USA. The disease is known to attack people of all ages but neurological complications and death are most frequent in the elderly. The virus is thought to overwinter in hibernating mosquitoes (Bailey et al. 1978) with a variety of wild birds functioning as amplifying hosts in the spring. The mosquitoes that serve as the primary vectors to humans vary from one part of the country to the next. In the northeast, Culex pipiens has been incriminated as an important species but Culex restuans and Culex salinarius may also play a major role (Clark et al. 1977).

New Jersey is on the geographic fringe of SLE's main distribution, thus, human outbreaks have been sporadic over the years. In 1964, 117 cases were documented in the Camden-Philadelphia area with the city of Camden representing a rather distinct epi-center (Altman and Goldfield 1968). In 1975, 29 human cases were recorded in New Jersey with one center of activity along the Delaware River south of Trenton and another in the area encompassed by Monmouth and Middlesex Counties. New Jersey has not maintained an ongoing surveillance program to monitor SLE virus thus, there are no data to document the presence or absence of virus in the state when human cases do not occur. Information is needed to determine if SLE virus is merely introduced from the west during outbreak years or is continually present at a low level in mosquitoes and birds.

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In 1980, the New Jersey State Department of Health and the Agricultural Experiment Station cooperated in a pilot surveillance program to monitor SLE virus with sentinel chicken flocks (Schulze 1981). The following year, the New Jersey State Mosquito Control Commission allocated funds to continue the surveillance on a broader scale. The first 2 years have produced encouraging results in our understanding of the epidemiology of SLE virus in the urban north-east. This paper will review the procedure that New Jersey has adopted and present a plan for SLE surveillance for the future.

METHODOLOGY

In both 1980 and 1981, SLE surveillance was accomplished by strategically placing chicken flocks in areas where human cases of the disease had occurred in the past. Domestic poultry do not develop symptoms when they make contact with SLE virus but they do develop antibody that can be detected through blood analysis. The mosquito vectors are bird feeders and the chickens are used as attractants. By repeatedly bleeding the sentinel flocks during the active season, the system provides an inexpensive method to indirectly sample vector populations over a wide geographic area. Sero-conversion (conversion from antibody negative to antibody positive) provides evidence of SLE virus in the immediate vicinity. The number of birds that sero-convert is a direct indication of the intensity of transmission.

The sentinel flocks used in New Jersey consisted of 10 birds each of equal age with no previous exposure to the virus. White leghorns were used in 1980 and golden comets were employed in 1981. The birds were hatched over the winter and temporarily housed at the Agricultural Experiment Station in the spring. Mosquito Commission Superintendents located cooperators that were paid to house and care for the flocks during the period of the experiment. Site selection was based on the known status of Culex populations in areas with a history of human cases of SLE virus. In many cases, the Mosquito Commissions built special pens to house the birds according to Center for Disease Control (CDC) recommendations.

In 1980, 4 flocks were distributed in the Counties of Camden, Burlington, Mercer and Middlesex. In 1981, the number was increased to 12 with placement in Salem, Gloucester, Camden (4 flocks), Burlington (2 flocks), Mercer, Monmouth, Middlesex and Bergen. Each bird was banded and bled from the wing vein every other week from late May to November. The blood samples were centrifuged at Rutgers University, frozen at -70°F and the whole serum was transported to the New Jersey State Department of Health Laboratories for antibody analysis.

RESULTS AND DISCUSSION

In 1980, SLE virus became a national problem with notable outbreaks in Texas, Louisiana, Tennessee and Illinois. Two of the 4

pilot flocks established in New Jersey, sero-converted during the season and a single human case was documented in the state. Schulze (1981) has reviewed the chronology of events, including the isolation of virus from Cx. pipiens as an aftermath of the episode. The pilot program showed that the sentinel system could provide an early warning system to alert mosquito control agencies to concentrate on Culex control and reduce the risk of human involvement.

In 1981, no conversions were detected in any of the 12 flocks that were placed in the state. The information agreed with regional data that ultimately showed that SLE virus was relatively inactive throughout the USA. Negative data is frequently viewed as being irrelevant, but for the first time in many years, New Jersey had a monitoring system to indicate that SLE was not being amplified at detectable levels. Prior to 1980, the first indication of SLE virus in the state was the report of a human case, followed by local epidemics and the eventual documentation of an epi-center.

CONCLUSIONS

The use of sentinel chickens appears appropriate for New Jersey where SLE does not occur on a regular basis. Data from the sentinel flocks appear accurate and the method is much less expensive than screening large numbers of mosquitoes over a broad geographic area. Results from the first 2 years of the investigation have been encouraging and plans are being formulated to continue the effort in 1982. The New Jersey State Mosquito Control Commission has allocated funds to support the study with early detection of SLE virus as the major objective.

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