

SPOTLIGHT ON University of Minnesota Veterinary Medicine

Advancing animal health and welfare through research

From lab to Labrador: basic and applied health research

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Research at the University of Minnesota (UMN) College of Veterinary Medicine (CVM) spans from bench to bedside—or perhaps more accurately, from lab to Labrador. Our research strengths range from basic disease pathogenesis to applications in individual animals, animal populations, the environment, and human health.

Fundamental Disease Discovery and Pathogenesis

CVM research starts with basic science work to understand the underpinnings of chronic diseases such as cancer, arthritis, and metabolic disease using *in vitro* systems and models to understand how the relationships between genes, molecules, and cells lead to disease initiation and progression. For example, researchers in canine cancer are at the forefront of identifying and testing novel cancer treatments including immunotherapies for cancers common in both humans and dogs.

Research in genomics and computational biology uses big data approaches to unravel how genes contribute to susceptibility to metabolic, immunologic, and neuromuscular disease in mammals and birds. For example, CVM researchers are collaborating to understand hyperlipidemia in dogs and equine metabolic syndrome by integrating the genome, transcriptome, proteome, and metabolome. This work is supported by core resources including the UMN Genomics, Metabolomics, and Proteomics Centers and the Informatics and Supercomputing Institutes.

CVM has a rich history of pathogen discovery and surveillance research that relies on partnerships with practitioners, producers, and the Minnesota Veterinary Diagnostic Laboratory. These partnerships provide thousands of samples for identifying new and emerging pathogens and investigating environmental risks such as how the microbiome in poultry bedding impacts *Campylobacter* persistence. Our faculty also study host-pathogen interactions and how pathogens spread (eg, by modeling pig immune response to new strains of porcine reproductive and respiratory syndrome [PRRS] to guide immunization protocols, drive vaccine development, and prevent outbreaks of PRRS). By understanding complex host-pathogen-environment interactions, researchers are

able to identify management and therapeutic practices that mitigate disease.

Relationships between Environmental, Animal, and Human Health

Our researchers are working to understand how the microbiomes of animal and human populations interact with the environment to impact health and disease. For example, the Companion Animal Veterinary Surveillance Network, a collaboration between the CVM, the Minnesota Department of Animal Health, industry entities, and veterinary practices, is evaluating how antimicrobial prescribing in cats, dogs, and horses could result in antimicrobial resistance. The Minnesota Center for Prion Research and Outreach is working with local, state, and national partners to examine how the interdependence between people, livestock, wildlife, and the environment plays a role in chronic wasting disease spread and environmental persistence.

Applied Research and Discovery in Animals and Animal Populations

Minnesota is ranked fifth in agricultural production, and food animal health is an important focus. Spanning from viral transmission in honeybees to dairy calf welfare, this research addresses the challenge of feeding the planet while promoting food-animal health and well-being. Supported by unique CVM resources including the John Fetrow Dairy Education Center—a research lab situated within a 4,500-cow dairy—researchers are seeking answers that directly impact food-animal welfare such as the best rehydration solution for calf diarrhea.

The Veterinary Medical Center sees nearly 40,000 cases a year, providing another major resource for answering important clinical questions. Infrastructure such as the Clinical Investigation Center and the Clinical and Translational Science Institute and recent investments in an electronic health records data repository, a clinical biobank, and a state-of-the-art MRI allow researchers to investigate clinical diseases while providing cutting-edge therapy to clinical patients. Examples include advanced, quantitative MRI methods to detect intervertebral disc disease in dogs and improved anesthesia protocols in horses.