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05/2019
What’s your vision for the future of your business?

3 Questions to ask as you enter discussions with potential partners.

**NO. 01**
Is it the right culture fit for your team?

As you begin considering your options for selling your pet hospital business, it’s important to find a partner aligned with your values, respectful of the individuality of what you’ve built, and equipped to grow your business, while your team and culture remain intact.

Ask around to find out which buyers have the best reputation for caring for pets and the people who love them.

**NO. 02**
Are there flexible deal structures?

Because selling your pet hospital is such a personal decision, you’ll want to understand what types of options are available, and to what level they can tailor the terms to meet your needs.

**ASK IF THE BUYER CAN:**
- Make all cash offers with no finance contingency
- Offer Joint Venture partnerships for growth and flexibility
- Buy the real estate outright or lease from you

**NO. 03**
How comprehensive are the support services?

As you contemplate transitioning your business, you’ll want to know every aspect is covered. Seek out a partner with a dedicated team seasoned in marketing (including digital advertising and social media strategy), web development and hosting, client satisfaction surveys, IT, HR, accounting, taxes, legal and more.

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Loose control of diabetes mellitus with protamine zinc insulin in cats

Dear editor,

I am a former employee of Dr. Norsworthy, and feel compelled to write and share my firsthand experiences of using loose control in diabetic cats (Can Vet J 2019;60:399–404). This approach has completely changed how I practice with regard to diabetic cats. I would not go back to the more traditional approaches taught to me in veterinary school and my internship, although having practiced that way allows me to compare my experience with both methods. I have been using loose diabetic control in cats on ProZinc for 7 years. In that time, I have been struck by several things:

1) Long-term success for control of the disease, with patients either well-regulated or in remission. I’m sure many general practitioners reading this paper think, “Huh, interesting approach to managing a frustrating disease, but the real question is: does it work?” In my experience, loose control is a very effective way to manage diabetic cats on ProZinc. I also think it has made decision-making easier with regard to dosage adjustments. Previously there was so much emphasis on the BG curve values that when those numbers didn’t follow the expected trends (i.e., a curve that’s not a curve), it was hard to know how much of the unexpected values was attributable to stress in the hospital, and what to do for my patient. With loose control, my decision-making process has been much more straightforward. I have been better able to follow the mantra that “too little insulin is better than too much.”

2) Owner compliance and acceptance. With loose control, the owner’s job is to observe their cat at home. This emphasis on clinical signs makes sense to owners — the focus is on “how is your cat doing?” Also, I am thrilled to never ask a client to do at-home blood glucose checks. I do ask them to come in for more frequent visits (see below), but each visit is lower cost (just a spot BG, not a curve + fructosamine), so compliance is good. I found with traditional control that most clients failed to come in as prescribed, most often due to cost or stress on the cat from staying in the hospital most of the day for a curve.

3) Seeing my patients more often allows me to pick up trends before the cat is in trouble (hypoglycemic, DKA). Seeing my diabetic kitties every 4 to 6 weeks instead of a couple times a year has allowed us to provide better care. I’m confident this frequent screening has kept many of our patients out of the ER. The potential for a client to give up on managing a diabetic patient who has been through either hypoglycemia or DKA should not be underestimated — these can lead to a decision to euthanize.

4) As a practice owner, bringing a new way of doing things can be met with resistance. My staff was skeptical at first, but certainly liked the idea of not doing curves. Within 6 months, they had really bought in to this approach and are proud to tell clients that we do things a bit differently — more cat friendly, more owner friendly. I would tell other practitioners to keep an open mind and try this in a newly diagnosed diabetic… you might like it!

5) One last point: I would not do this with any other insulin type or with dogs. But for cats, loose regulation with ProZinc is a paradigm shift we need!

Submitted by Jennifer Lavallee, DVM, RSO, Cat Specialist, Castle Rock, Colorado, USA.

Constructive and professional comments made in the spirit of intellectual debate are welcomed by the Editor. Writers are expected to be respectful of others and to ensure that letters are considerate and courteous. The Editor reserves the right to remove comments deemed to be inflammatory or disrespectful.
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Robots in medicine
Robots en médecine

Robots are poised to revolutionize the practice of medicine. Artificial intelligence, miniaturization, and computer power are contributing to the rise in design and use of robots in medicine.

Medical robots had their start about 34 years ago when an industrial robot and computed tomography navigation were used to insert a probe into the brain to obtain a biopsy specimen (1). This was followed by a number of robots that were capable of certain urological procedures and total hip arthroplasty. These fully autonomous robots, however, did not find favor with surgeons and subsequent robots were designed to be slaves to surgeon masters (1).

Today, medical robots are well known for their roles in surgery, specifically the use of robots, computers and software to accurately manipulate surgical instruments through one or more small incisions for various surgical procedures (2). A 3-D high-definition magnified view of the surgical field enables the surgeon to operate with high precision and control. One instrument, da Vinci, approved by the FDA in 2000, is said to have been used to perform over 6 million surgeries worldwide. Patient benefits from robot-assisted surgery are largely those associated with the laparoscopic approach — smaller incisions, reduced blood loss, and faster recovery. Long-term surgical outcomes don’t appear to be different from those of traditional surgery and the system has occasional malfunction. Surgeons benefit from improved ergonomics and dexterity in comparison with traditional laparoscopy. Major drawbacks are high cost and the need for training of surgeons and the surgical team. The base price of a da Vinci system is upwards of $1 million.

Various companies are developing surgical robots designed for a single specific procedure such as knee or hip replacement. Other companies are seeking to build systems that incorporate artificial intelligence to assist surgical decision-making (1). In neurosurgery, Modus V is an automated robotic arm and digital microscope built by a Toronto company and based on the space shuttle Canadarm technology (3). The arm tracks surgical instruments, automatically moves to the appropriate area in

Les robots s’apprécient à révolutionner l’exercice de la médecine. L’intelligence artificielle, la miniaturisation et la puissance informatique contribuent tous à la montée de la conception et de l’utilisation des robots en médecine.

Les robots médicaux ont fait leur début il y a 34 ans lorsqu’un robot industriel et la navigation par tomodensitométrie ont été utilisés pour insérer une sonde dans le cerveau afin d’obtenir un spécimen de biopsie (1). Cette première a été suivie de plusieurs robots capables de certaines interventions des voies urinaires et d’une arthroplastie complète de la hanche. Cependant, les chirurgiens ne privilégiaient pas ces robots entièrement autonomes et les robots subséquents ont donc été conçus pour être des esclaves aux maîtres chirurgiens (1).

Aujourd’hui, les robots médicaux sont bien connus pour leur rôle en chirurgie, plus particulièrement l’utilisation des robots, des ordinateurs et des logiciels afin de manipuler des instruments chirurgicaux avec exactitude dans une ou plusieurs petites incisions pour diverses interventions chirurgicales (2). Une vue 3-D à haute définition magnifiée du champ chirurgical permet au chirurgien d’opérer avec une grande précision et un excellent contrôle. Un instrument, da Vinci, qui a été approuvé par la FDA en 2000, aurait été utilisé pour réaliser plus de six millions de chirurgies à l’échelle mondiale. Les patients qui bénéficient de la chirurgie assistée par robot sont surtout ceux associés à l’approche laparoscopique — de petites incisions, une perte de sang réduite et un rétablissement accéléré. Les résultats chirurgicaux à long terme ne semblent pas différents de ceux de la chirurgie traditionnelle et le système a connu des ratés occasionnels. Les chirurgiens profitent aussi d’une ergonomie améliorée par rapport à la laparoscopie traditionnelle. Les principaux inconvénients sont le coût élevé et le besoin de former les chirurgiens et l’équipe chirurgicale. En outre, le prix de base d’un système da Vinci s’élève à 1 000 000 $.

Diverses compagnies développent des outils chirurgicaux conçus pour une seule intervention spécifique comme le remplacement du genou ou de la hanche. D’autres compagnies cherchent à construire des systèmes qui intègrent l’intelligence
which the surgeon is working, and projects a magnified, high
resolution image on a screen.

Prostheses are benefiting considerably from new structures
and control systems (2). Robotic limbs with bionic skin and
neural system are allowing a remarkable degree of user control.
Robotic exoskeletons (orthoses) are finding use in rehabilitation,
assisting paralyzed people to walk and to correct for malforma-
tions (2). Robots are also finding a place in keeping hospitals
clean as hospital rooms are being disinfected with the use of
high intensity UV light applied by a robot (2).

Traditional endoscopy may soon be replaced by small robots
that can be driven to specific locations to carry out various tasks
such as taking a biopsy or cauterizing a bleeding blood vessel.
Microrobots may be employed to travel through blood vessels
and deliver therapy such as radiation or medication to a specific
site. Robotic endoscopic capsules can be swallowed to patrol
the digestive system, gather information, and send diagnostic
information back to the operator. Then there are robotic nurses
designed to assist or replace overworked nurses with tasks such
as digital entries, monitoring patients, drawing blood, and
moving carts. A really exciting area of medical robotics is in
replacement of antibiotics. The concept is that nanorobots with
receptors to which bacteria adhere can be used to attract bacteria
in the blood stream or in sites of local infection.

Do any of these grand developments have a place in veteri-
mary medicine? Robots are currently being used in simulations
for training veterinarians and can be used for tasks such as lifting
animals. Until robot-assisted surgical equipment becomes far
less expensive and proves to add value to current laparoscopic
procedures it seems unlikely to become incorporated into vet-
erinary practice. However, robot assistants, robotic prostheses,
hospital disinfectant machines, and microrobots that conduct
digestive system examinations treat patients are distinct possibili-
ties for the veterinary practice of the future. Indeed, it may not
be long before there are robotics veterinarians who provide care
for animals with prosthetic limbs or implanted chips or for
robotic animals that are used in a variety of settings.

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Carlton Gyles
(Opinions expressed in this column are those of the Editor)

artificielle afin d’aider la prise de décisions (1). En neurochirurgie,
Modus V, un bras robotique automatisé et un microscope
numérique, est construit par une compagnie de Toronto et se
fonde sur la technologie du Canadarm de la navette spatiale (3).
Le bras suit les instruments chirurgicaux, bouge automatiquement
jusqu’à l’endroit approprié où le chirurgien travaille et projette
une image à haute résolution magnifiée sur un écran.

Les prothèses bénéficient aussi considérablement de structures
et de systèmes de contrôle nouveaux (2). Les membres robotiques
avec une peau bionique et un système neural permettent un
degré remarquable de contrôle par l’utilisateur. Les exosquelettes
robotiques (orthoses) sont utilisés en réadaptation pour aider les
personnes paralysées à marcher et à corriger des malformations
(2). Les robots sont aussi utiles afin de garder les hôpitaux
propres car les chambres sont désinfectées en utilisant une
lumière ultraviolette à haute intensité appliquée par un robot (2).

L’endoscopie traditionnelle pourra bientôt être remplacée
par de petits robots qui peuvent être conduits à des endroits
particuliers pour effectuer diverses tâches, dont le prélèvement
d’une biopsie ou la cautérisation d’un vaisseau qui saigne. Les
microrobots peuvent être utilisés pour voyager dans les vaisseaux
sanguins et administrer un traitement comme de la radiation
ou un médicament dans un endroit spécifique. Des capsules
endoscopiques robotiques peuvent être avalées pour patrouiller
le système digestif, recueillir des renseignements et envoyer des
données diagnostiques à l’opérateur. Puis, il y a les infirmières
robotiques conçues pour assister ou remplacer les infirmières
surchargées en réalisant des tâches comme les entrées numériques,
la surveillance des patients, les prélèvements sanguins et le
déplacement des chariots. Un domaine vraiment excitant de
la robotique médicale est le remplacement des antibiotiques.
Le concept est que l’on peut utiliser des nanorobots dotés de
récépteurs auxquels les bactéries peuvent s’attacher qui servent
to attire les bactéries dans le courant sanguin ou dans des foyers
d’infection.

Est-ce que les progrès importants ont une place en médecine
vétérinaire? Les robots sont actuellement utilisés dans des
simulations pour former les médecins vétérinaires et ils peuvent
être utilisés pour des tâches comme le soulèvement des animaux.
Il semble improbable que l’équipement chirurgical assisté par
robot soit intégré à la pratique vétérinaire avant que son prix ne
devienne beaucoup plus abordable et qu’il ait été démontré qu’il
ajoute de la valeur aux interventions laparoscopiques actuelles.
Cependant, les assistants robots, les prothèses robotiques,
les machines de désinfection des hôpitaux et les microrobots
qui effectuent des examens endoscopiques représentent une
possibilité réelle pour la médecine vétérinaire de l’avenir. En
effet, il pourrait bientôt y avoir des vétérinaires robotiques qui
fournissent des soins aux animaux qui ont des prothèses ou
de puces implantées ou pour des animaux robotiques qui sont
utilisés dans divers contextes.

Renvois
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to-neurosurgery Dernière consultation le 19 juin 2019.

Carlton Gyles
(Les opinions exprimées dans cette rubrique sont celles du rédacteur
en chef.)
An ethicist’s commentary on increased litter size resulting in lower birth weight and viability

When I first began teaching veterinary ethics in the 1970s, I asked the veterinary students if they had ever experienced any lectures on ethics. The students said that in their freshman year, one instructor had advised them that, as veterinarians, they only had one job — making more money for the clients. Presumably, the scenario described in this case represents an archetypal example of making more money for the client at the expense of animal welfare. One can be morally certain that this approach does not sit well with the students — their aspirations to enter the veterinary profession were generally based in maximizing the health and welfare of the animals, not profit for producers at the expense of animal welfare.

As the case description indicates, genuine “stock people,” imbued with the ancient ethic of good husbandry, are distressed by the cavalier disregard of concern with the high mortality entailed by this new mindset. In previous columns, we have discussed the welfare costs of industrialized agriculture, where profit and productivity are in the driver’s seat. Inevitably, good welfare is eclipsed by an obsessive concern with profit. The situation is reminiscent of the mindset that kept baby calves immobile and borderline anemic to satisfy “veal cognoscenti.” And we have all witnessed the societal revulsion that forced abolition of that method of raising the veal calves.

Clearly, a major function of veterinarians in agricultural practice is maintaining basic standards of welfare that accord with common decency. One would fervently hope that methods of enhancing the quality of agricultural products that sacrificed a decent life for the animals would be roundly disapproved of by veterinarians in keeping with their basic mission. In the long run, they are protecting the image of the producer in the mind of the general public, as well as the animals.

It does not take a great deal of imagination to conceive of what anti-meat activists could do with the scenario described. It would play well with the factions advocating vegan-based meat.
substitutes. Morally concerned producers, providing good care even sometimes at the expense of profit, go a long way towards restoring the public desire that food animals enjoy a decent life.

As societal concern with animal welfare increases, it is imperative that producers visibly demonstrate to the public their concern with how animals live. Were I orchestrating a campaign against pork, the scenario described in this case would be ideal grist for my mill. Imagine the headlines: “three baby pigs die for each one that grows up.” Nowhere is the mediational role of veterinarians between welfare and profit more apparent than in this situation. Imagine the following headline: “veterinarians advocate for saving low birth-weight piglets.”

Bernard E. Rollin, PhD

Ethical question of the month — August 2019

Ms. Smith has been a longtime client of your practice and a great lover of dogs. After Ms. Smith’s death, her 7-year-old cocker spaniel is brought into the practice for boarding while her family deals with the funeral arrangements. The dog is well-known and well-loved by the staff at your clinic and is given special privileges while boarding. Two weeks following the death of Ms. Smith, her son comes in requesting that you euthanize her dog. You tell the son that the dog is healthy and happy and would make a wonderful pet and would easily be adopted by a loving family. The son explains that in her will, Ms. Smith requested that the dog be cremated, and that her and the dog’s ashes were to be scattered together in her garden. Neither you nor your staff were aware of this arrangement and are reluctant to comply. How should you respond?

Responses to the case presented are welcome. Please limit your reply to approximately 50 words and forward along with your name and address to: Ethical Choices, c/o Dr. Tim Blackwell, 6486 E. Garafraxa, Townline, Belwood, Ontario N0B 1J0; telephone: (519) 846-3413; fax: (519) 846-8178; e-mail: tim.e.blackwell@gmail.com

Suggested ethical questions of the month are also welcome! All ethical questions or scenarios in the ethics column are based on actual events, which are changed, including names, locations, species, etc., to protect the confidentiality of the parties involved.

Les réponses au cas présenté sont les bienvenues. Veuillez limiter votre réponse à environ 50 mots et nous la faire parvenir par la poste avec vos nom et adresse à l’adresse suivante : Choix déontologiques, a/s du Dr Tim Blackwell, 6486, E. Garafraxa, Townline, Belwood (Ontario) N0B 1J0; téléphone : (519) 846-3413; télécopieur : (519) 846-8178; courriel : tim.e.blackwell@gmail.com

Les propositions de questions déontologiques sont toujours bienvenues! Toutes les questions et situations présentées dans cette chronique s’inspirent d’événements réels dont nous modifions certains éléments, comme les noms, les endroits ou les espèces, pour protéger l’anonymat des personnes en cause.
1. Which of the following is most likely in a kitten urinating from the area of the umbilicus?
   A. Persistent urachus.
   B. Ectopic ureter.
   C. Congenital fistula from the urethra through the abdominal wall.
   D. Primary sphincter mechanism incompetence (PSMI).
   E. Incorrect history, since urinating from the area of the umbilicus is not possible.

2. Which of the following is TRUE when comparing struvite stone formation in dogs with that in cats?
   A. Bacterial urinary infection with a urease-positive organism very commonly precedes struvite stone formation in dogs but not in cats.
   B. Struvite stones can successfully undergo medical dissolution in cats but not in dogs.
   C. Acidic urine favors precipitation of struvite crystals in the dog and cat.
   D. The presence of struvite crystals in the urine predicts the presence of a urinary stone in cats but not in dogs.
   E. Struvite stones are uncommon in dogs.

3. Which of the following is most correct concerning acute intrinsic renal failure (AIRF)?
   A. It is easy to distinguish between AIRF and chronic renal failure (CRF) based on the magnitude of serum creatinine and blood urea nitrogen (BUN) (higher levels are expected in AIRF).
   B. When the serum phosphorus level is very high, it is easy to distinguish between AIRF and CRF.
   C. The presence of dehydration on physical examination makes it easy to distinguish between AIRF and CRF.
   D. Lesions of acute tubular necrosis are usually quite evident in renal tissue from a patient with AIRF.

1. Lequel des problèmes suivants est le plus probable chez un chaton qui urine par l’ombilic?
   A. persistance de l’ouraque;
   B. uretère ectopique;
   C. fistule urétrale congénitale dans la paroi abdominale;
   D. incompétence du sphincter urétral (ISU);
   E. anamnèse incorrecte, puisque uriner par l’ombilic n’est pas possible.

2. Lequel des énoncés suivants est VRAI à propos de la comparaison de la formation de calculs de struvite chez le chien et chez le chat?
   A. Une infection urinaire bactérienne par un organisme uréase positif précède très souvent la formation de calculs de struvite chez le chien mais non chez le chat.
   B. Les calculs de struvite peuvent subir une dissolution médicale avec succès chez le chat mais non chez le chien.
   C. L’urine acide favorise la précipitation de cristaux de struvite chez le chien et le chat.
   D. La présence de cristaux de struvite dans l’urine annonce la présence d’un calcul urinaire chez le chat mais non chez le chien.
   E. Les calculs de struvite ne sont pas communs chez le chien.

3. Lequel des énoncés suivants est le plus juste à propos de l’insuffisance rénale intrinsèque aiguë (IRIA)?
   A. Il est facile de distinguer entre l’IRIA et l’insuffisance rénale chronique (IRC) en se basant sur la quantité de créatinine sérique et d’azote uréique du sang (BUN) (on s’attend à des taux plus élevés dans l’IRIA).
   B. Lorsque le taux de phosphore sérique est très élevé, il est facile de distinguer l’IRIA et l’IRC.
   C. La présence de déshydratation à l’examen physique rend plus facile la distinction entre l’IRIA et l’IRC.
   D. Les lésions de nécrose tubulaire aiguë sont habituellement bien évidentes dans le tissu rénal chez un patient souffrant d’IRIA.
E. Unlike those with CRF, patients with AIRF have the potential to recover normal or near-normal renal function if given enough support early.

4. Which of the following is correct concerning xylazine’s oxytocic effect on the heavily pregnant equine uterus?
   A. Xylazine has an oxytocic effect on the heavily pregnant equine uterus.
   B. Xylazine does not have an oxytocic effect on the heavily pregnant equine uterus.

5. Which of the following organisms is unlikely to be isolated from a gangrenous bovine mastitic quarter?
   A. *Escherichia coli*
   B. *Clostridium perfringens*
   C. *Staphylococcus aureus*
   D. *Streptococcus uberis*

(See p. 894 for answers.)/Voir les réponses à la page 894.)
New Brunswick Veterinarian Appointed 71st President of the Canadian Veterinary Medical Association

The Canadian Veterinary Medical Association (CVMA) is delighted to welcome Dr. Melanie Hicks as its new president.

Originally from Prince Edward Island, Dr. Hicks obtained a Bachelor of Science from the Nova Scotia Agricultural College, Dalhousie University, before attending the Atlantic Veterinary College, University of Prince Edward Island. Upon graduation in 2003, she moved with her family to Moncton, New Brunswick, and began her career as a companion animal practitioner. After 10 years of enjoyment in private practice, Dr. Hicks moved to industry and currently works as an International Diagnostic Medical director for Zoetis.

She has been involved with the New Brunswick Veterinary Medical Association as a council member since 2009 and was acting president from 2011–2012. She joined the CVMA as a council member in 2013, serving on numerous task forces including the Business Management Advisory Group, Veterinary Wellness Advisory Group, and an innovation/technology group.

“I am honored to serve as the next president of the Canadian Veterinary Medical Association,” says Dr. Hicks. “The years I have spent working on various CVMA groups and Council have confirmed for me how important the Association’s role is regarding animal welfare advocacy and leadership on national veterinary issues. I look forward to helping the CVMA play a leading role in these areas in the year to come.”

Dr. Hicks currently resides in Moncton with her husband and son on a small alpaca farm. She will serve on the CVMA Council as president from July 2019 until July 2020. The CVMA would like to take this opportunity to thank Dr. Terri Chotowetz for her dedication and enthusiasm while serving as president for the past year.

Dr./Dre Melanie Hicks

The Association canadienne des médecins vétérinaires (ACMV) est ravie d’accueillir la Dʳ Melanie Hicks en tant que nouvelle présidente de l’Association.

La Dʳ Hicks, qui est originaire de l’Île-du-Prince-Édouard, a obtenu un baccalauréat en sciences au Nova Scotia Agricultural College de l’Université Dalhousie avant de fréquenter l’Atlantic Veterinary College de l’Université de l’Île-du-Prince-Édouard. En 2003, après l’obtention de son diplôme, elle est déménagée à Moncton, au Nouveau-Brunswick, avec sa famille et a entamé sa carrière de praticienne pour animaux de compagnie. Après 10 années heureuses en pratique privée, la Dʳ Hicks est passée à l’industrie et elle travaille actuellement à titre de directrice médicale des diagnostics internationaux pour Zoetis.


“Je suis honorée d’occuper le poste de président de l’Association canadienne des médecins vétérinaires”, dit la Dʳ Hicks. «Les années passées à travailler au sein des divers groupes de l’ACMV et au Conseil ont confirmé pour moi l’importance du rôle de l’Association en matière de bien-être animal et de leadership à l’égard des enjeux vétérinaires. Je me réjouis à la pensée d’aider l’ACMV à jouer un rôle de premier plan dans ces domaines au cours de l’année à venir.»

La Dʳ Hicks habite actuellement à Moncton avec son mari et son fils dans un petit élevage d’alpagas. Elle siégera au Conseil de l’ACMV en tant que présidente de juillet 2019 jusqu’en juillet 2020. L’ACMV aimerait aussi profiter de cette occasion pour remercier la Dʳ Terri Chotowetz de son dévouement et de son enthousiasme pendant son mandat à la présidence au cours de la dernière année.
Annual Awards Ceremony Recognizes CVMA Members for Outstanding Contributions to Veterinary Medicine

For over 30 years, the Canadian Veterinary Medical Association (CVMA) has proudly recognized its members for their exceptional contributions to the veterinary profession, and animal health and welfare. This year was no exception as individuals were honored at the CVMA Awards Ceremony in Toronto, Ontario, which took place during the 2019 World Small Animal Veterinary Association (WSAVA) and CVMA Congress in July.

Dr. Kate Lupton was honored with the CVMA Small Animal Practitioner Award, sponsored by Petsecure Pet Health Insurance, for bringing awareness of better handling, diagnosis, and treatment of felines through educating her clients and colleagues. Dr. Lupton grew up on a farm in southern Alberta before attending the Western College of Veterinary Medicine at the University of Saskatchewan. She excelled in feline medicine and was awarded the American Association of Feline Practitioners (AAFP) Student Award in 2012 upon graduating with distinction. Dr. Lupton has been practicing in Lethbridge, Alberta and obtained Gold Standard Cat Friendly Practice status for the clinic in 2013, a first in western Canada. She has written articles on cats for various local magazines and is a monthly contributor to Neighbors Magazine and Quirk. Dr. Lupton is the primary veterinarian for several local feline rescue groups including Last Chance Cat Ranch, Purrfect Endings, and the PAW Society. She hospitalized and treated over 30 cats with injuries after Last Chance Cat Ranch experienced a devastating fire that destroyed its main adoption house in 2013. Every cat made it to discharge. Dr. Lupton is kept busy by her teenage daughter, her 6 cats, and a jungle of houseplants.

Dr. Dennis Will was awarded the CVMA Humane Award, sponsored by Merck Animal Health, for his contribution to the Canadian veterinary infrastructure that assures the welfare of animals at the time of slaughter. Dr. Will, a 1978 graduate of the Western College of Veterinary Medicine, University of Saskatchewan, has worked in mixed-animal practice, for the Canadian Food Inspection Agency (CFIA), and Agriculture and Agri-Food Canada in various capacities. He has worked in disease control and food safety, including work in beef, hog, poultry, and alternative livestock plants. The development of a specific animal welfare policy and training manual was undertaken by the CFIA in large part due to Dr. Will’s dedication and diplomacy. He researched and spearheaded the publication that is science-based and reflects current best practices and international (World Organisation for Animal Health) standards for animal welfare at slaughter. Dr. Will’s animal welfare experience also includes work with the Domestic Inspection Program, as well as consulting with the Domestic Inspection Program, as well as consulting

Depuis plus de 30 ans, l’Association canadienne des médecins vétérinaires (ACMV) reconnaît avec fierté les contributions extraordinaires de ses membres à la profession vétérinaire ainsi qu’à la santé et au bien-être des animaux. Cette année n’a pas fait exception lorsque des personnes ont été honorées durant la Cérémonie annuelle de remise des prix de l’ACMV qui s’est tenue en juillet à Toronto, en Ontario, dans le cadre du congrès 2019 de la World Small Animal Veterinary Association (WSAVA) et de l’ACMV.

Le Prix du praticien des petits animaux de l’ACMV, qui est commandité par Petsecure assurance maladie pour animaux, a été décerné à la Dre Kate Lupton pour son travail en vue de sensibiliser ses clients et ses collègues à l’égard d’une manipulation, d’un diagnostic et d’un traitement améliorés des félinés. La Dre Lupton a grandi dans une ferme du Sud de l’Alberta avant de fréquenter le Western College of Veterinary Medicine de l’Université de la Saskatchewan. Elle a exceller en médecine féline et a reçu le prix étudiant de l’American Association of Feline Practitioners (AAFP) en 2012, au moment de l’obtention avec distinction de son diplôme. La Dre Lupton exerce à Lethbridge, en Alberta, et a obtenu le statut de la norme d’excellence Gold Standard Cat Friendly Practice pour la clinique en 2013, une première dans l’Ouest canadien. Elle a rédigé des articles sur les chats pour divers magazines locaux et est une collaboratrice mensuelle à Neighbors Magazine et à Quirk. La Dre Lupton est la principale vétérinaire pour plusieurs groupes de secours pour chats, notamment Last Chance Cat Ranch, Purrfect Endings et la PAW Society. Elle a hospitalisé et traité plus de 30 chats souffrant de blessures après un incendie dévastateur au Last Chance Cat Ranch qui a détruit son principal bâtiment d’adoption en 2013. Tous les chats se sont rétablis. La Dre Lupton mène une vie chargée avec sa fille adolescente, ses six chats et une jungle de plantes d’intérieur.

Le Prix humanitaire de l’ACMV, qui est commandité par Merck Santé animale, a été décerné au Dr Dennis Will pour sa contribution à l’infrastructure vétérinaire canadienne en vue d’assurer le bien-être des animaux au moment de l’abattage. Le Dr Will, un diplômé de 1978 du Western College of Veterinary Medicine de l’Université de la Saskatchewan, a travaillé en pratique mixte et a occupé divers postes au sein de l’Agence canadienne d’inspection des aliments (ACIA) et d’Agriculture et Agroalimentaire Canada. Il a travaillé dans le contrôle des maladies et la salubrité alimentaire, notamment auprès des usines de bovins, de porcs, de volaille et d’autres animaux d’élevage. L’élaboration d’une politique spécifique au bien-être animal et un manuel de formation a été entreprise par l’ACIA en grande partie en raison du dévouement et du tact du Dr Will. Il a réalisé de la recherche et dirigé la publication de normes factuelles qui reflètent les meilleures pratiques ainsi que des normes internationales (Organisation mondiale de la santé.
work, plant reviews, and advice and training for provinces concerning animal welfare and slaughter. His international development work includes periods of time in China and Mongolia where he was part of a Canadian team based in Calgary that provided training in animal health, disease control, food safety, and public health. He is chairperson of the Saskatchewan Veterinary Medical Association Animal Welfare Committee, which is actively involved in several animal welfare related projects.

The Merck Veterinary Award, sponsored by Merck Animal Health, was given to Dr. Karin Orsel for her work in animal health and welfare, and sustainability of animal production. Dr. Orsel completed her Doctor of Veterinary Medicine at Utrecht University in 1996 and did locums in several veterinary clinics in the Netherlands. In 1997, she returned to her alma mater to work in the ambulatory clinic of the Department of Farm Animal Health. Her active involvement in an epidemiologic study during a foot and mouth disease outbreak in 2001 motivated her to enroll in graduate studies on this topic. She received a Master of Science in Veterinary Epidemiology and Economics in 2004 and subsequently a PhD in 2007. The following year, Dr. Orsel, along with her husband, moved to Canada to join the Faculty of Veterinary Medicine at the University of Calgary (UCVM) where she works with a focus on epidemiology, concentrating on infectious diseases of cattle. She passed the board exam of the European College of Bovine Herd Management in 2009. Currently, Dr. Orsel leads the UCVM’s Cattle Health Research Group. As a veterinary epidemiologist, her main interests are herd-level approaches to health, disease transmission, and identifying risk factors for multi-factorial diseases using multi-disciplinary approaches. Currently, her research includes both beef and dairy cattle, with a focus on lameness, specifically digital dermatitis, Johne’s disease, bovine leucosis, and other infectious diseases at the herd level.

The Practice of the Year Award, sponsored by Scotiabank, was presented to the Veterinary Specialty Centre of Newfoundland and Labrador (VSCNL) for the exceptional care it provides as the only specialty referral hospital in Newfoundland and Labrador where patients can access a wide range of advanced, specialist, diagnostic, and treatment options locally, and often in one visit. Dr. Trina Bailey, founder and managing director of the VSCNL, grew up on the west coast of Newfoundland. She completed a Bachelor of Science at Dalhousie University before completing her animal welfare related projects.

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Doctor of Veterinary Medicine at the Atlantic Veterinary College (AVC), University of Prince Edward Island, in 2000. She worked at AVC as a clinical instructor and research assistant, followed by a small animal rotating internship in 2002. Following her internship, Dr. Bailey and her family moved to Baton Rouge, Louisiana in 2003. There, she completed a surgical residency and a Master of Science degree in 2006. Dr. Bailey became a diplomate of the American College of Veterinary Surgeons in 2007. She worked as a professor at the AVMA and travelled to Newfoundland 3 to 4 times a year to provide surgical services from 2006 until 2014. During these trips, a need for advanced veterinary care was expressed by both veterinarians practicing in the province and pet owners. Travel with sick and injured pets was difficult and sometimes impossible. In 2014, Dr. Bailey moved back to St. John's, with the support of her husband, John MacKenzie, and her family, to provide full-time referral surgical services for animals in her home province. This grew to include radiology and 24-hour emergency services, as well as visiting specialists in other areas. The VSCNL is the only referral hospital and emergency centre in the province and was opened to help provide advanced care for pets in Newfoundland and Labrador. The ultimate goal is that no pet will have to leave home for the care they need.

Dr. Jim Brackett was honored with a CVMA Life Membership this year for an exemplary career as a clinician and mentor to aquaculture veterinarians, as a leader in the pharmaceutical environment, and in taking the Canadian veterinary profession into novel areas of practice. Dr. Brackett graduated from the Ontario Veterinary College, University of Guelph, in 1980 and after a few years in mixed practice he began fish farm health management consulting and managed a fish disease diagnostic laboratory in British Columbia. He was a consultant for the provincial government on fish regulatory issues and served as a special advisor to Fisheries and Oceans Canada on fish health regulations. Dr. Brackett founded Atlantic Fish Health Inc. at the Atlantic Veterinary College, University of Prince Edward Island, and he founded and served as the first CEO of the British Columbia Centre for Aquatic Health Sciences. Until retiring in 2018, he was an owner and president of Syndel Laboratories Ltd., an aquaculture pharmaceutical company. Dr. Brackett was a member of the CVMA, and the British Columbia and New Brunswick Veterinary Associations, along with membership and various roles in the Association of Aquaculture Veterinarians of British Columbia, Eastern Aquatic Veterinarians Association, Canadian Association of Aquatic Veterinarians, World Aquatic Veterinary Medical Association, and the American Veterinary Medical Association (AVMA). Over the years, Dr. Brackett assisted the CVMA in its active involvement with fish health and welfare, and drug approval and use issues. He was the CVMA's representative on the AVMA Aquatic Veterinary Medicine Committee.

Dr. Lloyd Keddie was awarded the 2019 CVMA President's Award for his years of service to the veterinary community and the CVMA. Dr. Keddie was raised on a mixed animal farm outside of Fairview, Alberta. After attaining a Bachelor of Science and teaching certificate in 1970, Dr. Keddie taught high school pets in 2002. After his internat, la Dʳ Bailey et sa famille sont déménagées à Baton Rouge, en Louisiane, en 2003. C'est à cet endroit qu'elle a terminé une résidence en chirurgie et une maîtrise en sciences en 2006. La Dʳ Bailey est devenue diplomate de l'American College of Veterinary Surgeons en 2007. De 2006 à 2014, elle travaillait comme professeure à l'AVC et voyageait trois ou quatre fois par année afin d'offrir des services chirurgicaux. Durant ces voyages, le besoin de soins vétérinaires avancés a été exprimé par les médecins vétérinaires exerçant dans la province ainsi que les propriétaires d’animaux. Il était difficile, et parfois impossible, de voyager avec des animaux malades. En 2014, la Dʳ Bailey est retournée à St John's, avec le soutien de son mari, John MacKenzie, et de sa famille, afin d'offrir des services chirurgicaux spécialisés pour les animaux de sa province natale. Cette clinique a pris de l'expansion afin d'inclure des services de radiologie et une clinique d'urgence ouverte 24 heures sur 24 ainsi que des spécialistes en visite provenant d’autres régions. Le VSCNL est le seul hôpital spécialisé et centre d'urgence dans la province et il a été ouvert afin d'offrir des soins avancés pour les animaux de compagnie de Terre-Neuve-et-Labrador. L'hôpital s'est fixé l’objectif de veiller à ce qu’aucun animal ne soit obligé de quitter la province pour obtenir les soins dont il a besoin.

Cette année, le titre de Membre à vie de l'ACMV a été décerné au D'r Jim Brackett pour sa carrière exemplaire en tant que clinicien et mentor auprès des vétérinaires de l'aquaculture, en tant que leader dans l’environnement pharmaceutique et pour avoir introduit la profession vétérinaire canadienne à de nouveaux domaines de pratique. Le D'r Brackett a obtenu son diplôme en 1980 à l’Ontario Veterinary College de l'Université de Guelph et, après quelques années passées en pratique mixte, il a commencé à faire de la consultation en gestion de la santé des piscicultures et a géré un laboratoire diagnostique des maladies du poisson en Colombie-Britannique. Il a été consultant auprès du gouvernement provincial à l’égard des enjeux réglementaires liés au poisson et a agi tant que conseiller spécial auprès de Pêches et Océans Canada sur la réglementation de la santé des poissons. Le D'r Brackett a établi Atlantic Fish Health Inc. à l'Atlantic Veterinary College de l'Université de l'île-du-Prince-Édouard, et a fondé et été le premier PDG du British Columbia Centre for Aquatic Health Sciences. Jusqu’à sa retraite en 2018, il était propriétaire et président de Syndel Laboratories Ltd., une compagnie pharmaceutique de l’aquaculture. Le D'r Brackett a été membre de l'ACMV ainsi que des associations de médecins vétérinaires de la Colombie-Britannique et du Nouveau-Brunswick et a été membre et occupé divers rôles au sein de l'Association d'Aquaculture Vétérinaires de British Columbia, de l'Eastern Aquatic Veterinarians Association, de la Canadian Association d'Aquatic Veterinarians, de la World Aquatic Veterinary Medical Association et de l'American Veterinary Medical Association (AVMA). Au fil des ans, le D'r Brackett a porté assistance à l'ACMV dans sa participation active en lien avec la santé et le bien-être des poissons ainsi qu'avec des enjeux associés à l'homologation et à l'utilisation des médicaments. Il a été le représentant de l'ACMV au sein du Comité de la médecine vétérinaire aquatique de l'AVMA.
Ms./Mme Kate Rundle

The R.V.L. Walker Award is presented annually to the president of the Students of the CVMA (SCVMa) for his/her work to promote student interests in the Association. This award features 2 recipients — a plaque is presented to the president of the SCVMa and a cash award is made available to the veterinary college where the president is registered to provide financial assistance to a student veterinarian in need. The recipient of this year's R.V.L. Walker Award plaque is Ms. Kate Rundle from the Atlantic Veterinary College (AVC), University of Prince Edward Island (UPEI). Ms. Rundle has dreamed of becoming a veterinarian since she was a small child. She gained experience with a variety of small, large, and exotic animals throughout high school and her undergraduate years, which cemented her choice to pursue a career in veterinary medicine. Ms. Rundle completed an undergraduate degree in Biology with a specialization in Life Sciences at UPEI in 2014 and returned in 2015 to add an honors to that degree. After completing the honors degree, she spent 7 weeks at a local wildlife rehabilitation centre and fell in love with wildlife medicine. In the fall of 2015, Ms. Rundle began a Master of Science in AVC's Department of Biomedical Sciences where she studied the effects of naphthenic acids, a toxicant found in oil sands' wastewater, on mitochondria isolated from fish samples. She presented her research in Orlando, Florida at the 2016 Society of Environmental Toxicology and Chemistry (SETAC) World Congress and has since published a paper in Environmental Science and Technology. In 2017, Ms. Rundle’s dream of becoming a veterinarian was realized when she was accepted to study at the AVC. While


Le Prix R.V.L. Walker est décerné annuellement au président des Étudiants de l'ACMV (ÉACMV) pour son travail en vue de promouvoir l'intérêt des étudiants envers l'Association. Il y a deux récipiendaires de ce prix — une plaque est présentée au président des Étudiants de l'ACMV et une bourse est remise au collège où est inscrit le président afin d'offrir de l'assistance financière à un étudiant en médecine vétérinaire dans le besoin. Cette année, la récipiendaire de la plaque du Prix R.V.L. est Mme Kate Rundle de l'Atlantic Veterinary College (AVC) de l'Université de l'Ile-du-Prince-Édouard (UPEI). Mme Rundle rêve de devenir vétérinaire depuis sa tendre enfance. Kate a acquis de l'expérience auprès d'un éventail d'animaux qui étaient petits, grands et exotiques pendant ses études à l'école secondaire et de premier cycle universitaire, ce qui a cimenté son choix de poursuivre une carrière en médecine vétérinaire. Kate a obtenu son diplôme de premier cycle en biologie avec spécialisation en sciences de la vie à l'Université de l'Île-du-Prince-Édouard (UPEI) en 2014 et elle est retournée à l'UPEI en 2015 pour ajouter une spécialisation à son diplôme. Après l'achèvement de son diplôme avec spécialisation, Kate a passé sept semaines dans un centre local de réadaptation de la faune et elle s'est éprise de la médecine faunique. À l'automne 2015, Kate a entamé sa maîtrise en sciences au Département des sciences biomédicales de l'AVC où elle a étudié les effets des acides naphthéniques, une substance toxique qui se retrouve dans les eaux usées des sables bitumineux, sur la mitochondrie isolée dans des échantillons de poisson. Elle a présenté sa recherche à Orlando, en Floride, au Congrès mondial 2016 de la Society of Environmental Toxicology and Chemistry (SETAC) et elle a depuis publié un article dans la revue Environmental Science and Technology. En 2017, le rêve de Kate de devenir vétérinaire
at AVC, she has continued to work on her Master’s part-time and will be defending in the coming months. She has become involved with numerous clubs at the AVC and has spent her summers since beginning veterinary school at Hope for Wildlife helping treat and rehabilitate Nova Scotia’s wildlife.

Nominations for the 2020 CVMA Awards will open in the fall of 2019. The submission deadline is January 31, 2020. Visit the CVMA website (www.canadianveterinarians.net/about/awards) to learn more.

CVMA Welcomes New Treasurer — Dr. Brian Evans

The Canadian Veterinary Medical Association (CVMA) is pleased to welcome Dr. Brian Evans as its new treasurer.

Dr. Evans is an alumnus of the University of Guelph, Ontario where he obtained a Bachelor of Science in Agriculture in 1974 and a Doctor of Veterinary Medicine in 1978 (Ontario Veterinary College).

Following several years in private practice with a professional focus on reproductive herd health and embryo transfer, Dr. Evans was recruited by the Federal Government of Canada into public practice to develop domestic and international standards and certification programs in support of the safe international movement of animal semen and embryos.

Dr. Evans had a distinguished career in public service that included serving as the 14th Chief Veterinary Officer of Canada for a period of 15 years, as well as Governor-In-Council appointments, initially as the executive vice-president of the Canadian Food Inspection Agency (CFIA), then as Canada’s first Chief Food Safety Officer, and finally as a special advisor to the president of the CFIA.

Dr. Evans also served as the Government of Canada’s Delegate to the 182-member country World Organisation for Animal Health (OIE) for 13 years. During that time, he was elected as the Secretary General for the OIE Regional Commission for the Americas and to 4 consecutive 3-year terms as a representative of the member countries of the Americas Region on the Council of the OIE.

Dr. Evans retired from the Government of Canada in 2013 and was subsequently recruited by the OIE to be the Deputy Director General responsible for animal health, veterinary public health and international standards based in Paris, France.

He is a strong advocate for the integrated management of the

L’ACMV accueille un nouveau trésorier — le Dr Brian Evans

L’Association canadienne des médecins vétérinaires (ACMV) est heureuse d’accueillir le Dr Brian Evans au poste de trésorier.

Le Dr Evans est un ancien de l’Université de Guelph, en Ontario, où il a obtenu un baccalauréat en sciences de l’agriculture en 1974 et un doctorat en médecine vétérinaire en 1978 (Ontario Veterinary College).

Après plusieurs années passées en pratique privée en se concentrant sur la santé de la reproduction du troupeau et le transfert des embryons, le Dr Evans a été recruté par le gouvernement fédéral du Canada pour travailler en pratique publique en vue d’élaborer des normes nationales et internationales et des programmes de certification pour favoriser le mouvement international sécuritaire du sperme et des embryons animaux.

Le Dr Evans a connu une carrière distinguée à la fonction publique en occupant notamment le poste de 14e médecin vétérinaire en chef du Canada pendant une période de 15 ans ainsi que des nominations par le Gouverneur en conseil, d’abord comme premier vice-président de l’Agence canadienne d’inspection des aliments (ACIA), puis comme premier chef de la salubrité des aliments et enfin comme conseiller spécial auprès du président de l’ACIA.

Le Dr Evans a aussi agi en tant que délégué du gouvernement canadien pendant 13 ans auprès de l’Organisation mondiale de la santé animale (OIE), qui compte 182 pays membres. Pendant ce temps, il a été élu secrétaire général de la Commission régionale de l’OIE pour les Amériques et à quatre mandats consécutifs de trois ans à titre de représentant des pays de la région des Amériques au sein du Conseil de l’OIE.

Le Dr Evans a pris sa retraite du gouvernement du Canada en 2013 et a ensuite été recruté par l’OIE pour occuper le poste de directeur général adjoint pour la santé animale, la santé publique vétérinaire et les normes internationales à Paris, France.

C’est un ardent défenseur de la gestion intégrée des risques sociaux et économiques ainsi que de ceux liés à la biosécurité et à la salubrité des aliments qui émergent à l’interface de la santé de l’écosystème, des animaux et des humains.

Le Dr Evans est récipiendaire de nombreux prix nationaux et internationaux, notamment le Prix du président de l’ACMV, les
social, economic, biosecurity, and food security risks that emerge at the interface of eco-system, animal and human health.

Dr. Evans has been the recipient of numerous national and international awards including the CVMA President’s Award, the Queen’s Gold and Diamond Jubilee medals, and 2 Public Service of Canada Excellence awards. His achievements have also been recognized with Honorary Degrees of Laws by both the University of Guelph and the University of Calgary.

We look forward to working with such a dedicated and distinguished veterinarian. The CVMA would also like to thank Dr. Barry Stemshorn for his years of devotion serving the CVMA as treasurer since 2010. We wish him all the best in his future endeavors.

**Mental Health Awareness Week: It’s Time to Talk About Mental Health in Veterinary Medicine**

There are important reasons to start talking about mental health in the veterinary profession. Difficult to see, mental health issues, problems, and illness affect many people working in veterinary clinics. While 1 in 5 Canadian veterinarians and technologists have reported suicide ideation, burnout, and depression, most will be cautious about talking to a co-worker, friend, or family member about it. They are even less likely to adopt self-care strategies or seek professional help. And while some members of the veterinary profession may not experience mental illness first-hand, it is likely they know someone who has or will experience mental illness.

Stigma is one of the biggest obstacles to overcome. Merck Animal Health and the CVMA are leading the way to start open and honest conversations about mental health in the veterinary community, help breakdown stigma, and create a community where members look out for and help one another. The conversation will kick off with an inaugural *It’s time to talk about Mental Health in Vet Med Awareness Week* from September 9 to 15, 2019. In recognition of National Suicide Awareness day on September 10, a live webinar will be offered to all veterinary professionals providing important and practical information for those working in the veterinary profession. All participants will receive a certificate for one continuing education unit.

Semaine de sensibilisation à la santé mentale : Il est temps de parler de santé mentale en médecine vétérinaire

Il y a des raisons importantes de commencer de parler à propos de la santé mentale dans la profession vétérinaire. Les problèmes et les maladies de santé mentale peuvent être difficiles à voir et ils affectent un grand nombre de personnes qui travaillent dans les cliniques vétérinaires. Même si, parmi les médecins vétérinaires et les technologues en santé animale, 1 personne sur 5 a signalé l'idéation du suicide, l'épuisement professionnel et la dépression, la plupart feront preuve de prudence pour en parler à un collègue de travail, à un ami ou à un membre de la famille. Ils sont encore moins probable qu'ils adoptent des stratégies d'autosoins ou sollicitent de l'aide professionnelle. Et, même si certains membres de la profession vétérinaire peuvent ne pas vivre une maladie mentale eux-mêmes, il est probable qu'ils connaissent quelqu'un qui a vécu ou vira une maladie mentale.

Les préjugés représentent l'un des obstacles les plus importants à surmonter. Merck Santé animale et l'ACVM donnent l'exemple afin d'entamer des conversations ouvertes et honnêtes à propos de la santé mentale au sein de la collectivité vétérinaire, d'aider à dissiper les préjugés et de créer une collectivité où les membres collaborent et s'entraident. La conversation donnera le coup d'envoi de la *Semaine de sensibilisation Il est temps de parler de santé mentale en médecine vétérinaire* qui se déroulera du 9 au 15 septembre 2019. En reconnaissance de la Journée nationale de sensibilisation au suicide le 10 septembre, un webinaire en direct sera offert à tous les médecins vétérinaires, technologues vétérinaires agréés et employés de la clinique. Les participants pourront :

- Apprendre les quatre stratégies d’adaptation factuelles qui ont été étudiées spécifiquement chez les médecins vétérinaires et les technologues afin de contribuer à la réduction de l’épuisement professionnel et du stress et les mettre en pratique.
- Apprendre les étapes simples pour aider un collègue de travail qui vit de la détresse et les mettre en pratique.
September 10, a live webinar will be available for all veterinarians, RVTs, and clinic staff. Participants will:

- Learn and practice the 4 evidence-based coping strategies that have been specifically researched in veterinarians and technologists to help reduce burnout and stress.
- Learn and practice simple steps on how to help a coworker who is in distress.
- Leave the webinar with practical guidelines on how to start conversations about mental health in work environments.
- Have access to a list of provincial and community mental health resources.

We all deserve to be heard, to know that we are not alone, to feel worthy to look after ourselves, and feel empowered to keep each other safe from harm.

Visit the website (www.canadianveterinarians.net) in August to download helpful resources including:

- It’s time to talk about Mental Health in Vet Med Awareness Week poster.
- Provincial and regional mental health community resource lists.
- Mental health alert checklist to recognize signs and symptoms of burnout, depression, and suicidal thoughts.

This article was written by CVMA member, Dr. Kathy Keil. Dr. Keil is a member of the ABVMA Member Wellness Committee. She is also a technical services veterinarian for Merck and is the leading force behind this Mental Health Awareness Week campaign in collaboration with the CVMA.

Help Unite Canada in Celebrating Animal Health Week!
Optimal Nutrition for Optimal Health

Animal Health Week (AHW), the Canadian Veterinary Medical Association’s (CVMA’s) national public awareness campaign, provides Canadian veterinarians a chance to present a united front, while emphasizing an important animal health issue.

With this year’s theme, Optimal Nutrition for Optimal Health: Talk to Your Veterinary Team About Your Animal’s Dietary Needs, the CVMA, and veterinary teams across the country, are highlighting the importance of nutrition and underscoring the value in providing animals with balanced and nutritious meals! Join us!

During AHW 2019, from October 6–12, encourage animal owners to speak to their veterinary teams about creating the best individual nutrition protocol for their animals. Good nutrition forms the basis of an animal’s overall health!

- Quitter le webinaire avec des lignes directrices pratiques sur la façon d’entamer des conversations sur la santé mentale en milieu de travail.
- Avoir accès à une liste de ressources provinciales et communautaires en santé mentale.

Nous méritons tous d’être écoutés, de savoir que nous ne sommes pas seuls, de sentir que nous valons la peine de nous occuper de nous-mêmes et de nous sentir capables de nous protéger les uns les autres.

Visitez le site Web (www.veterinairesaucanada.net) en août pour télécharger des ressources utiles, notamment :

- L’affiche de la Semaine de sensibilisation Il est temps de parler de santé mentale en médecine vétérinaire.
- Des listes de ressources de santé mentale communautaires provinciales et régionales.
- Une liste de contrôle des avertissements de santé mentale afin de reconnaître les signes et les symptômes de l’épuisement professionnel, de la dépression et des pensées suicidaires.

Cet article a été rédigé par la membre de l’ACMV Dr. Kathy Keil. Dr. Keil est membre du Comité du bien-être des membres de l’ABVMA. Elle est aussi médecin vétérinaire des services techniques chez Merck et organisatrice principale de cette campagne de Semaine de sensibilisation à la santé mentale en collaboration avec l’ACMV.

A Semaine de la vie animale (SVA), la campagne nationale de sensibilisation du public de l’Association canadienne des médecins vétérinaires (ACMV), fournit aux médecins vétérinaires canadiens l’occasion de présenter un front uni tout en insistant sur un enjeu important en santé animale.

Sous la bannière du slogan de cette année, Nutrition optimale = Santé optimale : Consultez votre équipe vétérinaire pour vous renseigner sur les besoins alimentaires de votre animal, l’ACMV et les équipes vétérinaires au pays souligneront l’importance de la nutrition et insisteront sur la valeur d’offrir des repas équilibrés et nutritifs aux animaux! Joignez-vous à nous!

Durant la SVA 2019, qui se déroulera du 6 au 12 octobre, nous encouragerons les propriétaires d’animaux à parler à leurs équipes vétérinaires à propos de la création du meilleur protocole
During AHW 2019, remind your clients:

- **Optimal nutrition** is central to **optimal health** and well-being.
- **Diets must be appropriate** for species, breed, age, and health status of an animal.
- **Portion control** is of utmost importance — obesity is a leading cause of illness and premature death in overfed animals.
- All diets, prepared commercially or at home, must be formulated with **appropriate balances of essential nutrients** as required by your animal.

Place your order before the early bird deadline on **July 19, 2019** for a chance to win a $100 Subway gift card (and treat the whole team to lunch!) and other fun prizes. Online ordering (www.canadianveterinarians.net), (instead of faxing or mailing) also gives you a chance to win a $50 Tim Hortons gift card (treat your hard-working team to some morning steam)! The deadline to place your AHW materials order is **August 2, 2019**.

Share your celebrations with Canada on Facebook, Twitter, and Instagram using the hashtag #AnimalHealthWeek and please tag @cvma.acmv on Instagram to be featured in our stories!

Our Generous supporters

Generous support of the 2019 Animal Health Week campaign is provided by Principal Sponsor, Royal Canin, and Program Sponsors, iFinance Canada (Petcard), and The Personal.

This month we highlight one of our Program Sponsors and the CVMA’s exclusive home and auto group insurance provider, The Personal:

Save Money by Switching to the CVMA Group Insurance Program!

As a CVMA Member, you get exclusive access to great rates, saving you money while protecting what matters most. Plus, as one of Canada’s leading home and auto group insurers, you can expect a seamless experience every step of the way.

How group insurance works for you:

- The combined buying power of CVMA members gives you access to preferred group rates, and important savings.
- Enjoy personalized coverage that’s as unique as you are.

With the trust of 700+ organizations, The Personal is committed to making insurance straightforward and affordable. These are just some of the reasons our annual client renewal rate is 97%.

For Personal Use Only
Save even more when you bundle your home and auto insurance with us, along with your exclusive group rates!

Together, the CVMA and The Personal give you access to all the group insurance advantages, allowing you to save on the coverage you need, and enjoy the service you deserve.

Get a quote and see what The Personal can do for you. Call 1-866-860-2862 or visit the website (www.cvmainsurance.com).

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The CVMA Has Resources to Help You Throughout Your Career

L'ACMV possède des ressources pour vous appuyer pendant votre carrière

Only the Canadian Veterinary Medical Association (CVMA) represents the interests and priorities of Canada’s diverse veterinarians. As a CVMA member, you benefit from our wide range of activities and resources. In many instances the resulting savings from the exclusive member benefits, discounts and services covers more than the cost of your annual membership fee.

Clinician’s Brief and Plumb’s Veterinary Drugs are just 2 of CVMA’s exclusive member benefits.

Aligned with CVMA’s goals, the mission of Clinician’s Brief and Plumb’s Veterinary Drugs is to provide small animal veterinary teams the tools they need to develop successful practices, build lasting client relationships, and deliver gold-standard patient care.

As CVMA members, you are entitled to a free monthly Global Digital Edition of Clinician’s Brief or a special discounted print subscription. Some features and benefits of Clinician’s Brief include:

• Practical, relevant information on the latest topics in veterinary medicine.
• Information presented in a brief format for busy practitioners.
• Ranked #1 most essential publication by small animal veterinarians for 9 years. (2007–2015 PERQ and Essential Media Studies)
• Access Clinician’s Brief anytime, anywhere — on your desktop, tablet, or mobile device.

To request your free digital subscription, go to the CVMA Member Benefits and Services web page and click on Clinician’s Brief (member log-in required).

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Seule l’Association canadienne des médecins vétérinaires (ACMV) représente les divers intérêts et priorités de la profession vétérinaire. En tant que membre de l’ACMV, vous profitez de notre vaste éventail d’activités et de ressources. Dans beaucoup de cas, les avantages, rabais et services offerts exclusivement aux membres permettent de récupérer des sommes qui dépassent le coût de la cotisation annuelle.

Clinician’s Brief and Plumb’s Veterinary Drugs représentent seulement deux des avantages exclusifs des membres de l’ACMV.

Conformément aux objectifs de l’ACMV, la mission de Clinician’s Brief et de Plumb’s Veterinary Drugs consiste à fournir aux équipes vétérinaires pour petits animaux les outils qu’ils ont besoin afin de bâtir des cliniques prospères, d’établir des relations durables avec la clientèle et d’offrir des soins de qualité supérieure aux patients.

À titre de membres de l’ACMV, vous avez droit à une édition numérique mondiale mensuelle de Clinician’s Brief ou à un abonnement en version imprimée à prix réduit. Voici quelques-uns des avantages de Clinician’s Brief :

• Des renseignements pratiques et pertinents sur les sujets d’actualité en médecine vétérinaire.
• Des renseignements présentés dans un format abrégé pour des praticiens occupés.
• Depuis neuf ans, Clinician’s Brief a été jugé comme la publication essentielle n° 1 par les médecins vétérinaires pour petits animaux. (Études 2007–2015 de PERQ et d’Essential Media)
Also, as part of your CVMA member benefits, you receive a 30% discount on the individual or practice online subscription or print edition of Plumb’s Veterinary Drugs™, the veterinary drug resource everyone is talking about. Some features and benefits of Plumb’s Veterinary Drugs include:

• Easy-to-use, digital resource for accessing veterinary drug information, covering:
  — Dosages
  — Drug interactions
  — Adverse effects
  — Contraindications

• Provides busy veterinarians with streamlined dosing information that reflects the latest evidence-based recommendations combined with clinical expertise.

• The exclusive Veterinary Medication Guides provide information about the drugs you prescribe to your clients in language they can easily understand, along with handouts on how they can monitor their pet’s treatment at home.

• Plumb’s mobile app provides you with instant, offline access to drug dosing information, any time, from any location.

Contact the CVMA at 1-800-567-2862 or e-mail (admin@cvma-acmv.org) to obtain your CVMA member discount code that you will need to provide in order to benefit from the discount. Then subscribe (www.plumbsveterinarydrugs.com).

Plumb’s Veterinary Drugs and Clinician’s Brief are 2 more of CVMA’s benefits that can help position your practice on the forefront of veterinary medicine.

• Vous pouvez accéder à Clinician’s Brief n’importe quand, n’importe où — sur votre ordinateur, tablette ou appareil mobile.

Pour demander votre abonnement numérique gratuit, allez à la page Web des Avantages et services aux membres de l’ACMV et cliquez sur Clinician’s Brief (il faut ouvrir une session).

De plus, dans le cadre de vos avantages de membres de l’ACMV, vous recevez un rabais de 30 % sur l’abonnement individuel ou de la clinique pour la version en ligne ou l’édition imprimée de Plumb’s Veterinary Drugs™, la ressource sur les médicaments vétérinaires dont tout le monde parle. Voici quelques-uns des avantages de Plumb’s Veterinary Drugs :

• Ressource numérique facile à utiliser pour accéder à des renseignements sur les médicaments vétérinaires qui traitent des sujets suivants :
  — Posologie
  — Interactions médicamenteuses
  — Réactions indésirables
  — Contre-indications

• Communication aux médecins vétérinaires occupés de renseignements simplifiés sur la posologie qui reflètent les plus récentes recommandations factuelles et des conseils cliniques.

• Le Guide des médicaments vétérinaires exclusif communique des renseignements à propos des médicaments que vous prescrivez à vos clients dans une langue qu’ils peuvent facilement comprendre ainsi que des feuilles sur la façon dont ils peuvent surveiller le traitement de l’animal à la maison.

• L’appli mobile de Plumb’s vous offre un accès hors ligne instantané à des renseignements sur la posologie n’importe où et n’importe quand.

Contactez l’ACMV au 1-800-567-2862 ou par courriel (admin@cvma-acmv.org) pour obtenir votre code de rabais de membre de l’ACMV que vous devrez fournir afin de profiter de ce rabais. Vous pourrez ensuite vous abonner (www.plumbsveterinarydrugs.com).

Plumb’s Veterinary Drugs et Clinician’s Brief représentent deux autres avantages de l’ACMV qui peuvent aider votre établissement vétérinaire à demeurer à l’avant-garde de la médecine vétérinaire.
How Does the CVMA Shape National Policy and Legislation that Affect You?

Comment l'ACMV façonne-t-elle les politiques nationales et les lois qui vous touchent?

The CVMA provides leadership and advocacy on behalf of Canadian veterinarians; one of its strategic priorities is advocacy for veterinarians across Canada. The CVMA provides crucial feedback on relevant legislative and policy issues that impact the veterinary scope of practice. How does the CVMA implement these desired changes?

• Engages with government and stakeholders to influence policy decisions
• Develops international relations and represents veterinarians across Canada
• Ensures that the media provide accurate information and promotes veterinary professionals
• Issues position statements regarding national veterinary issues
• Encourages member consultations on key issues
• Takes a lead role on antimicrobial stewardship and antimicrobial surveillance.

Below are some examples of how the CVMA supports Canadian veterinarians by generating policy and legislative changes.

CVMA Summit

The Annual CVMA Summit is a forum at which Canadian and international veterinary leaders share information on key issues in veterinary medicine. These Summit discussions have proven invaluable in exploring and adopting common approaches to challenges in our profession. All CVMA Convention delegates can attend this event, hosted during the CVMA Convention.

The 2019 CVMA Summit was on the Gold Standard of Animal Welfare — Positive and Negative Impact on Animals and Veterinarians. This Summit included 3 separate sessions and speakers:

2. What Do We Mean by One Welfare? by Dr. David Fraser, professor, Faculty of Land and Food Systems — University of British Columbia.
3. The Gold Standard of Animal Welfare — Positive and Negative Impact on Animals and Veterinarians by Dr. Heather Bacon, Veterinary Welfare Education and Outreach manager at the Jeanne Marchig International Centre for Animal Welfare Education at the University of Edinburgh's Royal (Dick) School of Veterinary Medicine.

National Issues Forum

The Annual CVMA National Issues Forum allows CVMA members an opportunity to express their views on a topic of national interest in the veterinary community. Forum discussions have proven invaluable in exploring and formulating positions on important veterinary issues. All CVMA Convention delegates can attend this event, hosted during the CVMA Convention.

L'ACMV assure le leadership et la défense des intérêts au nom des médecins vétérinaires canadiens. L'une de ses priorités stratégiques est la défense des intérêts des médecins vétérinaires au Canada. L'ACMV fournit de la rétroaction cruciale sur les enjeux législatifs et politiques pertinents qui ont un impact sur la portée de l'exercice de la médecine vétérinaire. Comment l'ACMV met-elle en œuvre ces changements souhaités?

• Elle engage un dialogue avec le gouvernement et les intervenants afin d'influencer les décisions politiques.
• Elle établit des relations internationales et représente les médecins vétérinaires au Canada.
• Elle veille à ce que les médias fournissent des renseignements exacts et fassent la promotion des professionnels vétérinaires.
• Elle publie des énoncés de position sur les enjeux vétérinaires nationaux.
• Elle encourage des consultations auprès des membres sur des enjeux importants.
• Elle assume un rôle de leadership à l'égard de l'antibio-gouvernance et de la surveillance des antimiobiens.

Vous trouverez ci-dessous des exemples de la façon dont l'ACMV appuie les médecins vétérinaires canadiens en produisant des changements politiques et législatifs.

Sommet de l'ACMV

Le Sommet annuel de l'ACMV est un forum au cours duquel les leaders vétérinaires canadiens et internationaux partagent des renseignements sur des enjeux clés en médecine vétérinaire. Les discussions du Sommet se sont avérées utiles pour l'exploration et l'adoption d'approches communes en vue d'aborder les défis présents dans notre profession. Tous les délégués au congrès de l'ACMV peuvent assister à cet événement qui sera organisé durant le congrès de l'ACMV.

Le Sommet 2019 de l'ACMV portait sur La norme d'excellence en matière de bien-être animal — Impact positif et négatif sur les animaux et les médecins vétérinaires. Ce Sommet incluait trois ateliers et conférenciers distincts :

2. Quelle est la signification d’Un seul bien-être? Par le D’ David Fraser, professeur, Faculté des systèmes agricoles et alimentaires — Université de la Colombie-Britannique.
3. La norme d'excellence en matière de bien-être animal — Impact positif et négatif sur les animaux et les médecins vétérinaires par la Dʳ Heather Bacon, gestionnaire de l'éducation publique sur le bien-être vétérinaire au Jeanne Marchig International Centre for Animal Welfare Education de la Royal (Dick) School of Veterinary Medicine de l'Université d'Édimbourg.

Forum sur les enjeux nationaux

Le Forum annuel de l'ACMV sur les enjeux nationaux donne l'occasion aux membres de l'ACMV d'exprimer leurs vues sur un
The 2019 CVMA National Issues Forum discussed and explored issues and challenges pertaining to *Telehealth and Animal Welfare — Pros, Cons and Implications for Veterinary Patients*. This year’s panelists included:

- **Dr. Heather Bacon** BSc (Hons), BVSc, CertZooMed MRCVS
- **Jan Robinson**, registrar and CEO of the College of Veterinarians of Ontario
- **Dr. Lori Teller**, Texas A&M University (for AVMA)

**Government relations**

The CVMA participated in an Ottawa forum discussing the *prevention and control of African Swine Fever (ASF)* in the *Americas* in May, organized by the Canadian Food Inspection Agency (CFIA), including 150 delegates from 15 countries, to collaborate on a global plan to prevent and mitigate the ASF risk in North and South America. The forum gathered government, industry leaders, and decision-makers to discuss the ASF threat, learn from recent outbreak experiences in Europe and Asia, and collaborate on concrete actions to mitigate the ASF threat in the region. The forum also began a collaborative framework development for managing the disease’s threat. The CVMA continues collaborations with the CFIA and stakeholders to prevent ASF from infecting the Canadian pig herd.

The CVMA created a dedicated web section to keep veterinarians up-to-date on the most recent ASF news (www.canadianveterinarians.net/practice-economics/asf).

In February 2019, **Dr. Henry Ceelen**, chair of the CVMA’s National Issues Committee, presented at the Standing Committee on Agriculture and Agri-Food. The Committee was conducting a study on *public perception of the Canadian agricultural sector*. Dr. Ceelen stated the veterinary profession has an important responsibility to help ensure public perception of the agri-food system remains positive because of the high level of trust placed in veterinarians and the key role the profession plays in supporting producers and sustainable animal agriculture.

He highlighted the relevance of a One Health approach, and the CVMA’s commitment to helping the Government of Canada respond to the threat of antimicrobial resistance.

The CVMA continues to represent Canadian veterinarians on the topic of cannabis. The Canadian Association of Veterinary Cannabinoid Medicine (CAVCM) *called on the federal government to make 2 cannabis regulations changes* to better protect pets’ safety and health. The CVMA recently submitted a letter to Health Canada in response to its open consultation on cannabis edibles/extracts/topicals. The letter indicates veterinarians are now frequently fielding questions from companion animal owners, livestock producers, and others about the potential therapeutic benefits of using cannabis in animals for the alleviation of pain, relief of anxiety, and treatment of behavioral conditions. The CVMA submitted the following comments (originally brought forward by the CVMA in a letter to Health Canada in January 2018):

1. The CVMA strongly urges that Part 14 of the Cannabis Regulations — Access to Cannabis for Medical Purposes be amended to allow veterinarians to provide necessary medication to their patients, while maintaining an arms-length oversight on its dispensing. 2. The CVMA requests that subject of interest national au sein de la collectivité vétérinaire. Les discussions du Forum se sont avérées utiles pour l’exploration et la formulation de positions sur des enjeux vétérinaires importants. Tous les délégués au congrès de l’ACVM ont pu assister à cet événement qui est organisé durant le congrès de l’ACVM.

L’édition 2019 du Forum sur les enjeux nationaux de l’ACVM a exploré les enjeux et les défis en lien avec *La télésanté et le bien-être animal — Avantages, inconvénients et conséquences pour les patients vétérinaires*. Les panélistes de cette année incluaient :

- **Dr. Heather Bacon**, BSc. (spéc.), B. Sc.Vet., CertZooMed MRCVS
- **Jan Robinson**, registrare et PDG de l’Ordre des vétérinaires de l’Ontario
- **Dr. Lori Teller**, Texas A&M University (pour l’AVMA)

**Relations gouvernementales**

En mai, l’ACVM a participé à un forum tenu à Ottawa pour discuter de la *prévention et du contrôle de la peste porcine africaine (PPA)* dans les Amériques. Ce forum, qui réunissait 150 délégués provenant de 15 pays, a été organisé par l’Agence canadienne d’inspection des aliments (ACIA) en vue de collaborer à un plan mondial pour prévenir et atténuer le risque de PPA en Amérique du Nord et du Sud. Le forum a réuni des fonctionnaires gouvernementaux, des leaders de l’industrie et des décideurs afin de discuter de la menace de la PPA, d’apprendre des écoscènes récentes en Europe et en Asie et de collaborer à des mesures concrètes en vue d’atténuer la menace de la PPA dans la région. Le forum a aussi inauguré l’élaboration d’un cadre de travail concerté pour la gestion de la menace de la maladie. L’ACVM continue de collaborer avec l’ACIA et des intervenants afin de prévenir l’infection par la PPA au sein du cheptel porcin au Canada.

L’ACVM a créé une section dédiée de son site Web afin d’informer les médecins vétérinaires à propos des dernières nouvelles en lien avec la PPA (www.veterinairesaucanada.net/practice-economics/asp).

En février 2019, le **Dr. Henry Ceelen**, président du Comité sur les enjeux nationaux de l’ACVM, a fait une présentation devant le Comité permanent de l’agriculture et de l’agroalimentaire. Le comité menait une étude sur *la perception publique à l’égard du secteur agricole canadien*. Le Dr. Ceelen a affirmé que la profession vétérinaire avait une responsabilité importante en vue d’assurer que la perception publique à l’égard du système agroalimentaire demeure positive en raison du haut niveau de confiance dont jouissent les médecins vétérinaires et du rôle clé de la profession afin d’appuyer les producteurs et l’agriculture animale durable. Il a souligné la pertinence de l’approche *Une seule santé* et de l’engagement de l’ACVM afin d’aider le gouvernement du Canada à répondre à la menace de l’antibiorésistance.

L’ACVM continue de représenter les médecins vétérinaires canadiens dans le domaine du cannabis. L’Association canadienne de médecine cannabinoïde vétérinaire (ACVM) a **exhorté le gouvernement fédéral à apporter deux modifications à la réglementation sur le cannabis** afin de mieux protéger la sécurité et la santé des animaux de compagnie. L’ACVM a récemment soumis une lettre à Santé Canada en réponse à sa consultation ouverte sur le cannabis combustible, les extraits de cannabis et les produits topiques. La lettre indique que les médecins
a warning statement be included on THC-containing products (e.g., “keep out of reach of animals”). “Warning labels need to be changed to explicitly advise Canadians to keep these products out of pets’ reach and regulations need updates to permit veterinarians to consult with pet owners seeking cannabis use as a therapeutic treatment and authorize appropriate products and doses,” said Dr. Terri Chotowetz, CVMA president.

The CVMA created a dedicated web section to keep veterinarians up-to-date on the most recent cannabis news (www.canadianveterinarians.net/cannabis-legalization).

The CVMA sent a letter to Finance Minister Bill Morneau during the federal government’s 2019 pre-budget consultation noting that antimicrobial resistance (AMR) was not top of mind in the upcoming budget. Canada previously committed to take action against AMR at the United Nations and G20. Such action requires a multi-sectoral One Health approach that considers humans, animals, and the environment as interconnected players in the development and spread of AMR. Currently, Canada’s response has been inadequate. The CVMA feels the federal government has an opportunity to reconsider future generations by supporting the Association’s efforts in tackling this important challenge. Read more in the News & Events section of the CVMA website (www.canadianveterinarians.net/news-events/news).

**International relations**

The CVMA ensures Canadian veterinarians’ voices circle the globe. Food safety, drug supply, labor mobility, education, standards, and global trade are some of the international issues that impact the profession, the scope of practice, or practice standards. The CVMA ensures Canadian veterinarians’ involvement in these matters and provides leadership in global discussions.

The CVMA collaborates with various international organizations, including:
- World Organisation for Animal Health (OIE) — Canadian delegation
- World Veterinary Association
- North American Veterinary Medical Education Consortium
- North American Veterinary Leaders
- Commonwealth Veterinary Association
- PANVET
- World Small Animal Veterinary Association
- Pet Nutrition Alliance
- Partners for Healthy Pets
- International Veterinary Officers Council

**Improving Antimicrobial Stewardship in Canada**

The CVMA’s new *Guidelines for Veterinary Antimicrobial Use* provides Canadian veterinarians with world-class advice on decision support for selecting which cases require antimicrobial treatment and recommended treatments. All licensed veterinarians in Canada have full access to the platform until December 1, 2019, after which only active CVMA members will have full access. To access these guidelines, visit the website (www.canadianveterinarians.net/AMU-UAM).

The CVMA National Issues Committee (NIC) reviews and monitors veterinary issues on an ongoing basis. The committee veterinarians respond maintaining frequently to questions of proprietors of animals of company, of elevators of bétail and of other persons to proposals of the benefits therapeutic potential of the use of cannabis with animals for the attenuation of the dilution, the soulagement of the anxiety and the treatment of affections comportementales. L’ACMV a soumis les commentaires suivants (qui avaient d’abord été communiqués par l’ACMV dans une lettre transmise à Santé Canada en janvier 2018) : 1) L’ACMV exhorte vivement le gouvernement à modifier la Partie 14 du Règlement sur l’accès au cannabis à des fins médicales afin de permettre aux médecins vétérinaires de fournir les médicaments nécessaires à leurs patients tout en maintenant une surveillance indépendante sur sa distribution. 2) L’ACMV demande qu’une mise en garde soit apposée sur les produits contenant du THC (p. ex., «Garder hors de la portée des animaux»). «Les étiquettes de mise en garde doivent être modifiées afin d’informer explicitement les Canadiens de garder ces produits hors de la portée des animaux de compagnie et la réglementation doit être mise à jour afin d’autoriser les médecins vétérinaires à consulter avec les propriétaires d’animaux qui cherchent à utiliser du cannabis comme traitement thérapeutique et à leur prescrire des produits et des doses appropriés», a dit la Dʳ Terri Chotowetz, présidente de l’ACMV.

L’ACMV a créé une section dédiée du site Web afin de garder les médecins vétérinaires au courant sur les dernières nouvelles en lien avec le cannabis (www.veterinairesaucanada.net/cannabis-legalization).

L’ACMV a envoyé une lettre au ministre des Finances Bill Morneau durant la consultation prébudgétaire 2019 du gouvernement fédéral en signalant que la résistance aux antimicrobiens ne figuraient pas parmi les grandes priorités du budget à venir. Le Canada s’était déjà engagé à prendre des mesures contre la résistance aux antimicrobiens auprès des Nations Unies et du G20. Une telle action exige une approche multisectorielle Une seule santé qui tient compte des humains, des animaux et de l’environnement comme étant des acteurs interconnectés dans le développement et la propagation de l’antibiorésistance. À l’heure actuelle, la réponse du Canada n’a pas été à la hauteur. L’ACMV estime que le gouvernement fédéral a l’occasion de se rappeler des générations futures en appuyant les efforts de l’Association pour relever cet important défi. On peut lire davantage à ce sujet dans la section des Nouvelles et événements du site Web de l’ACMV (www.veterinairesaucanada.net/news-events/news).

**Relations internationales**

L’ACMV veille à ce que la voix des médecins vétérinaires canadiens fasse le tour du monde. La salubrité des aliments, l’approvisionnement de médicaments, la mobilité de la main-d’œuvre, l’éducation, les normes et le commerce international figurent parmi les enjeux internationaux qui ont un impact sur la profession ainsi que sur la portée et les normes d’exercice. L’ACMV assure la participation des médecins vétérinaires du Canada à l’égard de ces enjeux et elle assure le leadership dans les discussions mondiales.

L’ACMV collabore avec diverses organisations internationales, notamment :
- Organisation mondiale de la santé animale (OIE) – délégation canadienne
Amélioration de l’antibiogouvernance au Canada

Les nouvelles Lignes directrices pour l’utilisation des antimicrobiens vétérinaires de l’ACMV offrent des conseils de calibre mondial aux médecins vétérinaires canadiens pour les aider à prendre des décisions lors du choix des cas qui exigent un traitement antimicrobien et des traitements recommandés. Tous les médecins vétérinaires autorisés au Canada auront plein accès à la plateforme jusqu’au 1er décembre 2019, après quoi seulement les membres actifs de l’ACMV auront accès à la plateforme. Pour accéder à ces lignes directrices, visitez le site Web (www.veterinairesaucanada.net/AMU-UAM).


Le but des énoncés de position de l’ACMV est de servir de ligne directrice en vue d’aborder les enjeux vétérinaires. Ils visent à guider la profession et à éduquer le public à l’égard du point de vue vétérinaire sur divers enjeux. Les positions offrent un point de vue «avant-gardiste» des enjeux en se basant sur ce qui se passe au Canada et ailleurs dans le monde.

Veuillez consulter le site Web de l’ACMV pour lire des énoncés de position sur un vaste éventail de sujets, notamment :

- Vaccination des animaux
- Electroéjaculation des ruminants
- Complementary and Alternative Veterinary Medicine
- Importation of Dogs into Canada
- Extra-Label Drug Use

L’ACMV fournit des mises à jour mensuelles sur nos activités afin de façonner les politiques et les lois nationales qui vous touchent dans notre cyberbulletin «En direct du 339» et dans la section des nouvelles Web (www.veterinairesaucanada.net/news-event/news).

Each year, the Canadian Veterinary Medical Association (CVMA), in partnership with the provincial veterinary medical associations, conducts a Practice Owners Economic Survey. The purpose of this survey is to gather data on revenue, expenses, income, number of current and new clients, fees, and DVM and non-DVM staff compensation.

This survey is graciously supported by the following industry partners:

This report presents the findings of the 2018 CVMA National Practice Owners Economic Survey for companion and mixed/large animal practices and analyzes Canada-wide trends over the past 5 years. View the report on the CVMA website (www.canadianveterinarians.net/practice-economics/business-management).

Also available on the CVMA website (www.veterinairesaucanada.net/practice-economics/national-reports) is the 2019 Report on Veterinarians in Government, Industry and Academe. Every year, the Canadian Veterinary Medical Association (CVMA), in partnership with the Ontario Veterinary Medical Association (OVMA) and the Canadian Animal Health Institute (CAHI), conducts a national survey of Veterinarians Employed in Government, Industry and Academe.

The survey results enable veterinarians working in these fields to compare their earnings, hours and benefits with peers. The survey provides a unique opportunity to gather valuable information, ensuring a successful economic future for these professions.
Is there a due diligence standard for wildlife disease surveillance? A Canadian case study

Craig Stephen, Patrick Zimmer, Michael Lee

Abstract — Due diligence is a concept used to justify investment in wildlife health surveillance to satisfy trading partners and other animal health stakeholders. Canadian literature and legislation were reviewed and key informant interviews were used to determine if a wildlife surveillance due diligence standard existed. Wildlife surveillance is constrained by challenges that necessitate convenience and opportunistic sampling, making it difficult to apply surveillance performance standards from public or domestic animal health. Key informants cited due diligence to justify wildlife health surveillance activities but could not identify a due diligence threshold nor could regulations, international obligations, or the literature. The lack of a due diligence standard puts wildlife health surveillance managers at a disadvantage when trying to show public return on investment or when assessing the adequacy of surveillance efforts. Steps being taken by the Canadian Wildlife Health Cooperative to meet the performance needs of the Pan-Canadian Approach to Wildlife Health are introduced.

Résumé — Est-ce qu’il y un standard de devoir de précaution pour la surveillance des maladies de la faune? Une étude de cas canadienne. Le devoir de précaution est un concept utilisé pour justifier les investissements dans la surveillance de la santé de la faune afin de satisfaire les partenaires commerciaux et les autres parties intéressées en santé animale. La littérature canadienne et la législation ont été passées en revue et des entrevues d’intervenants clés ont été utilisées afin de déterminer si un standard de devoir de précaution en matière de surveillance de la faune existe. La surveillance de la faune est limitée par des défis qui nécessitent un échantillonnage de convenance et opportuniste, rendant difficile la mise en place de standards de performance de surveillance provenant de la santé publique ou de celle des animaux domestiques. Les intervenants clés ont cité le devoir de précaution pour justifier les activités de surveillance de la santé de la faune mais n’ont pu identifier un seuil de devoir de précaution, pas plus que la réglementation, les obligations internationales, ou la littérature. L’absence d’un standard de devoir de précaution met les gestionnaires de la surveillance de la santé de la faune à un désavantage lorsqu’ils tentent de démontrer un retour public de l’investissement ou lors de l’évaluation de la pertinence des efforts de surveillance. Les démarches entreprises par la Coopérative canadienne de la santé de la faune pour atteindre les attentes de performance de la Stratégie pancanadienne pour la santé de la faune sont présentées.

Introduction

As a member of the World Organisation for Animal Health (OIE), Canada is obliged to have a national wildlife disease surveillance system. A national wildlife disease surveillance system also supports the threat detection needs of other international obligations to which Canada is a signatory such as the International Health Regulations, Convention on Biological Diversity, and Rio Declaration. Domestic responsibilities through the Health of Animals Act and the North American Free Trade Agreement have further substantiated investment in a defensible and reliable surveillance system. In addition to these obligations, the demands for wildlife health surveillance are growing with climate change, urbanization, and natural resource development. Wildlife surveillance outputs are increasingly being turned to for forecasting and early warning of emerging diseases threatening public health and agriculture (1). Disease control is a growing concern for conservationists because of mounting evidence that pathogens may be a significant threat...
to endangered species, especially when disease interacts with other threats (2). Emerging understanding of the role of natural capital, including wildlife, in climate change resilience, especially in rural, remote, and indigenous populations, highlights the need to have evidence-informed wildlife health management decisions (3).

Despite these growing demands there is little guidance on the necessary performance standards of a national wildlife health surveillance program (4). The lack of performance expectations is not without consequences. Canada’s interagency wild-bird avian influenza surveillance plan, for example, aims to provide early warning for public health and agriculture but criteria such as, how early, the necessary level of confidence in prevalence estimates, or the degree of geographic and species representativeness are left undefined. This results in variation in the timeliness, sample sizes, and geographic representation of samples collected from different provinces and territories. A national wildlife surveillance program should generate knowledge to improve the effectiveness of policies and programs and inform management decisions (3).

The accuracy, efficiency, and comparability of surveillance depend upon the adoption of consistent standards (6). However, the challenges in undertaking standardized surveillance in wildlife are well-known. Unrepresentative access to the populations at risk, biased case ascertainment, the lack of properly validated diagnostic tests, inaccurate or missing denominator data, lack of standard case definitions and diagnostic protocols, regulatory restrictions, ecological complexities, and fiscal constraints are but some of the factors that prevent the direct application of standards from domestic animals or public health to wildlife surveillance (7–9). What has yet to be established in the literature are the characteristics of wildlife disease surveillance needed to exercise due diligence in cases of regulatory or civil liability, in supporting claims of clean, safe, and healthy environments, and in ensuring fair and secure marketplace access.

Due diligence is a multi-dimensional social construct used in both the legal and business fields to ensure that an appropriate level of care is taken in the decision-making process. It is used to assess whether an investigation, investment, or person meets a certain standard of care or attention that one would reasonably be expected to take in a given situation to acquire reliable information and facts that are most relevant to making a decision or taking an action under realistic circumstances. In this paper we ask, is there a due diligence performance standard for wildlife health surveillance that can be used to assess and design surveillance programs under the typical circumstances faced when trying to access, test, and assess the disease status of free-ranging wild animals?

Due diligence permeates conversations about doing enough to satisfy trading partners or other stakeholders interested in animal health. Due diligence concepts inform Canadian animal health regulations (11,12), standards for environmental protection and means to assess environmental harm (13,14). In this paper, we investigated whether a due diligence standard was present in peer-reviewed literature or Canadian federal and provincial legislation governing wildlife surveillance. We then evaluated opinions of program managers and directors to determine if there was a shared vision of wildlife surveillance due diligence. The motivation for this project was to determine if standards could be identified to support the goals of nationally harmonized and equivalent surveillance programs across Canada as well as to augment the evidence base to support claims that Canada is adequately addressing its obligations for wildlife disease surveillance.

Materials and methods

Literature review

A systematic literature review was conducted using the guiding question, “Is there an existing due diligence standard for wildlife health surveillance?” Initial inclusion criteria were any peer-reviewed literature that used the term “due diligence” in relation to a surveillance system, restricting the search to papers that dealt with an ongoing surveillance system, as opposed to a survey or one-time research study. This was expanded to include any paper that used a broader range of keywords associated with “due diligence.”

Key words used to search for the concept of due diligence included:

- “due diligence” OR
- “appropriate attention” OR
- “appropriate care” OR
- “performance expectation” OR
- “standard of care” OR
- “standard of practice” OR
- “common practice” OR
- “standard practice” OR
- “threshold of care” OR
- “performance expectation” OR
- “appropriate attention” OR
- “reasonable care” OR
- “policy obligation” OR
- “reasonable care” OR
- “duty of care.”

Key words used to search for the concept of surveillance included:

- “surveillance OR monitor” OR
- “systematic collection” OR
- “ongoing collection” OR
- “systematic record” OR
- “ongoing record” OR
- “continuous record” OR
- “systematic sample” OR
- “ongoing sample” OR
- “continuous sample” OR
- “track” OR
- “systematic data” OR
- “ongoing data” OR
- “continuous data” OR
- “systematic assess” OR
- “ongoing assess” OR
- “continuous assess.”
Key words used to search for the concept wildlife included:
- “wild*” OR
- “free ranging” OR
- “fish*”.

Groups of keywords were combined using the Boolean operator “AND,” while keywords pertaining to the same concept were combined using “OR.”

Peer-reviewed and gray literature were obtained using 5 databases: Web of Science Core Collection, Zoological Record, Medline, Ebscohost, and Aquatic Sciences and Fisheries Abstracts, searching English language papers. No restrictions were put on publication date. Abstracts and full texts were screened together to determine whether papers met the inclusion criteria. The search was conducted in January and February 2017.

**Policy review**

A legislative review was conducted to find regulatory standards and/or performance thresholds for wildlife disease surveillance due diligence in Canada. Federal legislation and regulations on record in 2018 were found by searching Canada’s Department of Justice’s “Justice Laws website,” the online source for Canada’s consolidated Acts and Regulations (15). Provincial and Territorial legislation and regulations were found by searching respective Ministry of Justice and the “publications” section of provincial/territorial public websites. We also used the search tool on the websites of provincial and federal agencies responsible for wildlife surveillance to assemble applicable policies and regulations, using the titles of the legislation and regulations found on the Justice Laws website and applicable provincial/territorial websites as search terms. Using the search terms “due diligence” and “wildlife” or “animal” and “management” or “surveillance” and “regulations” or “policy” or “standards” in Google, we sought additional relevant international law and reports from international organizations.

Websites of the Canadian Food Inspection Agency, Public Health Agency of Canada, Parks Canada Agency, and Environment and Climate Change Canada were searched for agency performance reports, strategic program plans and priorities, and guiding documents using key words of “standard,” “due diligence,” “evaluation,” “indicator,” and “performance” along with concepts derived from overarching documents reflecting general government priorities for the Federal Government of Canada, including those from the Treasury Board of Canada. Documents were searched to establish whether performance indicators and results were defined for wildlife health programs within the Federal government.

**Key informant interviews**

The purpose of key informant interviews is to collect qualitative information from people who have firsthand knowledge about the community. This information was used to clarify other research findings. We used the community of practice of the Canadian Wildlife Health Cooperative (CWHC) to identify people who have the necessary firsthand knowledge, based on their job positions, to comment on how due diligence is applied in national wildlife health surveillance in Canada. The CWHC has been operating in Canada since 1992 and serves to address many of Canada’s national wildlife health obligations. The CWHC has a core group of 6 regional centers and 1 central office distributed across all 5 Canadian veterinary colleges and the British Columbia Animal Health Centre. The CWHC community of practice includes management agencies that finance and/or require CWHC assistance to diagnose, assess and report on wildlife diseases. (For more information see www.cwhc-rcsf.ca).

Interviewees were selected based on their job titles as representative of a Canadian federal or provincial agency or government entity responsible for wildlife health and/or their roles as a practitioner in the field. Interviewees were provided with a summary of the project and the results of the literature and policy reviews to ensure key documents were not missed. Open-ended discussion was used to ground truth the findings of the literature and policy review and to determine the interviewees’ familiarity with due diligence concepts such as a standard and threshold of care/performance and the use of such in their programs. Subsequent discussion focused on their due diligence expectations and goals in designing and carrying out wildlife surveillance programs. Individuals were asked whether their organization had defined standards or common practices in this regard. Attributes of program monitoring and surveillance goals relevant to due diligence were sought. Documentation supporting those expectations was requested from the interviewees.

**Results**

**Literature review**

The search yielded 286 papers, only 4 of which concerned data from surveillance programs and discussed potential guidelines for surveillance. However, of these 4, none provided performance standards to determine due diligence thresholds for wildlife disease monitoring or surveillance.

This review does not preclude that wildlife surveillance programs may have general design expectations; however, there was relatively little literature on wildlife surveillance compared to public and domestic animal health programs. Excluding wildlife-related terms from our search and focusing on whether the term due diligence was a part of the vernacular of general surveillance yielded 167 additional publications, 7 of which included the term due diligence. Extracted papers provided some rationale or advice on performing surveillance/monitoring in the specific area of the research or for a defined question rather than surveillance program performance in general. Most defaulted to standard epidemiological sample size calculations developed for domestic species or public health purposes as a design standard or to OIE standards, which do not provide thresholds for acceptable performance. When due diligence was specifically mentioned, it was used in general or aspirational terms. For example, Kelly et al (16), stated that a surveillance system had a “due diligence nature.” However, the authors suggested that the program itself constituted due diligence by collecting baseline data so that subsequent changes could be detected, rather than outlining specific program features that met a due diligence standard.
A previous review of recent fish and wildlife disease publications found 35% of the 469 papers focused on pathogen or parasite detections, surveys, or surveillance, with surveillance papers often limited to targeted and time limited surveys (17). Challenges and limitations in meeting epidemiological expectations were noted (18–20) including problems accessing and randomly sampling sufficient numbers to represent a population at risk, inadequate knowledge of the performance characteristics of diagnostic tests for wildlife, and lack of standards for surveillance data management. Cameron (21) noted “wildlife surveillance techniques are necessarily very different from those for domestic animal surveillance” and recognized the need for creative surveillance designed for a particular context in order to overcome such constraints. The Food and Agriculture Organization (22) proclaimed a traditional lack of highly effective wildlife surveillance programs without providing criteria for effectiveness.

**Policy review**

No legislation was found specific to wildlife disease surveillance. This is consistent with past reviews that found few regulations addressing wildlife health in general (23). However, animal health, human health, and trade regulations, including the Health of Animals Act, provincial and territorial wildlife acts, the Migratory Birds Convention Act, and the Public Health Agency of Canada Act considered or included elements that could be inclusive of wildlife. Most wildlife specific legislation was geared toward the doctrine of public trust, wherein governments manage wildlife in sustainable numbers to bequeath licensed property rights on individual hunters, trappers, and fishers. Canada’s constitution enshrines an obligation to ensure access to safe, sustainable wildlife for First Nations and Inuit peoples. Together, this legislation created a regulatory framework, that, although fragmented across jurisdictions, established domestic obligations to have a wildlife disease surveillance system in Canada. The fragmentation of tools, capacity, and regulations was noted in the OIE assessment of the performance of Canada’s veterinary services (24).

No legislation or policy provided thresholds that could indicate action signals for wildlife health surveillance (apart from requirements to report reportable diseases) or serve as performance standards. No agency strategic or guiding documents included standards of performance for wildlife health surveillance. Criteria or attributes of domestic animals or public health surveillance could not be directly extrapolated to wildlife due to fundamental differences in the populations of concern as noted. While the simplicity, flexibility, acceptability, stability, and data quality can be assessed using structural and functional attributes of a wildlife health surveillance system, deficits in knowledge of the ecology of populations at risk, limits in the ability to determine the true disease statuses of wildlife populations and diagnostic test limitations preclude assessment of the sensitivity, positive predictive value, representativeness, timeliness, and data validity.

The OIE considers surveillance of wildlife diseases to be “equally as important as surveillance and control of diseases in domestic animals” (25) and deems it an essential component of reporting animal disease threats accurately. Chapter 2 of the OIE Tool for the Evaluation of Performance of Veterinary Services notes that Veterinary Services must have the authority and capability “to determine, verify and report on the sanitary status of the animal populations, including wildlife, under their mandate” (26). The OIE expects its members to support surveillance data with environmental information concerning the epidemiology of the disease, including environmental and wildlife migration data, and strongly encourages its members to have wildlife disease monitoring and notification systems in place. Despite these expectations, there is little evidence-based guidance or consensus on the necessary competencies and critical functions of a national wildlife health program (4). The OIE Terrestrial and Aquatic Codes provide basic principles for animal disease surveillance, but they are focused largely on surveillance of trade relevant infectious diseases. Surveillance needs for conservation, environmental or other purposes generally fall outside existing guidance documents (4). The OIE acknowledges the challenge of extrapolating veterinary epidemiological standards for surveillance to wildlife (27). The OIE guiding documents note that there are unique challenges in achieving its goals for wildlife for all circumstances but does not suggest minimum performance standards (28).

**Key informant interviews**

Twelve key informants were interviewed. All reported that wildlife surveillance programs within their regulatory realm were conducted opportunistically and common standards were not recognized. Interviewees agreed with the notion that many government activities, including those relating to wildlife health surveillance programs, are conducted based on due diligence. A failure to consider known wildlife disease risks in decision-making was seen as an impediment to meeting due diligence expectations and avoiding negative repercussions such as failure to meet domestic and international obligations influencing trade restrictions or other liabilities. There was broad agreement that investment in wildlife disease surveillance can help establish that an agency acted reasonably but the degree of investment was undefined. No interviewee could provide specific documentation of evidence-based standards for the design of a wildlife disease surveillance program that ensured their agency’s obligations can be met nor did they have indicators for meeting a due diligence threshold. Examples of epidemiological design considerations, such as sample size calculations and approaches to sampling populations, were available for a small number of targeted surveillance efforts.

**Discussion**

Canadian legislative obligations and mandates drive government authorities to take reasonable steps to avoid or mitigate negative repercussions associated with their wildlife disease surveillance actions or inactions, but criteria to establish a reasonable duty of care were not found. The challenge of creating, implementing, and assessing wildlife surveillance programs that will meet regulatory obligations and social expectations for due diligence is enormous when agreed-to standards to assess program are not available or not tailored to the practical reality of wildlife surveillance.
Table 1. Aspirational health intelligence goals and requirements of the 2018 Pan-Canadian Approach to Wildlife Health.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Requirements to meet goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationally equitable diagnostic and investigative capacity to track trends in wildlife mortality and disease and assess their significance for conservation, public health, and economic activities.</td>
<td>Functional regional centers of expertise distributed throughout Canada’s distinct regions.</td>
</tr>
<tr>
<td></td>
<td>Harmonized, equivalent surveillance capacity and approaches across jurisdictions.</td>
</tr>
<tr>
<td></td>
<td>Cooperative agreements that maximize economic efficiency in program delivery.</td>
</tr>
<tr>
<td>Coordinated analytical capacity to assess, interpret, and communicate surveillance outputs.</td>
<td>Sustainable, adaptable pan-Canadian information management that meets evolving needs and documents wildlife health status.</td>
</tr>
<tr>
<td></td>
<td>Resources for rapid assessment and communication of health information.</td>
</tr>
<tr>
<td></td>
<td>Shared information on the determinants of wild animal vulnerability in advance of harm.</td>
</tr>
<tr>
<td>A pan-Canadian perspective of the state of wildlife health that shares policy-relevant knowledge in a timely fashion.</td>
<td>Mechanisms to integrate, summarize, and communicate the state of wildlife health to identify emerging policy needs.</td>
</tr>
<tr>
<td></td>
<td>Mechanisms for sharing knowledge and capacities between federal, provincial, territorial, and Indigenous governments to strengthen information exchange.</td>
</tr>
<tr>
<td></td>
<td>Identify and address policy gaps that allow significant wildlife health issues to go unmet owing to narrow interpretation of jurisdictional mandates.</td>
</tr>
</tbody>
</table>

There are 3 approaches that could be used to develop surveillance program performance expectations: i) epidemiological standards; ii) conformation with national and international requirements; and iii) due diligence. Logistic, biological, and fiscal constraints complicate direct application of epidemiological and national or international standards for surveillance in humans or domestic animals to free-ranging wildlife. Although public health and domestic animal surveillance guidelines can frame key wildlife surveillance design considerations, they do not provide thresholds that can be adapted to determine when a wildlife surveillance system has met obligations or expectations under the widely varying circumstances and species subject to surveillance. National and international requirements tend to not be prescriptive, but rather provide higher level guidance on program attributes and few are specific to wildlife. Due diligence was a widely recognized standard among wildlife surveillance managers interviewed for this project and has become a default justification for many Canadian wildlife health programs.

Due diligence is best characterized as a spectrum, wherein reasonable steps are expected to be taken in the given circumstances, without the expectation that all possible or imaginable steps be taken (29). Reasonableness is measured by asking, did the average entity in the same circumstances take the same actions or make similar choices? It could be said that Canada’s wildlife health surveillance system is reasonable as evidenced by the generally favorable review of wildlife health capacity in the 2017 OIE assessment of the performance of Canada’s veterinary services (24). However, the outcome of this OIE assessment still does not explicitly help managers determine how best to make wildlife surveillance investments to meet their duty of care. Furthermore, OIE standards focus primarily on surveillance for a subset of infectious diseases relevant to international trade and not to the many other wildlife health issues including trauma, pollution, or impacts on their determinants of health.

In the absence of an established due diligence standard, challenges in extrapolating other surveillance standards to wildlife, and insufficient detail in international guidelines to information program planning, the CWHC, which serves as Canada’s national wildlife health surveillance system, was left with the challenge of developing performance standards de novo. Performance standards were desired because they can be used to establish organizational targets and goals to improve practices and to support claims that CWHC practices are valid and reliable means of meeting the purpose and objectives of the organization. Performance standards can be used to:

i) assess the capacity of a program to perform its essential services;
ii) identify critical gaps in performance;
iii) inform partners of the program’s role and the infrastructure and investment necessary to fulfill that role;
iv) track and measure accomplishment; and
v) justify continued or expanded services (30).

Table 2. Preliminary Canadian Wildlife Health Cooperative 2018 performance standards to meet health intelligence goals of the Pan-Canadian Approach to Wildlife Health.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health intelligence information reflects Canada’s geographic, ecological, and species diversity.</td>
<td>Spatial, species and seasonal patterns of health intelligence and diagnostic sample submission.</td>
</tr>
<tr>
<td>Surveillance results are available in a timely fashion.</td>
<td>Timeliness of report generation, information input, and results sharing.</td>
</tr>
<tr>
<td>Information is shared quickly and accurately with those who need to know.</td>
<td>Frequency and reach of technical reporting, alerts, and social media reports.</td>
</tr>
<tr>
<td>Access to and incorporation of contextual information to turn surveillance information into knowledge.</td>
<td>Access and use of contextual information to supplement surveillance outputs.</td>
</tr>
<tr>
<td>Expertise is available to partners and supports decision-making.</td>
<td>Diversity, stability, and growth of the expertise within the CWHC community of practice.</td>
</tr>
<tr>
<td>Contribute to identifying priorities, options for action and strategies to manage wildlife health.</td>
<td>Requests for assistance and feedback on impacts of information products.</td>
</tr>
<tr>
<td>Investment meets changing and growing needs.</td>
<td>Financial status, budget sustainability, and resources meet funders needs for service.</td>
</tr>
</tbody>
</table>
Wildlife health surveillance managers are in the paradoxical situation wherein the chronic deficit in program funds (5) prevents investment in efforts to develop and validate standards to show program impact, but without evidence of impact, additional funds are not forthcoming.

The first step in developing performance standards is to engage stakeholders in defining the goals and objectives of the program, because due diligence is ultimately a social standard that reflects expectations. The CWHC championed efforts that engaged stakeholders from within and out of government to more explicitly define a cross-country standard for wildlife health programs. The result was the Pan-Canadian Approach to Wildlife Health; a strategic document approved in 2018 by provincial, territorial, and federal Ministers responsible for conservation and biodiversity. The mission of the Approach is to ensure strong, consistent stewardship to protect wildlife health and the values that wildlife health bring Canadians by promoting, sustaining, coordinating, and integrating infrastructure and expertise in Canada. Two goals of the Approach relevant to surveillance are i) to strengthen Canada's capacity to identify and reduce wildlife health threats that put conservation, public health, or economic and cultural opportunities at risk; and ii) to develop, implement, and assess programs and policies to reduce disparities and differences in wildlife health capacity across the country. Desired outcomes include but are not limited to i) promoting a pan-Canadian network of information and capacity sharing to guide investment and improve situational awareness; and ii) improving performance outcomes by creating greater uniformity and consistency in wildlife health across Canada. No performance or due diligence standards were provided for these activities and outcomes, preventing ongoing program assessment and improvement.

Health intelligence is a pillar of the Pan-Canadian Approach. Health intelligence is the process of generating, collecting, and analyzing a variety of information to foster collaboration and consultation to protect, promote, and support decisions affecting wildlife health and its associated social values. Generating and linking information to document the wildlife health situation in Canada, including signals of emerging risks and changes in vulnerability, is a cornerstone of health intelligence. In 2018, the CWHC began the process of creating its own performance standards in the absence of due diligence standards for health intelligence expectations of the Pan-Canadian Approach (Tables 1, 2). The CWHC will undertake a 5-year assessment of its proposed performance standards to establish quantitative or qualitative thresholds for acceptable performance. This assessment will include determining current performance levels and sharing these with stakeholders and funders to ascertain their fit for need.

Performance standards are an important aspect of demonstrating the successes and challenges of a wildlife health program. Although there exist epidemiological principles, international and national guidance, and an expectation for due diligence, there is no clear set of guidelines in literature or regulations to help wildlife health surveillance programs transparently and explicitly determine if their level of performance, infrastructure, or activities provide evidence of the exercise of due diligence. Developing wildlife health surveillance standards will require cross-sectoral negotiations as the needs and interests of wildlife cross agriculture, conservation and public health. Although the health intelligence expectations of the Pan-Canadian Approach to Wildlife Health do not establish a due diligence standard, they do provide an opportunity for organizations like the CWHC to begin the process of creating and assessing performance standards that may later influence social expectations for wildlife surveillance.

References
Chronic Pain in Small Animal Medicine


As the title implies, Chronic Pain in Small Animal Medicine explores the unique requirements of persistent pain that resists otherwise effective treatment protocols. In this first edition, the author ventures beyond the typically formulaic procedures seen in similar texts by providing current considerations regarding why and how to treat. The focus of this book is to offer practical guidance to veterinary professionals who have traditionally been taught to assess pain by inflexible criteria or quickly access pertinent information as needed. The occasional human examples could be seen as unnecessary but they offer interest and variety that is often excluded from comparable veterinary resources. Colored illustrations are generously supplied throughout and are an excellent accompaniment to the text, improving the educational experience for all types of learners. This book also offers 3 case reports that provide real-world examples of complex treatment applications. While these cases are useful, this unit would be of greater merit if it contained a larger number of diverse reports.

The author delivers a book that could be beneficial to veterinary students, practicing veterinarians, and veterinary technicians. Taking adequate time to describe the long-standing facts as well as the latest evidence allows readers to either build their chronic pain knowledge from scratch or supplement what they know with the modern understanding of the subject. Chronic pain is an inevitable part of practicing veterinary medicine and, as such, a well-rounded approach that considers both the established protocols and the individual needs of patients is imperative for effective treatment. This book is a worthwhile resource for anyone looking to remain up-to-date and progress their management of chronic pain in small animals.

Reviewed by Lisa Gibson, HBSc, DVM, 25 McCarthy Street, Orangeville, Ontario L9W 4T8.
Investigating novel anatomical predictors for endotracheal tube selection in dogs

Jesse Tong, Daniel S.J. Pang

Abstract — The selection of an appropriate endotracheal tube (ET) for orotracheal intubation in dogs is based largely on experience, with no well-established guidelines available. This study examined relationships between several novel and published methods for selecting endotracheal tubes in a heterogeneous population of 79 adult dogs. The following measurements were included: left and right nare width, nasal septum width, sum of left and right nares width plus the nasal septum width, total nose width and height, tracheal width, metacarpal and digital footpad width and height, and body mass. Using the Bland and Altman ratio method, the calculation of Cube Root Mass provided the greatest accuracy and precision, predicting actual ET size use within 3 to 4 tube sizes. A simpler to calculate, but less precise method was Width of Nose/3. The majority of published methods for estimating ET size performed poorly, including nasal septum and tracheal width.

Introduction

Orottracheal intubation is a fundamental technique in the provision of general anesthesia. Selection and placement of the correct size of endotracheal tube (ET) depends on the experience of the anesthetist, with evidence from this and other technical skills showing that the learning process in achieving proficiency can vary considerably between individuals (1,2).

The ideal size of the ET is the largest that will pass through the larynx into the trachea without excessive force. According to the Hagen-Poiseuille equation, as the ET radius is halved, airflow is decreased 16-fold (3). Additionally, if an ET is too small it may not be possible to achieve an adequate airway seal, risking workplace pollution and exposure of personnel to inhalational anesthetics, failing to protect the patient from aspiration of...
regurgitated material or fluids introduced into the pharynx during a procedure, and limiting the ability to provide positive pressure ventilation.

Few published guidelines exist for the selection of ETs for orotracheal intubation in dogs and no single method has been widely adopted (4,5). Avki et al (4), in a study of Dalmatian puppies (n = 29, < 6 mo of age, 1.2 to 12.7 kg), described successful methods of predicting ET size based on body mass and the length of the fourth digital pad. Lish et al (5), in a cadaver study (n = 28 mixed breed dogs, 6 mo to 5 y old, 5.4 kg to 29.3 kg) assessing digital palpation of the trachea and width of the nasal septum against ET diameter, found the width of the nasal septum to predict both outer (OD) and inner (ID) ET diameters, and that palpating the external borders of the trachea was sufficient to predict the correct size of ET in 46% of dogs. The results of these studies require testing in live dogs (5) and a heterogeneous population (different breeds, ages, body masses) (4). It has also been suggested that tracheal diameter is proportional to the cube root of body mass in various newborn mammals (mouse, rat, guinea pig, cat, rabbit, dog, pig, human, dolphin; < 10 d old) and adult dogs (5,6).

We hypothesized that an acceptable guide for selecting ET for orotracheal intubation in dogs could be developed for use by novice anesthetists. Acceptability was defined as a formula that would suggest a range of ET sizes within 1 mm of the actual size used that would also be simple to calculate. Our objective was to collect phenotypic data from a heterogenous population of dogs scheduled for general anesthesia. These data would include previously published and novel anatomical measurements. A secondary objective was to evaluate and compare the 5 published methods for selecting ETs (4,5).

Materials and methods
The study was conducted at the Western Veterinary Specialist and Emergency Centre (Calgary, Alberta) with institutional animal care and use committee approval (AC15-0091). A requirement for informed client consent was waived by the institutional animal care and use committee approval (AC15-0091). A total of 60 dogs were included in the study. All dogs were scheduled for general anesthesia and were selected based on the following pre-determined inclusion criteria: age 6 mo to 5 y; weight 1 to 20 kg (median 10 and 33.8 kg); body condition score 1 to 9 (median 3.0 and 3.8); American Society of Anesthesiologists physical classification 1 to 4 (median 2.6 and 2.8); and absence of respiratory distress on pre-operative evaluation. Any dog scheduled for general anesthesia could be enrolled. The study was conducted at the Western Veterinary Specialist and Emergency Centre (Calgary, Alberta) with institutional animal care and use committee approval (AC15-0091). A total of 60 dogs were included in the study. All dogs were scheduled for general anesthesia and were selected based on the following pre-determined inclusion criteria: age 6 mo to 5 y; weight 1 to 20 kg (median 10 and 33.8 kg); body condition score 1 to 9 (median 3.0 and 3.8); American Society of Anesthesiologists physical classification 1 to 4 (median 2.6 and 2.8); and absence of respiratory distress on pre-operative evaluation. Any dog scheduled for general anesthesia could be enrolled.

Table 1. Demographic data of dogs included in the study.

<table>
<thead>
<tr>
<th>Breed</th>
<th>Median age (years) (range)</th>
<th>Gender</th>
<th>Median body mass (kg) (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrier &amp; terrier-cross</td>
<td>6 (1 to 11)</td>
<td>Male (neutered, n = 10) Female (spayed, n = 4) Male (intact, n = 1)</td>
<td>8.8 (2.9 to 36.2)</td>
</tr>
<tr>
<td>Malamute &amp; husky</td>
<td>5.5 (4 to 8)</td>
<td>Female (spayed, n = 1) Male (neutered, n = 3)</td>
<td>33.2 (29.2 to 44.6)</td>
</tr>
<tr>
<td>Spaniel &amp; spaniel-cross</td>
<td>9 (15 to 11)</td>
<td>Female (spayed, n = 2) Male intact (n = 1)</td>
<td>14 (9.3 to 21.8)</td>
</tr>
<tr>
<td>Beagle &amp; beagle-cross</td>
<td>6.5 (6 to 7)</td>
<td>Female (spayed, n = 2)</td>
<td>(11 to 20.8)</td>
</tr>
<tr>
<td>Sheepdogs</td>
<td>5.5 (1 and 10)</td>
<td>Male (intact, n = 1) Male (neutered, n = 1)</td>
<td>(10 and 33.8)</td>
</tr>
<tr>
<td>Bernese mountain dog, Great Pyrenees, Great Dane</td>
<td>4 (1 to 10)</td>
<td>Male (intact, n = 1) Male (neutered, n = 3) Female (spayed, n = 2)</td>
<td>45.0 (35.2 to 53.0)</td>
</tr>
<tr>
<td>Bichon frise, shih tzu, lhasa apso, -crosses</td>
<td>8 (5 to 12)</td>
<td>Male (neutered, n = 3) Female (spayed, n = 2)</td>
<td>7.9 (7.1 to 9.2)</td>
</tr>
<tr>
<td>Chihuahua, miniature pinscher, Daschund &amp; Daschund-cross</td>
<td>6.5 (3, 10)</td>
<td>Male (intact, n = 1) Male (neutered, n = 2) Female (spayed, n = 1)</td>
<td>8.8 (2.6 to 9.9)</td>
</tr>
<tr>
<td>Dogue de Bordeux, Mastiff, Newfoundland, Rottweiler</td>
<td>4 (1 to 9)</td>
<td>Male (intact, n = 2) Male (neutered, n = 3) Female (spayed, n = 2)</td>
<td>53.0 (37.2 to 68.8)</td>
</tr>
<tr>
<td>Retriever, Labrador, pointer, Standard poodle, vizsla &amp; crosses</td>
<td>7 (1 to 14)</td>
<td>Male (intact, n = 1) Male (neutered, n = 11) Female (spayed, n = 9) Female intact (n = 1)</td>
<td>31.3 (15.3 to 48.0)</td>
</tr>
<tr>
<td>German/Belgian shepherd, Rhodesian ridgeback &amp; crosses</td>
<td>9.5 (1 to 12)</td>
<td>Female (intact, n = 2) Female (spayed, n = 4) Male (neutered, n = 2)</td>
<td>31.8 (21.6 to 42.6)</td>
</tr>
<tr>
<td>Greyhound</td>
<td>7</td>
<td>Male (intact, n = 1)</td>
<td>31.6</td>
</tr>
</tbody>
</table>
by 1 of 2 experienced anesthesia technicians (15 y of experience working exclusively in anesthesia and 5 y of exclusive experience plus VTS anesthesia qualification, respectively).

All measurements were taken with digital Vernier calipers after induction of general anesthesia and orotracheal intubation were completed. The following distances were measured or calculated:

i) width, at widest point of left and right nare;
ii) nasal septum width at its narrowest point;
iii) sum of left and right nares width plus the nasal septum width;
iv) width of nose — the outer diameter at the widest point; and
v) height of nose; across the longest distance from the top of the nose to the base.

Shortly after beginning the study, metacarpal and digital foot-pads (height and width) and external tracheal diameter (immediately caudal to the larynx) were included in the measurements to allow evaluation of published formulae using the fourth digital pad

\[
\frac{[\text{pad height in cm} \times 6] - 2}{[\text{kg} \times 6/10} + 2.5\] (4,5).

The inner (ID) and outer diameters (OD) of ETs placed were recorded. The ID was that supplied by the tube manufacturer while the OD was measured with calipers at the midpoint of the ET.

In addition to these measurements, the following calculations were evaluated: width of nose divided by 3 (WN/3), nares width divided by 2, the average of WN/3 and nares width divided by 2, and the cube root of body mass (Cube Root Mass). Relationships between anatomical dimensions or formulae and ET size were explored with the Bland and Altman method, plotting the difference versus the average of 2 methods (8). Resulting plots were visually assessed for the shape of data distribution and where distribution deviated substantially from horizontal, indicating a variable relationship between measures, data were transformed by calculating the ratio (ratio versus average of 2 methods) (9). Comparisons were made using both ET ID and OD. The bias and limits of agreement produced by the Bland and Altman method were used to make a semi-objective assessment of accuracy (closeness of the bias to the actual ET placed) and variability (closeness of limits of agreement to the estimate provided by the bias). Data were analyzed and plotted with commercial software (GraphPad Prism v6.01; GraphPad Software, La Jolla, California, USA). Data supporting the results and supplemental data are available in an electronic repository: https://doi.org/10.7910/DVN/F4AQI0

Results

Measurements were recorded for 79 dogs (Table 1), except for metacarpal pad height (n = 78) and width (n = 74), digital pad height and width (n = 51), and tracheal diameter (n = 29).

Of the methods evaluated for predicting ET size, Cube Root Mass provided the most accurate prediction of ID and OD ET size when the Bland and Altman ratio method was applied (Figure 1, Table 2). This gave a smaller bias and narrower limits of agreement than when applying the difference method, which revealed a proportional difference between the variables (Figure 1a, Table 2). Using the ratio method, predicting ID or OD ET size is: cube root mass/bias, with limits of agreement of cube root mass/upper or lower limit.

The WN/3 calculation (using ET ID) resulted in a similar bias to that of Cube Root Mass, but had larger limits of agreement, so that selecting ETs 1 mm either side of the bias would correctly predict ET size in 63% of dogs (Figure 2, Table 2). Of the methods evaluated, this provided the best predictive ability using the difference method (Table 2, Supplementary data). Using this method, the calculation for predicting ET size is: WN/3 plus bias, with limits of agreement of WN/3 plus upper or lower limit. Using ET OD for the WN/3 calculation generated a non-horizontal distribution of data and the application of the ratio Bland and Altman method yielded a larger bias than the ET ID calculation (Supplementary data).

The published formula based on the length of the fourth digital pad

\[
\frac{[\text{pad height in cm} \times 6] - 2}{[\text{kg} \times 6/10} + 2.5\] (4,5)
Table 2. Bland and Altman (bias and 95% limits of agreement) comparing anatomical measurements to the endotracheal tube (ET) inner diameter (ID) and outside diameter (OD) (orotracheal intubation).

<table>
<thead>
<tr>
<th>Item</th>
<th>Bias</th>
<th>Standard deviation of bias</th>
<th>95% Limits of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cube root mass (ID)</td>
<td>−8.26</td>
<td>2.11</td>
<td>−12.40 to −4.12</td>
</tr>
<tr>
<td>Cube root mass (OD)</td>
<td>0.26</td>
<td>0.02</td>
<td>0.22 to 0.31</td>
</tr>
<tr>
<td>Cube root mass (OD)</td>
<td>−12.74</td>
<td>3.34</td>
<td>−19.29 to −6.19</td>
</tr>
<tr>
<td>Width of nose/3 (ID)</td>
<td>0.19</td>
<td>0.02</td>
<td>0.15 to 0.22</td>
</tr>
<tr>
<td>Width of nose/3 (OD)</td>
<td>0.31</td>
<td>1.2</td>
<td>−2.03 to 2.65</td>
</tr>
<tr>
<td>[(pad height in cm × 6 − 2)] (OD)</td>
<td>0.74</td>
<td>0.08</td>
<td>0.59 to 0.89</td>
</tr>
<tr>
<td>[(pad height in cm × 6 − 2)] (ID)</td>
<td>−3.62</td>
<td>2.33</td>
<td>−8.18 to 0.94</td>
</tr>
<tr>
<td>Tracheal width (ID)</td>
<td>0.89</td>
<td>2.47</td>
<td>−3.95 to 5.74</td>
</tr>
<tr>
<td>Tracheal width (ID)</td>
<td>12.48</td>
<td>2.91</td>
<td>6.78 to 18.19</td>
</tr>
<tr>
<td>Tracheal width (OD)</td>
<td>2.05</td>
<td>2.05</td>
<td>1.61 to 2.50</td>
</tr>
<tr>
<td>Tracheal width (OD)</td>
<td>7.55</td>
<td>2.39</td>
<td>2.86 to 12.24</td>
</tr>
<tr>
<td>Tracheal width (OD)</td>
<td>1.46</td>
<td>0.16</td>
<td>1.15 to 1.78</td>
</tr>
<tr>
<td>Nasal septum width (ID)</td>
<td>−2.56</td>
<td>1.67</td>
<td>−5.84 to 0.71</td>
</tr>
<tr>
<td>Nasal septum width (ID)</td>
<td>0.79</td>
<td>0.12</td>
<td>0.56 to 1.01</td>
</tr>
<tr>
<td>Nasal septum width (OD)</td>
<td>−7.04</td>
<td>2.72</td>
<td>−12.37 to −1.72</td>
</tr>
<tr>
<td>Nasal septum width (OD)</td>
<td>0.56</td>
<td>0.09</td>
<td>0.39 to 0.74</td>
</tr>
<tr>
<td>[(kg × 6/10) + 2.5] (ID)</td>
<td>8.11</td>
<td>6.91</td>
<td>−5.44 to 21.65</td>
</tr>
<tr>
<td>[(kg × 6/10) + 2.5] (ID)</td>
<td>1.63</td>
<td>0.51</td>
<td>0.63 to 2.64</td>
</tr>
</tbody>
</table>

* Standard Bland and Altman plot with mean difference between methods.
* Bland and Altman plot using ratio versus average of different methods.
* Formulas presented by Avki et al (4) for the prediction of ET size based on body mass and height of the 4th digital pad.

Figure 2. Bland and Altman plot of the difference versus average of nose width divided by 3 (WN/3) and endotracheal tube (ET) inner diameter (ID). Bias (solid horizontal line) is −2.03 to 2.65 mm. N = 79.

Figure 3. Bland and Altman plot of the difference versus average of nose width divided by 3 (WN/3) and endotracheal tube (ET) inner diameter (ID). Bias (solid horizontal line) is −2.03 to 2.65 mm. N = 79.

Table 3. Limits of agreement between the Cube Root Mass method and the WN/3 method for the prediction of ET size in the population of dogs studied. Limits of agreement are expressed in millimeters (mm).

<table>
<thead>
<tr>
<th>Item</th>
<th>Bias</th>
<th>Limits of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cube root mass (ID)</td>
<td>−8.26</td>
<td>−12.40 to −4.12</td>
</tr>
<tr>
<td>Cube root mass (OD)</td>
<td>0.26</td>
<td>0.22 to 0.31</td>
</tr>
<tr>
<td>Cube root mass (OD)</td>
<td>−12.74</td>
<td>−19.29 to −6.19</td>
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<tr>
<td>Width of nose/3 (ID)</td>
<td>0.19</td>
<td>0.15 to 0.22</td>
</tr>
<tr>
<td>Width of nose/3 (OD)</td>
<td>0.31</td>
<td>−2.03 to 2.65</td>
</tr>
<tr>
<td>[(pad height in cm × 6 − 2)] (OD)</td>
<td>0.74</td>
<td>0.59 to 0.89</td>
</tr>
<tr>
<td>[(pad height in cm × 6 − 2)] (ID)</td>
<td>−3.62</td>
<td>−8.18 to 0.94</td>
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<tr>
<td>Tracheal width (ID)</td>
<td>0.89</td>
<td>−3.95 to 5.74</td>
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<tr>
<td>Tracheal width (ID)</td>
<td>12.48</td>
<td>6.78 to 18.19</td>
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<tr>
<td>Tracheal width (OD)</td>
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<td>Tracheal width (OD)</td>
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<tr>
<td>Nasal septum width (ID)</td>
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<td>−5.84 to 0.71</td>
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<td>Nasal septum width (ID)</td>
<td>0.79</td>
<td>0.56 to 1.01</td>
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<tr>
<td>Nasal septum width (OD)</td>
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<td>−12.37 to −1.72</td>
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<tr>
<td>Nasal septum width (OD)</td>
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<td>0.39 to 0.74</td>
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<tr>
<td>[(kg × 6/10) + 2.5] (ID)</td>
<td>8.11</td>
<td>−5.44 to 21.65</td>
</tr>
<tr>
<td>[(kg × 6/10) + 2.5] (ID)</td>
<td>1.63</td>
<td>0.63 to 2.64</td>
</tr>
</tbody>
</table>

* Standard Bland and Altman plot with mean difference between methods.
* Bland and Altman plot using ratio versus average of different methods.

These results show that the anatomical measurements and calculations that were investigated have a limited ability to predict ET size in the population of dogs studied. Furthermore, our attempts to confirm the findings of published formulae for determining ET size were largely unsuccessful.

Based on these results the 2 methods that could be beneficial to novice anesthetists are the Cube Root Mass and the WN/3. The Cube Root Mass (ratio method) was the best predictor of actual ET size. Use of the ET ID or OD performed similarly, but the ID would be easier to apply as OD sizes are often not provided by ET manufacturers. Though OD could be simply measured, this adds an unnecessary step given the comparable performance when using ET ID. Performing a cube root

Discussion

The relationship between nasal septum width and ET size also varied as ET size increased, as indicated by the non-horizontal distribution of the data, resulting in wide limits of agreement (Table 2, Figure 5a). Use of the ratio method improved the bias and limits of agreement (Table 2, Figure 5b). A similar pattern was observed when comparing the nasal septum width to the ET OD (Table 2).

The published body mass formula

$$[	ext{kg} \times 6/10] + 2.5$$

was not suitable for analysis using Bland and Altman plots as data distribution was not horizontal with either difference or ratio calculations (Table 2, Figure 6).
calculation usually requires a scientific calculator, but the advantage of a calculation based on body mass is that this could be performed before the animal is sedated or anesthesia induced. A sample calculation for a dog with a body mass of 30.0 kg would be: \( \sqrt[3]{30} / 0.26 \), where 0.26 is the bias, giving a predicted ET ID size of 12.0. The limits of agreement would range from \( \sqrt[3]{30} / 0.31 \) to \( \sqrt[3]{30} / 0.22 \) mm. Therefore, ET size could be predicted within 3 to 4 sizes. This level of precision could help novices perform an initial selection, potentially shortening the learning curve to achieving proficiency in predicting the appropriate size of ET.

An alternative to Cube Root Mass, which is less accurate but should not require a calculator, is the WN/3 method. In the population studied, a 30 kg dog typically had a nose width of 34 to 42 mm, giving predicted ET ID sizes of 11.6 to 14.3 mm (including the bias of 0.3 mm). This would provide an accurate prediction in approximately 60% of dogs, with limits of agreement predicting ET ID sizes ranging from 9.3 to 16.6 mm (approximately 2 mm either side of the predicted size). Though less precise, it could nonetheless be a useful approach for novices, particularly as the WN/3 measurement could be estimated by holding an ET up to the nose.

A secondary aim of this study was to investigate the accuracy of several published methods for predicting ET sizing in dogs. With the exception of Cube Root Mass, none of the published methods proved to be accurate in the study population. Applying the Bland and Altman methodology in assessing the published formulae allowed a quantitative comparison to be made, which is of more practical value than a correlation and facilitates identifying proportional relationships between measures (4,5,8). The nasal septum and tracheal width approaches proposed by Lish et al (5) showed a proportional difference with predicted ET size being overestimated (tracheal width) or underestimated (nasal septum) as each measure increased. This is a likely explanation of the authors’ observation that the nasal septum method tended to underestimate ET sizes greater than 7 mm ID. In contrast, the same observation of underestimating ET size based on tracheal palpation was not seen here. This may reflect the subjective nature of attempts to measure the trachea beneath soft tissue. For tracheal width,
using the ratio analysis generated an approximately horizontal data distribution but the limits of agreement were wider than for both Cube Root Mass and WN/3. Accuracy and precision of tracheal palpation in predicting ET size is limited by the mass of skin and soft tissue overlying the trachea and the difference in diameter between the palpated or measured width and the narrowest part of the upper airway (rima glottidis) through which an ET passes during orotracheal intubation. For nasal septum width, the ratio method also improved the applicability of this measure, but performance is lower than either the Cube Root Mass or WN/3 method. From the study population, a 30-kg dog with a nasal septum width of approximately 11.0 mm gives a predicted ET ID size of 13.9 and limits of agreement ranging from 10.9 to 19.6 mm. This lack of accuracy reflects previous work showing that ET sizes could only be identified correctly in 21% of cases (5).

The formulae using fourth digital pad length and body mass that were proposed by Avki et al (4), based on measured tracheal diameters from radiographs of Dalmatian puppies, were inaccurate in the population studied here. Potential contributors to this inaccuracy are the use of tracheal diameter (as discussed) and the differences in study population (pediatric versus adult dogs). It is unknown if these formulae are limited to this population or could perhaps include other dolichocephalic breed puppies. Further work is needed to confirm this.

The limitations of this study include: i) the assumption that the ideal ET size was always used, ii) differences in study populations, and iii) the smaller sample sizes for the digital pad and tracheal diameter measurements. Consistency in ET selection may have improved with a single person performing all intubations, although this may have been offset by the substantial experience and level of proficiency of the technicians. Drawing direct comparisons between studies must always consider potential differences in study populations. The intention of this study was to assess these methods in a wide range of adult dogs, typical of a clinical population. Inevitably, this limits comparisons where a more homogenous population was used. The unfortunate late addition of the digital pad and tracheal measures limits interpretation of these data due to the smaller sample sizes; however, the observed data variability suggests that little improvement would be achieved with a larger sample and the limits of the tracheal width method support previous observations (5).

The only method that could predict ET choice within 3 to 4 sizes was Cube Root Mass and this is the recommended technique if a calculator is available. An alternative, but less accurate technique, is the WN/3 calculation, though the correct ET must

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**Figure 5.** a – Bland and Altman plot of the difference versus average of nasal septum width and endotracheal tube (ET) inner diameter (ID). Bias (solid horizontal line) is -2.56 and limits of agreement (black broken horizontal line) are -5.84 to 0.71 mm. b – Bland and Altman plot of the ratio versus average of nasal septum width and ET ID. Bias is 0.79 and limits of agreement are 0.56 to 1.01 mm. N = 79.

**Figure 6.** a – Bland and Altman plot of the difference versus average of body mass formula \( \left( \frac{kg \times 6/10}{2.5} \right) \) and endotracheal tube (ET) inner diameter (ID). Bias (solid horizontal line) is 8.11 and limits of agreement (black broken horizontal line) are -5.44 to 21.65 mm. b – Bland and Altman plot of the ratio versus average of body mass formula and ET ID. Bias is 1.63 and limits of agreement are 0.63 to 2.64 mm. N = 79.
be selected from a slightly larger initial range. Further work is required to assess the use of these methods on the learning curve associated with accurately predicting ET size in dogs.

Acknowledgments
We thank anesthesia technicians Melanie Prebble RAHT VTS (anesthesia) and Andrea Radke RAHT for technical support.

References
Deslorelin and naltrexone stimulate follicular development in mares during autumn transition and early anestrus

UCVM DVM Class of 2018, Grace P.S. Kwong, Claudia Klein

Abstract — Horses are long-day breeders and commence ovarian follicular activity during the spring. Evidence suggests that there is an endogenous circannual rhythm in mares, and it is uncertain whether hormonal manipulation during or immediately following the fall transition induces follicular development. The current study was designed to test the hypothesis that both deslorelin and naltrexone induce follicular development in late fall transitioning or anestrous mares. Five of six mares treated with deslorelin, and 4 of 6 mares treated with naltrexone, developed a pre-ovulatory-sized follicle and were inseminated. Zero of three deslorelin-control mares and 1 of 3 naltrexone-control mares were inseminated. The number of mares bred in the deslorelin treatment group was significantly higher than in the corresponding control group (P < 0.05). Six of nine mares inseminated were pregnant 14 days after insemination. In conclusion, we were able to induce follicular development resulting in fertile ovulations during and shortly after the fall transition.

Résumé — Stimulation du développement folliculaire par le deslorelin et le naltrexone chez des juments durant la transition automnale et le début de l’anœstrus. Les chevaux sont des reproducteurs saisonniers influencés par la lumière du jour et l’activité folliculaire ovarienne débute au printemps. Les évidences suggèrent que chez les juments il y a un rythme circannuel endogène, et il est incertain si une manipulation hormonale durant ou immédiatement après la transition automnale induit le développement folliculaire. La présente étude a été conçue afin de vérifier l’hypothèse que le deslorelin et le naltrexone induisent le développement folliculaire tard à l’automne lors de la période de transition ou chez des juments en anœstrus. Cinq des six juments traitées avec du deslorin et quatre des six juments traitées avec du naltrexone ont développé un follicule de taille pré-ovulatoire et ont été inséminées. Aucune des trois juments témoins pour le deslorin et une des trois juments témoins pour le naltrexone furent inséminées. Le nombre de juments saillies dans le groupe de traitement deslorin était significativement supérieur à celui du groupe témoin correspondant (P < 0.05). Six des neuf juments inséminées étaient gestantes 14 jours après l’insémination. En conclusion, nous avons été en mesure d’induire le développement folliculaire résultant en des ovulations fertiles durant et tôt après la transition automnale.

(Traduit par Dr Serge Messier)

Introduction

Horses are long-day breeders and commence ovarian follicular activity as daylight hours increase during the spring, with the typical breeding season spanning April to October in the northern hemisphere (1). The pineal gland, through the secretion of melatonin, plays a central role in controlling seasonal reproduction and translates the photoperiodic signals registered by the eye to endocrine signals (2). In the fall, shorter daylight hours result in increased melatonin secretion, with a subsequent decrease in gonadotropin-releasing hormone (GnRH) and luteinizing hormone (LH) (3). Although follicle-stimulating hormone (FSH) concentrations in the anterior pituitary do not vary with season (3), circulating levels of FSH are reduced during winter (4). Contrarily, during the spring transition period when daylight hours are increasing, melatonin production decreases, followed by increased release of GnRH,
which allows the mare to return to estrus and thus be ready for breeding. Artificial lighting commencing in the month with the shortest day length, December, is therefore commonly used to stimulate early follicular development and result in ovulation between 2 and 3 mo later (5). The most efficient lighting regimen implements 16 h of light and 8 h of dark, which results in virtually all exposed mares cycling by the end of February (6).

In addition to melatonin, endogenous opioids influence seasonal patterns of reproductive activity in the mare through regulating the release of GnRH, LH, and FSH. In cyclic mares, endogenous opioids inhibit the release of LH and FSH during the diestrous but not the estrous phase of the cycle (7). During anestrus, the opioid inhibitory tone is higher than during the breeding season, a shift that is not observed in mares that cycle throughout the winter (8). Targeting the inhibitory effects of endogenous opioids, naloxone, an opioid antagonist, results in the release of LH and FSH when administered in a single dose to mares in anestrus (9–11). To date though, no study has addressed the repeated administration of an opioid antagonist as a mechanism of advancing the onset of breeding season in mares.

Exogenous gonadotropin-releasing hormone also supports follicular growth in anestrous mares when administered in advance of the naturally occurring spring transition (12). Turner and Irvine (13) completed a series of 3 experiments on seasonally anestrous mares with treatment groups receiving varying levels of GnRH and found that a dose of 50 μg IM, q8h for 21 d and 25 μg IM hourly for a further 9 d was sufficient to stimulate follicular development. Nickerson et al (14) and McCue (15) suggest that subcutaneous implants of GnRH are also effective in inducing follicular development and further ovulation.

Kisspeptin, through the stimulation of GnRH release, is a peptide pivotal to control of seasonal reproduction in small ruminants (16). In anestrous mares, kisspeptin triggers a rise in LH and FSH concentrations; however, this increase in gonadotropin secretion is transient even when kisspeptin is administered for a prolonged period (17).

Despite the obvious influence of exogenous factors such as light on seasonal reproductive activity, evidence suggests that there is also an endogenous circannual rhythm in mares. Following removal of the pineal gland, the source of melatonin, or removal of the superior cervical ganglia which relay photic information to the pineal gland, a seasonal, albeit altered, pattern of ovarian activity persists (18,19). Mares that are exposed to 15 h of light per day starting at summer solstice still enter anestrus (6) and mares that are maintained on only 8 h light per day still resume cyclic ovarian activity in the spring (6,20). This eventual resistance to the imposed photoperiod, is called a refractory state.

Inducing early cyclicity during the spring transition period, therefore, is a common practice. However, with the growing import/export industry between Northern and Southern Hemispheres for Thoroughbred horses, interest in manipulation immediately following the fall transition has grown. Given the endogenous circannual rhythm, it is uncertain whether hormonal manipulation during or immediately following the fall transition has the potential to induce follicular development. This study, therefore, aims to fill that gap by testing the hypothesis that both a GnRH agonist and naltrexone will result in increased follicular growth when compared to sham-treated mares.

Materials and methods

Animals and experimental protocol

This study was carried out in October and November of 2016 in the Northern Hemisphere (51.0486° N, 114.0708° W). Eighteen mares (Thoroughbred, Standardbred, and Quarter Horse breeds), ranging in age from 3 to 18 y, and housed in individual outdoor paddocks were included in the study. All procedures were approved by the University of Calgary’s Veterinary Sciences Animal Care Committee (AC16-0058). During the last 2 wk of October, mares were examined twice, 9 d apart (October 21 and October 30) by transrectal palpation and ultrasound to document ovarian structures present and obtain a blood sample from the jugular vein. Mares were assigned to 1 of the 4 following treatments using a random number generator:

i) naltrexone (50 mg/mL; Alberta Veterinary Laboratories, Calgary, Alberta), 0.1 mg/kg body weight (BW), IM, q12h ($n = 6$);
ii) deslorelin (BET Pharmacy, Lexington, Kentucky, USA), 63 μg IM, q12h ($n = 6$);
iii) naltrexone-control, 1 mL 0.9% NaCl, IM, q12h ($n = 3$), deslorelin-control; and
iv) 1 mL non-aqueous vehicle used for compounding deslorelin, IM, q12h.

Treatments commenced on November 3 for all mares. Mares were examined 3 times a week (2 to 3 d apart) by transrectal palpation and ultrasound (SonoScape S9; Universal Imaging, Bedford Hills, New York, USA) to document follicular development and to determine uterine tone (flaccid versus toned) and edema (uterine edema was graded on a scale of 0 to 3; where: 0 = no edema, 1 = mild edema, 2 = moderate edema, 3 = pronounced edema). A blood sample was obtained at each time point. Examiners were blinded to the treatment mares were receiving. Treatment and blood sampling were continued for 14 d unless follicular development resulting in the presence of a follicle ≥ 35 mm in diameter accompanied by moderate to pronounced edema occurred, in which case treatment and blood sampling were discontinued and 2500 IU hCG IV (Chorulon; Merck, Toronto, Ontario) was administered to induce ovulation. Mares were artificially inseminated using 500 million motile sperm obtained from a single stallion with known fertility 24 h after administration of hCG and thereafter examined every 24 h until detection of ovulation. Transrectal palpation and ultrasound were carried out 12 d and 14 d after ovulation to confirm the presence or absence of an embryonic vesicle. Resulting pregnancies were terminated through transcervical flush of embryos.

Hormone analysis

Progesterone levels in pre-treatment serum samples were determined using the TARGET Equine Progesterone Kit (BioMetallics, Princeton, New Jersey, USA). Levels of FSH in serum samples collected before and during treatment were
determined by BET Labs (Lexington, Kentucky, USA) using a previously validated, double-antibody radioimmunoassay as described by Thompson et al (21). LIMIT of detection and intra- and inter-assay coefficients of variation averaged 1.4 ng/mL, 7%, and 11%, respectively.

**Statistical analysis**
A linear mixed effects model was used to examine the effects of treatment and time (as fixed effects) on FSH (as outcome), after accounting for the nested data structure from animals (as random effects). The assumptions of normality and equal variance were assessed for using the model. A natural log transformation of FSH was used for data analysis in the linear mixed effects model since the data distribution on the original scale was highly skewed. Analyses were performed using R version 3.5.1, in particular, ‘nlme’ package Version 3.1-137 was used for linear mixed effects model analysis and ‘lmeans’ package Version 2.27-62 was used for post-hoc analysis with Tukey’s HSD method for P-value adjustment. Fisher’s exact test was used to explore the relationship between number of mares inseminated and treatments. Statistical significance was set at \( P < 0.05 \) for all tests.

**Results**
Pre-treatment serum progesterone concentrations were < 1 ng/mL in all mares. Ten mares had follicles < 20 mm in diameter on both pre-treatment evaluations and were determined to be in anestrus, whereas the remaining 8 mares had follicles ranging in size up to 30 mm, with negligible uterine edema, and were determined be in fall transition. After random assignment to a treatment group, both the naltrexone and deslorelin treatment groups contained 2 transitional mares and 4 anestrous mares, while the 2 control groups contained 2 transitional mares and 1 anestrous mare each.

Five of the six mares treated with deslorelin (including 3 transitional mares), and 4 of the 6 mares treated with naltrexone (2 of which were transitional), developed a pre-ovulatory sized follicle with accompanying pronounced uterine edema (treatment-to-estrus interval ranged from 5 to 8 d). They were each administered hCG followed by artificial insemination (treatment-to-ovulation interval was 48 h; all mares ovulated in response to hCG). None of the 3 deslorelin-control mares displayed follicular growth and/or development of uterine edema.

A single transitional mare among the 3 naltrexone-control mares displayed follicular growth with concurrent uterine edema and was inseminated (Figure 1). Thus, both anestrus and transitional mares ovulated and were inseminated in response to stimulatory treatment.

The number of mares inseminated in the deslorelin treatment group was significantly higher than in the corresponding control group (\( P < 0.05 \)), whereas the number of mares inseminated in the naltrexone group did not differ from the corresponding control group (\( P = 0.34 \)). Four of the five mares inseminated in the deslorelin group and 2 of the 4 mares inseminated in the naltrexone group were pregnant as evidenced by the presence of an embryonic vesicle 12 d and 14 d after ovulation. The single naltrexone control mare which was inseminated did not become pregnant.

Serum concentrations of FSH had large intra- and inter-individual variability. Treatment had a statistically significant effect on log (FSH) (\( P = 0.01 \)), but not time or treatment and time interaction. Naltrexone treated mares had a significantly lower log (FSH) compared with mares receiving deslorelin [difference = 0.63 ng/mL, standard error (SE) = 0.194, \( P = 0.02 \)]. Serum FSH concentrations are shown in Figure 2.

**Discussion**
The current study was designed to test the hypothesis that both deslorelin, a potent GnRH superagonist, and naltrexone, an opioid antagonist, will induce follicular development in late fall transitional or anestrous mares. To the best of our knowledge, no study has tested whether hormonal manipulation during or immediately following the fall transition can overcome the endogenous circannual rhythm in mares and induce follicular development with subsequent ovulation and formation of a corpus luteum.

Deslorelin is a synthetic GnRH analogue which acts as a potent superagonist and has previously been shown to induce follicular development in mares in January when administered at 63 µg, q12h (22). Five of six (83%) mares treated with deslorelin developed pre-ovulatory sized follicles and ovulated in August 2019.
response to hCG in the current study. In contrast, none of the deslorelin control mares displayed follicular growth. Naltrexone is primarily a μ-receptor opioid antagonist, similar to naloxone, which results in FSH and LH secretion when administered to mares in anestrus (9,11). When administered at higher doses, naloxone also activates the adrenal axis and stimulates the release of cortisol. Irvine et al (11) found maximum stimulation of FSH and LH release at 0.1 mg/kg BW, IV, whereas 0.4 mg/kg BW, IV, resulted in a less pronounced increase of FSH and LH in the systemic levels of 0.1 mg/kg BW. Intramuscular administration of cortisol. Irvine et al (11) found maximum stimulation of FSH and LH release at 0.1 mg/kg BW, IV, whereas 0.4 mg/kg BW, IV, resulted in a less pronounced increase of FSH and LH in the systemic levels of 0.1 mg/kg BW. Intramuscular versus intravenous bioavailability was extrapolated from data in humans, which indicated a 35% bioavailability for naloxone when administered IM versus being administered IV (23). Four of six (67%) mares treated with naltrexone developed pre-ovulatory sized follicles and ovulated in response to hCG in the current study, while 1 of the 3 (33%) naltrexone control mares entered estrus and ovulated in response to hCG. The number of mares inseminated was significantly higher in the deslorelin-treated group compared to the respective control group, whereas this was not applicable for mares treated with naltrexone, likely due to the small number of mares enrolled in the study.

Anestrous and fall transitional mares were present in both treatment groups, and both anestrous and transitional mares responded to deslorelin and naltrexone with follicular growth. Due to the limited number of mares included in the study, it was not possible to determine whether anestrous or transitional mares responded preferentially to treatment. Serum FSH values did not reveal a time-and/or treatment-dependant pattern, likely due to large intra- and inter-individual variability. While basal FSH concentrations in mares in January exhibit little intra- and inter-individual variability (24,25), considerable fluctuations in FSH concentrations can be observed during the 30 d following the last ovulation of the year (26), offering a treatment-dependant pattern of serum FSH concentrations in our study. A drawback considering the use of naltrexone is that it is not an approved drug. In our case the cost of having naltrexone compounded approximated $350.00 per mare.

In conclusion, we were able to induce follicular development resulting in fertile ovulations during early anestrus and fall transition, and were therefore able to overcome the refractory state reported when attempting to extend ovarian activity through manipulation of the photoperiod (6). Mares will respond to pharmacological stimuli, even following the fall transition. Future studies should include a larger number of mares so that pregnancy rates following induction of cyclicity can be determined.

References

Determination of the dynamics of respiratory diseases using thoracic ultrasonographic examination in preweaned dairy calves

Abdelmonem A. Abdallah, Ahmed M. Abdelaal, Abdelkhal R. El-Sheikh, Hatem Selim, Sébastien Buczinski

Abstract — This study aimed to explore the dynamics of lung consolidation in preweaned calves and the association between ultrasonographic findings and prognosis (defined as the time until first consolidation occurrence during the preweaning period) and average daily gain. Two dairy herds were visited weekly for 9 weeks. The preweaned dairy heifers were examined for bovine respiratory disease using thoracic ultrasonography and the calf respiratory scoring criteria, weighed, and had blood samples checked for passive immunity transfer status. A total of 57 preweaned dairy calves were examined. Prevalence of lung consolidation increased from the first week of age (12.5%) and peaked (90%) by 10 weeks of age. In a subgroup of 25 calves monitored from birth, lung consolidation appeared as soon as a few hours after birth (1 cm consolidation depth) and by the 17th day of age (3 cm consolidation depth). Lung consolidation can be detected early by routine thoracic ultrasonography in preweaned dairy calves and is therefore valuable for use in farms with a high risk of pneumonia in preweaned calves.

Résumé — Détermination de la dynamique des maladies respiratoires par examen échographique thoracique chez des veaux laitiers pré-sevrés. L’étude visait à explorer la dynamique de la consolidation pulmonaire par ultrasons chez les veaux pré-sevrés et l’association entre les résultats de l’échographie et le pronostic (défini comme le délai avant la première consolidation pendant la période de pré-sevrage) et le gain quotidien moyen. Deux troupeaux laitiers ont été visités chaque semaine pendant neuf semaines, toutes les génisses pré-sevrées, toutes les génisses pré-sevrées ont été examinées par échographie thoracique. Les scores cliniques respiratoires à des veaux, et des échantillons de sang ont été prélevés pour vérifier leur statut de transfert d’immunité passive. Un total de 57 veaux laitiers pré-sevrés ont été examinés. La prévalence de la consolidation pulmonaire a augmenté dès la première semaine d’âge (12,5 %) jusqu’à son maximum (90 %) à l’âge de 10 semaines. Dans un sous-groupe de 25 veaux suivis depuis la naissance, la consolidation pulmonaire est apparue quelques heures après la naissance (consolidation DEPTH 1 cm) et au 17ème jour (consolidation DEPTH 3 cm). Une détection précoce des lésions pulmonaires peut être réalisée par échographie thoracique systématique ce qui démontre une application potentielle dans les fermes au risque élevé de pneumonie pré-sevrage.

(Traduit par les auteurs)

Introduction

Bovine respiratory disease (BRD) is a major concern when raising replacement heifers because of its high incidence and negative long-term effects (1). Heifers treated for BRD during the first 3 mo of life are 2.5 times more likely to die after 3 mo of age than those that are not treated (2). In a recently published study, heifers that experienced lung consolidation at 60 d of age were less likely to get pregnant and more likely to be culled before their first parturition than heifers without lung consolidation (3).

The clinical diagnosis of BRD can be made using several clinical scoring systems (4,5). However, BRD diagnosis poses significant challenges to the clinician as there are numerous infectious etiologies and clinical presentations (6). Previous studies have shown a lack of agreement between clinical signs and postmortem lesions (7) and between producers’ and veterinarians’ diagnoses (8). Clinical signs may lack both sensitivity and specificity (9), and have low inter-observer agreement (10). For these reasons, ancillary tests are often used to improve the accuracy of the diagnosis (11).
The prevalence of lung consolidation in preweaned heifers on farms with enzootic pneumonia problems and to determine the association between ultrasonographic findings (the first lung consolidation episode) and average daily gain (ADG) throughout the preweaning period.

This cross-sectional study posed several questions regarding i) the percentage of calves with lung consolidation at 1 cm consolidation depth within different age ranges.

<table>
<thead>
<tr>
<th>Age (d)</th>
<th>Number of calves</th>
<th>Calves with consolidation (%)</th>
<th>Median depth (range) (cm)</th>
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</thead>
<tbody>
<tr>
<td>0 to 7</td>
<td>24</td>
<td>3 (12.5)</td>
<td>1 (1 to 2)</td>
</tr>
<tr>
<td>8 to 14</td>
<td>21</td>
<td>9 (43)</td>
<td>1 (1 to 4)</td>
</tr>
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<td>36 to 42</td>
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<td>43 to 49</td>
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<td>9 (45)</td>
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<td>9 (50)</td>
<td>2 (1 to 6)</td>
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<td>6 (85.5)</td>
<td>2.5 (1 to 6)</td>
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<td>78 to 91</td>
<td>3</td>
<td>2 (66.5)</td>
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Thoracic ultrasonography (TUS) has been reported as a non-invasive and relatively accurate ancillary tool for assessing BRD-associated lung lesions, which are usually characterized by various degrees of lung consolidation (12,13). Thoracic ultrasonography can be done quickly calf-side, and has the potential to be used by bovine practitioners and researchers in a field setting (14).

In a previous study on dairy farms with enzootic pneumonia in preweaned calves (15), the prevalence of BRD-associated lung lesions detected by ultrasound was reported to be as high as 53% (56 of 106 calves). The high prevalence of lung lesions in this cross-sectional study posed several questions regarding i) the age when lung consolidation first occurs during the preweaning period, ii) the duration of a consolidation episode as well as its impact on growth, and iii) the correlation between lung lesions, active inflammation, and clinical score.

The objectives of this study were to assess the dynamics of lung consolidation in preweaned heifers on farms with enzootic pneumonia problems and to determine the association between ultrasonographic findings (the first lung consolidation episode) and average daily gain (ADG) throughout the preweaning period.

Materials and methods

The study protocol was approved by the animal care committee of the Faculty of Veterinary Medicine, University of Montreal, St. Hyacinthe, Quebec.

Study design and animals

A prospective cohort study was conducted in the winter of 2015 on 2 dairy herds of 170 and 110 dairy cows, respectively, experiencing recurrent enzootic pneumonia. These farms were selected based on their history of BRD in preweaned calves, group housing, availability of health records for the calves, and the willingness of the farmers to participate in the study. The facility at farm 1 was composed of 2 adjacent pens and used an automated milk feeder through 1 common nipple for the group. The calves were then progressively weaned at 8 wk of age and transferred to the post-weaning pen the weekend after.

A total of 9 weekly visits were performed during which all preweaned female calves were selected for examination to monitor the dynamics of lung consolidation throughout the preweaning period.

Procedures

During each visit, all female calves in the preweaned pens were examined clinically by 2 examiners. Each calf was scored for BRD using the calf respiratory scoring criteria (CRSC) of the University of Wisconsin and weighed and measured through the heart girth circumference (cm) by the same examiner (SB). The heart girth was then converted to kg according to a quadratic regression equation (17). Information on any previous treatments that had been administered to the calf was collected, with particular attention paid to previous treatments for BRD. All calf deaths were recorded during the preweaning period.

Clinical score assessment

Each calf was clinically assessed using the CRSC for the presence of BRD clinical evidence with a cutoff point of ≥ 5 defining the BRD positive cases (4). Briefly, points were based on rectal temperature, nasal discharge, cough, and ocular discharge or ear position. Each criterion was scored on a 0 to 3 scale, with 0 associated with the lowest risk of being sick and 3 with the highest risk of BRD.

Ultrasonographic examination

Both sides of the lung area of each calf were scanned by ultrasound starting from the 10th intercostal space (ICS). The probe was positioned within each ICS parallel to the ribs and moved ventrally towards the costal arch or the sternum, then cranially up to the right first or left second ICS to examine the cranial aspect of the cranial lung lobe (13). Ultrasonography was conducted by the same examiner (AA) at all visits using an 8.5 MHz linear probe (iScan; DRAMINSKI, Olszyn, Poland).

On farm 2, the calves were also individually housed for the first 2 d then grouped in the preweaning pen, which is one of the main identified risk factors for developing pneumonia (16). The milk replacer was offered at a maximum of 10 L per day. Only 1 group was present and the calves were fed by an automated milk feeder through 1 common nipple for the group. The calves were then progressively weaned at 8 wk of age and transferred to the post-weaning pen the week after.

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The probe was directly applied on the thorax after application of 70% isopropyl alcohol to the area of interest as contact media for acceptable image quality without clamping body hair (14). Pulmonary consolidation was considered when the lung tissue appeared hypoechoic (non-aerated) and its echo texture looked like liver parenchyma (18). The chosen cutoffs for consolidation depth were 1 cm and 3 cm as previously reported (9,19). The echo texture looked normal if lung tissue appeared hyperechoic (aerated) (18). The described cutoffs were selected to define the consolidation hypothesis (18). The consolidation depth was determined by the area of hypoechoic lung tissue (18).

Blood sampling
Jugular blood (10 mL) was collected from every calf during each visit, placed into a sterile, plastic, commercial blood collection tube without anticoagulant, and stored on ice. Within 4 to 6 h of collection, the blood was centrifuged at 3500 rpm for 10 min. Serum was harvested and a few drops were used for measuring blood total solids (TS) using an optical refractometer (refractometer, Atago, Tokyo, Japan). The total solids were used for evaluating the passive immune transfer during first week of life. Failure of passive transfer (FPT) was detected with a cutoff for evaluating the passive immune transfer during first week of life. Failure of passive transfer (FPT) was detected with a cutoff (5.5 g/L as previously reported (20).

Statistical analysis
Data were analyzed using computer software (SAS Version 9.3; SAS, Cary, North Carolina, USA) and R3.1.3 (R Foundation for Statistical Computing, Vienna, Austria).

Calves were classified according to age into weekly intervals, from 1 wk to 13 wk of age. The prevalence of lung consolidation (PrevCons) within each age range was obtained using the following formula:

\[ \text{Prev}_\text{Cons} = \frac{n}{\text{total number of calves within the same age stratum}} \times 100 \]

where \( n \) is the number of calves with consolidation depth \( \geq 1 \) cm.

The median and range of consolidation depth were also reported. The Kruskal-Wallis test was used to assess the difference between the observed prevalence depending on the age of the calf.

Dichotomous variables such as consolidation depth (\( \geq \) cutoff versus < cutoff) as well as the treatment history (treated versus not treated) were compiled. The proportion of visits with consolidation was calculated as the number of visits with consolidation divided by the total number of visits for both cutoff points. The proportion of visits with consolidation (i.e., \( \geq \) cutoff) was a priori categorized as less versus more than 50% of the time (PCON 1 and 3 for the 2 different cutoffs).

The ADG was determined for each calf by calculating the weight gain between first and last farm visits and dividing this result by the number of days between those visits. The ADG was tested as a dependent variable versus the independent ones such as PCON1 (or PCON3), treatment and herd, the Wilcoxon rank sum analysis was performed as the ADG was not normally distributed. Statistical significance was set at \( P < 0.05 \).

Results
A total of 57 preweaned female Holstein calves from 2 herds (31 in the first herd and 26 in the second herd) were examined between February and April 2015. Their age ranged from 1 to 91 d (median: 46 d), the median weaning age was 63 d in the first herd (IQR: 59 to 77 d) and 51 d in the second herd (IQR: 46 to 60 d). The median number of clinical examinations per calf was 5, ranging from 1 to 9 examinations. Twelve calves in both herds were reported to have diarrhea at least once during the study period.

Percentages of consolidated calves in both herds within different age strata are summarized in Table 1 and Figure 1. No significant difference was observed between the percentages of consolidation prevalence based on weeks of age (\( P = 0.44 \)) with peak incidence reached by 10 wk of age. Twenty-four out of 57 calves (42%) examined during the study period had measurable consolidation episodes with the average duration of those episodes being 15.5 d (range: 5 to 47 d); 2 of these calves had 2 consolidation episodes (recurrent consolidation).

Forty-five calves in both herds were examined at least twice, so ADG could be obtained from those calves. Thirty-six (63%) of these 45 calves experienced lung consolidations at least once and had a median ADG of 0.9 kg (IQR: 0.67 to 1 kg); 1/3 of those calves developed consolidation in the first 10 d. Nine of the 45 calves (20%) did not develop any consolidation and had a median ADG of 0.7 kg (IQR: 0.33 to 0.85 kg).

Twelve calves (21%) were examined once due to culling of 7 heifers, death of one, and 4 newborns were examined only in the last visit, so ADG could not be calculated.

Table 2. Descriptive statistics for the calves monitored weekly from birth to the end of the study.

<table>
<thead>
<tr>
<th>Calf ID</th>
<th>Number of visits</th>
<th>Maximum depth (cm)</th>
<th>TUS</th>
<th>Days till consolidation appeared</th>
<th>Duration of consolidation episode/days</th>
<th>CRSC maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>1</td>
<td>C</td>
<td>0</td>
<td>ND</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>8</td>
<td>C</td>
<td>9</td>
<td>47</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>4</td>
<td>C</td>
<td>20</td>
<td>ND</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>0.5</td>
<td>NC</td>
<td>43</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>1</td>
<td>C</td>
<td>—</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>0.5</td>
<td>NC</td>
<td>4</td>
<td>7</td>
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<tr>
<td>7</td>
<td>7</td>
<td>5</td>
<td>C</td>
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<td>C</td>
<td>12</td>
<td>ND</td>
<td>2</td>
</tr>
</tbody>
</table>

TUS — Thoracic ultrasonography; CRSC — call respiratory scoring criteria; C — consolidated; NC — not consolidated; ND — not determined as consolidation was observed at one visit but not at the next one.
The Wilcoxon rank-sum test results revealed no significant association between any of the included variables (PCON1, PCON3, treatment or herd) and the outcome ADG.

A subgroup of 25 calves, 16 in the first herd and 9 in the second herd, were examined from birth. Among them, 1 calf per herd had a TS level ≥ 5.5 g/L (6% and 11% in each herd) as estimated during their first week. Twelve calves (48%) had lung consolidation (depth: ≥ 1 cm), with median age at first consolidation at 10 d (range: 0 to 43 d; IQR: 6 to 12 d). When using a more specific cutoff point (depth: ≥ 3 cm), only 4 calves (16%) had lung consolidation and the median age at first consolidation was 24 d (range: 17 to 49 d, IQR: 21 to 32 d).

Of this subgroup, only 11 were examined from birth weekly until the end of the study. Descriptive statistics for those calves are summarized in Table 2. Nine calves (82%) had ultrasonographic evidence of consolidation (depth: ≥ 1 cm), with the median ADG of 0.83 kg/d (range: 0.26 to 1.00 kg/d). Three of the 11 calves (27%) had been treated previously with antibiotics by the producers, 2 had no lung consolidation and 1 had consolidation at both cutoff points.

**Discussion**

To the authors’ knowledge, this is the first study evaluating the dynamics of lung consolidation during the preweaning period in BRD high-risk herds. Thoracic ultrasonography, which was used as gold standard to determine BRD status in this study, has been studied as a practical tool to assess BRD in preweaned dairy calves with moderate to high sensitivity and high specificity (9,13).

We also focused on determination of the age at which first consolidation could appear, using ultrasonographic evidence of consolidation at 1 or 3 cm depths. For the 1 cm cutoff point, calves began to be consolidated in their 1st wk of age and nearly 33% of the lung consolidation occurred in the first 10 d of age. This finding may be attributed to rapid mixing of the newborn calves with a large number of older calves from 1 wk to 3 mo of age in the preweaning pen. Also, a high percentage of FPT in the newborn calves (almost 92%), similar to previously reported findings (16,21,22), is associated with higher odds ratios (OR) for respiratory disease. In a recent experimental study, lung consolidation was seen by trans-thoracic ultrasonography as soon as 2 h after infection with Mannheimia haemolytica (23), so lung consolidation can occur earlier during the first few days of calf life.

Lung consolidation in the current study showed irregular patterns between increase and decrease until it peaked (90%) during the 10th wk of age. This is different from previous studies (2,24,25), which reported highest prevalence of BRD at 7, 6, and 5 wk of age, respectively.

The variation in BRD prevalence may be due to different definitions for a BRD case. In our study, calves with ultrasonographic evidence of consolidation (depth: ≥ 1 cm) were considered in prevalence calculation, while in the formerly reported studies, clinical diagnosis or even treatment for BRD was used as the gold standard for case definition.

In a recent study (26), 6 to 12 preweaned calves in 39 herds were visited twice (the first visit was in summer and the second was in winter) to investigate the herd prevalence of lung lesions using TUS. The median prevalence rates (using a 1-cm cutoff) were 17% and 50% during summer and winter seasons, respectively, but the actual prevalence of BRD in the selected herds could be underestimated due to absence of age stratification of the selected calves and the cross sectional design (just 1 visit per season).

In the present study, BRD treatment had no significant effect on ADG. This is consistent with another study (27), which reported that heifers experienced BRD before moving to group housing at 8 wk of age and antimicrobial treatment had no effect on growth. However, in another study, BRD treatment before 6 mo of age significantly decreased the average daily gain between 6 and 14 mo of age (28). The lack of association in our study may be due to the small sample size or variable length of time when calves were followed.

The higher prevalence of FPT in the subgroup monitored from their birth in the present study could be attributed to colostrum management practices in both herds. Having more than 20% of tested calves with FPT is associated with a potential FPT problem at the herd level (29). As FPT exceeded 90%, this could be a potential disease risk factor that may limit external validity of our study to herds with FPT problems.

Inclusion of 2 herds with a history of BRD and a small number of preweaned dairy heifers (convenience sample), short follow-up, and lack of confounder adjustment like diarrhea as a concurrent illness that could interfere in the association between the studied variables and the ADG outcome may limit our inference power for the study results.

In conclusion, in this study on high BRD risk farms, the first consolidation episode appeared as soon as the 1st week of age (1-m cutoff) and the 3rd wk of age (3-cm cutoff). The peak of consolidation was observed at the 10th wk of age. The results from this preliminary study need to be confirmed with future studies of a higher number of herds and various BRD risks.

**References**

9. Buczinski S, Ollivent TL, Dendukuri N. Bayesian estimation of the accuracy of the calf respiratory scoring chart and ultrasonography for...
Case Report  Rapport de cas

Partial resection of bilateral ulnar remnants for treatment of carpus valgus in a 3-week-old Hanoverian foal

Julia Dubuc, Eduardo A. Da Silveira

Abstract — A 3-week old Hanoverian foal was presented with bilateral moderate to severe carpal valgus. The deviations were 10 and 14 degrees, respectively for the left and right carpi and orthogonal radiographs of both front limbs highlighted bilateral persistent ulnar remnants. A partial resection of the ulnar remnants and periosteal transection on the disto-lateral aspect of the radius were performed bilaterally under general anesthesia. The valgus deviations began to improve within the first month and the limbs were almost straight (2 degrees for the left and right carpi) 5 1/2 months after surgery.

This is the first report of successful surgical correction of bilateral carpal valgus secondary to persistent ulnar remnants in a large breed foal. The combination of partial ulnar remnant resection and radial disto-lateral periosteal transection, detailed in this report, should be considered for treatment of foals with this condition.

Résumé — Résection ulnaire bilatérale partielle comme traitement d’un valgus des carpes chez un poulain Hanovrien de 3 semaines d’âge. Un poulain Hanovrien de 3 semaines d’âge a été présenté avec un valgus bilatéral des carpes. Les déviations étaient de 10 et 14 degrés, pour les carpes gauche et droit respectivement. Des projections radiographiques orthogonales des deux membres antérieurs ont mis en évidence un ulna persistant bilatéralement. Une résection partielle des ulnas persistants et une section périostée de l’aspect disto-latéral de chaque radius a été effectuée sous anesthésie générale. Une amélioration des déviations a d’abord été observé durant le premier mois et les deux membres antérieurs étaient quasi droits (2 degrés pour chacun des carpes) 5 1/2 mois après la chirurgie.

Ceci est le premier rapport de cas à décrire la correction chirurgicale d’un valgus bilatéral des carpes secondaire à la présence d’ulnas persistants, chez un poulain de grande taille. La combinaison de la résection ulnaire partielle et de la section périostée disto-latérale du radius présentée ici devraient être considérée comme traitement des poulains présentant cette condition.

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Valgus deformity of the carpus is a common angular limb deformity (ALD) in newborn foals. This condition typically improves spontaneously with increasing muscular strength and age. Deviations caused by growth disparity of the physeal complex, either congenital or acquired, can be more challenging to resolve and might need surgical intervention if controlled exercise fails to improve the condition (1).

Carpal valgus deviations of 2 to 5 degrees are considered normal (2–4) and up to 94% of Thoroughbred foals present with this ALD in the first week of life (5). This number decreases to 71% in 1- to 2-month-old foals and to 35% in 5- to 6-month-old foals, as shown by the same authors in a subjective conformational study performed solely on Thoroughbred foals (5). According to Bramlage et al (1), a natural carpal correction can be reached if the ALD improves to within 5° to 7° of being straight, by 4 mo of age. After that period, a plateau is reached and the rate of correction will slow down until 8 to 10 mo of age, when the final straightening of the limb takes place.

The treatment of carpal ALD is controversial and conflicting reports concerning periosteal stripping and growth retardation techniques have been published (6–8). Depending on the severity of the deviation, growth retardation implants can be placed.
Angular limb deformity caused by complete ulnas/fibulas is a rare condition also named atavism and has only been described in miniature horses or ponies (7,10,11). The prognosis in cases of atavism is poor due to the severity of the angular and rotational limb deformities. For these advanced cases, Tyson et al (10) suggested partial ostectomies along with periosteal transections as a treatment option. By contrast, persistent ulnar remnants, characterized by varying degrees of ossification of the distal aspect of the ulna, are often considered an incidental finding on radiographs. The general recommendation for completely ossified remnants is to perform ulnar ostectomy in these cases to avoid ALD (12). There is limited information available regarding carpal valgus due to persistent ulnar remnants in non-miniature or pony horse breeds and successful outcome following surgical treatment for this condition.

The purposes of the present case report were to provide clear anatomical landmarks for partial resection of ulnar remnants in the distal radius during a wide time frame, from a few days to several months (9). Despite all the controversies about the appropriate carpal ALD treatment, consensus is established that early diagnosis is important to correct the problem before closure of the growth plates.
and to report a successful surgical outcome for a Hanoverian foal with bilateral carpal valgus associated with persistent ulnar remnants.

**Case description**

A 22-day-old, 114.5-kg, male Hanoverian foal was presented to the equine surgery service of the Veterinary Teaching Hospital of The University of Montreal for evaluation of a moderate to severe bilateral carpal valgus that had worsened since birth, despite stall rest. The foal had been presented 7 days previously for colic, which was treated medically.

The foal had a moderate to severe bilateral carpal valgus and mild bilateral hind fetlock valgus deformities. Complete blood (cell) count (CBC) and biochemistry values were within normal limits. Radiographs (Siemens Vertix, Munich, Germany) of both front limbs centered on the carpi were taken. The dorsopalmar projections confirmed the bilateral carpal valgus (left carpus: 10°; right carpus: 14°), while lateromedial views revealed bilateral persistent ulnar remnants (Figure 1).

The foal was anesthetized the following day and placed in dorsal recumbency with both front hooves attached to a transverse pole allowing complete extension of the forelimbs. Prior to

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**Figure 2.** Follow-up of the foal’s conformation. a, b – Conformation 4 wk after surgery and at the last re-evaluation, 5 1/2 mo after surgery. c, d – Lateromedial radiographs of the left and right carpi, 5 1/2 months after surgery, on which no ulnar regrowth was observed (arrows). e, f – Dorsopalmar projections showing the significant improvement in angulation of both carpi (2 degrees for the left and right carpi). R – right, L – left.
anesthesia, the patient received phenylbutazone (Phenylbutazone 20%; Rafter 8, Calgary, Alberta), 4.4 mg/kg body weight (BW), IV, and ceftiofur (Excenel 50 mg/mL; Zoetis, Kirkland, Quebec), 5 mg/kg BW, IV. The pre-anesthetic medication included a combination of diazepam (Diazepam 5 mg/mL; Sandoz, Boucherville, Quebec), 0.1 mg/kg BW, xylazine (Rompun 100 mg/mL; Bayer Animal Health, Mississauga, Ontario), 0.22 mg/kg BW, IV, morphine (Morphine sulfate 10 mg/mL; preservative-free, Sandoz), 0.05 mg/kg BW, IV, and ketamine (Narketan 100 mg/mL; Vétoquinol, Lavaltrie, Quebec), 3 mg/kg BW, IV. Anesthesia was maintained with isoflurane in oxygen for the entire duration of the surgical procedure. Both front limbs were clipped from the proximal aspect of the radius to the proximal aspect of the third metacarpus, aseptically prepared, and draped in a standard fashion. Five-centimeter longitudinal incisions were made using a scalpel blade (no. 10), starting 10 cm proximally to the palpable physis of the distal radius, between the muscle belly of the lateral digital extensor muscle and the tendon of the ulnaris lateralis muscle (13) and extending distally. Blunt dissection of the underlying connective tissue using Metzenbaum scissors and digital palpation allowed easy localization of the ulna. A Weitlaner retractor was placed into the incision to retract the skin and surrounding soft tissues. The interosseous ligaments were incised using sharp dissection and the partial resection of the ulnar remnant was then performed using small Liston bone-cutting forceps. Approximately 3 cm of ulna was resected in both front limbs. A bone rasp was used for smoothing the edges of the ulnar remnants. The surgical site was rinsed with sterile saline before closure in 2 distinct layers. Subcutaneous tissues were apposed with a simple continuous suture pattern using 2-0 Polyglycaprone 25 (Monocryl; Ethicon, Markham, Ontario) on a tapered needle and the skin was closed in the same fashion using 2-0 Monocryl on a reverse cutting needle. The distal aspect of the skin incisions was closed with 2 simple interrupted sutures. A bilateral periosteal transection was only performed on the disto-lateral aspect of the radius using a minimally invasive technique, with a scalpel blade (no. 12), as previously described (12). The surgical incisions from the ulnar resections were kept under a light bandage for 16 d and skin sutures were removed on the 14th day following surgery. During the post-operative period, the foal received ceftiofur (Excenel; Zoetis), 5 mg/kg BW, IV, q12h, for 3 d and decreasing doses of phenylbutazone [(Phenylbutazone 20%, Rafter 8), 2.2 mg/kg BW, on the evening after surgery, then 1.1 mg/kg q12h for 1 d and q24h for 1 more day]. A fentanyl patch (Sandoz Fentanyl Patch; Sandoz), 50 μg/kg BW per hour, was also applied over the right cephalic vein before surgery and kept in place for 72 h.

Results
The comfort of the foal was excellent throughout the post-operative period. He was discharged 15 d after surgery. Instructions for rehabilitation included 1 more wk of complete stall rest, followed by 3 wk of small paddock turnout and standard turnout 6 wk following surgery. Approximately 3 wk after surgery, a focal swelling developed bilaterally at the sites of the periosteal elevations. The deformations were firm, nonpainful upon palpation, and resolved spontaneously. Post-operative radiographs were taken 2 d after surgery and again 5 1/2 mo later (Figure 2). Compared with the pre-operative radiographs, no change in the angular deformities was observed at the first radiographic re-evaluation. The owner reported major improvement of the ALD during the 1st month following surgery. Three months after the surgical procedure the foal was inspected by the Canadian Hanoverian Society and passed inspection without fault. The final radiographic evaluation confirmed significant correction of both deviations (carpal valgus of 2 degrees for each carpus).

Discussion
This case is the first report of a successful surgical correction of bilateral carpal valgus secondary to persistent ulnar remnants in a Hanoverian foal. Persistent complete ulnas (or fibulas) with concurrent limb deviations are rare, and have only been reported in miniature horses and ponies (7,10). Conversely, up to 20% of foals can present with ossified rudimentary ulnas (12), which are considered an individual variation. In line with the general recommendations, a partial resection of both ulnar remnants was performed as they are known to act as a mechanical tension band and impede the growth of the concave aspect of the radius (12).

Early recognition and treatment of atavism are mandatory to avoid the development of severe ALD in miniature foals because of their limited and short growth potential. In the present case, complete ossification of the rudimentary ulnas was confirmed radiographically and by palpation during surgery. For this foal, deviations caused by persistent ulnar remnants appear more likely than atavism. The ideal time frame to proceed with partial resection of ulnar remnants is unclear. The current recommendation to treat carpal deviations in regular-sized horses is to correct severe cases within the first 3 mo of life and mild to moderate deformities after the rapid growth phase, at about 6 mo old (7). The decision for early surgical correction herein was made to avoid worsening of the carpal valgus during the fast-growth phase. This choice was supported by the fact the valgus had deteriorated during the first 3 wk of life.

Diagnosis of angular limb deformities is based on clinical examination and visual inspection in order to differentiate between flaccid peri-articular soft tissues, incomplete ossification, or true angular limb deformity (1). Radiographs constitute an essential tool to assess affected joints, especially in cases in which incomplete ossification is suspected or, as in this case, persistent ulnar remnants are present. Dorsopalmar/dorsoplantar projections on long cassettes are mandatory to allow optimal visualization of axes of the long bones proximal and distal to the affected joint. In cases of carpal or tarsal deformities, orthogonal projections should always be acquired to ensure absence of persistent ulna or fibula and a craniocaudal bowing of the radius. In the present case, lateromedial radiographs of both tarsi were not acquired as the conformation of the foal’s hind limbs was good and any tethering mechanism caused by ossified fibula was unlikely.

Hemi-circumferential periosteal transection and elevation (HCPTE) has been recommended concurrently with partial
ulnar ostectomies in an attempt to stimulate the growth acceleration in cases of carpal valgus (7). This technique might be more effective in younger foals because the cambium layer of the periosteum is most productive at an early age (14). The literature discussing the efficacy of periosteal transection is controversial (6,12,15–17) and more studies are needed before conclusions can be drawn regarding its merit. In the present case, the authors believed that bilateral partial resection of the ulnar remnants alone would have been enough to correct the carpal deviations. However, considering the age of the patient and the uncertainty of the outcome following surgery, the decision was made to take advantage of the same anesthetic period and to perform a minimally invasive periosteal transection as well.

The ulnar ostectomy technique has been reported previously (10,12) for the treatment of completely ossified ulnas in miniature/pony foals, but no detailed description of the anatomical landmarks is available. The technique for partial resection of ulnar remnants is a straightforward procedure with minimal anatomical limitations or risks and has landmarks which are similar to those for the ulnar ostectomy and are easily palpated. The ulnar remnant was palpated as a bony structure running in the caudo-lateral surface of the radius until it became attached distally. The cranial interosseus and collateral ulnar vessels should be avoided cranial to the lateral digital extensor muscle, if a proximal or deeper dissection is necessary (18). These vessels were not observed in the surgical field of the described case. Careful dissection of deeper tissues medial to the ulna is necessary to avoid inadvertent entry into the carpal canal (18). This problem was not encountered in this specific case.

Ulnar ostectomy along with HCPTET has been reported as treatment of a congenital bilateral carpal valgus in a 2-month-old alpaca cria which presented with severe deviations (19 and 18 degrees of the right and left forelimbs, respectively) (19). The bilateral carpal valgus angle increased to 22° 4 wk after the surgical procedure and bilateral transphyseal bridging of the distal medial radial physis was needed to correct the deviation. The valgus deformities were resolved 5 mo following the second surgery. Another report on crias revealed osteotomized ulnas ossified between 30 and 60 d after the initial ostectomy (20). In the present case, follow-up radiographs acquired 5 1/2 mo following surgery did not show any ulnar regrowth. Hunter et al (20) suggested that surgical correction of carpal valgus should be withheld until crias reach 4 mo of age and that a transphyseal bridging correction should be performed in the first surgical procedure. Extrapolation between species is difficult, considering crias normally have ulnas which are completely ossified, compared to foals which only have vestigial distal ulnas. Given these differences, one could presume ulnar regrowth would not be a problem encountered in foals. Nevertheless, further research is required into ulnar remnant resection in foals.

The successful outcome related here is illustrated by an almost complete straightening of the bilateral carpal valgus described in this foal and on the radiographic measurements taken before and approximately 6 mo after surgery. No success rate or positive outcome has been reported for bilateral partial resection of ulnar remnants as a treatment for bilateral carpal valgus in standard-sized horses. Based on the case described herein, it is impossible to determine the ideal time frame to proceed with ulnar remnant resection in foals, but the results demonstrate that early correction can be successful. Future studies should focus on the effect of ulnar or fibular ostectomy or partial resection in relation with age, severity of the deviation, and possible regrowth of the osteotomized ulnas. Given the degree of correction of the carpal valgus in the current report, early partial remnant resection for treatment of this specific ALD in horses should be considered.

Acknowledgments

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References

Complication of an artificial urethral sphincter in the treatment of a urethral sphincter mechanism incompetence

Lindsay A. Parker, Sherisse Sakals

Abstract — A 5-year-old, 39-kg spayed female mixed breed dog was treated for urinary sphincter mechanism incompetence with an artificial urethral sphincter (AUS). The dog was continent for 2 months, but then dramatic incontinence abruptly recurred. Imaging indicated that there was a leak in the cuff of the AUS. The AUS was replaced and continence was re-established.

Résumé — Complication d’un sphincter urétral artificiel dans le traitement d’incontinence due au mécanisme du sphincter urinaire. Une chienne de race croisée âgée de 5 ans et pesant 39 kg a été traitée pour l’incontinence due au mécanisme du sphincter urinaire avec un sphincter urétral artificiel (SUA). La chienne était continente pour 2 mois, mais de l’incontinence dramatique est réapparue soudainement. Un examen par imagerie a montré qu’il y avait une fuite dans le manchon du SAU. Le SAU fut remplacé et la continence ré-établie.

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Artificial urethral sphincter (AUS) devices offer an effective treatment alternative for dogs with urethral sphincter mechanism incompetence (USMI) that are unresponsive to medical therapy. In a long-term prospective study of 4 dogs with USMI, 26 to 30 mo following AUS (DOCS Biomedical Products and Supplies, Ukiah, California, USA) placement, patient median continence scores improved from 3/10 to 10/10 and none required further medical therapy to control incontinence (1). In a case series of 27 dogs with naturally occurring urinary incontinence, 55% of dogs with placement of an AUS required inflation after surgery, while the remainder became continent simply with the placement of the AUS (2). It has been hypothesized that this may be due to the semi-rigid backing of the occluder cuff, which may increase urethral resistance without any fluid volume (1). The purpose of this article is to report a case in which an AUS failed after 2 mo due to a small defect, prompting replacement with a second AUS, which successfully resolved clinical signs. As far as the authors are aware, this mode of failure has not been reported and should be considered as a differential diagnosis for continued or recurrent incontinence after placement of an AUS.

Case description

A 5-year-old, 39 kg spayed female mixed breed dog was referred to the Western College of Veterinary Medicine (WCVM) for evaluation of progressive urinary incontinence. The patient had been surrendered to a humane society at 1 y of age and her previous history was unknown. Throughout her time at the humane society, she developed progressive urinary incontinence.

On physical examination, the patient was overweight with a body condition score (BCS) of 7/9. She dribbled urine constantly. No abnormalities were detected on digital vaginal examination. A complete blood (cell) count (CBC) did not reveal any abnormalities. Serum biochemistry revealed a slight elevation in cholesterol [7.69 mmol/L; reference interval (RI): 2.70 to 5.94 mmol/L] and creatinine levels (122 μmol/L; 41 to 121 μmol/L). Urine specific gravity was 1.006. This finding, in combination with the elevated creatinine, was evidence of unsatisfactory renal function. A repeat urinalysis performed 2 mo later revealed a minimally concentrated urine (specific gravity 1.018). Urine culture was negative for bacteria.

Ultrasoundographic examination of the abdomen performed by a Diplomate of the American College of Veterinary Radiologists revealed morphologically normal kidneys. The ureters could not be fully visualized due to the pelvic positioning of the bladder, and consequently, ectopic ureters could not be ruled out. Contrast computed tomography (CT) demonstrated that the kidneys, urinary bladder and urethra were structurally normal, but ectopic ureters could still not be definitively ruled out.

Medical therapy was initiated with phenylpropanolamine (Vétoquinol, Lavaltrie, Quebec), 1.5 mg/kg body weight (BW), q8h and diethylstilbesterol (Ormond Veterinary Supply, Ancaster, Ontario), 1 mg PO, q72h. Medical therapy was continued for approximately 4 mo without improvement of urinary incontinence.

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incontinence. Urinalysis at this time was unremarkable with the exception of hypostenuria with a urine specific gravity of 1.007. A repeat biochemistry profile was within normal limits.

Cystoscopy demonstrated that the left and right ureteral papillae were anatomically normal in appearance and location. Adequate urine jets from the ureteral openings were observed after the patient was administered furosemide (Sanofi-Aventis, Guildford, Surrey, UK), 1 mg/kg BW, IV. No ectopic ureteral opening abnormalities were observed at the urethral sphincter or within the urethra or vagina. A diagnosis of urethral sphincter mechanism incompetence was made and the patient was taken for surgery for placement of an AUS.

The patient was pre-medicated with hydromorphone (West-Ward Pharmaceuticals, Eatontown, New Jersey, USA), 0.1 mg/kg BW, IM, and dexmedetomidine (Zoetis, Kirkland, Quebec), 4 μg/kg BW, IM. The dog was induced with alfaxalone (Jurox UK, Worcestershire, UK), 25 mg, IV, and general anesthesia was maintained with inhaled isoflurane (Pharmaceutical Partners of Canada, Belleville, Ontario) in 100% oxygen. The abdomen was approached via a standard ventral midline celiotomy. The proximal urethra was isolated by circumferential blunt dissection of the periurethral connective tissue. Umbilical tape was used to measure urethral circumference. A 10 mm x 14 mm AUS was filled with sterile saline (0.9% NaCl) and all air was eliminated. No leaks were detected. The total fill volume was 2.6 mL. The device was entirely emptied prior to placement. The cuff was placed around the proximal urethra and the AUS ring was closed with 2-0 polypropylene (Ethicon, Somerville, New Jersey, USA) sutures using the provided eyelets. The actuating tubing was passed through the ventral body wall just left of midline and connected to the subcutaneous injection port (CP2u; Access Technologies, Skokie, Illinois, USA). The subcutaneous tissue was undermined at the level of the 4th mammary gland on the left to allow for placement of the port. The port was secured in place with 2-0 polydioxanone (Ethicon) in a simple interrupted sutures. The abdomen was lavaged with sterile saline (0.9% NaCl; Mississauga). The linea alba was closed with 2-0 polydioxanone (Ethicon) in a simple continuous pattern; the subcutaneous tissue was closed with 3-0 poliglecaprone 25 (Ethicon). The skin was closed with 3-0 poliglecaprone 25 (Ethicon) in an intradermal pattern. The patient recovered uneventfully.

After confirmation of voluntary urination, the patient was discharged the day following surgery. In the 24 h following surgery, the patient was continent. The owners were instructed to see the referring veterinarian for injection of 0.9% NaCl to the AUS if there was urinary incontinence at 1 mo after surgery.

The dog’s owners reported that she became incontinent 8 wk after surgery and the dog was taken to the referring veterinarian. An injection of 1 mL of 0.9% NaCl was made into the AUS subcutaneous port, using a Huber needle (Access Technologies). No improvement was noted in continence and the dog was returned to WCVM for evaluation. A urine analysis and urine culture showed no evidence to indicate a lower urinary tract infection. The dog was sedated with dexmedetomidine (Zoetis), 0.03 mg/kg BW, IV, for radiographs. The AUS appeared to be in the same position as when it was placed, with no appreciable abnormalities of the tubing or its attachments. However, a volume of 4 mL of 0.9% NaCl could slowly be injected into the subcutaneous port without resistance.

Since 4 mL was markedly beyond the total fill volume of the AUS, a defect in some portion of the AUS was suspected. A 1-mL volume of Iohexal (GE Healthcare, Princeton, New Jersey, USA) was injected into the subcutaneous port and orthogonal radiographs were taken. A flare of contrast was noted exiting

![Figure 1. Ventrodorsal abdominal radiograph showing leakage of contrast material from AUS (white arrow).](image1)

![Figure 2. Removed AUS showing leakage of fluid (white arrow) upon applied pressure.](image2)
the cuff of the AUS, confirming a defect (Figure 1). Surgery was planned to replace the AUS.

The patient was premedicated with acepromazine (Vedco, St. Joseph, Missouri, USA), 0.02 mg/kg BW, IM, and hydromorphone (West-Ward), 0.1 mg/kg BW, IM. The dog was induced with propofol (APP Pharmaceuticals, Schaumburg, Illinois, USA), 130 mg, IV, and was maintained with isoflurane in 100% oxygen for the duration of the procedure. The defective AUS was removed and a new one of the same size was placed in its stead. The day following surgery small pools of urine were found on the dog’s bedding, and therefore 0.1 mL of sterile 0.9% NaCl was added to the AUS daily for 3 d until continence was achieved. A total of 0.3 mL was added to the replaced AUS. Continence was subsequently maintained for 6 y until the patient was euthanized for an unrelated cause. Examination of the removed AUS revealed a pinpoint defect adjacent to where the cuff meets the tubing (Figure 2).

Discussion

Artificial urethral sphincters have been found to offer a good long-term control of USMI with minimal associated morbidity. Artificial urethral sphincters are made by combining a medical grade inflatable silicone occluder connected by tubing to a titanium subcutaneous injection port (3). The device includes a cuff which is placed around the proximal urethra and secured with sutures through holes at the cuff edges for this purpose. The AUS are adjustable and allow mechanical occlusion of the urethra with minimal trauma (3). The cuff is inflated using the injection port, which is placed in the subcutaneous layer of the ventral abdomen to provide extra-luminal urethral compression (3). Potential complications of placing an artificial urethral sphincter device include implant-associated infections, urinary obstruction, leakage of AUS fluid, and recurrence of incontinence (1).

To the authors’ knowledge, this is the first case report documenting the ramification of an AUS defect resulting in inability to gain control of persistent incontinence. Originally our patient did not require inflation of the AUS with fluid to maintain continence. At 2 mo after surgery, the dog became incontinent, and therefore saline was injected into the AUS. However, the injection had no effect on continence. Repeated injections instilled saline in excess of the fill volume of the AUS, at which point we became suspicious of a leak in the device. If the dog had not become incontinent at 2 mo post-surgery and required saline in the AUS, the leak in the cuff would have had no consequence and would not have been discovered.

Temporary worsening of incontinence for 7 to 10 d after surgery may be due to fluid diuresis during general anesthesia (2). A urinary tract infection should be ruled out as a cause for persistent urinary incontinence. It is recommended that dogs recover for 4 to 6 wk before inflating the device to allow revascularization of the dissected urethra and prevent urethral atrophy (3). In our patient, we did not wait this time after replacing the AUS due to concerns about compliance with the recheck schedule as the patient lived far away from our facility. At the time of AUS replacement, the peri-urethral tissues had not formed adhesions or constrictions around the urethra, and the dissection from the initial device placement remained an open tract. We were therefore not concerned that the urethra had been further de-vascularized at the time of the replacement surgery.

The relationship between maximal urethral closure pressure (MUCP) and cystourethral leak point pressure (CLPP) was investigated by measuring MUCP and CLPP before and after the installation of an AUS in 6 female dog cadavers (4). By taking serial digital radiographs after incremental volume additions of 0.1 mL lactated Ringer’s solution the internal urethral lumen of each cadaver was measured as the AUS was progressively inflated to determine the percentage occlusion associated with total AUS volume. The MUCP and CLPP were directly proportional to the volume injected into the AUS and inflation of the AUS to 25% and 50% resulted in an increase of MUCP and CLPP to equal or more those of sedated, continent female dogs (4,5). However, postoperative urethral profile pressures could not be determined in a live animal study due to difficulties passing the catheter cranial to the AUS, and therefore the hypothesis of AUS resulting in increased MUCP and CLPP after surgery in live patients could not be tested (1). Since some patients experience an excessive amount of occlusion with just 25% of the original filling volume, it is recommended that increments of 0.1 to 0.2 mL be used to increase the volume in the cuff until continence is achieved while maintaining urination without difficulty (3). In a study investigating the safety and efficacy of AUS in dogs, the median total volume of saline required to achieve maximal continence was 0.4 mL (range: 0.1 to 0.7 mL) (2), while in another study it was 0.525 mL (range: 0.075 to 0.9 mL) (6).

It is possible that the original AUS placed was too large for our patient. However, the size of AUS device appeared appropriate on intraoperative assessment. Furthermore, it was replaced with another AUS of the same size which facilitated the achievement of continence with 0.3 mL volume of saline. Extrapolating data from the cadaver study indicated that the urethra would have been occluded by approximately 75%. The patient may have required a high level of occlusion or perhaps she may have been better fitted with a slightly smaller AUS.

Replacement of the AUS was straightforward. There was no build-up of fibrous tissue around any part of the device that hampered removal. The tissue tunnel which had been created for the original AUS allowed for rapid placement of a new AUS of the same size.

During the original procedure, the AUS had been filled to evaluate for defects and none had been found. The defect was not easily detected and required the build-up of some pressure in the device before it was noted. It is possible that because of the small size of the defect, it may have been missed initially when the device was checked for fill volume and defects during the initial surgery. The initial continence noted could have declined due to gradual leakage from the device. It is also possible that the AUS was damaged during implantation by being pierced with a suture needle. Although we were conscientious in avoiding all parts of the AUS when suturing, it is possible that inadvertent damage occurred. However, the owners reported a dramatic and acute loss of continence 8 wk post-surgery, which may indicate that the defect was not initially present.
Cystocentesis was not performed after surgery due to concerns about damaging the AUS and therefore could not have been a cause for the defect. Additionally, once incontinence recurred, injected saline rapidly moved out of the device, as seen by the lack of resistance with injection of large volumes and with the imaging of contrast leaving the cuff. The defect may have been initially present and increased in size over time to a point where leakage occurred, although internal pressure should not have been a contributor as no saline was injected into the first AUS placed.

Other opportunities for potential damage were during times when saline was added to the subcutaneous injection port. However, the non-coring Huber needles used to inject the port are 1.3 cm in length and the depth of the AUS cuff which contained the defect was far in excess of the depth within the abdomen that could be reached by a needle of this length. Furthermore, this patient was significantly overweight, increasing the depth needed to reach the port. Indeed, the base of the subcutaneous port itself was at times difficult to reach through the significant adipose tissue of the patient’s ventrum.

A regular hypodermic needle can damage the port and cause leakage. However only Huber non-coring needles (Access Technologies) were used at both the referring and referral facilities and the leak originated from the cuff rather than at the subcutaneous injection port. There was no defect detected at the port. Testing by the manufacturer, Access technologies, has certified that the injection ports will not leak after up to 1500 punctures with a 22-gauge non-coring needle (4).

lohexal was added to the AUS for confirmation of a defect causing leakage only after it was relatively certain that the AUS was going to be replaced. It is possible that the lohexal itself may damage the material of the AUS and we are not recommending that it be injected into an AUS for routine monitoring.

We experienced an unusual complication in this patient that to our knowledge is the first of its type described. Replacement with a new AUS resolved the relapse of urinary incontinence in our patient. Our experience suggests that if urinary incontinence persists or recurs following placement of an AUS, investigation of possible compromise to the device itself should be part of the evaluation.

References

The Dog, A Natural History


This enjoyable book introduces the dog; its origins, its evolution to present day companion status, and its potential future. The role of dogs over time has altered considerably, from primarily working dogs to lap companions and pseudo family members. This book is a nod to this transition in a delightful and fun manner.

This is a book for both the public and veterinary professionals. The text is readable and light, and yet surprisingly detailed. Full of photographs and diagrams, it covers anatomy and biology, behavioral issues, and the dogs’ various roles with people in society. There are interesting sections describing how dogs communicate, how they think, and how they interact as pack animals. There is also a partial directory of dog breeds.

The book is useful to veterinarians, apart from a break from more scientific and clinical material, in that it teaches what is often not taught in veterinary school. It helps flesh out the dog that our clients know and offers plenty of material that can yield helpful insight into what clients are experiencing. There are endless bits of knowledge that can be inserted into a canine appointment with clients, helping to both teach and bond with them. It would also be very helpful to those veterinary students that have not owned a dog, to quickly bring them up to speed on all things dog.

Submitted by Janeen Junaid, MVSc DVM, VCA, Bay Cities Animal Hospital, Burlington, Ontario.
Case Report Rapport de cas

Bilateral hind limb deformities and subsequent medially luxating patellas in a kitten

Natasha M. Walzthöni, Trina R. Bailey

Abstract — A 9-week-old domestic long-haired kitten was presented for evaluation of bilateral hind limb deformities. Bilateral hyperextension of the tarsi was diagnosed on physical examination and was treated with physical therapy and splinting. At 4 months of age, the patient was presented with bilateral, medially luxating patellas, which were successfully treated with bilateral chondroplasty and joint capsule imbrication.

Résumé — Difficulté bilatérale des pattes postérieures et luxation médiale subséquente des rotules chez un chaton. Un chaton domestique à poils longs âgé de 9 semaines a été présenté pour une évaluation d’une difformité bilatérale des pattes postérieures. Une hyperextension bilatérale du tarse fut diagnostiquée lors de l’examen physique et fut traitée avec de la physiothérapie et des attelles. À 4 mois d’âge, le patient a été présenté avec des luxations médiales bilatérales des rotules qui furent traitées avec succès par chondroplastie bilatérale et imbrication de la capsule articulaire.

Patellar luxation in cats is infrequent, but when it occurs, it is most often developmental, is more commonly bilateral than unilateral, and is more commonly medial than lateral (1). Most commonly, luxations in cats are grade 1–2 and a grade 1 luxation can typically be managed conservatively, while luxations with higher grades may require surgical intervention depending on the severity of lameness (2). Domestic shorthair has been reported to be the most frequently affected breed (1), while pedigree breeds are also considered at high risk. In dogs, higher grade luxating patellas are associated with skeletal deformities such as femoral varus, tibial valgus, and internal tibial rotation (3) and the more severe the luxation the greater the incidence of these skeletal deformities.

Treatment options for patella luxation in the cat are similar to those for the dog and include conservative management such as rest and pain management (2) or surgical correction including trochleoplasty, sulcoplasty, chondroplasty, trochlear wedge or block recession, tibial tuberosity transposition, partial parasagittal patellectomy, femoral corrective osteotomies, or soft tissue reconstructive techniques such as release of contracted tissues and imbrication (1–3).

Case description

A 9-week-old intact male domestic long-haired kitten was presented to the Veterinary Specialty Center of Newfoundland and Labrador with a history of abnormal hind limbs and gait suspected to be present since birth. The owner had reported the kitten as otherwise healthy and playful.

On presentation, the patient was bright, alert, and responsive with a body condition score of 5/9. On physical examination, all parameters were within normal limits except severe bilateral hyperextension of the hind limbs at the tarsal joints with the plantar surface of the metatarsals and paws facing dorsally. The kitten had severe ligamentous laxity of the tarsi including the lateral collateral ligament and the proximal extensor retinaculum. There was mild contraction of the medial collateral ligament and the plantar ligaments including the tarsal ligaments. The patient was weight-bearing on the dorsal aspect of the metatarsals and had mild keratinization and mild alopecia of the dorsal surface of the metatarsals. The stifles were also mildly turned laterally in a valgus position. The gait was assessed by a veterinary surgeon and surgery intern. The patient was ambulatory, not in pain, even with manipulation, and there was no evidence of swelling or joint effusion of the stifles or tarsi. The gait was difficult to assess as the patient tended to drag his hind limbs due to the flexural deformities. Distal to the tarsus, both paws were rotated medially in a varus position and the left paw was rotated worse than the right (Figures 1A, 1B).

A complete blood (cell) count (CBC) and serum biochemistry were performed with abnormalities attributed to the young age of the patient and decreased muscle mass. These abnormalities included a mild hyperphosphatemia, mild increase in alka-
line phosphatase, and mild hyporeatinemia. Radiographs showed severe flexural limb deformities including the bilateral hyperextension distal to the tarsi, and medial displacement of the metatarsals. No luxation, dislocations, or fractures were noted (Figure 2).

Treatment options were discussed and a conservative approach was initially taken with physical therapy alone. The physical therapy consisted of supported walking 4 to 6 times a day with the manual placing of the pelvic limbs and feet in the correct orientation. Two days of this physical therapy showed no notable improvement so caudal splints were applied to both hind limbs to maintain the limbs in a more natural position and supported walking with the proper manual placement of the feet was continued. Three days of this treatment yielded limited results and sciatic splints were applied in place of the caudal splints. These new splints consisted of 2-inch medical tape that extended from the dorsal hock, just above the calcaneus, crossed over the dorsal aspect of the metatarsals, wrapped around the plantar surface of the paw and crossed again over the dorsal aspect of the metatarsals to finally attach dorsal to the hock. The tape was wrapped in several layers to provide a durable splint. A few days of continued supported walking and proper foot placement showed improvement in the conformation and gait in the hind limbs and the patient was discharged for ongoing care at home. The sciatic splints were left in place for 5 d. The patient continued to improve in overall conformation and gait.

As he continued to grow, it was noted that even with remarkable improvement, he had mildly externally rotated stifles and the digits pointed medially in a varus position.

At 4 mo of age, the patient was presented a second time with bilateral grade 3 medially luxating patellas and grade 3 lameness bilaterally (1). Radiographs of the left and right stifles confirmed medially luxated patellas in both limbs (Figures 3A, 3B). Lateral radiographs of the stifles were obtained and showed mild stifle joint effusion, but significant improvement of the flexural limb deformities (Figures 4A, 4B). Radiographs of the tarsi were also obtained and showed overall improvement with only mild degenerative joint disease noted (Figure 4C). The radiographic diagnosis was bilateral, medially luxated patellas with improvement, but persistence, of previously described flexural deformities. Bilateral chondroplasty with possible joint imbrication was
CASE REPORT

This kitten with severe bilateral hind limb deformities and subsequent bilateral medial patellar luxation was successfully treated initially with physical therapy and splint application, then at a young age with chondroplasty and joint capsule imbrication to address the patellar luxation.

Due to the age of this patient and the congenital hind limb deformities present early in life, we did not want to wait until he had grown further to address the patellar luxation due to his lameness and the risk of negative effects on long bone growth and risk of subsequent skeletal deformities. A surgical approach was chosen that would spare the growth plates. A multimodal approach that would not disrupt the growth plates was taken by deepening the trochlear groove with a bilateral chondroplasty and lateral joint capsule imbrication. We discussed but excluded surgical approaches that would directly affect the growth plates.

Discussion

This kitten with severe bilateral hind limb deformities and subsequent bilateral medial patellar luxation was successfully treated initially with physical therapy and splint application, then at a young age with chondroplasty and joint capsule imbrication to address the patellar luxation.

Due to the age of this patient and the congenital hind limb deformities present early in life, we did not want to wait until he had grown further to address the patellar luxation due to his lameness and the risk of negative effects on long bone growth and risk of subsequent skeletal deformities. A surgical approach was chosen that would spare the growth plates. A multimodal approach that would not disrupt the growth plates was taken by deepening the trochlear groove with a bilateral chondroplasty and lateral joint capsule imbrication. We discussed but excluded surgical approaches that would directly affect the growth plates such as tibial tuberosity transposition or wedge osteotomy.

There was concern that the abnormal limb conformation and abnormal pull of the musculature as the kitten was growing,
even with physical therapy and correction of the hyperextension of the tarsi and managing the subsequent ligament laxity, may have predisposed this kitten to medial luxation of the patellae. For satisfactory stability of the patella, proper anatomic alignment of all structures in the pelvic limb is necessary; this includes proper alignment of the quadriceps, patella, trochlea, patellar ligament, and tibial tuberosity. Malalignment can lead to luxation of the patella. In a retrospective study of surgical outcome, higher-grade luxations were associated with a higher risk of complications such as relaxation. Although the highest rates of recurrence typically occur with grade 4 luxations, a retrospective study reported grade 3 luxations to have a 16% chance of recurrence. In our patient’s case, in combination with a history of hind limb deformities and ongoing malformation of externally rotated stifles, medially turned phalanges, the pull from dominant musculature and the initial grade 3 medial luxation, we believe our patient was at risk and continued to be at risk for relaxation as he continued to grow.

Hind limb congenital deformities in cats are uncommon and there is no consensus on appropriate treatment. In a case series including 3 cats with tarsal hyperextension, conservative management with external coaptation and physical therapy led to favorable results in all 3 cases with no further surgical or therapeutic intervention required. A similar condition exists in infant humans, called clubfoot, with similar anatomical abnormalities to those described in the kitten in this case. It is more common in humans and can be treated conservatively, but more severe deformation often requires surgical intervention. Similarly, literature that describes chondroplasty in young cats as treatment for luxated patella is limited, although the procedure has been described in puppies. This case provides an example of the treatment of both of these orthopedic problems in a young kitten. Although we were limited in our surgical options based on our patient’s young age, surgical procedures that spare the growth plate should be considered viable options in other patients with significant patellar luxation and lameness that present at a young age. Our case also highlights that higher grade patellar luxations are at risk of relaxation and this should be considered when choosing these growth plate sparing surgical options.

In conclusion, in this kitten, patella luxation was treated with a similar approach as is taken in young, small breed dogs. It remains important to fully assess and grade the extent of a patellar luxation and the concurrent lameness. In animals of any age with severe lameness, surgical correction should be considered. In animals younger than 6 months of age, a surgical correction that spares the growth plates is important to consider. Waiting until 6 mo of age to treat patella luxation may contribute to limb deformities including lack of pressure from the patella causing the trochlear/patellar groove to not develop and the quadriceps mechanism putting abnormal forces on the limb.

**References**

Investigation of a *Yersinia enterocolitica* outbreak in a commercial alpaca farm in Saskatchewan

Valentina M. Ragno, Fabienne D. Uehlinger, Kamal Gabadage, Ahmad R. Movasseghi, Julia B. Montgomery

**Abstract** — An outbreak of enterocolitis and sudden deaths occurred in an alpaca herd in Saskatchewan (mortality rate: 18.6%). *Yersinia enterocolitica* was isolated from the intestine, liver, and spleen of the index case, the kidney of a second case, and the feces of affected animals. The initial source of infection could not be identified. Treatment with oxytetracycline was followed by resolution of diarrhea and arrest of fatalities. The end of the outbreak was determined by absence of new cases and negative fecal cultures. This is the first report of a presumed herd outbreak of yersiniosis in camelds in North America.

**Yersinia enterocolitica** is a well-recognized zoonotic agent of gastrointestinal disease. It is adapted to the pig, which is usually an asymptomatic carrier (1), but it has been isolated from various domestic and wild animal species worldwide, as well as from contaminated surface waters (2). Estimates from the Centers for Disease Control and Prevention (CDC) indicate that this organism is responsible for almost 117 000 cases and 35 fatalities yearly in humans in the United States (3). In camelds, there are only a few reports of isolated cases of yersiniosis, including that caused by *Y. pseudotuberculosis*, but there have been no farm outbreaks (4).

**Case description**

On November 2, 2016 a pregnant 66-kg adult female Huacaya alpaca was admitted to the Large Animal Veterinary Medical Centre (VMC) of the Western College of Veterinary Medicine in Saskatoon. The animal had been found recumbent and non-responsive that morning. No treatments had been administered prior to presentation.

The alpaca had a body condition score (BCS) of 1/5 (5), was recumbent, non-responsive, and intermittently having seizures. Physical examination revealed hypothermia [36.2°C, reference range (RR): 37.5°C to 38.9°C (6)]; tachycardia [148 beats per min (bpm), RR: 60 to 90 bpm (6)]; dyspnea [open-mouth breathing at 16 breaths per min, RR: 10 to 30 breaths per min (6)]; congested, tacky mucous membranes; capillary refill time of 3 s. The abdomen was not distended; gastrointestinal sounds, including those in compartment 1, were decreased to absent bilaterally; dark brown, mucoid diarrhea was noticed in the perineal area.

Venous blood gas analysis (RAPIDPoint 500; Siemens Healthcare, Oakville, Ontario) showed metabolic acidosis [pH: 7.139, RR: 7.35 to 7.45 (7)], hyperlactatemia (24.3 mmol/L), and hypoglycemia [1.4 mmol/L; RR: 4.10 to 13.06 mmol/L (8)]. There was also hypoproteinemia [40 g/L, RR: 43 to 71 g/L (8)], in the face of high-normal packed cell volume [PCV 43%, RR: 18% to 48% (8)].
Fluid resuscitation was initiated with isotonic crystalloids (Normosol R; Hospira, Lake Forest, Illinois, USA), 20 mL/kg body weight (BW) bolus, and dextrose (Dextrose 50%; Vétoquinol, Cambridge, Ontario), two 75 mg/kg BW boluses, then 2 mg/kg BW per minute. However, the animal became agonal approximately 30 min after presentation and was euthanized with pentobarbital sodium (Euthanyl Forte; Bimeda-MTC Animal Health, Cambridge, Ontario), 108 mg/kg BW, through IV catheter.

Postmortem examination revealed submandibular edema. There were moderate amounts of fibrin, hemorrhage, and necrotic material in the intestinal lumen, with hemorrhagic foci on mucosal surfaces. Multifocal, crater-like necrotizing lesions were noted on small and large intestinal mucosa. Several mesenteric lymph nodes were enlarged, hyperemic and edematous, with red foci scattered throughout the surface. Small amounts of fibrinous material were adhered to the serosal surface of the abdominal organs. Liver, spleen, and kidneys were diffusely congested and variably enlarged. A fresh fetus was present in the uterus. Histopathological examination of the intestines revealed variable amounts of fibrinous exudate admixed with hemorrhage, necrotic debris and numerous intralesional bacterial aggregates. Fibrin thrombi with Gram-negative bacteria (Figures 1A, B) were present in many vessels. Multifocally, extensive necrosis of intestinal mucosa and submucosa was detected, with edema, hemorrhage, infiltration of leukocytes, (mostly neutrophils, some of which were degenerate), macrophages, and fewer lymphocytes and plasma cells. Fibrinosuppurative, necrotizing enterocolitis was confirmed. Variable sized foci of necrosis were noted in mesenteric lymph nodes with edema, hemorrhage, and infiltration of neutrophils. Large clusters of Gram-negative rods were noted throughout the lesions (Figures 1C, D). Similar areas of necrosis with infiltration of neutrophils, hyperemia, edema, hemorrhage, and large numbers of bacteria were noted in lung, liver, kidneys, and spleen. A heavy growth (4+) of Yersinia enterocolitica was obtained on bacterial culture from liver, spleen, and intestines. The strain of Y. enterocolitica was identified as biotype 3/O-antigen untypable (Enteric Department, Public Health Ontario Laboratory, Toronto, Ontario). The pathogen was

Figure 1. Histopathological findings on postmortem examination of an alpaca with Yersinia enterocolitica infection (index case). A — Large intestine. Necrotizing colitis with numerous intralesional bacterial aggregates (arrows). Fibrin thrombi are present in submucosal vessels with numerous rod-shaped bacteria (arrowheads). Hematoxylin & eosin (H&E) stain; ×100. B — Large intestine. Numerous intralesional Gram-negative bacteria (arrows). Gram stain; ×100. C — Mesenteric lymph node. Edema, hemorrhage, and infiltration of neutrophils. Large clusters of bacterial rods are seen throughout the section (arrows). H&E stain; ×100. D — Mesenteric lymph node. Numerous intralesional Gram-negative bacteria (arrows), Gram stain; ×100.
susceptible in vitro: ceftiofur, danofloxacin, enrofloxacin, florfenicol, gamithromycin, spectinomycin, tetracycline, trimethoprim/sulpha, and tulathromycin; intermediate susceptibility to tilmicosin and resistant to penicillin.

At the farm, 4 female alpacas had died suddenly during the week before admission of this index case to the VMC, followed by one 4 d later and one 6 d after, and new diarrhea was seen on the ground, although the sources were not identified. All these animals belonged to the same pen. Their carcasses were discarded without seeking veterinary advice. The owner reported that these animals had segregated themselves from the rest of the herd for about a day before they were found dead. A disease outbreak investigation was initiated 10 d after the index case was presented to determine if the new cases were due to Y. enterocolitica, identify the source of infection, and prevent further fatalities.

The original herd size before the recent deaths was 59 animals: 30 females with 9 crias lived in 1 pen and 20 males in an adjacent pen, with occasional nose-to-nose contact. The alpacas were bred for fiber and did not participate in shows. Breeding was carried out with studs from the same herd. No introduction of stock or movement of animals was reported within the previous 2 y. The pens were two 0.6-acre dry lots, with bushes on one end. Each pen had a barn to which the animals had free access. A central well on the property supplied water, through a double heated water trough in each pen. This water source was carried out with studs from the same herd. No introduc-

<table>
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<th>T² (°C)</th>
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<td>3</td>
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¹ Initial visit (November 12, 2016).
² Final visit (January 16, 2017).

BCS — body condition score; T — rectal temperature; Y — yes; N — no; NA — not available.

Blood and fecal samples were obtained from most of the alpacas with diarrhea and from others with normal feces. Blood and fecal samples were obtained from most of the alpacas with diarrhea and from others with normal feces. All alpacas were dewormed by the owner with ivermectin (Ivomec; Merial, Burlington, Ontario) and vaccinated with an octavalent clostridial vaccine (Tasvac 8; Merck Animal Health, Kirkland, Quebec) at shearing time, typically in May each year. Previously deceased alpacas had been transported approximately 600 m from the pens, next to a slough, without any measures to limit scavenging of the carcasses.

During our initial farm visit, all females (n = 22) and their crias (n = 9) were assessed by veterinarians who recorded attitude, rectal temperature, BCS, and presence/absence of diarrhea. Blood and fecal samples were obtained from most of the alpacas with diarrhea and from others with normal feces. The day before the farm visit, a yearling female had died, increasing the total number of deaths over the last 3 wk to 8 out of 59 alpacas at risk. Another female (ID 22) was found with weakness and lethargy on the day of the farm visit, but referral to the VMC or humane euthanasia was declined. This animal died in the evening of that day. Seven adult females were showing lethargy, inappetence, increased temperature, and/or diarrhea and were isolated in a “sick” pen. If there was a cria at foot, it was kept in isolation with the dam. Table 1 reports BCS, presence of diarrhea, body temperature, and fecal results for the sick females. Five of them had a BCS = 2/5, while 14/15 of the other females had a BCS of 3/5.

Blood samples were submitted to Prairie Diagnostic Services Inc. (Saskatoon, Saskatchewan) for 9 complete blood (cell) counts (CBC) (Siemens Advia 2120i; Siemens Healthcare) and 5 serum biochemistry profiles (Roche Cobas c311; Hoffmann-La Roche, Mississauga, Ontario), from a combination of sick and healthy females. Selected blood analyses from the sick females are shown in Table 2. Enzyme-linked immunosorbent assay (ELISA) for Mycobacterium avium spp. paratuberculosis antibodies was performed on the available serum samples (n = 5), as Johnes's
Table 2. Selected hematology parameters of the 7 adult female alpacas that were transferred to the isolation pen based on initial assessment.

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<th>WBCb × 10^9/L</th>
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<th>Bandsb × 10^9/L</th>
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* Initial visit (November 12, 2016).
* Reference ranges utilized by the lab (8) were broad and not specifically based on alpacas from this region.

WBC — white blood cell count; Segs — segmented neutrophils; Bands — band neutrophils; PCV — packed cell volume; TP — plasma total protein concentration; NA — not available.

disease was a differential diagnosis. Fecal egg counts (FEC) (n = 6 individuals, 1 male pen-pooled, 1 female pen-pooled) and fecal cultures from rectal swabs (n = 3 sick), individual (n = 6 sick and healthy) and pen-pooled (n = 2) samples were taken. A fecal swab from the dog was collected for culture on the second visit (13 d after index case). Since none of the male alpacas showed clinical signs and there had been no fatalities in that pen, no blood samples were collected to avoid stress from handling. Additional samples obtained for bacterial culture at the second visit included: hay, oats, and commercial alpaca ration; a soil sample from the pen with female animals; water from the water troughs and main faucet of the well; and surface sponge swabs of the pen from the male animals that had been entirely consumed before sampling.

Gross necropsy of the yearling female that had died the day before the visit showed widespread congestion of the lungs, severe enterocolitis, enlarged pale liver, and pale kidneys with multifocal microabscesses. Histopathology showed diffuse severe lung congestion, with many parenchymal foci filled with bacterial colonies, massive foci of necrotic neutrophils in the renal medulla, surrounded by severe hemorrhage, and diffused hepatic lipidosis. The intestine was too autolytic for analysis. Y. enterocolitica 4+ was cultured from the kidney tissue.

The initial CBCs showed signs of systemic inflammation in animals that were identified as clinically ill (Table 2), but to a lesser extent also in some of the animals that were not showing diarrhea at the time of sampling. Although all animals tested were either hypoproteinemc or on the low end of normal (with hypoalbuminemia in 4/5 chemistry panels available), no other significant abnormalities were found on serum chemistry. Serum mineral panels (n = 2) were unremarkable, aside from marginal selenium concentrations. All the alpacas tested (n = 5) were negative for M. avium ssp. paratuberculosis on serum ELISA. Fecal cultures grew Y. enterocolitica from 8/9 alpacas; in general, heavier growths were seen on samples from animals with diarrhea (i.e., 4+ versus 2+). Low parasite burdens were found on fecal floatation: Eimeria spp. (0 to 251 oocysts/g), Nematodirus spp. (20 eggs/g only in 1 yearling), and Trichostrongylus spp. (0 to 3 eggs/g). Nitrate, iron, and other mineral levels were normal in the water samples. No pathogenic bacteria were isolated from surfaces, water, or feed. Ergot alkaloids (3.8 ppb, toxic > 100 to 200 ppb total dietary concentration) and deoxynivalenol (54.7 ppb, toxic > 1000 ppb in cattle) were identified in the oats with a liquid chromatography-mass spectrometry mycotoxin panel. The dog’s fecal swab was negative for Y. enterocolitica and other bacterial pathogens.

Given the severity of the losses and the strong suspicion that Y. enterocolitica was the etiologic agent of the outbreak, treatment was initiated during the first visit, after sample collection. Male and female adult alpacas that were not showing clinical signs were given 2 doses of long-acting oxytetracycline (Bio-Mycin 200; Boehringer Ingelheim, Burlington, Ontario), 20 mg/kg BW, SC, 72 h apart, whereas sick alpacas additionally received a third and fourth dose. The cria did not appear to be affected and were not treated, in consideration of potential side effects such as nephrotoxicity and teeth discoloration (11). Owners were instructed to implement biosecurity measures, such as wearing disposable gloves and boot covers, feeding animals in the isolation pen last, and limiting access to the alpaca pens to necessary personnel. The isolation protocol was maintained until the fourth visit.

Pooled fecal cultures from each pen (males, healthy females, and sick pen) collected on the third visit (12 d after the first), and individual fecal samples (n = 11) from the final visit (53 d after initial visit) were negative for Y. enterocolitica and other pathogens. Overall, the enterocolitis outbreak lasted approximately 5 wk. The farm lost 18.6% (11/59) of their stock, including 30% (9/30) of the adult females, 1 yearling female and 1 adult male. The cria did not seem to be affected. However, 2 that had become orphans during the outbreak died approximately 6 wk after the last case, increasing the total losses to 22% of the herd. Necropsy examinations could not be performed but nutritional deficiencies were suspected to be at least partially responsible for their deaths. The producers did not report any illnesses in themselves or family members visiting the farm.
Discussion

Necropsy, histopathology, and bacteriology findings indicated that the 2 deceased alpacas examined had suffered severe enterocolitis and sepsis caused by Y. enterocolitica. The fact that 8/9 fecal cultures were positive for the same pathogen supports the hypothesis that this bacterium had circulated in the whole herd, which was likely naïve to it.

Unfortunately, serologic tests for antibodies against Y. enterocolitica were not available. This represents a limitation of the investigation, as it would have been ideal to confirm the presence of antibodies and seroconversion in those animals. However, in human medicine, culture of Y. enterocolitica from the stool of a subject showing clinical signs is considered sufficient to confirm a diagnosis of yersiniosis, and serology is not routinely used (8,9).

In general, Y. enterocolitica infections appear to be more common in Europe, where pathogenic serotypes have been cultured from several species of wildlife, production animals, dogs, and cats (12). According to an annual report of the European Food Safety Authority (13), yersiniosis from Y. enterocolitica was the third most reported zoonosis in the European Union in 2016. A classification based on cultural characteristics describes 6 biootypes of Y. enterocolitica: 1A, 1B, 2, 3, 4, and 5 (14). According to the O-antigen type, 60 serotypes are currently described. Bioserotype can be informative about the possible source of infection (e.g., domestic pigs, wildlife, environmental) and pathogenicity of the isolate. For example, in Europe and North America, biohype 1A is the most common non-pathogenic isolate, bioserotype 2/O:9 is more commonly isolated from grazing ruminants, 4/O:3 from pigs (15), and 5/O:2,3 from lagomorphs (16). In New World camelds, Y. enterocolitica biohype 2 was cultured from the feces of 1 alpaca in New Zealand (17). Biohype 3, which was isolated from our index case, is pathogenic and has been previously isolated from rodents, including domestic chinchillas (16). In France, it accounted for 3% of the pathogenic Y. enterocolitica isolated from human patients over 50 y (16).

In Canada, Y. enterocolitica has been isolated from wild rodents and lagomorphs (18), reptiles (19), domestic pigs (20), and surface water (21). Other sporadic reports include a muskrat in Saskatchewan, a snowshoe hare in Quebec, a Vancouver Island marmot in British Columbia, and beavers in Ontario; the bioserotypes were not reported (18).

Any disturbance of intestinal barriers or host immunity seems to play an important role in the development of yersiniosis in most species. In this herd, intestinal parasites were unlikely to contribute to the clinical picture: the animals lived on dry lots and were not grazing; therefore, environmental conditions were not ideal for most parasites to complete their life cycles. Whole oats were introduced suddenly in the diet, for approximately 10 d before the first animal died; this may have resulted in mechanical damage or disturbance of the resident gastrointestinal flora. Coarse feed materials that may cause ulcerations within the intestinal mucosa have been implicated as a predisposing factor for the septicemic form of yersiniosis in goats (22) and camelds (4). Avian species and rodents can contaminate feeds with pathogenic Y. enterocolitica, for which they can act as reservoirs (22). Bacterial contamination could have been missed by culturing a small sample. Even though the oats mycotoxin levels were likely insufficient to cause primary disease, they cannot be excluded from having contributed to a disturbance in the intestinal environment or the hosts’ immunity.

Multiple factors including stress, inadequate nutrition, overcrowding, and sudden fall in temperature can predispose farm animals to enterocolitis from Y. enterocolitica (4), often involving the younger stock during their first winter (22). In this herd, none of the crias appeared to be affected; this might point towards a feed contamination, since the crias were still nursing and likely eating less solid feed than the adults. Decreased selenium levels may have contributed to impaired immune function. Since adult female breeding stock was mostly affected in this outbreak, immune suppression due to pregnancy, and possibly inadequate nutrition to support lactation for the 2016 cria and growth of the new fetuses, might have been contributing factors. Moreover, according to records of the weather and climate database of the Government of Canada (23) the temperatures in the area had abruptly dropped during the 3 wk preceding the first alpaca’s death (October 20).

John’s disease has been previously reported as a cause of chronic wasting and diarrhea in alpacas (4). In the tested subset of this herd, exposure to M. avium ssp. paratuberculosis was not supported by serology, although fecal culture and polymerase chain reaction (PCR) would have been more sensitive. In addition, the intestines of the 2 animals that were examined did not have the typical thickened, corrugated appearance described in paratuberculosis cases and there was no evidence of granulomatous inflammation on histopathology (24).

The decision to treat all adults with oxytetracycline, a first line antibiotic in production animals, was made in compliance with responsible use of antimicrobials, given the circumstances of rapid progression of disease and severity of the losses. Previous reports state that treatment of yersiniosis is often ineffective in individual animals, due to late detection of disease (4); however, in this herd it may have contributed to limit further losses. Only 2 alpacas died after treatment was initiated.

Previously described episodes of disease caused by Y. enterocolitica in camelds in North America are rare (4), and generally seemed to affect a single animal in a herd (Long P.O. personal communication, 2016). To the authors’ knowledge, this is the first report of an epizootic of enterocolitis due to Y. enterocolitica in an alpaca herd in North America, leading to significant economic and genetic losses for the producer. Although the source of infection was not ultimately identified, the on-site investigation was instrumental in confirming the etiologic agent of the outbreak and establishing appropriate treatment, in addition to highlighting the need for several improvements in the biosecurity of the farm.

Acknowledgment

The authors acknowledge the support of the WCVM Disease Investigation Unit, funded by Saskatchewan Agriculture.

References

Danby Appliances Launches New Danby Health Refrigerators to Bridge Gap in Existing Market

Danby Appliances is excited to announce the launch of their newly designed Danby Health compact refrigerators. Built with medical grade components and loaded with powerful features, Danby Health combines innovative technology, energy efficiency, and proven reliability for medical and clinical facilities. The new units provide top-grade features for less than current fully-featured medical refrigerators.

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- Temperature stability engineered to maintain a steady range of 2–8°C (set point not to vary +/- 2°C)
- Internal forced-air fan to ensure even cooling from top to bottom
- External digital thermostat with lock and external digital display permitting precise temperature management without opening the door
- High/low temperature alarm will sound if temperature rises or falls out of the set range
- Hospital-grade green dot power cord conforming to the strict standards for grounding reliability, assembly integrity, strength and durability in more demanding environments
- Keyed door lock to protect the contents of the refrigerator

More features include:
- Built-in USB port for temperature data
- Integrated temperature logger
- Interior LED lighting
- Flat interior door liner
- Wire racks for better air flow

Contact: Danby Appliances, PO Box 1778, 5070 Whitelaw Road, Guelph, ON N1H 6Z9; phone: (519) 837-0920; e-mail: dkane@danby.com (Darrell Kane); website: www.danby.com

Canada Approves Phibro Solution for Beef Cattle

V-Max™ (Virginiamycin) medicated feed additive has received regulatory approval by the Veterinary Drugs Directorate (VDD), Health Canada for use in beef cattle. V-Max is approved for the reduction of incidence of liver abscesses in cattle fed in confinement, which is a condition that affects the well-being of an estimated one in five feedlot cattle in Canada.

Liver abscesses negatively impact cattle health and well-being, causing significant losses to cattle producers. When V-Max was included in feed, cattle showed significant reductions in liver abscesses in recent commercial feedlot trials in Canada.

V-Max is part of Phibro Animal Health’s commitment to providing customers with high quality solutions that help optimize animal health and wellness.

Contact: Phibro Animal Health Corporation, Glenpointe Centre East, 3rd Floor, 300 Frank W. Burr Boulevard, Suite 21, Teaneck, New Jersey 07666-6712 USA; website: www.pahc.com
New mobile application for veterinarians and producers takes the guesswork out of deworming

What is the recommended dose of fenbendazole for an individual animal, based on its weight? How much fenbendazole will it take to treat a specific number of animals? Which Safe-Guard® or Panacur® formulation is the most appropriate and cost-effective option in a particular instance?

The answers to these and other questions are just a few clicks away with Merck Animal Health’s new Safe-Guard® mobile application.

This one-of-a-kind tool makes it easy for veterinarians and producers to quickly calculate the volume and amount of fenbendazole required based on the number of animals to be treated, the animal’s weight, and the selected formulation of Safe-Guard®, Panacur® or Panacur® Aquasol™.

The Safe-Guard® mobile application also includes an optional cost comparison feature to help users select the most cost-effective formulation and presentation of fenbendazole to meet their specific needs.

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“Merck Animal Health has always been committed to providing veterinarians and producers with value-added products and services that promote the well-being of animals and help increase productivity and efficiency,” says Douglas Wong, Product Manager, Farm Animal Business Unit. “Our goal in developing the Safe-Guard® mobile application was to create an easy-to-use, practical calculator and resource tool that helps save time and money by taking the guesswork out of fenbendazole administration.”

The Safe-Guard® mobile application can be used to calculate fenbendazole dosages, quantities and costs for four different species: cattle, swine, horses and poultry.

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Contact: Merck Animal Health, 167500 TransCanada Highway, Kirkland, Quebec H9H 4M7; phone: 1-866-683-7838; website: www.merck-animal-health.ca

Bayer Announces the Approval of Claro® in Canada

Bayer in Canada announced the approval of Claro®; the only single-dose, veterinarian-administered first-line treatment for canine otitis externa. Claro® is used specifically for the treatment of otitis externa in dogs associated with susceptible strains of yeast (Malassezia pachydermatis) and bacteria (Staphylococcus pseudintermedius).

Otitis externa is one of the most common reasons dog owners take their dog to a veterinarian. The condition is frustrating for both canine patients and their owners. It is caused by inflammation of the external ear canal and is often accompanied by secondary infections. Otitis externa can cause pain, itching and a strong odour in affected dogs. Most existing treatments require dog owners to apply ear medications at home, which can be challenging.

Claro® is intended to be a first-line treatment for otitis externa that addresses the needs of veterinarians and dog owners. It is a clear liquid solution featuring a fixed combination of antibacterial, antifungal, and anti-inflammatory ingredients that penetrates deep into swollen ear canals. A single dose lasts for 30 days. The unique single-dose veterinarian-administered treatment spares pet owners the frustration of in-home application and eliminates veterinarian uncertainty about pet owner compliance. A single, 1 mL dose in each affected ear treats dogs of all sizes.

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Brief Communication  Communication brève

Comparison of cerebrospinal fluid parameters from the cerebellomedullary and lumbar cisterns in 54 dogs

Peter J. Early, Karen J. Munana, Natasha R. Olby, Christopher L. Mariani

Abstract – The purpose of this retrospective study was to compare findings from analyses of paired samples of cerebrospinal fluid (CSF) from cerebellomedullary cistern and lumbar cistern in dogs. Tests of fluid collected from the lumbar cistern were more sensitive for identifying pleocytosis and elevated protein concentrations compared to the fluid from the cerebellomedullary cistern in dogs with spinal cord disease.

Résumé – Comparaison de paramètres du liquide céphalo-rachidien provenant de la citerne cérébello-médullaire et de la citerne lombaire chez 54 chiens. Le but de cette étude rétrospective était de comparer les trouvailles des analyses d’échantillons pairs de liquide céphalo-rachidien (LCR) provenant de la citerne cérébello-médullaire et de la citerne lombaire chez des chiens. Les tests effectués sur le fluide prélevé de la citerne lombaire étaient plus sensibles pour identifier une pléiocytose et des concentrations élevées en protéines comparativement au fluide provenant de la citerne cérébello-médullaire chez les chiens avec une maladie de la moelle épinière.

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Cerebrospinal fluid (CSF) is predominantly derived from arterial blood by a combined process of diffusion, pinocytosis, and active transfer in the choroid plexuses of the lateral and fourth ventricles. The CSF circulates through the ventricular system of the brain and the subarachnoid space of the brain and spinal cord (1–3). Analysis of CSF can be useful in the diagnosis of neurological disease. In humans, it has been shown that the concentration of plasma-derived proteins increases as CSF travels towards the lumbar region (3,4). However, there are limited published studies that objectively compare the sensitivity and specificity of detection of analytes in paired cerebellomedullary cistern (CMC) and lumbar cistern (LC) CSF to accurately identify disease in veterinary patients. Of 2 published veterinary papers, neither compared the sensitivity of paired analyses of CSF collected from the CMC and LC sites in the same patient (5,6).

Collection of CSF is performed less frequently from the LC than from the CMC because it is technically more demanding and is associated with an increased risk of contamination with blood. However, the risk of iatrogenic central nervous system (CNS) injury is lower with LC collection due to the termination of the spinal cord cranial to the common collection sites, L5–L6 in large breed canines and L6–L7 in small breed canines and felines (2). The site of CSF collection should be caudal to the lesion, but beyond that, most clinicians choose a site based on their clinical experience. If multifocal disease is suspected, or if advanced imaging is unclear, CSF can be collected at both sites to increase the likelihood of attaining a diagnosis (1,3).

A previous study that evaluated the sensitivity of tests of CSF sampled from the CMC and LC in 145 dogs with CNS disease confirmed by surgery or necropsy concluded that LC CSF analysis detected CNS pathology with greater sensitivity than did CMC CSF analysis in dogs with spinal cord disease (5). The authors recommended CMC analysis due to the technical challenges of LC collection but it is important to note that only 13 dogs had paired samplings from both the CMC and LC sites. Also, the study used a cutoff for red blood cell (RBC) contamination of 5000 cells/μL, which is 10 times higher than the most current acceptable clinical standards used by veterinary neurologists when evaluating RBC contamination.

To avoid known alterations to nucleated cell count (NCC) and CSF protein concentrations, the present acceptable standard of erythrocyte contamination for both human and veterinary CSF analysis is 500 cells/μL (2,3,6). Iatrogenic hemorrhage is more common with LC puncture, and the level at which it is expected to interfere with CSF analysis is not agreed upon. It has been shown that RBC contamination values > 15 000 RBC/mL only result in minimal elevation of the white blood cell (WBC) count, but this is still considered controversial (7–9).

The present study aimed to compare paired CSF samples in a large cohort of dogs in which both CMC and LC CSF analyses were performed. We hypothesized that CSF collected from the LC would have a greater sensitivity to detect abnormalities than CSF collected from the CMC.
Medical records were reviewed from dogs presenting to North Carolina State University Veterinary Hospital (NCSU-VH) for neurological evaluation between 2007 and 2017 and that had both CMC and LC CSF analyses performed at the same time. For inclusion in the study, both paired CSF sample analyses had to have reported NCC, RBC count, protein quantification, gross description of the fluid, and the results of cytological examination. Although not reported in individual case records, the most common LC sites typically used are L5-L6 and L6-L7 (2), with the choice of needle size (20-G or 22-G) determined by patient size, conformation, and clinician preference. Concurrent magnetic resonance imaging (MRI) was reviewed when available, and diagnosis classified as presumptive or definitive. Definitive diagnosis was based on postmortem analysis. Patients were excluded if the CSF was blood contaminated (> 500 RBCs/μL) (2), in adherence to the more stringent clinical standards of veterinary neurologists compared to that reported in previous publications (1,2,10). Additional exclusion criteria were: i) incomplete medical records that did not provide a neurolocalization, and ii) administration of a corticosteroid in the 4 wk before sample collection. Normal reference ranges established at NCSU-VH for CSF analysis were used, with pleocytosis defined as > 5 cells/μL in both CMC and LC samples and protein considered elevated if > 0.25 g/L from CMC and > 0.40 g/L from LC. A Board-certified clinical pathologist provided a cytology report.

The dogs were grouped according to lesion localization and MRI localization (Table 1). Localization were defined as extraneural (no evidence of structural disease), brain, C1-C5, C6-T2, T3-L3, L4-S3, or MRI analyses were not performed. If a lesion localization was defined as multifocal, the most caudal extent of the lesion, clinically, or on MRI was the neurologic lesion localization. Ten dogs that had not undergone MRI were excluded from the analysis that involved MRI results. A presumptive or definitive diagnosis was obtained from discharge instructions based on the patient’s history, signalment, neurologic lesion localization, and the results of the MRI and CSF analysis. To examine the impact of collection site on the NCC, a mixed effect model was adopted in which the collection site, MRI localization, and the interaction between the collection site and the MRI localization were included as fixed effects. Subject identification was used as a random effect, and the log_{10} transformation of the NCC number was used as the response variable to satisfy the normality assumption for the mixed effect model. The least square means of log_{10} NCC values were estimated and compared between the collection site and the MRI localization, and between the collection sites within each MRI localization. P-values were adjusted for multiple comparisons using Tukey's method. Similarly, the impact of the collection site on the protein concentration was also examined using a mixed effect model. All statistical analyses were performed using PROC MIXED in SAS v9.4 (SAS Institute, Cary, North Carolina, USA). P ≤ 0.05 was considered statistically significant.

The medical record search identified 148 dogs with paired CMC and LC CSF analyses. Of these, 32 were eliminated due to insufficient volume to perform a complete CSF analysis, and 62 were eliminated because the sample was contaminated with > 500 RBCs/μL. Of the 62 RBC contaminated samples, 23 were contaminated from the CMC and 56 from the LC, demonstrating that blood contamination is more common when the sample is collected from the LC, as previously reported (5). Six dogs had concurrent RBC contamination in samples obtained from both the CMC and LC sites. The remaining 54 patients were included in the study. Of these, 44 had concurrent MRI performed (Table 1). The study population had a median age of 5.8 y (range: 6 mo to 14 y). The median CMC CSF NCC was 2 cells/μL (range: 0 to 5511 cells/μL) and the median protein concentration was 0.17 g/L (range: 0.09 to 2.41 g/L). The median LC CSF NCC was 4 cells/μL (range: 0 to 1609 cells/μL); the median protein concentration was 0.55 g/L (range: 0.17 to 15.0 g/L). The median RBC count was 3 cells/μL (0 to 380 cells/μL) in the CMC CSF samples and 97 cells/μL (0 to 433 cells/μL) in the LC CSF samples. In 18 dogs, both the CMC CSF and LC CSF samples had normal NCC and protein concentrations. In 16 dogs, both the CMC CSF and LC CSF samples had abnormal NCC and abnormal protein levels. In 20 dogs, the CMC CSF sample was normal, and the LC CSF was abnormal. Of the 44 patients undergoing MRI, 2 dogs had brain disease, 33 dogs had spinal cord disease, 2 dogs had neuromuscular disease, and 7 dogs had non-neurologic disease. When CMC and LC CSF NCC were compared, the LC samples were significantly more likely to be abnormal (adjusted P-value: 0.0303). When comparing the CMC and LC CSF quantitative protein analyses, the LC samples were more likely to identify abnormalities at all of the spinal cord localizations. There was no significant difference between collection sites based on brain localization (adjusted P-value: 0.4408) or MRI localization (adjusted P-value: 0.4340).

Routine LC CSF collection should be strongly considered in all patients with spinal cord localizations to increase the likelihood of identifying abnormalities, improve the sensitivity of diagnostic testing, and potentially influence the diagnosis and therapeutic decisions. There is less inherent risk to sampling at the LC location compared with the CMC location because there is no risk of brainstem puncture. Major limitations to sampling at the LC include obstruction to flow due to either disease or viscosity. The complications associated with CSF collection at either site include infection and risk of hemorrhage leading to blood contamination of samples and iatrogenic CNS trauma. With respect to iatrogenic trauma, CMC collection carries similar risks, but it is of potentially greater consequence due to the possibility of brainstem trauma (2).

The results from the current study agree with the findings reported in a previous study, which determined that tests of CSF collected from the LC are more sensitive for identifying pleocytosis and elevated CSF protein concentrations compared with CSF collected from the CMC in individual patients with spinal cord lesions (5). There was no increase in diagnostic sensitivity based on the spinal cord localization of the lesion on MRI. This may be because the LC is located further from the brain allowing a greater change in NCC along the neuraxis, either via increased permeability or via changes in fluid constituents (6). This information lends support to the idea that the rostro-caudal
gradient can be useful in the diagnosis of CNS disease. The authors believe that the practice of LC CSF collection will result in ease of sampling, decreased risk of RBC contamination, and inherently less risk of iatrogenic CNS trauma in comparison to CMC CSF collection.

Some limitations to this study include the limited sample population, as a result of having to exclude 32 patients from the analysis based on our stringent cut-off value for RBC contamination of 500 cells/μL (2). Prior publications have reported no alteration in NCC with marked RBC contamination, although that finding remains controversial amongst veterinary neurologists (2,7,8). Additionally, 10 of the 54 cases did not have an MRI to verify MRI neurolocalization; these cases were excluded from the analysis involving MRI localization. Only 2 of the included cases had an intracranial localization, limiting conclusions correlating the significance of LC collected CSF

<table>
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<tr>
<th>Breed</th>
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<td>0.22</td>
<td>Neumuscular</td>
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IVDD — intervertebral disc disease; ANNPPE — acute non-compressive nucleus pulposus extrusion; FUO — fever of unknown origin; HOD — hypertrophic osteodystrophy; SRMA — steroid-responsive meningitis arteritis; CSF — cervical spondylomyelopathy; IMPA — immune-mediated polyarthritis; MUE — meningoencephalitis of unknown etiology; FCE — fibrocavitaginous embolism.

MRI was not performed in 10 cases, which were excluded from analysis of MRI localization.
with intracranial disease in this population. Lastly, definitive diagnosis was only attained via necropsy or surgery in 1 case; while this is a major weakness of this analysis, it is consistent with clinical veterinary practice. The inclusion of more cases, standardization of the spinal needle gauge, and documentation of the number of collection attempts would improve future studies on this topic. Selecting cases with definitive diagnoses would further strengthen the finding, although it might also result in selecting cases with more severe disease.

This retrospective analysis contributes data to the existing body of evidence showing an increased concentration of protein in CSF collected from the LC compared with CSF collected from the CMC. When comparing the protein concentration at both locations within an individual, LC CSF analysis is more likely to identify abnormalities at all spinal cord MRI localizations, even when no morphologic lesion is identified on MRI. There was no statistical significance when assessing individual comparisons of CSF NCC and MRI lesion localization. Future studies involving more patients and greater standardization of technique could lend more support to these findings and aid in optimizing patient management. Routine LC CSF collection should be considered in all patients with spinal cord localizations to increase the diagnostic yield.

References

Renaissance BioScience Corp. partners with Mitacs in a million-dollar project to test precision yeast-based RNAi technologies for environmentally friendly agricultural biopesticides and medical biotherapeutics

Renaissance BioScience Corp. (RBSC), a leading global microorganism bioengineering company, is pleased to announce a new partnership with Mitacs, the University of British Columbia and the University of Manitoba for a three-year, $975 000 multi-investigator research and development project.

Mitacs, a not-for-profit organization that fosters growth and innovation in Canada, will provide matching funding for the RBSC project to extend its R&D of an engineered, yeast-based RNA interference (RNAi) production and delivery platform across multiple insect and animal models. This will test and confirm the proof-of-concept utility for the system to augment or replace industrial chemical pesticides in many different agricultural applications, as well as form the basis of an animal and human biotherapeutics production and delivery platform.

“We are pleased to work with Mitacs as a co-funding partner in this exciting project to further develop and test our yeast-based RNAi production and delivery platform, initially in biocontrol and biotherapeutic applications,” said Dr. Matthew Dahabieh, Chief Science Officer, RBSC. “There is a significant potential global market, for these environmentally friendly, RNAi-based technologies, especially in the crop protection and animal agricultural sectors. Up until now, the efficient and cost-effective delivery of RNAi in the field has always been a barrier to adoption. Yeast, however, as a stable, non-toxic and well-understood industrial organism, is an excellent platform to deliver on the promise of RNAi as a biocontrol and medical biotherapeutics agent.”

Alejandro Adem, Mitacs’ CEO and Scientific Director, added, “Yeast-based RNAi therapeutics and biocontrol is an exciting emerging area of research in which Canada can become a world leader. Mitacs is excited to partner on this research and leverage Renaissance’s expertise, while helping to expand Canada’s intellectual capacity in this newly emerging field.”

Contact: Renaissance Bioscience, 410–2389 Health Sciences Mall, Vancouver, British Columbia V6T 1Z3; website: www.renaissancebioscience.com

WVC’s 91st Annual Conference Hits Record High Attendance

A record number of veterinary professionals descended upon Las Vegas for the WVC’s 91st Annual Conference, held February 17–20 at the Mandalay Bay Convention Center.

As the year’s most influential gathering of veterinary professionals and the organization’s flagship event, WVC brought together a record 15 030 of the best and brightest in the veterinary profession for four impactful days of education, innovation, and collaboration, truly creating an event experience that mattered. Industry thought leaders unveiled new trends, knowledge and know-how on preventive medicine, emerging drugs and innovative treatments, operational efficiencies, financial management, staff and customer retention, among hundreds of other continuing education (CE) offerings.

Highlights encompass the expansive Exhibit Hall with over 500 of the industry’s leading companies, the debut of WVC Central, an exciting and interactive organization-focused area on the show floor, new session breaks to allow participants dedicated time to explore products and services, world-class entertainment featuring Keith Urban, Mayim Bialik, and Mel Robbins, plus a multitude of sessions, intimate learning workshops, a sold-out Women’s Veterinary Summit, and variety of hands-on labs at the Oquendo Center.

“We are elated with the success of our 2019 WVC Annual Conference”, said incoming WVC President, Dr. Dennis McCurnin. “Our attendance was a record high and by all the smiling faces I ran into throughout the halls of the convention center, participants truly enjoyed their time with us. Lecture rooms were packed, the Exhibit Hall was bustling, we had non-stop action at the Oquendo Center where more than 27 hands-on courses were presented, the entertainment was off the charts, and of course Las Vegas as a destination never disappoints! We always wonder how we will top each year’s conference in the following year… and 2020 will be no exception. Our team always rises to the occasion. Thank you to all of the participants that chose WVC as their continuing education partner, our exhibitors and sponsors, and to the WVC Board, Education Managers, operational teams, partners, and everyone involved in making the 91st Annual Conference a resounding success.”

Registration for WVC’s 92nd Annual Conference, to be held February 16–19, 2020, will open later this summer. To learn more about the Conference or the variety of programs available throughout the year, visit wvc.org
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PRELIMINARY PROGRAM

COMPANION ANIMAL

• Dental Radiology, Dental Diseases, Principles of Maxillofacial Trauma Repair, Principles of Oral Oncology — Santiago Peralta, DVM, DAVDC, Department of Clinical Sciences, Cornell University of Veterinary Medicine, Ithaca, NY, USA

• Nutrition — Lori Prantil, DVM, VCA South Shore (Weymouth) Animal Hospital, South Weymouth, MA, USA

• Anesthesia and Analgesia — Craig Mosley, DVM, MSC, DACVAA and Cornelia Mosley, DVM, DACVAA, CVA, VCA 404 Emergency and Referral Hospital, Newmarket, ON, CAN

• Neurology — Dr. Curtis Wells Dewy, Cornell University College of Veterinary Medicine, Ithaca, NY, USA

FOOD ANIMAL

• Pharmacology and Pathology — Antimicrobial Stewardship, Phil Buote, DVM, Alberta Veterinary Medical Association, Edmonton, AB, CAN; Reproduction Pathology and Bovine Reproductive Disease, Jennifer Davies, DVM, MVSc, DACVP, University of Calgary, Faculty of Veterinary Medicine, Calgary, AB, CAN

• Opportunities for Veterinarians to Get Involved Beef and Dairy Cow Lameness — Dr. Gerard Cramer, College of Veterinary Medicine, University of Minnesota, MN, USA

• Food Animal Medicine — Calf Resuscitation, Claire Windeyer, DVM, DVSc, University of Calgary, Faculty of Veterinary Medicine, Calgary, AB, CAN; Field Post Mortems, Ashley Gaudet, RVT, VTS-CP, Veterinary Agri-Health Services, Airdrie, AB, CAN; External Parasites, Douglas D. Colwell, PhD, Agriculture and Agri-Food Canada, Lethbridge, AB, CAN; Penis Surgery of the Ruminant, Roy Lewis, DVM, Roy Lewis Veterinary Services, AB, CAN

EQUINE

• More Important Than Medicine - Building a Successful Team — Betsy Charles, DVM, MA, Veterinary Leadership Institute/Western University of Health Sciences

• Equine Reproduction — Etta Bradecamp, DVM, ACT, ABVP, Rood and Riddle Equine Hospital, Lexington, VA, USA

• Equine Farriery and Hoof Related Topics — Sammy L. Pittman, DVM, Innovative Equine Podiatry and Veterinary Services, Collinssville, TX, USA

VETERINARY TEAM

• *Fear Free: Fear Free is the Ultimate Win, Exam Room Secrets Revealed, What does the perfect visit look like, no feel like, for both the vet and the client — Marty Becker, DVM, Founder and CEO of Fear Free, Bonner Ferry, ID, USA

• Client and Staff Communications — Sarah Wooten, DVM, Greely, CO, USA

• Human Resources: hiring, job descriptions, performance reviews — Ms. Heather Lowe, AHT, MBA, Heather Lowe Veterinary Consulting Inc., Acton, ON, CAN

VETERINARY TECHNOLOGIST

• *See Vet Team Program Above — Marty Becker, DVM, Founder and CEO of Fear Free, Bonner Ferry, ID, USA

• Wildlife (1/2 day) — Pain treatment for birds, better animal welfare for wildlife; Restraint, regulations, reducing stress and basic technical skills — Kim Blomme, RVT, WildNorth Northern Alberta Wildlife Rescue and Rehabilitation, Edmonton, AB, CAN

• Dermatology (1/2 day) — Tyler Udenberg, DVM, Dipl. ACVD, North West Veterinary Dermatology Services, Ltd, Vancouver, BC/St. Albert, AB, CAN

*Sunday’s Vet Team and Vet Tech session featuring Dr. Marty Becker will be a combined session

ABVTA PRE-CONFERENCE CE

— SATURDAY, OCT. 19, 2019

• Why Fear Free veterinary visits are the most important transformation to hit veterinary practice in 50 years. Why veterinary technologists must drive fear free and the client experience — Marty Becker, DVM, Founder and CEO of Fear Free, Bonner Ferry, ID, USA
Animal Welfare  
Bien-être des animaux

Barriers to accessible veterinary care

Michelle Lem

The issue of accessible veterinary care has been growing in the veterinary professional discourse. Currently, there is considerable interest in addressing the barriers to accessible veterinary care. Broad categories of barriers to accessible veterinary care include socioeconomic, geographic, and knowledge-based barriers. These are not mutually exclusive of one another and contribute to the complexity of accessible veterinary care. The financial or socioeconomic barriers to care often create the most tension in daily veterinary practice and within the broader profession, while geographic barriers pose both logistical and sociocultural challenges. Barriers to accessible care impact not only animal welfare, but also the experiences of those who care for the animals, animal owners and veterinarians alike. It should be noted that the veterinary profession, animal welfare agencies, and animal health industries have been highly successful in reducing knowledge-based barriers to care through active public engagement, communication, and education on issues such as preventive medicine, population control (spay/neuter), and care for cats. The purpose of this paper is not to provide an exhaustive examination of this challenging issue, but rather to engage with veterinary professionals in an open dialogue on multi-level barriers to care in order to further our understanding.

Research on the issues of accessible veterinary care is being conducted by several groups including the Access to Veterinary Care Coalition (AVCC) at The University of Tennessee Knoxville (1), Shelter and Community Medicine at Tufts University (2,3), the Access to Care Initiative of the American Veterinary Medical Association (4), and the Strategy and Research Department of the American Society for the Prevention of Cruelty to Animals (5). In terms of barriers to accessible care, the recent AVCC report identified challenges to providing care from perspectives of both veterinarians and animal owners. Among veterinarians, factors impacting the provision of accessible care include personal finances (e.g., student debt), concerns about standard of care, workplace policies, and devaluing professional services. This report also identified how veterinarians’ attitudes on pet ownership may impact the provision of accessible care: “the majority of respondents do not think everyone is entitled to own a pet…However, veterinarians in urban areas were more likely to believe that everyone is entitled to a pet and that society bears some responsibility to help care for all pets” (1). Among pet owners, socioeconomic and financial factors are not surprisingly, significant barriers to accessing veterinary care along with transportation challenges, not having appropriate equipment (e.g., carrier), geographic barriers, and not knowing where to get care (1).

As noted earlier, the issue of accessible veterinary care is complex. Therefore, in order to examine this issue in a structured approach, a One Health framework will be used. Adopting a One Health model ensures that other sectors and stakeholders are considered, as well as the interactions between sectors. Additionally, it supports the examination of complex issues from multiple levels, including individual, institutional and systemic, and structural levels. For the purposes of this paper in exploring the barriers to accessible care, the human sector of the One Health model will include both individual and institutional or systemic barriers, whereas structural barriers and influences will be considered within the broader environment sector. A nested One Health model was developed by the author in order to frame the rest of the discussion (Figure 1). Similar to social determinants of health frameworks (6), a nested model appropriately describes how larger structures influence both systems and individual experiences in the context of accessible care.

Naturally, the sector that has been most explored in terms of accessible care is the human sector. As mentioned previously, the stakeholders providing individual care include both animal owners and veterinarians. Socioeconomic and/or financial factors are obvious barriers for animal owners to access veterinary care in terms of available disposable income and affordability. However, financial factors may also be barriers for veterinarians in providing care. For example, financial factors for veterinarians including operational costs and remuneration models based on production may influence provision of care. Education level influences access to care for animal owners both directly through an awareness of the health needs of animals and indirectly through the effect of education level on employability.
socioeconomic, and financial status. Similarly, for veterinarians, the cost of education creates significant debt load and when remuneration is tied to production may create further financial barriers. Geographical factors for animal owners may be tied to socioeconomic status for those living in impoverished areas, but also for rural or remote areas which may be “care deserts” where there are few to no veterinary services available. Such geographical issues impact care provision for veterinarians as well, creating logistical, operational, and financial challenges in serving large geographical areas with smaller populations, as well as challenges in attracting veterinarians to rural and remote areas. The issue of serving rural and remote populations is not unique to veterinary medicine and is tied to several larger systems and structures.

The role of demographics and culture on barriers to care further adds to the complexity of this issue. Among animal owners, cultural roles of animals, expectations of care, and individual experiences contribute to accessing veterinary care. For example, self-sufficiency, stoicism, and trust are cultural issues that have been identified as barriers to accessing care among rural Canadian farmers (7). Among veterinarians, similar factors of roles of animals, expectation of care, and individual experience impact where, how, when, and to whom care is provided. As mentioned, attitudes and perceptions on the right to pet ownership, the value of veterinary care, as well as risk and liability, and appropriate standards of care contribute to the provision of care.

Systems within the human sector include human health systems, education, and regulations, legislations, and policies. The human health system is relevant to the discussion on accessible veterinary care, as there are still considerable barriers to accessing care from both factors and sectors has been explored; however, large structural factors are often ignored in discussions on accessible care. Much like the social determinants of human
health, broad socioeconomic, cultural, and environmental conditions in which we live and work have a powerful influence on both human and animal health (10). Environmental conditions including climate change, urbanization, and globalization impact the daily lives and experiences of individuals, families, communities, and the animals with which we live and work. For example, the effects of climate change disproportionately affect the poor and vulnerable, humans and animals alike. Environmental inequalities and injustices include speciesism via wildlife extinction and endangerment but are also experienced in urban populations. One well-known example is hurricane Katrina, in which environmental injustice and human (and animal) neglect were shown to be tied to race, education, and class (11) and further prompted the 2006 US Pet Evacuation and Transport Standards (PETS) Act (12). This environmental disaster highlighted the impacts of structural inequalities on both humans and animals.

It is in this way that political socioeconomic factors are important to consider when discussing the issues of accessible veterinary care, as these large factors are also tied to deeper issues of race, class, and gender inequalities. As veterinary care is fee-for-service, to exclude discussion of these issues would be to ignore the reality of people’s lived experiences in current political socioeconomic times. As previously stated, the issue of accessible care is complex, and while exploring these barriers through lenses of One Health and structural influences may uncomfortably increase its complexity, our social discourse and actions must include ways to acknowledge and address these multi-level barriers to accessible care.

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— NDLR
1. A) With ectopic ureters, urine will dribble from the vulva or penis. A fistula is possible but exceedingly rare. With PSMI, urine should dribble from the vulva.
A) Avec la présence d’uretères ectopiques, l’urine s’égouttera de la vulve ou du pénis. Une fistule est possible mais excessivement rare. Avec la présence d’ISU, l’urine s’égouttera de la vulve.

2. A) Struvite stones in both dogs and cats are amenable to medical dissolution. Alkaline urine favors struvite precipitation. Struvite crystalluria does not predict the presence of a stone. Crystals are often present in the absence of a stone.
A) Les calculs de struvite chez le chien et le chat peuvent faire l’objet d’une dissolution médicale. L’urine alcaline favorise la précipitation de struvite. Une cristallurie de struvite n’annonce pas la présence de calculs. Des cristaux sont souvent présents en l’absence de calculs.

3. E) The magnitude of azotemia, as well as the serum phosphorus level, can be identical in either AIRF or CRF; there is no discriminatory value. Early in AIRF, the serum phosphorus value may be increased out of proportion to the BUN or creatinine. Both conditions are often associated with dehydration. Lesions of acute tubular necrosis often are quite subtle, or none can be found from biopsies taken from the renal cortex.
E) L’ampleur d’azotémie et le taux de phosphore sérique peuvent être identiques dans l’IRIA et l’IRC, il n’y a pas de valeurs discriminatoires. Tôt dans l’évolution de l’IRIA, la valeur du phosphore sérique peut être augmentée hors proportion aux valeurs du BUN ou de la créatinine. Les deux problèmes sont souvent associés à la déshydratation. Les lésions de nécrose tubulaire aiguë sont souvent subtiles ou aucune n’est visible lors de biopsies du cortex rénal.

4. B) Xylazine does not have an oxytocic effect on the heavily pregnant equine uterus.
B) La xylazine n’as pas d’effet oxytocique sur l’utérus lourd d’une jument gravide.

5. D) Gangrenous mastitis always results in loss of function of affected quarters. The case mortality rate is high. Affected quarters will slough in cases that survive beyond the subacute stage of the disease.
D) Une mammite gangreneuse résulte toujours dans la perte du quartier atteint. Le taux de mortalité est élevé. Les quartiers atteints vont tomber dans le cas de survie des animaux au-delà du stade subaigu de la maladie.

Answers to Quiz Corner
Les réponses du test éclair

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- Prolonged release mineralocorticoid replacement therapy with a non-mercury-based preservative
- Subcutaneous (SC) injection for easier administration and client compliance
- Easy to start in treatment-naïve dogs, and easy to switch in existing cases
What Can’t Be Taught
Ce qui ne s’enseigne pas

Passionate Canadian Veterinary Medical Association life member shares valuable wisdom

Alexandra Schlesiger

"I have few, if any regrets, that would make me want to start over and do something differently in my career," states Dr. Clayton MacKay. “One day, while traveling to Washington for an animal welfare meeting in the late 1980s, for a moment, I was sure I was going to die in a plane crash in Buffalo during a violent thunderstorm. As my life flashed before me, my only regret was that my life was ending in Buffalo, not in a more exciting place like Paris, Tokyo, or Melbourne. Somehow this comforted me, I knew I was on the right track and that I would be able to handle any problem.”

Dr. MacKay, a life member of the Canadian Veterinary Medical Association (CVMA), is a career veterinarian with 22 years of experience as a companion animal practice owner, and 4 years in academic administration of a veterinary teaching hospital. Dr. MacKay has spent 13 years working in the veterinary industry, including his role as the Director of Veterinary Affairs at Hill’s Pet Nutrition Canada. He also has 45 years of involvement in organized veterinary medicine under his belt, including past roles as President of the American Animal Hospital Association, Ontario Veterinary Medical Association, College of Veterinarians of Ontario, Toronto Academy of Veterinary Medicine, and the Society of Veterinary Medical Ethics.

Dr. MacKay’s interests now include increasing the visibility and importance of veterinary medicine to the public via speaking engagements and presentations throughout North America, Europe, and Asia on practice management, pet nutrition, and the future of the veterinary profession. His specialties include business consulting for veterinary practices, providing an overview and history of the veterinary profession, and networking global connections in the companion animal practice world.

“Dr. Clayton MacKay is an outstanding veterinarian, mentor, and colleague, with many national and international contributions to the veterinary profession,” says Dr. Bernhard Pukay, a fellow CVMA life member and Past-President, CEO, and general practitioner of the Alta Vista and Bayview Animal Hospitals. "He is highly regarded for his thoughtful demeanor, his true interest in people, and his insight into the challenges and opportunities we all face. For over 40 years, Dr. MacKay has mentored many talented veterinarians, helping them accomplish their goals and understand the breadth and depth of veterinary medicine.”

Dr. MacKay, a second-generation veterinarian, graduated from the Ontario Veterinary College (OVC) like his father. He entered private practice, becoming a partner in MacKay Animal Clinic and, in 1993, he returned to OVC’s Veterinary Teaching Hospital as the Director. Dr. MacKay has volunteered countless hours serving as President for many notable organizations and as an advisor to the Pickering, Ajax, and Whitby Animal Control for 15 years.

Dr. MacKay grew up watching his father, who, at a young age, gave him insight into what the working life of a veterinarian entailed. However, because of his active involvement in high school, and then university, Dr. MacKay formulated his own methods for dealing with multi-tasking. “I participated in school sports and clubs and volunteered in student activities,” says Dr. MacKay. “While I understood the value of my academics, I somehow knew I needed to add to my soft skills which were not taught or rarely mentioned in my school curriculums or early in my veterinary career.”

Mental health in veterinary medicine has been an important topic of discussion, especially over the past few years. Dr. MacKay became involved in creating awareness around the profession’s mental health and potential suicide crisis when former CVMA President, Dr. Douglas Roberts, asked him to present his paper titled “Health Risks for Veterinarians” at the 2010 CVMA Convention Summit, an annual forum in which Canadian and international veterinary leaders share information on key veterinary issues. “Having personal knowledge of at least 3 suicide cases involving veterinarians, including my retired partner and father, mental health issues have become very important in my life,” explained Dr. MacKay. “Preparing for the CVMA Summit exposed me to a subject that, up to that point, I only paid attention to in passing. Giving that talk, and ones that followed, gave me insight into the mental health risks all veterinarians may face in their lives. Until that time, I had never used the words suicide and veterinarian in the same sentence, even though suicide ended my father’s life.” From that
point forward, he has continued to spend time on mental health issues, helping anyone he can and supporting veterinary medical associations provide resources and help for their members.

One thing Dr. MacKay learned in veterinary college is that success is not born out of high marks and class standings. “During my undergrad, I took the time to do many things which, in my opinion, were the additional puzzle pieces that allowed me to have a lifetime of pleasure in my chosen career,” says Dr. MacKay. “While at times I wished I dedicated more time to my studies, I found that learning how to manage a student government or fraternity gave me insights unavailable to every student. Finding out you can carry on and learn something from failure became more and more important in my life as a clinician, business owner, academic administrator, and member of the veterinary industry.”

One piece of advice Dr. MacKay has for new graduates is to not get too set in what they foresee as their future. “Prepare extensively for the most rapidly changing environment you have ever seen,” he urges. “Doors will open, and you need to be prepared to walk through them, regardless of what is on the other side.”

In 1968, at 24 years old, Dr. MacKay took his first airplane from Toronto to Saskatoon to visit the brand new Western College of Veterinary Medicine (WCVM), as its first class graduated, and to host a CVMA annual meeting. Along with a fellow OVC student, 2 students from the Faculty of Veterinary Medicine (FMV) of the University of Montreal and 2 from WCVM, they attempted to transform the CVMA’s student association into a Canada-wide group, instead of only OVC students. At that time, Dr. MacKay was elected as the first President of what is now known as the Students of the CVMA, representing all 5 Canadian veterinary colleges. “Unfortunately, in that first year, FMV chose not to join, so we moved forward with just OVC and WCVM,” says Dr. MacKay. “Again, an early personal lesson in failing that has allowed me to accomplish many wonderful things since then.”

Dr. MacKay shares the CVMA’s opinion that mentorship today is more important than ever. “During my undergrad, Dr. Jim Lennox, a practitioner turned faculty member, was always available, professionally and personally, with great advice and more importantly a listening ear for my problems, real or perceived,” he says. “I understand that undergraduates and recent graduates ask for such people but, in my experience, they don’t seek this help often. As a registered mentor in the CVMA Mentorship Program for over 4 years, I have yet to see a new graduate seek advice from me. Whether new graduates are unaware of the program or uncertain of the available help, I know there are several amazing veterinarians on the CVMA mentor roster who could offer sound counsel to anyone in need. Just ASK!”

“Dr. MacKay has been a leader, pioneer, and teacher for many generations of veterinarians and through many changes in the profession,” asserts Dr. Pukay. “He has a genuine passion for the profession, a high level of integrity, and is always contributing his time to the advancement of veterinary medicine and its role in society.”
Help for new veterinary school in Madagascar

Jerry Haigh

During a recent visit to Madagascar I was shown the new small animal clinic at the University of Antananarivo, the capital of Madagascar. Dr. Ando Miharifetra is tasked with the development of the clinic at the main campus of the School of Veterinary Medicine. He has written that this is the first veterinary clinic for the training of students in Madagascar. I was impressed with the design of the clinic as well as the aims and hopes of the faculty who showed me around. Dr. Ando is seeking an experienced small animal clinician to take on both teaching and clinical responsibilities. Madagascar has three official languages, Malagasy, French, and English. The applicant should either be fluent in or have a working knowledge of French.

Anyone interested in the position or able to help with donations can e-mail him directly — contact information follows.

The stated objectives of the clinic are
• to ensure proper practice of veterinary medicine, including consultations, care, and surgeries;
• interpretation of laboratory data;
• initial and continuing training for veterinary students; and
• capacity building of practicing veterinarians.

Figure 1. The new clinic with its spectacular curved design. Exam room, surgery suites, and labs are all accessible from the outside corridor.

Figure 2. Second year students in front of the new clinic.

Figure 3. Established lecture rooms and student labs beside the clinic.

Figure 4. One of the rooms inside the clinic.

Dr. Haigh is a retired professor, Western College of Veterinary Medicine, Saskatoon, Saskatchewan. Use of this article is limited to a single copy for personal study. Anyone interested in obtaining reprints should contact the CVMA office (hbroughton@cvma-acmv.org) for additional copies or permission to use this material elsewhere.
Target species are
- dogs and cats;
- exotic pets including guinea pigs and chameleons; and
- wild animals such as lemurs, tortoises, and birds.

The creation of a special unit for wild animals such as lemurs, tortoises, and birds is one of the priorities to protect the unique biodiversity in Madagascar. The school is actively engaged in community projects that include a spay-neuter program in rural areas that is linked with a rabies vaccination program and there is a chicken vaccination program to protect against Newcastle disease.

The chicken vaccination program was developed as a conservation effort by Dr. Christopher Golden of Harvard University, who was joined by Drs. Graham Crawford and Susan Ostapak of the San Francisco Zoo and other experts from around the world. Dr. Ando now heads the in-country program.

Details of how the unlikely combination of chicken vaccination and lemur conservation evolved can be found online at wildlifehealthnet.org. The first link on the site, titled Improving Chicken Health To Promote Livelihoods And Decrease Bushmeat Hunting In Madagascar tells the story. This account provides blog links to the way in which the program impacts rural communities and the conservation of endangered lemurs. An embedded YouTube video in the third one gives an insight to village life and the vaccination work.

To learn more details about what is still needed to bring the clinic up to modern standards of animal care please contact Dr. Ando at miharifetrando@gmail.com Tel: 1261 34 06 405 98.
The Art of Private Veterinary Practice
L’art de la pratique vétérinaire privée

Inadequate communication

Myrna Milani

When asked what kinds of client communication scenarios trouble her the most, Dr. DeGraff’s family and friends expect her to say those related to an animal’s euthanasia or conditions for which no curative treatments exist. As soon as the practitioner agrees that these are troubling — and sometimes emotionally draining — client interactions, those people assume that she agrees with them and move on to discuss other topics.

When Dr. DeGraff mentions the exchange to a fellow practitioner and recent graduate, she admits that she really did not agree with this answer completely. She gave it because she knew it was the expected response. The kinds of client interactions that troubled her most were not only those related to death and dying. They also were the ones that made her feel inadequate in some way.

“While some of these are related to terminal situations, others are more mundane and even what some people might consider trivial,” she admits. “But I hate it when I know clients want more information from me and I can’t give it to them for some reason. It makes me feel so incompetent.”

She goes on to tell the other practitioner how sometimes she winds up saying something that sounds lame to her just to say something. But she always regrets this. Whether clients respond with skepticism or acceptance, she feels like she has failed them and their animals.

Fortunately, the practice owner, Dr. Herrera, overhears this exchange between these two associates and points out that no practitioner is omniscient no matter how much that person or others may want to believe this is true. However, he also acknowledges that the gap between not-knowing and accepting this may seem insurmountable at times. But although his younger colleagues find this reassuring, it does not tell them how to respond when the potential for such client interactions exists. Their employer then describes a 2-step process he finds helpful at these times.

“The first thing I do is decide whether I can provide the information the client wants. For example, if they want more information than I can give them about their animal’s condition, treatment, prognosis or anything related to it that I don’t know, I don’t hesitate to admit it,” he explains. “But that’s not where I stop. I also tell those clients that I’ll get more information for them. Then I check the necessary veterinary databases, seek input from more experienced colleagues, hit the books. Whatever it takes.”

Dr. Herrera goes on to say that he spent much more time doing that as an inexperienced young veterinarian than he does now. However, it was not until later that he realized this was normal. He also admits that the biggest hurdle to meaningful client communication he had to overcome back then was his ego. Even though he knew he did not and could not know everything there was to know about veterinary medicine, he did not want to admit to clients that this was the case. But like other inexperienced practitioners who attempt to cover their ignorance with lame answers, he soon discovered that this approach more often than not led to more client questions for which he had no viable answers either. He also discovered to his great embarrassment that some of his clients recognized his feeble attempts to placate them for what these were: attempts to hide his ignorance. While most of those clients attributed his responses to his youth and lack of experience, others sought veterinary care from someone else. Faced with this reality, he realized that it would be less time-consuming, nerve-wracking, and costly to admit any lack of knowledge up-front if he wanted to succeed.

At that time an older colleague reminded Dr. Herrera, the then-new graduate seeking to fill his knowledge void, that there were members of the veterinary faculty at his alma mater who were more than willing to answer questions from graduates. He should not perceive contacting them as an admission of his own inadequacy. He should perceive them as people with whom he already had a relationship who could serve as valuable sources of the latest information.

“When that older practitioner put it that way, I realized I didn’t hesitate to ask those same people questions when I attended continuing education meetings,” he admitted to his Dr. Milani is a behavior and bond practitioner, teacher, and author of several books on the interaction of animal behavior, health, and the human-animal relationship.

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younger associates. “Like I said, it was my problem, not theirs. Once I started looking at them as valuable resources instead of judges, it became easier. That’s not to say that all of them possessed what I considered stellar communication skills. But I didn’t — and still don’t — always possess them either!”

When Dr. DeGraff brought up the option of doing a literature search on the subject in question using an academic search engine instead, the practice owner did agree that she could gain valuable information that way. However, that would depend on the kind of information her clients wanted to know. If they wanted to know about the latest treatment options available for their animal’s condition, then contacting those routinely implementing these treatments in a teaching hospital would provide more pertinent information faster than researching the minutia of each option separately in the professional literature.

A situation that increasingly results in feelings of communication inadequacy even in the most experienced practitioners occurs when clients present animals transported long distances that arrived with little or questionable histories. Often by the time the veterinarian sees these animals, they may have medical or behavioral problems too. At such times, clients often turn to their veterinarians for answers to a wide range of questions about their new animals. Further complicating matters, their questions may be the same ones clinicians have as they review the limited documentation with which the animals were shipped. What genetic predispositions and epigenetic influences contribute to this animal’s health and behavior? Does this dog or cat belong to any breed or specific breed mix? Or is the animal the offspring of generations of free-roaming scavengers and predators who survived on human garbage or the vermin it attracted? What’s the probable cause of the animal’s cough or diarrhea: is it contagious to other animals in the client’s home or the people who live there?

These and other natural and legitimate questions are those for which practitioners may have no concrete answers. Simultaneously, the new owners of these animals may want immediate answers because they have not had the animal long enough to create the kind of bond that would support successful treatment of serious problems. Some of those people also may believe that the individual or organization from which they adopted the animal has taken advantage of them and want hard facts to support or refute these beliefs.

These situations can be time-consuming and also generate feelings of inadequacy. At the same time though, Dr. Herrera’s younger associate has a better understanding of how the companion animal rescue and transport system works than he does. She contacts the veterinary authorities in the province, state, or region from which the animal was shipped. Even if they can provide her with little information specific to the shelter or rescue responsible for shipping the animal, they can tell her about their free-roaming canine and feline populations and what diseases and parasites are common in their areas. While she does this, she enlists the client’s help to track down information about where the animal came from, how the animal was transported (alone or with other animals, directly from source to adopter accomplished by one person, or accomplished in a series of jumps from foster homes over a large area), and any other information that might be helpful.

Although Dr. Herrera had reservations about his associate’s approach, he was surprised by how many clients were willing to do this and the quality of the information they collected. This gave Dr. DeGraff more time to again information specific to the animal’s medical or behavioral problems. In such a way, she increased her own knowledge at the same time as she made her client’s active participants in the fact-finding process. Rather than feeling inadequate or victimized by the experience, they felt empowered. Even if they ultimately decided that the kind of bond necessary to sustain the amount and quality of care the animal needed did not exist between them, they considered the veterinarian’s help and support invaluable.

Effective communication consists of 3 components: the speaker, the message, and the recipient. When practitioners experience client interactions in which they judge their ability to communicate with the client inadequate, one or more of these components may contribute to the problem. In the examples discussed, the problem was not the practitioners’ or the clients’ lack of desire to communicate to the help the animal. It was the practitioners’ reluctance to admit that they could not provide the information the clients wanted. By accepting this without guilt and addressing the deficit, the practitioners gained their clients’ respect and appreciation rather than the criticism they feared.
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