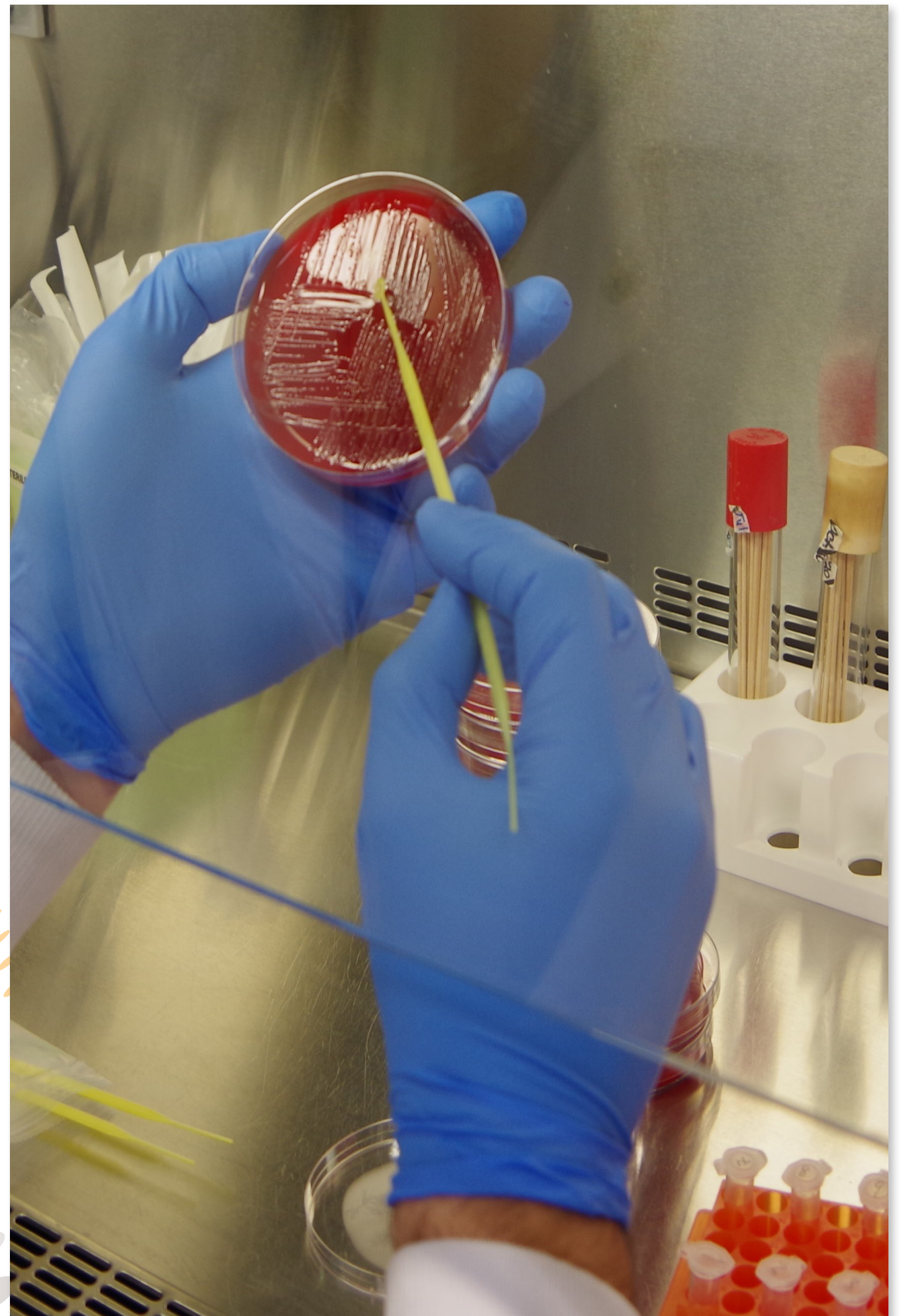




**PRAIRIE DIAGNOSTIC
SERVICES INC**

2020-2021 ANNUAL REPORT





Overview of **PDS**

Prairie Diagnostic Services Inc. (PDS) is a non-profit corporation created by a partnership of the Province of Saskatchewan and the University of Saskatchewan and is located in Saskatoon, 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 by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) – full accreditation, all species.

Our **Vision**

A Leader in Veterinary Diagnostic Services

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 market access.

pdsinc.ca



Message from **BOARD CHAIR**

This has been a most unusual year. With the arrival of COVID 19 coronavirus early in 2020, and persisting well into 2021, the functioning of PDS and the Board has been tested in many ways. Thanks to the innovation and adaptation by the management and staff of PDS, the operations of the lab have continued, and even flourished, posting a modest surplus of revenue over expenses this last fiscal year. This is an encouraging step on the path to achieving financial stability, with funds being available to replace and upgrade equipment. The Board wishes to recognize the job well done by all at PDS to make the best of a very trying situation.

The Board membership continues to reflect a diversity of expertise and geographic representation that well serves the long-term goals of PDS. With the Board members' input, PDS management are establishing key performance indicators, benchmarks against which progress can be measured in the previously identified areas of focus (client relations, financial stability, staff retention and recruiting, and diagnostic excellence and innovation). This is an important development in the ability to monitor the organization's health.

To reinforce this forward-thinking approach, we have upgraded the Strategic Directions working group to the status of a standing committee. The work initially accomplished through the working group helped to refine the thinking around longer term goals for PDS, so it was felt there was value to have a permanent committee to continue this process. The committee has three roles:

- To monitor the progress on the recommendations outlined in the 2019 AGM report.
- To envision what will the future hold for One Health and the role of diagnostics in surveillance, disease information management and solution development.
- To recommend strategies and actions that will contribute to favourable positioning of PDS within the animal health/ One Health system.

This group, dedicated to looking ahead, will be an important addition to the Board's value to the organization.

Finally, let me thank all of the Board members, the leadership team of PDS, and the staff for their dedication and commitment to excellence. PDS is recognized for its quality service among many stakeholders, and it is its people who make the difference.

Wayne Lees, Chair
PDS Board of Directors



Our Core Values



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

Our Strategic Focuses

- Continuous Improvement with a Client-Focus Mindset
- Continuous Improvement by Innovation
- Continuous Improvement through Strategic Partnerships

Message from **CEO**



At the time of the writing of the previous annual report (fiscal year 2019-2020), I would not have, in my wildest imagination, thought that we would still be in a global pandemic. Yet here we are, unclear where COVID-19 variants are going to take our society to.

However, our great people at PDS, who we call “PDSers”, have adapted to the changing reality and have been steadfast guarding animal health in western Canada in the past year. PDSers recognize we are essential to society. Lives of animals and livelihoods of animal owners depend on the great works of PDSers. And PDS and PDSers delivered!

PDS has made necessary adjustments to maintain the timeliness and quality of services while observing public health measures. We are proud that PDS not only maintained but improved on the average turnaround time during this year.

PDS has strong expertise and experience in livestock and will continue to build on these strengths. Ranchers and farmers have long relied on our services through working with their veterinarians. During this year, there has been increased interest in and attention to animal health, especially for the companion animals. Diagnostic submissions from companion animals have increased compared to last year, highlighting the importance of pets to the mental health of people. Through services related to companion animal health, PDSers also contributed to human well-being.

Besides diagnostic work, PDS has provided strong supports to large-scale research and surveillance projects that involved laboratory testing. Our collaborations with the Western College of Veterinary Medicine (WCVN), Canadian Cow Calf Surveillance Network (C3SN), Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) are some of the successful stories.

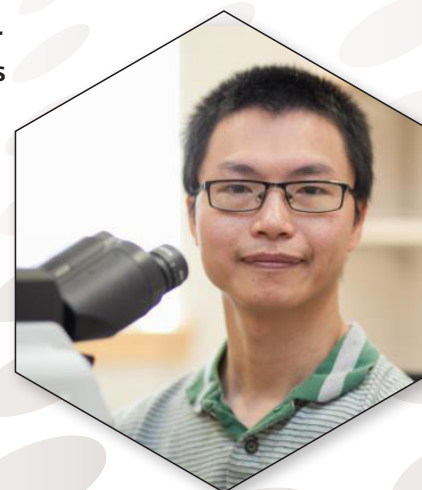
PDS continued its active participation in various regional and national surveillance initiatives. PDS’s diagnostic data has been the fuel of the Western Canadian Animal Health Network (WeCAHN) and Western Canadian Swine Health and Intelligence Network (CWSHIN). We supported the CanSpotASF and Brucellosis pilot projects and continued to test for various reportable and high-impact diseases.

PDS is not just a passive bystander of the COVID-19 pandemic, we actively participate in the fight against it! Our collaborative works with VIDO-InterVac has contributed to the characterization of SARS-CoV-2 pathogenesis, as well as vaccine and therapeutics efficacies.

All the hard work done by PDSers has translated into a strong year, allowing PDS to build reserve funds to invest in equipment, internal research, test development and innovation, placing PDS in a strong position for bigger future successes.

PDS and PDSers will continue to improve through focus in clients’ needs, research and development, and strategic partnerships. I am sure I am not the only person who thinks PDS’s future is bright – because we are truly essential to our society.

Yanyun Huang
Chief Executive Officer
PDS Board of Directors



YEAR AT A GLANCE

• 2020

166,187
tests
conducted

17
tests
developed
or
improved

12,605
tests for
regulated
diseases

\$620,000
awarded for
primary
research

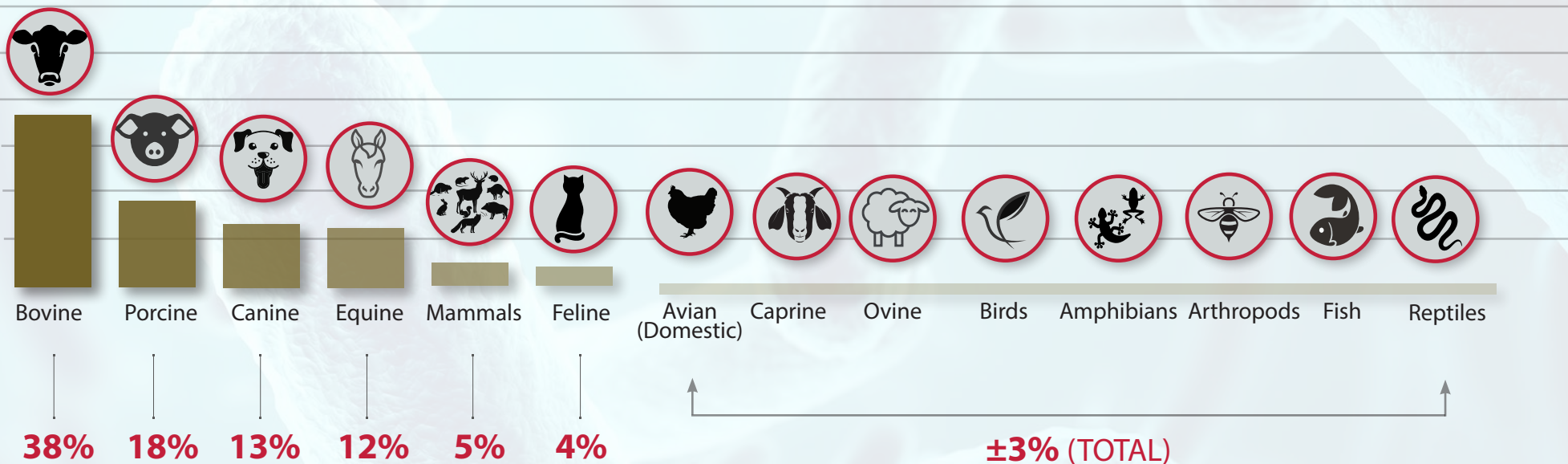
10
peer-
reviewed
publications

• 2021

DIAGNOSTICS

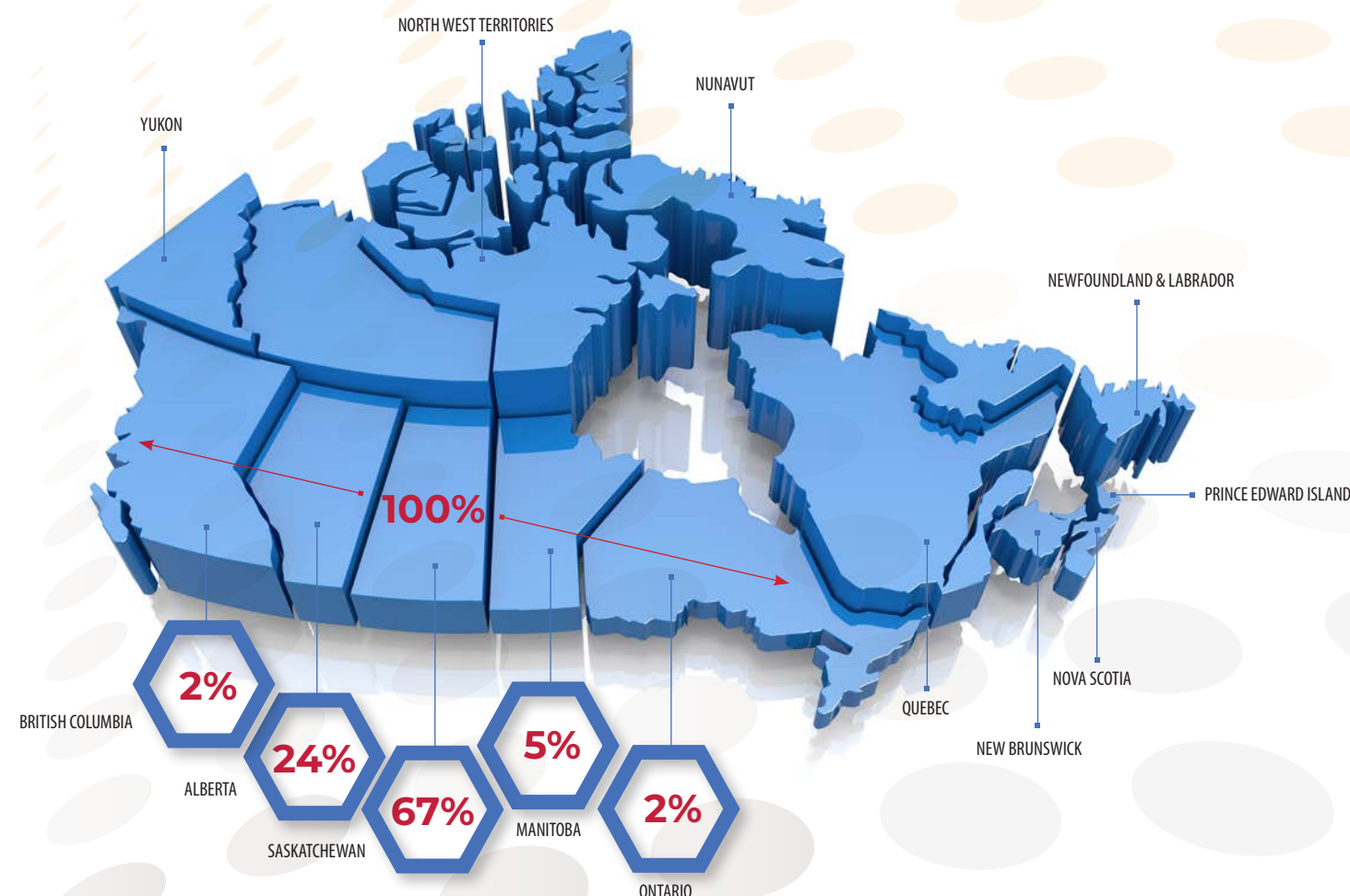
Between May 2020 and April 2021, PDS received over 43,000 cases, and conducted over 166,000 tests, both higher than previous year. The submissions are mainly from the prairie provinces (Saskatchewan, Alberta, and Manitoba), which compose 95% of the total submissions. Submissions are also received from British Columbia, Ontario, Quebec, and even oversea from Taiwan (electronic dermatopathology). PDS continues to provide diagnostic services for all species to veterinary communities. By the numbers of samples tested, the top four species we work on are bovine, porcine, equine, and canine, but a whole array of other species are also submitted to PDS. Responding to the increasing need from the industry, PDS began offering diagnostic test for Honeybees. The diversity of expertise is one of PDS's strengths. The tests for honeybees are also results of collaborations between PDS and Dr. Elemir's active research group, which is an example of how PDS follows its strategic focuses.

Tests Breakdown **BY SPECIES**



Tests Breakdown **BY PROVINCES**

PDS continues to develop new tests and improve existing tests. It is our commitment and one of the strategic focuses to improve through research and development. Below is a list of new and improved test in the past year. Salmonella typing by sequencing reduced the turnaround time by at least 7 times, significantly improves the response for poultry producers when Salmonella is detected in their flocks and reduce economic impacts. With DNA/RNA vaccines available to producers, PDS quickly validated sequencing for Porcine circovirus 3. Having the sequence is the key to access the vaccine product. Streptococcus equi. sbsp zooepedimicus is an emerging pathogen causing massive mortality in pigs. In collaboration with Dr. Matheus Costa, who is a renowned in Canada expert on the subject, PDS became the first laboratory in Canada to offer a test for this organism, receiving great appreciation from the affected operations. Chronic Wasting Disease (CWD) genotyping PCRs were developed and will facilitate the regulation and management of CWD affected herds. Significant numbers of genomic based tests were also added into PDS's portfolio. This is an emerging and disruptive diagnostic technology, which PDS invested heavily in the past 5 years. The aggressive test development and improvement helps PDS to continue safeguarding animal health.



New Projects

- Bacterial culture and identification for American Foulbrood (*Paenibacillus larvae*)
- Bacterial culture and identification for European Foulbrood (*Melissococcus plutonius*)
- Bacterial culture for *Mycoplasma bovis*
- *Salmonella* typing by sequencing
- Porcine circovirus 3 (PCV3) ORF2 sequencing
- *Streptococcus equi. sbsp zooepedimicus* PCR with ST194 typing
- Chronic Wasting Disease (CWD) genotyping PCR for elks
- Chronic Wasting Disease (CWD) genotyping PCR for white tail deer
- Whole-genome sequencing – bacterial isolate identification
- Whole-genome sequencing –viral isolate identification
- Amplicon sequencing – Nanopore
- Amplicon sequencing – Sanger
- Bacterial metagenomic whole-genome sequencing
- Viral metagenomic whole-genome sequencing
- Bacterial isolate serotyping by sequencing
- Tape Station fragment analysis
- Antineoplastic drug detection method re-development





What do our clients say?

“ I think you guys have great customer service. Whenever I call the ladies are always so helpful!

Helpful team, quick turnaround times, easy forms to complete, online submissions very helpful

Rapid turnaround time, quality reports

The numerous professionals working at the laboratory which can easily be contacted when we have questions or concerns.

Good service, ability to speak with a pathologist re elements of the case – they help us do a better job.

Prompt service. Variety of testing for a wide range of species

Quality lab results. We know we can trust the pathologists.



APPLIED RESEARCH

Ongoing research and development efforts at PDS are essential for the organisation to remain a world-class animal health diagnostic service provider. All PDS laboratories are on a constant lookout for new technological advances to implement, new tests to add to our scope, and ways to improve our workflows and efficiencies.

PDS is actively working on developing a genomics-based animal health diagnostic services portfolio. In 2020, PDS created a genomic laboratory as a dedicated operational unit of the PDS microbiology section. Originally offering two sequencing-based laboratory tests, PDS genomics lab is growing with additional tests in development, technologists in training, and advanced bioinformatic and laboratory informatics support coming into place. PDS is strategically investing into building the team expertise in genomics – in 2020 two staff members were supported to enroll in formal advanced training programs.

The Western College of Veterinary Medicine is PDS's important partner in applied research. PDS has increased its role as a vital member of the WCVI research community in three distinct ways:

- As a laboratory service provider, PDS supports a wide variety of research programs by advising and developing project-specific laboratory protocols, training graduate students, and performing laboratory testing. Ninety-nine projects were created from Jan 1, 2020 to Dec 31, 2020 and total amount was \$1,385,984.42 of laboratory services work to support external research projects planning.
- As a driver of applied research necessary to advance laboratory methods, PDS professionals lead a number of active projects supported by external funding. The total applied research funding portfolio managed by PDS in 2020 exceeded \$ 620,000 . New research grants awarded to PDS in 2020 are aiming to investigate bovine coronavirus vaccine efficacy (Dr. Huang) and advance metagenomics-based Salmonella diagnostics (Drs. Ngeleka and Trokhymchuk).
- Finally, as a research partner, PDS is involved in a number of strategic initiatives shaping up the future of the WCVI and USASK scientific landscape.



“Genomic ASSETS (Antimicrobial Stewardship Systems from Evidence-based Treatment Strategies) for livestock” is a revolutionary program led by Dr. Cheryl Waldner to establish a rapid diagnostic support framework for bovine respiratory disease diagnostics. PDS plays an important role in “Genomic ASSETS” not only as a laboratory services provider to the research team, but also as the ultimate recipient and implementer of the project outcomes.

“IntegrOMES” (Integrated Genomics for Sustainable Agriculture and Environmental Stewardship) is a visionary initiative led by Dr. Gregg Adams to establish a next-generation research capacity at the University of Saskatchewan. The key objective of “IntegrOMES” is to leverage the existing WCVI/USASK research interests and strengths in advanced bison reproduction and infectious disease control through genomic technologies applications.

This \$17 million initiative has received funding support from the Canadian Foundation of Innovation and other partners to finance the targeted infrastructure and equipment investments. PDS serves both as a research and co-funding partner on this project. PDS will be hosting and managing a number of major laboratory instruments for the group to the mutual benefit of diagnostic work performed by PDS and research conducted by WCVI faculty.



SURVEILLANCE

Animal health surveillance is an important part of the PDS core mandate. Besides being alerted for reportable and notifiable diseases during routine diagnostic works (infographic X), PDS conducts targeted surveillance programs and supports regulatory programs administered by the Saskatchewan Ministry of Agriculture Animal Health Unit.

In 2020, a *Coxiella burnetii* (the causative agent for Q fever in people) surveillance program helped detecting the organism in a number of unexpected diagnostic cases. The detections would be missed without this program, since the clinical diseases were not thought to be related to *C. burnetii*. The presence of this organism in the herds, however, is important for the health of the ranchers. This program demonstrates very well that veterinary diagnostic laboratories like PDS are essential for both animal and public health (i.e. One Health).

PDS has continued participation in the national African Swine Fever (ASF) surveillance program, CanSpot ASF and tested 35 samples that matched the case definition. This important work ensure early detection for the Canadian swine industry, and allows PDS to maintain vigilance and proficiency in ASF testing.

The **Western Canadian Animal Health Network (WeCAHN)** one-year pilot facilitated by PDS was well-received and much appreciated initiative by the professional community supported through a collaborative funding from the four western provinces' Ministries of Agriculture and federal government. Beef cow-calf, dairy, and poultry networks have been established and held regular meetings to facilitate setting priorities, monitor clinical impressions and laboratory data, and provide focused discussion forums for target practitioner groups. **WeCAHN website** has become a valuable animal health resource for public and professional community members. All four original funding partners (MB, SK, AB, BC) have unanimously agreed to renew the WeCAHN agreement. Additionally, led by Dr. Barb Wilhelm, WeCAHN was successful in securing funding from the Beef Cattle Research Council (BCRC) to further enhance functionality and expand objectives of the beef cow-calf network.



www.wecahn.ca

The global antimicrobial resistance crisis was somewhat moved to a back seat by the COVID pandemic, but still remains a very important concern for One Health and animal agriculture. In the light of ongoing regulatory changes in antibiotic access for animals, PDS has prioritized expanding the scope of services provided to the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) administered by the Public Health Agency of Canada. In 2020 PDS has supported CIPARS activities by performing primary culturing of samples collected across western Canada and conducting minimum inhibitory concentration testing of pathogens and indicator organisms.

PDS continues to contribute to antimicrobial resistance surveillance through aggregation and publishing of the antibiograms – summaries of the observed antimicrobial resistance across the key microbial groups in various clinical situations. This information is a valuable resource for veterinary practitioners in guiding their antibiotic prescriptions decision making when a laboratory diagnostic test results are not available.



LOOKING FORWARD

Although PDS's core purposes safeguarding animal health and contributing to our society will not change, PDS will continue to adapt and improve to meet the evolving needs from veterinarians, farmers, animal owners and researchers in the animal health field. PDS's improvements will be guided by our strategic focuses.

We hear from our clients more clinical advice is needed from our services. In response to this, PDS is moving forward to collaborate with species experts from the Western College of Veterinary Medicine to offer extension veterinary services. There is also request for quicker pathology results, thus we are expanding the team of diagnostic professionals to reduce workload and turnaround time.

Aggressive test development and improvement will continue. With more adoption of DNA/RNA vaccines, sequencing-based tests will be in higher demand, and PDS is going to deliver. In the development pipeline is sequencing for influenza A virus, influenza D virus, rotavirus A, B and C. Sequencing methods also demand more bioinformatics expertise and computational capacity, which we are actively developing and seeking long-term solutions. Significant research funding will also allow us to develop a solution for rapid *Salmonella* detection and identification, capitalizing on the momentum that has already been built this year. There will be improvement on companion animal services as well. An equine metabolic panel is under development and will fill a void in western Canada. Collaboration with experts in specialties like ophthalmology, dermatology and oncology will take our services in these areas to a new high.

PDS will continue to be forward thinking in fulfilling our mandates to 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 market access.



PUBLICATIONS

Journal Publications

- Khosa, S., **Araya, M. B.**, Griebel, P., Arsic, N., & Tikoo, S. K. (2020). Bovine Adenovirus-3 Tropism for Bovine Leukocyte Sub-Populations. *Viruses*, 12(12), 1431.
- Ravanbakhsh, A., **Munasinghe, L.**, Acuna, C., Kafle, P., & Jenkins, E. (2021). What is your diagnosis? Thoracic fluid from a dog. *Veterinary Clinical Pathology*, 50(1), 84-85.
- **Zhang, M.**, Hill, J. E., Alexander, T. W., & **Huang, Y.** (2020). The nasal viromes of cattle on arrival at western Canadian feedlots and their relationship to development of bovine respiratory disease. *Transboundary and emerging diseases*.
- Han, S., Armien, A. G., Hill, J. E., Fernando, C., Bradway, D. S., Stringer, E., ... & **Huang, Y.** (2020). Infection With a Novel Rickettsiella Species in Emperor Scorpions (*Pandinus imperator*). *Veterinary Pathology*, 57(6), 858-870.
- Chohan, M. R., Munro, B. J., Cowan, V. E., Anzar, M., **Blakley, B.**, McKinnon, J., ... & Singh, J. (2021). Feeding yearling Angus bulls low-level ergot daily for 9 weeks decreased serum prolactin concentrations and had subtle effects on sperm end points. *Theriogenology*, 161, 187-199.
- Yonpam, R., Gobbet, J., Jadhav, A., Desai, K., **Blakley, B.**, & Al-Dissi, A. (2021). Vasoactive Effects of Acute Ergot Exposure in Sheep. *Toxins*, 13(4), 291.
- Kozii, I. V., Barnsley, S., Silva, M. C. B. D., **Wood, S. C.**, Klein, C. D., de Mattos, I. M., ... & Simko, E. (2021). Reproductive fitness of honey bee queens exposed to thiamethoxam during development. *Veterinary Pathology*, 03009858211031845.
- Kozii, I. V., **Wood, S. C.**, Kozii, R. V., & Simko, E. (2021). Histomorphological description of the reproductive system in mated honey bee queens. *Journal of Apicultural Research*, 1-13.
- Zabrodski, M. W., Wilson, G., Moshynskyy, I., Wentzell, A., **Wood, S. C.**, Klein, C. D., ... & Simko, E. (2020). Investigation of clinical outbreaks of American foulbrood in honey-bee operations in Saskatchewan. *The Canadian Veterinary Journal*, 61(10), 1055.
- Burgess, H. J., MacDonald Dickinson, V., **Kerr, M.**, & Bienzle, D. (2020). Marginal zone lymphoma in a dog. *Veterinary Clinical Pathology*, 49(2), 312-318.

Conference Presentations

- **S. Wood**, J. Thebeau, D. Liebe, I. Kozii, C. Klein, I. Medici de Mattos, M. Zabrodski, M. Sharafi, M. Roulin, J. DeBruyne, L. Sobchishin, I. Moshynskyy, M. Milbrath, R. McCallum, Marta Guarna, P. Wolf Veiga, E. Gerbrandt, E. Simko. "Host, pathogen, and environmental determinants of European foulbrood disease"
 - Massachusetts Beekeepers Association Annual Spring Conference, March 2021, invited online presentation
 - Western Apicultural Society Mini-Conference, March 2021, invited online presentation
 - Ontario Beekeepers Association Annual Spring Meeting, April 2021, invited online presentation
- **S. Wood**. "Roadmap for a one health career in veterinary medicine"
 - WCVN Pathology club, March 2021, invited online presentation
- **S. Wood**, J. Thebeau, D. Liebe, L. Sobchishin, I. Kozii, C. Klein, I. Medici de Mattos, M. Zabrodski, M. Sharafi, M. Roulin, J. DeBruyne, I. Moshynskyy, M. Milbrath, R. McCallum, Marta Guarna, P. Wolf Veiga, E. Gerbrandt, E. Simko. "Assessing the impact of fungicides on European foulbrood in honeybees" British Columbia Berries Research Review, virtual meeting, February 2021, invited online presentation.
- **S.C. Wood**, J. Thebeau, I.V. Kozii, I. Medici de Mattos, C.D. Klein, M.W. Zabrodski, E. Simko. "Diseases of Honey Bees" virtual day-seminar hosted by the Davis-Thompson DVM Foundation. January 2021, online platform presentations.
- **Blakley, B.**, (2021). Mycotoxin Disease in Cattle in Western Canada. Presented virtually at the 2021 Conference of the Western Canadian Association of Bovine Practitioners, Saskatoon, SK, January 16, 2021.
- **Blakley, B.**, (2021). Perinatal Beef Calf Morbidity and Mortality. Presented virtually at the 2021 Conference of the Western Canadian Association of Bovine Practitioners, Saskatoon, SK, January 16, 2021.

Others

- **Blakley, B.**, Drinking Water Quality related to Metals, Broadcast Interview with J. Doll. Global Television News, Alberta, February 11, 2121.
- **Blakley, B.**, Molds and Mycotoxins, Broadcast Interview with S. Cabak. Manitoba Agriculture and Resource Development, Primary Agriculture Branch for MB Stock Talk, Recorded December 15, 2020, for January 15, 2021.
- **Blakley, B.**, Mycotoxins and Horses, Text interview with D. Ferguson, Animal Protection Services of Saskatchewan, Saskatoon, Saskatchewan, Feb 26, 2021.
- **Blakley, B.**, Molds and Mycotoxins in Livestock. Text Interview with C. Lester, Rural Roots Canada. Alberta, February 18, 2021.
- **Blakley, B.**, Mycotoxins and Mold Disease in Cattle. Text Interview with J. Gaye, Saskatchewan Stock Growers Association. December 17, 2020.
- Temitope Kolapo, Allison Hay, Sarah Revell, Janna M. Schurer, Polly Tsybina, Karen M. Gesy, Stuart Skinner, **Maira Kerr**, Jamie L. Rothenburger, Danny Joffe, Janet E. Hill, Alessandro Massolo, Emily J. Jenkins. (2020). Alveolar echinococcosis in dogs in Western Canada. American Association of Veterinary Parasitologists (AAVP) virtual conference (June 20-23, 2020).

BOARD OF DIRECTORS



Dr. Wayne Lees: Chair of the Board –
Chief Veterinary Officer of Manitoba (Retired)



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



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



Dr. Susan Cork: Professor – Faculty of Veterinary Medicine,
University of Calgary



Mr. Derek Hoffman: Lawyer, strategic advisor,
and founder at Hoffman Group



Dr. Grant Maxie: Director – Animal Health Laboratory,
Laboratory Services, University of Guelph (Retired)



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



Dr. William Murphy:
Associate Professor – Edwards School of Business,
University of Saskatchewan



Mr. Pat Pitka: Chief Financial Officer –
Genome Prairie Inc.



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



Dr. Elemir Simko: Faculty Member –
Department of Veterinary Pathology,
Western College of Veterinary Medicine



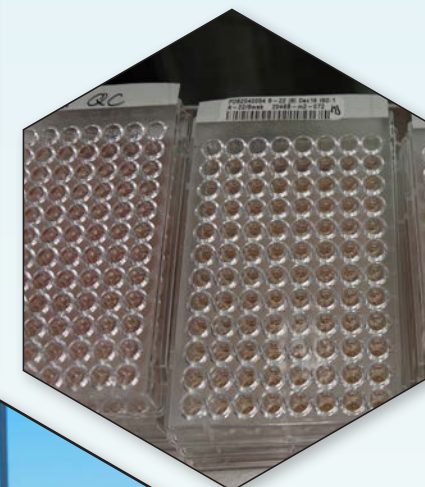
Dr. Trent Wennkamp: Veterinary Practitioner –
Mixed Animal Practice – Lloydminster Animal Hospital



Mr. Lee Whittington: CEO, Four Oaks Investments



Mr. Grant Zalinko: Executive Director -
Livestock Branch, Saskatchewan Ministry of Agriculture



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SERVICES INC**