MARS

Veterinary Health

2024

Pets, Purpose, Progress:

Synergizing Research and Clinical Excellence

Inaugural Science Impact Report

Foreword

A Better World For Pets

At Mars Veterinary Health, we're committed to advancing veterinary medicine in support of our Purpose: A BETTER WORLD FOR PETS.

As part of this commitment, we invest in scientific research and share findings with the entire veterinary community. Today, we are thrilled to introduce Mars Veterinary Health's inaugural science report: Pets, Purpose & Progress: Synergizing Research and Clinical Excellence—a compilation of clinical studies and research published across our global veterinary practices in 2024.

As part of a family-owned business with nearly 90 years of experience and heritage caring for pets, we think about the long-term impacts of our actions in terms of generations. Given our global reach as a leading provider of veterinary care in more than two dozen countries, we feel a unique opportunity and responsibility to harness the vast knowledge that exists across our organization and invest proactively in data-driven insights to improve veterinary care.

Molly McAllister, DVM, MPH
Global Chief Medical Officer

As the largest conductor of private practice clinical studies in the world, Mars Veterinary Health Associates executed prospective studies at more than 140 sites, and our clinicians authored more than 450 peer-reviewed and published manuscripts in the past 12 months. To expand support for outcomes-based healthcare and clinical studies across our global network, in 2024 we formed the global Mars Veterinary Health Medical Affairs Science Team.

Dottie Brown, MS, DVM, DACVS
Global VP
Science & Healthcare Innovation

The team compiled this inaugural report with an emphasis on clinical studies, peer reviewed publications, and our clinician scientist training programs. Studies in this year's report span a range of critical topics—several of which were the first or largest of their kind—that support our focus on healthy weight, sustainability and pharmaceutical stewardship, and One Health, among others.

By sharing this body of work with veterinary professionals around the world, we aim to support better diagnoses, treatments, and prediction of pet-related conditions, so pets live even happier, healthier lives.

We want to offer a heartfelt thanks to our dedicated Associates and partners who made this research possible through their continuous innovation and dedication to excellence. By working together within Mars Veterinary Health and across the profession, we are already making significant strides in improving the health and wellbeing of pets through world-class science and look forward to driving further progress together in the years to come.

Contents

Introduction to the new Mars Veterinary Health Medical Affairs Science Team

Mars Veterinary Health established the Medical Affairs Science Team (MAST) in 2024, with a focus on clinical studies and outcomes-based healthcare.

The team leverages strategic partnerships and the breadth and depth of our data-driven capabilities to enhance the lives of pets and provide veterinary professionals scientific insights to better diagnose, treat, and predict pet-related conditions.

Our Medical Affairs Science Team brings together a mix of veterinary clinician scientists with decades of collective experience in veterinary research and clinical care to focus on owner-centered healthcare delivery with patient outcomes as a primary measure of success. The team's focus on design, execution, and management of high-quality, rigorous and efficient clinical studies is intended to enable Mars Veterinary Health to advance clinical science and research for the profession at large.

Through collaborations with industry and academic institutions, and by harnessing knowledge from Mars Veterinary Health's nearly 70,000 Associates and across nearly 3,000 veterinary clinics worldwide, the team aims to improve patient outcomes and generate pet healthcare insights that have the potential to enhance the lives of pets and advance care profession-wide.

Clinical Studies Team

Phil Bergman

Global Director of Clinical Studies
DVM Colorado State University 1990; Small Animal Rotating Intern Kansas State University 1990-1991; MS/Residency CSU 1994, PhD & ACS Fellowship MD Anderson Cancer Center 1999

Negin Habibi

Global Lead Clinical Research Associate
BSc (Hons), CCRP., CCRA

Tracy Mills

Clinical Studies Accounting

Linda Louie

Clinical Studies Accounting Support

Talon McKee

Clinical Studies Coordinator
BSc (Public Health), CVT, MPVM candidate from UC Davis School of Veterinary Medicine

Corley-Ann Parker

Clinical Studies Communications Coordinator
B.S. Molecular Biology, Texas Lutheran University 2017. M.S. Science and Technology Journalism Texas A&M University College of Veterinary Medicine and Biomedical Sciences 2020

Amber Lynch

Clinical Studies Coordinator
BSc (Biology) Clarion University of Pennsylvania 2004, CVT Delaware 2011

Sara Cook

Clinical Studies Coordinator
BS Animal Science with a concentration in Zoo/Exotics from Cal Poly San Luis Obispo 2010; Registered Veterinary Technician License 2014

Science and Health Outcomes

Jo Ann Morrison

Global Director, Veterinary Science and Health Outcomes
DVM (Purdue University, 1993); MS (Iowa State University 2004); DACVIM (SAIM) 2002

Associate Research

Hannah Sargent

Global Manager, Associate Research
DVM Royal Veterinary College (2013); PhD at RVC (2021)

Luisa De Risio

Global Director, Associate Research
DVM (University of Parma, 1996); PhD 2020; Neurology resident (North Carolina State University) DECVIM (Neurology) 2004

Enhancing the roles for credentialed veterinary technicians and nurses in science

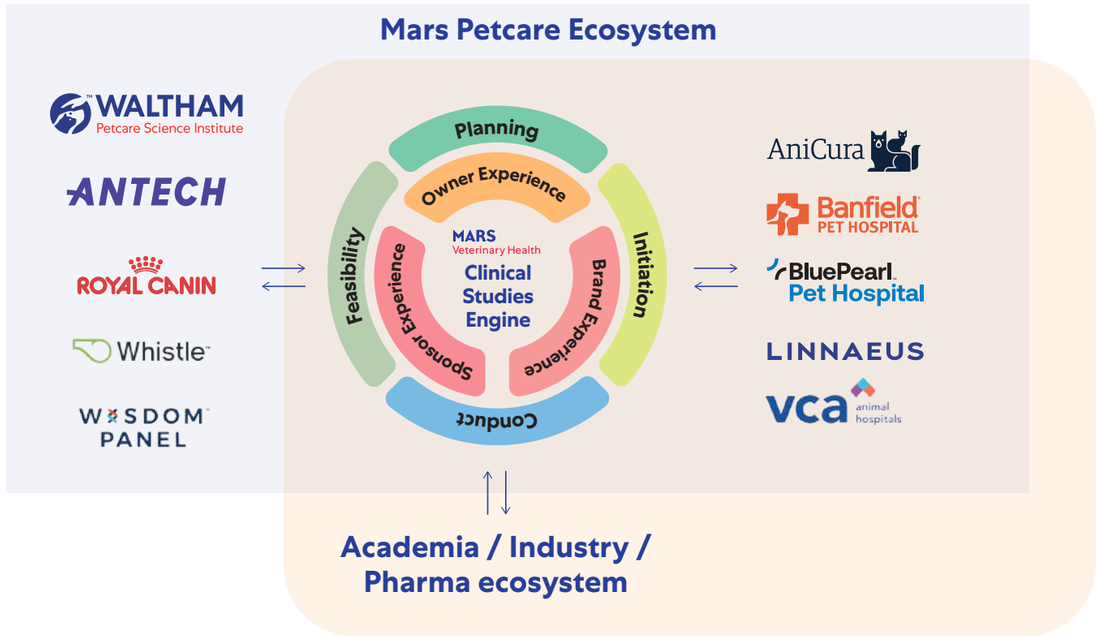
Several MAST positions are currently held by credentialed veterinary technicians and nurses, given their unique combination of clinical expertise, clinic operations, and scientific acumen. At Mars Veterinary Health, we remain committed to expanding career-pathing opportunities for our credentialed technicians and nurses.

Clinical Studies

Mars Veterinary Health Science Network

As part of the Mars Petcare Ecosystem, we have an opportunity to deliver on the **Five Principles** via more efficient, mutual, and responsible ways of doing quality science work. This allows us to be responsible with our resources, promoting efficiency and leveraging the scientific expertise that exists across our organization. The result is a streamlined, rigorous, consistent process, facilitating clinical studies. We are actively building the capabilities to expand our future partnerships with interested external collaborators.

MAST supports two ecosystems



Clinical Studies Engine

The clinical studies engine is a centralized expertise hub providing clinical studies support to the Mars Petcare Ecosystem and Mars Veterinary Health to accelerate the delivery of science and healthcare innovation. The centralized team provides the infrastructure needed to conduct high quality clinical studies efficiently and effectively, ensuring adherence to regulatory compliance. Streamlining the necessary processes allows consistent and transparent reviews and helps ensure needed resources are in place to facilitate clinical study success.

Clinical studies are an important component of advancing veterinary science and improving animal health & well-being.

Ethical Review Processes for Clinical Studies

The Mars Veterinary Health Veterinary Clinical Studies Committee (VCSC) is a rigorous and structured scientific and ethical review board that promotes, safeguards and assures clinical studies meet the scientific, quality and highest standards of animal welfare. Studies are conducted with the utmost respect to the safety and well-being of our patients, clients, and Associates.

Clinical Studies Site Coordinator Program

As a new development this year, Mars Veterinary Health is supporting an initiative to engage clinic teams in clinical studies through the designation of Clinical Studies Site Coordinators (CSSC) at select locations. These roles are primarily held by veterinary assistants, credentialed veterinary technicians, and veterinary nurses. A CSSC helps organize, oversee, and execute clinical studies at their home clinic location. They ensure that we maintain quality of study procedures while also safeguarding our patients' well-being as patient advocates.

This program recognizes that successful clinical studies are often reliant on the contributions and skills of these clinical team members.

Developing talent through formal recognition, research training, and comprehensive total rewards is essential to building the foundations of our scientific and innovative pursuits. Future prospects of the CSSC program may offer career progression opportunities while also advancing the clinical and scientific impact of our clinical studies.

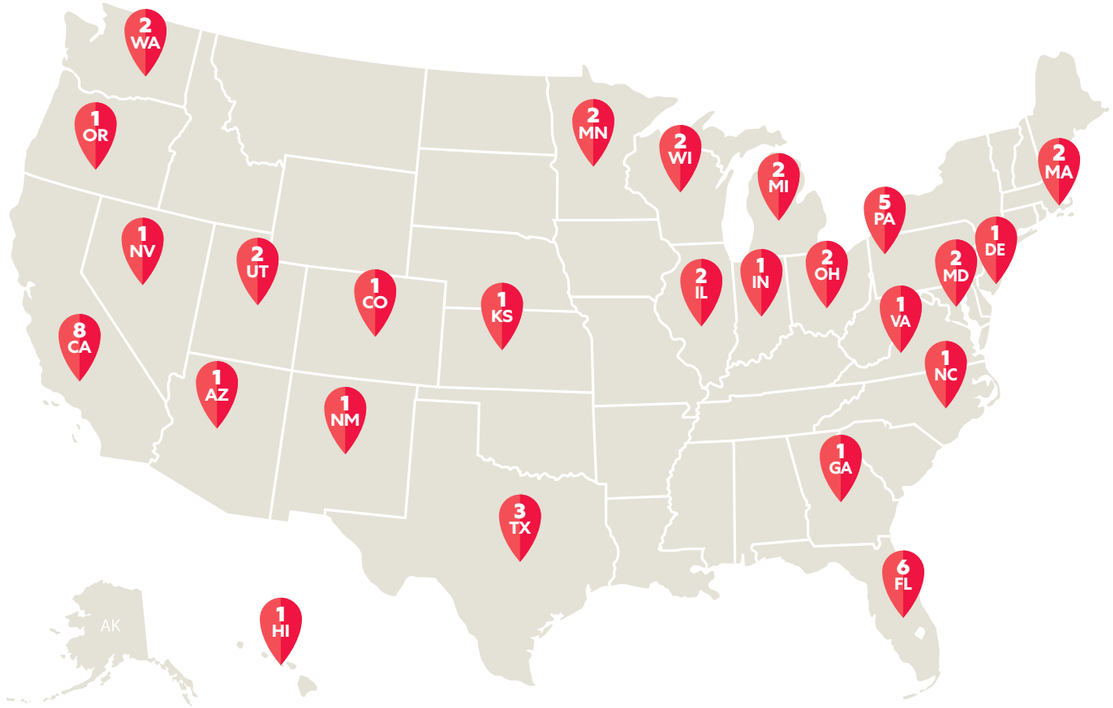
Clinical Studies in 2024

In 2024, 140 clinics within Mars Veterinary Health participated in prospective clinical studies and the Mars Petcare Biobank (see page 8). Clinics involved in these studies are marked within the United States and Europe, including the U.K. on pages 7 and 8. We are proud of not only the number of studies that are ongoing within Mars Veterinary Health, but also the rigor and quality of the studies we perform. Clinical studies advance our medical knowledge and the care we provide and help develop new diagnostic and treatment options for our patients.

They also can play a key role in improving access to care, as study participation may be accompanied by funding, allowing some of the cost of care to be offset. Clinics that participate in clinical studies may also bring new modalities of care to an entire geographic region where such care had not previously been accessible.

Clinical Studies Sites

51 clinical study sites across the US



28 clinical study sites across Europe

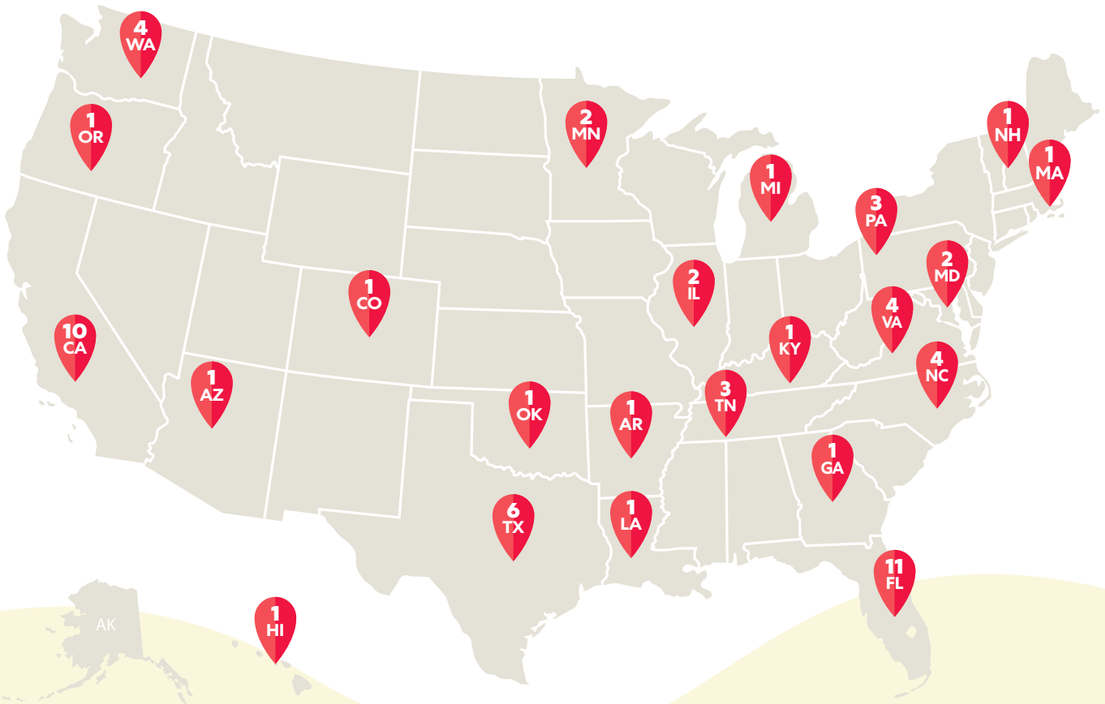
Mars Petcare Biobank Clinics

Mars Veterinary Health clinics enable the Mars Petcare Biobank, an unprecedented study of clinical, genetic, and lifestyle data from the planned enrollment of 20,000 dogs and cats that has the potential to enable new scientific discoveries that would improve pet health for generations to come.

Participating Mars Veterinary Health clinics in the United States identify, enroll, collect, and provide crucial medical data and biologic samples to add to the biobank repository. Clinics across the U.S. are involved, as shown in the map below. The data collected in this biobank will be vital to our future scientific work and achieving our Purpose: A BETTER WORLD FOR PETS.

To learn more, visit marspetcarebiobank.com

63 Biobank sites across the US

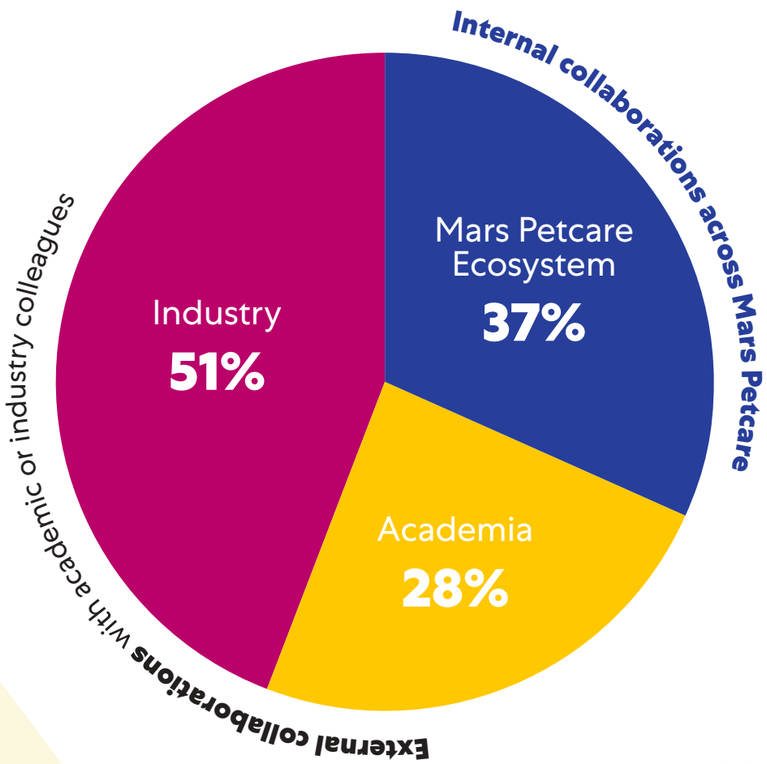


Collaborations

Scientific Research

Collaborations involving researchers with a shared interest and varying perspectives, backgrounds, and training enable more robust research.

Across Mars Veterinary Health, we have ongoing research collaborations with multiple internal and external groups. Some of these projects have already resulted in peer-reviewed publications, while others are long-term and ongoing for years.



Peer-Reviewed Publications

At Mars Veterinary Health, we are committed to scientific discovery and the advancement of veterinary medicine through the sharing of our knowledge and scientific discoveries with the broader profession. In 2024 alone, more than 450 research manuscripts with authors from Mars Veterinary Health clinics were published.

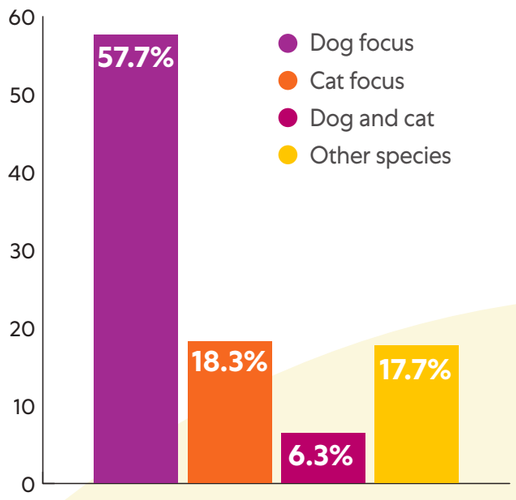
Top 10 journals for peer-reviewed publications:

Journal of Small Animal Practice	**16.4 %**
Journal of Veterinary Internal Medicine	**15.3 %**
Veterinary Surgery	**11.2 %**
Veterinary Radiology and Ultrasound	**10.1 %**
Journal of Feline Medicine and Surgery	**9.2 %**
Journal of the American Veterinary Medical Association	**8.7 %**
Journal of Veterinary Emergency and Critical Care	**8.7 %**
Veterinary Record	**7.2 %**
Veterinary and Comparative Oncology	**6.9 %**
Journal of Veterinary Cardiology	**6.3 %**

Areas of study for peer-reviewed publications:*

Internal medicine	**57.5 %**
Surgery	**33.6 %**
Microbiology / immunology	**13.4 %**
Radiology	**13.4 %**
Anesthesia / analgesia	**6.0 %**
Nephrology / urology	**5.2 %**
Pharmacology	**5.0 %**
Preventive medicine	**5.0 %**
Dermatology	**4.3 %**
Ophthalmology	**4.1 %**
Other	**9.4 %**

Species breakdown of publications:



*Note: The percentages of the areas of study add up to more than 100%. This is due to the classification process where one article may represent more than one field of study. For example, a study investigating the prevalence of urinary tract infections in a diabetic population may be counted in microbiology / immunology as well as internal medicine.

Collaborative Mars Veterinary Health Publications

AniCura LINNAEUS

- Retrospective study and outcome of 307 cats with feline infectious peritonitis treated with legally sourced veterinary compounded preparations of remdesivir and GS-441524 (2020-2022)
  pubmed.ncbi.nlm.nih.gov/37732386/
- Relationship between magnetic resonance imaging findings and histological grade in spinal peripheral nerve sheath tumors in dogs
  pubmed.ncbi.nlm.nih.gov/37726924/

Banfield PET HOSPITAL · BluePearl Pet Hospital · vca animal hospitals · LINNAEUS

- Evaluation of antimicrobial purchasing by companion animal veterinary facilities in Canada, the United Kingdom, and the United States of America (2019-2021)
  pubmed.ncbi.nlm.nih.gov/38660791/

BluePearl Pet Hospital · vca animal hospitals

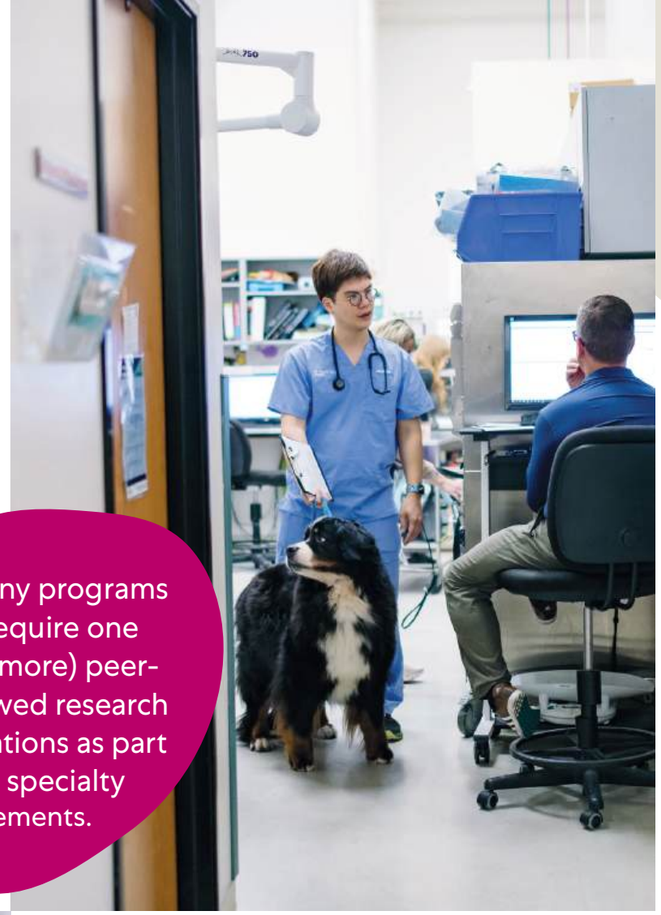
- Computed tomographic features of exocrine pancreatic carcinomas in dogs and cats
  pubmed.ncbi.nlm.nih.gov/38650074/
- Melanoma of the dog and cat: consensus and guidelines
  pmc.ncbi.nlm.nih.gov/articles/PMC11026649/

Clinician Scientist Training Programs

Many Mars Veterinary Health clinics are sites of advanced training programs in the form of rotating internships, specialty (discipline specific) internships, and residencies.

These training programs provide the necessary clinical skill development and introduction to clinical research to graduate veterinarians interested in receiving advanced training. Training programs undergo a regular review process and are accredited by various specialty boards and organizations across North America and Europe, including the U.K., to help educate the next generation of veterinarians. Additionally, some residents receive training at accredited veterinary teaching hospitals, with program sponsorship from Mars Veterinary Health clinics.

Many programs require one (or more) peer-reviewed research publications as part of the specialty requirements.



Mars Veterinary Health and the Mars Petcare Ecosystem Support Clinician Scientist Research Efforts

Biostatistics, study design, and publication support for interns and residents has been accessed through the generous support of Waltham Petcare Science Institute for several years.

Online educational materials in these critical areas have been made available. Mars Veterinary Health has also newly developed the ability to provide similar biostatistics and research support.

Clinician Scientists in Training

AniCura

Residents: **105**

Anicura's scientific research programme offers residents, specialists in training, and Clinical Science Master delegates support in study preparation, determination of valid sample sizes and biostatistics, along with practical and theoretical tools.

Banfield PET HOSPITAL

Banfield Pet Hospital has provided anonymized and aggregated medical data sets to residents in training, enabling them to fulfill their publication requirements. These data sets are typically the largest data sets currently available in the profession and are well known for their structure and completeness, enabling more efficient research and analysis.

BluePearl Pet Hospital

- Rotating interns: **130**
- Specialty interns: **38**
- Residents: **65**

VCA animal hospitals

- Rotating interns: **155**
- Specialty interns: **29**
- Residents: **65**

BluePearl and VCA house officers participated in a two-day research training workshop. The agenda included exposure to best practices in clinical research, study design, implementation, and data analysis. Nearly 50 residents, specialty interns, and rotating interns attended, and breakout sessions allowed the trainees to work with experienced mentors to build their own research ideas.

LINNAEUS

- Rotating interns: **91**
- Specialty interns: **44**
- Residents: **107**

Linnaeus has been hosting an annual, on-line clinical research skills course for interns and residents for the past three years. An in-person event was held in 2024 for residents with a focus on clinical research training.

Peer-Reviewed Publication Highlights

The following manuscripts have been identified as some of our highest impact publications since November 2023.

AniCura

Last author Eric Zini, DVM, PhD, DECVIM-CA Prof. Dr., Dipl. ECVIM-CA (Internal Medicine). Renal amyloid-A amyloidosis in cats: Characterization of proteinuria and biomarker discovery, and associations with kidney histology.
doi.org/10.1111/jvim.16920

Traditionally, AA amyloidosis is considered rare in domestic cats. This research team discovered that AA amyloidosis is extremely frequent in shelter cats (based on histologic evaluation) with rates up to 40% to 70%. AA amyloidosis causes proteinuria and chronic kidney disease, hence is associated with morbidity and mortality in shelters, but also in zoos with captured large felines. AA amyloidosis has become a natural model of disease for amyloidosis of humans.

Banfield PET HOSPITAL

Last author Jo Ann Morrison, DVM, MS, DACVIM. Body weight, gonadectomy, and other risk factors for diagnosis of osteoarthritis in companion dogs.
doi.org/10.3389/fvets.2023.1275964

More than 100,000 dogs were investigated to determine risk factors for the development of osteoarthritis, in one of the largest studies of this kind to date. Higher risks for osteoarthritis development were significantly associated with older age, larger size (body weight), gonadectomy (independent of weight gain), and age at gonadectomy. Additionally, the impact of these risks varied according to dog breed.

BluePearl

Last author Ewan Wolff, DVM, DACVIM. Relapse Risk Factors for Immune-Mediated Hemolytic Anemia: A Retrospective Study of 163 Dogs.
doi.org/10.5326/JAAHA-MS-7371

This retrospective study was specifically designed to identify risk factors for relapse in dogs with immune mediated hemolytic anemia (IMHA), a well-known and challenging clinical condition. More than 160 dogs were included in the study and a relapse rate of almost 8% was identified. The most significant risk factor for relapse was determined to be total bilirubin concentration, which may indicate a more aggressive hemolytic process. The most commonly affected breeds were cocker spaniels, dachshunds, and chihuahuas.

LINNAEUS

Last author Fergus Allerton, BSc BVSc CertSAM DipECVIM-CA FRCVS. Influencing attitudes towards antimicrobial use and resistance in companion animals–the impact on pet owners of a short animation in a randomized controlled trial.
doi.org/10.1093/jacamr/dlae065

An educational animation was developed to communicate key messages regarding antimicrobial resistance (AMR) and antimicrobial stewardship to pet owners. The animation was shown to half of the participants in a randomised controlled trial. In the subsequent survey, pet owners who watched the animation demonstrated greater AMR awareness, were less likely to expect antibiotics if their pet had diarrhoea and recognised the dangers of requesting antibiotics from their veterinarian.

The animation is freely available on the ENOVAT website (https://enovat.eu/) and has already been translated into 20 different languages to maximise its utility. Veterinarians are invited to use this resource to support their conversations with pet owners on this topic.

vca animal hospitals

First author Anne Kimmerlein, DVM, MPVM, DACVPM. The transmission of SARS-CoV-2 from COVID-19-Diagnosed People to Their Pet Dogs and Cats in a Multi-Year Surveillance Project.
doi.org/10.3390/v16071157

This was the largest veterinary SARS-CoV-2 seroprevalence study of its kind with 1,000 dogs and cats owned by VCA Associates. Pet seropositivity correlated with the U.S. human case rates over time, exhibiting peaks corresponding with the major COVID-19 surges. Antibodies persisted longer than previously documented (828 days in dogs; 650 days in cats). Increasing age and duration of proximity to infected people were associated with increased seropositivity in dogs but not cats.

Disclaimer. *Despite our best efforts, some scientific contributions in 2024 may have been inadvertently excluded from this report. Any omissions were inadvertent, and we apologize for any unintentional oversights.*

MARS
Veterinary Health

Conclusions

The research and publication work captured in this inaugural report represents the passion, expertise, and drive of thousands of Mars Veterinary Health clinician scientists. We look forward to expanding our scientific innovation, discovery, and impact each year.

Acknowledgements

This inaugural report was made possible by the generous support and dedicated time from science leads across Mars Veterinary Health. Special thanks go out to Anneli Bjoersdorff (AniCura) and Sarah Moore (BluePearl) along with everyone who provided critical reviews and inputs.

As always, none of this work would be possible without the Mars Veterinary Health Associates working in our clinics around the globe. Their tireless dedication to providing high-quality, evidence-based care enables the breadth and depth of research summarized in this report. We are grateful for their devotion to their patients.

To learn more about science and innovation at Mars Veterinary Health, visit **marsveterinary.com/veterinary-science**