Mission

The University of Minnesota Veterinary Diagnostic Laboratory (VDL) is the official laboratory of the Minnesota Board of Animal Health. VDL’s mission is to protect and promote animal and human health through early detection and monitoring of animal diseases. VDL fulfills its mission by identifying emerging diseases, timely reporting of test results, developing new diagnostic methods and training diagnosticians, residents, veterinarians and graduate students. The laboratory is a part of the College of Veterinary Medicine and serves as Minnesota’s only full service laboratory for animal health diagnosis. The VDL is fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD).

Operations

As the official laboratory of the Minnesota Board of Animal Health, the VDL contributes to the economy of Minnesota and surrounding states by responding to outbreaks of animal diseases (e.g., highly pathogenic strains of avian influenza, swine influenza and other zoonotic diseases), thus protecting the livestock and poultry industries. Also, VDL’s faculty is actively involved in research projects on emerging disease identification, new test development and disease prevention.

VDL participates in national laboratory networks and contributes to enhanced animal testing capacity and disease response. VDL is a member of the National Animal Health Laboratory Network (NAHLN), The Food Emergency Response Network (FERN) and the Veterinary Laboratory Response Network (Vet-LRN). VDL is involved in a number of research projects sponsored by USDA in surveillance and diagnosis of animal diseases like Foot and Mouth Disease, Classical Swine Fever, Chronic Wasting Disease and other diseases and threats to the food supply and public health.

During 2010-2011, the VDL received 56,534 accessions for disease investigations. A total of 1,411,863 laboratory tests were conducted at VDL’s St. Paul facility. Although the total accessions submitted for 2010-2011 declined by 6% as compared to those in 2009-2010, total test procedures in 2010-2011 increased by 7% from previous year.

VDL strives to provide quality services to meet clients’ needs. To maintain and raise customer satisfaction, VDL conducted a client satisfaction survey in May 2011. Clients were asked to evaluate VDL’s performance based on a scale of excellent, good, fair, poor or not applicable on six different parameters. Among those surveyed, 295 existing clients responded with the following results:

- Accuracy of results – 98% chose excellent and good
- Turn-around time – 83% chose excellent and good
- Test availability – 91% chose excellent and good
- Cost – 80% chose excellent and good
- Customer service – 87% chose excellent and good
- Sample submission process – 88% chose excellent and good
As of June 2011 the VDL staff consists of 10.40 full-time equivalent (FTE) faculty members, 5 FTE pathology residents, 74.23 FTE bargaining unit employees and 17 part-time student employees.

**Funding**

Slow economy and continuous budget cuts at both the state and university levels have been a big challenge for VDL’s operation. VDL management has made efforts in cutting and controlling both direct and indirect cost and improving operational efficiency, which has resulted in improved productivity. Payroll expenses declined by 3% in FY11 and declined by 5% in FY10 as compared with previous fiscal years. Also, total FY11 procedure numbers and total external revenue increased by 7.0% and 7.4%, respectively, as compared with those in FY10. VDL fees remained unchanged in FY11. There are no plans to raise fees in the coming year.

VDL is actively seeking an alternative funding model to solve the budget deficit problem, mainly through additional state funding. Currently, VDL user fees account for 82% of the VDL’s estimated $15M total operating budget, which is extremely high when compared to that for other state peer veterinary diagnostic laboratories. For example, in Iowa VDL, user fees account for 65% of total operating budget, and in Wisconsin VDL, only 51%.

**Highlight of Accomplishments**

Influenza surveillance:

- In 2010, we continued our quest to improve influenza A virus surveillance in pigs by providing guidance to USDA on test methodology and sample handling. We supplied the greatest numbers of samples into the voluntary surveillance program and continue to lead the efforts of the entire international swine influenza surveillance network.
- We were integral to two influenza disease investigations in the United States– one involving a human case of H3N2 swine influenza in a man in Pennsylvania and the other a case of swine influenza in a family in MN. In both cases, we provided animal testing, animal viruses, and rapid follow up and sharing of viruses and reagents to state public health laboratories, the National Veterinary Services Laboratory, and the CDC.
- We participated in several multi-lab test validation efforts regarding influenza testing in animals and led all laboratories in fastest turnaround time and greatest virus isolation success rate on non-traditional pig samples. We subsequently shared our methods with private (St. Jude’s Hospital) and public collaborating laboratories with international stature on influenza research.
- We improved the typing of influenza isolates found worldwide by implementing new full length sequencing focusing on the matrix, neuraminidase and hemagglutinin genes. The increased genetic information has allowed for a greater understanding of the existing and ever changing diversity of influenza viruses.
Molecular Diagnostics:

- We streamlined and updated PCR technology for porcine reproductive and respiratory disease, the most important viral disease of the swine industry. The new real time PCR protocol decreased test turnaround time by two hours while providing sensitive virus detection and simultaneous differentiation of North American and European strains and reducing cost (approximately $300,000 in reagent savings/year).
- New porcine and bovine rotavirus, bovine coronavirus and porcine hemagglutinating encephalomyelitis virus PCR testing were implemented. These sensitive, fast and reproducible protocols enabled a wider range of research studies around these viruses; the methodology was shared with other diagnostic labs with similar interests throughout North American and Canada.
- A novel strain of Brachyspira sp. was identified as an emerging pathogen in US swine herds. The veterinary student who first identified the organism while working on a special project in the VDL won first place for best scientific presentation at AASV national meeting.
- We helped implement a new type of sample collection process for PCR detection which will provide us with the ability to receive samples from various regions worldwide while minimizing the risk of foreign animal disease introduction into the US.
- Significant progress was made on the Viral Hemorrhagic Septicemia PCR test, in a collaboration with USDA, which will broaden the services we provide to Minnesota’s aquaculture industry.
- The lab started working closely with medical school and other institutes on xenotransplantation projects to detect unusual porcine viruses, such as porcine endogenous retrovirus and hokovirus for pathogen screening to assist the Schulz Diabetes Institute’s effort to cure type 1 diabetes.
- Procedures run in the molecular bacteriology laboratory continued to grow, despite the economic crisis. The molecular bacteriology laboratory went from 17,000 tests in 2008 to 19,000 tests in 2009 and 21,000 tests in 2010. In addition, the laboratory responded to the needs of the swine and poultry industries by developing, evaluating and introducing four new diagnostic tests for emerging diseases of swine and poultry.

Epidemiology:

- We were first to identify Chronic Wasting Disease (CWD) in wild white-tailed deer in MN. We rapidly collaborated with MN DNR to study CWD prevalence in SE MN under a MN CWD surveillance plan developed by DNR and BAH.
- We established an infectious disease repository lab to increase availability & sharing of pathogens among U of MN researchers, private industry and government agencies.
- We developed a new PCR test to aid the Turkey Industry’s response to an outbreak of Mycoplasma synoviae in breeder flocks. The new test helped to eradicate M. synoviae from MN turkey flocks 6 months after detection.
- We received U of MN certification of new BSL3 necropsy laboratory. Faculty and staff can now work safely with high risk zoonotic disease agents.
• In collaboration with the USDA, we identified a new poxvirus in gazelles at a zoo. Procedures were put in place to ensure the virus was not introduced into livestock and wildlife.

Quality Assurance:

• In collaboration with the College of Veterinary Medicine, we expanded our successful laboratory quality assurance program to support multiple laboratory teams within the College. A core team of scientists, called ‘Quality Central’ has begun working with research and service laboratories to cooperatively integrate and implement quality management software and quality assurance practices to increase efficiencies and facilitate continuous improvement.

Pathology:

• Established pathology collaboration with Experimental Surgical Services in the Department of Surgery at the U of MN Medical School.

Aquaculture:

• The emergences of fish diseases such as the viral hemorrhagic septicemia virus have had significant impacts on the aquaculture and recreational fishing industries. In response, we developed a fish disease diagnostic service and became a core lab of the developing National Aquatic Animal Pathogen Testing Network.
• We expanded fish services and research to better serve the stakeholders and state of Minnesota. This has included increased surveillance of public waters, new assay development, regulatory inspections, and investigative diagnostics.
• We took the lead in a national effort to standardize molecular methods for the detection of hemorrhagic septicemia virus in fish. Once present in a water body, this highly pathogenic fish disease cannot be eliminated. Therefore, proactive surveillance programs are necessary. Through this project, the assay we developed has been recognized as one of the best fit-for-purpose assays available and therefore, a front-runner for acceptance by the USDA. This partnership with government, university and private laboratories represents the most collaborative effort of this magnitude for a fish disease in the United States.
• In 2010 we tested more than 10,000 fish for a variety of health issues from across the United States. The majority of these samples originated in Minnesota and represented about 115 water bodies. Although this is a small percentage of the state’s 10,000 lakes, they are some of the most ecologically and recreationally important. From these tests, several diseases were identified that had not previously been described in this region and have informed important management decisions.
Electron Microscopy:

- Identified a foreign animal disease, hemorrhagic disease virus, in an outbreak in Minnesota rabbits
- In collaboration with the Plum Island Foreign Animal Disease Diagnostic Laboratory diagnosed a cervixpoxvirus infection in a gazelle.
- Identified new type of rotaviral pneumonia and new type of rotavirus (type C) enteritis in pig

Grants Received by VDL Faculty (listed by project period covering FY10 and FY11)


Swine influenza at the interface of pigs and people. Funded by CFAHFS, $10,000 (September 2009-June 2010). P.I: Torremorell, Co-investigator: Marie Gramer.


Understanding transmission of swine influenza under field conditions. Funded by Agricultural Experiment Station – RARF, $199,995 (Jan 2010-June 2011). P.I: Torremorell, Co-investigator: Marie Gramer.


Wisconsin Tribal Conservation VHS Surveillance. $10,000 (April 2010 – October 2010. PI: Nick Phelps


VHS rRT-PCR Validation. USDA Cooperative Agreement (1094190177). $76,516.00 (September 2010 to August 2011). PI: Nick Phelps


Investigation of a possibly emerging disease referred to as Peri-weaning Failure to Thrive Syndrome in Minnesota swine herds. Rapid Agricultural Respond Funds 2011. $193,000. P.I: Albert Rovira

Mesenchymal stem cells in tumor growth and immuneresistance. AHC-Faculty Research Development Grant, $200,000, (February 2011 – January 2013), Co-Investigator: Tim O’Brien

Investigation into the factors contributing to influenza transmission, persistence and viral change in pig populations. MCEIRS/NIH: $251,665 (Pending). PI: Torremorell, Co-investigator : Marie Gramer.