

Dairy Farms, Wheat Fields, Whooping Cough Shape Agenda of North Dakota Laboratory

“Game is abundant. The country appears much more pleasant and fertile than that we have passed for several days...the high country on either side of the river is one vast plain, . . . consisting of a dark rich mellow looking lome.”

Meriwether Lewis--May 1, 1805

While some states boast famous cityscapes and urban attractions, what most characterizes North Dakota is the land itself. Indeed, Meriwether Lewis and William Clark spent a quarter of their entire 19th century scouting expedition in what is now the state of North Dakota. Replete with tallgrass prairies, bur oak savannas, and hundreds of species of wildflowers, even two hundred years later the countryside, said Bonna Cunningham, is “unbelievably fantastic.”

Cunningham, who directs the state public health laboratory in Bismarck, describes North Dakota as primarily a rural state with about 635,000 people occupying 70,000 square miles. Agriculture is a major industry. The official North Dakota Web site notes that last year the so-called “peace garden state” produced enough beef for 113 million hamburgers, enough potatoes for 207 million servings of French fries, and enough wheat for 16.2 billion loaves of bread.

While ranching, farming and hunting have played a large role in shaping residents’ roughrider reputation, they have also influenced the work of the state public health laboratory—virtually the only public health laboratory in the state. The laboratory, officially known as the North Dakota Department of Health, Division of Microbiology, is authorized under the FDA’s Grade A Pasteurized Milk Ordinance to certify and evaluate milk laboratories that engage in interstate commerce. It also tests Grade A and manufacture grade dairy products and monitors for antibiotics in milk on a fee-for-service basis for the state department of agriculture.

Although the laboratory’s name has changed through the years, the Division of Microbiology remains known to its customers as the North Dakota Public Health Laboratory (NDPHL). The NDPHL provides services to complement and guide disease prevention and control programs (including maternal and child health, environmental health,

immunization, and TB control programs); develops new laboratory methods to address specific public health problems (lately including emerging infectious diseases, antibiotic resistance, and bioterrorism preparedness); and is the reference laboratory for local health units, veterinary services (for rabies testing) and private and community health care facilities.

Given the abundance of cultivated and wild flora, pollen is a concern, and, in the absence of another laboratory to do the work, the NDPHL has taken on the task of testing for aeroallergens in the Bismarck area. Laboratory-generated pollen counts are regularly broadcast on local television networks throughout the spring, summer and fall months.

The largest chunk of laboratory testing, however, is for chlamydia and HIV, two problems that are shared with the rest of the nation. The ND public health laboratory runs a large statewide screening program and also performs testing on behalf of the Indian Health Service, which serves a half dozen native tribes including the Turtle Mountain Band of Chippewa, Standing Rock Sioux, Hidatsa, Mandan, Arikara and Spirit Lake Nation.

While a separate state laboratory handles chemical environmental testing, the NDPHL performs the microbial testing for surface and ground water (under the EPA Clean Water Act), drinking water (under the EPA Safe Drinking Water Act), and monitors lagoons (under the EPA National Pollutant Discharge Elimination System). In addition, the NDPHL is the certifying agency for the state drinking water program.

Each year, the North Dakota Mosquito Surveillance Program, housed at the NDPHL, operates from May to September. Two statewide mosquito trapping networks are the backbone of the program—the New Jersey Trap



The North Dakota lab’s Diagnostic Bacteriology Lab, circa 1936. In its nearly 100 years, the lab has seen many changes and improvements.

Photo courtesy of North Dakota Public Health Laboratory.

Network monitors mosquito populations and the CDC Light Trap Network provides samples for detection of specific arboviruses, such as West Nile virus. NDPHL staff coordinate the program, speciate the mosquitoes and perform molecular testing for viral detection.

Since the public health laboratory was first established in 1907 (with a generous \$2000 appropriation for equipment and \$5000 for annual maintenance), it has come a long way. Today the NDPHL, located in Bismarck, is fully staffed with 24 employees and is in the midst of moving to a new, 13,112-square-foot facility that has a BSL-3 suite containing seven isolation labs. With this relocation, the NDPHL is joining a laboratory complex also housing the chemistry environmental laboratory and the forensic laboratory. Even though staff are relocating from the banks of the Missouri River to “out by the pen”—the North Dakota State Penitentiary, that is—Cunningham said, “We are extremely happy.” The new laboratory is about five miles from the state capitol complex where the state health department is sited.

Cunningham was also happy to report that a major outbreak of *Bordetella pertussis*, or whooping cough, finally appears to be subsiding. The bug, she said, hit the state in July, and by the end of October the laboratory had performed molecular testing on roughly 6,400 patient specimens, compared to a total of 200 in a normal year. (Pulsed field gel electrophoresis was handled by the Minnesota Public Health Laboratory under a regional testing arrangement.)

Cunningham said the outbreak “taught us how to respond to surges.” At the height of the outbreak, the laboratory was receiving 200 to 250 specimens per day, but had the capacity to process only about 150 specimens daily. The testing backlog, coupled with delays of up to two days for specimen transport from remote areas, generated some negative media coverage. However, the crisis also spurred enhanced electronic communications with the state epidemiologist and helped to educate North Dakota policymakers about the laboratory’s central public health role. “(Policymakers) could see that the laboratory was the supporting element for the outbreak investigational process,” said Cunningham.

The NDPHL receives about half of its funding directly from state appropriations and additional state monies indirectly through fee-for-service testing from other state agencies and federal dollars through grant awards. Said Cunningham, of all the state health department divisions, “we rely the greatest on general dollars and so it greatly affects us when the legislature cuts general fund spending.”

Lately Cunningham has been ramping up the laboratory’s emergency response

In the near future, Cunningham looks forward to the implementation of a new laboratory information management system—STARLIMS—that will enable remote ordering of laboratory tests, remote test status inquiry, and real-time reporting to various government agencies, the National Electronic Disease Surveillance System and other stakeholders on a 24/7 basis. In addition, the NDPHL, as the reference laboratory for the North Dakota Laboratory Response Network, is building a Web site for the

“These past few years, the lab has been taxed as never before—from testing for suspected anthrax in letters and packages to testing for West Nile virus, SARS and whooping cough. Through it all, lab personnel have provided timely and valuable services to the people of North Dakota.”

Terry Dwelle, MD

North Dakota State Health Officer

program. A centerpiece of the program is the HELP Force, a group of scientists who are cross-trained to act as first responders within the laboratory. (HELP, an acronym borrowed from the Wisconsin State Laboratory of Hygiene, stands for Health Emergency Laboratory Personnel.) She is also working with colleagues on the other side of the state’s long border with Canada: exchanging ideas and exploring “the mechanism for cross-border laboratory testing in an emergency situation.” Cunningham explained that “if we have an event on the northern border, the closest electron microscope may be in Saskatchewan.”

“The Division of Microbiology is doing amazing work,” said North Dakota State Health Officer Terry Dwelle, MD “These past few years, the lab has been taxed as never before—from testing for suspected anthrax in letters and packages to testing for West Nile virus, SARS and whooping cough. Through it all, lab personnel have provided timely and valuable services to the people of North Dakota. I’m very proud of our public health laboratory and the vital work they do every day.”

network to enhance communications with allied health laboratories. The site, funded through the APHL-CDC Public-Private Laboratory Integration Project, will function as an information clearinghouse, as well as a mechanism for proficiency testing and agent specific quizzes.

With a full staff, a brand new building, and updated communication systems in the works, the North Dakota Public Health Laboratory is sitting pretty on the prairie. Said Cunningham, “We feel so good.” 