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EMERGING INFECTIONS PROGRAM

FOODNET NEWS

An Introduction to FoodNet Sites

INSIDE THIS ISSUE:

By Mary Patrick, CDC

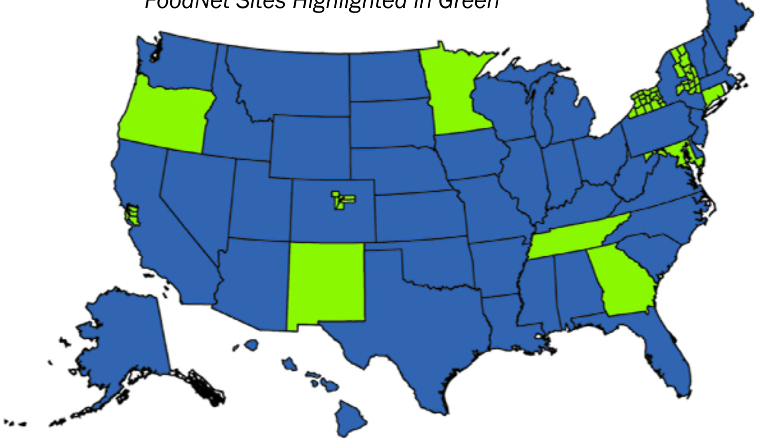
The Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease component of the Centers for Disease Control and Prevention's (CDC) Emerging Infections Program. FoodNet is a collaborative project among CDC, 10 state health departments, the Food Safety and Inspection Service of the United States Department of Agriculture and the Food and Drug Administration. FoodNet is a sentinel network that produces national estimates of the burden and sources of foodborne diseases in the United States through active surveillance and special research studies.

FoodNet surveillance began in 1996 with selected counties in California, Connecticut and Georgia and the states of Minnesota and Oregon. By 2004, the FoodNet catchment area had expanded to cover 44.5 million persons in the states of Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee and selected counties in California, Colorado and New York. Although the population under surveillance has increased since 2004, no additional states or counties have been added. In 2008, FoodNet encompassed 45.9 million persons and was generally racially and ethnically representative of the entire U.S. population, with only a slight under-representation of Hispanics.

FoodNet is a worldwide model for conducting active surveillance. Beyond surveillance, FoodNet sites conduct national and site-specific studies, data analyses, and outbreak investigations.

This issue of FoodNet News highlights some of these recent projects in four sites: Georgia, Maryland, New York, and Tennessee.

FoodNet Sites Highlighted in Green



WHAT IS FOODNET?

The Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease component of CDC's Emerging Infections Program. FoodNet is a collaborative project of the CDC, ten sites (CA, CO, CT, GA, MD, MN, NM, NY, OR, TN), the U. S. Department of Agriculture (USDA), and the Food and Drug Administration (FDA). The CDC FoodNet Team is in the Enteric Diseases Epidemiology Branch (EDEB), in the Division of Foodborne, Bacterial, & Mycotic Diseases (DFBMD) in the National Center for Zoonotic, Vector-Borne, & Enteric Diseases (NCZVED).

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Co-monitoring non-typhoidal *Salmonella* isolates of human and animal origin

By Alice Green, TN

Nontyphoidal salmonellosis is a major public health problem in the United States, with an estimated 1.4 million cases annually, and multidrug-resistant *Salmonella* is an issue of concern. *Salmonella* transmission to humans occurs through exposure to contaminated food and direct contact with animal reservoirs such as reptiles, food-producing animals, and companion animals. Infections acquired directly from animals are usually sporadic and are consequently difficult to link epidemiologically.

In 2008, the Tennessee Department of Health, Tennessee Department of Agriculture, and University of Tennessee's College of Veterinary Medicine began a pilot project to further analyze or sub-type non-typhoidal *Salmonella* isolates from animals in the state and to compare them to human isolates already being sub-typed. The project should help determine the commonality of serotypes and genotypes for *Salmonella* spp. and if antibiograms are similar for selected *Salmonella* serotypes.

As of November 2008, 51 animal-origin isolates had been submitted and analyzed. Most isolates were from cattle (45.1%) and horses (23.5%). Isolates from cats, dogs, pigs, sheep, and snakes were also submitted. The most common serotype was *S.* Typhimurium (21.6%). Among the other 40 non-Typhimirium isolates, 28 different serotypes were identified.

Eight of the submitted isolates are types that have been isolated from humans and match the patterns of some isolates found in the PulseNet database. Six of these are *S.* Typhimurium. The other two are *S.* Newport and *S.* Meleagridis.

Continuous systematic comonitoring of human and animal isolates has been used effectively in other public health settings. Comonitoring allows us to compare antimicrobial susceptibility patterns and trends, and to detect and investigate outbreaks associated with the direct transmission of *Salmonella* from animals to humans.

Regional differences in *Campylobacter* Infections in Georgia

By Melissa Tobin-D'Angelo, GA

Background

Campylobacter infections are one of the most common causes of diarrheal illness in the United States, contributing to an estimated 2.4 million infections annually. Sources of infection include poultry, unpasteurized dairy products, and contaminated water. Complications of *Campylobacter* infections include Guillain-Barré syndrome and reactive arthritis.

FoodNet has documented a *Campylobacter* incidence rate of 12.7 cases per 100,000 population, but rates vary widely across FoodNet sites. For example, in 2007, the incidence in Georgia was only 7.9 cases per 100,000 population, while it was more than 18 per 100,000 in New Mexico and Colorado[1]. Various FoodNet working groups have identified factors contributing to the differences between sites. Issues related to laboratory testing, surveillance, and levels of chicken contamination at the retail level have not definitively explained the reasons for these regional differences.

Chickens do not become ill from this bacterium, and they may likely transmit the bacteria vertically to offspring and horizontally through the environment to the other animals. Georgia is the top producer of broiler chickens in the country, comprising approximately 15% of the national industry[2].

Georgia is divided into 18 health districts and 159 counties, and *Campylobacter* rates per district varied in 2007 from 1.5 per 100,000 in one of the Atlanta area districts to more than 15 per 100,000 in Northeastern Georgia. Local health departments in Georgia do not routinely collect exposure information on individual *Campylobacter* cases, but have investigated two outbreaks with known vehicles since 2005—one was associated with well water and the other associated with consumption of unpasteurized milk. The Georgia Division of Public Health recently conducted a district-level evaluation to examine factors associated with regional differences in *Campylobacter* rates within the state and to describe how frequently *Campylobacter* cases consumed unpasteurized dairy products. We hypothesized that high-rate areas of the state may be more likely to have environmental exposures than foodborne exposures.

Methods

We administered a standardized surveillance questionnaire by telephone to a convenience sample of reported *Campylobacter* cases in high-and low-rate health districts (low rate<5/100.000 and high rate>10/100,000) during the time period from May 2008–August 2008. We asked about food, animal, travel, and water exposures. We also asked about occupation among adults because the high rate districts correspond with poultry farming areas in Georgia (See Figure).

Results

Sixty-five of 100 case-patients were interviewed. Race, ethnicity, and age were not significantly different between high-and low-rate districts. Cases in low-rate districts were significantly more likely to have consumed undercooked poultry products (p<0.01) and to have traveled outside their communities (p=0.02) than cases in high rate districts. Cases in high-rate districts were significantly more likely to have had been exposed to farm animals (p=0.05), to have well water as their primary drinking water source (p=0.02), and to self-report their home location as being in a rural area (p=0.01). Only one *Campylobacter* case-patient reported consuming unpasteurized dairy products in Georgia (two others consumed raw dairy products abroad). Two persons in high-rate districts worked with poultry in farm and factory settings.

Discussion

Preliminary analysis demonstrates that *Campylobacter* infections in high-rate areas may be more likely associated with environmental factors (water, animals), and infections in low rate areas are more likely to have been acquired internationally or through food (undercooked poultry). However, living in a rural area may be a confounder for some of these associations. Limitations of this pilot included: 1) limitations with self-reported “rural” definition; 2) small numbers limiting analysis of different age groups and exposures of interest such as international travel and consumption of unpasteurized foods; 3) limited food history was obtained— many meat and produce items were not queried. Future steps include exploring additional ways to define “rural” and examining the subsequent effect on the analysis, examining county-level data rather than district-level data (since rates are not necessarily homogeneous even within a district), and more closely examining a possible association between *Campylobacter* infections and residences near poultry farms in Georgia.

References

2. Cunningham DL et al. 2005-2006 Broiler production systems in Georgia: Cost and returns analysis. 2006. <http://pubs.caes.uga.edu/caespubs/pubcd/B1240.htm>

1. CDC. Preliminary FoodNet data on the incidence of infection with pathogens transmitted commonly through food---10 states, United States, 2006. MMWR 2007;56:336–339

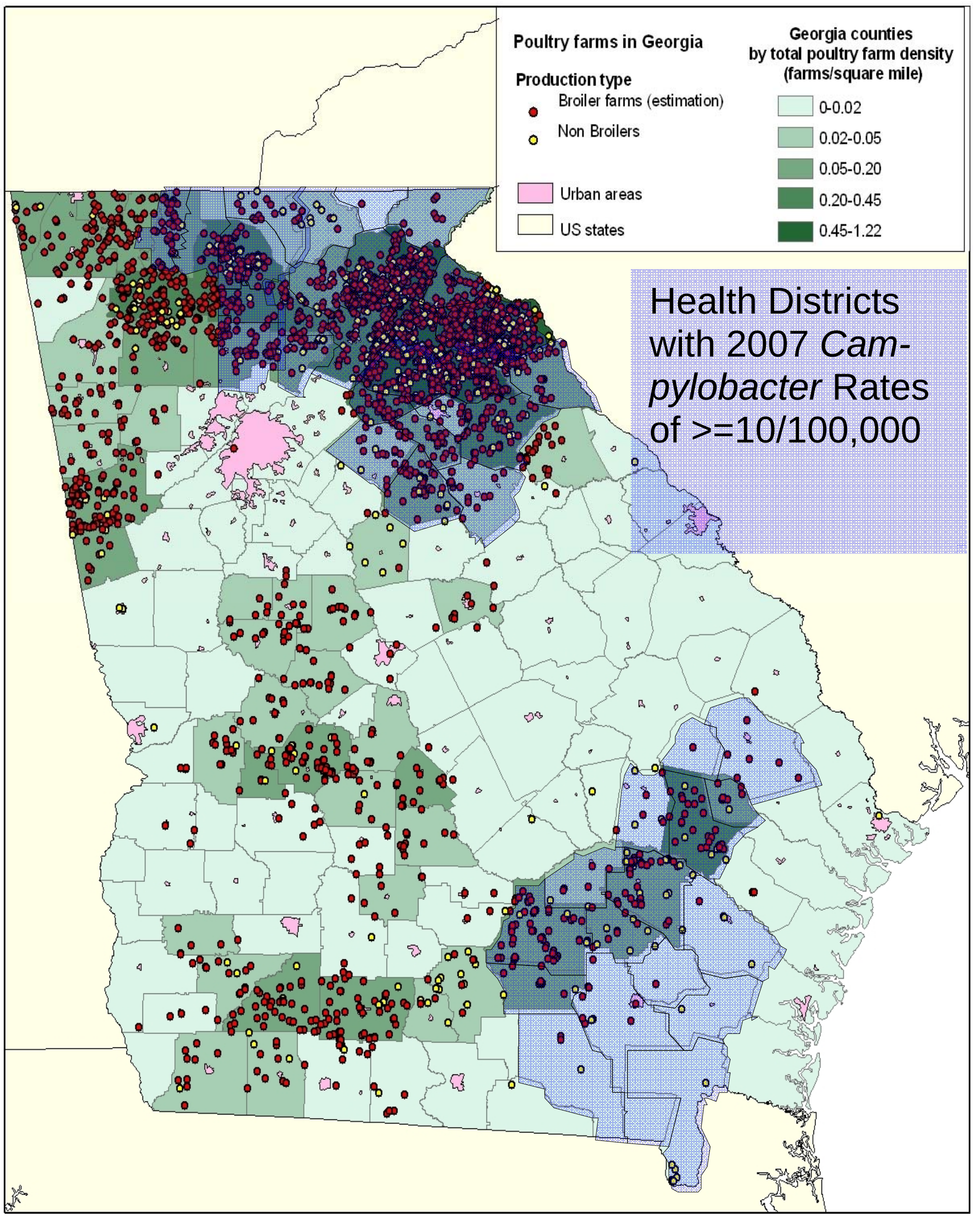

Figure: Overlay of Health Districts with High Rates of Campylobacter Infections on Poultry Farm locations in Georgia

Multi-Drug Resistant Non-Typhoidal *Salmonella* in New York State's Foodborne Diseases Active Surveillance Network (FoodNet) Counties

By SM Solghan[1], SM Zansky[1], NB Dumas[2], TP Root[2], TM Quinlan[2], LR Armstrong[2], NL Spina[1]

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In the United States, an estimated 1.4 million cases of non-typhoidal (NT) *Salmonella* cases are reported annually, resulting in more than 16,000 hospitalizations and 580 deaths[1]. Most cases are self-limiting, but severe cases may require antibiotic treatment. With the emergence of multi-drug resistant NT *Salmonella*, knowledge of current resistance patterns is key to determine the appropriate treatment. The following paragraphs describe the prevalence and trends of NT *Salmonella* antimicrobial susceptibility within the New York State Foodborne Diseases Active Surveillance Network (FoodNet) from May 2003– December 2007.

The New York State Department of Health Wadsworth Center public health laboratory tested all *Salmonella* isolates from cases residing in NYS's 34 county FoodNet catchment area from May 2003 through December 2007 for antimicrobial susceptibility to ampicillin, chloramphenicol, streptomycin, sulfisoxazole, tetracycline, nalidixic acid and ciprofloxacin. Isolate susceptibility results were linked to their corresponding demographic and clinical data and analyzed. Multi-drug resistant isolates were defined as resistant to ampicillin, chloramphenicol, streptomycin, sulfisoxazole and tetracycline (R-type ACSSuT).

Antimicrobial susceptibility for 2,189 (98.5%) FoodNet cases showed that 80.6% of isolates were pansusceptible, 13.5% were resistant to at least one agent but not R-type ACSSuT, and 6.9% were R-type ACSSuT. Only 7 (0.3%) isolates were resistant to ciprofloxacin. From 2004 to 2007 cases with R-type ACSSuT decreased from 8.7% (37/424) to 4.8% (24/499) ($p<0.01$). Serotypes with the highest proportion of R-type ACSSuT included *S.* Typhimurium, 17.8% (79/444) and *S.* Newport, 29.1% (51/175).

Cases with R-type ACSSuT were older (median age, 47 years) compared to pansusceptible cases (median age, 35 years) ($p<0.01$). More than 14% of African American cases (21/143) had R-type ACSSuT isolates, compared to 6.6% of Caucasian cases (124/1870) ($p<0.01$). R-type ACSSuT cases were hospitalized (36.4%) more frequently than pansusceptible cases (24.7%) ($p<0.05$) while length of hospitalization was not significantly different.

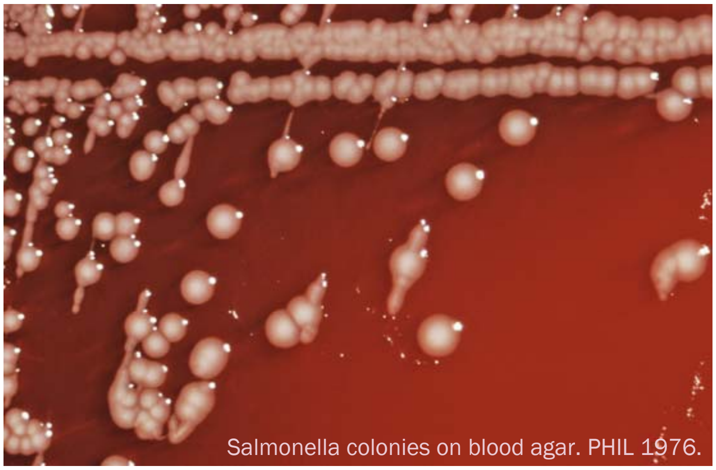
Although R-type ACSSuT NT *Salmonella* has decreased since 2003 within the NYS FoodNet catchment area, monitoring resistance patterns remains important in identifying emerging resistant strains, vulnerable populations and in determining appropriate treatment regimens. The higher rate of R-type ACSSuT among African American cases requires further study.

References

1. Mead PS, Slutsker L, Dietz V, McGaig LF, Bresee JS, Griffin PM, Tauxe RV. Food-related illness and death in the United States. Emerg Infect Dis 1999;5:607–625.

RECENTLY PUBLISHED MANUSCRIPT

Voetsch AC, Poole C, Hedberg CW, Hoekstra RM, Ryder Rw, Weber DJ, et al. Analysis of the FoodNet case-control study of sporadic *Salmonella* serotype Enteritidis infections using persons infected with other *Salmonella* serotypes as the comparison group. Epidemiol Infect 2009;137:408–16. Available from URL: http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=3650240.



Salmonella colonies on blood agar. PHIL 1976.

A Case Illustrating the Need for Additional Testing Methods to Confirm Enzyme Immunoassay Testing (EIA)

By Amanda Palmer, MD

In March 2007, a child who had a history of intermittent diarrhea attributed to a possible milk allergy had a stool specimen collected for enteric pathogen testing. The specimen was forwarded to a large commercial laboratory and tested positive by Shiga toxin assay testing using the Meridian Premier EHEC kit. The specimen was forwarded to the Maryland Department of Health and Mental Hygiene (DHMH) laboratory for confirmatory testing. At the DHMH lab, the specimen again yielded a positive EIA result when tested with the Meridian Premier EHEC kit. No Shiga toxin-producing *Escherichia coli* (STEC) isolate was identified by culture, and PCR testing was not performed at the DHMH lab.

The child attended daycare at a small home with six other children aged 21 months to 5 years, including a sibling of the index case. A local health department inspection discovered that another attendee and the daycare operator were symptomatic with diarrhea, vomiting, and fever. In addition to the index case, specimens were collected from 15 persons including daycare attendees, the operator, the operator's household contacts, and family members of some attendees. Specimens from 5 of these 15 other people were positive for Shiga toxin by enzyme immunoassay (EIA) at the state lab, including the brother of the index case (also a daycare attendee), an additional daycare attendee, the daycare operator, and two household contacts of the daycare operator. Three of these five people were asymptomatic.

In response to the positive test results, the daycare was closed and clearance specimens were collected for the four daycare-associated cases. Specimens collected from the index case in the ensuing 4 weeks remained EIA-positive; however, no STEC was isolated from any of these specimens. Broths from these specimens were sent to the CDC laboratory. EIA testing, again by the Meridian Premier EHEC kit, yielded a positive result for one of the index case's clearance specimens, although testing of the initial specimen, which was positive at the commercial lab and at the state public health lab, was negative at CDC. PCR testing for Stx 1, Stx 2, eae, and E-hly virulence markers was negative for all specimens tested at CDC. Cultures performed at CDC did not identify any STEC. Provided with these results and other follow up on the EIA-positive people, the health department removed all exclusions and other restrictions from the daycare.

This situation emphasizes difficulties that can arise when public health actions are based solely on EIA testing and stresses the importance of confirming EIA results with other methods such as culture or PCR.

ABSTRACTS PRESENTED AT INFECTIOUS DISEASES SOCIETY OF AMERICA (IDSA)

- Henao OL, Long C, Vugia D, Marcus R, Tobin D'Angelo M, Ryan P, et al. Differences in incidence of select foodborne pathogens by age group, implications for intervention and prevention efforts, Foodborne Active Surveillance Network, 1996-2007.
- Long C, Limbago B, Dumyati G, Lathrop S, Keefe J, Jones T, et al. Description of risk factors for presumed community-acquired *Clostridium difficile* infections in FoodNet sites.
- Viray M, Gould LH, Ong KL, Talkington D. Serological testing for Shiga toxin-producing *Escherichia coli* in pediatric Hemolytic Uremic Syndrome in the Foodborne Diseases Active Surveillance Network (FoodNet) Surveillance System-United States, 2000–2005.

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For more information about this newsletter, please contact dlchen@cdc.gov

The Dangers of Raw Milk* and Raw Milk Products

*Raw milk is milk that has not been pasteurized

What is raw milk?

Raw milk is milk from cows, goats, and sheep that has not been pasteurized.

What is pasteurization?

Pasteurization is a heating process that kills harmful bacteria in milk. Pasteurization does not significantly change the nutritional content of milk.

Why are raw milk and products made with raw milk dangerous?

Raw milk and products made with raw milk (soft cheese, yogurt, pudding, or ice cream made with raw milk) are the sources of many serious infections. Raw milk is often contaminated with *Campylobacter, Brucella, Listeria, Salmonella, Shigella,* and *E. coli* among other pathogens. Raw milk is dangerous even if the animal it comes from is healthy, clean, and grass-fed.

Why do people drink raw milk?

Some people incorrectly believe there are health benefits to drinking raw milk. On the contrary, numerous scientific studies show there are many health risks associated with drinking raw milk. (http://www.cfsan.fda.gov/~ear/milksafe.html)

Who should avoid raw milk?

Everyone should avoid raw milk and products made with raw milk. However, infants, the elderly, people with compromised immune systems, and pregnant women are at especially high risk for developing serious infections.

How do I know if a cheese is made with raw milk?

Unless the label says the cheese is made from pasteurized milk, it may be made from raw milk. Soft cheeses, such as Brie, Camembert, and Mexican-style soft cheese, made with raw milk can be dangerous. Soft cheese made from pasteurized milk and hard cheeses are considered to be safe. To prevent illness from consuming products made with raw milk, take a few moments to read the labels. Products made with safe milk will have “pasteurized” on the label. When in doubt ask your grocer or store clerk.

I may have eaten raw mild or soft cheese made with raw milk. What are the symptoms of illness?

Symptoms of foodborne illness can include: vomiting, diarrhea, abdominal pain, flulike symptoms such as fever, headache and body ache. If you think you may have eaten contaminated milk, cheese, or other products and begin to experience any of these symptoms, call your doctor immediately.

Can I still become ill from raw milk and raw milk products if the cows or goats are healthy, clean, and grass-fed or if the dairy is especially careful when collecting the milk?

Yes. Even healthy animals may carry the pathogens that can contaminate milk. Milk may be contaminated with the bacteria during the milk collection process. Although dairy methods have improved, there is still no substitution for pasteurization in assuring milk is safe to drink.