

# Zoonotic Disease Newsletter

Washington State Department of Health's bulletin on zoonoses and vector-borne diseases

March 2007

Volume 1, Issue 3

## In This Issue

Springtime salmonella carried by young poultry

Behavior influences your risk for West Nile virus disease

Killing harmful *E. coli* inside the animal carriers

Ecology issues improved mosquito control permit

DOH encourages communities to prepare for aquatic mosquito control

## Springtime salmonella carried by young poultry

By Anne Duffy, Public Health Advisor, WA DOH Zoonotic Disease Program

For many families, a spring chick or duckling is traditionally given as an Easter surprise for their children. It symbolizes the re-emergence of life after the winter, and the thankful arrival of spring. Unfortunately for public health officials, this spring hatchling likewise represents the re-emergence of a different sort—the recurrent problem of salmonellosis from handling young poultry.



Chicks and ducklings are sometimes carriers of the *Salmonella* bacteria, and handling these young birds can lead to transmission of the bacteria—which can cause diarrhea, vomiting, fever, and may cause death in small children and the elderly.

Each spring, incidences of chick-associated salmonellosis tend to occur in Washington. This reoccurrence is due primarily to hatcheries' efforts to fulfill an increased demand for young poultry during the Easter season. Large numbers of hatchlings, especially chicks, are shipped to feed and farm supply stores across the country. Crowded conditions increase the stress upon the hatchlings and make them more susceptible to disease. Thus, the potential of shedding *Salmonella* bacteria and infecting other hatchlings increases. People who purchase hatchlings typically are unaware of the risk of salmonellosis through contact with feces from these birds.

In Washington, last spring was no exception—six people developed salmonellosis from exposure to chicks originating from three different hatcheries. Half of those who became ill were children under 5. This represents the third consecutive year that clusters of illness have been detected in residents who handled chicks.

*Springtime Salmonella* continues on page 5

## Behavior influences your risk for West Nile virus disease

By Ben Hamilton, Health Services Consultant, WA DOH Zoonotic Disease Program

Two neighboring cities, alike in more ways than they differ, were involved in the severe Colorado West Nile virus (WNV) outbreak in 2003. Surprisingly, the city that had an extensive mosquito control program and fewer WNV-infected mosquitoes had significantly higher rates of West Nile neuroinvasive disease, according to research published in the March issue of *Emerging Infectious Diseases*.

In 2003, Colorado led the nation with 2,947 human WNV cases, 63 of which died. Larimer County, in northern Colorado, was particularly affected with 546 cases, which included 63 neuroinvasive disease cases and 9 deaths.

Larimer County health officials found differences in rates of WNV neuroinvasive disease between the county's two largest cities, Loveland and Fort Collins. Neuroinvasive disease rates were used because they are more likely to be identified due to the severity of illness, unlike the generally milder non-neuroinvasive (West Nile virus fever) form of West Nile illness.

*Risk for WNV* continues on page 2



Subscribe

[zd@doh.wa.gov](mailto:zd@doh.wa.gov)

Submit articles,  
comments to editor

[benjamin.hamilton@doh.wa.gov](mailto:benjamin.hamilton@doh.wa.gov)

## The Tale of Two Cities

### Fort Collins

WNV risk perception (%)  
 Very worried: 14.1  
 Somewhat worried: 54  
 Not worried: 31.6

DEET use (%)  
 Sometimes/Always: 63.9  
 Seldom/never: 34.7

Dusk to Dawn, Mon-Fri (%)  
 ≤5 hr outside: 61.6  
 6-60 hr outside: 32

### Loveland

WNV risk perception (%)  
 Very worried: 12.8  
 Somewhat worried: 53.8  
 Not worried: 33.2

DEET use (%)  
 Sometimes/Always: 55.9  
 Seldom/never: 41.8

Dusk to Dawn, Mon-Fri (%)  
 ≤5 hr outside: 52.4  
 6-60 hr outside: 38

Source: Gujral IB, et al. *Behavioral Risks for West Nile virus Disease, Northern Colorado, 2003*. EID, Vol. 13, No. 3

*Risk for WNV* continued from page 1

The age-adjusted rate of neuroinvasive disease was much higher in the city of Loveland (38.6 per 100,000) compared to the city of Fort Collins (15.9 per 100,000).

"These findings were unexpected given the demographic and ecological similarities of the two cities and because Loveland had an integrated mosquito control program that had been in place since 1986," says lead researcher Indira Gujral, who worked with the Larimer County Department of Health and Environment in 2005.

Fort Collins and Loveland are largely similar demographically in age, race, income, and both share *Culex tarsalis* and *Cx. pipiens* as their dominant WNV mosquito vectors.

During the 2003 outbreak, around 20-40 CO2 baited CDC light traps were collected per city per week. During the peak of the outbreak, the number of *Cx. tarsalis* and *Cx. pipiens* mosquitoes collected per trap night was higher in Fort Collins than in Loveland. A vector index was calculated to estimate the average number of WNV-infected mosquitoes collected per trap night and it was found that more WNV-infected mosquitoes were present in Fort Collins. This was expected, since Loveland had an established control program and Fort Collins initiated emergency mosquito control later in the outbreak.

"We wanted to know why Loveland residents had higher rates of neuroinvasive disease," says Gujral. "So a survey was commissioned to assess city residents' knowledge, attitudes, and beliefs about WNV and to measure personal protective practices during the 2003 WNV season."

The survey found that Loveland residents were 39% more likely to report seldom or never using repellent containing DEET and about 30% more likely to report being outdoors during prime mosquito-biting hours than Fort Collins residents.

"These results suggested that differences in WNV neuroinvasive disease rates may have been due, in part, to lower use of repellents containing DEET and greater dusk-to-dawn outdoor exposure among Loveland residents," says Gujral.

At the time, repellents containing DEET were the only ones recommended.

Why Loveland residents were less likely to practice personal protection measures has sparked interesting theories.

Since both Fort Collins and Loveland residents perceived very similar risks for WNV infection, environmental triggers may have played a role in the differences in prevention behaviors. During the outbreak, biting pressure from the nuisance mosquito *Aedes vexans* (Fort Collins, 39.6 per trap night, and Loveland, 22.6 per trap night) along with *Culex* sp. may have prompted Fort Collins residents to "fight the bite" more proactively.

Another possibility is that Loveland residents may have relied on their city's long-standing control program instead of practicing individual prevention measures to ward off mosquito bites.

Gujral also points out that Loveland's water surface area is larger than Fort Collins, and this ecological difference may have influenced the human and mosquito interaction in ways that aren't fully understood.

"The results of this study support the use of personal protection measures, even in areas with strong mosquito control programs, and show that individual efforts may influence disease rates," says Gujral. "It also suggests that people living in areas with greater mosquito-biting pressure were more likely to take prevention measures."

Read the complete research article at [www.cdc.gov/eid/content/13/3/419.htm](http://www.cdc.gov/eid/content/13/3/419.htm).

## Killing harmful *E. coli* inside the animal carriers

By Ben Hamilton, Health Services Consultant, WA DOH Zoonotic Disease Program



Harnessing their individual specialties – Dr. Brabban’s in biotechnology, industrial development and agriculture and Dr. Kutter’s in phage and molecular biology and complementary medicine – they make a formidable team at Evergreen’s Phage Lab.



Electron micrograph of phage infecting a bacterium. Before penicillin was discovered, phages were used in the US in the 1930s. At that time, the American Medical Association dismissed the effectiveness of phage therapy because the viruses themselves could not be seen.

Phage therapy is currently gaining more attention in the US, especially since certain types of harmful bacteria have become drug resistant.

A mixture of phages, used as a food additive, was recently approved by the FDA to help protect people from *Listeria monocytogenes*.

Breakthrough research currently underway at The Evergreen State College brings hope that we’ll someday have a “cocktail” of bacteria-eating viruses that could be used to eliminate *E. coli* O157:H7 from the animals that naturally harbor the bacteria.

*E. coli* O157:H7 is a serious human pathogen that is responsible for an estimated 70,000 illnesses annually in the U.S. The bacteria lives harmlessly in the intestines of about a quarter of ruminants and other livestock and often enters our food chain during the slaughter and subsequent processing. Animals also shed O157:H7 in their feces, which can result in direct animal to human transmission or the contamination of agriculture irrigation water.

Bacteriophage, or phages, are naturally occurring viruses that kill bacteria. Evergreen’s Phage Laboratory, led by Dr. Betty Kutter and Dr. Andrew Brabban, have made some of the biggest discoveries regarding how phages can help eliminate O157:H7.

Together with research fellow Raul Raya in Argentina and dedicated students, Kutter and Brabban have isolated and identified a strain of phage, CEV1, which is extremely effective in killing the dangerous strain of *E. coli*.

“Now that we’ve isolated the phage we are trying to develop it into a type of treatment,” Brabban says. “The phage attacks the bacteria by injecting its DNA into the bacterial cell. Daughter phages are rapidly produced inside the infected cell and eventually lyse the bacterium releasing around 100 new phage per cell and killing it. All of this occurs without harming the animal.”

Animal trials have shown that the *E. coli* O157:H7 can be nearly eradicated. “At the moment, we don’t have any in animal trials that completely eradicate it,” but Brabban says they are getting large levels of reduction. “We’re knocking it down 99.9%.”

The implications of such a solution are enormous, says Kutter. “We’re talking about a simple, natural, inexpensive way to control bacteria. Phages are the most common life-form on the planet – they are everywhere. The potential they offer for human use is unparalleled.”

“We have hopes that orally administered phages will be a major means of eliminating *E. coli* from farm livestock,” says Brabban. “It makes so much more sense to eliminate this dangerous pathogen at the source rather than treating ill patients.”

The potential uses of phages go far beyond eliminating this dangerous strain of *E. coli* from animals.

Kutter explains how Western medicine is slowly learning about the beneficial therapeutic applications of phages. “Phage therapy has been used by physicians in Tbilisi, Georgia to treat a host of conditions such as diabetic ulcers and infected wounds and burns with outstanding results. Introducing phage therapy here could greatly reduce foot amputations in diabetics and reduce the number of deaths from antibiotic-resistant bacteria such as MRSA, which kills thousands each year. The rest of us are so far behind in understanding the benefits of phage therapy to patients.”

Hopefully, with increased awareness and maintained financial support for research, the benefits of phages will continue to be realized.

### Phage Pages

The Evergreen State College: [www.evergreen.edu/phage/](http://www.evergreen.edu/phage/)

American Society for Microbiology: [www.asm.org/division/M/M.html](http://www.asm.org/division/M/M.html)

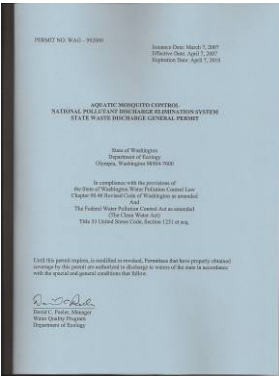
US Food and Drug Administration: [www.fda.gov/fdac/features/2007/107\\_virus.html](http://www.fda.gov/fdac/features/2007/107_virus.html)

## Ecology issues improved mosquito control permit

Washington State Department of Ecology, News Release, March 7, 2007



City and county municipalities often find that their storm drains and catch basins provide excellent breeding habitat for mosquitoes.



The updated aquatic mosquito control permit allows for more proactive larvicide treatment. Storm drains, catch basins, and other related restricted drainage systems are not required to be dipped prior to treatment.

OLYMPIA - As this year's mosquito season nears, the Washington Department of Ecology (Ecology) today issued a revised aquatic mosquito control general permit.

Ecology and the Washington Department of Health developed the permit in close coordination. The revised permit protects human health and the environment, has an easier reporting system for permit holders, and simplifies the on-line application.

"The permit is an important tool for controlling mosquito populations in state waters," said Dave Peeler, manager of Ecology's water quality program. "Mosquitoes may transmit diseases that can make people sick, including West Nile virus."

West Nile virus is a mosquito-borne disease that can cause illness in humans and some animals, according to the Department of Health. Most people infected with West Nile virus don't have symptoms, but in some people, particularly those over age 50, the virus can cause serious illness.

Last year in Washington, three people, six horses and 13 dead birds were found to be infected with the mosquito-borne disease, according to the Department of Health. In 2006, neighboring Idaho reported more than 980 human cases and 21 deaths from the virus. West Nile has steadily spread across the country since it was first detected in the New York City area in 1999.

The Department of Health encourages cities, counties, mosquito-control districts and commercial pest-control businesses to obtain permit coverage in the event they need to conduct aquatic mosquito control.

The application of larvicides is regulated by Ecology and the state Department of Agriculture (WSDA). WSDA oversees label compliance, product registration and issues professional licenses to those who apply pesticides, while Ecology issues permits for users of aquatic pesticides to assure water quality is protected.

Most entities qualified to conduct aquatic mosquito control in Washington apply directly to the Department of Health for free-of-charge permit coverage. A small number of entities that control mosquitoes obtain the permit directly from Ecology.

The insecticides, or larvicides, allowed under this federal National Pollution Discharge Elimination System (NPDES) permit kill the mosquito larvae before they become biting adults. The primary larvicides used in the state are biological in origin or are insect growth regulators and are extremely effective in targeting mosquito larvae.

Prepare for  
Mosquito  
Season

Obtain Free  
Permit

Mosquito control is a local responsibility. The Washington State Department of Health is available to assist local jurisdictions with their control plans and has obtained Ecology's aquatic mosquito control permit. DOH is offering the permit, cost free, to entities qualified to conduct aquatic mosquito control.

Municipalities and other land owners with water bodies that could act as mosquito breeding habitat are encouraged to obtain permit coverage in the event they need to conduct aquatic control. Mosquito control districts can obtain permit coverage on behalf of the community they serve. Commercial pest control businesses can obtain permit coverage on behalf of their contracted clients.

Those who were covered under DOH's permit in 2006 are not covered under the newly re-issued permit. They will need to re-apply for permit coverage under DOH.

For more information about the updated permit and to apply for permit coverage go to [www.doh.wa.gov/ehp/ts/Zoo/WNV/Permit.html](http://www.doh.wa.gov/ehp/ts/Zoo/WNV/Permit.html).

**Manager**

Dorothy Tibbetts  
360.236.3361

[dorothy.tibbetts@doh.wa.gov](mailto:dorothy.tibbetts@doh.wa.gov)

**Administrative Support**

Cyndi Free  
360.236.3384

[cyndi.free@doh.wa.gov](mailto:cyndi.free@doh.wa.gov)

**Program Staff**

Jo Marie Brauner  
360.236.3064

[jomarie.brauner@doh.wa.gov](mailto:jomarie.brauner@doh.wa.gov)

Anne Duffy  
360.236.3372

[anne.duffy@doh.wa.gov](mailto:anne.duffy@doh.wa.gov)

Liz Dykstra  
360.236.3388

[elizabeth.dykstra@doh.wa.gov](mailto:elizabeth.dykstra@doh.wa.gov)

Ben Hamilton  
360.236.3364

[benjamin.hamilton@doh.wa.gov](mailto:benjamin.hamilton@doh.wa.gov)

David Nash  
360.236.3362

[david.nash@doh.wa.gov](mailto:david.nash@doh.wa.gov)

Ron Wohrle  
360.236.3369

[ron.wohrle@doh.wa.gov](mailto:ron.wohrle@doh.wa.gov)

ZD Program Web site  
[www.doh.wa.gov/ehp/ts/ZOO/HTM](http://www.doh.wa.gov/ehp/ts/ZOO/HTM)

**Newsletter Reviewers**

Jo Marie Brauner  
Anne Duffy  
Liz Dykstra  
Cyndi Free  
Ben Hamilton  
Nancy Napolilli  
David Nash  
Dorothy Tibbetts  
Ron Wohrle

**Springtime Salmonella** continued from page 1

Washington is not the only state with incidences of salmonellosis cropping up during springtime. Outbreaks associated with young poultry have been reported over the past few years in numerous states. Three outbreaks, each linked to a single hatchery source, were identified in 2006. These outbreaks involved approximately 80 people ill from more than 20 states. The actual number of salmonellosis cases is likely to be considerably greater since many milder cases often are not diagnosed or reported. Details about the 2006 multi-state outbreaks of salmonellosis associated with young poultry and hatchery sources is reported in [CDC's March 30<sup>th</sup> Morbidity and Mortality Weekly Report](#).

In efforts to prevent seasonal outbreaks, Washington State Departments of Agriculture and Health jointly developed printed educational materials on the risks of salmonellosis associated with chicks and ducklings, particularly among young children. For the past three seasons, educational materials emphasizing hand washing after handling chicks and ducklings were distributed to approximately 140 feed and farm supply stores state wide, targeting the point-of-sale for young poultry. Distribution points also included 39 WSU extensions and agricultural-related youth groups, 4-H and FFA clubs. Samples of these educational materials were also sent to local health jurisdictions, fair committees, and veterinary clinics.

This season, CDC has shared Washington's educational materials nationally to help assist states in expanding their outreach efforts to hatcheries, feed and farm supply stores, elementary schools, and day care centers. The materials were made available to state health departments, Zoonoses Education Coalition which includes over 30 partner organizations, as well as the National Association of Public Health Veterinarians.

Education of owners about the health risk of *Salmonella* from handling poultry is the key in prevention. Washington's educational materials, *After you touch a duck or chick, Wash Your Hands, so you don't get sick* are available free for outreach at venues, such as feed and farm supply stores, fairs, petting farms, agriculture-related youth groups, and schools. The materials clearly convey the principal behavior expected for salmonellosis prevention, and appeal to young children. The message is provided in a flyer, poster, and sticker format, as well as translated in Spanish. To order, visit Washington State Department of Health, Salmonella in Chicks Web page at [www.doh.wa.gov/ehp/ts/Zoo/salmonellachick.html](http://www.doh.wa.gov/ehp/ts/Zoo/salmonellachick.html).

**Additional Resources:**

Pet-related diseases, Why parents should think twice before giving baby birds for Easter, [CDC, Healthy Pets Healthy People](#)

Poultry diseases, [Washington State Department of Agriculture, Animal Health](#)



Feed stores (left) have utilized the educational materials to inform their customers about the importance of hand washing after touching young poultry.

Social marketing techniques were used in developing the flyers, stickers (above), and posters. Interviewing the target audiences helped shape the final products. Materials were translated into Spanish after the follow-up evaluations with feed stores indicated the need.

Ben Hamilton