

RESULTS OF A SEROSURVEY FOR WEST NILE VIRUS IN FREMONT COUNTY

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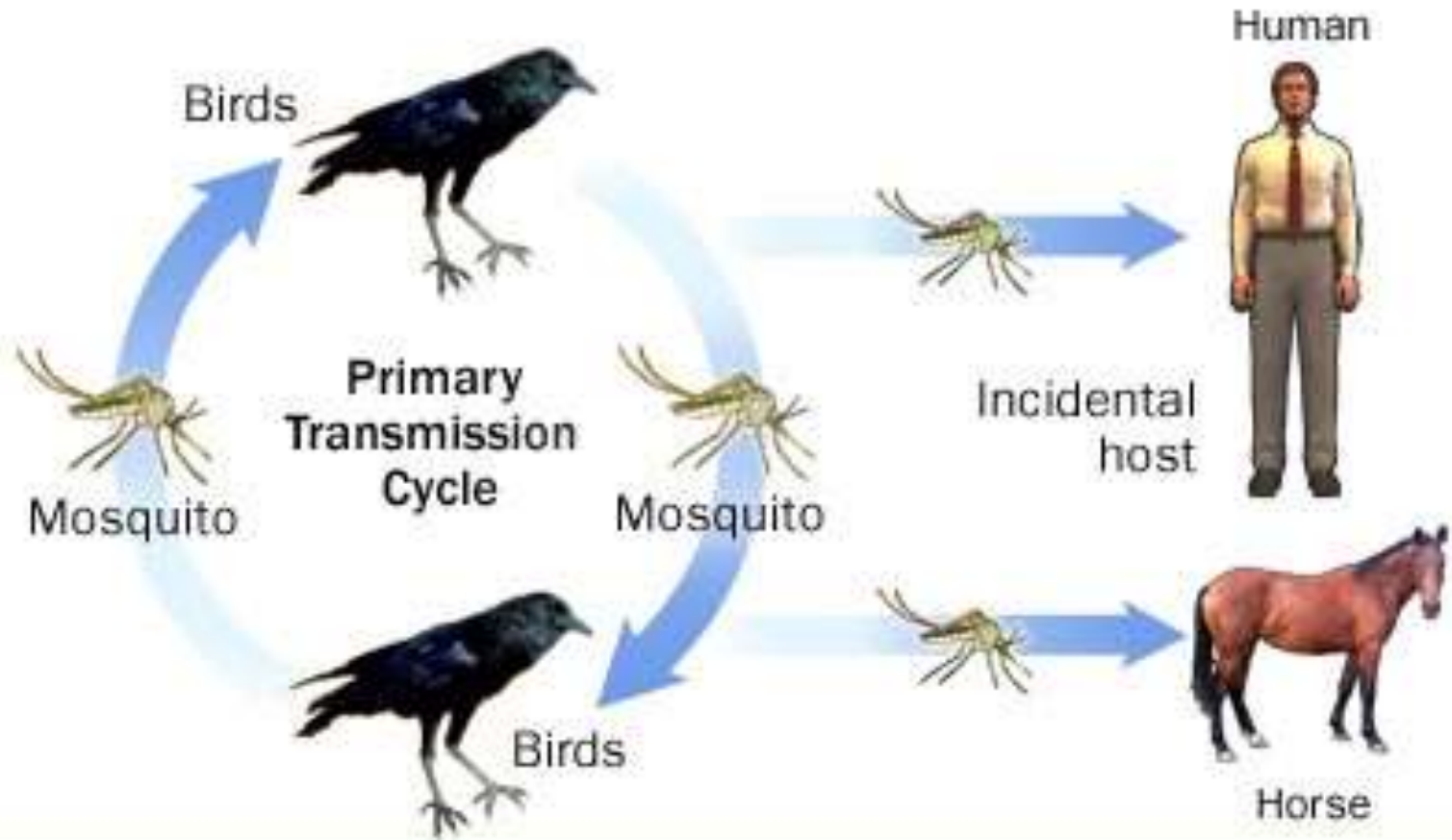
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Introduction

- West Nile virus (WNV) was first discovered in Uganda in 1937
- WNV is a flavivirus, the same family as Dengue Fever, Tick Borne Encephalitis, and Yellow Fever
- WNV is a (+) single stranded RNA virus that enters the cell and mimics the host cell's mRNA and replicates

Route of transmission



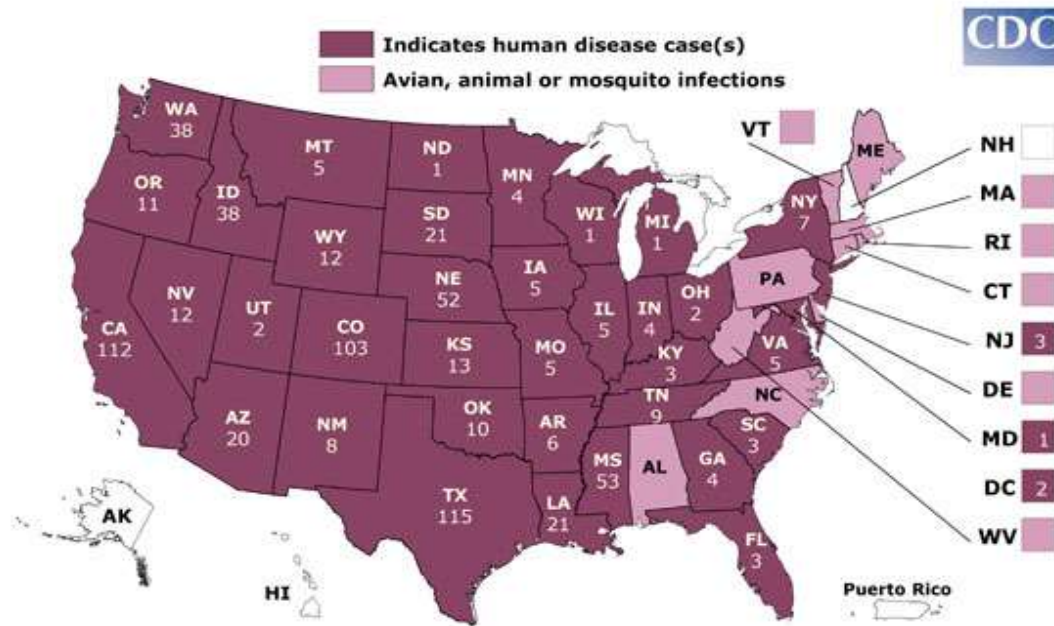
Introduction (continued)

- The primary vector in Wyoming of WNV is the *Culex tarsalis* mosquito
- Transmission also via transfusions, transplants, and mother-to-child have occurred, but are very rare
- Symptoms of the virus in humans:
 - ~80% experience no symptoms
 - ~19% experience fever and malaise
 - <1% experience severe, disabling illness
 - encephalitis, meningitis, and polio-like paralysis
- There is no vaccine available in the US for humans



Introduction (continued)

- WNV was first detected in the United States in 1999
- The virus rapidly migrated across the lower 48 continental states over the course of 10 years



West Nile virus in Wyoming

- Human cases of WNV were first detected in Wyoming in 2002
- There were 2 human cases in 2002
- 2007 was the height of WNV cases in Wyoming
 - There were 185 human cases with two fatalities
 - 63% of these cases were in Fremont County



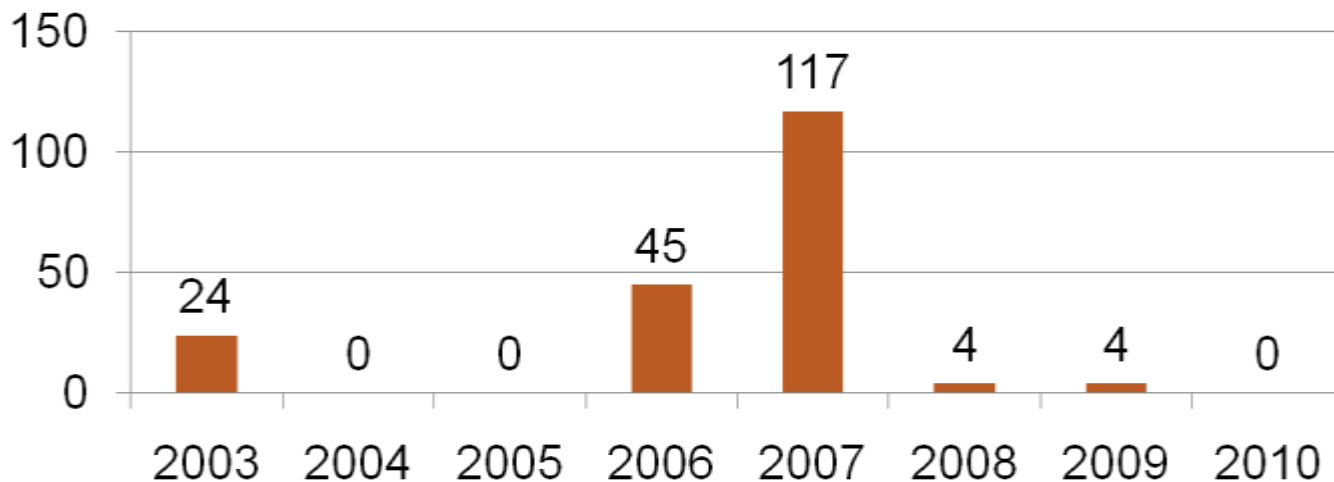
WNV in Wyoming (continued)



- Since 2007 the rate of human cases in Wyoming has declined significantly
- In 2009 there were 12 diagnosed human cases, with one fatality

WNV in Fremont County, WY

- In Fremont County in 2007 there were 117 human cases of WNV with one fatality in Fremont County (63% of all cases in Wyoming that year)
- Fremont County had four human cases in both 2008 and 2009



Hypothesis

There is a high prevalence of immunity to WNV in Fremont County due to a large number of individuals with prior exposure to the virus since 2002, indicated by the presence of WNV antibodies. As a result, the rate of disease from WNV has dropped due to widespread immunity within the population.

Purpose of Study

- To determine the prevalence and the distribution of the West Nile virus carriers of IgG in human subjects throughout Fremont County

Previous Studies

- A review of the literature indicates very few serosurveys for West Nile virus, and the results from these surveys are mixed
 - A study of two populations in Punjab Province of Pakistan in 1978-1979 indicated that 32.8% and 38.5% were sera positive for WNV (Hayes)
 - A study in 1999 in New York city during an encephalitic epidemic indicated that only 2.6% of the population was sera positive (Mostahshari)
 - An additional study in Spain indicated a sera positive rate as low as 0.6% (Bernabeu-Wittel)

Materials and Methods

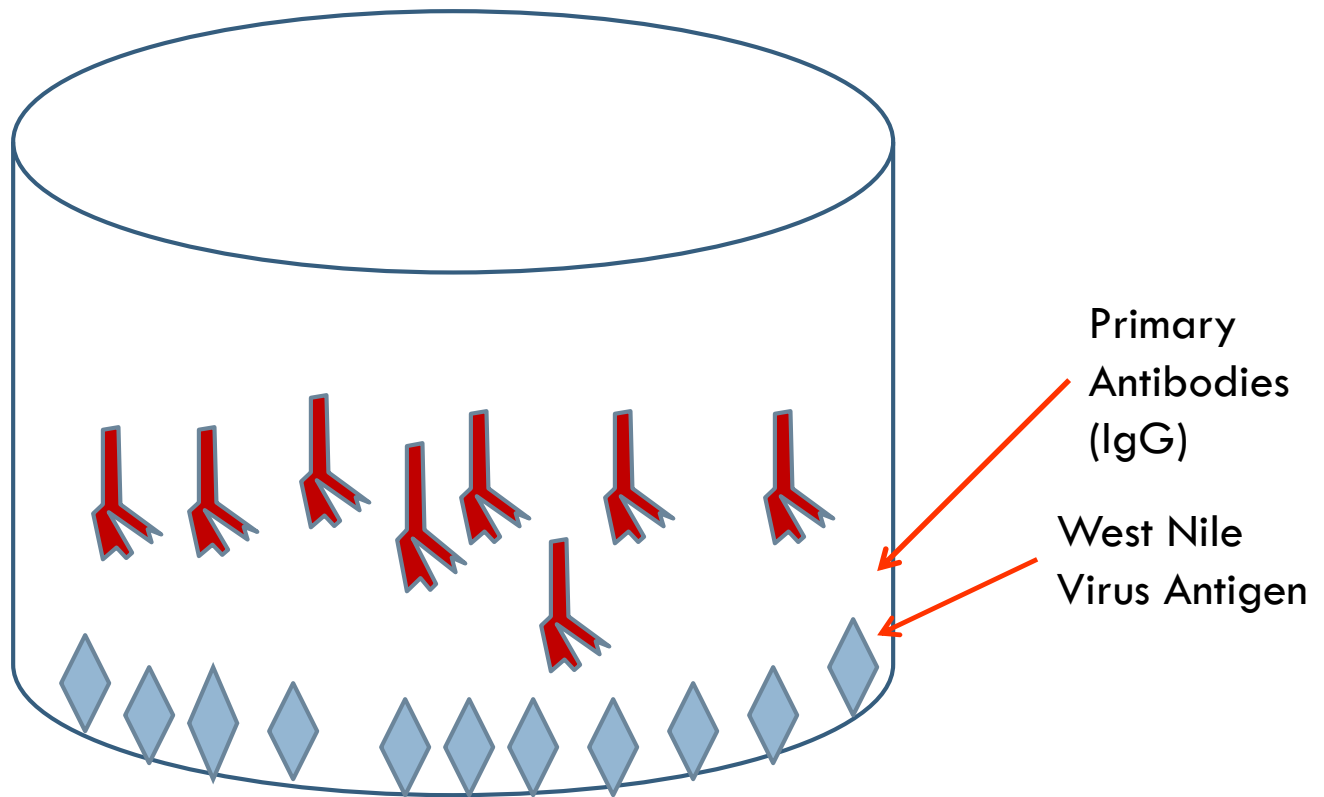
- Blood samples were collected from human subjects that have lived in or are living in Fremont County
- Blood samples were centrifuged for 15 minutes to separate the serum from the red blood cells
- Serum was extracted and stored at -20°C until tested using ELISA (Enzyme Linked Immunosorbant Assay)



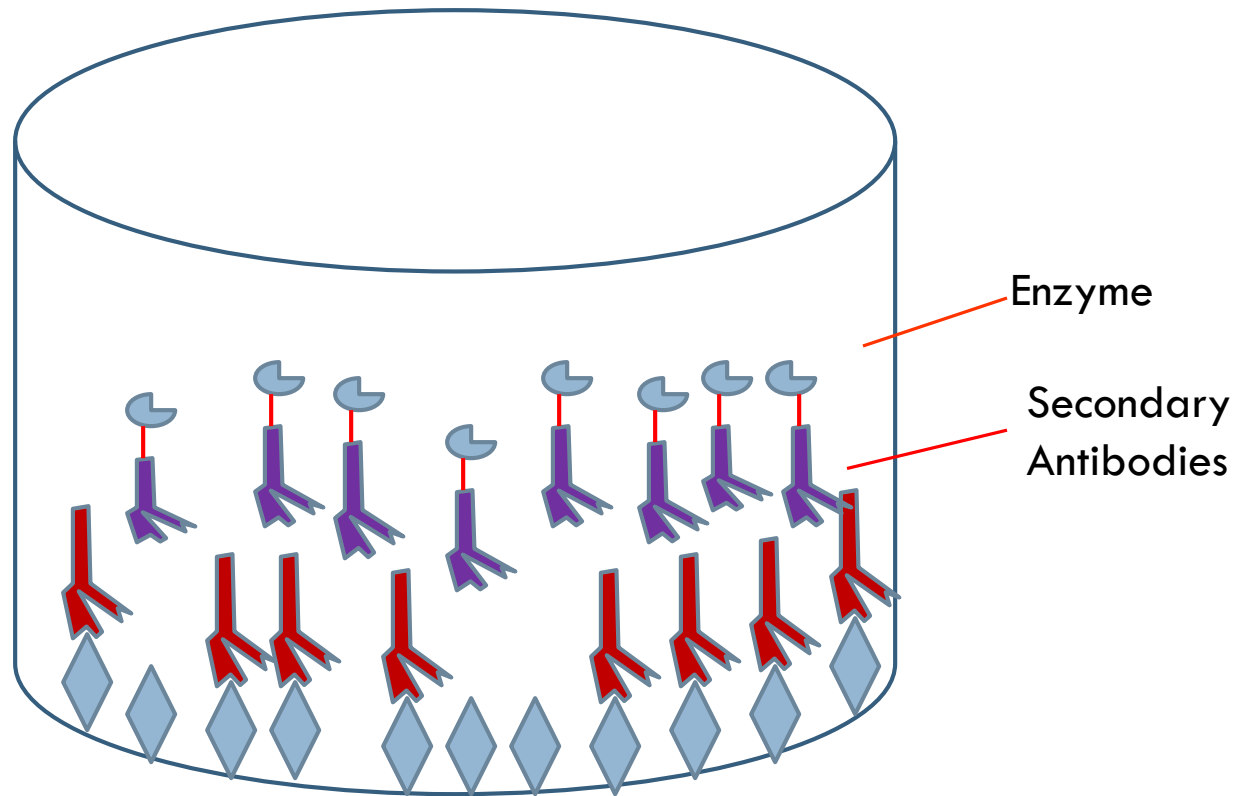
ELISA

- A method commonly used to detect the presence of a particular molecule (e.g antibody)
- The wells of the test plate (microplate) are coated with the antigen for the antibody of study, or the anti-antibody for the antibody of study
- Sera is diluted and added to the wells, followed by immunoglobulin specific buffers, diluents, and reagents

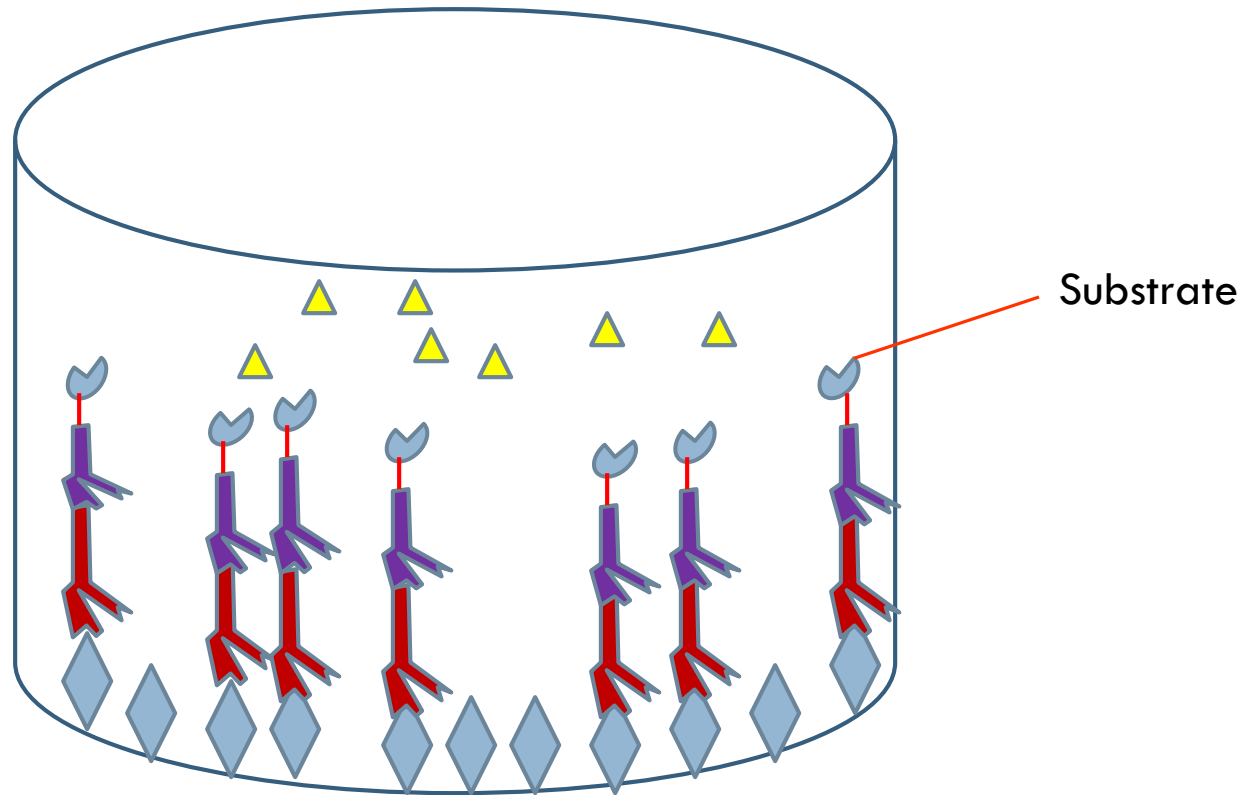
ELISA Testing



ELISA Testing



ELISA Testing



ELISA (continued)

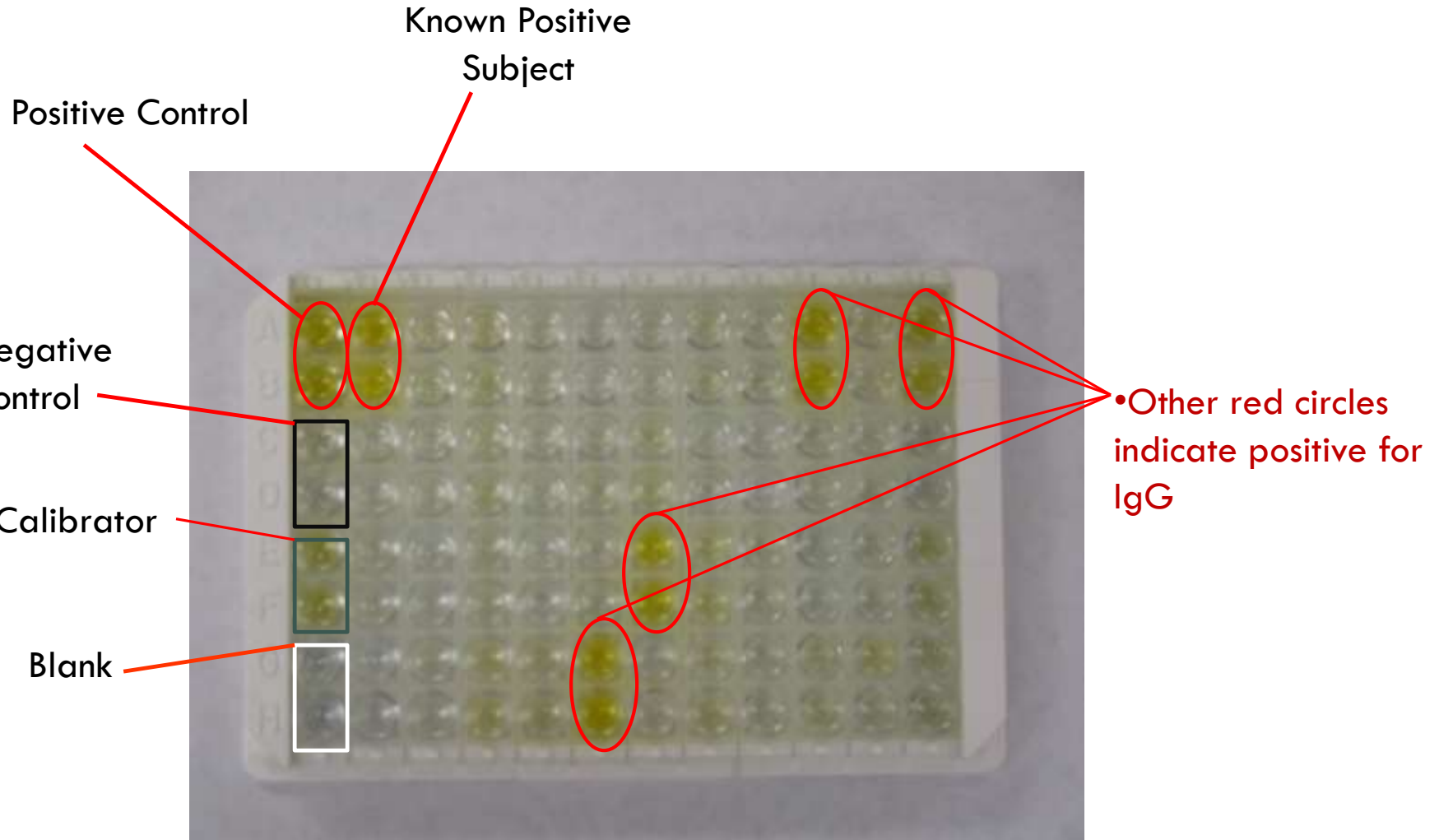
- The microplate is placed in a spectrophotometer (microplate reader) and light is passed through a selected filter (450 nm) then through the samples in the wells
- The amount of light absorbed by the samples is measured, giving the optical density (OD) value of the sample

Materials and methods (continued)

- A microplate reader generates an OD value for each serum sample
- The index value is calculated based on the OD value for the sample and the calibrator OD value
- The index value reveals if a given sample is positive or negative for IgG WNV antibodies
 - Positive > 1.5
 - Negative < 0.8



Example of ELISA Test Results



Results

- The first set of ELISA consisted of 82 subjects of which 13 tested positive for WNV IgG antibodies.
- Our preliminary data shows that approximately 16 percent (95% CI: 9.5% to 25.3%) of the population in Fremont County has been exposed to WNV
- This suggests that the vast majority of the population is still at risk and continued mosquito control is still necessary to prevent a future outbreak.

Acknowledgments

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