



PDS



**PRAIRIE DIAGNOSTIC
SERVICES INC**

Annual Report

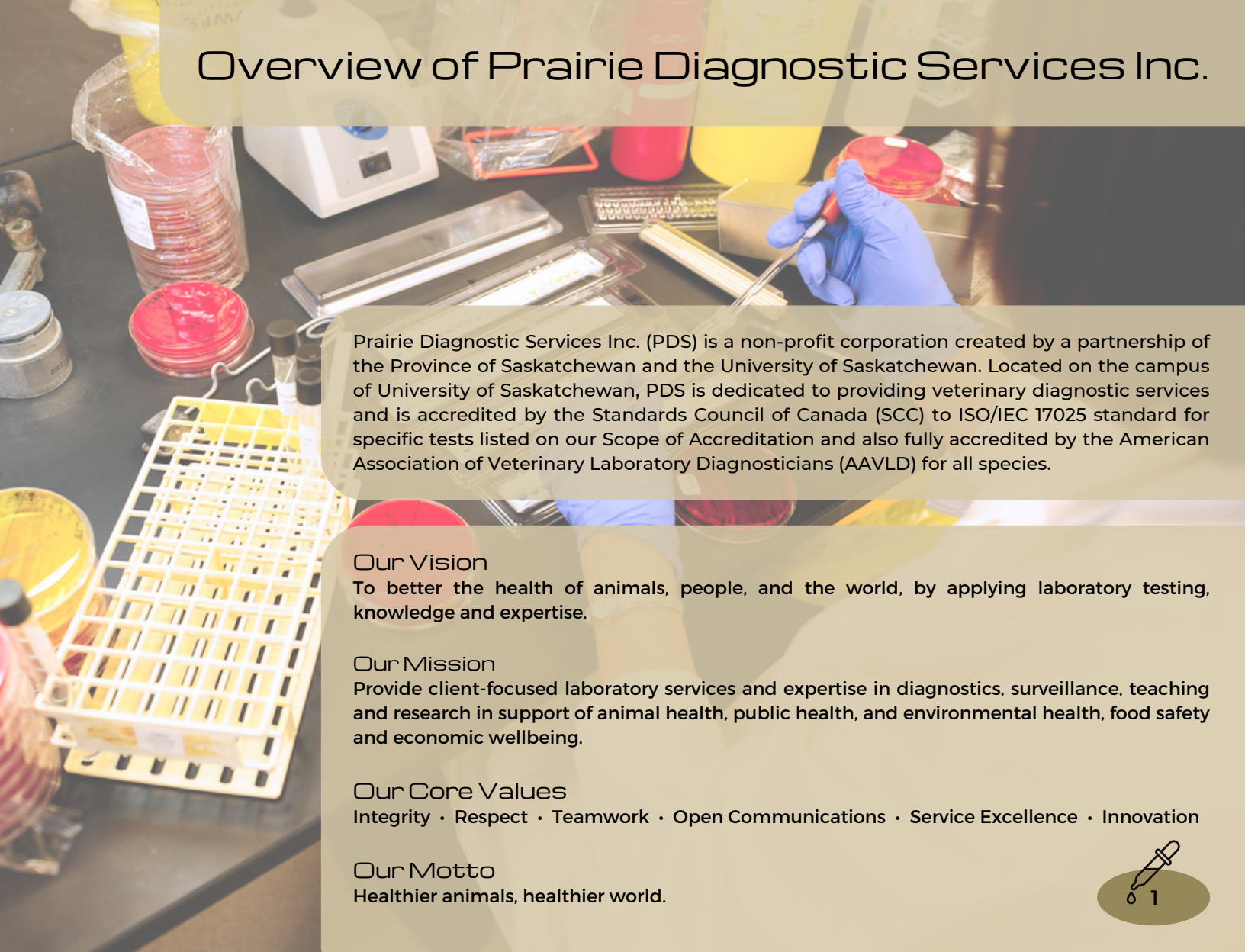
2022-2023



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Overview of Prairie Diagnostic Services Inc.



Prairie Diagnostic Services Inc. (PDS) is a non-profit corporation created by a partnership of the Province of Saskatchewan and the University of Saskatchewan. Located on the campus of University of Saskatchewan, PDS is dedicated to providing veterinary diagnostic services and is accredited by the Standards Council of Canada (SCC) to ISO/IEC 17025 standard for specific tests listed on our Scope of Accreditation and also fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) for all species.

Our Vision

To better the health of animals, people, and the world, by applying laboratory testing, knowledge and expertise.

Our Mission

Provide client-focused laboratory services and expertise in diagnostics, surveillance, teaching and research in support of animal health, public health, and environmental health, food safety and economic wellbeing.

Our Core Values

Integrity • Respect • Teamwork • Open Communications • Service Excellence • Innovation

Our Motto

Healthier animals, healthier world.



Board of Directors



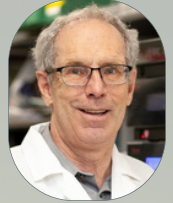
Dr. Julie de Moissac
Chair of the Board
Veterinary Practitioner
Mixed Animal Practice
Bratton Road Vet Holdings



Dr. William Murphy
Professor
Edwards School of Business
University of Saskatchewan



Dr. Grant Maxie
Former Director
Animal Health Laboratory
Laboratory Services
University of Guelph (Retired)



Dr. Barry Blakley
Faculty Member
Department of Veterinary Biomedical Sciences
Western College of Veterinary Medicine



Mr. Lee Whittington
Chief Executive Officer
Four Oaks Investments



Mr. Venkata Vakulabharanam
Executive Director
Livestock Branch
Saskatchewan Ministry of Agriculture



Dr. Betty Althouse
Former Saskatchewan Chief Veterinary Officer
and veterinarian (Retired)



Mr. Pat Pitka
Chief Financial Officer
Genome Prairie Inc.



Dr. Susantha Comis
Faculty Member
Department of Veterinary Pathology
Western College of Veterinary Medicine



Dr. Trent Wennkamp
Veterinary Practitioner
Mixed Animal Practice
Lloydminster Animal Hospital



Mr. Robert Pentland
Director of Financial Services
Saskatchewan Ministry of
Agriculture



Dr. Nancy deWith
Animal Health Veterinary Officer, British Columbia
Canadian Food Inspection Agency
Government of Canada



Message from Board Chair

Once again, PDS has had a challenging fiscal 2022-2023 year due to a number of factors out of the control of the organization, including a shrinking cattle herd, in-clinic diagnostic equipment and the trend towards corporate practices. Despite these challenges, the staff of PDS continue to deliver excellent service to the lab's clients who have again shown strong positive feedback. As a PDS client, I can confirm the top quality diagnostic reports and the quick turnaround time provided that is essential to my animal clients and their owners.

Professional staff are in high demand world-wide and finding and keeping our exceptional people is always a challenge. We strive to be an employer of choice. I would like to thank the entire staff for their dedication and ability to innovate within the lab. We realize that our staff is our strength and we are committed to their well-being.

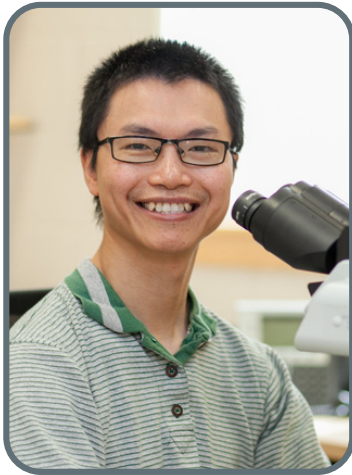
I'd like to thank the members of our board, an eclectic and dedicated group who bring experience and expertise to every meeting they attend. I would like to thank Dr. Susantha Gomis for his insightful contribution to the board. He replaced Dr. Elemir Simko this past year who was away on sabbatical. Welcome back Elemir. Our newest board member, Dr. Betty Althouse brings to the table a vast amount of experience and expertise, as a former CVO, CFIA employee and practitioner.

PDS is an essential organization to the animals and people of Western Canada and it is my great privilege to serve as Board Chair.

Dr. Julie de Moissac
PDS Board of Directors



Message from CEO



The macroeconomic conditions such as decreasing cattle inventory, profitability challenges in the swine sector, the continued maturation of for-profit companion animal diagnostics, and general economic conditions presented difficulties to PDS. Some of these factors existed before the current year, but together with some large project timeline changes, the challenges to this year's operations were not insignificant.

Despite these challenges, PDS continued to provide high quality and vital services to livestock and companion animals. Worth highlighting is our response to reportable disease outbreaks. The outbreak of Highly Pathogenic Avian Influenza in North America, including Saskatchewan, this year was truly unprecedented. It was the most significant outbreak PDS has responded to in nearly a decade. I am extremely proud of PDS's professionalism and willingness to go over and above in response this outbreak. What's more, as a regional center, PDS also stepped up to help the province of Manitoba in their response to Chronic Wasting Disease (CWD). Times like these, although extremely unfortunate to the industry and society, highlight one of the core reasons for PDS's existence. We are an essential service to our society.

PDS continues to innovate, demonstrated by the number of new tests we developed to address needs from the sectors we serve. It is also reflected in our continued progress in applied research grants in areas such as Salmonella rapid diagnostic genomic workflow and Bovine Reproductive Failure Sequencing panel.

Our participation and championship to regional and national surveillance activities is another valuable contribution PDS has to animal health. This year, besides our continued support of the Western Canadian Animal Health Network (WeCAHN) and Western Canadian Swine Intelligence Network (CWSHIN), PDS also made a big step in our surveillance efforts by becoming a service provider for the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) program. These programs help western Canada and Canada turn individual test results into big data and intelligence to monitor disease trends and antimicrobial resistance.

Last but not least, PDS's vital roles are recognized by the Saskatchewan Ministry of Agriculture's continued funding support. We have entered a new five-year agreement with the Ministry to provide animal health diagnostic services to Saskatchewan and Canada. The \$18-million funding in this new agreement represents a 12.5% increase from the previous agreement, and what's more, a clear message regarding PDS's importance to society.

Dr. Yanyun Huang
Chief Executive Officer
Prairie Diagnostic Services Inc.



What do our clients say?

PDS continues to receive strong positive client feedback. This year, our Net Promoter Score is 49, a nine-point improvement from last year's result, which was already considered a good score. Here are some of our clients' comments:

"Accessibility to the services and to reports on the PDS web page."

"Easy online forms, and info."

"Quick to return calls regarding cases. Accept samples on Saturdays."

"Fast turnaround for results. Ability to consult with pathologists if needed."

"Friendly staff that try to answer any questions we have."



Year at a Glance

147,431 tests conducted



10 tests developed or improved

19,352 tests for regulated diseases



\$625,758 equipment investment

13 peer-reviewed publications

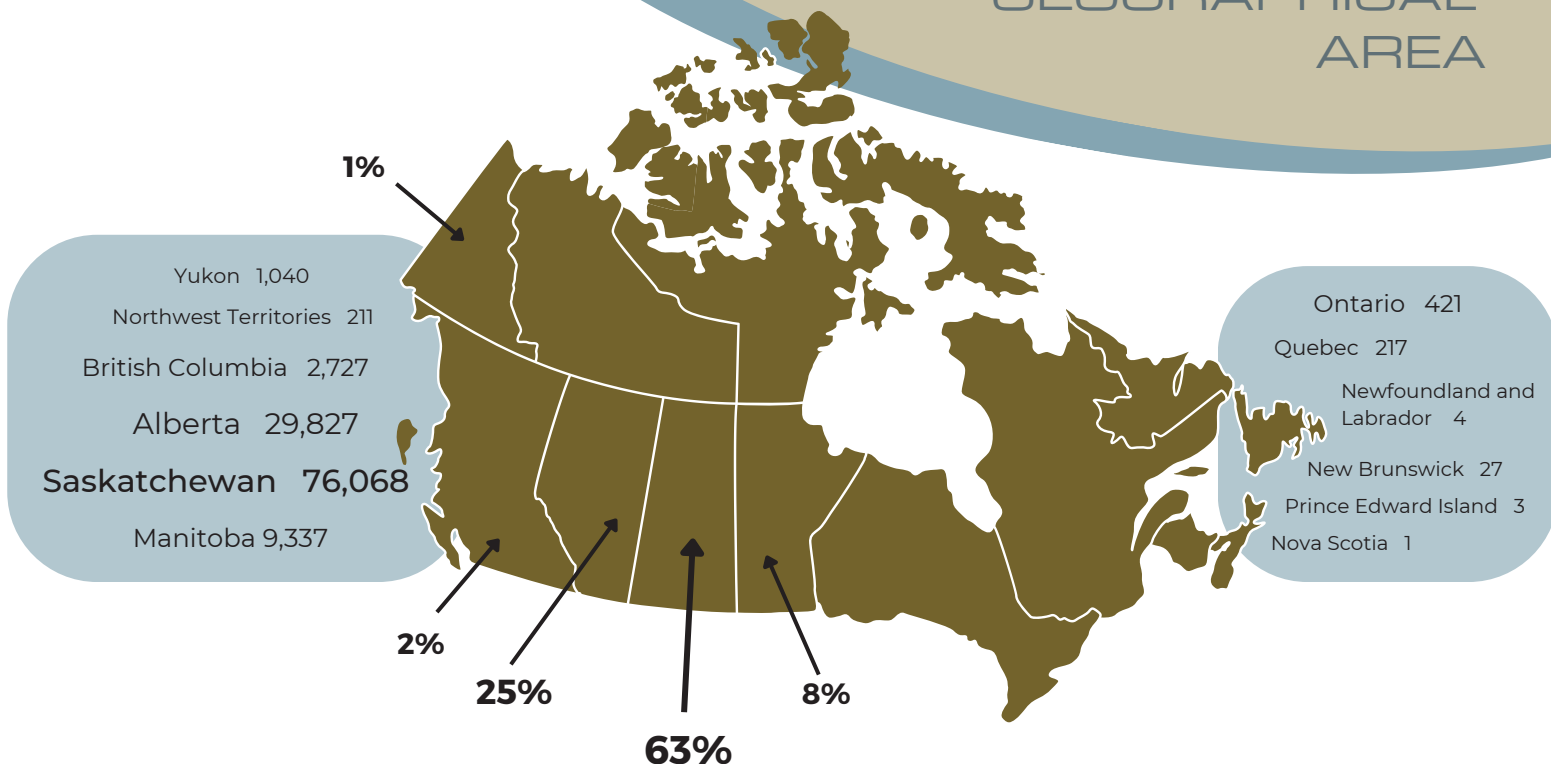


**Net Promoter Score
from client survey: 49**



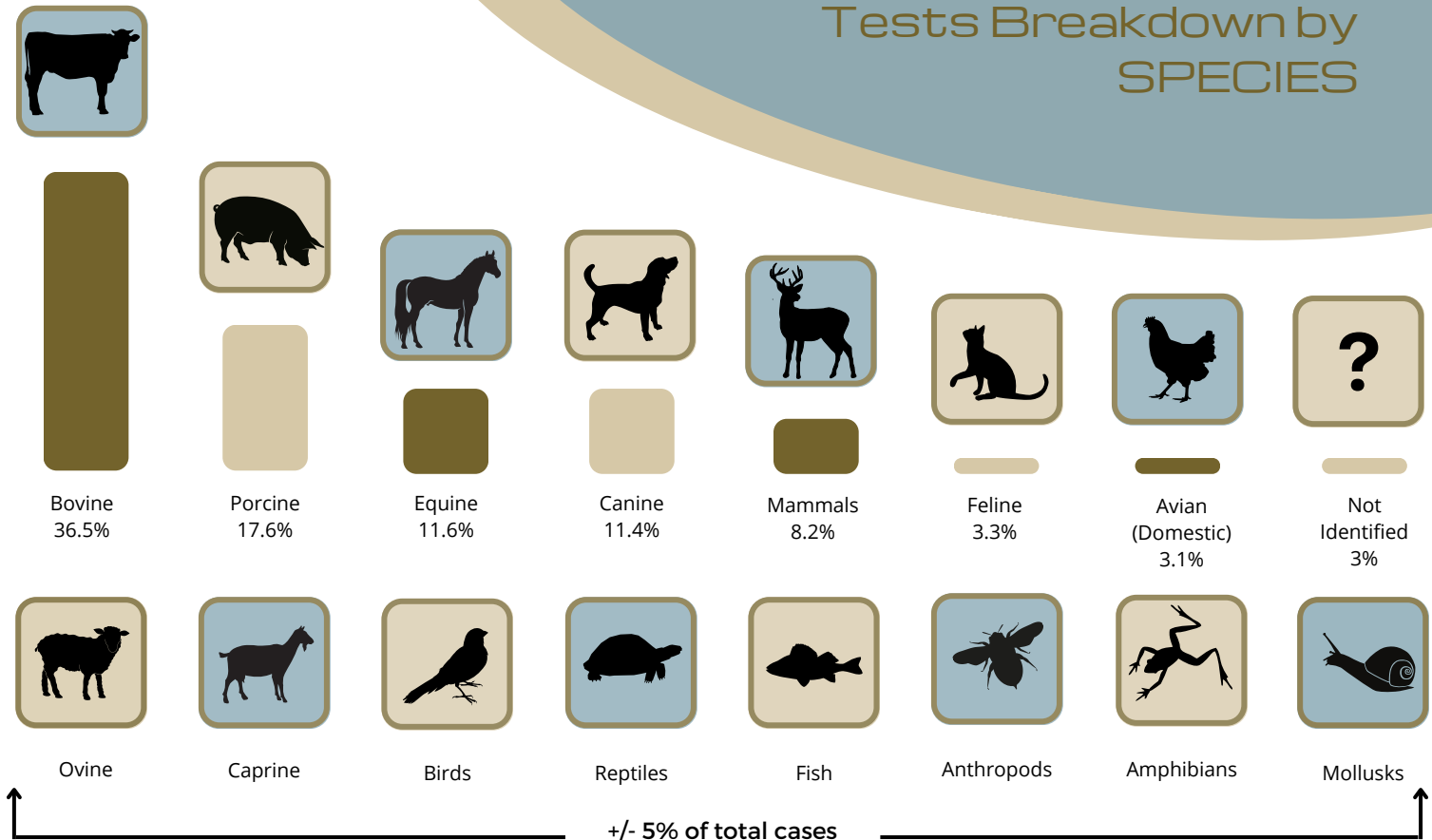
Diagnostics

Tests Breakdown by GEOGRAPHICAL AREA



Between May 2022 and April 2023, PDS received about 39,500 cases and conducted close to 121,000 tests, which represent a stable testing activity. The prairie provinces (Saskatchewan, Alberta, and Manitoba), which compose ~96% of the total submissions, continue to be the main geographical areas that PDS serves. PDS also occasionally supports other Canadian provinces and conducts small numbers of digital pathology internationally.

Tests Breakdown by SPECIES



PDS continues to provide diagnostic services for all species to veterinary communities. The top four species PDS serves are bovine, porcine, equine and canine, comprising a total of 77% of samples.

Applied Research

2022 brought more growth to the PDS applied research portfolio with over \$1.3 m in generated revenue and 121 new external research project requests. We have accomplished significant progress on three large applied research portfolios aimed at developing new testing capacity for the organization – “Genomic ASSETS for Livestock”, BovReproSeq and Salmonella genomics.

The third year of “Genomic ASSETS for Livestock” was another steep, very challenging, and rewarding learning curve for PDS. As with any new development of this massive scale, difficulties are inevitable – endless evolution of the protocols, high client expectations, pressing timelines, and the sheer number of samples have put a lot of pressure on the team. Lessons learned from this experience are of immense value for the organization as we are heading into uncharted waters of genomics-based routine animal health diagnostics and surveillance. PDS has partnered with the University of Saskatchewan Global Institute for Food Security (GIFS) Omics and Precision Agriculture Laboratory (OPAL) to fulfill the project commitments on time and on budget.

Another first for the organization, in partnership with the Western College of Veterinary Medicine Department of Veterinary Microbiology, PDS has offered staff an opportunity for advanced research training and post-graduate education under BovReproSeq. With the increasingly scientifically-intense nature of the PDS service portfolio, this model can provide an exciting career-building opportunity venue for our technical team members striving for professional growth.

Driven by the Mitacs Accelerate postdoctoral fellow (Dr. Ruwani Kattandi Gedara), Salmonella genomics-based applied research program has accomplished a significant improvement in isolate serotyping turnaround time. Historically, clients had to wait up to three weeks or more for the final serotyping information from the Public Health Agency of Canada. With the new workflow developed and validated by the PDS applied research team, isolate serotyping by sequencing can be performed same day by the PDS genomics laboratory. The team method development efforts are now focused on further turnaround time reduction by using metagenomic sequencing and removing the need and limitations of primary pathogen isolation.

As originally envisioned in the Canadian Foundation for Innovation proposal “Integrated omics for sustainable animal agriculture and environmental stewardship” (IntegrOmics), WCVm room 2207 has been renovated to accommodate the joint PDS/IntegrOmics high throughput molecular diagnostic laboratory with the Hamilton NGS STAR liquid handling robot as the centrepiece. This capacity is critical to accommodate the planned sequencing work for the bovine respiratory disease samples from “Genomics ASSETS for Livestock”, support future large research projects, and serve as a reserve capacity for animal health emergency preparedness. IntegrOmics also brings a new -80 freezer farm to be managed under the PDS biobank umbrella and supported by the PDS Laboratory Information Management System.

BioSeqDB, the PDS genomic data management and bioinformatic analysis platform, was expanded with an additional high-performance server and the capacity for full integration of the University of Saskatchewan data warehousing resources (DataStore).

The PDS showcase of a point-of-need genomics-based diagnostic support concept was featured and well-received as a dedicated station at the 2022 University of Saskatchewan Livestock and Forage Centre of Excellence Field Day.



Animal Health Surveillance

Animal health surveillance is a distinct and important element of the Prairie Diagnostic Services core mandate. PDS serves as the key laboratory facility supporting a multitude of Saskatchewan government animal health surveillance programs. With the support of the four western provinces and the Beef Cattle Research Council, PDS continues to serve as a home base for the Western Canadian Animal Health Network (WeCAHN). Four major WeCAHN activities in 2022 included ongoing beef, dairy, small ruminant, and poultry networks connecting peers, experts, and key stakeholders of the respective industries to identify and communicate events and trends affecting for animal health.

The beef network continued to note a cyclic multi-year rise and fall in the detection of several laboratory-confirmed prioritized bovine respiratory disease (BRD) and calf diarrhea pathogens. PDS continues efforts to identify potential predictors of these cycles. The beef network also noted two unusual disease syndromes in 2022: hepatic necrosis (extensive structural liver damage) in neonatal beef calves, and lameness and hoof damage apparently associated with chronic ergot toxicity.

The dairy network discussed the ongoing health and performance impacts of feeding alternative feedstuffs to dairy cattle due to ongoing drought in some parts of the West limiting the availability of some feeds. They also discussed the diagnostic challenges posed by the relatively widespread use of modified live vaccines for BRD and calf diarrhea in very young dairy calves.

The small ruminant network repeatedly discussed the challenges created by the limited number of pharmaceuticals approved for use in sheep and goats. Several network members have volunteered for the Canadian Animal Health Surveillance System (CAHSS) working group which is studying this problem

further at the national level. The WeCAHN small ruminants network also prioritized drafting educational materials describing the infectious causes of reproductive loss in small ruminants, and alternatives to antimicrobials for control of these agents. A factsheet was created and shared with other surveillance partners, veterinary practitioners, and industry.

Poultry network meetings were understandably dominated by discussions of the Highly Pathogenic Avian Influenza (HPAI). During the spring and fall WeCAHN poultry network meetings, which were opened to all western poultry practitioners, CFIA provided HPAI situation updates. The meeting in February 2023, discussing the final three months of 2022, unfortunately, identified an uptick in multidrug-resistant *E. coli* in western flocks as a sequel to HPAI incursions, reducing the quality of subsequently available breeding poult and eliminating the protective microbiome established in depopulated commercial flocks.

To augment other activities such as dedicated listservs to support veterinary practitioners in serving small-scale clients, WeCAHN partnered with CAHSS in offering an online small flock medicine webinar series in April and May of 2023, which had a registration of roughly 500 veterinarians and veterinary technicians from across Canada.

Contributing to the extremely important cause of the national antimicrobial surveillance, through an open-tender process, PDS won a federal contract to provide laboratory support for the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) beef feedlot antimicrobial resistance surveillance program. PDS also became an official data contributor to the National Microbiology Laboratory Antimicrobial Resistance Network (AMRNet).

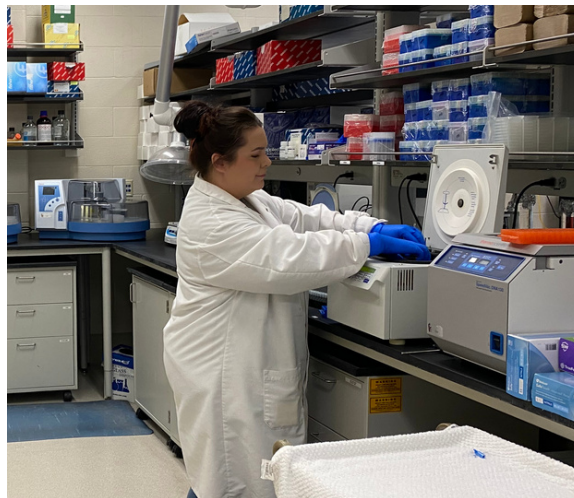
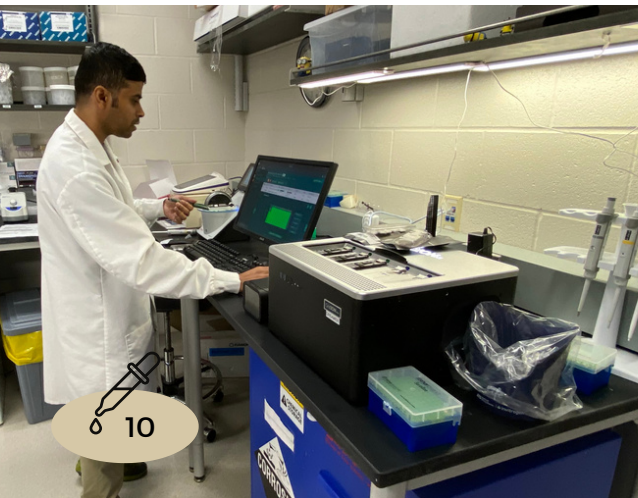


Quality Assurance

PDS implements a Quality Management System in accordance with the current version of the *ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories*, Standards Council of Canada, and the current version of the standard *AAVLD Requirements for an Accredited Veterinary Medical Diagnostic Laboratory*, American Association of Veterinary Laboratory Diagnosticians, Inc.

The laboratory participates in proficiency test programs, inter-laboratory comparisons, and in-lab assessments to ensure the standard of testing expertise is maintained.

The Standards Council of Canada is scheduled to conduct an on-site assessment in October 2023 of the PDS Microbiology section for the test methods listed on the Scope of Accreditation.



Looking Forward

Challenges this year are opportunities for PDS to get better and stronger. We will continue to provide world-class animal health diagnostic services. PDS is renewing our strategic planning effort to guide our great team through the next five years. We will double down on our client caring mindset that leads to world-class services and drive growth through innovation – not just any innovation, but the kinds that western Canada, Canada and the world need.



Journal Publications

Bousquet, Teresa, **Maria Bravo-Araya**, and Jennifer L. Davies. "Gastric neuroendocrine carcinoma (carcinoid) in a ferret (*Mustela putorius furo*).
The Canadian Veterinary Journal 63, no. 11 (2022): 1109.

Alkie, T.N., Cox S., Embury-Hyatt C., Stevens B., Pople N., Pybus M.J., Xu W., Hisanaga T., Suderman M., Koziuk J., Kruczkiewicz P., Nguyen H.H., Fisher M., Lung O., Erdelyan C.N.G., Hochman O., Ojkic D., Yason C., **Bravo-Araya M.**, Bourque L., Bollinger T.K., Soos C., Giacinti J., Provencher J., Ogilvie S., Clark A., MacPhee R., Parsons G.J., Eaglesome H., Gilbert S., Saboraki K., Davis R., Jerao A., Ginn M., Jones M.E.B., Berhane Y.. Characterization of neurotropic HPAI H5N1 viruses with novel genome constellations and mammalian adaptive mutations in free-living mesocarnivores in Canada. *Emerging microbes & infections*. (2023): 2186608.

Kolapo, T.U., Hay, A., Gesy, K.M., Frey, C.F., Rothenburger, J.L., Joffe, D.J., Spotswood, T., **Huang, Y.**, Massolo, A., Peregrine, A.S. and Hill, J.E., 2023. Canine alveolar echinococcosis: an emerging and costly introduced problem in North America. *Transboundary and Emerging Diseases* (2023).

Niroula, Nirajan, Ze Long Lim, Stewart Walker, **Yanyun Huang**, Volker Gerds, Slim Zriba, Kylee Drever, and Jeffrey M. Chen. "Domestic pigs experimentally infected with *Mycobacterium bovis* and *Mycobacterium tuberculosis* exhibit different disease outcomes." *Tuberculosis* 133 (2022): 102167.

Zabrodski, Michael W., Tasha Epp, Geoff Wilson, Igor Moshynskyy, Mohsen Sharafi, Lara Reitsma, Mateo Castano Ospina et al. "Establishment of apiary-level risk of American foulbrood through the detection of *Paenibacillus* larvae spores in pooled, extracted honey in Saskatchewan." *Scientific Reports* 12, no. 1 (2022): 8848.

Corda, Erica, Jillian Russnak, and **Moir Kerr**. "What is your diagnosis? Inguinal mass in a dog." *Veterinary Clinical Pathology* 52 (2023): 113-115.

Sarich, Jenna M., Kim Stanford, Karen S. Schwartzkopf-Genswein, Robert J. Gruninger, Tim A. McAllister, Sarah J. Meale, **Barry R. Blakley**, Gregory B. Penner, and Gabriel O. Ribeiro. "Effect of ergot alkaloids and a mycotoxin deactivating product on in vitro ruminal fermentation using the Rumen simulation technique (RUSITEC)." *Journal of Animal Science* 100, no. 9 (2022): skac226.

Cherewyk, Jensen E., Sarah E. Parker, **Barry R. Blakley**, and Ahmad N. Al-Dissi. "Sustained vascular contractile response induced by an R- and S-epimer of the ergot alkaloid ergocristine and attenuation by a noncompetitive antagonist." *Journal of Animal Science* 100, no. 9 (2022): skac235.

Jose, Divya, Andrew L. Allen, **Barry R. Blakley**, and Ahmad Al-Dissi. "Evaluation of metallothionein and Ki-67 expression in chronic cholangiohepatitis in cats." *Canadian Journal of Veterinary Research* 85, no. 1 (2021): 36-44.

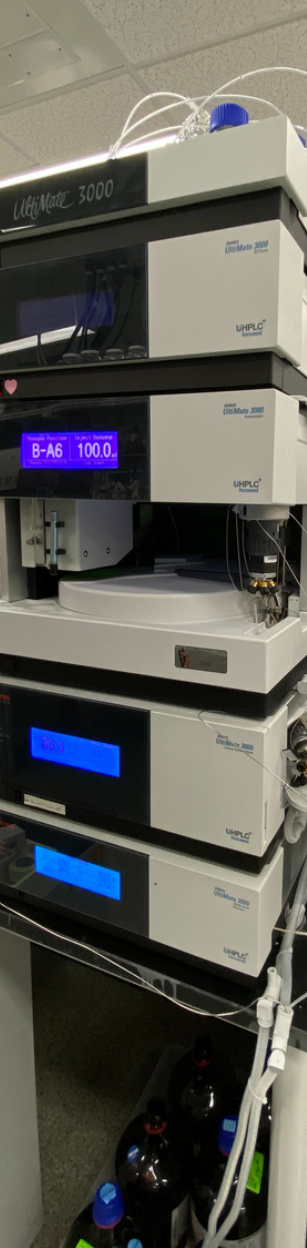
Cherewyk, Jensen E., **Barry R. Blakley**, and Ahmad N. Al-Dissi. "Investigation of the relationship between ergocristinine and vascular receptors." *Toxicology Reports* 10 (2023): 604-611.

Cowan, Vanessa E., Moveed Chohan, **Barry R. Blakley**, John McKinnon, Muhammad Anzar, and Jaswant Singh. "Chronic ergot exposure in adult bulls suppresses prolactin but minimally impacts results of typical breeding soundness exams." *Theriogenology* 197 (2023): 71-83.

Cherewyk, Jensen E., Taylor J. Grusie-Ogilvie, Sarah E. Parker, **Barry R. Blakley**, and Ahmad N. Al-Dissi. "Ammonization of the R- and S-epimers of ergot alkaloids to assess detoxification potential." *Journal of Agricultural and Food Chemistry* 70, no. 29 (2022): 8931-8941.

Stanford, Kim, Karen S. Schwartzkopf-Genswein, Daniela M. Meléndez, Skyler Ngo, Michael Harding, Tim A. McAllister, Dian Schatzmayr, Mary Lou Swift, **Barry R. Blakley**, and Gabriel O. Ribeiro. "Effects of Heating, Pelleting, and Feed Matrix on Apparent Concentrations of Cereal Ergot Alkaloids in Relation to Growth Performance and Welfare Parameters of Backgrounding Beef Steers." *Toxins* 14, no. 9 (2022): 580.





Conference Presentations

Zabrodski, M.W. Thymoma with paraneoplastic exfoliative dermatitis in a rabbit. Oral Presentation (virtual): 2022 Western Conference of Veterinary Diagnostic Pathologists (Sep. 30, 2022), Saskatoon, SK, CA.

Trokhymchuk, A., A. Berg, C. Liu "Integrating bioinformatics into a diagnostic lab workflow: a PDS case study". Canadian Animal Health Laboratorians Network annual meeting, June 7, 2023, Saskatoon, SK

Trokhymchuk, A., R. Mesquita, M. Links. "Point-of-need genomics-based diagnostics" Livestock and Forage Centre of Excellence Field Day, June 21, 2022, Clavet, SK.

Trokhymchuk, A., "Rapid Metagenomics at a Point of need in animal health diagnostics", Nanopore Community Meeting 2022, New York, USA

Trokhymchuk, A., "Rapid Metagenomics at a Point of need in animal health diagnostics", American Association of Veterinary Laboratory Diagnosticians, October 6, 2022, Minneapolis, MN, USA.

Blakley, B.R., (2022). Beef Fall Webinar Bonus session: Mycotoxin Disease in Cattle in Western Canada, Saskatchewan Agriculture, October 4, 2022.

Blakley, B.R., (2022). Copper Deficiency. Interview by J. Campbell. Beef Cattle Health and Nutrition Podcast. Sponsored by the Beef Cattle Research Council and the Alberta Beef Producers, December 3, 2022.

Contributed Presentations:

- Sarich J.M., Standford, K., Schwartzkopf-Genswein, K.S., McAllister, T.A., **Blakley, B.R.**, Penner, G.B., Ribeiro, G.O. (2022). Effect of Increasing Levels Of Ergot Alkaloids in the Diet of Feedlot Cattle. American Society of Animal Science - Canadian Society of Animal Science Annual Meeting, Oklahoma City, Oklahoma, June 26-30, 2022. Published Abstract: Journal of Animal Science, 100: supplement 3:66. #156. <http://doi.org/10.1093/jas/skac247.130>.

Poster Presentations:

- Cherewyk, J.E., Grusie-Ogilvie, T., Parker, S.E., **Blakley, B.R.**, Al-Dissi, A., (2022). The Use of Liquid Chromatography Mass Spectrometry to Assess the Impact of Storage Temperature and Time on Ergot Alkaloid Concentration Stability. Rapid Methods Europe – 14th Conference, Amsterdam, the Netherlands, October 3-4, 2022.
- Cherewyk, J.E., Parker, S.E., **Blakley, B.R.**, Al-Dissi, A.N., (2022). Prolonged Vascular Contractile Response Induced by the R and S – Epimers of the Ergot Alkaloid Ergocristine, and Attenuation by a non-competitive Antagonist, International Symposium on Toxicology Assessment (ISTA 20th Conference), Saskatoon SK, August 15-18th, 2022.
- Mayer, N.M, Koehnke, N., Feng, T., **Blakley, B.R.**, Sukat, S., (2023). Blood Lead Levels and Hand Surface Lead in Veterinary Workers using Lead Shielding during Diagnostic Radiology, American Occupational Health Conference, Philadelphia, Pennsylvania, April 16-19, 2023.



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