Demographics of the Canadian dairy industry from 1991 to 2011

Autologous vaccination for the treatment of equine sarcoids: 18 cases (2009–2014)

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Antimicrobial dispensing by Ontario dairy veterinarians

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Hypertrophic osteopathy associated with hepatocellular carcinoma in a dog

Diode laser coagulation for the treatment of epistaxis in a Scottish fold cat

Glenoid dysplasia and osteochondritis dissecans in a cat

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President’s Message  
Mot du président

The CVMA and the veterinary profession in Canada  
L’ACMV et la profession vétérinaire au Canada

D uring my term as president of the Canadian Veterinary Medical Association (CVMA), I had the opportunity to meet many veterinarians, from St. John’s to Vancouver. Many interesting discussions were had. I was surprised to find out that the majority of veterinarians whom I met knew very little about the work accomplished by the CVMA. Most importantly, few members and non-members know that the work accomplished by the CVMA staff and volunteers has a direct daily impact on their professional lives.

So, for my last message, I decided to present some examples that illustrate the importance of the CVMA for Canadian veterinarians and the veterinary profession.

I will not go into detail about member services, as most provincial associations offer similar benefits. However, some of the services offered are unique. The group insurance program is currently the best one offered to Canadian veterinarians and the rebates received when joining this program are generally greater than the CVMA membership fee. And what about the possibility of a personalized Web store for your practice? This added value can help you re-launch your sale of pet food and other products. Lastly, recent surveys have shown that the suggested fee guides, the reports on compensation of veterinarians and on wages of non-veterinarians were appreciated by members. I invite you to visit the CVMA website to see all the other services that are offered to members. There is something for everyone, for owners as well as employees.

As you know, the practice of veterinary medicine is under provincial jurisdiction in Canada. However, many of the decisions affecting the profession are made by federal and international agencies. The CVMA is the national and international voice of Canadian veterinarians and it takes on a leadership and advocacy role for veterinary medicine in Canada and on the international stage. Here are 2 examples of advocacy work accomplished by the CVMA on behalf of all Canadian veterinarians.

T ough I have been solely focused on the subject of leadership in my previous messages, I will now shift to the topic of advocacy work. This is an important aspect of the CVMA’s role as it helps to protect the interests of the veterinary profession.

One example is the advocacy work done by the CVMA in relation to the proposed changes to the Veterinary Practice Act in Nova Scotia. The CVMA was able to effectively communicate the concerns of its members to the government and influence the final legislation. This is an example of how the CVMA is able to protect the interests of its members.

Another example is the advocacy work done by the CVMA in relation to the proposed changes to the Animal Health Act in Alberta. The CVMA was able to influence the final legislation, ensuring that the interests of the veterinary profession were protected. This is another example of how the CVMA is able to protect the interests of its members.

In both cases, the CVMA was able to effectively advocate on behalf of its members, protecting their interests and ensuring that their concerns were heard. This is an important aspect of the CVMA’s role, and one that I hope to continue to see in future messages.
For more than 15 years, the CVMA has been active in the fight against antimicrobial resistance (1). The CVMA has succeeded in showing various federal authorities that it is serious about reducing the devastating impact of antimicrobial resistance. So much so that it is now considered an indispensable partner by Health Canada, the Public Health Agency of Canada, Agriculture and Agri-Food Canada and the Canadian Food Inspection Agency. The CVMA is present at meetings on the federal framework for antimicrobial resistance. This means that the opinions of veterinary practitioners are always heard in those discussions. This is essential in order to avoid making decisions that do not take into account the reality of veterinarians working in the field.

My 2nd example concerns the right of veterinarians to sell antibiotics. This prerogative could soon be questioned. Several active stakeholders from the antimicrobial resistance camp regularly bring up the supposed conflict of interest that veterinarians have when they sell antibiotics. In fact, according to them, veterinarians have a stake in selling more antibiotics to improve their revenues. Therefore, these stakeholders pressure federal authorities to take away the right of veterinarians to sell antibiotics. The CVMA has defended and will continue to defend the right of veterinarians to continue to sell antibiotics. The CVMA considers that these affirmations demonstrate a lack of respect toward veterinarians who protect animal and public health every day, and display an exceptional commitment and strict oversight for the use of antimicrobials. The only winners of such a move would be companies and pharmacies of all types (including online pharmacies) that have been trying for several years to break through the veterinary market.

Our French colleagues were almost subjected to such regulations. In 2013, the Health Minister of France wanted to enact a law that would have prevented veterinarians from selling antimicrobials. Ten thousand veterinarians took to the streets of Paris and, thanks to an unprecedented mobilization and the involvement of their national association, the Minister reversed his decision.

This is only the tip of the iceberg. We have been informed by our American partners that large American retailers, which are also now established in Canada, are exerting pressure on various levels of the American government to prevent veterinarians from selling any medications at all! The lobby groups have won the first battle and an American law is now forcing veterinarians to give a written prescription to all clients requiring medications. The client then decides if he/she wants to buy from the veterinarian or elsewhere. It is only a matter of time before these companies exert similar pressures on Canadian federal authorities and take this issue to court to advance their economic interests.

These lobby groups will not stop working at the national level and they will not hesitate to exert pressure on international organizations like the World Health Organization (WHO), the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), and World Trade Organization (WTO), to name only 4. These organizations have the power to issue recommendations that could influence the practice of veterinary medicine in Canada. Autant au Canada qu’à l’international. Voici deux exemples qui décrivent bien la défense des intérêts de tous les vétérinaires canadiens par l’ACMV.

Depuis plus de 15 ans, l’ACMV est très active au chapitre de l’antibiorésistance. L’ACMV a réussi à démontrer aux diverses autorités fédérales le sérieux de sa démarche pour diminuer les effets dévastateurs de l’antibiorésistance. Tant et si bien qu’elle est maintenant considérée comme un partenaire incontournable par Santé Canada, l’Agence de la santé publique du Canada, Agriculture et alimentation Canada et l’Agence canadienne d’inspection des aliments. L’ACMV est présente aux réunions portant sur le cadre d’action fédéral sur la résistance aux antimicrobiens. Ce qui signifie que le point de vue des vétérinaires praticiens canadiens est toujours entendu lors de ces discussions. C’est essentiel, afin d’éviter des prises de décisions qui ne tiendraient pas compte de la réalité des vétérinaires œuvrant sur le terrain.

Mon deuxième exemple porte sur le droit qu’ont les vétérinaires de vendre des antibiotiques. Cette prérogative pourrait bientôt être remise en question. En effet, plusieurs intervenants actifs dans le milieu de l’antibiorésistance soulèvent régulièrement le supposé conflit d’intérêt qu’ont les vétérinaires en ce qui a trait à la vente d’antimicrobiens. En effet, selon eux, les vétérinaires ont intérêt à vendre plus d’antibiotiques afin d’améliorer leurs revenus. Par conséquent, ils font pression auprès des autorités fédérales afin que les vétérinaires ne puissent plus vendre d’antibiotiques. L’ACMV défend, et elle continuera de défendre, le droit des vétérinaires à continuer de vendre des antibiotiques. L’ACMV considère que ces affirmations représentent un manque de respect à l’honneur et l’honnêteté des vétérinaires qui, tous les jours, garantissent la santé animale et la santé publique pour la population canadienne, grâce à un engagement exceptionnel et à une supervision étroite de l’usage des antimicrobiens. Les seuls gagnants d’une telle mesure seraient les compagnies et pharmacies de tout acabit (dont les pharmacies en ligne) qui essayent depuis des années de percer le marché vétérinaire.

Nos collègues français ont failli vivre une telle réglementation. En effet, en 2013, le ministre de la Santé de la France a voulu promulguer une loi empêchant les vétérinaires de vendre des antimicrobiens. Dix mille vétérinaires ont pris d’assaut les rues de Paris et, grâce à une mobilisation sans précédent et à l’implication de leur association nationale, le ministre est revenu sur sa décision.

Et ce n’est que la pointe de l’iceberg. Nous avons été mis au courant par nos partenaires américains que de gros détaillants américains, qui sont maintenant aussi établis au Canada, font pression auprès des différents paliers de gouvernement des États-Unis afin d’empêcher les vétérinaires de vendre des médicaments, quels qu’ils soient! Ces groupes de pression ont gagné la première bataille. En effet, une loi américaine oblige dorénavant tous les vétérinaires à donner une ordonnance écrite à tous les clients qui ont besoin de médicaments. Par la suite, le client décide s’il désire acheter ses médicaments chez son vétérinaire ou ailleurs. Ce n’est qu’une question de temps pour que ces entreprises fassent des pressions similaires auprès des autorités fédérales canadiennes et aillent même en cour afin de faire valoir leurs intérêts économiques.

Ces groupes de pression n’arrêteront pas leur travail au niveau national et n’hésiteront pas à faire pression auprès d’organismes...
For all these reasons, the CVMA must continue to represent and defend the interests of the profession and of Canadian veterinarians on all national and international levels.

These are only a few examples of the work accomplished by the CVMA to defend the interests of the veterinary profession and Canadian veterinarians. We count on the support of all Canadian veterinarians to continue to do this work well.

Jean Gauvin

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For all these reasons, the CVMA must continue to represent and defend the interests of the profession and of Canadian veterinarians on all national and international levels.

These are only a few examples of the work accomplished by the CVMA to defend the interests of the veterinary profession and Canadian veterinarians. We count on the support of all Canadian veterinarians to continue to do this work well.

Jean Gauvin

Ce ne sont que quelques exemples du travail qu’effectue l’équipe de l’ACMV afin de défendre les intérêts de la profession et des vétérinaires canadiens. Nous comptons sur l’appui de tous les vétérinaires canadiens afin de continuer à bien le faire.

Jean Gauvin

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Ethical question of the month — July 2015

You recently joined a mixed animal practice that is an hour outside of a major metropolitan area. Many of the traditional livestock farms in the area are being purchased by suburbanites with significant off-farm income. They often keep a couple of horses or have a small goat herd or sheep flock. Your new employers are struggling to adjust to treating “farm” animals that are more closely tied to the emotional rather than the financial interests of the owners. Recently a horse with colic was seen by your colleague, treated with analgesics and the owners were instructed to walk the horse whenever it showed signs of colic. There has been little improvement over the past two days, the owners call several times a day to express their concerns and the senior partners continue to advise over the phone to keep walking the horse. You suggest it might be wise to refer this horse to a neighboring practice with more equine experience. Your employers are not in the habit of referring cases and are reluctant to invite in a competing practice. The horse is not improving. 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 résponses 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 D’ 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.

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Ethical question of the month — April 2015

A long-standing client of your mixed animal practice passed away recently and his widow is moving to a nursing home where pets are not allowed. She requested that you find a suitable home for their 6-year-old Labrador retriever. You recently had to euthanize the 16-year-old shepherd-cross that belonged to a family that lives on a hobby farm. You call and enquire as to whether they would be interested in adopting the Labrador and they gladly accept. When they come to pick up the dog they are most grateful and explain that they had been unable to adopt a dog because no shelter or rescue association would provide a dog to a family that did not keep the dog in the house. They had resigned themselves to purchasing a dog from a breeder. This family’s dog has free access to a heated garage with a heated dog bed. You have taken care of this family’s pets and livestock for over a decade and find them exceptionally caring and attentive owners. You cannot believe that a shelter would deny a dog to such an excellent home. You contact a few shelters to enquire regarding their adoption policies and find that they only offer dogs to people who keep their pets in the house. There was a long list of additional restrictions some of which you also found unreasonable. **Is it in the best interest of companion animals to have such stringent requirements regarding adoptions?**

Question de déontologie du mois — Avril 2015

Un client de longue date de votre pratique mixte est récemment décédé et sa veuve déménage dans un foyer de soins infirmiers où les animaux sont interdits. Elle vous a demandé de trouver un bon foyer pour leur Labrador retriever âgé de 6 ans. Vous avez récemment dû euthaniser le chien berger de race croisée âgé de 16 ans qui appartenait à une famille habitant sur une ferme d’agrément. Vous appelez la famille et vous lui demandez si elle aimerait adopter le Labrador, ce qu’elle accepte avec joie. Lorsqu’elle arrive pour chercher le chien, elle est très reconnaissante et explique qu’elle ne réussissait à adopter un chien parce qu’aucun refuge ni association de sauvetage ne donnait un chien à une famille qui ne le gardait pas dans la maison. Ils s’étaient résignés à acheter un chien auprès d’un éleveur. Le chien de cette famille avait librement accès à un garage chauffé doté d’un lit chauffant. Vous soignez les animaux de compagnie et le bétail de cette famille depuis plus d’une décennie et vous trouvez que ce sont des propriétaires exceptionnellement compatisants et attentifs. Vous ne pouvez pas croire qu’un refuge refuserait un chien à cet excellent foyer. Vous contactez quelques refuges pour vous informer de leurs politiques d’adoption et vous constatez qu’ils offrent seulement des chiens aux personnes qui les gardent dans la maison. Il y avait aussi une longue liste de restrictions dont certaines vous semblaient déraisonnables. **En va-t-il du meilleur intérêt des animaux de compagnie que les refuges imposent de telles exigences restrictives pour les adoptions?**

An ethicist’s commentary on shelter reluctant to adopt

Let me begin with a caveat: the vast majority of people working in animal shelters do not fit the description I am about to present. Most are dedicated, selfless people who take it upon themselves to rectify grievous social wrong.

But in too many cases over the past 40 years, I have encountered an insufferable sanctimonious attitude on the part of a small number of those who have taken upon themselves the very real burden of dealing with the societal problem of unwanted animals needing to be homed. According to this attitude, no home is good enough for the animals for whom they have assumed responsibility. In one case, there was a prominent veterinary oncologist employed at the Colorado State University College of Veterinary Medicine and Biomedical Sciences who was attempting to acquire a dog from a shelter as a family pet. He worked very long hours on numerous cancer patients for whom he effected unprecedented cures. After repeated home visits, the shelter refused to place an animal with him, since “he was not home enough." I could not imagine a better owner with a nicer family!

I have encountered the same story in far too many shelters — the self-appointed guardians of animal welfare seem to believe that the animal is better off dead than placed in what they deem to be a less than perfect home! In stark contrast to this inexplicable attitude, my close veterinarian friend Brian Forsgren, who has spent decades unselfishly serving a ghetto community by providing affordable veterinary care, has repeatedly stressed, both in narratives and in his photographs, that these pets may belong to people whose clothes are in tatters, but whose animals are immaculate, well fed, and well cared for. As Brian tellingly puts it, who would be willing to say that a companion animal means more to a rich person than to a poor one.

Besides having to answer a battery of questions paralleling what one might be required to answer for adopting a child, a shelter sometimes consider an animal “unadoptable” for indefensible reasons. Foremost among these reasons are spurious “behavior tests” administered by self-appointed “behavior experts.” Failing these tests may amount to a death sentence for the animal. In one horrifying case I witnessed, a dog was moved from his kennel into a common area, growled at another male dog, and was euthanized for being “overly aggressive.”

In 1978, I gave my first public speech on these issues. I argued that too many shelters protect the public from the ugly truth of their behavior, rather than the animals. In attendance was Richard Avenzino, who had just taken over running the
San Francisco Society for the Prevention of Cruelty to Animals (SPCA). He came up to me after my talk, shook my hand and told me he had resolved not to let animals die under his aegis. He served a wealthy and morally responsible community, and soon cut the euthanasia rate drastically. Shortly thereafter, he was tapped to head the Maddie Fund, a billion-dollar bequest devoted to end the killing of healthy animals. He recently retired, leaving an unparalleled legacy of animals saved from euthanasia.

It is worth remembering that “the perfect home” is a mythic construct by which real homes should not be judged. Such ridiculous criteria, as are described in the current case, are a travesty. No one with an ounce of sensitivity would affirm that a dog is better off dead than living in a home with access to a heated garage. Almost no one adopts aggressive dogs, yet there are situations such as isolated and well-fenced rural properties where these dogs could live a good life while serving to protect people and property. Obviously such cases require a modicum of common sense. No one should adopt an aggressive dog to a house regularly populated by small children, just as such a home should not keep pistols and long guns, which are an “attractive nuisance,” in plain view or otherwise accessible to prying children. Yet if managed appropriately these dogs can live well in a loving home while at the same time earning their keep. No one should choose death for another creature for anything but the utmost compelling reasons, such as amelioration of intractable suffering.

Bernard E. Rollin, PhD

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CANADIAN VETERINARY MEDICAL ASSOCIATION
L’ASSOCIATION CANADIENNE DES MÉDECINS VÉTÉRINAIRES

www.canadianveterinarians.net
1. An 8-year-old golden retriever dies unexpectedly, with no premonitory signs of illness. At necropsy, the pericardial sac contains clotted and unclotted blood, and there is a soft, dark red mass in the right atrium. The most likely diagnosis for the atrial mass is which of the following?
   A. Hematoma
   B. Hemangiosarcoma
   C. Fibrosarcoma
   D. Rhabdomyosarcoma
   E. Vascular hamartoma

2. A 6-month-old cat is diagnosed with a tapeworm infestation. Which of the following drugs is the most likely to be effective?
   A. Fenbendazole
   B. Ivermectin
   C. Praziquantel
   D. Pyrantel
   E. Metronidazole

3. A 2-year-old, mixed-breed dog is being evaluated for an acute onset of ataxia, depression, polyuria, polydipsia, and vomiting. Urinalysis reveals an abundance of calcium oxalate monohydrate crystals. A diagnosis of ethylene glycol poisoning has been made, but there is as yet no evidence of renal disease. Which of the following is the most appropriate treatment for this problem?
   A. N-acetylcysteine
   B. Vitamin K1
   C. Fomepizole
   D. Misoprostol
   E. Pralidoxime hydrochloride

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Q: What time is it when a single palatable chew can protect dogs against fleas and ticks for 12 weeks?
4. Which of the following actions will prevent or minimize tissue damage following accidental perivascular injection of thiopental in the horse?
   A. Injection of bupivacaine solution into the area
   B. Dilution of the area with three times the volume of saline
   C. Injection of methylene blue into the area
   D. Alternation of cold and hot packs in the area
   E. Shock wave treatment of the area

5. Concerning bovine spongiform encephalopathy (BSE), which of the following statements is false?
   A. High risk sources of the causal agent are affected cattle brains, tonsils, and spinal cord.
   B. The human disease, thought to be contracted from cattle-derived food, has an incubation period of approximately one week.
   C. Diagnosis is confirmed through histological examination of brain tissue.
   D. In order to facilitate control, the feeding of most mammalian protein to ruminants is prohibited.
   E. The disease belongs to a class known as transmissible spongiform encephalopathies.

(See p. 766 for answers./Voir les réponses à la page 766.)

Editors Wanted
The Canadian Journal of Veterinary Research (CJVR) is looking for a new editor. After a long and successful time at the helm, the current CJVR editor, Dr. Éva Nagy, is leaving. The Editorial Committee of the CVMA is seeking an individual responsible for the peer-review process for scientific articles in the CJVR. A job description is available by request (hbroughton@cvma-acmv.org).

The Editorial Committee is also seeking individuals interested in the position of associate editor for CJVR. An associate editor has a key role in allocating to peer reviewers various articles submitted to the journals for potential publication and in participating in policy development as a member of the Editorial Committee. The success of the peer-review process and, thus, the credibility of a journal are in large measure dependent on the selection of appropriate individuals to review manuscripts. There is a vast number of individuals with specialized knowledge in private practice, research, academia and industry — the challenge is in tapping into these resources for the peer review process.

If interested in these positions please contact the Journals’ staff at 339 Booth St., Ottawa, Ontario K1R 7K1; tel: 613-236-1162 or 800-567-2862, ext. 124; or e-mail (hbroughton@cvma-acmv.org).

Rédacteurs recherchés
La Revue canadienne de recherche vétérinaire (RCRV) est à la recherche d’un nouveau rédacteur. Après avoir occupé ses fonctions pendant longtemps et avec grand succès, la rédactrice actuelle de la RCRV, Mme Éva Nagy, quitte son poste. Le Comité de la rédaction de l’ACMV est à la recherche d’une personne responsable du processus d’évaluation par les pairs pour la lecture des articles scientifiques de la RCRV. Une description de poste est disponible sur demande (hbroughton@cvma-acmv.org).

Le Comité de la rédaction est aussi à la recherche de personnes intéressées au poste de rédacteur associé pour la RCRV. Le rédacteur associé joue un rôle clé lors la distribution, aux examinateurs, des divers articles soumis aux revues aux fins de publication potentielle et il participe à l’élaboration de politiques en tant que membre du Comité de la rédaction. Le succès du processus d’évaluation par les pairs et, en conséquence, la crédibilité d’une revue dépendent en grande partie du choix des personnes appropriées pour réviser les manuscrits. Il y a un grand nombre de personnes possédant des connaissances spécialisées en pratique privée et en recherche ainsi que dans les universités et l’industrie, et le défi consiste à mettre ces ressources à contribution lors du processus d’évaluation par les pairs.

Si l’un de ces postes vous intéresse, veuillez communiquer avec le personnel des Revues au 339, rue Booth, Ottawa (Ontario) K1R 7K1; tél. : 613-236-1162 ou 800-567-2862, poste 124; ou par courriel (hbroughton@cvma-acmv.org).
Full Launch of the CVMA Mentoring Program

Now accepting requests for mentoring relationships

The Canadian Veterinary Medical Association (CVMA) is pleased to announce the full launch of its newly-created mentoring program. Program participation will provide individuals being mentored (the mentees) opportunities to discuss their goals, concerns and challenges with a trusted mentor. All mentors are veterinarians and members of the CVMA.

“I would like to acknowledge our members who responded to the CVMA’s call-out for mentors,” says Dr. Jean Gauvin, CVMA president. “They are willing to help support and guide a new generation of veterinarians and give some of their time to help mentees settle into professional life.”

The CVMA Mentoring Program is now open to those wishing to establish a mentoring relationship. CVMA members who are recent veterinary graduates, early career veterinarians or Students of CVMA in their last year of study can register as a mentee by completing a Mentee Profile Form and submitting it to the CVMA. Requests for mentoring relationships will be confidential. We encourage you to take advantage of this new opportunity.

For information about the program or how to register as a mentor or a mentee, please consult the program information posted on our website (www.canadianveterinarians.net) under the Practice & Economics tab, or e-mail us (communications@cvma-acmv.org).

Thank you to CVMA’s registered mentors
(listing as at June 3, 2015)

Allen, Dr. Dana — Guelph, ON
Aucoin, Dr. Melissa — Truro, NS
Baxter, Dr. Beverly — Sudbury, ON
Bell, Dr. Chris — Winnipeg, MB
Buote, Dr. Phil — Edmonton, AB
Cartwright, Dr. Dan — Fredericton, NB
Chalhoub, Dr. Serge — Calgary, AB
Collis, Dr. Lisa — Edmonton, AB
Craig, Dr. Crystal — Dartmouth, NS
Dhillon, Dr. Jasmine — Edmonton, AB
Dickinson-Mills, Dr. Elisha — Hampton, NB
Dowling, Dr. Patricia — Saskatoon, SK
Emery, Dr. Amanda — Lethbridge, AB

Lancement intégral du Programme de mentorat

Nous acceptons maintenant des demandes de mentorat

L’Association canadienne des médecins vétérinaires (ACMV) est heureuse d’annoncer le lancement intégral de son nouveau programme de mentorat. La participation au programme offrira l’occasion aux personnes mentorées (les mentées) de discuter de leurs objectifs, de leurs préoccupations et de leurs défi avec un mentor de confiance. Tous les mentors sont des vétérinaires et des membres de l’ACVM.

« J’aimerais reconnaître et remercier les membres qui ont répondu à l’appel de l’ACMV pour trouver des mentors », dit le Dr Jean Gauvin, président de l’ACMV. « Ces personnes sont disposées à appuyer le soutien et l’orientation d’une nouvelle génération de vétérinaires et à donner de leur temps afin d’aider les mentées à s’installer dans la vie professionnelle. »

Le Programme de mentorat est maintenant ouvert aux personnes qui désirent établir une relation de mentorat. Les membres de l’ACMV qui sont des diplômés récents, des vétérinaires en début de carrière ou des étudiants de l’ACVM dans leur dernière année d’étude peuvent s’inscrire en tant que mentée en remplissant un «Formulaire de profil de mentorée» et en le soumettant à l’ACVM. Les demandes de relations de mentorat demeureront confidentielles. Nous vous encourageons à profiter de cette nouvelle occasion.

Pour en savoir davantage à propos du programme ou sur la façon de vous inscrire en tant que mentor ou mentoré, consultez les renseignements de programme qui sont affichés sur notre site Web (www.veterinairesaucanada.net) sous l’onglet Pratique et finances, ou envoyez-nous un courriel à communications@cvma-acmv.org

Merci aux mentors inscrits de l’ACMV
(liste du 3 juin 2015)

Allen, D’ Dana — Guelph (Ont.)
Aucoin, D’e Melissa — Truro (N.-É.)
Baxter, D’e Beverly — Sudbury (Ont.)
Bell, D’e Chris — Winnipeg (Man.)
Buote, D’ e Phil — Edmonton (Alb.)
Cartwright, D’ e Dan — Fredericton (N.-B.)
Chalhoub, D’ e Serge — Calgary (Alb.)
Collis, D’ e Lisa — Edmonton (Alb.)
Craig, D’ e Crystal — Dartmouth (N.-É.)
Dhillon, D’ e Jasmine — Edmonton (Alb.)
Dickinson-Mills, D’ e Elisha — Hampton (N.-B.)
Dowling, D’ e Patricia — Saskatoon (Sask.)
Emery, D’ e Amanda — Lethbridge (Alb.)
Farewell from SCVMA President

The past year has been an incredible experience and I would like to thank all the Students of the CVMA for trusting me and allowing me the honor to represent you. Together, we are all shaping the future of our profession, and by making strong bonds within our own circle we will have an impact outside the circle.

The CVMA is really an amazing Association that strives to improve our profession every day. I’ve learned so much during this process and from working with so many committed volunteers. I would like to leave you all with this final thought; don’t be afraid to be involved and take risks, this career is so broad. You can be the connection between animals, humans and the environment. You can really make a difference. Don’t forget your values, and as you all embark on your own journeys, don’t forget to stay connected and up-to-date with your national professional Association, the CVMA!

It has truly been a privilege to represent the Students of the CVMA and although I’m sad to leave my wonderful committee, I am happy to introduce Justin Kristjansson, your 2015–16 SCVMA president, and to allow him the opportunity to shine.

Best of luck in your future pursuits!

(by Guylène Kheirkhah, Université de Montréal, Faculté de Médecine Vétérinaire, Class of 2017, 2014–2015 SCVMA President)

Adieux de la présidente des ÉACMV

Cette dernière année a été une expérience incroyable et j’aimerais remercier tous les Étudiants de l’ACMV qui m’ont accordé leur confiance ainsi que l’honneur de les représenter. Ensemble, nous avons façonné l’avenir de notre profession et, en établissant des liens solides dans notre propre entourage, nous aurons aussi un impact à l’extérieur de ce dernier.

L’ACMV est vraiment une association incroyable qui travaille en vue d’améliorer notre profession tous les jours. J’ai appris tant de choses durant ce processus et en travaillant auprès de tant de bénévoles engagés. J’aimerais vous quitter en vous communiquant cette dernière pensée : n’ayez pas peur de participer et de prendre des risques, car cette carrière est tellement vaste. Vous pouvez agir en tant que lien entre les animaux, les humains et l’environnement. Vous pouvez vraiment faire une différence. Don’t forget your values, and as you all embark on your own journeys, don’t forget to stay connected and up-to-date with your national professional Association, the CVMA!

Cela a vraiment été un grand honneur pour moi de représenter les Étudiants de l’ACMV et, bien que je sois triste de quitter mon merveilleux comité, je suis heureuse de vous présenter Justin Kristjansson, votre président des ÉACMV 2015–2016, et de lui donner l’occasion de se distinguer.

Je vous offre mes meilleurs vœux de succès dans vos projets futurs!

(par Guylène Kheirkhah, Université de Montréal, Faculté de médecine vétérinaire, promotion 2017, présidente des ÉACMV 2014–2015)
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Get to Know the 2015–16 Students of the CVMA Committee

The Students of the Canadian Veterinary Medical Association (SCVMA) Committee represents the CVMA at all 5 Canadian veterinary colleges, strengthening the links between the Association and its student members.

Justin Kristjansson, SCVMA representative at the Western College of Veterinary Medicine (WCVM), was born and raised in rural Manitoba and was involved in day-to-day operations of his family's beef cattle operation from a young age. An early veterinary interest stemmed from vaccination protocols, calving experiences, sick cows, calves, horses, and the rare caesarean. During high school, Justin worked at a poultry breeder barn where he took part in flock health management, feeding and lighting programs, and strict biosecurity protocols. Immediately following high school, Justin completed 2 years of a Bachelor of Science degree with a major in biology at Brandon University. For 2 summers, he worked as a meat hygiene inspector for the Canadian Food Inspection Agency, and was involved with pathology identification, national slaughter plant inspection standards, and gaining insight into the public health sector of veterinary medicine. After 2 years at Brandon University, he transferred into an Animal Science degree at the University of Saskatchewan and after 3 years of undergrad, he was accepted into the WCVM. A summer of beef cattle lameness research at the WCVM and 2 summers of mixed-animal clinical experience in Glenboro, Manitoba, have greatly enhanced his understanding of the broad scope of the veterinary profession.

Justin is involved in many organizations at the WCVM. He was a first-year representative and then the bovine representative for the Production Animal Club, as well as the junior vice-president external of the Western Canadian Veterinary Students Association (WCVSA). This position doubles as the junior SCVMA representative, in which he assisted the senior SCVMA representative with the planning and organization of the 2015 SCVMA “Prairie Zebras” Symposium. For the 2015–2016 school year, his 3rd year at WCVM, as the senior vice-president external of the WCVSA and as the president of the SCVMA, Justin looks forward to having the opportunity to represent Canadian veterinary students on the CVMA Council, ensuring that their needs and concerns are addressed. Continuing existing student programs, such as the Symposium, as well as implementing new student opportunities, such as a student leadership program alternating among the colleges, are priorities for the year. Justin encourages all students to provide the SCVMA with their feedback on any aspect of their academic and professional lives.

Noëlle Webb, SCVMA representative from the Atlantic Veterinary College (AVC), grew up in Surrey, British Columbia, before moving to Nova Scotia at 9 years old. Like many, she wanted to become a veterinarian from a young age. Her curiosity and passion about the diversity of the animal kingdom led her to become fascinated with exotic and zoological medicine. Noëlle is also interested in languages, which motivated her to take French and Spanish in high school. After high school, Noëlle


Le Comité des Étudiants de l’Association canadienne des médecins vétérinaires (ÉACMV) représente les cinq collèges de médecine vétérinaire canadiens, afin de renforcer les liens entre l’Association et ses membres étudiants.

Justin Kristjansson, représentant des ÉACMV au Western College of Veterinary Medicine (WCVM), est né et a grandi dans une région rurale du Manitoba et, dès un jeune âge, il a participé aux activités quotidiennes de la ferme d’élevage de bovins de sa famille. Il a développé un intérêt précoce pour la médecine vétérinaire en observant des protocoles de vaccination, le vêlage, les vaches malades, les veaux, les chevaux et une rare césarienne.

Durant l’école secondaire, Justin a travaillé chez un éleveur de volaille où il a participé à la gestion de la santé du troupeau, à des programmes d’alimentation et d’éclairage ainsi qu’à des stricts protocoles de biosécurité. Immédiatement après l’école secondaire, Justin a achevé deux années d’un diplôme de baccalauréat en science avec une majeure en biologie à l’Université de Brandon. Pendant deux étés, il a travaillé comme inspecteur d’hygiène des viandes pour l’Agence canadienne d’inspection des aliments et il a travaillé à l’identification pathologique et au respect des normes nationales d’inspection des abattoirs, ce qui lui a permis de découvrir le secteur de la santé publique de la médecine vétérinaire. Après deux années à l’Université de Brandon, il a transféré dans un programme de sciences animales à l’Université de la Saskatchewan et, après trois années d’études de premier cycle, il a été accepté au WCVM. Pendant un été, il a effectué de la recherche sur la boiterie des bovins de boucherie au WCVM et, au cours de deux autres étés, il a fait l’acquisition d’expérience dans une clinique mixte à Glenboro, au Manitoba, ce qui lui a permis de grandement améliorer sa compréhension de la vaste portée de la profession vétérinaire.

Justin participe à de nombreuses organisations au WCVM. Il a été représentant de première année, puis représentant bovin pour le Club des animaux d’élevage ainsi que vice-président externe junior de l’association étudiante Western Canadian Veterinary Students Association (WCVSA). Ce poste remplit aussi la fonction de représentant junior des ÉACMV, où il a porté assistance à la représentante sénior des ÉACMV lors de la planification et l’organisation du Symposium 2015 des ÉACMV «Zèbres des Prairies». Lors de l’année universitaire 2015–2016, sa troisième année au WCVM, Justin sera vice-président externe sénior de la WCVSA et vice-président des ÉACMV, et il se réjouit à la perspective d’avoir l’occasion de représenter les étudiants canadiens en médecine vétérinaire au sein du Conseil de l’ACMV, afin de veiller à répondre à leurs besoins et à leurs préoccupations. Les priorités de l’année consisteront à assurer la continuité des programmes étudiants en cours, comme le Symposium, ainsi qu’à mettre en œuvre de nouvelles possibilités pour les étudiants, comme le programme de leadership étudiant qui se déplacera d’un établissement à l’autre. Justin encourage tous les étudiants à communiquer leur rétroaction au Comité des ÉACMV sur tout aspect de leur vie universitaire et professionnelle.

Noëlle Webb, représentante des ÉACMV de l’Atlantic Veterinary College (AVC), a grandi à Surrey, en Colombie-Britannique, avant
Kelsey Chapman, a student at the University of Calgary — Faculty of Veterinary Medicine (UCVM), has been surrounded by animals her entire life. When she was young, her mother would drop her off at a Jersey farm for daycare, lay her on a hay bail in her 101 Dalmatians sleeping bag, and tuck in a bunny to keep her warm. Kelsey spent most of her childhood balancing school, riding, team sports, and competitive swimming, and when she was old enough, she began volunteering at the British Columbia SPCA and shadowing veterinarians in her community. When Kelsey began her undergraduate degree in general sciences at the University of British Columbia, she also took up modern pentathlon, a sport comprised of fencing, horse jumping, swimming, and a combined run-shoot event. Upon moving to Calgary for her DVM degree, Kelsey decided to tone down the amount of time spent on sports in order to focus on veterinary medicine. She feels incredibly fortunate that the UCVM has given her the opportunity to take on a variety of jobs with large animals, from caring for dairy calves, to helping with behavioral research on the bucking stock at the Calgary Stampede. The rewards of working with her high-spirited peers drew Kelsey into becoming vice president of Events in the Calgary Association of Veterinary Students and, as of this year, Calgary’s senior SCVMA representative. Kelsey revels in making meaningful connections with all her veterinary peers, and is delighted to continue being a part of the incredibly talented SCVMA team in the upcoming year.

Jamie Freeman-Braganca, a student at the Ontario Veterinary College (OVC), was born in Brampton, Ontario, where she first set foot in a veterinary clinic as a co-op student. It wasn’t long before the wagging of tails and the hustle and bustle of the clinic had her hooked. She knew then that she would be pursuing a career in veterinary medicine. Jamie was hired at the clinic where she worked for the remainder of high school. After high school, Jamie studied at the University of Guelph, majoring in animal biology. During her studies, Jamie continued to learn her field by working in a pet store, small animal de déménager en Nouvelle-Écosse à l’âge de neuf ans. Comme beaucoup de jeunes, elle désirait devenir vétérinaire dès un jeune âge. Sa curiosité et sa passion à propos de la diversité du royaume animal ont éveillé un intérêt pour la médecine exotique et zoologique. Noëlle s’intéresse aussi aux langues et elle a suivi des cours de français et d’espagnol à l’école secondaire. Après l’école secondaire, Noëlle a achevé une double majeure de trois ans en biologie et en allemand à l’Université Dalhousie avant d’être acceptée à la promotion 2018 de l’AVC. En 2013, Noëlle a passé l’été en Allemagne afin de perfectionner ses compétences linguistiques. Pendant ses cours à l’Université Ludwig Maximilians de Munich, elle a aimé élargir ses connaissances auprès d’un groupe de personnes incroyables. À son arrivée à l’AVC, Noëlle a été de nouveau impressionnée par la diversité des étudiants et du personnel. En 2015–2016, Noëlle agira aussi comme représentante de la faune pour le Club des animaux exotiques, de laboratoire et de la faune et comme secrétaire du Teaching Animal Enrichment Club. Noëlle est reconnaissante des expériences merveilleuses qu’elle a vécues pendant deux étés passés à travailler à la SPCA provinciale à Halifax, lors de son bénévolat auprès de Hope for Wildlife et de travaux de parasitologie à Dalhousie. Elle se réjouit à la pensée de relever des défis et des occasions d’apprentissage au cours de la prochaine année et elle offre ses meilleurs vœux de succès à ses camarades de classe.

Kelsey Chapman, une étudiante de l’Université de Calgary — Faculté de médecine vétérinaire (UCVM), a été entourée d’animaux pendant toute sa vie. Lorsqu’elle était jeune, sa mère la déposait à une ferme de vaches Jersey comme garderie, la couchait sur une botte de foin dans son sac de couchage des 101 Dalmatiens et plaçait un lapin sous son bras pour la garder au chaud. Kelsey a passé la majeure partie de son enfance à jongler école, équitation, sports d’équipe et nage compétitive et, lorsqu’elle a atteint l’âge requis, elle a commencé à faire du bénévolat auprès de la SPCA de la Colombie-Britannique et à suivre des vétérinaires dans sa collectivité. Lorsque Kelsey a entamé son diplôme d’études de premier cycle en sciences générales à l’Université de la Colombie-Britannique, elle a aussi commencé à s’entraîner pour le pentathlon moderne, un sport qui comprend l’escrime, le saut à cheval, la natation et une épreuve de tir à la course. À son déménagement à Calgary pour son diplôme de D.M.V, Kelsey a décidé de réduire ses activités sportives afin de se concentrer sur la médecine vétérinaire. Elle se sent incroyablement fortunée que l’UCVM lui ait donné l’occasion d’occuper divers emplois auprès des grands animaux où elle a pris soin de veaux laitiers et a porté assistance lors de travaux de recherche comportementale sur la ruade des bovins au Stamped de Calgary. Les récompenses du travail avec ses pairs enthousiastes ont incité Kelsey à devenir vice-présidente des événements de la Calgary Association of Veterinary Students et, cette année, représentante sénior des ÉACMV à Calgary. Kelsey adore établir des liens intéressants avec tous ses pairs vétérinaires et elle est ravie de continuer de faire partie de l’équipe extrêmement talentueuse des ÉACMV au cours de l’année à venir.

Jamie Freeman-Braganca, une étudiante de l’Ontario Veterinary College (OVC), est née à Brampton, en Ontario, où elle a mis pied dans une clinique vétérinaire pour la première fois en tant qu’étudiante dans un programme d’études coopératives. Il n’a pas fallu longtemps pour que les animaux affectueux et
clinics and volunteering in equine boarding facilities, a beef operation and a turtle hatchery. Her studies and the hours spent gaining experience earned Jamie a spot in the OVC’s Class of 2018, also known as the Ivory Owls. In the 2014–15 school year, Jamie was the junior representative for the SCVMA at the OVC. This position allowed Jamie to meet veterinary students from across Canada and to learn about common issues that currently face Canadian veterinarians. In the coming school year, Jamie is excited to take on the role of senior representative of the SCVMA and chair of the 2016 SCVMA “The Elephant in the Room” Symposium, which will be held at the OVC in January. In organizing this event, Jamie hopes to provide students with the opportunity to learn about some of the tough subjects of veterinary medicine. Jamie also hopes to showcase what the OVC brings to the table when it comes to veterinary medicine in Canada.

Hélène Rembeaux, SCVMA representative from La Faculté de Médecine Vétéranire (FMV), was born and raised in La Réunion, a small island located in the Indian Ocean, east of Madagascar. Hélène, her younger brother, and her parents spent their weekends on the picturesque beaches of La Réunion where she discovered what her island had to offer. La Réunion benefits from the eco-diversity of its coral reef, which covers a large portion of the island’s western cost. The tropical island hosts a variety of animals such as the white-tailed tropicbird as well as the panther chameleon. As a child, Hélène was eager to learn about all the different types of animals that her island and its surrounding waters harbored. Since then, she knew that she wanted to become a veterinarian. When Hélène was 7, she moved with her family to Montréal, Quebec. When Hélène was 16 years old, she had the opportunity to travel to Hanuman Bay in Hawaii to train as a lifeguard. There, she was once more awed by the bio-diversity and fragility of the tropics and her love of animal science was rekindled. After CEGEP, Hélène was accepted to study veterinary medicine in 2012 and she currently lives with 2 roommates, their cats and her beloved rabbit Prunelle in St-Hyacinthe, Quebec. After graduation, Hélène wishes to complete an internship in exotic animal medicine and open a practice where she can treat small animals and exotic animals native to her birthplace. Hélène became more involved with the SCVMA in her 2nd-year at FMV and helped organize the 2014 SCVMA “LegenDairy” Symposium. She is now looking forward to representing FMV’s students as senior representative of the SCVMA and to meet colleagues from across Canada!
Tools for Your Practice: Take Full Advantage of CVMA Resources

The CVMA has developed a range of practice tools and resources, including videos, guidelines, protocols, posters and best practices, to support you, your healthcare team and your practice. These practice resources are a tangible benefit of your CVMA membership and are intended to provide veterinary practitioners with knowledge and information to assist you in your everyday work and enable you to deliver high quality veterinary care. Although some of the resources were developed for particular areas of practice (companion animals, food animals, equine) a number of them may be of relevance to all members.

Throughout the year, each month we will focus on one specific tool to help you learn more about it and see how you can use the practical information to make sound decisions in your day-to-day practice of veterinary medicine.

CVMA's Guidelines for the Legitimate Use of Compounded Drugs in Veterinary Practice

The CVMA, in consultation with a multi-member task force, created Guidelines for the Legitimate Use of Compounded Drugs in Veterinary Practice. These guidelines are intended to provide veterinary practitioners with information needed to make appropriate professional decisions when considering whether or not to use a compounded product to treat a patient.

Compounding drugs is a process that involves combining 2 or more ingredients, at least one of which is a drug, to create a final product for dosing. This process is necessary and beneficial in the treatment of veterinary patients but can harm animals and the public and open veterinarians up to liability if not done properly.

The purpose of these guidelines is to summarize and clarify existing legislation and policy regarding the compounding and prescribing of compounded products.

Members can access the digital copy of these guidelines by opening a session on the CVMA website (www.canadianveterinarians.net) in the Practice & Economics section under Practice Tools — Companion Animal or Food Animal.

We hope you will find these guidelines useful!

L'ACMV a mis au point un éventail d'outils et de ressources pour la pratique, notamment des vidéos, des lignes directrices, des protocoles, des affiches et des meilleures pratiques, afin de vous appuyer vous, votre équipe de la clinique et votre pratique. Ces ressources pour la pratique sont un avantage concret de votre adhésion à l'ACMV et elles ont pour but de communiquer des connaissances et des renseignements qui assistent les praticiens vétérinaires dans leur travail quotidien et leur permettent d’offrir des soins vétérinaires de grande qualité. Même si certaines des ressources ont été élaborées pour des domaines particuliers de la pratique (animaux de compagnie, animaux destinés à l'alimentation, équidés), plusieurs d'entre elles pourraient être pertinentes pour tous les vétérinaires.

Pendant l'année, nous examinerons un nouvel outil chaque mois afin que vous puissiez mieux le connaître et déterminer si vous pouvez utiliser ces renseignements pratiques pour prendre des décisions sûres dans l'exercice quotidien de la médecine vétérinaire.

Lignes directrices de l'ACMV sur la pratique légitime des préparations magistrales de médicaments

L'ACMV, en consultation avec un groupe de travail, a créé les Lignes directrices sur la pratique légitime des préparations magistrales de médicaments. Ces lignes directrices visent à communiquer aux praticiens vétérinaires les renseignements requis pour prendre des décisions professionnelles appropriées lors de la considération d’une préparation magistrale pour traiter un patient.

La préparation de médicaments est un processus qui comporte le mélange de deux ingrédients ou plus, dont au moins un est un médicament, afin de créer un produit final pour la posologie. Ce processus est nécessaire et bénéfique pour le traitement des patients vétérinaires, mais il peut faire du tort aux animaux et au public et les vétérinaires peuvent assumer une responsabilité si le cheminement approprié n’est pas respecté.

Le but de ces lignes directrices consiste à résumer et à clarifier les lois et les politiques existantes concernant les préparations magistrales et l’ordonnance de préparations magistrales.

Les membres peuvent accéder à l’exemplaire numérique de ces lignes directrices en ouvrant une session sur le site Web de l’ACMV (www.veterinairesaucanada.net) dans la section Pratique et finances sous Outils pour la pratique — Animaux de compagnie ou Animaux destinés à l'alimentation.

Nous espérons que vous trouverez ces lignes directrices utiles!
The Perfect Pair: Partners in preventive veterinary care
Animal Health Week – October 4 to 10, 2015

Des partenaires hors pair en matière de soins vétérinaires préventifs
Semaine de la vie animale – Du 4 au 10 octobre 2015

The 2015 Animal Health Week will mark the 30th year the Canadian Veterinary Medical Association (CVMA) has run the campaign, and we want to emphasize that while medical technology and veterinary care have advanced, the connection between the veterinary team and the client remains one of the most important facets of veterinary care.

With each passing year pets (and barn animals alike!) are increasingly being considered members of the family. It's with knowledge such as this that we celebrate the importance of “The Perfect Pair: Partners in preventive veterinary care.”

During Animal Health Week, from October 4 to 10, 2015, we’re reminding animal owners that they and their entire veterinary team are important partners in ensuring optimal health for their animal. The establishment of a close relationship between an animal healthcare team and an animal (large or small) owner can play a major role in laying the groundwork for a healthy, happy life for the animal.

We’d like to remind animal owners that:
• Animal owners and veterinarians are partners who work together to ensure animals stay healthy.
• Your veterinary team is there for you to discuss healthcare options, and can help you make well-informed decisions about your pet’s medical care.
• Prevention is always better for pets and more cost-effective for pet owners.
• All pets should visit a veterinarian at least once yearly.

Each year veterinary teams rank waiting room displays as the most popular way of celebrating Animal Health Week, followed closely by client contests. In addition to the official campaign poster, the following items will engage your entire healthcare team and help celebrate Animal Health Week:
• Balloons
• Temporary tattoos
• T-shirts (available in men’s and women’s sizes)
• V-neck pullover scrub shirts (available in a range of sizes)
• Pet rescue window decals
• CVMA activity book “Big or Small, We Help Them All!”

La Semaine de la vie animale 2015 marquera le 30e anniversaire de cette campagne organisée par l’Association canadienne des médecins vétérinaires (ACMV) et nous désirons souligner que, même si la technologie et les soins vétérinaires ont réalisé des progrès énormes, le lien entre l’équipe vétérinaire et le client demeure l’un des aspects les plus importants des soins vétérinaires.

Chaque année, les animaux de compagnie (et les animaux de ferme aussi!) en viennent de plus en plus à être considérés comme des membres de la famille. C’est pour reconnaître ce fait que nous célébrons l’importance des «Partenaires hors pair en matière de soins vétérinaires préventifs».

Durant la Semaine de la vie animale, qui se déroulera du 4 au 10 octobre 2015, nous rappellerons aux propriétaires d’animaux qu’ils sont, avec toute l’équipe vétérinaire, des partenaires importants afin d’optimiser la santé de leur animal. L’établissement d’un lien étroit entre l’équipe de santé animale et un propriétaire d’animal (grand ou petit) peut jouer un rôle majeur afin de jeter les bases d’une vie heureuse et en santé pour l’animal.

Nous aimerions rappeler aux propriétaires d’animaux que:
• Les propriétaires d’animaux et les vétérinaires travaillent ensemble afin de protéger la santé des animaux.
• Votre équipe vétérinaire est là pour discuter avec vous des options de soins de santé et elle peut vous aider à prendre des décisions éclairées à propos des soins médicaux de votre animal de compagnie.
• La prévention est toujours préférable pour les animaux de compagnie et elle est plus économique pour les propriétaires.
• Tous les animaux de compagnie devraient visiter le vétérinaire au moins une fois par année.

Chaque année, les équipes vétérinaires considèrent que les expositions dans la salle d’attente sont la façon la plus populaire de célébrer la Semaine de la vie animale, suivies de près par les concours pour les clients. En plus de l’affiche officielle de la campagne, les articles suivants invitent toute l’équipe vétérinaire à célébrer la Semaine de la vie animale :
• Ballons
• Tatouages temporaires
• T-shirts (disponibles en tailles pour hommes et femmes)
• Blouses chirurgicales avec encolure en V (offertes dans diverses tailles)
• Décalques de secours pour les fenêtres
• Album d’activités de l’ACMV «Petits et grands, ce sont nos patients!»
• Sac à dos sport (chaton) qui peut être utilisé pour toutes sortes d’activités et pour transporter de l’équipement de sport ou des vêtements de plage
• Chapeau de papier pour enfants – Vache

Placez votre commande avant la date limite du 10 juillet 2015 pour courir la chance de gagner une carte-cadeau de 100 $ chez Subway (assez pour sortir toute l’équipe à manger le
• Paws N’ Claws Sports Pack (kitten), which can be used for a variety of activities like carrying sports gear or beach apparel
• Kid friendly cow-themed paper hat

Place your order before the early bird deadline on July 10, 2015 for a chance to win a $100 Subway gift card (enough to treat the whole team to lunch!) and other fun prizes. The last day to place your order for Animal Health Week materials is July 24, 2015.

Generous support of the 2015 Animal Health Week campaign is provided by Principal Sponsor Petsecure Pet Health Insurance, Program Plus sponsor IDEXX, and Program sponsors iFinance Canada (Petcard), and Merial. This month, we invite you to learn more about our AHW Program Plus sponsor, IDEXX Laboratories.

For over 20 years, IDEXX employees across Canada have worked to offer veterinary practices the most comprehensive range of diagnostic services available. Whether it is an in-practice or external reference laboratory — IDEXX provides the right diagnostic capabilities in every situation.

By leveraging technology and information in partnership with advanced medical professionals, its innovative solutions are designed to help practices solve complex medical problems and deliver the best possible care while fostering strong, lasting bonds with clients.

Some examples of IDEXX’s recent ground-breaking products are:
• Catalyst One® in-house chemistry analyzer and SNAP® 4Dx® Plus Test deliver flexible, accurate, real-time results to the pet owner.
• IDEXX Pet Health Network® Pro provides convenient online tools and services to help strengthen business and client relationships.
• IDEXX VetConnect® PLUS app is the ideal mobile companion for veterinarians and practice staff who use IDEXX VetConnect® PLUS to view diagnostic results and patient histories.
• Pet Health Network® 3D was created by IDEXX to provide advanced client education tools using vivid 3D anatomical animations, radiographs, and instructional home care videos.
• PetDiseaseReport.com, IDEXX Canada’s real-time pet disease reporting site, now has the ability to allow veterinarians to report and share their leptospirosis test results in addition to vector-borne disease test results.

Research and development is at the heart of IDEXX’s commitment to partnering with veterinary professionals. As the profession continues to move to a preventive care model, IDEXX’s innovative solutions will be there to enhance the health and well-being of people, pets and livestock.

Un généreux soutien de la campagne de la Semaine de la vie animale 2015 est offert par notre commanditaire principal Petsecure assurance maladie pour animaux, le commanditaire de programme Plus IDEXX et les commanditaires de Programme iFinance Canada (Petcard) et Merial. Ce mois-ci, nous vous invitons à en apprendre davantage sur notre commanditaire de programme Plus, IDEXX Laboratories Inc.

Depuis plus de 20 ans, les employés d’IDEXX à l’échelle du Canada travaillent pour offrir aux praticiens vétérinaires l’éventail le plus complet de services diagnostiques. Qu’il s’agisse d’un laboratoire à la pratique ou d’un laboratoire de référence externe — IDEXX procure les capacités de diagnostic convenant à chaque situation.

En mettant à contribution la technologie et l’information en partenariat avec des professionnels médicaux spécialisés, IDEXX conçoit des solutions innovatrices pour aider les pratiques à résoudre des problèmes médicaux complexes et à offrir les meilleurs soins possibles tout en favorisant des liens solides et durables avec les clients.

Voici quelques exemples des produits de pointe récemment créés par IDEXX :
• Catalyst One® analyseur chimique interne et le test SNAP® 4Dx® PLUS fournir des résultats flexibles, exacts et en temps réel aux propriétaires d’animaux.
• IDEXX Pet Health Network® Pro offre des outils et des services en ligne pratiques pour aider à renforcer les relations d’affaires et les liens avec les clients.
• L’appli IDEXX VetConnect® PLUS est le compagnon mobile idéal pour les vétérinaires et les employés de la pratique qui utilisent IDEXX VetConnect® PLUS pour visualiser les résultats diagnostiques et les anamnèses des patients.
• Pet Health Network® 3D a été créé par IDEXX pour fournir des outils avancés pour la sensibilisation des clients à l’aide d’animations anatomiques 3D, de radiographies et de vidéos éducatives sur les soins à domicile.
• PetDiseaseReport.com, le site de déclaration en temps réel de maladies d’animaux d’IDEXX Canada, qui a maintenant la capacité de permettre aux vétérinaires de signaler et de partager les résultats de tests de la leptospirose en plus des résultats des tests sur les maladies à transmission vectorielle. La recherche et le développement se trouvent au cœur de l’engagement d’IDEXX en vue de former un partenariat avec les professionnels vétérinaires. Au fur et à mesure que la profession continue de se diriger vers un modèle de soins préventifs, les solutions innovatrices d’IDEXX seront là pour améliorer la santé et le bien-être des personnes, des animaux et du bétail.
As president of the Manitoba Veterinary Medical Association, I am pleased to share some highlights of our work with colleagues across Canada.

Veterinary fee “clarity”
The MVMA first began meeting with government (representatives from Consumer Protection and Manitoba Agriculture were in attendance) in the spring of 2014 regarding this matter. The meeting was called by Consumer Protection in response to complaints from the public — and through the media — about veterinary fees, with a focus on companion animal fees.

During our spring meetings, we were told there were 3 main areas of concern in regards to veterinary fees:
1) Cost of services;
2) Clients not understanding the veterinary services being recommended and the related fees; and
3) Decisions being made by a veterinarian after initial review of services, without the client understanding the increase in cost and/or without the client’s approval to proceed.

The government was not interested in regulating fees but in ensuring the MVMA would address complaints regarding fee clarity and transparency (items number 2 and 3). The practice of the MVMA has been to only address fee complaints when coupled with other actions or behaviors that are brought to the attention of the Peer Review Committee (namely a breakdown in communication). Typically, the MVMA does not become involved in fee disputes. It appears the intention of the government is to increase public protection related to clarity and transparency of veterinary fees by requiring the MVMA to create by-laws, through legislation, that support this endeavor.

Opening of Manitoba’s Veterinary Medical Act
With the government mandate regarding veterinary fees, it means Manitoba’s Veterinary Medical Act will be opened in the spring of 2015. In Manitoba, veterinarians are not allowed to incorporate. The MVMA has been requesting the Act be opened to insert the required language to allow veterinarians to incorporate since 2010. So, the bright side of “fee clarity” is it appears the amendment to allow veterinarians to incorporate will finally be completed.

The MVMA is also reviewing areas of the Act where change is required with a focus on the use and application of the term “member” and the regulation of animal health technologists.

Dr./Dre. Roxane Neufeld
President of the Manitoba Veterinary Medical Association

Le tour des provinces
Manitoba Veterinary Medical Association (MVMA)
À titre de présidente de la Manitoba Veterinary Medical Association, je suis heureuse de partager certains faits saillants de notre travail avec nos collègues de toutes les régions du Canada.

«Clarté» des tarifs vétérinaires
La MVMA a commencé à rencontrer des représentants du gouvernement (des responsables de l’Office de la protection du consommateur et d’Agriculture Manitoba étaient présents) au printemps de 2014 concernant ce sujet. La réunion a été organisée par l’Office de protection du consommateur en réponse à des plaintes du public — et dans les médias — à propos des tarifs vétérinaires, particulièrement les tarifs pour animaux de compagnie.

Durant les réunions du printemps, on nous a communiqués les trois grands domaines de préoccupation en rapport avec les tarifs vétérinaires : 1) Coût des services; 2) Les clients ne comprennent pas les services vétérinaires qui sont recommandés et les tarifs exigés; 3) Les décisions prises par un vétérinaire après un examen initial des services, sans que le client ne comprenne la hausse du coût et/ou sans obtenir l’autorisation du client pour prodiguer les soins.

Le gouvernement ne désirait pas réglementer les tarifs, mais il voulait plutôt assurer que la MVMA répondrait aux plaintes concernant la clarté et la transparence des tarifs (questions 2 et 3). La MVMA a eu pour politique d’aborder les plaintes relativement aux tarifs uniquement lorsqu’elles accompagnaient d’autres actes ou comportements qui étaient présentés au Comité d’examen par les pairs (notamment une rupture des communications). Habituellement, la MVMA ne s’occupe pas des conflits relatifs aux tarifs. Il semble que le gouvernement a l’intention d’accroître la protection du public en ce qui concerne la clarté et la transparence des tarifs vétérinaires en exigeant que la MVMA crée des règlements administratifs, dans le cadre d’une loi, pour appuyer ce comportement.

Modification de la Loi sur la médecine vétérinaire du Manitoba
En raison du mandat du gouvernement concernant les tarifs vétérinaires, la Loi sur la médecine vétérinaire du Manitoba fera l’objet d’un examen au printemps de 2015. Au Manitoba, les vétérinaires n’ont pas le droit de se constituer en société. Depuis 2010, la MVMA demande que la Loi soit modifiée afin d’intégrer le langage requis pour permettre aux vétérinaires de se constituer en société. Donc, le côté positif de la «clarté des tarifs» sera qu’il semble que l’amendement permettant aux vétérinaires de se constituer en société sera enfin intégré à la Loi.

La MVMA procède aussi à l’examen de la Loi où des changements sont requis en portant une attention particulière à l’utilisation et à l’emploi du terme «membre» et à la réglementation des technologies en santé animale.
Regulation of animal health technologists
In early 2014, the Manitoba Animal Health Technologists Association (MAHTA) approached the MVMA with a request to change their members’ designation from “Animal Health Technologists” (AHT) to “Veterinary Technologists” (VT) as the veterinary technologist designation is most commonly used in Canada. As the designation “Animal Health Technologist” is defined in the Veterinary Medical Act, a review of the Act, as it pertains to AHTs, was undertaken.

During this review of the Veterinary Medical Act, it was identified that AHTs are members of the MVMA and the MVMA is responsible for their regulation. Consequently, the MVMA would need to undertake the regulation (including registration) of AHTs in Manitoba. Currently, MAHTA fulfills the roles of the regulatory and member service body for AHTs in Manitoba.

The MVMA’s assumption of the regulation of animal health technologists has been paused due to the opening of the Veterinary Medical Act in the spring of 2015. Once any amendments to the Act are complete, the MVMA and MAHTA will determine how best to proceed with the required changes to their respective governing documents as well as determining the responsibilities of each association.

MVMA leadership retreat
In November of 2014, nearly 20 veterinarians, representing all demographics, attended the 2014 MVMA Leadership Weekend. Key outcomes from this weekend included the identified opportunities in 3 areas where our Association can work to improve. These opportunities are in the areas of professional image, membership services, and membership engagement. Furthermore, through an intense session of brainstorming, this group was able to come together and redefine the MVMA’s Vision and Mission Statements. They are:

Vision:
We envision a society that embraces excellence in animal health and welfare.

Mission:
As trusted leaders and advocates for the betterment and protection of animals and people in Manitoba, we provide regulatory governance and empower our members to champion the art and science of veterinary medicine.

Those who participated in the weekend activities, unanimously declared the weekend a success. Many felt it was definitely worth doing again. We all know that for success, we need to have a plan; and a Leadership Weekend is a great place to collectively come up with that plan. Now, it’s time for “the rubber to hit the road” and move the plan into action.

(by Dr. Roxane Neufeld, President, Manitoba Veterinary Medical Association)

Règlementation des technologues en santé animale
Au début de 2014, la Manitoba Animal Health Technologists Association (MAHTA) a approché la MVMA pour demander de changer la désignation de ses membres en tant que «technologues en santé animale» (TSA) pour «technologues vétérinaires» (TV) car la désignation de technologue vétérinaire est plus couramment utilisée au Canada. Vu que la désignation de «technologue en santé animale» est définie dans la Loi sur la médecine vétérinaire, un examen de la Loi, telle qu’elle se rapporte aux TSA, a été entrepris.

Durant cet examen de la Loi sur la médecine vétérinaire, il a été identifié que les TSA sont des membres de la MVMA et que la MVMA est responsable de leur réglementation. Par conséquent, la MVMA aimerait entreprendre la réglementation (y compris l’enregistrement) des TSA au Manitoba. À l’heure actuelle, la MAHTA remplit la fonction d’organisme de réglementation et de service aux membres pour les TSA du Manitoba.

La prise en charge de la réglementation des technologues en santé animale par la MVMA a été mise en suspens en raison de l’examen de la Loi sur la médecine vétérinaire au printemps de 2015. Une fois que les modifications à la Loi seront terminées, la MVMA et la MAHTA détermineront la meilleure façon d’aller de l’avant avec les changements requis pour les documents de réglementation respectifs ainsi que la détermination des responsabilités de chaque association.

Retraite du leadership de la MVMA
En novembre 2014, près de 20 vétérinaires, représentant toutes les régions démographiques, ont assisté à la fin de semaine du leadership 2014 de la MVMA. Les principaux résultats de cette fin de semaine incluaient l’identification d’occasions dans trois domaines où notre association peut apporter des améliorations. Ces occasions touchent les domaines de l’image professionnelle, les services aux membres et l’engagement de l’effectif. De plus, dans le cadre d’une séance intensive de remue-méninges, ce groupe est parvenu à un consensus et a redéfini les énoncés de vision et de mission de la MVMA. Les voici :

Vision :
Nous avons pour vision une société qui favorise l’excellence en matière de santé et de bien-être des animaux.

Mission :
À titre de leaders et de défenseurs de confiance pour la protection des animaux et des personnes du Manitoba ainsi que l’avancement de leurs intérêts, nous assurons une régie de la réglementation et nous habilitons nos membres à être des champions de l’art et de la science de la médecine vétérinaire.

La fin de semaine a été déclarée comme un succès par tous ceux qui ont participé à ses activités. Beaucoup ont estimé qu’il valait la peine de renouveler l’expérience. Nous savons tous que pour connaître le succès, nous avons besoin d’un plan, et une fin de semaine du leadership représente une excellente occasion de mettre ce plan au point. Il est maintenant temps de passer aux actes et de mettre ce plan en œuvre.

(par la D’re Roxane Neufeld, présidente, Manitoba Veterinary Medical Association)
Obituary

Dr. Albert “Bud” Ings

A man who walked softly while leaving a trail of gigantic footprints across Prince Edward Island passed away in March with his family at his side. Dr. Albert “Bud” Ings died at the Kings County hospital at the age of 89. It would be easier to list the things he didn’t do, and the people he didn’t know, than try to note such a list of achievements and friends.

A long-time veterinarian and politician, Ings still found time to be a fiddler, a founder and a family man. He was well known for driving his VW “bug” from farm to farm through the rut filled roads in eastern Prince Edward Island during the 1950s and 1960s and penned books about those rural visits that included hot tea and biscuits.

“The Island has lost one of its best known vets,” wrote colleague Dr. Claudia Lister. “He was PEI’s answer to James Herriot.” Ings established the Montague Veterinary Clinic in 1967 and was elected Kings 3rd MLA in 1970. He was re-elected in 1974, 1978, and 1979.

He served as minister of agriculture and forestry and minister of health and social services in the Alex Campbell government.

“Bud will always be around in the memories of all the people he knew and served,” wrote former PEI poet laureate Hugh MacDonald.

Ings helped establish the Atlantic Veterinary College (AVC), the Queen Elizabeth Hospital, and was a charter member of the Garden of the Gulf Museum, the Montague Rotary Club, and was a Rotary Paul Harris Fellow. He served on the town council in Charlottetown, was a member of the Montague Legion, and was a trustee of the Kings County Memorial Hospital and the local school board. He was a member of the Prince Edward Island Centennial Commission and the Holland College Board of Governors.

Ings was a member of Hillcrest United Church Choir and the Montague Male 8 Chorus, the Venerables senior drama group, and was a lifetime member of the PEI Fiddler’s Society. Ings was also an avid photographer and upon retiring penned 2 award winning books about his travels as a vet and earned the Order of Prince Edward Island in 2012. His book, Mud, Sweat and Tears, saw all proceeds from book sales donated to the PEI Humane Society.

Ings was married to Connie Mair, who predeceased him, and has 3 daughters and 2 grandchildren.

He also received the Eugene Whalen Green Hat Award (AVC’s highest award) and the Atlantic Award of Excellence in Veterinary Medicine.

(Info from The Guardian)

Nécrologie

Dr. Albert «Bud» Ings

En mars, un homme qui parlait doucement pendant qu’il laissait des traces de géant est décédé à l’Île-du-Prince-Édouard avec sa famille à ses côtés. Le Dr. Albert «Bud» Ings est décédé à l’hôpital de Kings County à l’âge de 89 ans. Il serait plus facile d’énumerer les choses qu’il n’a pas accomplies et les gens qu’il n’a pas connus, plutôt que de signaler la liste de réalisations et d’amis.

Vétérinaire et politicien de longue date, Ings trouvait toujours le temps d’être violoneux ainsi que fondateur et homme de famille. Il était bien connu pour conduire sa Volkswagen Beetle dans l’est de l’Île-du-Prince-Édouard durant les années 1950 et 1960 et il a écrit des livres à propos de ses visites rurales qui incluaient du thé chaud et des gâteaux.


Il a occupé le poste de ministre de l’Agriculture et des Forêts et de ministre de la Santé et des Services sociaux dans le gouvernement d’Alex Campbell. «Bud sera toujours présent dans le souvenir des personnes qu’il connaissait et qu’il a servies», a écrit l’ancien poète officiel de la Reine de l’Île-du-Prince-Édouard, Hugh MacDonald.

Ings a contribué à la fondation de l’Atlantic Veterinary College (AVC), de l’hôpital Queen Elizabeth et il était membre fondateur du musée Garden of the Gulf, du Club Rotary Montague et était un fellow Rotary Paul Harris. Il a siégé au conseil municipal de Charlottetown, a été membre de la Légion de Montague ainsi qu’administrateur de l’hôpital Kings County Memorial et du conseil scolaire local. Il était membre de la Commission du Centenaire de l’Île-du-Prince-Édouard et du conseil d’administration de Holland College.


Ings était marié à Connie Mair, qui l’a précédé dans la mort, et il avait trois filles et deux petits-enfants.

Il a aussi reçu le Prix du chapeau vert d’Eugene Whalen (le plus grand honneur décerné par l’AVC) et le Prix d’excellence de l’Atlantic en médecine vétérinaire.

(Renseignements d’après The Guardian)
The Canadian Veterinary Medical Association (CVMA) is the national and international voice for Canada’s veterinarians, providing leadership and advocacy for veterinary medicine. The CVMA has close to 7000 members and 5800 affiliate veterinary technicians and technologists who are members of the Registered Veterinary Technologists and Technicians of Canada (RVTT).

For a small profession and a small association, collaboration is essential. In 2014, the CVMA was proud to formalize collaboration with 3 important stakeholders:

**Canadian Council of Veterinary Registrars (CCVR):** The CVMA and the regulatory bodies have worked for many years to establish a more formal collaboration among the veterinary regulatory bodies and with the CVMA. The registrars reworked a proposal submitted in 2013 by a joint regulatory body/CVMA Task Force and drafted Terms of Reference for a Canadian Council of Veterinary Registrars. During the 2014 CVMA Convention, these terms were signed by all regulatory bodies and the CVMA. The CVMA representative holds a non-voting position on the CCVR.

**Registered Veterinary Technologists and Technicians of Canada (RVTT):** To strengthen the ties of the veterinary health care team, RVTT (formerly called the Canadian Association of Animal Health Technologists and Technicians [CAAHTT]) and the CVMA signed a Memorandum of Understanding during the 2014 CVMA Convention. This agreement formalizes many of the collaborative activities that evolved over time and adds new opportunities. An ex-officio, non-voting position has been reserved on the CVMA Council for an

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Speakers from the 2014 Summit of Veterinary Leaders, which took place at the 2014 CVMA Annual Convention.

Conférenciers du Sommet des leaders vétérinaires 2014 qui s’est déroulé lors du congrès annuel 2014 de l’ACMV.
The American Veterinary Medical Association (AVMA), the Canadian Veterinary Medical Association (CVMA) and the Federation of Veterinarians of Europe (FVE) represent 40 countries and over 330,000 veterinarians, the AVMA, CVMA, and the FVE have signed a Letter of Association. These 3 groups will work together on animal health and welfare, public health, trade agreements in relation to animal and veterinary matters, the advancement of veterinary education, the advancement of veterinary science, and the promotion of the veterinary profession. To date, the 3 parties agreed to joint positions on the Global Control of Canine Rabies; Statement on The Essential Role of Veterinarians in Protecting Animal, Human, and the Public; Environmental Health — A Global Public Good; Statement on Veterinary Education; The Role of Veterinarians in Ensuring Good Animal Welfare; and Responsible andJudicious Use of Antimicrobials.

In 2014, the CVMA put a special focus on antimicrobial stewardship, an issue that the CVMA has been promoting for over a decade. One event that caught much attention was the CVMA’s Summit of Veterinary Leaders, chaired by Dr. Jean Gauvin. This Summit, under the title “Antimicrobial Stewardship: A New World Order,” was attended by over 180 veterinarians. The Summit offered the opportunity to learn from Canadian and international experts in the animal and human health fields and provided a platform for animated discussions. The CVMA has continued to advocate for the regulated importation of active pharmaceutical ingredients, the prohibition of own-use importation (OUI), or at least the establishment of a list of permissible products, and increased veterinary oversight of antimicrobials in livestock feeds and water. Results of joint advocacy efforts with other stakeholder groups are expected in 2015. The CVMA provides Antimicrobial Prudent Use Guidelines for Beef Cattle, Dairy Cattle, Poultry and Swine. In 2014, the CVMA released the Antimicrobial SmartVet mobile app to assist veterinarians with the prudent use of antimicrobials when treating urinary tract infections in companion animals. Another tool currently under development is for canine pyoderma, to be followed by another for respiratory infections.

The following reports provide a summary of the main activities that were undertaken by the CVMA in 2014 for its members and, in many instances, for the profession at large. This would not have been possible to achieve without the contribution of over 400 volunteers and a small, but dedicated team of staff.

Jost am Rhyn, Chief Executive Officer, CVMA

RVTTC representative and a reciprocal position has been made available on the RVTTC Board for a CVMA representative.

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Jost am Rhyn, Chief Executive Officer, CVMA

non votant a été réservé au sein du Conseil de l’ACMV pour un représentant de TTVEC et un poste réciproque a été ouvert au sein du Conseil de TTVEC pour un représentant de l’ACMV.

L’American Veterinary Medical Association (AVMA), l’Association canadienne des médecins vétérinaires (ACMV) et la Fédération des vétérinaires de l’Europe (FVE) : Representant 40 pays et plus de 330 000 vétérinaires, l’AVMA, l’ACMV et la FVE ont signé une Lettre d’association. Ces trois groupes travailleront ensemble pour améliorer la santé et le bien-être des animaux, la santé publique, les accords commerciaux se rapportant aux questions animales et vétérinaires ainsi que pour avancer l’enseignement de la médecine vétérinaire, de la science vétérinaire et la promotion de la profession vétérinaire. Jusqu’à maintenant, les trois parties ont se sont entendues sur les positions conjointes suivantes : Contrôle mondial de la rage canine; Déclaration sur le rôle essentiel des vétérinaires dans la protection de la santé des animaux, des humains et du public; Santé environnementale — Un bien public mondial; Déclaration sur l’enseignement de la médecine vétérinaire; Le rôle des vétérinaires afin d’assurer un bon bien-être animal; et L’utilisation responsable et judicieuse des antimicrobiens.

En 2014, l’ACMV a concentré ses efforts sur la gestion responsable des antimicrobiens, un enjeu dont l’ACMV fait la promotion depuis plus d’une décennie. Le Sommet des leaders vétérinaires de l’ACMV, qui a été présidé par le Dr Jean Gauvin, a été l’un des événements qui a attiré beaucoup d’attention. Plus de 180 vétérinaires ont assisté à ce Sommet, qui a été présenté sous le thème de «Gestion responsable des antimicrobiens : un nouvel ordre mondial». Le Sommet a offert l’occasion de se renseigner auprès d’experts canadiens et internationaux dans les domaines de la santé animale et humaine et il fourni une plate-forme pour la tenue de discussions animées. L’ACMV a continué de préconiser la réglementation de l’importation des ingrédients pharmaceutiques actifs, l’interdiction de l’importation pour utilisation personnelle, ou du moins l’établissement d’une liste de produits autorisés, ainsi qu’une supervision vétérinaire accrue des antimicrobiens dans les aliments et l’eau du bétail. Les résultats des efforts conjoints de défense des intérêts avec d’autres groupes d’intervenants sont attendus en 2015. L’ACMV fournit les Lignes directrices sur l’administration pour les bovins laitiers, les bovins de boucherie, la volaille et les porcs. En 2014, l’ACMV a lancé l’appli mobile IntelliVet pour aider les vétérinaires avec l’utilisation prudente des antimicrobiens lorsqu’ils traitent des infections des voies urinaires chez les animaux de compagnie. Un autre outil actuellement en voie de développement servira à traiter la pyoder mie canine et il sera suivi d’un autre ciblant les infections respiratoires.

Les rapports suivants présentent un sommaire des principales activités qui ont été entreprises en 2014 par l’ACMV à l’intention de ses membres et, dans beaucoup de cas, pour la profession en général. Ces réalisations n’auraient pas été possibles sans la contribution de plus de 400 bénévoles ainsi que d’une petite équipe d’employés dévoués.

Jost am Rhyn, président-directeur général, ACMV
Corporate Partnership Program (CPP)

The CVMA Corporate Partnership Program (CPP) is a comprehensive sponsorship program that was implemented in 2007 to better recognize a company's overall financial contribution to the Association. The CPP takes into account the various programs and events that are corporately sponsored, and allows companies that support the CVMA in various ways to receive better recognition for their overall contributions. The 3 levels of sponsorship in 2014 were Platinum (> $80 000), Gold ($48 000–$79 999) and Silver ($27 000–$47 999).

The CVMA would like to recognize the following sponsors for their overall contribution to the Association for 2014:

Gold: IDEXX Laboratories
Scotiabank

Silver: Hill’s Pet Nutrition Canada
Merck Animal Health
Petsecure Pet Health Insurance
Royal Canin

The following programs and activities underpin the CVMA’s core competencies and leadership initiatives in the areas of Policy and Advocacy, Science and Knowledge, and Practice and Economics.

Policy & Advocacy

National and international leadership efforts that advance the concerns and professional interests of members.

Les programmes et les activités qui suivent servent de piliers aux compétences fondamentales et aux initiatives de leadership de l'ACMV dans les domaines des Politiques et défense des intérêts, des Sciences et connaissances ainsi que de la Pratique et finances.

Animal Welfare

Bien-être des animaux

The CVMA’s 2014 key initiatives for animal welfare included:


En 2014, les principales initiatives de l’ACMV dans le domaine du bien-être des animaux comprenaient notamment :

Mammal Pets Code of Practice and finalizing the revision of the Code of Practice for Canadian Kennel Operations.

**Gouvernement legislation:** The AWC continued to monitor the various private member bills that are being tabled to address the need for updated federal animal cruelty legislation. The AWC prepared a feedback letter to Member of Parliament Isabelle Morin voicing concerns regarding her private member bill and the excluded activities (rodeo, livestock production). The CVMA submitted another letter to the Minister of Agriculture to voice concerns about the slow progress of the humane transport regulatory amendment.

**Représentation au sein des comités des intervenants en matière de bien-être animal:** L’ACMV a été représentée au sein du Conseil d’administration et de l’exécutif du Conseil national sur les soins aux animaux d’élevage (CNSAE). L’ACMV a continué d’assurer une représentation au sein des comités des codes et de la science ainsi qu’auprès des Comités du programme d’évaluation des soins aux animaux qui considèrent la vérification de la mise en œuvre des codes. L’ACMV a fourni de la rétroaction au sondage et au rapport du Conseil national sur la santé et le bien-être des animaux d’élevage (CNSBAE) relativement à la capacité de recherche en matière de bien-être animal au Canada.

**Éducation et sensibilisation en matière de bien-être animal:** Le CBA a soumis les articles suivants à *La RVCA* aux fins de publication (en anglais seulement) : *Fitness for Transport Awareness, One Welfare — an Ethical Dilemma, and Stressed Hogs.* Les ressources suivantes en matière de bien-être animal continuent d’être offertes sur le site Web de l’ACMV : affiches sur la gestion de la douleur; affiche sur la chirurgie esthétique; codes pour les chenils et les chatteries; renseignements sur la violence envers les animaux et des nouvelles et des articles pertinents sur le bien-être animal. On procède maintenant à la révision de l’affiche sur la gestion de la douleur des grands animaux. À l’automne 2014, à la réunion du CBA à la Faculté de médecine vétérinaire de l’Université de Calgary, la Dr. Michelle Lem a donné une présentation aux étudiants en médecine vétérinaire et aux professeurs sur son travail avec les propriétaires d’animaux en marge de la société.
National Issues
Enjeux nationaux

The CVMA’s 2014 focus for the National Issues Committee (NIC) was on antimicrobial stewardship but numerous other files were also managed on behalf of members and the profession.

Position Statements: The CVMA approved new Position Statements on Active Pharmaceutical Ingredients (API) for Veterinary Use, and Veterinary Telemedicine, and revised the positions on Antimicrobial Use in Animals, Microchip Animal Identification, and Veterinary Surgical Procedures. The CVMA also approved a joint CVMA/AVMA/FVE position on the Global Control of Canine Rabies. The positions on Vicious Dogs, Aquatic Veterinary Medicine, and Extra Label Drug Use (ELDU) are under review.

Therapeutics: In March 2014, the CVMA launched the new mobile app Antimicrobial SmartVet. The Urinary Tract Infection tool was the first one loaded into the app. A working group is developing the pyoderma content for the next tool. The CVMA was represented on the Ad Hoc Antimicrobial Stewardship Committee formed after the Antimicrobial Stewardship Conference and on the AVMA Companion Animal Antimicrobial Stewardship Task Force. A Veterinary Pharmaceutical Stewardship Advisory Group was struck to develop communication tools to highlight the key role veterinarians play in pharmaceutical stewardship.

Regulatory: The CVMA was represented on committees addressing the Veterinary Drugs Directorate on the topics of ELDU, APIs and OUI. The CVMA renewed efforts to urge Health Canada to act on regulatory modernization to address regulatory voids related to API importation and OUI. The CVMA drafted a response to the release of the Health Canada antimicrobial federal framework.

En 2014, le Comité sur les enjeux nationaux (CEN) de l’ACMV s’est concentré sur la gestion responsable des antimicrobiens, mais de nombreux autres dossiers ont aussi été gérés au nom des membres et de la profession.


Produits biologiques : Le CEN a rencontré des représentants de l’Agence de la santé publique du Canada (ASPC) afin de préciser l’exemption de la pratique vétérinaire en vertu du Règlement sur les agents pathogènes humains et les toxines et il a effectué un suivi auprès de l’ASPC afin de finaliser l’exemption de la pratique vétérinaire conformément à la Gazette du Canada. Le CEN a étudié le projet de loi C-17 (Loi visant à protéger les Canadiens contre les drogues dangereuses) afin de comprendre les répercussions pour les praticiens vétérinaires.


Réglementation : L’ACMV a été représentée au sein de comités dialoguant avec la Direction des médicaments vétérinaires sur les sujets de l’UMDDE, des IPA et de l’importation pour utilisation personnelle. L’ACMV a renouvelé ses efforts pour exhorter Santé Canada à passer aux actes relativement à la modernisation réglementaire en vue de corrigir les lacunes réglementaires liées à l’importation des IPA et à l’importation pour utilisation personnelle. L’ACMV a rédigé une réponse au lancement du cadre d’action fédéral de Santé Canada sur la résistance et le recours aux antimicrobiens.

Salubrité des aliments et santé publique : L’ACMV a été représentée à la réunion des intervenants de la Canada Global Food Animal Residue Avoidance Databank (CgFARAD) pour aborder le besoin d’un financement durable à long terme du programme CgFARAD.

Conseil national sur la santé et le bien-être des animaux d’élevage : L’ACMV a été représentée au sein de ce Conseil et
**Food Safety & Public Health:** The CVMA was represented at the Canada Global Food Animal Residue Avoidance Databank (CgFARAD) stakeholder meeting to address the need for long-term sustainable funding for the CgFARAD program.

**National Animal Health & Welfare Strategy Council:** The CVMA was represented on this Council and sought opportunities to provide input on issues important to the veterinary community (disease surveillance; Codes of Practice incorporation into provincial regulations; antimicrobial stewardship/resistance). The CVMA made a presentation at the NFAHWC Forum on its antimicrobial use/antimicrobial resistance activities.

**Ecosystem Health:** The CVMA’s Green Veterinary Practice resources continued to be promoted.

**“One Health” concept:** The CVMA was interviewed by the Office of the Auditor General regarding issues surrounding antimicrobial regulation in Canada.

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**Communications & Public Relations**

Communications et relations publiques

With 690 mentions tracked in the news and over 90 media inquiries logged during 2014, the CVMA is the confirmed reliable source of veterinary information for Canadian journalists. Throughout the year, the CVMA proved to be a valuable resource for journalists seeking knowledge and information on antimicrobial stewardship. The CVMA’s advocacy on the jerky treat issue was highlighted in the spring when the issue made headlines across the country. A successful media event was held during the CVMA Convention, giving the event and the profession added visibility in St. John’s, Newfoundland.

2014 was the first year of implementation in the 3-year marketing plan established by Delta Media’s Communications Audit. In accordance with the plan, messaging is being organized under the CVMA’s 3 leadership areas: Policy & Advocacy, Science & Knowledge, and Practice & Economics. Selected content is being moved out from behind the member restricted areas of the website to show value to prospective members and the public. The CVMA’s website and eNewsletter were enhanced and the volume of information shared via our social media channels increased. The CVMA’s number of followers and fans on Twitter and Facebook increased by over 30% and 55% respectively: A YouTube Channel was also launched to provide a space for sharing educational videos.

“Our Role, Our Responsibility” was the slogan of the 2014 Animal Health Week campaign to promote veterinarians as responsible stewards of the important medications that keep animals and humans healthy. Animal owners were encouraged to trust in their veterinarian, use antimicrobials safely, and keep their animals healthy. Four industry partners (Program Plus Sponsor: IDEXX Laboratories and Program Sponsors: Petsecure

L’ACMV a communiqué aux membres des mises à jour sur les programmes de l’ACMV et des nouvelles vétérinaires générales dans le cadre d’envois de masse de bulletins par courriel et télécopieur, de mises à jour sur les médias sociaux, d’articles dans les publications provinciales, d’information sur le site Web de l’ACMV ainsi que dans le cyberbulletin mensuel. Des outils pour la pratique, comme ceux offerts dans le cadre de la collaboration de l’ACMV avec la Pet Nutrition Alliance, Partners for Healthy Pets et Soins des chats, ont aussi été mis en lumière.

Pet Health Insurance Inc., iFinance [Petcard] et Scotiabank) provided support for Animal Health Week. Mass e-mail and fax bulletins, social media updates, articles in provincial publications, information on the CVMA’s website and in the monthly eNewsletter provided members with CVMA program updates and general veterinary news. Practice tools, such as those available through the CVMA’s involvement with the Pet Nutrition Alliance, Partners for Healthy Pets and Cat Healthy, were also highlighted.

The Editorial Committee is currently working hard to fill the positions of one editor and 2 associate editors for CJVR. The associate editor position for The CVJ was filled by Dr. Wayne McDonell in August, 2014.

Journals

The Canadian Veterinary Journal (CVJ) and Canadian Journal of Veterinary Research (CJVR) are the only national, general or multi-species, peer-reviewed veterinary journals in Canada. The number of manuscripts submitted to The CVJ in 2014 was 336, up from 325 in 2013; the number submitted to CJVR in 2014 was 108, close to the 109 of 2013. Efforts are ongoing to reduce the backlog of CVJ manuscripts. The CJVR backlog will be addressed with the installment of $150 000 approved by CVMA Council. The extra funds will be used to prepare additional manuscripts for the online issues of CJVR; policy adjustments will be made to prevent future backlogs. Both journals will continue to promote the relevance of journal articles to practice and build demand for the knowledge delivered.

La Revue vétérinaire canadienne (La RVC) et la Revue canadienne de recherche vétérinaire (RCRV) sont les seules revues vétérinaires nationales, à contenu général ou multi-espèces, évaluées par les pairs au Canada. Le nombre de manuscrits soumis à La RVC en 2014 a été de 336, soit une hausse par rapport aux 325 soumissions reçues en 2013; le nombre de manuscrits soumis à la RCRV en 2014 a été de 108, soit près des 109 soumissions reçues en 2013. Les efforts se sont poursuivis afin de réduire l’arrière des manuscrits de La RVC. L’arrière de la RCRV sera corrigé à l’aide d’un financement de 15 000 $ approuvé par le Conseil de l’ACMV. Les fonds supplémentaires serviront à préparer des manuscrits supplémentaires pour les numéros en ligne de la RCRV et des ajustements aux politiques permettront de prévenir des arriérés dans l’avenir. Les deux revues continueront de promouvoir la pertinence des articles de la revue pour la pratique et d’élargir la demande pour les connaissances transmises.
It was confirmed with the Canadian veterinary school deans that editors would be recognized by the schools for their work with the journals in determining academic advancement/tenure. The journals department created a letter from the CVMA to the deans on behalf of the editors.

As a benefit to CVMA members, CVMA authors will have lower publication fees for The CVJ and lower page charges for CJVR. Both journals will continue to strive toward a break-even budget.

During the 2014 March Committee meeting and strategic planning session it was noted that the journals are one of the most important member benefits for the CVMA. A redesign/reformatting of the news section of The CVJ was also discussed, and was initiated in the fall and introduced with the May 2015 issue; this activity was also suggested by the Delta Media report completed in 2014.

Readers and CVMA members are reminded that all issues, except the most recent 6 months, of both The CVJ and CJVR are available to the public on the PubMed Central archive (www.pubmedcentral.com); a link is also available through the CVMA website (www.canadianveterinarians.net). CVMA members can view the most recent 6 months of the journals on the member-only section of the CVMA website.

Le Comité de la rédaction travaille actuellement en vue de combler les postes d’un rédacteur et de deux rédacteurs associés pour la RCRV. Le poste de rédacteur associé de La RVC a été accepté par le Dr Wayne McDonell en août 2014.

Il a été confirmé auprès des doyens des écoles de médecine vétérinaire canadiennes que les rédacteurs seraient reconnus par les écoles pour leur travail auprès des revues afin de déterminer l’avancement et la permanence dans les universités. Le service des revues a créé une lettre de l’ACMV adressée aux doyens au nom des rédacteurs.

En tant qu’avantage de l’adhésion à l’ACMV, les auteurs de l’ACMV bénéficieront de tarifs de publication inférieurs pour La RVC et de frais réduits par page pour la RCRV. Les deux revues continueront de travailler en vue d’équilibrer le budget.

Durant la réunion de la fin de semaine des comités de mars 2014 et lors d’une séance de planification stratégique, il a été signalé que les revues représentent l’un des plus importants avantages de l’adhésion à l’ACMV. Une refonte et un nouveau format pour la section des nouvelles de La RVC ont aussi été fait l’objet de discussions et cette démarche a été entamée à l’automne et introduite dans le numéro de mai 2015; cette activité avait aussi été suggérée lors du rapport de Delta Media publié en 2014.

Nous rappelons aux lecteurs et aux membres de l’ACMV que tous les numéros, sauf pour les derniers six mois, de La RVC et de la RCRV sont toujours disponibles au public dans les archives PubMed Central (www.pubmedcentral.com); un lien est aussi disponible sur le site Web de l’ACMV (www.veterinairesaucanada.net). Les membres de l’ACMV peuvent visualiser les six plus récents mois des revues dans la section réservée aux membres du site Web de l’ACMV.
Conventions
Congrès

As a crucial Science and Knowledge pillar, the CVMA Professional Development Committee (PDC) oversees the program development for the continuing education (CE) sessions at the CVMA Annual Convention. Canada’s only multi-species convention was held in St. John’s, Newfoundland and Labrador in 2014 attracting 735 attendees. The CE sessions consisted of a dental and orthopedic lab; a full-day practice management stream focusing on communication; and 36 concurrent sessions in the following streams: companion animal, bovine, equine, animal welfare, shelter medicine, social media, and team wellness. Over 40 speakers from Canada, the United States and overseas presented during the convention.

The 2014 convention evaluation received a 31% response rate. Results showed that the majority of respondents were companion animal practitioners with 15 or more years of experience. The 2 factors that contributed to their original decision to attend the CVMA Convention were the CE sessions overall and the location.

The majority of respondents attended 6 sessions per day (the maximum possible) taking full advantage of the CE options. In addition, they were very satisfied with the caliber of speakers and the length of sessions, and satisfied with the time for Q&A and the session chairs.

For the first time, a video was produced to market and promote the convention. This video featured then president-elect Dr. Jean Gauvin and several PDC members. It was hosted on CVMA’s You Tube channel and had over 700 views.

For the 2nd time, a mobile convention app was used onsite. However, a new module, the CVMA Quest, was added and introduced for the first time. In total, 21 activities allowed participants to earn points (with pre-site and onsite questions) allowing the top 3 scorers to win prizes. The CVMA Lounge, in the Exhibit Hall, had a monitor displaying all participants and their standing in the Quest. Activities ranged from questions about St. John’s, to finding CVMA Council members, and their standing in the Quest. Activities included as questions and answers and presidents of the ateliers.

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Le Comité du perfectionnement professionnel (CPP) de l’ACMV supervise l’élaboration du programme des ateliers de formation continue (FC) du congrès annuel de l’ACMV, car il s’agit d’un pilier essentiel de la priorité Science et connaissances. En 2014, le seul congrès multi-espèces du Canada s’est tenu à St. John’s, à Terre-Neuve-et-Labrador, et il a attiré 735 congressistes. Les ateliers de FC comptaient un laboratoire dentaire orthopédique; un volet d’une journée sur la gestion d’une pratique axé sur la communication; et 36 ateliers parallèles dans les volets suivants : animaux de compagnie, bovins, équidés, bien-être animal, médecine des refuges, médias sociaux et bien-être de l’équipe. Plus de 40 conférenciers provenant du Canada, des États-Unis et d’outremer ont donné des présentations durant le congrès.

L’évaluation du congrès 2014 a obtenu un taux de réponse de 31 %. Les résultats ont montré que la majorité des répondants étaient des praticiens pour animaux de compagnie possédant 15 années ou plus d’expérience. Les deux facteurs qui ont contribué à la décision originale d’assister au congrès étaient les ateliers de formation continue et l’emplacement.

La majorité des répondants ont assisté à six ateliers par jour (le maximum possible) et ont pleinement profité des options de formation continue. De plus, ils étaient très satisfaits du calibre des conférenciers et de la durée des ateliers ainsi que du temps réservé aux questions et aux réponses et aux présidents des ateliers.

Pour la première fois, une vidéo a été produite pour faire la promotion du congrès. Cette vidéo a présenté le président désigné du moment, le Dr Jean Gauvin, ainsi que plusieurs membres du CPP. Il a été hébergé sur le canal You Tube de l’ACMV et a obtenu plus de 700 visualisations.

Pour la deuxième fois, une appli mobile du congrès a été utilisée sur place. Cependant, un nouveau module, la Quête de l’ACMV, a été ajouté et introduit. Au total, 21 activités ont permis aux participants d’accumuler des points (avec des questions avant l’arrivée et sur place) et les trois concurrents ayant accumulé le plus de points ont remporté des prix. Le Salon de l’ACMV, qui était aménagé dans le Salon des exposants, comportait un moniteur affichant tous les participants et leur classement dans la Quête. Les activités comportaient des questions à propos de St. John’s, le repérage de membres du Conseil de l’ACMV ainsi que des questions portant sur les expositions et l’emplacement de la mascotte «Biscuit».

La tournée des grands ducs «Havin’ a Time» sur George Street a attiré plus de 275 congressistes qui ont fait l’expérience des saveurs et des traditions locales et ont été baptisés au screech à titre de Terre-Neuviens honorifiques.

Le Sommet des leaders vétérinaires 2014, qui a été présidé par le Dr Gauvin, a porté sur «La gestion responsable des antimicrobiens : un nouvel ordre mondial». Le sujet a suscité beaucoup d’intérêt et a attiré plus de 180 participants. Huit conférenciers, y compris un médecin en médecine humaine,
The “Havin’ a Time” Pub Crawl on George Street attracted 275 attendees who experienced local flavors and traditions and were screeched in as honorary Newfoundlanders.

The 2014 Summit of Veterinary Leaders, chaired by Dr. Gauvin, focused on “Antimicrobial Stewardship: A New World Order.” The topic was of great interest attracting over 180 participants. Eight speakers including a medical doctor, and representatives from the AVMA, the World Organization for Animal Health (OIE), the World Veterinary Association (WVA) and the Commonwealth Veterinary Association (CVA) shared their experiences and expertise. During the Summit, Dr. John Prescott, a veterinary bacteriologist at the Ontario Veterinary College, said that he believes Canada is in a “golden moment” to improve antibiotic stewardship. Dr. Prescott recommended a coordinated national and provincial framework for countering resistance that would involve chief veterinary officers and chief medical officers working together, closing regulatory loopholes, and implementing a comprehensive national surveillance system that will accurately track the use of antibiotic products.

Emerging Leaders Program (ELP)
Programme des futurs leaders (PFL)

The 2014 CVMA Emerging Leaders Program (ELP), in its 5th year of operation, had a total of 26 participants from across Canada. The program was chaired by Dr. Melodie Chan, founder of this CVMA program and again leveraged the depth of experience offered by our facilitator, Dr. Rick DeBowes from Washington State University who has offered this type of program around the world. Similar to last year’s program, Dr. DeBowes used an array of didactic and experiential learning approaches to help the participants gain insight into how best to lead themselves as individuals, how they communicate with
those around them, and ultimately how this knowledge would better prepare them to lead those around them.

The breakdown of participants included: 16 selected ELP candidates sponsored by CVMA/VMAs; 6 students sponsored by CVMA, 9 paid participants and the program chair sponsored by the CVMA.

The comments received from the feedback survey were overwhelmingly positive regarding both the content of the day, as well as the facilitator; 96% of the respondents indicated that the program met or exceeded their expectations, and 100% of the respondents rated Dr. DeBowes as a good or excellent facilitator.

Canadian Veterinary Reserve (CVR)
Réserve vétérinaire canadienne (RVC)

The CVMA’s Canadian Veterinary Reserve’s mandate is to provide veterinary surge capacity resources to first-responders in the event of large-scale emergencies involving animals, in order to address animal health and welfare issues. The reserve was created in 2006.

The CVR consists of 474 members, with 245 of them having received formal training. CVR members are practitioners from the 10 provinces, the Yukon and the Northwest Territories.

The reserve was called up by the Canadian Food Inspection Agency (CFIA) in early December 2014 due to an avian influenza outbreak in the Fraser Valley of British Columbia. Overall, 11 commercial premises (7 broiler breeder; 3 turkey; 1 table egg layer) were infected and 245 000 affected birds had to be culled: 155 CVR members responded to the call-up request, with 101 indicating that they would be able to serve for some of the weeks between December 28, 2014 and March 1, 2015. In total 525 weeks of service were offered. In the end, because the outbreak could be contained by the CFIA, the CVR members did not need to be deployed.

The CVR is attempting to partner with the Canadian Public Health Agency to obtain access to valuable online training modules that are also utilized by the AVMA Veterinary Medical Assistance Teams.

The CVMA is working with the provincial emergency management offices and Chief Veterinary Officers to engage CVR members in provincial exercises. At the same time, it is hoped that involvement of CVR members in CFIA training opportunities can be restarted.

La Réserve vétérinaire canadienne de l’ACMV a pour mandat de fournir des ressources pour une capacité d’appoint pour les premiers intervenants dans l’éventualité de situations d’urgence à grande échelle touchant les animaux, afin de gérer des enjeux liés à la santé et au bien-être des animaux. La réserve a été créée en 2006.

La RVC se compose de 474 membres, et 245 d’entre eux ont reçu une formation officielle. Les membres de la RVC sont des praticiens provenant de 10 provinces ainsi que du Yukon et des Territoires du Nord-Ouest.

La réserve a été mobilisée par l’Agence canadienne d’inspection des aliments (ACIA) au début de décembre 2014 en raison de l’éclosion de l’influenza aviaire dans la vallée du Fraser de la Colombie-Britannique. Dans l’ensemble, 11 établissements commerciaux (7 éleveurs de poulets à griller; 3 de dindons; 1 de poules pondeuses) ont été infectés et 245 000 oiseaux affectés ont dû être réformés : 155 membres de la RVC ont répondu à l’appel de mobilisation et 101 ont indiqué qu’ils pourraient intervenir pendant quelques semaines entre le 28 décembre 2014 et le 1er mars 2015. Au total, 525 semaines de service ont été offertes. En fin de compte, l’éclosion a pu être contenue par l’ACIA et il n’a pas été nécessaire de déployer les membres de la RVC.

La RVC tente de former un partenariat avec l’Agence canadienne de la santé publique afin d’obtenir l’accès à des modules de formation utiles qui sont aussi utilisés par les équipes d’assistance médicale vétérinaire de l’AVMA.

L’ACMV travaille avec les bureaux provinciaux de la gestion des urgences ainsi que les vétérinaires en chef afin d’engager les membres de la RVC dans le cadre des exercices provinciaux. Par ailleurs, nous espérons être en mesure de réinstaller la participation des membres de la RVC dans les occasions de formation de l’ACIA.
Business Management

Gestion commerciale

In 2014, the CVMA continued its unique benchmarking program that included valuable economic and practice management tools and resources such as provincial suggested fee guides, compensation and benefits reports for associate veterinarians, non-DVM wage reports, provincial economic reports and individual practice reports. The data for these reports come from the annual economic surveys that the CVMA conducts in partnership with the provincial veterinary medical associations (VMAs), Idexx Laboratories, Petsecure, Merck Animal Health and Scotiabank who co-sponsor this program together with the CVMA.

In 2014, the CVMA published 6 veterinary practice management articles in The CVJ:
• Associate salaries increase ... for half the provinces
• Provincial fees
• Results from the 2013 practice owners’ economic survey
• Non-DVM staff wages for 2013
• Market share and veterinary practice management software
• How much does a vacation cost?

All of these articles can also be found on the CVMA website under the Business Management Program section.

For the Business Management track at the 2014 CVMA Convention in St. John’s, Newfoundland, Dr. Bernadine Cruz presented a full-day CE stream on “It’s not what you say but how” with topics covering great first impressions, communicating well when you don’t have time, communicating with seniors, how to talk to your boss, confidence, and target markets (boomers). Also, during the St. John’s Convention, the CVMA offered its members free one-on-one business consultations with Mr. Darren Osborne.

Representatives from all provincial VMAs attended the yearly Economic Forum hosted by the CVMA during the St. John’s Convention. Participants were given an overview of the complexity of the scheduling and delivery of annual surveys and reports to all members. Mr. Darren Osborne, CVMA’s economic consultant, presented national data comparisons and discussed ways for improving the program and its delivery.

En 2014, l’ACMV a continué d’offrir son programme d’évaluation comparative du rendement unique en son genre qui comprenait des outils et des ressources pour la gestion d’une pratique, comme les guides tarifaires suggérés provinciaux, les rapports sur la rémunération et les avantages sociaux des vétérinaires salariés, les rapports sur les salaires des employés non-vétérinaires, les rapports économiques provinciaux et les rapports individuels des pratiques. Les données utilisées pour ces rapports proviennent des sondages économiques annuels réalisés par l’ACMV en partenariat avec les associations provinciales de médecins vétérinaires, Idexx Laboratories, Petsecure, Merck Santé animale et la Banque Scotia qui cocommanditent ce programme avec l’ACMV.

En 2014, l’ACMV a publié six articles sur la gestion commerciale d’une pratique vétérinaire dans La RVC :
• Les salaires des vétérinaires augmentent... pour la moitié des provinces
• Tarifs provinciaux
• Résultats du Sondage économique 2013 auprès des propriétaires de pratique
• Salaires des employés non-vétérinaires en 2013
• Part du marché et logiciels de gestion d’une pratique vétérinaire
• Combien coûtent vos vacances?

On peut aussi consulter tous ces articles sur le site Web de l’ACMV, dans la section du Programme de gestion commerciale.

Pour le volet sur la gestion commerciale du congrès 2014 de l’ACMV qui s’est tenu à St. John’s, à Terre-Neuve, la Dʳ Bernadine Cruz a présenté un volet de FC d’une journée sur « Ce n’est pas ce vous dites mais comment vous le dites » avec des sujets qui portaient sur la façon de donner une excellente première impression, de bien communiquer quand vous n’avez pas le temps, de communiquer avec les aînés, comment parler à votre patron, la confiance et les marchés cibles (les baby-boomers). De plus, durant le congrès de St. John’s, l’ACMV a offert aux membres ses consultations d’affaires individuelles avec M. Darren Osborne.

Des représentants de toutes les associations provinciales de médecins vétérinaires ont assisté au forum économique annuel organisé par l’ACMV durant son congrès à St. John’s. Les participants ont pu constater la complexité du calendrier et de la production des sondages annuels et des rapports pour tous les membres. Darren Osborne, consultant économique de l’ACMV, a présenté les comparaisons des données nationales et a discuté des façons d’améliorer le programme et sa mise en œuvre.
Veterinary Wellness
Bien-être des vétérinaires

There is a wealth of discussions on the topic of wellness in veterinary medicine and the CVMA continued to engage through education and awareness. Four members served on the CVMA Wellness Advisory Group in 2014 to help move this topic forward:

- National listing of helplines, support services and resources for veterinarians available on the CVMA website.
- Wellness session at the 2014 CVMA Convention presented by Dr. Jean E. Wallace, Ph.D., “Veterinarians and Animal Health Technician Wellness: The ups, the downs and maintaining momentum.”
- Editorial in the August 2014 CVJ by Dr. Carlton Gyles on veterinarian suicides.
- CVMA participation in a survey from the Association of American Veterinary Medical Colleges for the AAVMC 2015 Health and Wellness Summit.
- What Can’t Be Taught; a new feature in The CVJ where members share their experience on surviving their first year in practice, with the goal of helping new veterinarians cope with stress as they transition to professional life.
- CVMA engaged with the International Veterinary Professional Wellness Network through its online community.

Group Insurance Program
Programme d’assurance de groupe

The exclusive CVMA Group Insurance Program is designed for veterinarians and is overseen by the CVMA for the better protection and service of members.

Professional Liability and Commercial ‘Protected Self-Insurance’ (PSI) Program
Programme de responsabilité professionnelle et d’«assurance auto-protégée» commerciale

In 2014, the number of policies increased by 7% and the program grew to insure a total of 1476 practices. Overall, renewals for 2014 had a retention rate of 98%, which is quite exceptional. The PSI structure, the coverage enhancements (Legal Expense and Cyber Liability coverage) introduced at the 2014 renewal, and the proven rate stability comparison to competing products separate the CVMA Program from competitors.

Le Programme d’assurance de groupe exclusif de l’ACMV est conçu pour les vétérinaires et est supervisé par l’ACMV afin d’assurer une protection et un service améliorés pour les membres.

En 2014, le nombre de polices a augmenté de 7 % et le programme a connu une croissance pour atteindre un total de 1476 pratiques assurées. Dans l’ensemble, les renouvellements pour 2014 affichaient un taux de rétention de 98 %, ce qui représente un rendement assez exceptionnel. La structure de l’assurance auto-protégée, les améliorations apportées à la couverture (protection pour les dépenses juridiques et la cyber-responsabilité) introduites au renouvellement de 2014 ainsi que la comparaison éprouvée pour la stabilité des taux par rapport à
Employee Group Benefits Program
The TotalGUARD/CVMA Employee Benefits Program offers a flexible choice of employee benefits including health and dental coverage, life insurance, accidental death and dismemberment, and disability insurance. Insured clinics not only benefit from the rate stability generated by spreading claims over the entire TotalGUARD/CVMA pool, they also gain a competitive advantage to help them attract and retain star employees. The Program also offers optional wellness benefits such as professional referral services and counseling for insured members and their eligible family members, and business assistance and coaching for the employer’s organization. In 2014, the number of policies increased by 13%.

Other insurance solutions available under the CVMA Insurance Program include:
Affinity Program (Individual Life, Child Dependent Life, AD&D, LTD, Business Overhead Expense Insurance)
Veterinary Student & Graduate Program (Individual Life, AD&D, LTD)

Personal Automobile & Home Insurance
Members continued to enjoy exclusive group rates and benefits for their personal home and auto insurance as part of the CVMA Group Insurance Program. In 2014, the number of new auto and home policies more than doubled and increased by 69% and 79% respectively.

Western Group Insurance Solutions administers the specialized CVMA Group Insurance Program and provides risk management services for CVMA members across Canada. (In Québec, the administrator operates under HED, courtier en assurance, inc.) The Personal Insurance Company provides auto and home insurance products exclusively through professional associations. It is owned by The Desjardins General Insurance Group, a wholly owned subsidiary of Desjardins Group.

des produits concurrents distinguent le programme de l’ACMV de ceux de ses concurrents.

Programme collectif d’avantages sociaux pour les employés
Le Programme d’avantages sociaux TotalGUARD/ACMV offre un choix flexible d’avantages sociaux qui comprend l’assurance maladie et dentaire, l’assurance vie, l’assurance en cas de décès ou de mutilation par accident et l’assurance invalidité. Les cliniques assurées profitent non seulement de la stabilité des primes créée par la répartition des réclamations sur l’ensemble du groupe TotalGUARD/ACMV, mais elles jouissent aussi d’un avantage concurrentiel pour les aider à attirer et à conserver les meilleurs employés. Le Programme offre aussi des avantages optionnels de bien-être comme les services d’aiguillage professionnel et le counseling pour les membres assurés et leurs membres de la famille admissibles ainsi qu’une assistance et un encadrement d’affaires pour l’organisation de l’employeur. En 2014, le nombre de polices a augmenté de 13 %.

Les autres solutions d’assurance offertes en vertu du Programme d’assurance de l’ACMV incluent :
Programme Affinité (assurance vie individuelle, assurance vie pour les enfants à charge, assurance en cas de décès ou de mutilation par accident, invalidité de longue durée, assurance pour les frais généraux d’entreprise).
Programme d’assurance pour étudiants et diplômés (assurance vie individuelle, assurance en cas de décès de mutilation par accident, invalidité de longue durée).

Assurance automobile et habitation individuelle
Les membres ont continué de profiter de tarifs de groupe et d’avantages exclusifs pour leur assurance habitation et automobile individuelle dans le cadre du Programme d’assurance de groupe de l’ACMV. En 2014, le nombre de nouvelles polices automobile et habitation a plus que doublé, affichant des hausses de 69 % et de 79 % respectivement.

Western Group Insurance Solutions administre le Programme d’assurance de groupe spécialisé de l’ACMV et offre des services de gestion des risques pour les membres de l’ACMV à l’échelle du Canada. (Au Québec, l’administrateur est exploité sous le nom de HED, courtier en assurance, inc.) La compagnie d’assurance La Personnelle offre des produits d’assurance automobile et habitation exclusivement par l’entremise des associations professionnelles. Elle appartient à Desjardins Groupe d’assurances générales Inc. et est une filiale en propriété exclusive du Groupe Desjardins.
VALUE OF MEMBERSHIP

Membership

Policy and Advocacy
The CVMA continued to provide national and international leadership on veterinary and animal health issues, and to represent the collective interests of the veterinary profession. The CVMA engaged in activities on behalf of members to influence legislative and policy issues that may threaten the scope of practice of veterinarians in Canada and the health of humans and animals. For example:

• Veterinary input in the development of national farm animal welfare codes of practice
• Research and formulation of veterinary and animal welfare position statements
• Advocacy to influence federal legislation changes to close regulatory gaps
• Representation in global discussions in matters of food safety, drugs supply, labour mobility, education standards and global trade
• Media and public relations addressing national veterinary issues and the treatment and welfare of animals.

In 2014, 6895 veterinarians and student members enjoyed the wide array of programs, services and resources as a benefit of their membership. The CVMA uses its national volume purchase power to help put money back in members’ wallets and deliver a wealth of practice tools, guidelines, best practices, resources and information to support the delivery of high quality veterinary care and respond to the needs of its members. Here are some of the programs organized under the 3 leadership areas:

Science and Knowledge: includes The Canadian Veterinary Journal, the Canadian Journal of Veterinary Research, an enriching scientific CE program at the CVMA Convention, the Emerging Leaders workshop, timely advisories, and relevant news and information.

Practice and Economics: includes provincial suggested fee guides, associate and non-DVM compensation and benefits reports, compensation reports for veterinarians in non-clinical employment, specialized group insurance program, and practice management resources.

Practice tools and support services: includes the Antimicrobial IntelliVet app, the Green Veterinary Practice resource, anesthetic and pain management protocols and posters, antimicrobial prudent use guidelines, compounding guidelines, business banking program, merchant payment processing service, telephone ‘hold’ service, client education material and web resources, veterinary legal advice column and employment guidelines, to name a few.

VALEUR DE L’ADHÉSION

Effectif

Politiques et défense des intérêts
L’ACMV a continué d’assurer un leadership national et international à l’égard des enjeux vétérinaires et des questions liées à la santé animale ainsi que de représenter les intérêts collectifs de la profession vétérinaire. L’ACMV a participé à des activités au nom des membres afin d’influencer les enjeux législatifs et politiques qui peuvent menacer la portée d’exercice des vétérinaires au Canada ainsi que la santé des humains et des animaux, notamment dans les domaines suivants :

• la rétroaction vétérinaire lors de l’élaboration des codes de pratiques nationaux sur le bien-être des animaux d’élevage;
• la recherche et la formulation d’énoncés de position sur la médecine vétérinaire et le bien-être animal;
• la défense des intérêts en vue d’influencer les modifications législatives fédérales pour éliminer les lacunes réglementaires;
• la représentation dans les discussions mondiales sur des questions liées à la salubrité des aliments, l’approvisionnement en médicaments, la mobilité de la main-d’œuvre, les normes d’enseignement et le commerce mondial;

• les relations publiques et les relations avec les médias touchant les enjeux vétérinaires nationaux ainsi que le traitement et le bien-être des animaux.

En 2014, 6895 vétérinaires et membres étudiants ont profité du vaste éventail de programmes, de services et de ressources offerts dans le cadre de l’adhésion. L’ACMV met à contribution son pouvoir d’achat de volume national pour aider les membres à réaliser des économies et offrir une foule d’outils pour la pratique, de lignes directrices, de meilleures pratiques, de ressources et d’information afin d’appuyer la prestation de soins vétérinaires de grande qualité et de répondre aux besoins des membres. Voici quelques-uns des programmes organisés dans les trois domaines de leadership :

Science et connaissances : comprend La Revue vétérinaire canadienne, la Revue canadienne de recherche vétérinaire, un programme de formation continue enrichissant au congrès de l’ACMV, l’atelier des futurs leaders, des bulletins d’information opportuns et des nouvelles et des renseignements pertinents.

Pratique et finances : comprend les guides tarifaires suggérés pour les provinces, les rapports sur la rémunération et les avantages sociaux des vétérinaires salariés et des employés non-vétérinaires, les rapports sur la rémunération pour les vétérinaires occupant des emplois non cliniques, le programme d’assurance de groupe spécialisé et les ressources de gestion de la pratique.

Outils pour la pratique et services de soutien : comprend, entre autres, l’appli IntelliVet, la ressource pour une Pratique vétérinaire éco-responsable, les protocoles et les affiches pour l’anesthésie et la gestion de douleur, les lignes directrices sur l’administration judiciaire des antimicrobiens, les lignes directrices pour les préparations magistrales, le programme de services bancaires commerciaux, le service de traitement des paiements pour les commerçants, le service de « mise en garde » téléphonique, du matériel pédagogique et des ressources Web pour les clients, une rubrique juridique vétérinaire et des lignes directrices sur l’emploi des finissants.
Students of the Canadian Veterinary Medical Association (SCVMA)

Les Étudiants de l’Association canadienne des médecins vétérinaires (ÉACMV) représentent plus de 1600 étudiants en médecine vétérinaire dans les cinq collèges de médecine vétérinaire canadiens. L’ACMV a contribué plus de 80 000 $ de son budget de fonctionnement pour financer les initiatives des étudiants dans le cadre du programme des ÉACMV et cultiver la relation entre l’ACMV et les étudiants en médecine vétérinaire.

Le Symposium 2014 des ÉACMV s’est déroulé du 9 au 11 janvier à Saint-Hyacinthe, au Québec, et a été organisé par les étudiants de la Faculté de médecine vétérinaire de l’Université de Montréal. Cet événement dirigé par des étudiants a remporté un énorme succès et plus de 350 étudiants y ont participé.

Les ÉACMV ont réalisé leur Sondage annuel auprès des finissants afin de recueillir des renseignements qui peuvent être utiles pour les futurs diplômés en médecine vétérinaire et qui intéressent aussi la profession. Les résultats du Sondage 2014 auprès des finissants ont été publiés dans l’édition d’avril 2015 de La RVC.

Diverses ressources de l’ACMV ont été produites pour les membres des ÉACMV, notamment le bulletin étudiant annuel...
VetRap qui présente des articles provenant de chacun des cinq collèges ainsi que deux cyberbulletins destinés aux étudiants. Pendant l’année, la section des ÉACMV du site Web et le groupe Facebook des ÉACMV ont présenté des mises à jour.

Des sarraus affichant le logo de l’ACMV et des insignes d’identité ont été remis aux étudiants de première année durant la cérémonie d’accueil de chaque collège. Les prix de l’ACMV et les prix de l’enseignant de l’année ont aussi été décernés à chaque collège.

De nouveau cette année, la présentation d’automne de l’ACMV «Une voix» a été organisée à chaque école afin d’introduire les étudiants à l’ACMV et de discuter une question de l’heure portant sur le bien-être animal ou les enjeux vétérinaires nationaux. Un membre du Conseil et un représentant des ÉACMV ont donné la présentation et animé les discussions.

Par ailleurs, le partenaire d’assurance de groupe de l’ACMV, Western Financial Group Insurance Solutions, a organisé une présentation du midi à chaque collège. Cette conférence représente l’occasion de donner aux étudiants un aperçu des risques d’assurance auxquels ils pourront faire face durant leur carrière et d’expliquer les divers produits et couvertures d’assurance offerts.

Groupe consultatif de liaison avec les étudiants
Les membres du Comité de liaison avec les étudiants de l’ACMV représentent l’ACMV à chacun des cinq collèges de médecine vétérinaire canadiens afin de renforcer le lien entre l’ACMV et ses membres étudiants. Le groupe consultatif, qui se compose d’un professeur provenant de chacun des collèges, fournit des conseils aux représentants des ÉACMV à leur collège respectif. Les membres participent aussi à des initiatives annuelles de l’ACMV dans les collèges vétérinaires incluant la conférence «Une voix», la cérémonie des sarraus et le Symposium des ÉACMV.

CVMA-SBCV Chapter
Section de l’ACMV-SBCV

As the first chapter of the CVMA, the CVMA-SBCV Chapter continues to flex its provincial muscle while maintaining its place as part of the national team. The Chapter is the voice of veterinarians in British Columbia, sought after for comment, consultation, and information by the media, peers, stakeholders, and the public.

Communications and consultation
The CVMA-SBCV Chapter is contacted by British Columbia media on animal and veterinary-related stories of importance to British Columbians, such as raw pet food diets; West Nile Virus; and fire ants bites in dog parks. Other organizations turned to the Chapter for advice, such as British Columbia Ferries, which committed to consult with the CVMA-SBCV on pet travel, and will credit that consultation. The Chapter is represented on the Provincial Animal Health/Public Health Rabies working group, and was consulted on British Columbia’s earthquake preparedness.

À titre de première section de l’ACMV, la Section de l’ACMV-SBCV continue d’exercer des activités provinciales tout en conservant une place au sein de l’équipe nationale. La Section est la voix des vétérinaires en Colombie-Britannique qui est consultée par les médias, les pairs, les intervenants et le public pour obtenir des commentaires, des consultations ainsi que des renseignements.

Communications et consultation
Les médias de la Colombie-Britannique contactent la Section de l’ACMV-SBCV pour se renseigner sur des dossiers importants touchant les animaux et les vétérinaires auxquels s’intéressent les citoyens de la Colombie-Britannique, comme les diètes composées d’aliments crus, le virus du Nil occidental et les morsures de fourmis de feu dans les parcs à chiens. D’autres organisations consultent la Section pour obtenir des conseils, notamment British Columbia Ferries, qui s’est engagée à consulter la Section ACMV-SBCV sur les déplacements des animaux de compagnie et fera mention de cette consultation. La section est représentée...
Municipalities contact the CVMA-SBCV regarding animal enquiries; industry partners rely on the Chapter for definitive information. The CVMA-SBCV has strengthened its relationship with government veterinarians, reaching out to the Chief Veterinarian to publish a column in each issue of *West Coast Veterinarian (WCV)* magazine. The magazine itself continues to be a well-read and relevant magazine providing current, meaningful content for British Columbia veterinarians. Its periodic *WCV* Monthly e-mail blasts also provide timely and relevant information to members, and to Western College of Veterinary Medicine (WCVM) BC-quota students, at their request. The activities in this area fulfill the CVMA’s Policy and Advocacy objective.

**Continuing education**
The CVMA-SBCV Chapter offered 2 well-attended continuing education events. The 43rd Annual Equine Seminar organized by the Equine Committee, held in Delta, featured Dr. Nicholas Frank, from Tufts University, speaking on Endocrine Disorders of the Older Horse, and Dr. Hal Schott, from Michigan State University, speaking on Fluid Therapy, Weight Loss, Urinary, and Hepatic Diseases. The Chapter’s 2014 Fall CE and Trade Show, held in Richmond, featured Dr. Brigitte Brisson, Soft Tissue Surgery; Dr. Nancy Brock, Anesthesia; Dr. Marnie Ford, Ophthalmology; Dr. James Montgomery, Medical Imaging; Dr. Charlie Pye, Dermatology; Dr. Kevin S. Stepaniuk, Dentistry, and lunch-and-learns featuring Dr. Liz Ruelle, How to Use the Cat Healthy Toolkit to Increase Your Feline Practice, and Dr. Rebecca Ledger, Distinguishing Training Issues from Mental Health Disorders. Both CE events were financially successful, and most veterinarians surveyed were likely to return next year. The activities in this area fulfill the CVMA’s Science and Knowledge objective.

**Chapter development**
The Chapter Board has shown leadership in suggesting a fee review to address the needs of new graduates, and a review of membership benefits to attract new members. The CVMA-SBCV has been particularly involved in the establishment of a mentoring program, spearheading discussion with the WCVM, and it will continue to work with the WCVM and the CVMA to develop the best mentoring program available. The Chapter assists in the promotion of the fee guides, and the development and promotion of position statements.

**Formation continue**
La Section de l’ACMV-SBCV a offert deux activités de formation continue qui ont rassemblé un nombre important de participants. Le 43e Atelier annuel sur les équidés, qui a été organisé par le Comité des équidés, s’est tenu à Delta, et a présenté le Dr Nicholas Frank, de l’Université Tufts, qui a traité des troubles endocriniens chez le cheval âgé, et le Dr Hal Schott, de l’Université de l’État du Michigan, qui a abordé la fluidothérapie, la perte de poids ainsi que les maladies urinaires et hépatiques. Le Salon d’exposition et les ateliers de formation de l’automne 2014 de la Section ont eu lieu à Richmond. On y a présenté la Dr Brigitte Brisson, chirurgie des tissus mous; la Dr Nancy Brock, anesthésie; la Dr Marnie Ford, ophtalmologie; le Dr James Montgomery, imagerie médicale; le Dr Charlie Pye, dermatologie; le Dr Kevin S. Stepaniuk, dentisterie, et des causeries du midi qui ont présenté la Dr Liz Ruelle, Comment utiliser la trousse de Soins félin pour élargir votre pratique féline, et la Dr Rebecca Ledger, Comment distinguer les problèmes de propreté des troubles de santé mentale. Ces deux événements de formation continue ont été réussis sur le plan financier et la plupart des vétérinaires interrogés ont dit qu’ils y retourneraient l’an prochain. Les activités dans ce domaine répondent à l’objectif de Science et connaissances de l’ACMV.

**Évolution de la section**
Le Conseil de la Section a fait preuve de leadership lorsqu’il a suggéré une révision des cotisations afin d’aborder les besoins des finissants ainsi qu’un examen des avantages de l’adhésion afin d’attirer de nouveaux membres. L’ACMV-SBCV a été particulièrement présente dans l’établissement d’un programme de mentorat et elle a dirigé des discussions avec le WCVM et elle continuera de travailler avec le WCVM et l’ACMV pour élaborer le meilleur programme de mentorat possible. La Section collabore à la promotion de guides tarifaires et à l’élaboration et à la promotion d’énoncés de position.
SETTING STANDARDS
AHT/VT Program Accreditation

The mandate of the CVMA’s Animal Health Technologist/Veterinary Technician Program Accreditation Committee (AHTVTPAC) is to identify the minimum standards for educating and training qualified personnel who may join the veterinary health care team and accredits education and training programs accordingly. The graduates benefit by having their competence recognized and prospects for employment and mobility enhanced, and the veterinary team benefits from well-trained technicians and technologists.

The CVMA maintains a reciprocity agreement with the AVMA that allows for the mutual recognition of our respective accreditation processes.

In 2014, the CVMA Council approved accreditation for the programs at Vanier College and Georgian College.

The AHT/VT programs of the following educational institutions, 18 in total, are currently accredited by the CVMA:

• Algonquin College, Ottawa, Ontario
• Dalhousie University (formerly Nova Scotia Agricultural College), Truro, Nova Scotia
• Douglas College, New Westminster, British Columbia
• Georgian College, Orillia, Ontario
• Grand Prairie Regional College, Fairview Campus, Fairview, Alberta
• Lakeland College, Vermilion, Alberta
• Northern Alberta Institute of Technology, Edmonton, Alberta
• Northern College, Haileyburg, Ontario
• Olds College (on-campus and distance learning), Olds, Alberta
• Oulton College, Moncton, New Brunswick
• Red River College, Winnipeg, Manitoba
• St. Clair College, Windsor, Ontario
• St. Lawrence College, Kingston, Ontario
• Saskatchewan Institute of Science and Technology, Saskatoon, Saskatchewan
• Seneca College, King City, Ontario
• Thompson Rivers University (on-campus and distance learning), Kamloops, British Columbia
• University of Guelph, Ridgetown Campus (on-campus and distance learning), Ridgetown, Ontario
• Vanier College, St-Laurent, Quebec

ÉTABLISSEMENT DE NORMES
Agrément des programmes de TSA/TV

Le mandat du Comité d’agrément des programmes de technologie en santé animale et de techniques vétérinaires (CAPTSATV) consiste à identifier les normes minimales pour l’éducation et la formation d’un personnel qualifié qui pourra faire partie de l’équipe de soins vétérinaires et à agréer des programmes d’enseignement et de formation en fonction de ces normes. Les diplômés profitent du fait que leur compétence est reconnue et que leurs perspectives d’emploi et de mobilité sont améliorées.

L’ACMV maintient une entente de réciprocité avec l’American Veterinary Medical Association qui permet la reconnaissance mutuelle de nos processus d’agrément respectifs.

En 2014, le Conseil de l’ACMV a approuvé l’agrément des programmes à Vanier College et à Georgian College.

Les programmes de TSA/TV des établissements d’enseignement suivants, soit 18 au total, sont actuellement agréés par l’ACMV :

• Algonquin College, Ottawa (Ontario)
• Douglas College, New Westminster (Colombie-Britannique)
• Georgian College, Orillia (Ontario)
• Grand Prairie Regional College, Fairview Campus, Fairview (Alberta)
• Lakeland College, Vermilion (Alberta)
• Northern Alberta Institute of Technology, Edmonton (Alberta)
• Northern College, Haileyburg (Ontario)
• Olds College (sur le campus et téléapprentissage), Olds (Alberta)
• Oulton College, Moncton (Nouveau-Brunswick)
• Red River College, Winnipeg (Manitoba)
• St. Clair College, Windsor (Ontario)
• St. Lawrence College, Kingston (Ontario)
• Saskatchewan Institute of Science and Technology, Saskatoon (Saskatchewan)
• Seneca College, King City (Ontario)
• Université Dalhousie (anciennement Nova Scotia Agricultural College), Truro (Nouvelle-Écosse)
• Université de Guelph, Campus Ridgetown (sur le campus et apprentissage à distance), Ridgetown (Ontario)
• Université Thompson Rivers (sur le campus et téléapprentissage), Kamloops (Colombie-Britannique)
• Vanier College, Saint-Laurent (Québec)
National Exams
Examens nationaux

The National Examining Board (NEB) is responsible for the administration, in Canada, of a 3-part veterinary licensing examination process. Completion of the exams is a requirement to be eligible to apply for a license from any of the provincial veterinary licensing bodies. Another role delegated by Council to the NEB is to evaluate university programs designed to educate students to become veterinarians, as part of the AVMA/CVM-Council on Education (COE) accreditation program.

NEB examination process
Graduates of a non-accredited veterinary school are required to complete all 3 parts of the NEB examination sequence in order to receive a Certificate of Qualification (CQ). A CQ is a prerequisite to apply for a general license from any of the 10 provincial veterinary licensing boards in Canada.

In 2014, the NEB accepted applications from 247 new candidates and issued 450 CQs (323 Canadian students, 35 graduates from AVMA-accredited veterinary schools, 76 graduates of non-accredited veterinary schools, 16 American graduates from AVMA-accredited veterinary schools).

The initial application to the NEB, and registrations for all 3 NEB examinations, was moved to an online registration process during 2014.

The NEB’s veterinary licensing process for graduates of non-accredited veterinary schools is composed of the following examinations:
- the Basic and Clinical Sciences Examination (BCSE);
- the North American Veterinary Licensing Examination (NAVLE®);
- the Clinical Proficiency Examination (CPE).

Graduates of an accredited veterinary school need only to pass one of the exams, the North American Veterinary Licensing Examination (NAVLE), to receive a CQ. If such a candidate requires more than 2 attempts to pass the NAVLE®, they must also successfully complete the CPE.

The BCSE is the first exam that graduates of non-accredited veterinary schools must pass before being eligible to proceed to the NAVLE® and the CPE. In 2014, the NEB recorded a total of 173 attempts on the BCSE by NEB candidates, including those with more than one attempt. In 2013, there were 179 BCSE attempts by NEB candidates.

The NEB recorded a total of 613 attempts on the NAVLE® in 2014, during a 2-week testing window in April and a 4-week window from mid-November to mid-December. In 2013, NEB candidates had a total of 571 attempts.

A total of 45 candidates appeared for the full Clinical Proficiency Examination (CPE) at exam sites in Canada in 2014, compared to 52 in 2013.

Candidates who failed one to 3 sections during their attempt at the CPE in full repeated approximately 79 sections during the course of 2014, compared to 93 sections in 2013.


Processus d’examen du BNE
Un diplômé d’une école de médecine vétérinaire non agréée doit achever les trois étapes de la séquence d’exams du BNE afin de recevoir un Certificat de compétence (CC). Le CC constitue une exigence préalable à une demande de permis auprès de l’un des dix ordres vétérinaires provinciaux au Canada.

En 2014, le BNE a accepté des demandes provenant de 247 nouveaux candidats et émis 450 CC (323 à des étudiants canadiens, 35 à des diplômés d’écoles de médecine vétérinaire agréées par l’AVMA, 76 à des diplômés d’écoles de médecine vétérinaire non agréées, 16 à des diplômés américains provenant d’écoles de médecine vétérinaire agréées par l’AVMA).

En 2014, un nouveau système d’inscription en ligne a été instauré pour la demande initiale auprès du BNE ainsi que l’inscription aux trois examens du BNE.

Le processus d’agrément vétérinaire du BNE pour les diplômés des écoles de médecine vétérinaires non agréées se compose des examens suivants :
- l’Examen des sciences de base et cliniques (ESBC);
- l’Examen nord-américain d’agrément en médecine vétérinaire (NAVLE®);
- l’Examen de compétences cliniques (ECC).

Les diplômés d’une école de médecine vétérinaire agréée doivent uniquement réussir l’un des examens, l’Examen nord-américain d’agrément en médecine vétérinaire (NAVLE®), pour recevoir un CC. Si un tel candidat exige plus de deux tentatives pour réussir le NAVLE®, il doit alors aussi réussir l’ECC.

L’ESBC représente le premier examen que doivent réussir les diplômés des écoles de médecine vétérinaire non agréées avant d’être admissibles à subir le NAVLE® et l’ECC. En 2014, le BNE a enregistré un total de 173 tentatives à l’ESBC par les candidats du BNE, incluant ceux avec plus d’une tentative. En 2013, il y avait eu 179 tentatives de l’ESBC par les candidats du BNE.

Le BNE a enregistré un total de 613 tentatives au NAVLE® en 2014, durant une période d’examen de deux semaines en avril et une période d’examen de quatre semaines de la mi-novembre à la mi-décembre. En 2013, les candidats du BNE avaient réalisé un total de 571 tentatives.

Un total de 45 candidats se sont présentés à l’Examen de compétences cliniques (ECC) intégral à des centres d’examen au Canada en 2014, comparativement à 52 en 2013.
In 2014, a total of 29 NEB candidates completed the CPE in the United States compared to 46 in 2013. All were granted a Certificate of Qualification.

Collaboration with exam providers in the United States

Members or representatives of the NEB participated in meetings of its principal counterparts in the United States, including the Educational Commission for Foreign Veterinary Graduates (ECFVG), which is part of the AVMA, as well as the National Board of Veterinary Medical Examiners (NBVME), which owns the NAVLE®.

CVMA members also participated in meetings held by the ECFVG and the NBVME to prepare, review and validate exam content and procedures for all 3 exams. These activities ensure that they remain valid assessment tools.

AVMA/CVMA — COE Veterinary College Accreditation

The CVMA is a full, joint partner in the accreditation program of the COE of the AVMA. When the COE confers accreditation to a veterinary college in Canada, it is granted on behalf of the CVMA and the AVMA. The CVMA has a full, voting representative on the COE, which usually meets twice a year at AVMA headquarters in Schaumburg, Illinois, to discuss and decide upon policy and the accreditation status of colleges.

In 2014 AVMA/CVMA-COE site visits were conducted at:
• University College Dublin
• Oregon State University College of Veterinary Medicine
• North Carolina State University College of Veterinary Medicine
• University of Minnesota College of Veterinary Medicine
• Massey University Institute of Veterinary, Animal & Biomedical Sciences
• University of Utrecht
• Virginia/Maryland Regional College of Veterinary Medicine
• Mississippi State University College of Veterinary Medicine

Les candidats qui avaient échoué de 1 à 3 sections durant leur tentative à l’ECC intégral ont répété environ 79 sections au cours de 2014, comparativement à 93 sections en 2013.

En 2014, un total de 29 candidats du BNE ont terminé l’ECC aux États-Unis, comparativement à 46 en 2013. Ils ont tous obtenu un Certificat de compétence.

Collaboration avec les fournisseurs d’examen aux États-Unis

Des membres ou des représentants du BNE ont participé à des réunions avec leurs principaux homologues aux États-Unis, notamment l’Educational Commission for Foreign Veterinary Graduates (ECFVG), qui fait partie de l’AVMA, ainsi que le National Board of Veterinary Medical Examiners (NBVME), qui est propriétaire du NAVLE®.

Les membres de l’ACMV ont aussi participé à des réunions tenues par l’ECFVG et le NBVME pour préparer, examiner et valider le contenu et les procédures d’examen pour les trois examens. Ces activités veillent à assurer la validité de ces outils d’évaluation.

Agrément des collèges de médecine vétérinaire par l’AVMA/ACMV — COE

L’ACMV est partenaire à part entière du programme d’agrément géré par le COE de l’AVMA. Lorsque le COE confère l’agrément à un collège de médecine vétérinaire au Canada, il le fait au nom de l’ACMV et de l’AVMA. L’ACMV dispose d’un représentant à part entière avec droit de vote au sein du COE, qui se réunit habituellement deux fois par année au siège social de l’AVMA à Schaumburg, en Illinois, pour discuter et établir les politiques ainsi que le statut d’agrément des collèges.

En 2014, des inspections de l’AVMA/ACVM-COE ont été réalisées dans les établissements suivants :
• University College Dublin
• Collège de médecine vétérinaire de l’Université d’État de l’Oregon
• Collège de médecine vétérinaire de l’Université d’État de la Caroline du Nord
• Collège de médecine vétérinaire de l’Université du Minnesota
• Institute of Veterinary, Animal & Biomedical Sciences de l’Université Massey
• Université d’Utrecht
• Virginia/Maryland Regional College of Veterinary Medicine
• Collège de médecine vétérinaire de l’Université d’État du Mississippi
INDEPENDENT AUDITORS’ REPORT

To the Members,

Canadian Veterinary Medical Association:

We have audited the accompanying financial statements of the Canadian Veterinary Medical Association, which comprise the statement of financial position as at December 31, 2014, and the statements of changes in net assets, operations and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management’s responsibility for the financial statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors’ responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor’s judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity’s preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Canadian Veterinary Medical Association as at December 31, 2014, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

ouselley harney clipsham deep llp

Licensed Public Accountants

Ottawa, Ontario
March 25, 2015

RAPPORT DES AUDITEURS INDÉPENDANTS

Aux membres de

L’Association canadienne des médecins vétérinaires


Responsabilité de la direction pour les états financiers

La direction est responsable de la préparation et de la présentation fidèle de ces états financiers conformément aux normes comptables canadiennes pour les organismes sans but lucratif, ainsi que du contrôle interne qu’elle considère comme nécessaire pour permettre la préparation d’états financiers exempts d’anomalies significatives, que celles-ci résulteraient de fraudes ou d’erreurs.

Responsabilité de l’auditeur

Notre responsabilité consiste à exprimer l’opinion sur les états financiers, sur la base de notre audit. Nous avons effectué notre audit selon les normes d’audit généralement reconnues au Canada. Ces normes déterminent que nous nous conformions aux règles de déontologie et que nous suivions et réalisions l’audit de façon à obtenir l’assurance raisonnable que les états financiers ne comportent pas d’anomalies significatives.


Nous estimons que les éléments probants que nous avons obtenus sont suffisants et appropriés pour fonder notre opinion d’audit.

Opinion

A notre avis, les états financiers donnent, dans tous leurs aspects significatifs, une image fidèle de la situation financière de L’Association canadienne des médecins vétérinaires au 31 décembre 2014, ainsi que de sa performance financière et de ses flux de trésorerie pour l’exercice terminé à cette date, conformément aux normes comptables canadiennes pour les organismes sans but lucratif.

ouselley harney clipsham deep llp

Experts - comptables autorisés

OUSELEY HANVEY CLIPSHAM DEEP LLP

Licensed Public Accountants

Ottawa, Ontario
March 25, 2015

# Statement of Financial Position

**As at December 31, 2014**

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$ 471,921</td>
<td>$ 208,752</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>158,986</td>
<td>184,976</td>
</tr>
<tr>
<td>Interest receivable</td>
<td>60,821</td>
<td>38,756</td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>73,215</td>
<td>56,239</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$ 764,743</td>
<td>$ 488,723</td>
</tr>
<tr>
<td><strong>Investments</strong></td>
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<td>2,390,210</td>
</tr>
<tr>
<td><strong>Capital Assets</strong></td>
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<td>722,149</td>
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<tr>
<td><strong>Internal Claims</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>$ 3,650,939</td>
<td>$ 3,601,082</td>
</tr>
<tr>
<td><strong>Current Liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable and accrued liabilities</td>
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<td>$ 168,288</td>
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<tr>
<td>Government remittances payable</td>
<td>7,629</td>
<td>550</td>
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<tr>
<td>Deferred revenue</td>
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<td>505,233</td>
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<tr>
<td><strong>Total Liabilities</strong></td>
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<td>674,071</td>
</tr>
<tr>
<td><strong>Net Assets</strong></td>
<td>$ 3,650,939</td>
<td>$ 3,601,082</td>
</tr>
</tbody>
</table>

**Approved on Behalf of the Board**

President: [Signature]

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**État de la situation financière**

**Au 31 décembre 2014**

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Actif à court terme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encaisse</td>
<td>$ 208,752</td>
<td>$ 488,723</td>
</tr>
<tr>
<td>Débiteurs</td>
<td>184,976</td>
<td>158,986</td>
</tr>
<tr>
<td>Intérêts à recevoir</td>
<td>38,756</td>
<td>60,821</td>
</tr>
<tr>
<td>Frais payés d’avance</td>
<td>56,239</td>
<td>73,215</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$ 488,723</td>
<td>$ 764,743</td>
</tr>
<tr>
<td><strong>Placements</strong></td>
<td>2,390,210</td>
<td>2,221,091</td>
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<tr>
<td><strong>Immobilisations</strong></td>
<td>722,149</td>
<td>665,105</td>
</tr>
<tr>
<td><strong>Actif à court terme</strong></td>
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<td></td>
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<tr>
<td>Créditeurs et charges à payer</td>
<td>$ 168,288</td>
<td>$ 98,506</td>
</tr>
<tr>
<td>Remises gouvernementales à payer</td>
<td>550</td>
<td>7,629</td>
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<tr>
<td>Revenus reportés</td>
<td>505,233</td>
<td>708,291</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$ 674,071</td>
<td>$ 814,426</td>
</tr>
<tr>
<td><strong>Actif net</strong></td>
<td>$ 3,601,082</td>
<td>$ 3,650,939</td>
</tr>
</tbody>
</table>

**Actif nets affectés d’origine interne** :

- Éventualité opérationnelle
  - Éventualité de programme
  - Non affectés

**Total**

- $ 3,650,939
- $ 3,601,082

**À nom du conseil d’administration**

Président: [Signature]
### Canadian Veterinary Medical Association

#### Statement of Operations
For the Year Ended December 31, 2014

<table>
<thead>
<tr>
<th>Service</th>
<th>2014</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Program</td>
<td>$64 408</td>
<td>$59 211</td>
</tr>
<tr>
<td>Professional development</td>
<td>437 322</td>
<td>538 038</td>
</tr>
<tr>
<td>Journal – CJVR</td>
<td>73 457</td>
<td>73 604</td>
</tr>
<tr>
<td>Journal – CVJ</td>
<td>588 921</td>
<td>851 179</td>
</tr>
<tr>
<td>Membership services</td>
<td>1,299 209</td>
<td>1,292 362</td>
</tr>
<tr>
<td>National Examination Board</td>
<td>1,055 138</td>
<td>1,245 693</td>
</tr>
<tr>
<td>Canadian Veterinary Reserve</td>
<td>204 587</td>
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</tr>
<tr>
<td>AHTVTP Accreditation</td>
<td>46 500</td>
<td>42 750</td>
</tr>
<tr>
<td>Secretariat</td>
<td>424 243</td>
<td>360 287</td>
</tr>
<tr>
<td>Students Program</td>
<td>7 855</td>
<td>7 750</td>
</tr>
<tr>
<td>Special projects</td>
<td>106 375</td>
<td>118 074</td>
</tr>
<tr>
<td>Interest</td>
<td>46 317</td>
<td>43 226</td>
</tr>
<tr>
<td><strong>Total Revenues</strong></td>
<td><strong>4 564 332</strong></td>
<td><strong>4 614 056</strong></td>
</tr>
<tr>
<td>Inter-departmental revenues and administration allocations</td>
<td>(217 311)</td>
<td>(206 591)</td>
</tr>
<tr>
<td><strong>Net Revenues</strong></td>
<td><strong>$ (90 498)</strong></td>
<td><strong>$ 103 023</strong></td>
</tr>
</tbody>
</table>

### L'Association Canadienne des Médecins Vétérinaires

#### État des Résultats
Pour l’Exercice Terminé le 31 Décembre 2014

<table>
<thead>
<tr>
<th>Service</th>
<th>2014</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme de communication</td>
<td>$59 211</td>
<td>$538 038</td>
</tr>
<tr>
<td>Perfectionnement</td>
<td>538 038</td>
<td>736 04</td>
</tr>
<tr>
<td>Revue – RCRV</td>
<td>581 179</td>
<td>851 179</td>
</tr>
<tr>
<td>Revue – RVC</td>
<td>851 179</td>
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The increasing risk of Lyme disease in Canada

Catherine Bouchard, Erin Leonard, Jules Konan Koffi, Yann Pelcat, Andrew Peregrine, Neil Chilton, Kateryn Rochon, Tim Lysyk, L. Robbin Lindsay, Nicholas Hume Ogden

Abstract — There is an increasing risk of Lyme disease in Canada due to range expansion of the tick vector, *Ixodes scapularis*. The objectives of this article are to i) raise public awareness with the help of veterinarians on the emerging and expanding risk of Lyme disease across Canada, ii) review the key clinical features of Lyme disease in dogs, and iii) provide recommendations for veterinarians on the management of Lyme disease in dogs.


Lyme disease risk in Canada

Lyme disease (LD) is the most common tick-borne disease affecting human and dog health in North America and Europe (1). In most human cases, LD presents as a non-specific flu-like illness frequently with a characteristic skin lesion known as erythema migrans (2). If left untreated, the disease can progress to arthritic, cardiac, and neurological manifestations. In dogs, clinical disease is a less common outcome of infection than in humans and usually presents as one or more of: fever, anorexia, depression, lethargy, lameness, joint swelling, arthritis, and lymphadenopathy. Nephropathy can also occur in the more advanced stages of the disease in dogs, although this is uncommon (3).

In Canada, the agent of LD is the spirochete *Borrelia burgdorferi sensu stricto*, which is transmitted by the bite of ticks in the genus *Ixodes*. *Ixodes scapularis*, the blacklegged tick, is the main vector in eastern and central North America and *Ixodes pacificus*, the western blacklegged tick, is the main vector west of the Rocky Mountains (2).

Recent studies suggest that LD is an emerging health risk in southeastern and south central Canada, mostly due to the increasing geographic range of *I. scapularis* (2,4–7). *Ixodes scapularis* feeds on a broad range of animal species including rodents, birds, medium- and large-sized mammals, and reptiles, and also humans (8). Immature (larval and nymphal) ticks become infected by feeding on wild animal reservoirs (particularly rodents such as the white-footed mouse, *Peromyscus leucopus*) and are capable of transmitting infection to humans or animals after they molt into nymphs or adults. The tick season in Canada is typically from the spring snow melt to late autumn, although different life-cycle stages are active at different times of the year, and onset and end of activity can vary among years and localities. In most cases, ticks must attach and feed for 24 to 48 h before *B. burgdorferi* transmission occurs (9,10).

In southern parts of the country, the incidence of reported LD cases in humans has been increasing, particularly in southern parts of Ontario, Quebec, Manitoba, and in locations in Nova Scotia. In 2004, there were an estimated 40 reported human cases of LD in Canada (11); this number rose to 682 reported human cases in 2013 (unpublished data). The incidence of clinical cases of LD in dogs in Canada is unknown. The seroprevalence of *B. burgdorferi* in dogs in Canadian provinces ranged from 0.00% to 2.15% (average 0.72%) according to a study in 2008 (12). It was assumed that 2/3 of positive
Figure 1. Surveillance for Lyme disease risk areas, and tick vectors in eastern and central Canada based on different surveillance systems: A – Active surveillance sampling sites visited from 2003 to 2012: site locations that were sampled are delimited by grey lines (buffer of 25 km created around each site) and the sites with at least 1 *I. scapularis* tick found are represented following a colored gradient and quintile classification (darker areas indicating higher numbers of sites with ticks). B – The geographic distribution of *I. scapularis* ticks submitted from dogs based on the probable locations of acquisition, 1991 to 2012: the locations with ticks submitted are represented following a green gradient and quintile classification (darker green areas indicate higher numbers of locations with ticks submitted). C – The geographic distribution of *I. scapularis* ticks submitted from humans based on the probable locations of acquisition, 1991 to 2012: the locations with ticks submitted are represented following a brown gradient and quintile classification (darker brown areas indicate higher numbers of locations with ticks submitted).
SPECIAL REPORT

test results were associated with infections acquired in Canada, rather than being travel-acquired in LD risk areas outside the country. The low seroprevalence in Canada [in LD risk areas in the USA, seroprevalence is typically > 10% (13)] likely reflects the early stage of emergence of LD in Canada in 2008.

This article focuses on i) the environmental drivers of LD, ii) the geographic distribution and variation of LD risk areas in Canada, iii) the key clinical features and diagnostic options for detection of LD in dogs, and iv) recommendations for treatment and prevention of LD in dogs. Veterinarians across the country can play an important role in raising public awareness about ticks and the pathogens they transmit.

Environmental drivers

According to previous Canadian studies, the pattern of LD risk emergence and expansion is mostly shaped by the following environmental drivers: i) introduction of I. scapularis and B. burgdorferi by migratory birds (13–15); ii) climate conditions and climate warming that affect tick survival, activity, seasonality, and development (16,17); iii) habitat conditions that are suitable for host and tick populations (13,18,19); iv) density of B. burgdorferi reservoirs (e.g., the white-footed mouse, Peromyscus leucopus) (7,20); v) density of deer populations, which drives the density of local vector populations (21,22); and vi) biodiversity of hosts and other community components affecting the B. burgdorferi transmission cycles (13,22,23).

In Canada, humans and animals are usually exposed to tick bites in deciduous woodlands, but also coniferous woodlands in the Maritimes (Lindsay, unpublished data) and elsewhere in the range of blacklegged ticks (24). Woodland habitats favor the survival of ticks by providing refuge from weather extremes, suitable hosts, and a microclimate suitable for survival and host-seeking (16). Host-seeking ticks climb woodland undergrowth vegetation and stretch out their forelegs to better “sense” potential hosts. However, pets and humans can also be exposed (albeit at lower frequencies) in urban and suburban settings (e.g., parks and gardens) due to ticks dispersed out of LD risk areas in woodlands by migratory birds (so-called “adventitious” ticks). These ticks pose a low-level but geographically widespread potential risk of exposure to LD-infected ticks.

Geographic distribution of LD risk areas

Canadian studies have used analysis of active field and passive tick surveillance data to identify expansion of the geographic

Figure 2. Lyme disease risk areas (hatched areas) where surveillance and research studies (risk mapping in BC: http://www.bccdc.ca/NR/rdonlyres/A07283DB-A709-4494-BFD5-E2AB7ED2724C/0/Lyme_Disease_Risk_Areas_Map_BC_June_2013.pdf) suggest ticks and B. burgdorferi have become established.
range of *I. scapularis* and emerging LD risk areas. Active field surveillance involves collecting ticks directly from the environment using drag sampling or capture of rodent hosts (11). Passive tick surveillance involves collecting ticks submitted from animals or humans through participating veterinary and medical clinics (5,11). In Canada, LD-endemic areas are locations where transmission of *B. burgdorferi* by resident populations of vector ticks has been confirmed by active surveillance (25). The number of documented endemic areas in which *I. scapularis* is the vector has increased from 1 location in Ontario in the 1970s, to 22 locations in 2014 in New Brunswick, Nova Scotia, Quebec, Ontario, and Manitoba, although the extent of likely risk areas (i.e., locations where a field study has found ticks) is much wider (Figure 1A) (11). Based on field surveillance data from 636 locations visited from 2003 to 2012, there are 3 regions with higher risk for LD across the country: i) southern Manitoba, ii) southern and eastern Ontario, and southern Quebec, and iii) parts of Nova Scotia and southern New Brunswick (Figure 1A). More details on the methodology for active sampling and the level of effort can be found in published studies (6,11,26).

Passive tick surveillance from 1991 to 2012 indicates the likely locations where ticks were acquired by pet dogs (Figure 1B) and humans (Figure 1C): a total of 16,288 *I. scapularis* ticks were collected from dogs and 9,715 ticks were collected from humans. *Ixodes scapularis* ticks were found on dogs across Canada, from Newfoundland and Labrador to Alberta (Figure 1B). These maps show that the risk of dogs acquiring *I. scapularis* ticks is similar to that for humans (Figure 1C) and corresponds mostly to locations in which active surveillance has shown evidence of tick populations. However, because dogs are particularly effective at acquiring adventitious ticks (19), the geographic range of ticks collected in passive surveillance by veterinarians is wider than that of known reproducing tick populations (Figure 1B). Nevertheless, the regions with the highest risk of exposure to *I. scapularis* ticks for pets and humans are the southern parts of Manitoba, Quebec, and Ontario, and parts of the Maritimes.

In contrast, *I. pacificus* ticks are distributed widely throughout southern and central British Columbia (27). However, for several ecological reasons, the prevalence of *B. burgdorferi* in host-seeking *I. pacificus* ticks is relatively low (2). As a result, the probability of acquiring LD where *I. pacificus* ticks are the vector is much lower than the risk of acquiring LD where *I. scapularis* is the vector.

**Geographic variation of LD risk**

A range of landscape, climatic, and environmental factors have to converge for the co-existence of hosts, vectors, and transmission cycles of *B. burgdorferi* within a suitable habitat, and outside these broad limits significant LD risk cannot occur (28). However, these generalizations can break down on a fine geographic scale producing areas of uncharacteristically high or low environmental risk for LD. In Canada, the prevalence of *B. burgdorferi* in *I. scapularis* ticks varies regionally but is usually greater than 15% (sometimes reaching over 50%). Prevalence of infection may be less than 10% in locations where ticks and bacterium have only recently become established (29).

The prevalence of *B. burgdorferi* is typically less than 10% in *I. pacificus* ticks found in southern British Columbia (2). There is an estimated 5-year delay between *I. scapularis* population establishment and *B. burgdorferi* establishment in southeastern Canada, but, due to particularities of the ecology of *I. scapularis*, this delay may be as short as 1 y in south central Canada (29). The percentage of infected ticks, therefore, is likely to increase with geographically variable rapidity in the years following establishment of *I. scapularis* tick populations in the south central and southeastern parts of Canada.

**Key clinical features of LD in dogs**

**Clinical signs**

Unlike humans, infection of dogs by *B. burgdorferi* infrequently results in clinical disease. Only about 5% of dogs develop clinical signs of LD when exposed to *B. burgdorferi* (30,31); the most common clinical signs in dogs are presented in Table 1. In other animals such as cats, horses, and cattle, serological responses to *B. burgdorferi* have been detected but the spectrum of clinical disease is less clearly defined for these species (32–34).

**Table 1. Key clinical and diagnostic features to consider for possible LD in dogs**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Description</th>
</tr>
</thead>
</table>
| i) Clinical signs consistent with LD | • Approximately 5% of dogs exposed to infected ticks develop clinical LD  
• Most common clinical signs: fever, anorexia, depression, lethargy, sudden or recurrent lameness, joint swelling, myalgia, arthritis, and lymphadenopathy  
• Clinical signs appear 2 to 5 mo after exposure  
• Lyme nephritis, including immune-mediated glomerulonephritis and protein-losing nephropathy, can occur in later stages of the disease and more frequently in certain breeds of dogs (i.e., Labrador and golden retriever) \(^a\)  |
| ii) Credible evidence of exposure to infected *Ixodes* tick(s) | • Based on dog’s history of activity in locations where exposure to *Ixodes* ticks is possible  |
| iii) Positive laboratory tests | • Most serological tests are not able to distinguish between active infection and exposure  
• Antibodies can be detected in dogs between 3 and 5 wk after exposure to infected ticks and serological tests can remain positive for months and even over a year after infection (30,35) \(^b\)  |
| iv) Elimination of other differential diagnoses | • Many of the signs seen with LD could be due to other diseases [see algorithm in Littman et al (30)]  |
| v) Response to treatment \(^c\) | • A decision flowchart for Lyme positive dogs and treatment recommendations can be found in Littman et al (30) and clinical veterinary medicine textbooks  |

\(^a\) Less than 2% of seropositive dogs develop this disease with lameness reported in 9% to 28% of such cases (3); the conclusive involvement of *B. burgdorferi* has not been proven (37).

\(^b\) See further details in Diagnostic options section.

\(^c\) Some dogs with lameness due to other causes may respond to doxycycline treatment due to the drug’s anti-inflammatory properties (30).
Diagnostic options

In dogs, confirmation of clinical LD through laboratory testing can be challenging (30,31,35); therefore, it is recommended that a LD diagnosis be based on 5 key criteria (Table 1).

The most common diagnostic test used to help confirm infection with *B. burgdorferi* is detection of specific antibodies to *B. burgdorferi* in serum. The serological assays are highly sensitive and specific, although detection of antibodies cannot be used to differentiate active infection from previous exposure to *B. burgdorferi* (30,31,35). Outcomes of serological testing need to be interpreted with care when the patient is from an area with low risk of exposure to *B. burgdorferi*-infected ticks, as false positives are likely to occur in this situation, leading to overdiagnosis (35,36).

One of the most commonly used serological tests is the C6 enzyme-linked immunosorbent assay (ELISA) which detects IgM and IgG antibodies circulating in the blood, and does not cross-react with antibodies generated in vaccinated animals; C6 antibody responses typically occur 3 to 5 wk following experimental infection in dogs (31,35). A quantitative C6 assay is also available which measures the amount of antibody to the *B. burgdorferi* C6 peptide circulating in the animal tested; declines in C6-specific antibodies following antibiotic treatment in dogs have been used as evidence of successful treatment in clinically ill dogs (35,37). Other less-used serological tests include whole cell ELISA, immunofluorescent antibody assays (IFA), and Western blotting. Whole-cell ELISA and IFA can give false-positive results, particularly when a dog has another spirochete infection, an inflammatory condition or has previously been vaccinated for LD (31,35,38). Western blot, which is commonly used in human medicine as a confirmatory test, has been used to differentiate natural infection and immunization response in dogs, but is more time consuming to complete and requires expertise to interpret, and therefore is not often used for standard diagnostic purposes in pets (31,35,38).

Other diagnostic testing that may or may not aid in clinical LD diagnosis include, but are not limited to, polymerase chain reaction (PCR), culture, complete blood (cell) count (CBC), biochemistry, and synovial fluid cytology. Multiple irregularities can be found on CBC and biochemical testing in dogs with Lyme nephropathy. However, other than proteinuria, the findings are highly variable and non-specific (35). Culture of *B. burgdorferi* from tissue or blood is the gold standard test for confirming *B. burgdorferi* infection; however, it has low sensitivity, requires long incubation periods (up to 6 to 8 wk), and is typically only used in research settings (30,31,35). The specificity and specificity of PCR testing in dogs are poorly defined and test performance characteristics in different diagnostic laboratories can vary. Also, PCR does not distinguish between viable and non-viable spirochetes (30,31,35). Contact your local animal health laboratory representative for more details on the test performance characteristics for the different LD diagnostic testing options mentioned here.

Treatment recommendations

According to the consensus statement of the American College of Veterinary Internal Medicine (ACVIM), treatment should only be initiated in dogs displaying clinical signs consistent with LD, with evidence of exposure to LD risk areas and support from diagnostic laboratory tests (30) (Table 1). Treatment is also recommended in dogs with subclinical infections that are proteinuric. The standard treatment for LD in dogs is antibiotic therapy such as doxycycline for a minimum of 1 mo [10 mg/kg body weight (BW), PO, q24h] (31), although dogs with presumptive Lyme nephropathy may require longer courses of treatment (30). In young dogs, amoxicillin at 20 mg/kg BW, PO, q8h for 30 d may be used (31). Dogs will usually respond to treatment within a few days, provided infection is detected in the acute phase. However, in some cases, signs may return, and further treatment may be required (35,38).

Preventive measures

Since there is great regional variability in LD risk across the country and within each province, preventive measures should be encouraged where appropriate; recommendations for tick control should take into account the observed timing of infestations on pets in your practice area. Depending on the dog’s activity and exposure to LD risk areas, pet owners should be advised of the following preventive measures:

- **i)** If possible, avoid high-risk areas during tick season (usually from spring snow melt to late autumn).
- **ii)** Check for ticks daily and promptly remove ticks after being in high-risk areas.
- **iii)** Peridomestic risk of exposure can be lowered by using a number of landscape management practices (e.g., removal of leaf litter, reduction of vegetative cover, and exclusion of wildlife using fences or other barriers) (39).
- **iv)** Routine use of acaricides (topical and oral anti-tick products, collars) when regularly exposed to high-risk areas. Some anti-ectoparasite products (e.g., those containing permethrin) are effective and safe for dogs but toxic for cats. The efficacy and safety of available anti-tick products vary and should be taken into consideration when choosing an appropriate product for pets. Refer to the specific safety and efficacy information available for each product and always follow the instructions for use provided on the product label.
- **v)** Routine vaccination when animals are regularly exposed to high-risk areas (available for dogs only); however, at present, the benefits of vaccinating dogs for Lyme disease, even in endemic areas, are debated (3). Some experts have concerns that since Lyme nephropathy has an immune-mediated pathogenesis, vaccination may increase the risk of generation of immune complexes and thus the risk of Lyme nephropathy in dogs predisposed to this condition (30,40,41). Multiple brands of vaccine to the outer surface proteins of *Borrelia burgdorferi* (OspA & OspC) are available for use in dogs; contact your pharmaceutical representatives for specific safety and efficacy information and recommendations.

In conclusion, veterinarians are a potentially key source of information for the public on the risk of Lyme disease and ticks. Dogs are often more exposed to ticks than are humans, and sero-positive dogs are typically detected sooner and in higher...
numbers than human LD cases in emerging LD risk areas (42). Dogs may therefore be sentinels for early identification of emerging LD risk areas, allowing prompt implementation of activities to prevent human infections. Veterinarians can, therefore, play an important public health role in raising LD risk awareness.

Assessing risk in zones of emerging LD and endemic zones is challenging. The combination of active and passive surveillance systems has revealed increasing risk of LD in south eastern and south central Canada. However, the risk of infection can vary greatly across these regions. Veterinarians can use this information, as well as practice data and travel history, to adequately prevent/manage tick bites and LD cases in dogs. Information on regional, provincial, and federal public health organization websites (e.g., http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/14vol40/dr-rm40-05/index-eng.php) provides the most up-to-date information on LD risk areas in Canada.

Key points

• There is an increasing risk of Lyme disease in Canada following the expansion of the tick vector *I. scapularis* in southeastern and southern central Canada.
• Lyme disease can affect the health of both humans and dogs — it is important that veterinarians be aware of the risk of Lyme disease for their patients as well as their owners.
• Dogs are more likely to be bitten by ticks but less likely to develop clinical signs of Lyme disease when compared to humans.
• Surveillance systems help to identify where the emerging and expanding Lyme disease risk areas are.
• The prevalence of *B. burgdorferi* infection in ticks varies across the country, being mostly greater than 15% in *I. scapularis* ticks and less than 10% in *I. pacificus* ticks.
• Prevention of Lyme disease is best accomplished through avoidance of ticks; frequent checks for ticks with prompt removal of attached individuals, routine use of tick-bite prevention products and potentially vaccination.
• Diagnosis of LD in dogs should be based upon clinical presentation, history of exposure to ticks and/or LD risk, and diagnostic testing results; treatment should be restricted to animals that present both clinical manifestations and diagnostic test results consistent with LD.

Acknowledgments

We thank our colleagues in provincial organizations who participated in the field and passive tick surveillance system (BC CDC, Alberta Health, Saskatchewan Health, Manitoba Health, Ontario Agency for Health Promotion and Protection, *Institut national de santé publique du Québec* and *Laboratoire de santé publique du Québec, Université de Montréal*, New Brunswick Agriculture, Aquaculture and Fisheries and New Brunswick Health, Nova Scotia Health and Wellness and Department of Natural Resources, Newfoundland & Labrador Department of Natural Resources), the Hastings & Prince Edward Counties, Chatham-Kent, Region of Peel, Niagara Region, County of Lambton, Grey Bruce and Northwestern Health Units in Ontario who provided field surveillance data as well as individuals in Canadian universities, medical practitioners, veterinarians, and the public who submitted ticks.

References


Modest cost of veterinary services and goods to farmers in Canada

Canadian Animal Health Institute

Canadians enjoy the third lowest food cost after the USA and the UK. We spend 10% of the family budget on food at home, compared with 7% for the USA and 9% for the UK. China in comparison spends 21%, while Russians spend 31% (1). The cost of veterinary services, (including medicines) in Canada’s food animal sector is relatively small but crucial to the supply of safe and wholesome food for both the Canadian and export markets.

In the past 2 census periods, Statistics Canada has provided data on the cost of veterinary services as part of livestock farm operating expenses. Statistics Canada (2) defines the category “veterinary services” to include services, drugs, semen, breeding fees, etc. Comparing veterinary services with the other major cost categories for food animal producing farms (Table 1), the cost of veterinary services was only 1.85% of the total farm business operating expenses in 2006. In 2011, these costs dropped to 1.63% of the total operating expenses.

Veterinary services contribute the least to farm business expenses. Livestock and poultry purchases at 14.07% of total costs and total feed, supplements, and hay purchase impact total costs more dramatically. Even fuel at 6.89% of the total farm business cost has over 3 times the impact on costs that veterinary services and goods have. Of interest, the cost of fuel in the USA in 2011 was 4.8% of total farm production expenditures, compared with 6.07% in Canada.

Veterinary expenses were lower in 2011 than in 2006 in all provinces except Newfoundland (Table 2). Highest veterinary expenses by percentage for both census periods were in Quebec and Ontario at 2.71 and 2.04, respectively. The lowest percentage of costs was in Newfoundland where services are subsidized by the provincial government.

References

Table 1. Breakdown of Statistics Canada farm operating expenses for 2006 and 2011

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<th>2011 Census</th>
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<td>Total feed, supplements, and hay purchases</td>
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<tr>
<td>Livestock and poultry purchases</td>
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<tr>
<td>Veterinary services, drugs, semen, breeding fees, etc.</td>
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<td>1.63</td>
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<td>All fuel expenses (diesel, gasoline, oil, wood, natural gas, propane)</td>
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<td>6.07</td>
</tr>
<tr>
<td>Electricity, telephone and all other telecommunication services</td>
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<tr>
<td>Other</td>
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Table 2. Statistics Canada 2006 and 2011 data by province on cost of veterinary goods and services as a percentage of total farm operating expenses

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<td>Prince Edward Island</td>
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<tr>
<td>Newfoundland and Labrador</td>
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Demographics of the Canadian dairy industry from 1991 to 2011

Murray D. Jelinski, Stephen LeBlanc, Richard Kennedy

Abstract — A retrospective study of the demographics of the Canadian dairy industry was conducted using data derived from Statistics Canada’s Census of Agriculture from 1991 to 2011. This longitudinal study shows that Canada’s dairy industry has undergone considerable consolidation. From 1991 to 2011, the number of dairy producers and dairy farms decreased by 48.9% and 61.9%, respectively. Furthermore, this trend in consolidation is likely to continue; nearly half (45.8%) of all dairy producers in Canada were ≥ 50 y of age in 2011. Not only will most of these producers be retired by 2021, but younger producers will also exit the industry for other reasons. These findings mirror what is occurring in Canada’s cow-calf industry, underscoring that supply-managed sectors experience demographic consolidation similar to non-supply managed sectors. These substantial changes will have ramifications for the veterinary profession. There will be fewer but larger farms, and the services and knowledge demanded of veterinarians will change accordingly, which has implications for food animal veterinary education.

Résumé — Démographie de l’industrie laitière canadienne de 1991 à 2011. Une étude rétrospective de la démographie de l’industrie laitière canadienne a été réalisée à l’aide de données dérivées de statistiques provenant du Recensement de l’agriculture de 1991 à 2011 de Statistique Canada. Cette étude longitudinale montre que l’industrie laitière du Canada a subi une consolidation considérable. De 1991 à 2011, le nombre de producteurs laitiers et de fermes laitières a chuté de 48,9 % et de 61,9 %, respectivement. De plus, cette tendance à la consolidation se poursuivra probablement ; près de la moitié (45,8 %) des producteurs laitiers du Canada étaient âgés de ≥ 50 ans en 2011. La majorité de ces producteurs prendra non seulement sa retraite d’ici 2021, mais les jeunes producteurs quitteront aussi l’industrie pour d’autres raisons. Ces résultats reflètent ce qui se passe dans l’industrie d’élevage-naïssage et soulignent le fait que les secteurs à offre réglementée vivent une consolidation démographique semblable à celle des secteurs qui ne sont pas à offre réglementée. Ces changements importants auront des répercussions pour la profession vétérinaire. Il y aura moins de fermes mais elles seront plus grandes et les services et les connaissances demandées évolueront considérablement, ce qui aura des conséquences pour l’enseignement de la médecine vétérinaire des animaux destinés à l’alimentation.

(Traduit par Isabelle Vallières)
the time of the last census (5). This workforce structure appears to apply particularly to farming; only a third of Canadians who were self-employed and working in a non-agricultural position were ≥ 55 y of age in 2011 (6).

The retirement of nearly half of Canada’s producers is an event that has been foreshadowed since the 1960s. Following World War II, Canada, and most other industrialized nations, experienced a sudden increase in the national birthrate. This surge lasted for approximately 20 y (1946–1965) and created what is colloquially known as the “Baby Boom” generation (7). As of 2011, ~30% of Canadians were baby boomers (46 to 65 y of age), representing 42.2% of the working-age population (15 to 64 y of age) (8). Over the next 2 decades, Canada will experience a major exodus of people from its workforce (9). As a result, Canadians can expect to see a slowing in the growth of its labor force until 2026, by which time the tail-end of the baby boom generation will have retired.

Consolidation in agriculture has implications for food animal veterinary medicine with respect to the supply and demand for veterinarians, and the delivery of veterinary services. For much of the latter half of the 20th century the veterinary profession was concerned with a shortage of food animal practitioners (10–14). More recently, reports from the United States suggested that the pendulum has swung towards an oversupply of veterinary contact time per animal decreases as herd size increases (19). This trend towards fewer veterinarians overseeing larger operations is evident within Canada’s poultry, swine, and feedlot sectors.

This report is a companion paper to a previously published study in which the demographics of the Canadian cow-calf sector were described (20). The purpose of this study is to describe how the demographics of the Canadian dairy industry have changed over the last 20 y (1991 to 2011), with emphasis on changes in the age and number of dairy producers, number of dairy operations, and herd size.

### Materials and methods

All data were derived from Statistics Canada’s (StatsCan) databases, which had been compiled from the last 5 Census of Agriculture periods: 1991, 1996, 2001, 2006, and 2011. The customized data were cross-tabulated by 4 geographical regions (Quebec, Ontario, western Canada, and Atlantic Canada). Western Canadian data were provided at the provincial and census agricultural region (CAR) level for the provinces of British Columbia, Alberta, Saskatchewan, and Manitoba. All other data were provided at the provincial (Ontario and Quebec) and regional levels (4 Atlantic provinces combined). The national data were derived from the provincial and regional data.

StatsCan defined farm operators as persons responsible for the day-to-day management decisions relating to the operation of the farm, with up to 3 operators per farm. These data were stratified by operator gender (female/male); number of operations/farm (1 and ≥ 2); the operators’ age ranges (< 26 y, 26 to 30 y, 31 to 35 y, 36 to 40 y, 41 to 45 y, 46 to 50 y, 51 to 55 y, 56 to 60 y and > 60 y); and herd size (< 51, 51 to 100, 101 to 200, 201 to 300, 301 to 500, and > 500 dairy cows and replacement heifers > 1-year old). All the data underwent a “random rounding” procedure wherein StatsCan rounded the numbers in each sub-table to multiples of 5 to ensure that the data could not be associated with a particular farm.

In addition to the customized data, StatsCan’s online databases provided information on the number of dairy cows, dairy operations, and the average number of dairy cows/farm for the census years 1981 to 2011, inclusive (21). The accounting of dairy heifers changed across census periods; therefore, only dairy cow numbers (not heifers) were reported for these 3 datasets.

In 1976, StatsCan estimated the number of “Beef cows” by subtracting “Cows milking or to be milked” from “Total cows.” As a result, dairy herd size was underestimated because dairy farmers did not always classify dry dairy cows as “Cows milking or to be milked;” this was corrected in future surveys. However, response errors in 1996 may have led to a slight overestimate of the number of dairy cows and dairy farms, particularly in the provinces having a low proportion of dairy operations.

### Results

The Canadian dairy industry has been consolidating for the last 5 census periods. Canada had 60 495 dairy producers in 1991; 54 715 in 1996; 41 820 in 2001; 35 075 in 2006; and 30 870 in 2011. From 1991 to 2011, the number of producers decreased by nearly half (48.9%) and by 12% during the latest intercensal period (2006 to 2011).

Table 1 is a cross-tabulation of the 2011 population of producers by geographical location and age range. Quebec had the greatest percentage of Canada’s producers (40.8%), followed by Ontario (35.0%), western Canada (19.6%), and Atlantic Canada (4.6%). Nearly half (45.8%) of all dairy producers in Canada were ≥ 51 y of age; however, the producers’ age structure varied by region. Western Canada had the highest percentage of producers ≥ 51 y of age (55.4%), while Quebec had the lowest (40.5%). Included in Table 1 is the ratio of producers > 60 y of age to those < 31 y of age. Nationally there were 2 producers > 60 y old for every 1 producer < 31 y of age; in western Canada this ratio was 4.3:1.

The time-series (Figure 1) shows how the age structure of Canada’s dairy industry has changed over the 5 census periods. At

<table>
<thead>
<tr>
<th>Age range (years)</th>
<th>Western Canada</th>
<th>Atlantic Canada</th>
<th>Ontario</th>
<th>Quebec</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 31</td>
<td>5.8</td>
<td>6.7</td>
<td>9.3</td>
<td>9.6</td>
<td>8.6</td>
</tr>
<tr>
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<td>13.4</td>
<td>15.5</td>
<td>17.3</td>
<td>15.7</td>
</tr>
<tr>
<td>41 to 50</td>
<td>25.5</td>
<td>29.6</td>
<td>29.2</td>
<td>32.6</td>
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<td>25.2</td>
<td>21.1</td>
<td>17.9</td>
<td>13.3</td>
<td>17.6</td>
</tr>
<tr>
<td>Ratio&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.3</td>
<td>3.2</td>
<td>1.9</td>
<td>1.4</td>
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<tr>
<td>Total (n)</td>
<td>6065</td>
<td>1420</td>
<td>10 810</td>
<td>12 610</td>
<td>30 905</td>
</tr>
</tbody>
</table>

<sup>a</sup> The ratio compares the proportion of producers > 60 y to those < 31 y of age.
Figure 1. Age distribution (%) of Canadian dairy producers for the census years 1991 to 2011. The number at the top of each bar is the ratio of older producers (> 60 years of age) to younger producers (< 31 years of age).

Figure 2. Population pyramids representing all Canadian dairy producers for the census years 1991 (blue) and 2011 (green). Female producers are represented in the left panel, males in the right, and the middle y-axis is the age ranges for producers.
nearly every successive period the proportion of dairy producers in the 2 youngest age ranges has declined, while the proportion of producers in the 2 oldest age ranges increased. These trends are also captured in the ratio of old (> 60 y) to young (< 31 y) producers.

The overlapping population pyramids in Figure 2 show how the age structure of the dairy industry changed from 1991 to 2011; all the age ranges are in 5-year increments, except for the very youngest and oldest ranges. Not only was there half as many producers in 2011 compared to 1991, but the population structure changed dramatically for these 2 periods. The 1991 population is a typical population pyramid characterized by a large base of younger producers and an increasingly smaller number of producers at each successive age bracket. In contrast, the 2011 population forms an inverted pyramid comprised of a narrow base of young producers and a large cohort of older producers.

The population pyramids provide a graphical representation of how the age structure of Canada’s dairy producers has changed over the last 20 y, and also provide insight into when producers leave the industry. Presumably many of the producers > 45 y of age in 1991 exited the industry by 2011 because they had reached retirement age. However, producers appear to
leave the industry for reasons other than retirement. In 1991, there were 15,615 dairy producers in the 26- to 35-year age cohort, but by 2011 this same cohort, now 46 to 55 y of age, had decreased by 31.6% to 10,685 producers.

Figure 3 was derived from StatsCan's online databases and, unlike the customized data, it only includes dairy cows, not replacement heifers. Generally, the number of dairy cows has been in a steady decline in every geographical location in Canada since 1976. The number of dairy cows decreased by 26.9% between 1991 (n = 131,178) and 2011 (n = 96,170). More recently, the Canadian dairy herd declined by 3.4% between 2006 and 2011, which is the smallest reduction in herd size since 1976. Figure 3 also includes an extrapolation of the number of dairy cows to 2021, which is based on a continued steady decline of 3.4% per 5-year census period. This extrapolation suggests that Canada should have ~930,000 and ~898,000 dairy cows by 2016 and 2021, respectively.

The decline in dairy farm numbers has exceeded that of the dairy producers and cows (Figure 4). The number of farms reporting dairy animals decreased by 61.9% between 1991 (n = 39,077) and 2011 (n = 14,883). Although the decline in dairy operations appears to be slowing, there were 15% fewer...
dairies in 2011 compared to 2006. Based on continued consolidation of 15% per 5-year period, the Canadian dairy industry can expect to have ~12,650 and 10,750 dairies in 2016 and 2021, respectively.

Figure 5 shows how Canada’s average herd size (number of dairy cows/herd) changed between 1976 and 2011. Prior to 1996, dairy farms in Quebec and Ontario were larger than the Canadian average, while western Canada had the smallest herds. Since then, average herd size in western Canada has increased by 242% (37 to 89 head), while average herd size in Ontario and Quebec increased by 63% (38 to 62 head) and 37% (41 to 56 head), respectively. In 2011, the average dairy in Canada had 65 dairy cows, excluding replacement heifers.

Unlike the previous figures that were based on the number of dairy cows/herd, Figure 6 was generated from the customized analyses and hence herd size includes both dairy cows and replacement heifers. Since 1 year of age. From 1991 to 2011, the number of producers with dairies of < 51 head and 51 to 100 head decreased by 64.8% and 52%, respectively. In contrast, there was an increase in the number of producers with herds of 101 to 200 head (8.7%); 201 to 300 head (120.6%); 301 to 500 head (250.0%); and > 500 head (~1000%; increased from 35 to 385 producers).

Figure 7 provides the breakdown of dairy producers by age range and herd size for the 2011 census year. Generally, producers were evenly distributed by age across the varying herd sizes. The notable exception was the smallest herds (< 51 head), which had the highest proportion (23.8%) of producers > 60 y old compared with 15% for the other herd sizes.

**Discussion**

Canada’s agricultural sector has undergone significant consolidation over the last 2 decades, leading to fewer operators, fewer younger operators, fewer farming operations, and larger operations. Furthermore, these trends show no signs of reversing (22). Not surprisingly, a similar scenario has occurred within Canada’s dairy industry. For the period 1991 to 2011, there was a substantial reduction in the number of dairy cattle (26.9%), dairy producers (48.9%), and dairy farms (61.9%). Although the dairy industry has already undergone a considerable amount of consolidation over the last 2 decades, this process continues. Nearly half of all producers were > 50 y of age in 2011, and for every 1 producer < 31 y there were 2 > 60 y of age. If dairy producers are typical of the Canadian population, then most will retire from the workforce between the ages of 60 and 65. If this assumption is correct, then nearly half of the dairy producers identified in the 2011 census will no longer be farming by 2021.

Although it took 20 y (1991 to 2011) for the number of producers in dairy industry to decrease by half, it is conceivable that this number will decrease by half in the next 10 y (2021), thereby doubling the attrition rate of the previous 20 y. Furthermore, this pace of consolidation will probably continue until 2026, which is when the last of the baby boomers will be in a position to retire. This trend can only be reversed by a massive influx of new dairy producers, which is highly unlikely. New automated technologies that assist management of dairy herds (e.g., robotic milking systems, activity monitors for estrus detection, and in-line milk analyzers), will allow for more cows to be managed by fewer people. Furthermore, these same labor-saving tools may also displace the demand for traditional veterinary services such as pregnancy diagnosis.

Notwithstanding the demographics of the industry, dairy producers are relatively young compared to Canada’s beef cow-calf producers. A recent study found that at the time of the last census (2011) 61.9% of Canadian beef producers were > 50 y of age (20); this compares to 45.8% for dairy producers. Why
the beef sector has a greater percentage of older producers compared to the dairy sector may be related to how these 2 sectors are managed. It has been hypothesized that supply management of Canada’s dairy, poultry, and egg industries results in greater income stability, making these sectors more attractive to younger producers (22). While this may partially account for the current differences in the age structure of the dairy and cow-calf industries, supply management alone may be unable to attract and retain future dairy producers. A recent StatsCan study examined 7 sectors of agriculture and found that the hog and dairy sectors had the greatest proportional loss of producers < 40 y of age for the period 1991 to 2011 (22). This is salient because it confirms our finding that the loss of producers over the last 20 y is not solely related to producers leaving the industry due to old age. Rather, other socio-economic factors must be involved in the decision to sell the farm and exit the industry. High capital costs and a limited supply of milk production quota represent barriers to farm growth and entry into the dairy industry by new farmers and for business succession transfer at fair market values.

The pros and cons of supply management, particularly with respect to who benefits from this system, producers or consumers, is a topic of debate (23–27). Briefly, there are 3 pillars to Canada’s dairy supply management system: a quota system to control domestic milk production; the restriction of foreign competition by limiting the import of dairy products; and the existence of provincial and national marketing boards that set the price of milk paid to the producers (23). Opponents argue that supply management creates a cartel that drives up the price of milk for consumers and limits Canada’s ability to export milk to other countries. Supporters counter that supply management ensures price stability for producers, resulting in an economically viable industry that provides Canadians with a dependable supply of milk.

Supply management ensures that the milk price paid to Canadian dairy producers covers the full costs of production, which ostensibly provides stability in the industry. Ideally, this stability should result in an industry comprised of small, medium, and large producers. The data, however, show that there were 61.9% fewer dairies in 2011 than in 1991, and that there has been a disproportionately high loss in the number of smaller dairies (≤ 100 head). This loss in smaller dairies has been offset by a steady increase in the number of larger operations, which is reflected in the trend of increasing average herd size.

Canada’s decline in dairy farms closely mirrors what has transpired in the United States. Whereas the number of dairies in Canada decreased by 61.8% between 1991 and 2011, the US experienced a similar decline of 58.4% between 1991 and 2007 (28). As for the situation in Canada, the greatest loss in American dairies came at the expense of the smaller herds (< 50 head). This underscores the premise that consolidation appears inevitable, with or without supply management, and that the main reason for the disproportionate loss in smaller dairies is the drive by producers to capture economies of scale.

One of the initial unintended consequences of controlling milk production was an escalation in the price of milk quota. In response, the Dairy Farmers of Ontario (DFO) instituted a progressive transfer tax to help maintain the price of quota at a level that ostensibly all producers, large and small, could afford (29). This policy, however, met with limited success and eventually gave way to quota being capped at a price of $25 000/kg of butter fat/day. This cap has since been adopted by the 5 provinces that form the “All Milk Pool,” otherwise known as the “P5.” Member provinces of the P5 include Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island. It is equivocal, however, as to whether the price cap has helped or hindered the industry. A recent econometric study of Ontario’s dairy quota system found that producers with large-scale efficiency were more likely to buy quota; older producers were less likely to purchase quota; and those who had purchased quota in the previous year were also more likely to purchase additional quota in the current year (30). These findings indicate that even within the constraints of supply management there is a drive towards increasing herd size. While the price cap may be slowing the rate of consolidation, it does not appear to be arresting it.

The price of quota may also explain, in part, why the average herd size in western Canada is increasing much more rapidly than in Quebec and Ontario. The western provinces are not part of the P5 and hence there is no cap on the price of quota. As a result, the price of quota reflects supply and demand, which varies by province: British Columbia, $43 000; Alberta, $38 700; Saskatchewan, $34 000; and Manitoba $26 550 (31). We speculate that larger operations have a lower cost of production and hence have greater financial means to purchase quota, which drives both the price of quota and consolidation. A free market allows for quota prices to rise until it is either too expensive or enough sellers have been motivated to sell, leading to a reduction in demand. Conversely, capping the price on quota removes price discovery from the market, which in turn constrains the normal forces of supply and demand. This is particularly evident in Ontario, Quebec, and the Atlantic provinces where the amount of quota offered for sale (supply) is only 2% to 10% of what is being demanded (32).

The dairy industry forms an integral part of food animal veterinary practice, particularly in the provinces of Ontario and Quebec. Therefore, ongoing consolidation in the dairy industry, driven by demographics and economics, will have a direct impact on food animal veterinary practice. Increased consolidation means fewer but larger farms, which leads to a reduction in the number of veterinarians required to service this industry. Not only will continued consolidation have an impact on the supply and demand for veterinarians and veterinary services, but it will also change what services are demanded. Data from the beef sector show that increasing herd size is associated with an increased uptake in herd level services (19). A similar scenario will occur within the dairy industry, which will require veterinary practitioners to evolve along with the industry. This also has implications for veterinary teaching institutions, which need to adjust dairy curricula to meet the future demands of the industry. We urge collaborative research among veterinarians and economists, among others, to measure and project the market requirements and opportunities for veterinarians in the Canadian dairy industry.
References

Autologous vaccination for the treatment of equine sarcoids: 18 cases (2009–2014)

Caitlin C. Rothacker, Ashley G. Boyle, David G. Levine

Abstract — The purpose of this retrospective case series was to assess the outcome of an autologous vaccination procedure on single and multiple sarcoid lesions, determine complication rate, and report owner satisfaction. Medical records (18 cases) from January 2009 through May 2014 were evaluated to identify horses undergoing the procedure. Signalment, number, size, anatomic location of lesions, and type of historical treatment were recorded. Follow-up was obtained via standardized owner survey, veterinary examination, and digital images. Data recorded and analyzed included ancillary therapies post-procedure, decrease in number and/or size of sarcoid lesions, sarcoid regrowth, complications, and owner satisfaction. There was a decrease in number of lesions observed by owners in 75% of cases and a decrease in size of sarcoids in 93.8% of cases. Clinical regression observed by owners was noted in 68.8% of cases. There were complications in 43.8% of cases and owner satisfaction in 75% of cases.

Résumé — Vaccination autologue pour le traitement des sarcoïdes équins : 18 cas (2009–2014). Le but de cette série de cas rétrospectifs était d’évaluer le résultat d’une procédure de vaccination autologue sur des lésions de sarcoïdes simples et multiples, de déterminer le taux de complication et de signaler la satisfaction des propriétaires. Les dossiers médicaux (18 cas) datant de janvier 2009 à mai 2014 ont été évalués afin d’identifier les chevaux subissant l’intervention. Le signalement, le nombre, la taille, l’emplacement anatomique des lésions et le type de traitement historique ont été consignés. Le suivi a été obtenu par un sondage standard auprès des propriétaires, un examen vétérinaire et des images numériques. Les données consignées et analysées incluaient des traitements auxiliaires après l’intervention, une baisse du nombre et/ou de la taille des lésions des sarcoïdes, la repousse des sarcoïdes, les complications et la satisfaction des propriétaires. Il s’est produit une baisse du nombre des lésions observées par les propriétaires et de la taille des sarcoïdes dans 93,8 % des cas. La régression clinique observée par les propriétaires a été consignée dans 68,8 % des cas. Il y a eu des complications dans 43,8 % des cas et les propriétaires étaient satisfaits dans 75 % des cas.

(Traduit par Isabelle Vallières)

Sarcoids are the most common skin tumor in the equid population (1,2). Most tumors are benign, locally invasive, and fibroblastic; however, tumors can become large, ulcerate, and prevent proper use of equipment during athletic activity. Rarely, in one form of the disease, the tumor cells can migrate along chains of lymph nodes (1,2). Sarcoids can be classified based on their clinical appearance and behavior. Whether deemed occult, verrucous, nodular, fibroblastic, mixed or malignant, no significant distinctions have been noted histopathologically between the classifications (3). Sarcoids often require treatment due to their location and discomfort to the animal. Multiple modalities are described in the literature with no one treatment accepted as the gold standard (4).

The pathogenesis of equine sarcoids has not been completely elucidated. Bovine papilloma virus (BPV), however, has been strongly linked with equine sarcoids through the demonstration of viral DNA in 73% to 100% of sarcoid samples analyzed, but has not been detected in other types of equine skin tumors or equine papillomas (5). Typically, papilloma viruses are species-specific and the identification of BPV in equine sarcoids represents an unusual case of inter-species infection (6). In 1 study, BPV gene expression revealed the presence of the E5 protein in 23 sarcoid samples analyzed and its absence from all non-sarcoi...
samples (7). The E5 protein is a transforming protein with multiple modes of action. It promotes the down regulation of MHC class I molecules, thus allowing host immunosurveillance to overlook infected cells (6,7). This protein is also thought to aid in isolation of the infected cell and disruption of cell protein processing (6).

Transmission of BPV in equids is unclear. No intact virions have been detected within equine sarcoids (6) and equids were traditionally considered dead-end hosts. Recently, BPV DNA was detected in both the dermis and epidermis of equine skin, suggesting that equid to equid transfer may occur (8). Bovine papilloma virus DNA has also been found in face flies removed from horses with sarcoid lesions (9). Stable management practices may also contribute to the spread of the virus through contaminated tack or pastures (5).

There is a genetic predisposition, with Thoroughbreds, Quarter Horses, Arabians, and Appaloosas having an increased risk for sarcoid development (10,11). The presence of specific major histocompatibility (MHC) class II molecules has been noted to increase the likelihood of sarcoid lesions in the Thoroughbred population (10). Greater than 70% of sarcoids develop in horses <4 y old (1). Sarcoids may be found anywhere along the body, most commonly on the head, ears, and limbs (1,4,11). Sites of previous injury are reportedly predisposed to sarcoid development (1,2,11).

Treatment modalities include surgical removal, cryotherapy, chemotherapy, interstitial brachytherapy, electrochemotherapy, topical antiviral treatment, and topical herbal preparations (1,2,4,12–19). Immunotherapy has also been proposed with the use of Bacillus Calmette-Guerin (BCG) cell wall extract as an intralesional injection to induce an immunological response (16,17). An autologous vaccine that is based on the polymerization of antigenic tumor markers was reported to induce complete remission in 19 of 21 horses after varying lengths of treatment (20). In 2008, Epsy (21) reported on an autologous vaccination procedure performed in the field utilizing sarcoid tissue frozen in liquid nitrogen and subsequently implanted into subcutaneous pockets in the neck. Complete tumor regression was noted in 12 of 15 cases; however, no further results or larger case series have been published (21).

The objective of this retrospective study was to assess the effect of an autologous vaccine procedure on single and multiple sarcoid lesions, determine complication rate, and report owner satisfaction. Favorable results would potentially provide veterinarians an adjunctive modality to treat equine sarcoids, specifically in cases with multiple lesions in anatomically challenging regions of the body where satisfactory surgical margins are not possible.

Materials and methods

Case selection
The medical records of all horses undergoing an autologous vaccination procedure at the George D. Widener Hospital for Large Animals and the William H. Boucher Field Service section at the University of Pennsylvania’s New Bolton Center, from January 2009 to May 2014 were reviewed. Prior to implantation, all horses were required to have a biopsy with histopathology confirming the diagnosis of sarcoid. If multiple lesions were present, only 1 was chosen for biopsy and histopathology.

Medical records review
The gender and breed distribution of all equine patients at the George D. Widener Hospital from January 2009 through May 2014 were obtained. Data for the patients undergoing the autologous vaccination procedure included age, breed, gender, number and size of lesions, anatomic location of lesions, and type of historical treatment. Of the 18 horses undergoing this procedure, follow-up data were obtained for 16 patients.

Follow-up was done by telephone conversation with the owner using a consistent, standardized survey by a single author. Owners were asked to subjectively evaluate the number and size of current lesions. Where applicable, owners were asked to estimate the size of current lesions in centimeters. Complications associated with the procedure and sarcoid regrowth at the time of follow-up were recorded. Owner satisfaction was also recorded as positive, negative, or indifferent. When possible, follow-up measurements were obtained by a veterinarian through physical examination. Digital images of the lesions were obtained at the time of follow-up depicting the pre- and post-procedural appearance when possible.

Table 1. Horses treated with the autologous vaccine procedure with no ancillary therapies

<table>
<thead>
<tr>
<th>Breed</th>
<th>Age</th>
<th>Gender</th>
<th>Number of lesions</th>
<th>Total tumor area (cm²)</th>
<th>Historical treatment</th>
<th>Complete regression</th>
<th>Decrease in number</th>
<th>Decrease in size</th>
<th>Time to follow-up (mo)</th>
<th>Veterinary confirmation of results</th>
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ARAB — Arabian; QH — Quarter Horse; WB — Warmblood; TB — Thoroughbred; MC — male castrated; F — female.
Table 2. Horses treated with the autologous vaccine procedure and ancillary therapies

<table>
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<tr>
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<th>Historical treatment</th>
<th>Complete regression</th>
<th>Decrease in number</th>
<th>Decrease in size</th>
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WB — Warmblood; MC — male castrated; F — female.

Autologous vaccination procedure

The procedure was performed according to the technique described by Epsy (21). The patient was restrained and sedated using a combination of detomidine hydrochloride (Dormosedan; Pfizer Animal Health, New York, New York, USA), 0.01 mg/kg body weight (BW), IV, and butorphanol tartrate (Torbugesic; Fort Dodge Animal Health, Fort Dodge, Iowa, USA), 0.01 mg/kg BW, IV. However in 2 cases, the patient was placed under general anesthesia to facilitate sarcoid debulking in a difficult anatomic location (medial thigh and ventral abdomen). The sarcoid to be removed and surrounding skin were prepared by cleaning with 4% chlorhexidine gluconate (Betasept; Purdue Pharma, Stamford, Connecticut, USA) and rinsing with clean water. Using sharp dissection, the lesion was then debulked to approximately skin level, leaving the base in situ (Figure 1). Mild to moderate hemorrhage ensued, sterile 4 × 4 gauze squares were used for compression at the site. The removed sarcoid was sectioned into multiple small tissue cubes, measuring about 0.5 × 0.5 × 0.5 cm. Any superficial areas of gross necrotic tissue were removed from the cubes. The pieces were placed in sterile gauze and submerged in liquid nitrogen for 7 to 10 min. An area just ventral to the nuchal ligament, 10 cm long and 5 cm wide, was clipped and aseptically prepared. Approximately 2 to 3 mL of 2% mepivicaine hydrochloride (Carbocaine-V; Pfizer Animal Health) was infused subcutaneously in 2 to 3 locations. Stab incisions were created through the skin and subcutis using a number 10 scalpel blade. Hemostat forceps were used to aid in the creation of a pocket large enough to hold 1 to 3 cubes of sarcoid tissue. These were then placed subcutaneously in each stab incision. The skin was closed over the implanted sarcoid with simple interrupted suture with a non-absorbable suture material. Phenylbutazone 20% (Phenylbutazone 20% Injection; Vet One, MWI Veterinary Supply, Boise, Idaho, USA), 2.2 mg/kg BW, was administered intravenously or orally after surgery in all cases for 1 to 2 d. No antimicrobials were used.

Signalment, number and size of lesions, anatomic location of lesions, type of historical treatment, and follow-up data were evaluated descriptively. Continuous variables were examined for normality using the Shapiro-Wilk test. As most parameters were not normally distributed, data are presented as medians and interquartile ranges (IQR, 25th and 75th percentiles). Percentages were used to describe discrete data. The presence of multiple initial sarcoids, the initial tumor area (cm²), the type of historical treatment, and the use of topical historical treatments were analysed by logistic regression, in order to identify association with tumor regrowth or a decrease in tumor size. All analyses were performed using STATA ICV 12.1 (StataCorp, College Station, Texas, USA). Values of $P \leq 0.05$ were considered significant.

Results

Medical records review

The autologous vaccination procedure was performed on 15 geldings and 3 mares. The median age was 11 y ($n = 15$, IQR: 8 to 14). A variety of breeds were represented including Warmbloods [$n = 8$ (44.4%)], Quarter Horses [$n = 4$ (22.2%)], Thoroughbreds [$n = 3$ (16.7%)], Arabians [$n = 2$ (11.1%)], and mixed breed [$n = 1$ (5.6%)]. At this institution, during the same time frame, 41.0% of patients were mares, 41.0% were geldings, and 18% were stallions. Warmbloods represented 20.6% of the population, Quarter Horses 6.8%, Thoroughbreds 34.2%, and Arabians 3.2%. Two horses were vaccinated in the field and 16 were vaccinated in hospital.

Median number of lesions at presentation was 1.5 ($n = 18$, IQR: 1 to 3). Nine of the 18 horses had a solitary lesion and 9 had 2 or more sarcoids. In 16 of 18 (88.9%) cases, 3 or fewer lesions were recorded. Median area of the presenting lesions was 13.75 cm² ($n = 17$, IQR: 6.25 to 16). Sarcoids were located on the head in 7 of 18 horses (38.9%), the limbs in 5 of 18 (27.8%) and the body and trunk in 4 of 18 (22.2%). Two horses (11.1%) had lesions in multiple anatomic regions. Ten of 17 horses (58.8%) were treated historically prior to the autologous implantation procedure including...
topical bloodroot extract [Xtterra; Larson Laboratories, Fort Collins, Colorado, USA, n = 3 (30%)], topical Imiquimod [n = 1 (10%)], surgical debulking with intralesional cisplatin [n = 1 (10%)], and multiple modalities [n = 5 (50%)].

**Long-term follow-up**

The median time to follow-up from the autologous implantation was 10.5 mo (n = 15, IQR: 3 to 17.5). As reported by the owners, 12 of 16 (75%) horses showed an overall decrease in the number of sarcoids with 15 of 16 (93.8%) having a decrease in size of sarcoids present. Complete regression was noted in 11 of 16 (68.8%) cases (Figure 2). Follow-up physical examination confirming owner findings was performed by a veterinarian in 5 of 18 cases. Digital images were provided to the author by owners for an additional 3 cases. Therefore, 8 of 16 (50%) cases available for follow-up had results confirmed secondarily to owner reporting.

The cases available for follow-up were divided into groups based upon whether other post-procedural treatments were instituted or not. In 11 of 16 cases (68.8%) there was no other post-operative sarcoid treatment (Table 1). Veterinary examination or digital images provided confirmation of owner-reported results in 5 of 11 cases belonging to this cohort. Of these horses, 6 of 11 (54.5%) had single lesions. Five of 6 (83.3%) regressed completely following autologous vaccination and the remaining horse had a decrease in size. The remaining 5 horses had > 1 lesion. Three of 5 (60%) horses had complete regression of all lesions while 1 of 5 (20%) had a decrease in size and number (Table 1). Overall, in this cohort, 8 horses had complete regression with no further treatment following the autologous vaccination procedure.

Post-procedural treatment was instituted in 5 of 16 (31.3%) cases (Table 2). These included Imiquimod (n = 4) and cisplatin (n = 1). Of these, 3 (60%) had complete regression of all sarcoid lesions while all 5 (100%) had decreases in size (Table 2). Results were also examined based on the presence of absence of historical treatment. Nine of 16 (56.3%) horses were treated historically prior to implantation procedure. In these cases, 6 of 9 (66.7%) completely regressed, and the remaining 3 horses had decreases in overall size of sarcoids. At the time of follow-up, 3 of 16 horses (18.8%) had regrowth of 1 or more sarcoid lesions. All 3 cases belonged to the cohort of horses with historically treated lesions.

No statistical significance was found when analyzing the associations between the presence of multiple initial sarcoids, the initial tumor area in cm², the type of historical treatment, and the use of topical historical treatments with tumor regression or a decrease in tumor size.

Mild complications were noted in 7 of 16 cases (43.8%). The most common complication reported was swelling at the site of implantation [n = 5 (71.4%)] followed by fever and a single abscess at the implantation site. All complications resolved with a short course of anti-inflammatory therapy. Overall, 12 of 16 (75%) owners were reportedly satisfied with the autologous vaccine procedure. The remaining 4 owners were indifferent to the procedure and outcome but were dissatisfied with the complications.

**Discussion**

The results of this retrospective case series are promising as 75% of horses had a decrease in number of sarcoïds, 93.8% had a decrease in size of sarcoïds, and 69% of horses had complete regression. Of the 11 horses in which the autologous vaccine procedure was performed with no post-procedural treatment, 8 horses had complete regression of all sarcoïds. Three of the five patients with multiple lesions had complete regression of all lesions without any other direct treatment. These findings demonstrate the ability of the autologous vaccine to cause a decrease in the number and size of sarcoïds in multiple areas of the body with no other treatment. The 2 remaining cases of multiple lesions with no further post-procedural treatment were followed up at just 30 and 60 d post-procedure which may not be long enough to note significant change.

Many of the current treatment protocols for sarcoïds rely on a multimodal approach. It is also clear that biopsy or removal with incomplete margins often causes aggressive regrowth of lesions (1,11). Reports of surgical excision alone vary dramatically in success rate, ranging from 52% to 82% (1,4,11). Surgical debulking followed by topical treatment with acyclovir has resulted in complete regression in both nodular and mixed sarcoïds (14). In the present case series, 9 horses had single lesions. With surgical debulking and the autologous vaccine procedure, 7 of 9 (77.8%) had complete remission thereby demonstrating a benefit in utilizing the autologous preparation as an adjunct therapy. Of the 9 cases unresponsive to historical treatment,
all 9 had decreases in size with 7 (77.8%) showing decreases in number of lesions following the autologous procedure.

Treatment failure and regrowth of equine sarcoids are common (4, 12, 14). The choice of initial treatment is often based on location of the lesion, the presence of multiple lesions, and cost/availability. It is noted anecdotally that sarcoids that do not respond to therapy can become problematic and unresponsive to ancillary therapies. While 3 horses in this series had regrowth, all 3 had received historical treatment and thus most likely belong to a cohort of horses with more persistent lesions. In these cases, while regrowth of the original lesion had occurred, no new lesions were reported.

Complications were noted in 43.8% of cases but mostly consisted of mild swelling at the site of implantation. Mild complications are often associated with a variety of sarcoid treatments (12, 14, 16, 18). One horse developed an abscess at the site of implantation. This was treated by the animal’s referring veterinarian and resulted in a small scar along the neck. No inciting cause could be identified but the patient went on to have complete remission of 2 lesions.

In the present study, Quarter Horses, Warmbloods, and Thoroughbreds represented the majority of cases. These findings reflect the generic predisposition for sarcoids discussed in the literature (1, 4, 11), as Quarter Horses do not constitute a high percentage of the horses seen at this institution (6.8% of the patient caseload). Geldings were overrepresented in this study, as this institution recorded approximately equal numbers of mares and geldings in the same time frame. The median age at presentation (11 y) is likely related to a referral population bias, as the initial onset of sarcoid lesions is widely accepted to occur in younger animals ranging from 1 to 7 y old (1, 2, 6). The average age in this study is older than in most; therefore, these cases may represent more aggressive lesions requiring referral or lesions located in difficult anatomic locations where benign neglect is not a valid option. However, the anatomic distribution of lesions in this case series reflects the most common areas of sarcoid occurrence in the general population. Multiple lesions are common in patients with sarcoids, ranging from 14% to 84% of cases (11) which is reflected in this report as 46.7% of horses had 2 or more sarcoids.

All initial follow-up was performed through conversation with the owner; however, 5 horses were examined by a veterinarian for other medical reasons and the presence or absence of sarcoid lesions was noted. All owners were asked to submit digital before and after images during the standardized survey. Owner reported findings were confirmed in half of the cases available for follow-up by either veterinary examination or digital images. The use of an owner survey has several limitations including placebo effect and subjectivity and a prospective, case-controlled study with bi-weekly tumor measurements would provide more accurate documentation for the regression of tumor lesions. However, due to the extended geographic area this institution serves and the retrospective nature of the study, owner reporting was necessary in order to obtain long-term follow-up data.

While the exact mechanism of the autologous preparation is unknown, we suspect the implanted tissue is acting as an immuno-modulatory agent to stimulate a host response against the debulked lesion and other lesions. The innate response consists of primarily non-specific phagocytic cells that both engulf antigen and release granules in an attempt to remove an antigen. Soluble factors such as complement, acute phase proteins, and cytokines aid in cell signaling and phagocytosis (22). While the innate response has no antigenic memory, the acquired response consists of T-cells and memory B-cells that are primed to recognize specific antigens. Vaccine technology relies on creating a product that does not cause clinical disease but stimulates the production of memory B- and T-cells to prevent future infection (22).

There have been recent studies on the development of vaccines to both prevent and aid in the treatment of cervical neoplasia, a disease in which 99.7% of tumors are positive for specific strains of human papilloma virus DNA (23, 24). Papillomaviruses are unique in that development of cancerous lesions depends on negative regulation of cell cycle control as well as immune evasion (24). A variety of therapeutic vaccines including protein based products, plant-derived products, DNA-based vaccines as well as bacterial and viral vectors have been investigated with varying degrees of success. Combination therapy including traditional radiation therapy and a therapeutic vaccine was effective in a pre-clinical model (24) suggesting that a therapeutic vaccine is useful as an adjuvant to traditional therapy. Other work on a vaccine for HPV 16 demonstrated a strong immune response in the form of titers and cytokine production, but limited regression of tumors (23). These studies were mimicked in work on sarcoid-bearing donkeys which were vaccinated with a virus-like particle containing the L1 and E7 proteins; while a strong immunologic response was elicited, tumor regression was noted in only about half the donkeys (25).

Immuno-modulation differs from traditional vaccine therapy in that it aims to stimulate a non-specific enhancement of the innate or acquired response (26). In the equine population, this has traditionally consisted of a variety of crude products of bacterial, viral or plant origin (26). The proposed mechanism relies on macrophage activation and subsequent cytokine release that increases phagocytic activity, antibody production, and lymphocyte cytotoxicity. In equids, immune-modulation has centered on the treatment of equine respiratory disease complex. A recent systematic literature review examined studies on the use of Parapoxvirus ovis and Propionibacterium acne as immuno-modulators for equine respiratory disease; overall, favorable results in both the in vitro and in vivo work were noted with patients receiving these therapies showing improvement in recovery time (27).

The mechanism of action of these immuno-modulatory agents is largely unknown; however, clear success has been demonstrated in equids suffering from chronic virus-associated respiratory disease (27). In other species, in-depth in vitro work has identified interleukin (IL)-16, a proinflammatory cytokine secreted by activated T-cells, as a potential immuno-modulator in viral disease (28). In caprines, IL-16 may decrease the integration of caprine arthritis-encephalitis viral DNA into peripheral white blood cells (29).

Immuno-modulation represents a new front in both human and animal medicine as a targeted means to treat both chronic
viral disease and a variety of neoplasms. Future in vitro work is needed to support the use of the autologous sarcoid preparation utilized in this report. Larger case series or a prospective case-controlled report may provide stronger evidence for the efficacy of this procedure. However, the clinical results, in combination with owner satisfaction and mild complications, make this an attractive therapy to aid in sarcoid treatment.

References
Long-term prospective evaluation of intestinal anastomosis using stainless steel staples in 14 dogs

Manuel Benlloch-Gonzalez, Eymeric Gomes, Bernard Bouvy, Cyrill Poncet

Abstract — This prospective clinical study evaluated the use, complications, and clinical and ultrasonographic follow-ups of end-to-end intestinal anastomoses with skin staples in naturally occurring diseases in canine small and large intestines. Intestinal anastomoses were performed in 14 dogs and pre-, peri-, and postoperative data were recorded. Postoperative clinical and ultrasound evaluations were performed at regular intervals for 1 year. The mean time taken to construct the anastomosis was 5 min. There were no intraoperative complications. Hemorrhage and colonic stricture were the main postoperative complications. Staple loss occurred in 2 cases. Absence of wall layering and focal wall thickening were observed in all cases at each ultrasonographic follow-up. Hyperechoic fat was observed in all but 1 of the cases at month 1. Nine dogs were alive with normal digestive function at the end of the study. The skin stapler technique enabled rapid construction of consistent anastomoses with inexpensive stapling material.

Résumé — Évaluation prospective à long terme de l’anastomose utilisant des agrafes en acier inoxydable chez 14 chiens. Cette étude clinique prospective a évalué l’utilisation, les complications ainsi que les suivis cliniques et échographiques d’anastomoses termino-terminales utilisant des agrafes chirurgicales lors de pathologies naturelles du petit et gros intestins chez des chiens. Des anastomoses intestinales ont été réalisées chez 14 chiens et des données préopératoires, peropératoires et postopératoires ont été consignées. Des évaluations cliniques et échographiques postopératoires ont été réalisées à des intervalles réguliers pendant 1 an. La durée moyenne de la construction de l’anastomose était de 5 minutes. Il n’y a pas eu de complications peropératoires. L’hémorragie et le rétrécissement du côlon étaient les principales complications postopératoires. La perte de l’agrafe s’est produite dans deux cas. L’absence de couches de la paroi et un épaississement concentrique de la paroi ont été observés dans tous les cas à chaque suivi échographique. Le gras hyperéchogène a été observé dans tous les cas sauf un au mois 1. Neuf chiens étaient vivants avec une fonction digestive normale à la fin de l’étude. La technique de l’agrafeuse chirurgicale a permis la construction rapide d’anastomoses uniformes avec du matériel d’agrafage bon marché.

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Introduction

S

tapled intestinal anastomosis techniques include everting triangulating end-to-end anastomosis (EEA) using a thoracoabdominal (TA) stapler, inverting end-to-end anastomosis using a circular EEA stapler, and antiperistaltic side-to-side techniques using gastrointestinal anastomosis (GIA) and TA staplers (1,2). These techniques are safe alternatives to conventional manual suturing techniques, considerably reducing surgical time, with high levels of consistency and repeatability, reduced tissue trauma, and improved blood supply (1,3–7). Intestinal staplers come in various shapes and sizes, accommodating a range of intestinal sizes (1). However, these instruments are expensive and often several TA or GIA devices or cartridges are needed for each anastomosis (1,3,5,7). When using circular EEA staplers, only 1 device is required but additional intestinal incisions are often necessary to accommodate the instruments (1,4).

The use of a skin stapler for intestinal anastomosis was first described in 1990 by Fackler et al (8), who used stainless steel staples to appose the intestinal ends. Evaluation of the technique in porcine and canine models showed a significant reduction in surgical time and a consistently high quality of anastomosis irrespective of the experience of the surgeon or the presence of peritonitis (9–11). In addition to being inexpensive, the skin stapler technique provides a significant advantage, as only a single-use disposable skin stapler is required.

In 2000, Coolman et al (12) modified the original skin stapler technique in dogs by creating an approximating, single
layer end-to-end jejunal anastomosis rather than crushing and inverting the intestinal ends. The experimental jejunal anastomosis model significantly reduced surgical time, gave similar healing characteristics, and showed no significant difference in mean bursting strength immediately after surgery and at 4 and 21 d, compared with single-layer interrupted hand-sewn sutures (11). Experimental canine colonic anastomoses with skin staples resulted in a higher mean bursting strength immediately after surgery and at day 14 compared with single-layer interrupted hand-sewn sutures (13). However, experimental models exert non-physiologic increases in pressure across tissues and anastomotic lines and the clinical relevance of such tests is therefore unknown (1). Although the skin staple technique is reputed to be safe for intestinal anastomosis in dogs (11), its use in clinical situations and long-term follow-up have not been reported. To date, only 1 series of small and large intestine anastomoses has been reported in 39 human patients, with no complications (14).

The goal of this prospective clinical study was to evaluate the use, complications, and clinical and ultrasonographic follow-ups of end-to-end anastomoses with skin staples for the management of naturally occurring diseases in canine small and large intestines.

Materials and methods

Case selection

Dogs requiring a single enterectomy procedure between July 2010 and June 2012 were included. Dogs were excluded if a celiotomy had been performed within 15 d of presentation or if any concomitant surgical procedure that could increase the risk of peritonitis (e.g., pyometra, prostatic abscess, cystotomy, gastrotomy) was planned. Informed consent was obtained from the dogs’ owners.

Preoperative assessment and care

Signalment, body weight, presenting complaints, clinical findings, and duration of clinical signs were recorded. A complete blood (cell) count (CBC), electrolytes, and serum biochemical profiles were evaluated.

Abdominal ultrasonographs and radiographs (2 orthogonal views) were evaluated by a board-certified radiologist. Ultrasound evaluations were performed on each dog using a 5–8 MHz micro convex and a 14–8 MHz linear probe (Esaote Technos MPX, Genoa, Italy). Evaluation of the digestive tract included wall thickness, luminal diameter, and luminal content (mucus, fluid, gas and alimentary patterns or foreign body) (15). Gastrointestinal motility was subjectively assessed as increased, normal (stomach and duodenum: 4 to 5 contractions/min; jejunum: 1 to 3 contractions/min), decreased, or absent (15). Wall layering was deemed altered if all 4 layers were visible but 1 or more had changes in relative echogenicity or thickness. Absent wall layering was defined as loss of wall architecture (15). The echogenicity of the mesenteric fat was classified as normal or increased (focally or diffusely). The presence of abdominal effusion was recorded and described as localized or generalized. Free gas was recorded as present or absent. Abnormal lymph nodes presenting irregular margins, altered echogenicity, and/or increased (> 0.7) short/long axis ratio were recorded (16). Thoracic radiographs including opposite lateral and dorsoventral projections were taken if neoplasia was suspected.

Patients with dehydration or hypotension (systolic < 80 mmHg) were stabilized prior to surgery with intravenous lactated Ringer’s (Fresenius Kabi, Sèvres, France) or 0.9% NaCl solution [20 to 50 mL/kg body weight (BW) per hour] for the first 1 to 2 h. Infusion rates were then adjusted.

Surgeries

Trained surgeons (2 residents) performed the surgeries. Training consisted of a minimum of 3 intestinal anastomoses performed on fresh cadaver dogs. A board-certified surgeon supervised the clinical procedures.

The dogs were premedicated with morphine hydrochloride (C.D.M Lavoisier, Paris, France), 0.2 mg/kg BW, SC, and diazepam (Valium; Roche, Boulogne-Billancourt, France), 0.25 mg/kg BW, IV. Anesthesia was induced with propofol (C.D.M Lavoisier), 4 mg/kg BW, IV, and maintained with isoflurane (Baxter S.A.S., Maurepas, France) in 100% oxygen via endotracheal tube. Lactated Ringer’s solution (Fresenius Kabi), 10 mL/kg BW per hour, IV, was given. Each patient received cefalexin (Rilexine; Sogeval, Laval Cedex, France), 30 mg/kg BW, IV, q90min during surgery from the time of induction. Intestinal anastomoses were performed as described by Coolman et al (12). Three full-thickness 3-0 absorbable stay sutures (Biosyn; Covidien, Elancourt, France) were placed at 120° intervals around the intestine, with the first one placed at the mesenteric border. Tension was applied between 2 stay sutures, and skin staples (4.8 × 3.4 mm) were placed at intervals of 2 to 3 mm using a skin stapler (Autosuture Royal 35 R single use skin stapler; Covidien) between each of the stay sutures (Figure 1). The suture line was tested for leaks as described previously (2). Additional skin staples were used if necessary. The site of the anastomosis was lavaged with warm saline solution and draped with omentum. In patients with suspected peritonitis, samples were submitted for bacteriologic analysis. Concurrent procedures were performed if needed and the celiotomy was closed in layers.

We recorded a description of the suspected intestinal lesion and any other abdominal anomaly, the presence of focal or generalized peritonitis, the site and length of intestinal resection, the time required to construct the anastomosis (from the first intestinal stay suture to the last staple), the number of staples used, and a description of concurrent procedures performed.

Postoperative care

Post-operative analgesia was achieved with morphine chlorhydrate (C.D.M Lavoisier), 0.2 mg/kg BW, SC, q4h, as necessary and carprofen (Zoetis, Paris, France), 4.4 mg/kg BW, IV or PO, q24h once the dog started eating. Cefalexin (Sogeval), 20 mg/kg BW, IV or PO, q12h was continued in cases with peritonitis. Critically ill dogs were hospitalized in the intensive care unit for evaluation and treatment.

Postoperative gastrointestinal function was monitored for gastric distension, frequency and character of emesis, diarrhea, and bowel movements. Adequately hydrated patients were...
administered lactated Ringer’s solution at a maintenance rate (44 to 66 mL/kg BW per day), until they were eating and drinking without emesis. A highly digestible diet (Hill’s I/DTM) was reintroduced 8 h after surgery and continued for 4 wk. Dogs that were inappetent or had insufficient energy intake were given a high-energy liquid diet (Fortrol, Intervet) via nasoesophageal tube. The animals were hospitalized for at least 3 d before being discharged if they were free from complications. Surgical complications were recorded as minor (responding to conservative treatment) or major (including life-threatening conditions or requiring a second surgical intervention, euthanasia, or leading to death).

Outcome
A board-certified pathologist confirmed the histopathological diagnoses including presence or absence of neoplasia at the surgical margin. Follow-up data included clinical and ultrasound examinations. Short-term follow-up examinations were performed on days 3, 15, and 30 after surgery, and long-term follow-up examinations at 6 and 12 mo after surgery. The ultrasound examinations were performed as described previously with specific attention to the intestinal anastomosis. Wall thickness was measured at the site of the intestinal anastomosis and an adjacent healthy intestinal segment; the ratio of these 2 values was calculated to determine relative thickening. Abdominal radiographs were taken 1, 6, and 12 mo after surgery to determine the number of staples remaining at the surgical site.

Results

Animals
Fourteen dogs met the inclusion criteria (Table 1). The mean age at the time of surgery was 6.7 y (range: 5 mo to 15 y). The mean body weight was 15.7 kg (range: 5.3 to 39 kg). All dogs presented with gastrointestinal disturbances: vomiting, lethargy, anorexia, weight loss, pyrexia, and diarrhea (Table 1). On physical examination, abdominal pain, depression, palpable abdominal mass, and dehydration were the most common findings. The mean duration of signs prior to surgery was 14.4 d (range: 1 to 62 d).

Laboratory findings included decreased red blood cell count (cases 1, 7, 12), increased white blood cell count (cases 1–3, 7, 8, 13), hypoaalbuminemia (cases 1–3, 7), hypokalemia (cases 1, 3, 13), hypoglycemia (cases 1, 3, 13), increased aspartateaminotransferase (AST) (cases 1, 3, 4, 6, 11, 12) and increased alkaline phosphatase (ALP) (cases 1, 3, 4, 6, 11, 12). In case 3, metabolic acidosis and increased blood urea nitrogen (BUN), creatinine, blood lactate concentration were identified. The illnesses diagnosed by ultrasonography are listed in Table 1. Absent intestinal motility was observed in 6 dogs (cases 1–3, 5, 6, 8). Free gas was observed in case 2. A localized increase in mesenteric fat echogenicity was seen in 7 dogs (cases 1, 2, 4, 6–8, 11). The cranial mesenteric lymph nodes were abnormal in dogs 3, 7, 12, 14. Concomitant lesions included a splenic mass (case 12) and ovarian cyst with cystic endometrial hyperplasia (case 3). Thoracic radiographs (cases 3, 4, 7, 9–12, 14) showed no detectable pulmonary metastases.

Preoperative care
Intravenous fluids were administered to dogs 1 to 4, 6 to 8, and 13. Potassium chloride (30 mEq/L) or dextrose (0.5 g/kg BW) was added to the maintenance fluids to correct hypokalemia and hypoglycemia (cases 1, 3, 13). Dog 3 had signs compatible with compensated hypovolemic shock and was monitored in the intensive care unit; maropitant citrate (Zoetis), 1 mg/kg BW, slow IV, q24h, ranitidine (Zantac; GlaxoSmithKline, Marly-le-Roy Cedex, France), 2 mg/kg BW, slow IV, q4h, and cefalexin (Sogeval), 20 mg/kg, IV, q8h, were administered. Creatinine, BUN, glucose, electrolytes, and venous blood gas analyses were monitored every 8 h until normalization. Surgery was performed after stabilization, usually within 4 to 12 h (24 h in case 3) of admission.

Intraoperative findings
Intraoperative findings included focal severe intestinal wall thickening compatible with neoplasia (cases 3, 4, 7, 11, 12, 14); focal hypertensive jejunum with moderate wall thickening and multiple disseminated nodules bulging from the muscular and mucosal layers associated with lymphangiectasia (case 9); well-circumscribed fibronodular lesions at the ileocecal valve (case 10); un-reducible intussusception (cases 1, 8); intestinal wall necrosis due to foreign body (cases 5, 6); intestinal wall perforation due to linear foreign body sealed with omentum (case 2); and strangulated jejunal obstruction with vascular compromise due to adhesions associated with an uterine stump abscess (case 13). Dog 4 had a 5-cm diameter adenocarcinoma that required partial dissection of the right lobe of the pancreas to achieve safe intestinal margins (6 cm) proximally.

The mean length of intestinal resection was 18 cm. Significant mesenteric fat was carefully cleared to enable straightforward staple placement. The stapler proved difficult to manoeuvre for distal colonic anastomosis (case 11) due to the pubic bone. Where intestinal exposure was limited, such as the ileocolic junction or duodenal flexure, the duodenocolic ligament was transected to enable full mobilization of the intestinal segment.

![Figure 1. Intraoperative view showing the completed intestinal anastomosis. Mucosa was not trimmed after intestinal resection. True appositional pattern was difficult to achieve, as the squared shape of the closed staple tends to cause eversion of the intestinal edges.](image-url)
Table 1. Summary of details of animals undergoing intestinal anastomosis with skin staplers

<table>
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<th>Age (y)</th>
<th>Gender</th>
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<th>Weight (kg)</th>
<th>Illness</th>
<th>Length of lesion (cm)</th>
<th>Length of resection (cm)</th>
<th>Time (min) of anastomosis</th>
<th>Number of staples used</th>
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<td>13</td>
<td>Duodenal linear foreign body. Focal peritonitis</td>
<td>6</td>
<td>12</td>
<td>5.2</td>
<td>30</td>
<td>Vomiting</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>F</td>
<td>Basset artésian normand</td>
<td>14</td>
<td>Jejunal leiomyosarcoma</td>
<td>8</td>
<td>24</td>
<td>6.1</td>
<td>15</td>
<td>Collapse and death</td>
<td>Died</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>FS</td>
<td>Basset hound</td>
<td>30</td>
<td>Duodenal adenocarcinoma</td>
<td>5</td>
<td>20</td>
<td>4.8</td>
<td>20</td>
<td>Collapse and death</td>
<td>Died</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>M</td>
<td>Shih tzu</td>
<td>6.5</td>
<td>Jejunal foreign body</td>
<td>3</td>
<td>9</td>
<td>4</td>
<td>12</td>
<td>None</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>F</td>
<td>Bernese mountain dog</td>
<td>30</td>
<td>Jejunal foreign body</td>
<td>6</td>
<td>12</td>
<td>3.8</td>
<td>25</td>
<td>None</td>
<td>Good</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>FS</td>
<td>Mixed</td>
<td>21</td>
<td>Jejunal adenocarcinoma</td>
<td>4</td>
<td>18</td>
<td>2.1</td>
<td>25</td>
<td>Diarrhea</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>M</td>
<td>Cane corso</td>
<td>39</td>
<td>Ileocolic intussusception</td>
<td>10</td>
<td>30</td>
<td>3.2</td>
<td>35</td>
<td>None</td>
<td>Good</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>FS</td>
<td>Jack Russell terrier</td>
<td>6</td>
<td>Chronic lymphoplasmaicyt jejunal enteritis (xanthogranulomatous lesions)</td>
<td>10</td>
<td>17</td>
<td>5.5</td>
<td>21</td>
<td>None</td>
<td>Good</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>M</td>
<td>French bulldog</td>
<td>11.5</td>
<td>Sclerosing nodules/chronic granulomatous cecal inflammation</td>
<td>5</td>
<td>10</td>
<td>4.2</td>
<td>18</td>
<td>Diarrhea</td>
<td>Good</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>FS</td>
<td>Maltese</td>
<td>5.3</td>
<td>Colon carcinoma</td>
<td>2.5</td>
<td>8</td>
<td>12</td>
<td>20</td>
<td>Tenesmus, Stricture</td>
<td>Euthanized 1 mo after surgery</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>M</td>
<td>Shih tzu</td>
<td>6.5</td>
<td>Jejunal lymphoma</td>
<td>4</td>
<td>19</td>
<td>4.1</td>
<td>17</td>
<td>None</td>
<td>Euthanized 8 mo after surgery</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
<td>FS</td>
<td>Cavalier King Charles spaniel</td>
<td>9.5</td>
<td>Jejunal vascular compromise. Generalised peritonitis</td>
<td>4</td>
<td>14</td>
<td>4.2</td>
<td>15</td>
<td>Hypokalemia</td>
<td>Good</td>
</tr>
<tr>
<td>14</td>
<td>11</td>
<td>M</td>
<td>Cocker spaniel</td>
<td>15</td>
<td>Jejunal lymphoma</td>
<td>10</td>
<td>30</td>
<td>3.8</td>
<td>18</td>
<td>None</td>
<td>Euthanized 1 mo after surgery</td>
</tr>
</tbody>
</table>

M — male; F — female; FS — female spayed
There were 4 duodenojejunal (cases 2, 4, 7, 14), 6 jejunal (cases 1, 3, 5, 9, 12, 13), 1 jejunoileal (case 6), 2 jejunoileal (cases 8, 10), and 1 colonic (case 11) anastomoses. The mean time required for construction of the anastomoses was 5 min. The mean number of staples used was 20 (Table 1).

Concurrent surgical procedures included ovariohysterectomy (case 3), splenectomy (case 12), uterine stump excision (case 13), and mesenteric lymph node biopsy (cases 3, 7, 12, 14). A peritoneal drain (Blake silicone drain — flat, Ethicon) was used in case 13. Samples were taken for bacteriological analysis from the abscessed omentum (case 2) and free fluid (case 13).

Postoperative data

Dogs 2, 7, 10, 11, 13 experienced minor complications (Table 1), which resolved with medical therapy and dietary management. Dog 13 required intensive care immediately after surgery due to peritonitis and hypokalemia; peritoneal fluid, electrolytes, and hematology were analyzed regularly. Cefalexin (Sogeval), 20 mg/kg BW, IV, q12h and metronidazole (Flagyl; Sanofi-Aventis, France), 15 mg/kg BW, IV, q12h, were given to provide broad-spectrum coverage. Lactated Ringer’s solution (Fresenius Kabi), 50 mL/kg BW per day with potassium chloride (Fresenius Kabi), 30 mEq/L, and enteral feeding via nasoesophageal tube were administered until complete recovery 2 d later.

Four dogs experienced major complications including hypovolemic shock (case 1), collapse, and death (cases 3 and 4), and intestinal anastomosis stricture (case 11). Dog 1 had a rapidly falling peripheral hematocrit (21%) 12 h after surgery. Hemorrhage around the anastomotic site was suspected after ultrasound examination and guided abdominocentesis (hematocrit of the sample 37%). Abdominal counterpressure was applied and whole blood transfusion and oxygen therapy were administered. Clinical improvement was seen over the next day with stabilization of cardiovascular parameters and a hematocrit of 39%. Dog 3 required intensive care immediately after surgery; intravenous 0.9% NaCl (20 mL/kg per hour) and colloid solutions (Fresenius Kabi), 10 mL/kg BW over 4 h, were administered to maintain adequate blood pressure (systolic > 80 mmHg). Despite fluid therapy, hypotension persisted. Blood analyses showed leukocytosis, thrombocytopenia, hypoglycemia, azotemia and increased lactatemia, ALT, and ALP. Dobutamine (Baxter S.A.S.), 5 µg/kg BW per minute constant rate IV infusion, oxygen, dextrose (0.5 g/kg BW, IV), and metronidazole (Sanofi-Aventis), 15 mg/kg BW, IV, q12h, were instituted. Decompensation continued with refractory hypotension, oliguria, severe ventricular arrhythmias, and cardiac arrest 24 h after surgery. Dog 4 had prolonged prothrombin time (PT), activated partial thromboplastin time (aPTT), decreased platelets, and serum fibrinogen, consistent with DIC that led to collapse and death despite fresh blood transfusion 24 h after surgery. In cases 3 and 4, immediate postmortem examination revealed an intact anastomosis with no leakage. These deaths were considered to be unrelated to the surgical technique. In case 11, rectal palpation revealed stricture at the colonic anastomotic site 4 wk after surgery. The owner refused to continue therapy and requested euthanasia. Immediate postmortem examination of the anastomotic site showed extensive external and internal scar tissue narrowing the lumen and reducing compliance of the intestinal wall (Figure 2). Legs of the staples were occupying the intestinal lumen.

Enterococcus faecalis and Escherichia coli were isolated from cultures of cases 2 and 13, respectively. In case 2, the abscess was removed en bloc with the intestine. The postoperative CBC and clinical examinations showed no evidence of infection; cefalexin was discontinued 5 d after surgery. In case 13, metronidazole was stopped 5 d after surgery and cefalexin (20 mg/kg BW, PO,
q12h) was continued for 10 d. The mean duration of hospitalization was 3.25 d.

**Follow-up**

Histopathological data were available for 9 dogs (Table 1). Tumor-free resection margins were achieved in all except case 11. Mesenteric lymph node biopsies were consistent with metastases in dogs 3, 7, 12 and 14.

Mean follow-up time was 265 d. Five animals died or were euthanized during the study (Table 1). Dogs 12 and 14 were euthanized due to deterioration despite chemotherapy. The owners confirmed normal digestive function in the 9 dogs that were alive at the end of the study.

The surgical sites were visualized by ultrasound at each follow-up. Absence of wall layering (Figure 3) was observed in all cases at each follow-up but there was a sequential mild decrease in relative bowel wall thickness (Table 2). Hyperechoic fat was observed in all dogs (n = 12) at day 3, in all but 1 dog at month 1, and had resolved in all dogs (n = 10) at month 6. Complete resolution of post-surgical pneumoperitoneum was documented in all cases (n = 12) by day 15. Normal peristalsis was present in all dogs at each follow-up. Intestinal corrugation was observed in dogs 9 and 13 at day 3 and had resolved on day 15.

Staple loss was observed in cases 5 (8/12 staples) and 7 (17/25 staples) at the 6-month follow-up; no staples were seen in the abdominal cavity or intestinal lumen.

### Discussion

The use of a skin stapler with regular stainless steel staples was effective for performing intestinal anastomosis in a population of dogs with variable body weights and intestinal wall thicknesses, and with various clinical conditions. The technique required inexpensive material, appeared to reduce surgical time, and enabled consistent anastomoses with a low rate of complications.

The mean time required for anastomosis (5 min) was shorter than for hand-sewn interrupted anastomosis (range: 9.06 to 23.5 min) (12,13). Time reported for techniques using the GIA and/or TA devices (range: 7.7 to 18 min) included resection (5,7), which precludes comparison with our study.

Thoracoabdominal, GIA, and EEA devices fire 2 to 4 parallel staggered staple lines enabling consistent mechanically accurate tissue apposition (1), unlike the disposable skin stapler. Even staple alignment and depth control with the skin stapler rely on the surgeon’s skill, as each staple is applied individually. Inexperience with the technique resulted in anastomotic dehiscence in 30% of the cases in 1 study (13). This highlights the need for training before applying the technique in clinical cases. In our experience, a short training period was sufficient to enable reliable and consistent anastomoses, which was confirmed by the low rate of technical complications. The pubic bone hindered staple placement in 1 case of low colonic anastomosis. Procedures in the distal colon could be improved by using “pistol” type skin staplers with swivel noses that allow access to deeper, narrow anatomical spaces, or pubic osteotomy to increase intestinal exposure (1,2).

Unlike the B-shaped staples produced by circular or linear devices, skin staples close in a square shape and are not hemostatic (1). The origin of the bleeding in case 1 was not determined, but possible causes include inappropriate arcuate vessel hemostasis or vessel laceration by a staple. Bleeding from the staple line was reported in 2 cats after the use of circular EEA devices for colonic anastomosis, which was resolved with blood transfusion (4). Iatrogenic vessel laceration can be avoided by gentle clearing of surrounding fat at the bowel ends to facilitate accurate staple placement. Thorough inspection for evidence of pulsatile bleeding from the anastomotic line is essential before closure.

Stricture formation following colonic anastomosis using the skin stapler technique has not been reported previously (10,11,13,14). Stricture was reported in 20% of cases in a series of transrectal EEA in dogs and cats; no specific causes were identified (6). Colonic stricture may result from excessive tension, poor blood supply, adhesions at the level of the anastomosis, or inadequate postoperative management (1,2). Adequate blood supply to the anastomosis is vital: ligation of the cranial rectal artery in conjunction with colorectal resection and anastomosis has been associated with severe compromise of vascularity and necrosis of the distal colon and rectum (17). In dog 11 small perforating vessels from the caudal mesenteric and cranial rectal arteries required individual ligation along the resected intestine to preserve blood supply to the terminal colon and rectum. Tissue handling or inadequate blood supply to tissues adjacent to the anastomosis may have induced transitory edema or congestion leading to impaired healing and stricture. Fibrous tissue proliferation seen in dog 11 may be explained by the absence of clean margins after tumor resection or the high number of staples used that may have stimulated local

### Table 2. Details of the sequential ultrasonographic follow-up of the intestinal wall thickness at the anastomotic site

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>3 days</th>
<th>15 days</th>
<th>30 days</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dogs</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Wall thickness (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>6 to 12 (2.1 to 5.6)</td>
<td>5.5 to 8.2 (2.5 to 5.5)</td>
<td>5.5 to 7.5 (2.5 to 5.5)</td>
<td>5.5 to 6.8 (3.5 to 5.5)</td>
<td>5.5 to 7 (3.5 to 5.4)</td>
</tr>
<tr>
<td>Median</td>
<td>7.73 (4.32)</td>
<td>6.7 (4.08)</td>
<td>6.5 (3.94)</td>
<td>6.27 (3.62)</td>
<td>6.1 (4.1)</td>
</tr>
<tr>
<td>Wall thickness ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1.36 to 2.95</td>
<td>1.2 to 2.36</td>
<td>1.17 to 2.22</td>
<td>1.21 to 1.71</td>
<td>1.3 to 1.71</td>
</tr>
<tr>
<td>Median</td>
<td>1.84</td>
<td>1.72</td>
<td>1.58</td>
<td>1.46</td>
<td>1.48</td>
</tr>
</tbody>
</table>

* Intestinal wall thickness values of normal, adjacent intestinal segment are included in brackets.
inflammation (18). Passage of solid feces has been demonstrated to significantly decrease stricture formation by preventing the healing anastomosis site from forming scar tissue across the lumen (19). The laxatives administered to this dog induced formation of soft stool.

Postmortem evaluation of the anastomatic site in dog 11 showed protrusion of the staple legs into the lumen with proliferation of thick fibrous tissue. Migration of staples into the intestinal lumen and eventual excretion with the feces has been suggested (20). Disappearance of staples was observed on radiography in 2 cases without consequences. The mechanism of staple migration has not been elucidated and complications caused by the passage of the staples into the lumen cannot be excluded. Staples in GIA, TA, and EEA devices used for intestinal anastomoses close to a height of 1.5 and 2.0 mm, whereas skin staples used in this study close to a height of 3.4 mm (1). Discrepancy between the height of the staples and wall-thickness (2.1 to 2.5 mm) in this dog may have resulted in significant penetration of the staples into the lumen of the intestine contributing to obstruction and tenesmus. Intestinal obstruction secondary to staple exposure has been reported as a complication of EEA in a dog (21). Caution is therefore recommended when using regular staples in thinner intestinal walls, particularly in the colon, due to the risk of intraluminal staple exposure and subsequent intestinal obstruction.

Dehiscence is one of the most serious complications encountered in intestinal surgery with significant morbidity and mortality rates (22–24). Dehiscence at the anastomotic site was not observed in this study, although some of the dogs had preoperative peritonitis, intestinal foreign bodies, postsurgical blood transfusion, and/or low serum albumin concentrations, all of which are risk factors for intestinal anastomotic leakage in dogs (22–25). The absence of leaks in the present study compares favorably with previous clinical series using hand-sewn and stapled intestinal anastomosis, which reported leakage in 3% to 16% (22–24,26) and 0% to 8.3% of cases, respectively (3–7). Dehiscence was reported in 30% of the cases in an experimental canine model using the original skin stapler technique for colonic anastomosis, but these were attributed to initial unfamiliarity with the technique (13). In experimental and clinical studies using GIA and TA devices, leaks have been reported at the intersection of the staple lines where the high number of accumulated staples might have compromised the integrity of the anastomosis and promoted partial necrosis (3,7,27). The absence of superimposed staples with the skin stapler technique or a circular EEA device may reduce this risk.

Ultrasound examination of stapled intestinal anastomosis has rarely been reported in dogs (7). In our study, hyperechoic fat persisted in 92% of the cases 1 mo after surgery. Sequential ultrasonographic features of normally healing hand-sewn enterectomy and enterotomy sites showed resolution of hyperechoic fat in 80% of the cases by day 10 after surgery (28). In a case series of 30 dogs treated for intestinal obstruction with an end-to-end stapled anastomosis technique, hyperechoic fat was reported at day 3 in 2 dogs and was not evident on day 15 (7). Hyperechoic fat is associated with inflammation, fibrosis, or scar tissue (29). The evasion tendency of the skin stapler technique could explain the persistence of hyperechoic fat in this study (30).

The median relative wall thickening of dogs evaluated at 6 mo \((n = 10)\) and 1 y \((n = 9)\) after surgery was 1.46 and 1.48 times the normal adjacent intestinal wall, respectively. Similar data (1.4 times) were obtained for postoperative hand-sewn enterectomy wall thicknesses from 7 mo to 7 y (31). Despite this focal thickening, there was no evidence of significant luminal narrowing or impaired motility except in the dog that had colonic stricture.

None of the visualized enterectomy sites had normal wall layering. Histological analyses on old healed intestinal anastomoses (3.5 y) in humans have shown chronic inflammatory cells and muscular discontinuity with areas of intervening fibrosis (32). This finding is consistent with the previous long-term ultrasonographic study of enterectomy sites, which reported changes in the bowel wall architecture that persisted for up to 7 y (28).

The inclusion of dogs with neoplastic lesions influenced the number of postoperative deaths and reduced the length of postoperative follow-up, limiting the strength of our conclusions. Intestinal anastomosis using a standard skin stapler with stainless steel staples proved effective when applied to elective and emergency surgeries. The technique enabled rapid construction of consistent anastomoses with a single, inexpensive stapler. There was no dehiscence and stricture formation was observed in 1 of the 14 dogs. This surgical technique merits further investigation, especially with regard to the development of smaller staples for thinner intestinal walls.

References


Tasks for the Veterinary Assistant, 3rd edition


During the last decade, the description of a veterinary assistant has evolved from an on-the-job trained layperson performing a myriad of non-standardized and undefined tasks, to a more defined, respected, and pivotal member role of the veterinary healthcare team. “Tasks for the Veterinary Assistant” was created as an instruction and reference guide for the standardized North American training programs as well as for pupils who are trained on the work site.

Those who are interested in this career are made aware from the opening page that this is a gratifying profession to work in but that there are personal and professional standards that must be maintained and upheld in addition to the medical assistance aspect. The roles of the various members of the veterinary team are clearly explained and defined. Topics are thoroughly explained in an easy to understand format, then broken down into a “Preparation, Procedure, Follow-up” grid that provides a brief explanation as to the “why and how” for each particular procedure. Subsequent sections cover animal basics, anatomy, nutrition, restraint, laboratory and imaging, pharmacy, surgical and patient care; the latter topic earns 3 chapters to cover all areas for both companion small animals, pocket pets, and some large animals.

Compared with the previous edition, most of the line drawings have been replaced with black and white photographs — this is especially helpful in the Animal Restraint section, although it is my opinion that “how to restrain” videos would be a worthwhile future addition on the companion website. Answers for the most common questions associated with the tasks and procedures are provided, so that the assistant will be able to understand the “how” and “why” without having to continually seek out a supervisor. A website containing the tables, charts, and flashcards that are in the book is available for quick consultation, although it does not provide any new material. Rather disappointingly, the paper quality, thin cardboard cover, and spiral binding are as inferior as before and will not withstand the rigors of daily use for very long.

In the current 3rd edition format, the authors have kept the content up-to-date with the ever evolving protocols, techniques, and procedures of the veterinary field. Despite being a hefty tome, this book is worth having as it will be an invaluable aid to those who train new employees, well a useful reference guide for seasoned staff.

Reviewed by Donna Morley, VT, Clinique Vétérinaire de Beaconsfield, 40-J St. Charles Blvd, Beaconsfield, Quebec.
Antimicrobial dispensing by Ontario dairy veterinarians

David F. Léger, Nathalie C. Newby, Richard Reid-Smith, Neil Anderson, David L. Pearl, Kerry D. Lissemore, David F. Kelton

Abstract — This questionnaire-based cross-sectional study was designed to capture the demographics of dairy practitioners in Ontario and to describe aspects of antimicrobial dispensing on-farm and over-the-counter by these veterinarians. The information collected revealed that the prescription status of a drug and the level of veterinary-client-patient relationship were important elements of dispensing policies. Over-the-counter dispensing records were incomplete, while only a small proportion of on-farm dispensing records contained pertinent information and directions as required by the Veterinarians Act. While respondents recognized that antimicrobial use in dairy herds could lead to resistance in cattle, few indicated that this was a significant public health issue. Veterinarians can play a key role in antimicrobial stewardship, part of which is the provision of complete written dispensing instructions to producers for antimicrobial use in dairy cattle.

Résumé — La distribution des agents antimicrobiens par les vétérinaires qui s'occupent des vaches laitières en Ontario. Cette étude en coupe transversale a été réalisée à partir de réponses recueillies d’un questionnaire qui ciblait les données démographiques des praticiens des fermes laitières de l’Ontario en plus de décrire les habitudes de dispense des doses d’agents antimicrobiens in situ par les vétérinaires ou en vente libre auprès des distributeurs. Cette information nous a permis de reconnaître que le statut de l’agent antimicrobien prescrit et le niveau de relation entre le vétérinaire-client-patient sont des éléments très importants de la politique de dispense. Les données concernant les agents antimicrobiens achetés sans prescription étaient incomplètes dans les points de vente et seulement une petite proportion des données internes à la ferme contenait les informations et les dosages tels que requis par la loi sur les vétérinaires. Les répondants reconnaissaient que l’utilisation des agents antimicrobiens chez les vaches laitières pouvait élever leur résistance à ceux-ci, mais peu d’entre eux mentionnaient que ceci engendrait une réelle inquiétude pour la santé publique. Les vétérinaires ont donc un rôle clé à jouer et ils devront être assidus en fournissant, par écrit, des instructions complètes sur les prescriptions d’agents antimicrobiens aux producteurs de vaches laitières.

(C)Traduit par les auteurs)
Industry initiatives like CQM and the Livestock Medicines Education Program are intended to encourage proper handling and administration of drugs on-farm. Antimicrobials vary in their importance based on their ability to treat severe bacterial infections. The Veterinary Drug Directorate has categorized animal antimicrobials according to their importance to human medicine. It is noteworthy that ceftiofur, a 3rd generation cephalosporin, is in Category I (very high importance to human medicine), while penicillin-G is in Category II (high importance) (13). Both of these antimicrobials are commonly used in dairy medicine and their differences should be considered when selecting antimicrobial drugs.

This study was the first of its kind at the time and had the following objectives: provide demographic information for dairy practices and practitioners in the Province of Ontario; collect data on factors that could influence antimicrobial selection, dispensing and use; describe aspects of communications and record-keeping associated with antimicrobial dispensing; and ascertain the attitudes regarding antimicrobial resistance in an animal health and public health context.

Materials and methods

Sampling frame

The population of interest for this study was veterinarians in the province of Ontario who practice dairy medicine. A sampling frame of veterinarians (n = 340) was developed from a list of practices (n = 240) accredited as “Food-Producing Animal Mobile” by the provincial veterinary licensing body, the College of Veterinarians of Ontario (CVO). The CVO registry did not categorize practices or members by species focus. Individual veterinarians from these practices were identified using the CVO 2001 Directory. To further characterize the response rate, veterinary practices were sub-categorized in the sampling frame as Dairy Intensive (practices with 1 or more veterinarians committed to full-time dairy practice, n = 48 practices) based on known practice profiles and the species focus of individual practitioners (n = 117) within those practices. To limit design-based selection bias, in the form of non-response bias, all non-respondents were contacted with equal rigor through follow-up telephone reminders.

A questionnaire (described elsewhere, 14), designed to elicit information about antimicrobial use by dairy veterinarians, was pre-tested by 12 practitioners and refined. On July 2, 2001 questionnaires were mailed to 240 practices. There were no incentives in place to motivate participation. Over the 6-month period following the initial mailing, practices with non-respondents were contacted by telephone to remind those practitioners to complete and submit their surveys.

The questionnaire was self-administered and contained 4 sections focusing on respondent and practice demographics, antimicrobial dispensing considerations and communications, antimicrobial drug use, and opinions regarding antimicrobial use and resistance. Practitioner demographic information included the veterinary school year of graduation, the proportion of total professional activity dedicated to dairy practice, and the amount of time spent on different aspects of dairy production medicine.

The body of the questionnaire focused on aspects of antimicrobial use pertaining primarily to lactating cow treatments. Attitudes regarding antimicrobial use were investigated with questions about dispensing policies and the veterinarian-client-patient-relationship, factors influencing drug selection, the use of written (pre-printed or written at the time of visit) on-farm protocols, drug-use information sources, the records associated with antimicrobial drug dispensing on-farm and over-the-counter, and the impact of antimicrobial drug use by the dairy industry on antimicrobial resistance in dairy cattle and humans.

Questionnaire data were stored in a relational database (Microsoft® Access 2000). Descriptive analysis was conducted using statistical software; Fishers exact test, Chi-squared, t-test and t-test statistics (two-sided) were used to evaluate univariable associations between demographic variables, and were considered significant at P < 0.05 (SAS version 9.1.2; SAS Institute, Cary, North Carolina, USA). To assess associations between over-the-counter (OTC) dispensing policies for antimicrobials of different prescription status and the level of veterinarian-client-patient-relationship (VCPR), a mixed multivariable logistic regression model (PROC GLIMMIX) was created that controlled for extraneous respondent and practice demographic factors. Given the small number of predictor variables of interest, all were admitted to the full model. Spearman’s rank correlation coefficients were examined for pairwise correlations among predictor variables > 0.7 to avoid collinearity between model covariates. Model building was done manually through an iterative process in which variables were retained based on evidence of confounding, which was a substantive change (> 20%) in coefficients of the explanatory variables of interest (antimicrobials of different prescription status and VCPR), based on a significance level of P < 0.05, and also if they were part of an interaction term. Continuous variables (years in practice; percent time spent on individual cow medicine; percent time spent on dairy practice; number of dairy clients; and percent revenue from drug sales) were examined for linear relationships with the outcome, OTC, by assessing quadratic terms and hierarchical dummy variables, and also using a lowess curve. To account for a practice effect in the model, PracticeID was included as a random intercept. Interactions among all terms in the main effects model were examined for significant associations with OTC dispensing. Finally, Chi-square tests were used to evaluate the questions regarding the impact of antimicrobial drug use by the dairy industry on antimicrobial resistance, and these questions were dichotomized from the original 5-point scale (strongly agree to strongly disagree) into the following categories: strongly disagree, disagree, and no opinion versus agree and strongly agree. A Fisher’s exact test was used to evaluate potential associations between the opinion questions on the animal and human health impacts of antimicrobial use in cattle and the frequency with which a respondent was concerned about AMR in selecting an antimicrobial.

Results

Two hundred and sixty-four veterinarians remained in the sampling frame once those indicating dairy practice was “not a duty” were removed. The response rate was 47% (124/264).
Respondent demographics are summarized in Table 1. The response rate in each region was reflective of the provincial distribution of the dairy industry, with most respondents practicing in either southwestern or southeastern Ontario (Table 1). There were 83 practice locations: 42 in southwestern Ontario, 20 in southeastern Ontario, 15 in south-central Ontario, and 6 in northern Ontario. The number of respondents per practice ranged from 1 to 5, but in most cases there was only 1 (70%) or 2 respondents (18%) per practice. Seventy-three percent of the practices were categorized as dairy intensive and 57% of the veterinarians in these practices responded to the questionnaire.

Respondents to our questionnaire were Ontario dairy practitioners, predominantly male graduates of the Ontario Veterinary College with 11 to 24 y in practice (median time in practice = 19 y). Eleven female veterinarians (9%) responded (Table 1). There were no significant differences in the distribution of female and male respondents among the other demographic variables with the exception of the percentage of professional time spent in dairy practice, where most of the female respondents (9/11) spent < 50% of their professional time engaged in dairy practice compared with 68% of males spending > 50% of their time in dairy practice (Fisher’s exact test, P = 0.0006).

The number of dairy clients per practice was evenly distributed across the other categories with 48% of respondents serving 50 farms or less. There were no significant regional differences in the proportion of small, medium, and large herds across regions (F-test, 3 df, P > 0.05). Practices across the province indicated the majority of herds they attended milked 50 cows or less and a relatively small percentage of herds milked more than 100 cows (Table 1). Response rate to the question regarding dairy practice gross revenue was 80% (99/124). Specifically, this questionnaire asked respondents to estimate the percentage of their dairy practice gross revenue that was derived from drug sales and professional fees; the median for this estimate was 43% (with an interquartile range of 15%).

Table 1. Summary of respondent and practice demographics of a survey applied to 264 Ontario dairy veterinarians from 240 practices in July 2001

<table>
<thead>
<tr>
<th>Number (% of respondents</th>
<th>124</th>
<th>(47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (% of respondent practices</td>
<td>83</td>
<td>(35)</td>
</tr>
<tr>
<td>Median (range) years in practice</td>
<td>19</td>
<td>(0.25 to 50)</td>
</tr>
<tr>
<td>Number (% of OVC graduates</td>
<td>117</td>
<td>(94)</td>
</tr>
<tr>
<td>Number (% of female respondents</td>
<td>11</td>
<td>(9)</td>
</tr>
<tr>
<td>Number (% of respondents practicing in each Ontario region:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Southwestern</td>
<td>69</td>
<td>(56)</td>
</tr>
<tr>
<td>- Southeastern</td>
<td>33</td>
<td>(27)</td>
</tr>
<tr>
<td>- South-central</td>
<td>15</td>
<td>(12)</td>
</tr>
<tr>
<td>- Northern</td>
<td>7</td>
<td>(6)</td>
</tr>
<tr>
<td>Number (% of respondents, % professional time spent in dairy practice:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &gt; 75%</td>
<td>50</td>
<td>(40)</td>
</tr>
<tr>
<td>- 51% to 75%</td>
<td>34</td>
<td>(27)</td>
</tr>
<tr>
<td>- 26% to 50%</td>
<td>19</td>
<td>(15)</td>
</tr>
<tr>
<td>- 1% to 25%</td>
<td>21</td>
<td>(17)</td>
</tr>
<tr>
<td>% respondents active in different aspects of dairy practice, and the average % (range) practice time spent on those activities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Individual cow medicine and surgery (ICM)</td>
<td>95</td>
<td>40</td>
</tr>
<tr>
<td>- Reproduction</td>
<td>98</td>
<td>38</td>
</tr>
<tr>
<td>- Milk quality and udder health</td>
<td>85</td>
<td>7</td>
</tr>
<tr>
<td>- Feeding and nutrition</td>
<td>72</td>
<td>6</td>
</tr>
<tr>
<td>- Replacement heifer management</td>
<td>73</td>
<td>4</td>
</tr>
<tr>
<td>- Facility planning</td>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>- Financial consulting</td>
<td>15</td>
<td>0.4</td>
</tr>
<tr>
<td>Number (% of respondent practices in practice size categories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt; 26 farms/practice</td>
<td>24</td>
<td>(29)</td>
</tr>
<tr>
<td>- 26 to 50 farms/practice</td>
<td>24</td>
<td>(29)</td>
</tr>
<tr>
<td>- 51 to 75 farms/practice</td>
<td>15</td>
<td>(18)</td>
</tr>
<tr>
<td>- 76 to 100 farms/practice</td>
<td>10</td>
<td>(12)</td>
</tr>
<tr>
<td>- &gt; 100 farms/practice</td>
<td>11</td>
<td>(13)</td>
</tr>
<tr>
<td>Median (range) number of dairy herds per practice</td>
<td>45</td>
<td>(1 to 250)</td>
</tr>
<tr>
<td>Median (range) percentage of practice herds milking:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt; 50 cows</td>
<td>59%</td>
<td>(0 to 100)</td>
</tr>
<tr>
<td>- 51 to 100 cows</td>
<td>36%</td>
<td>(0 to 100)</td>
</tr>
<tr>
<td>- &gt; 100 cows</td>
<td>4%</td>
<td>(0 to 29)</td>
</tr>
<tr>
<td>Median % (range) herds per practice with free-stall barns</td>
<td>20%</td>
<td>(0 to 83)</td>
</tr>
<tr>
<td>Median % (range) gross practice revenue from drug sales</td>
<td>43%</td>
<td>(1 to 100)</td>
</tr>
</tbody>
</table>

* OVC — Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada.
From the client-type profiles provided by respondents in terms of level of Veterinarian-Client-Patient-Relationship (VCPR), the overall median values were as follows: 80% “regular clients” (farm visited every 2 to 8 wk), 15% sporadic clients (1 to 5 visits/y), and 0.5% rare clients (< 1 visit/y). A qualitative assessment of the data indicated within-practice variation among responses from multi-respondent practices; data, at the individual respondent-level indicated a higher frequency of OTC dispensing for both antimicrobials for regular clients (76% for penicillin, 69% for ceftiofur), followed by sporadic clients (51% and 38%, respectively) and finally a very low frequency for rare clients (21% and 8%, respectively). For regular clients, most of the respondents indicated a policy of OTC dispensing for both antimicrobials, with 24% and 31% requiring some form of veterinary consultation prior to dispensing penicillin or ceftiofur, respectively. After removing “NA” (not applicable) responses, 25% and 32% of respondents indicated they would not dispense penicillin or ceftiofur, respectively, OTC to any dairy producer, while 20% and 7% indicated they would dispense these antimicrobials without any form of veterinary consultation regardless of the level of VCPR.

A mixed multivariable logistic regression model indicated that OTC dispensing policy was associated with the type of antimicrobial being dispensed and VCPR client type, while controlling for the other demographic confounders in the model. The odds of procaine penicillin G being dispensed OTC were 4.6 times greater compared to ceftiofur [95% confidence interval (CI): 2.5, 8.6; \( P < 0.0001 \)]. Regular clients were 26.3 times more likely to receive antimicrobials OTC compared to sporadic clients (95% CI: 10.9, 63.7; \( P < 0.0001 \)), and the odds of OTC dispensing to sporadic relative to rare clients were 16.7 times greater (95% CI: 8.3, 33.3; \( P < 0.0001 \)). Relative to respondents with a percent time spent on dairy practice < 26%, those with higher percentages of time spent in dairy practice were significantly more likely to allow OTC dispensing without requiring a veterinary consultation [26% to 50% time spent on dairy practice, odds ratio (OR) = 5.9; 95% CI: 1.4, 24.3; \( P = 0.01 \); 51% to 75% time spent on dairy practice, \( OR = 12.3 \); 95% CI: 3.6, 42.7; \( P < 0.0001 \); > 75% time spent on dairy practice, \( OR = 7.3 \); 95% CI: 2.2, 24.3; \( P = 0.001 \)]. The odds of OTC dispensing were 5.2 times greater among respondents with less than 10 y in veterinary practice compared with their more experienced counterparts (95% CI: 2.2, 12.4; \( P < 0.001 \)).

Respondents provided a ranking of the relative frequency with which they consulted different sources of information regarding antimicrobial drug use in lactating cows. Continuing education seminars, veterinary journals, and pharmaceutical company representatives were cited as primary information sources and were ranked the highest, while the Internet was ranked the lowest. The second tier of information sources included veterinary colleagues, laboratory tests, and the Compendium of Veterinary Products, followed by provincial government publication and specialist advice. Among the lower ranking sources were the Veterinary Drugs Directorate (VDD), the gFARAD (global Food Animal Residue Avoidance Databank) system, and other sources (product labels and clinical experience).

Among different factors considered in choosing an antimicrobial treatment for a lactating cow, a drug treatment’s efficacy for the given condition ranked the highest, in terms of mean frequency score (Figure 1). Having a label indication for lactating dairy cattle and the milk withdrawal time for the drug were reported to be the next most frequent considerations in choosing an antimicrobial. Most indicated that potential injection site lesions and antimicrobial resistance development were only occasionally considered. Mean frequency scores for veterinarian’s profit were low, with the majority indicating this was never (72%) or only occasionally (22%) considered in antimicrobial selection.

Thirty-four respondents (28%) indicated they provided their dairy clients with antimicrobial drug use protocols for lactating cows. Several respondents commented that protocols were not provided frequently, nor were they provided to all clients. In reporting how antimicrobial use instructions were provided to dairy producers 88% of respondents indicated that they wrote instructions for clients “often” or “always,” of those, 40% indicated that they “always” left some form of written record. The “other” forms of treatment instruction included written instructions on the milk house white board, written instructions in the herd book, or written treatment sheets and protocols. Regarding record quality, the information most frequently included in an OTC record was the drug name (79%), the date (75%), and amount dispensed (73%), but information about the case and treatment specifics, including residue avoidance instructions were cited at frequencies < 20%. Twenty-seven percent of the veterinarians provided complete records when dispensing on-farm; however, none of the respondents provided a complete OTC dispensing record.

There was a greater proportion of veterinarians (81%) who responded to our questionnaire who agreed to the question “Do you feel antimicrobial drug use, at the current levels within the dairy industry, is a contributor to decreased antimicrobial efficacy in dairy cattle” compared with those who did not.
agree (18%) (Chi-squared = 48, 1 df, \( P < 0.01 \)). In contrast, 86% of respondents indicated some level of disagreement or no opinion, compared with the proportion that agreed, to the question asking whether antimicrobial use in dairy cattle could contribute to resistance in human medicine (Chi-squared = 64, 1 df, \( P < 0.01 \)); of these, 27% indicated no opinion (data not shown).

**Discussion**

The demographic statistics for veterinary respondents and practices mirrored the distribution of dairy operations in the province and regional milk production statistics for 2001 (15). In surveys conducted by the Ontario Veterinary Medical Association (OVMA), median drug revenue for mixed and large animal practitioners, excluding equine specialists, was found to be 45.7% of total revenue (Darren Osborne, Director of Economic Research, OVMA, personal communication, 2014) compared to the survey response median of 43% in this report.

The respondent demographics of the study population were reflective of those of the source population of dairy veterinarians thus minimizing non-response bias. The questionnaire design attempted to limit the potential for bias in responding by relying heavily on 5-point Likert scale questions, some with frequency scales (Never — Always), which appear to have minimized this potential bias. The response distributions did not indicate the presence of significant positive skewing, central tendency, acquiescence bias, or faking good (16).

The definition of a valid VCPR in the regulations under the **Veterinarians Act of Ontario** includes the elements that a veterinarian has “sufficient knowledge” through “timely visits to the premises,” that he/she believes that “the drug is prophylactically or therapeutically indicated for the animal,” and that the producer “has indicated a willingness to accept the advice” (17). Our questions regarding dispensing policies focused on 2 antimicrobials; penicillin G (non-prescription) and ceftiofur (prescription) (18). We found that most of the responders applied the concept of a valid VCPR in dispensed antimicrobials. Our survey instrument did not establish the extent to which responses reflected clinic level policy or individual case-by-case dispensing behavior. Responses to this question did establish that farm visit frequency and prescription status of an antimicrobial were used by veterinarians as discriminating factors in determining the limitations on OTC dispensing. There was evidence of a policy shift to less OTC dispensing with a greater requirement for consultation as the VCPR became more tenacious. Multivariable models indicated that practice and individual demographic factors, generation of veterinarian and his/her time spent on dairy practice, may affect dispensing policy.

Veterinarians should demonstrate an attitude of antimicrobial stewardship in their dispensing policies, given their role as a trusted advisor to producers. A survey of Ontario producers found that 99% of respondents ranked their herd veterinarian as a primary source of advice on antimicrobial use and 96% identified their veterinarian as a primary retail source of antimicrobial products for their herd (14). Another study noted that 94% of producer respondents relied on veterinarians most in dealing with health management issues (19). A study involving South Carolina producers suggested that herd veterinarians are viewed as credible sources of information about antimicrobial use and that a functional VCPR can influence attitudes of farm workers about the potential occupational hazards associated with antimicrobial resistance on the farm (20).

Implicit in the question about considerations in antimicrobial selections was that there was a presumptive diagnosis of a bacterial infection, given the empirical knowledge of the clinician, and the need for antimicrobial treatment was justified; this question was not intended to solicit pharmacodynamic/pharmacokinetic considerations in drug selection (21) beyond efficacy of an antimicrobial for the given condition. Respondents indicated that the potential for resistance development and veterinarian’s profit were rarely considered in selecting an antimicrobial, while efficacy, labeled for use in lactating dairy cow, and milk withdrawal time were the primary considerations, all of which are among the key elements of prudent antimicrobial use (6,7).

In this study, antimicrobial use protocol provision by veterinarians (28%) was similar to data from producer respondents in Pennsylvania (21%) (22), Washington State (27%) (19), and South Carolina (32%) (20), who indicated having written treatment plans in place (pre-printed or written at the time of visit versus verbal instructions only). A Wisconsin study showed that the use of written treatment protocols increased with herd size, likely driven by a need for standardized procedures as the number of farm personnel increased, and that 60% were written by a veterinarian (23). Interviews with South Carolina producers revealed that while protocols were not available as formal written documents, daily herd management still followed standard operating procedures developed through personal experience (20). Our study also revealed that the majority of veterinarians provided written instructions when dispensing antimicrobials OTC and on-farm. However, record quality in terms of case specific instructions was generally low, irrespective of dispensing location, which could result in poor producer compliance and/ or improper antimicrobial use. While our findings indicated that respondents may have deferred antimicrobial use instruction to the product label, the **Ontario Veterinarians Act** requires veterinarians to provide complete dispensing instructions to producers; some respondents may have assumed that the manufacturer’s label information meets the requirements for providing directions on use of the product. At the time of our survey, the Canadian dairy industry was developing, but had yet to implement, the Canadian Quality Milk (CQM) program (11), which included a requirement that producers maintain treatment protocols and records under the guidance of their herd veterinarian (24).

Most respondents agreed that antimicrobial use in the dairy industry could contribute to decreased efficacy in dairy cattle.
These results are similar to those from a study reporting that 74% of producers agreed that ‘antibiotics become less effective the more they are used’ and a majority of producers (59%) agreed that antibiotic use in food animals could affect human health, but only 34% felt that a cow with an antimicrobial resistant infection in the herd would pose a threat to farm workers (19). Interviews with South Carolina dairy producers revealed that 86% were not concerned about the potential for farm staff to carry antimicrobial resistant organisms in relation to the overuse of antimicrobials on the farm (20). Most respondents to our survey did not believe that antimicrobial use in dairy cattle had a public health impact. Furthermore, in selecting an antimicrobial, most of the respondents were not influenced by the potential for resistance development. However, 59% of Washington State dairy producers agreed that antibiotic use in food-producing animals could affect human health (19). Those in animal agriculture who disagree with this premise contend that the greatest determinant of antimicrobial resistance in humans is overuse/misuse by physicians. One assessment of physician prescribing behavior found that 61% of prescriptions met with guideline recommendations, 10% were for the use of newer important narrow spectrum antimicrobials, and in 20% of cases antibiotics were not indicated (25). Educational interventions aimed at curbing excessive or inappropriate prescriptions often focused on health economic outcomes, have met with varied success, and generally the net result has been modified prescription profiles of subject physicians (26–29). Calls for restricted use of antimicrobials in agriculture (30–32) and the need for veterinary leadership and education in developing strategies for the preservation of antimicrobials (10) have motivated several organizations to create prudent use guidelines (6,7), but there remains little in the way of sustained veterinary and producer education concerning antimicrobial use and resistance in a public health context. The Canadian Veterinary Medical Association has published species-specific prudent use guidelines, which ranked antimicrobial selection by their category of importance in human medicine, for various bacterial diseases. There is a need for additional research to better describe the potential public health impact of antimicrobial use on dairy farms.

In the years since this study was conducted there have been several initiatives [CgFARAD, CQM, Ontario Medical Association (OMA) policy paper] that may have impacted current veterinary dispensing practices and attitudes. CgFARAD, an ongoing service that was active at the time of this study, provides information to veterinarians pertaining to the extra-label use of drugs (ELDU) and the associated risks of violative residues (33). This program has provided limited advice on the potential for antimicrobial resistance development/dissemination, thus it is less likely to have had a significant impact on the dispensing of antimicrobials on dairy farms. On the other hand, the CQM program, an on-farm food safety/quality assurance program, requires producers to maintain drug inventory lists, log animal treatments, obtain veterinary prescriptions for ELDU and treatment protocols, and in turn increase awareness of the veterinarian’s role as a key advisor on drug use, including antimicrobials (34). The influence of prudent use guidelines, media, and veterinary and industry literature may have modified dispensing practices and antimicrobial use. Additionally, other initiatives have resulted in a call to action by commodity and veterinary organizations, and government agencies. New federal legislation on antimicrobial dispensing has been proposed (35). A recent policy paper published by the OMA has identified food-animal agriculture as major users of antimicrobials and has made several recommendations regarding how antimicrobials should be dispensed in this sector (36). Assuming there has been a shift in attitudes by policy makers toward greater antimicrobial stewardship, it is speculated that there will be a trickle down effect to end users, veterinarians and producers. A follow-up study is warranted to collect current data in Ontario dairy herds in order to assess if and how dispensing practices have changed since 2001.

In general, respondents indicated the requirement for some form of consultation prior to dispensing penicillin or ceftriaxone increased as the VCPR became more tenuous, and a shift towards more restrictive dispensing policies was greater for ceftriaxone than for penicillin. Most respondents frequently provided written instruction when dispensing an antimicrobial and just over half frequently added this information to the main clinic medical record for that farm. None of the respondents provided complete OTC dispensing records, whereas 27% provided complete records when dispensing on-farm. Potential antimicrobial resistance development was not a primary consideration in the selection of an antimicrobial but there was general agreement among respondent veterinarians that antimicrobial use in the dairy industry was a contributor to antimicrobial resistance in cattle. The majority disagreed that it could have a negative impact on human medicine. As trusted advisors to producers, veterinarians play a key role in antimicrobial stewardship in directing the appropriate use of these important drugs.

Acknowledgments

This project was supported by the Ontario Ministry of Agriculture and Food, Food Safety Program and by the Laboratory for Foodborne Zoonosis, Public Health Agency of Canada. We are grateful to the dairy veterinarians who participated in this research project by responding to the questionnaires. We thank Andrea Rowe, Heather Aitken, Mary Lichiti, Alison Mather, and Betsy Varughese for their help with data management. We also acknowledge and are grateful for the statistical support provided by William Sears.

References


Pharmacokinetics and bioequivalence of 2 meloxicam oral dosage formulations in healthy adult horses

Melanie Vivancos, Jessica Barker, Sarah Engbers, Carrie Fischer, Jami Frederick, Heather Friedt, Joanna M. Rybicka, Tereza Stastny, Heidi Banse, Alastair E. Cribb

Abstract — Meloxicam, a non-steroidal anti-inflammatory drug, is approved for use in horses in several countries, but an equine formulation is not available in North America. However, meloxicam is being used in an extra-label manner in horses in Canada. The purpose of this study, therefore, was to assess the bioequivalence of an approved oral meloxicam suspension (Metacam 15 mg/mL for horses; Boehringer Ingelheim Vetmedica GmBH, Ingelheim, Germany) from the European Union with human meloxicam tablets (Meloxicam 15 mg tablets; TEVA Canada, Toronto, Ontario) compounded with molasses to improve palatability and administration. The geometric mean ratios (GMR test/reference) and the 90% confidence intervals of the pivotal pharmacokinetic parameters (area under the curve and maximum concentration) were within the defined limits of 80% to 125% generally accepted for products to be considered bioequivalent. Therefore, use of human meloxicam tablets compounded with molasses would be expected to produce a similar clinical response in horses as the approved oral product from the European Union.

Résumé — Pharmacocinétique et bioéquivalence de 2 formulations de posologie orale de méloxicam chez des chevaux adultes en santé. Le méloxicam, un médicament anti-inflammatoire non stéroïden, est approuvé pour utilisation chez les chevaux dans plusieurs pays, mais une formulation équine n’est pas disponible en Amérique du Nord. Cependant, le méloxicam est utilisé en dérogation des directives de l’étiquette chez les chevaux du Canada. Par conséquent, le but de la présente étude était d’évaluer la bioéquivalence d’une suspension orale approuvée de méloxicam (Metacam 15 mg/ml pour les chevaux; Boehringer Ingelheim Vetmedica GmBH, Ingelheim, Allemagne) de l’Union européenne avec celle des comprimés de méloxicam pour les humains (comprimés de 15 mg de méloxicam; TEVA Canada, Toronto, Ontario) préparés avec de la mélasse pour améliorer la sapidité et l’administration. Les ratios géométriques moyens (test RGM/référence) et les intervalles de confiance de 90 % des paramètres pharmacocinétiques clés (secteur sous la courbe et concentration maximale) se situaient dans les limites définies de 80 % à 125 % généralement attendues pour des produits considérés comme bioéquivalents. Par conséquent, l’utilisation des comprimés de méloxicam pour humains préparés avec de la mélasse devrait produire une réponse clinique semblable chez les chevaux à celle du produit oral approuvé provenant de l’Union européenne.

Introduction

Non-steroidal anti-inflammatory drugs (NSAIDs) are used for their anti-inflammatory, analgesic, antipyretic, antithrombotic, and anti-endotoxic properties in a variety of clinical situations. Musculoskeletal disorders with mild to moderate pain and inflammation are among the most common indications for NSAID use in the horse (1,2). Phenylbutazone and acetylsalicylic acid (aspirin) are the only oral NSAIDs currently on the market in Canada approved for the horse. Aspirin is only labelled for relief of pain and is not commonly used in the horses for significant pain or inflammation. Phenylbutazone is labelled variously for pain and inflammation associated with osteoarthritis, myositis, and other musculoskeletal disorders in horses. It is frequently used for chronic treatment of musculoskeletal disorders in horses because of its accepted efficacy, cost, and availability as an oral formulation (3). However, phenylbutazone
studies have shown that the feeding status of horses (18) can influence the pharmacokinetics of oral meloxicam, so it may be that experimental or analytical differences are responsible for the apparent differences and the products may in fact be bioequivalent. However, if there are indeed significant differences between formulations, then the use of extra-label and/or compounded products should be approached with caution.

The goal of this study was to determine the bioequivalency of human meloxicam tablets (Meloxicam 15 mg tablets; TEVA Canada, Toronto, Ontario) compounded into a form suitable for administration to the horse compared with the approved equine product from the European Union (Metacam 15 mg/mL oral suspension for horses; Boehringer Ingelheim), at the recommended dose of 0.6 mg/kg body weight (BW), PO, q24h. We used Metacam as the reference pioneer compound because the original pharmacokinetic-pharmacodynamic studies for dose determination of meloxicam in horses (19) were carried out with this product.

The objective was to compare an oral product appropriate for chronic use. The preference was to use a product already approved for the oral route in a veterinary species. The oral small animal meloxicam products available would require a volume not practical for oral administration in horses (approximately 200 mL). There is no approved oral formulation for large animals. However, generic human tablets are available in Canada. As meloxicam is approved for use in humans and animals, as the target patient population is a non-food animal, and as there are no significant public health risks of using meloxicam in this patient population, use of meloxicam tablets approved for use in humans was deemed acceptable. Tablets are routinely compounded with molasses in equine practice to improve palatability and have a formulation that can be administered directly into the mouth with minimal loss of product. Therefore, in accordance with Health Canada Policy on Manufacturing and Compounding Drug Products in Canada (23), we elected to use human meloxicam tablets compounded with molasses [as previously reported (14)].

An alternative would have been use of the bovine intravenous product, but it is not approved for oral dosing in cattle, would still benefit from compounding to improve palatability and oral retention of product, and it is considerably more expensive than human generic tablets.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Product</th>
<th>Conditions</th>
<th>C_max (ng/mL)</th>
<th>T_max (h)</th>
<th>AUC (ng*h/mL)</th>
<th>t1/2 (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(19)</td>
<td>Metacam® 15 mg/mL oral solution for horses (Boehringer Ingelheim Vetmedica GmbH)</td>
<td>Fed horses</td>
<td>1730 ± 610</td>
<td>3.4 ± 1.2</td>
<td>Not reported</td>
<td>7.76 ± 1.992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonfed (fed 2 h post-dose)</td>
<td>2580 ± 580</td>
<td>1.5 ± 1.07</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>(21)</td>
<td>Ilium® Meloxicam 30 (Troy Ilium Pty Ltd)</td>
<td>Fed horses</td>
<td>915 ± 117</td>
<td>2.62 ± 1.88</td>
<td>11 281 ± 3240</td>
<td>10.24 ± 3.04</td>
</tr>
<tr>
<td>(14)</td>
<td>15 mg tablets crushed in 15 mL molasses (Caraco Pharmaceutical Labs)</td>
<td>Free choice hay; 1.5 kg grain twice daily</td>
<td>1580 ± 710</td>
<td>3.48 ± 3.30</td>
<td>11 220 ± 2000</td>
<td>5.25 ± 1.40</td>
</tr>
</tbody>
</table>

C_max — maximal concentration; T_max — time of C_max; AUC — area under the curve; t1/2 — half-life.
This study tested the hypothesis that human meloxicam tablets compounded with molasses for administration were bioequivalent to a pioneer product from the European Union developed for oral use in the horse.

Materials and methods

Animals
The study was carried out in accordance with the standards of the Canadian Council on Animal Care and received ethical approval from the University of Calgary Animal Care Committee. The horses were determined to be systemically healthy on the basis of a physical examination, complete blood (cell) count (CBC) and serum biochemical analyses completed 1 wk prior to initiation of the study.

Eight horses (7 geldings and 1 mare) were used in this study. Breeds included 3 Quarter Horses, 3 Thoroughbreds, and 2 Hanoverians. The age of the horses ranged from 2.5 to 30 y (mean: 14.4 ± 11 y). The mean weight was 526 ± 57 kg (range: 444 to 575 kg).

The horses were fed good quality grass hay throughout the study and had access to water at all times. The evening prior to the initiation of the study horses were fed 2 flakes of grass hay at 6 pm. Horses were not fed in the morning until 1 h post-dose. The horses then received free choice hay throughout the sample collection phase.

Experimental design
A two-period, two-way cross-over design was used. The horses were randomly assigned to 2 groups of 4. During the first period, 1 group received meloxicam suspension (Metacam 15 mg/mL oral suspension for horses; Boehringer Ingelheim Vetmedica GmbH; MXM-SUS) and the other group received meloxicam tablets (Meloxicam 15 mg tablets; TEVA Canada; MXM-TAB). Following a wash-out period of 2 wk [≥ 10× the maximum reported half-life of 10.24 h (Table 1)] the horses received the alternate product.

Meloxicam was administered orally to each horse. Tablets and suspension were administered in increments of 15 mg to ensure accurate dosing of tablets (i.e., fractions of tablets were not used). Therefore, the actual range of dose administered was 0.56 to 0.62 mg/kg BW, with a mean and median of 0.6 mg/kg BW.

A mortar and pestle was used to crush the appropriate number of tablets to a fine powder for compounding. The powdered drug was then added to 15 mL of molasses in a 60-mL catheter tip syringe and mixed in situ with a wooden stirring rod. Ten milliliters (total of 25 mL) of molasses was layered on top and the plunger was inserted. The same syringe was then used to administer the drug. The MXM-SUS was administered using the manufacturer’s syringe provided with the product (equivalent to a standard 20-mL syringe). Both the MXM-SUS and MXM-TAB were administered orally by inserting the syringe in the mouth to the back of the tongue and depositing the drug.

Each horse had a 14 g jugular catheter (Angiocath; Becton Dickinson Infusion Therapy Systems, Sandy, Utah, USA) placed prior to each dose. Blood samples (6 mL) were collected at 0.5, 1, 2, 3, 4, 5, 8, 12, 18, 24, 36, and 48 h into lithium-heparinized tubes. Samples were centrifuged at 1400 × g for 5 min. Plasma was transferred into microfuge tubes, frozen at −80°C, and stored at −20°C until assayed.

Sample analysis
Plasma samples were analyzed by use of validated high-performance liquid chromatography (HPLC). The HPLC system was Shimadzu LC-10A series equipped with two LC-10AT VP pumps, an SIL 10A autoinjector, an SCL-10A VP system controller, SPD-10A UV-VIS detector and Class-VP Chromatography Laboratory Automated Software (Shimadzu Scientific Instruments, 1998, Columbia, Maryland, USA), with a NovaPak 18 4-μm column (150 mm × 5 mm) (WAT086344, serial number: 11239232138 27; Waters Corporation, Milford, Massachusetts, USA). All routine chemicals were obtained through VWR Corporation, Radnor, Pennsylvania, USA.

The method was adapted from Dasandi et al (24). The extraction method was modified to improve the published recovery rate of approximately 35%. In a clean Eppendorf microcentrifuge tube, 500 μL of acetonitrile were added to 450 μL of equine plasma. After being vortexed for 10 s, 50 μL of 15% perchloric acid was added. The samples were incubated for 30 min at 4°C to allow protein precipitation. After centrifugation at 13 000 × g for 5 min, the supernatant was transferred to an injection vial and 50 μL were injected onto the HPLC system. The mobile phase consisted of a mixture of 85 mmol sodium acetate buffer (pH adjusted to 3.3 with glacial acetic acid) and acetonitrile (65:35 v/v), at a flow rate of 1 mL/min. Detection was at a wavelength of 355 nm. Under these conditions, meloxicam was eluted at a retention time of ~8 min.

The method was linear over the calibration range of 10 to 2000 ng/mL of meloxicam (Alfa Aesar; Ward Hill, Massachusetts, USA). Standard curves were accepted when the coefficient of determination exceeded 0.99.

The limit of quantification (LOQ) based on intra-day and inter-day accuracy and precision was determined to be 25 ng/mL, with a limit of detection (LOD) of 10 ng/mL. The LOD was established by the lowest evaluated concentration that still had a signal-to-noise ratio of at least 3 (concentrations < 10 ng/mL were not tested). The LOQ was established as the lowest evaluated concentration with a signal-to-noise ratio of at least 10 and that had coefficient of variations for accuracy and precision that were < 20%. The intra-day accuracy (n = 5) was ± 1% and the intra-day precision was ± 2.2% except at the lowest concentration of 25 ng/mL where it was 9.6%. The inter-day accuracy (n = 5) was ± 5% and the precision was ± 3.7%, except at the LOQ where it was 19.5%. Meloxicam recovery from plasma was 100% and it was stable in equine plasma for at least 30 d at −20°C. All samples were analyzed within 30 d of collection.

Pharmacokinetic analysis
The maximal concentration of meloxicam (Cmax) and time of Cmax (Tmax) were determined directly from the graphical data plots for each horse. The data obtained were subjected to non-compartmental pharmacokinetic analysis. The area under the curve (AUC0- t, LOQ and AUC0-∞) and the area under the first moment...
curve \( (\text{AUMC}_{0-t}) \) were calculated for each horse by use of the linear trapezoidal rule. The mean residence time \( (\text{MRT}_{0-t}) \) was determined by dividing the area under the first moment curve by the area under the curve \( (\text{AUMC}_{0-t}/\text{AUC}_{0-t}) \).

The terminal elimination rate constant \( (k_e) \) was estimated from non-linear exponential curve fitting of the log-linear terminal phase of the plasma concentration curve, using a minimum of 3 points. The terminal elimination half-life \( (t_{1/2}) \) was calculated as \( \ln(2)/k_e \).

**Statistical analysis**

Descriptive statistics are reported as the mean ± standard deviation (SD). For comparison of \( C_{\text{max}}, T_{\text{max}}, \text{AUC}, t_{1/2}, \text{and MRT} \), a ratio-paired \( t \)-test (comparing a ratio of means) was performed. To compare the pharmacokinetic profile between 2 drugs, a two-way repeated measures (time and drug) analysis of variance (ANOVA) was performed. Differences were considered significant when \( P < 0.05 \).

According to Health Canada guidelines (25), 2 products are considered to be bioequivalent if the Geometric Mean Ratio (GMR Test/Reference) of the \( \text{AUC}_{0-t} \) is 80% to 125% or \( 80\% \) to \( 125\% \). This method is equivalent to a 2 one-sided test procedure with the null hypothesis of bioequivalence at a 5% significance level. The statistical analysis to determine bioequivalence was carried out as described in the Health Canada Guidelines (25).

Statistical calculations were performed using Prism V. 6 (GraphPad Software; San Diego, California, USA) or using a standard spreadsheet program.

**Results**

Plasma concentrations versus time for the 2 meloxicam formulations are presented in Figure 1. There was a significant interaction between time and formulation \( (P = 0.02) \), with a more rapid increase in plasma concentration for MXM-TAB after oral administration and subsequently lower concentrations in the latter half of the curve.

Table 2 shows the summary of the results for the non-compartmental pharmacokinetic analysis. The \( C_{\text{max}} \) for the MXM-SUS and MXM-TAB were not significantly different. However, there was a significant difference in \( T_{\text{max}} \), with MXM-SUS having a longer \( T_{\text{max}} \) compared to MXM-TAB. As shown in Figure 2, the plasma profiles were similar for most horses, while some showed a marked delay in reaching \( C_{\text{max}} \) with MXM-SUS. Similarly, the \( \text{MRT}_{0-t} \) was significantly longer for MXM-SUS than for MXM-TAB. Overall, the \( \text{AUC}_{0-\text{LOQ}} \) for MXM-SUS was significantly larger than for MXM-TAB, but the difference between the means was less than 10%. The terminal elimination half-life \( (t_{1/2}) \) was not significantly different between the 2 formulations.

To formally assess the bioequivalence of the 2 formulations, the 90% CI for the geometric mean ratios (GMR MXM-SUS/MXM-TAB) of the logarithmic values of \( C_{\text{max}} \) and \( \text{AUC}_{0-\text{LOQ}} \) were determined. As shown in Table 3, the 90% CI of the GMR were entirely contained with the limits of 80% to 125% for both the \( C_{\text{max}} \) and \( \text{AUC}_{0-\text{LOQ}} \).

**Discussion**

The extra-label use of approved drugs is always a concern for the veterinarian, particularly if compounding is used to facilitate administration. Ideally, the veterinarian wants to know that the compounded drugs are behaving in a predictable manner \( \textit{in vivo} \) and that the expected concentrations are being achieved. Unfortunately, this information is often not available. Bioequivalence is the formal assessment of comparative pharmacokinetics of 2 different drug formulations and helps predict therapeutic differences between products. The lack of an approved meloxicam product for horses in North America means that veterinarians must use a product approved in other species in an extra-label manner if use of meloxicam is a clinically justified choice. The decision to compound the product is then based on issues of route of administration, palatability, and ease of administration. The purpose of this study was to determine if human meloxicam tablets (MXM-TAB) compounded in a formulation appropriate for use in the horse were bioequivalent to an approved oral meloxicam suspension for horses available in the European Union (Metacam; MXM-SUS). Human tablets (whether or not compounded) should not be administered to horses intended for food.

There was a significant difference in the pharmacokinetic profiles over time (a significant interaction between formulation and time) between MXM-SUS and MXM-TAB (Figure 1). The MXM-TAB demonstrated a more rapid absorption, resulting in a higher initial concentration and lower concentrations in the terminal phase. Although the terminal elimination half-life should be considered an estimate because only the last 3 points could be used to estimate this parameter, there was no significant difference between the formulations. This is consistent with the expectation that metabolism and renal clearance of absorbed meloxicam would be similar. There was no significant difference.
in the C\text{max} (Table 2), but the T\text{max} for the Metacam oral suspension was significantly longer than for MXM-TAB. This suggests that there was a delayed absorption of MXM-SUS compared to MXM-TAB. While it is not possible to calculate an absorption time from the data, the MRT was significantly longer for the oral suspension, consistent with a delayed absorption (as the terminal elimination half-lives were not significantly different). These observations are consistent with the statistically significant difference between the plasma concentration-time curves showing a more rapid increase in plasma concentrations with MXM-TAB.

The slower absorption of MXM-SUS in some horses (Figure 2) could be linked to either a decreased absorption rate because of the formulation or because the suspension was more susceptible to interaction with the feed provided 1 h after dosing. Administering drug to unfed horses, with feeding 1 h later, was intended to reflect what may happen in clinical situations and to minimize the effect of food on absorption. Administering meloxicam to fed horses has previously been shown to delay absorption and reduce peak plasma concentrations, although it did not change over-all bioavailability (18). Given that oral administration of meloxicam would be expected in clinical scenarios requiring repeat administrations for sub-acute or chronic conditions, the difference in T\text{max}, but with a similar C\text{max}, is unlikely to be of clinical significance.

As shown in Table 2, the AUC\textsubscript{0→LOQ}, which is an overall assessment of drug exposure, was significantly different between the oral suspension and crushed tablets. The difference is small (less than 10%). It is not possible to determine absolute bioavailability in this study design (as it requires direct comparison of oral to intravenous administration) nor to determine the specific cause of the differences between the formulations. However, one possible explanation is loss of drug during preparation and administration. Mixing crushed tablets in molasses is a form of compounding. A mortar and pestle was used to crush the

**Table 2.** Pharmacokinetic parameters (mean ± standard deviation) of meloxicam suspension (MXM-SUS) and crushed meloxicam tablets (MXM-TAB) in horses (n = 8) after oral administration at 0.6 mg/kg BW. The Geometric Mean of the Ratios and associated ratio paired t-test P-value are shown.

<table>
<thead>
<tr>
<th>Pharmacokinetic parameter</th>
<th>MXM-SUS</th>
<th>MXM-TAB</th>
<th>Geometric Mean of Ratios</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C\text{max} (ng/mL)</td>
<td>667 ± 196</td>
<td>708 ± 164</td>
<td>1.08 ± 0.11</td>
<td>0.42</td>
</tr>
<tr>
<td>T\text{max} (h)</td>
<td>5.5 ± 4.1</td>
<td>2.5 ± 0.8</td>
<td>0.55 ± 0.30</td>
<td>0.043</td>
</tr>
<tr>
<td>AUC\textsubscript{0→LOQ} (ng·h/mL)</td>
<td>9131 ± 2670</td>
<td>8373 ± 2794</td>
<td>0.91 ± 0.051</td>
<td>0.049</td>
</tr>
<tr>
<td>MRT\textsubscript{0→∞} (h)</td>
<td>11.1 ± 1.6</td>
<td>9.6 ± 1.33</td>
<td>0.86 ± 0.069</td>
<td>0.033</td>
</tr>
<tr>
<td>t\text{1/2} (h)</td>
<td>6.4 ± 3.0</td>
<td>6.5 ± 2.8</td>
<td>1.03 ± 0.26</td>
<td>0.090</td>
</tr>
</tbody>
</table>

C\text{max} — maximal concentration; T\text{max} — time of C\text{max}; AUC — area under the curve; t\text{1/2} — half-life; MXM-SUS — meloxicam suspension; MXM-TAB — meloxicam tablets.

**Figure 2.** Representative plasma concentration-time curves of MXM-SUS (closed circles) and MXM-TAB (open circles) in 2 individual horses illustrating the 2 different plasma concentration profiles observed.
appropriate number of tablets to a fine powder. The powdered drug was then transferred to molasses in the syringe and mixed in situ. It is possible that loss of small amounts of drug occurred in the process or remained in the catheter tip of the syringes used to administer the drug. Avoidance of the latter drug loss was attempted by layering molasses on top of the mixed drug in the syringe, but it may still have occurred.

To further assist in the determination of whether or not the observed differences in pharmacokinetic parameters of the 2 formulations are likely to be clinically significant, a formal assessment for bioequivalence was carried out in accordance with Health Canada Guidelines (25). The 2 pivotal parameters for bioequivalence are AUC<sub>0→LOQ</sub> and C<sub>max</sub>. To be considered bioequivalent, the GMR Test/Reference and the 90% CI should be within the limits of 80% to 125%.

In order to use AUC<sub>0→LOQ</sub> (area under the curve to the last measurable concentration), it is important to demonstrate that you have accounted for at least 80% of the AUC<sub>0→∞</sub> (area under the curve until infinity or complete elimination of the drug, estimated from the terminal elimination phase). As seen in Table 2, AUC<sub>0→LOQ</sub> accounted for over 98% of the AUC<sub>0→∞</sub> further, it must be shown that there are no effects of sequence of administration or period administration. It was determined by ANOVA that there was no significant period or sequence effect (P > 0.10 in all cases), allowing comparison of the GMR using the standard bioequivalence acceptance intervals.

As shown in Table 3, the GMR and the 90% CI for both C<sub>max</sub> and AUC<sub>0→LOQ</sub> fell within the 80% to 125% range, formally confirming that despite the minor differences in pharmacokinetic parameters, crushed meloxicam tablets in molasses can be considered bioequivalent to Metacam 15 mg/mL oral suspension for horses.

In a previous pharmacokinetic-pharmacodynamic (PK-PD) analysis, Toutain and Cester (19) reported median effective meloxicam concentrations of 130 ng/mL for increase in stride analysis, T<sub>outain</sub> and C<sub>ester</sub> (19) reported median effective concentrations for clinical effects of meloxicam in induced-synovitis model. The time above the reported median meloxicam concentrations of 130 ng/mL for increase in stride

product for horses. Veterinarians can expect to achieve a similar clinical response with human meloxicam tablets compounded in molasses as has been reported for the commercial product. However, further work is required to determine if meloxicam is as effective as phenylbutazone in the treatment of musculoskeletal pain and inflammation in the horse and if it has an improved safety profile, which would be required to fully justify its extra-label and/or compounded use in select equine patients.

Acknowledgments
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References

Exotic Animal Formulary, 4th edition

When a veterinary practice sees exotics the most immediate mountain to overcome is the sheer number and variety of taxon kept by pet owners. This is accomplished in large part by expanding the clinic library of textbooks and with staff training. Often simply known as “the Carpenter text” this book has quickly become an invaluable resource in our small animal exotic’s practice. It does an excellent job of bringing together information from all the major groups of species you may come across in private pet practice.

The Exotic Animal Formulary is laid out in a simple, easy to reference manner. A quick flip through the tabs finds you to your chapter of choice. Chapter selection covers the 3 major branches of exotic pets — birds, reptiles, and small mammals really well. Individual chapters for the small mammal species; sugar gliders, hedgehogs, rodents, rabbits, and ferrets offer a more complete reading for those species where information is most available. Additional chapters for invertebrates, fish, amphibians, miniature pigs, and primates provide additional reference for clinicians faced with less common exotic patients.

A most pleasant surprise is the finding of so much more information than simple drug dosages. For example, the bird chapter has 8 tables with hematologic and serum biochemistry values. Biological and physical data such as incubation periods, weaning ages, lifespan, and normal body weights are provided. Even obscure data like intraocular pressures and urinalysis values are offered when available in the scientific literature. Values you just don’t expect to ever find documented normal ranges for. This is where there is a nice meld between this book and species-specific textbooks; which often reference this formulary. Included in the Carpenter text are further tables to support the development of a treatment plan. Fluid therapy recommendations, gavage feeding volumes, reference to abnormalities in bloodwork and more are compiled in each chapter. The only major drawback is not one of the editors, but more of the supportive data available to draw from. Each chapter is somewhat unpredictable as to what can be found within. An example would be the cerebral spinal fluid values charted in the rabbit chapter. This is an unexpected find in its own right, but more so because the data aren’t available to be presented in the other chapters. I would also like to see the laboratory values presented in System International (SI) units as opposed to the “Conventional” USA units. Most of the world is faced with endless writing of conversions throughout the margins.

Near the end of the book Carpenter departs from the normal format with a chapter on wildlife. It contains a hodgepodge of miscellaneous information on a variety of species and groups of animals. While at certain times this may be helpful, it is an overextension past the realm of this book. This chapter does not include a formulary for wildlife species, nor does it have the strong supportive information you’ve come to expect from the previous chapters. Practitioners that treat wildlife will be reaching for other books for those patients.

All in all Carpenter’s 4th edition of Exotic Animal Formulary is a must have reference guide for any veterinarian treating exotic pets. It is also a good study guide for vets, AHT/RVT’s, and other veterinary staff looking to increase their familiarity with the more exciting patients this career has to offer. If you were ever to be faced with the unrealistic expectation of only having one exotic textbook, the Exotic Animal Formulary would be a pretty decent choice.

Reviewed by Ian Kanda, Animal Health Technologist, Park Veterinary Centre, 101 Broadway Blvd, Sherwood Park, Alberta T8H 2A8.
Transient diabetes mellitus in a domestic ferret (Mustela putorius furo)

Alexis Duhamelle, Isabelle Langlois, Marion Desmarchelier

Abstract – A 3.5-year-old spayed female ferret, fed a diet high in refined sugar, was referred for lethargy, polyuria, polydipsia, and polyphagia. Diabetic ketoacidosis was diagnosed. Treatment included insulin therapy and a low carbohydrate diet. Diabetes mellitus resolved 54 d later, and insulin therapy was discontinued. There has been no recurrence of the diabetes mellitus.

Résumé – Diabète mellitus transitoire chez un furet domestique (Mustela putorius furo). Une furette stérilisée de 3.5 ans, nourrie avec une diète riche en sucre raffiné, a été référée pour léthargie, polyuro-polydipsie et polyphagie. Un diagnostic de diabète acido-cétosique a été établi. Un traitement incluant une insulinothérapie et une diète faible en glucides a été mis en place. Le diabète s’est résolu après 54 jours et l’administration d’insuline a été arrêtée. Aucune récidive n’a été observée.

A 3.5-year-old spayed female ferret weighing 802 g was referred because of a 2-week history of lethargy, polyuria, polydipsia, and polyphagia. The animal lived with 3 other ferrets, 1 of which had died of diabetic ketoacidosis a month earlier (1). The ferrets’ diet consisted entirely of processed cereals (Honey Nut Cheerios®); treats for cats, dogs, and ferrets; candies and fruits, as all the ferrets had stopped eating their regular ferret diet approximately 1 y prior to presentation. A complete blood (cell) count (CBC) and serum biochemical analysis, performed by the referring veterinarian 6 d prior to presentation, had revealed hyperglycemia [25.3 mmol/L; reference range (RR): 3.4 to 7.4 mmol/L] (2), hyperglobulinaemia (46 g/L; RR: 20 to 31 g/L) (2), hyperalbuminemia (61 g/L; RR: 33 to 41 g/L) (2), and an increased packed cell volume (0.54; RR: 0.47 to 0.51) (2).

Case description

Upon presentation, the ferret was lethargic, emaciated (body score of 2/5), and dehydrated. A 2.5-cm diameter, cutaneous mass, adherent to underlying tissues, was observed at the end of the tail, and a 0.5-cm diameter, cutaneous, pedunculated soft-tissue mass was observed between digits 4 and 5 of the right thoracic limb. Though the ferret had been anorectic for the past 48 h prior to presentation, blood glucose was elevated at 13.6 mmol/L (RR: 3.4 to 7.4 mmol/L) (2). Electrolyte disorders included hypokalemia (3.7 mmol/L; RR: 4.5 to 6.1 mmol/L) (2) a metabolic acidosis with a decreased blood pH (7.086; RR: in cats, 7.310 to 7.462) (3) and a decreased bicarbonate (9.2 mmol/L; RR: in cats, 14.4 to 21.6 mmol/L) (3). Dipstick urinalysis (Chemstrip 9; Roche Diagnostics, Mississauga, Ontario) performed on a free-catch sample revealed a marked glucosuria, ketonuria, proteinuria, and an increased leucocyte presence. Abdominal ultrasonography was unremarkable.

A diagnosis of diabetic ketoacidosis was made based on the clinical signs and laboratory findings. A concurrent urinary tract infection was suspected based upon the proteinuria, the increased urinary leucocyte count, and the hyperglobulinaemia.

The ferret was hospitalized, and intravenous fluid therapy was administered with 0.9% saline, 7.5 mL/kg body weight (BW) per hour, supplemented with potassium chloride at 30 mEq/L. The fluid administration rate and the potassium chloride supplementation were subsequently adjusted according to repeated blood gas and electrolyte assessments. Cephalexin (Novolexin; Teva Pharmaceutical Industry, Toronto, Ontario), 30 mg/kg BW, IV, q8h for 2 d and then 20 mg/kg BW, PO, q12h was administered to prevent secondary bacterial infections and to treat the potential urinary tract infection. The ferret was offered a variety of foods for diabetic cats (canned and pelleted food OM Overweight Management® Feline Formula; Purina Veterinary Diets, Laval, Quebec; canned and pelleted food DM Dietetic Management® Feline Formula; Purina Veterinary Diets; canned food Hill’sMD Prescription DietMD a/dMD Canine/Feline, Streetsville, Ontario).

Blood glucose concentrations were measured every 2 h, using a handheld glucometer (Accu-Chek Active; Roche Diagnostic, Laval, Quebec). Blood was obtained from the ear vessels and then processed immediately. Diabetes mellitus therapy was initiated with Insulin Toronto (regular insulin) (Novolin®ge Toronto Department of Clinical Sciences, Faculté de médecine vétérinaire, Université de Montréal, Saint-Hyacinthe, Quebec J2S 7C6.

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100 U/mL; Novo Nordisk Canada, Mississauga, Ontario), 0.1 U/kg BW, IM, diluted with 0.9% saline at 1 U/mL, IM, q1h for 10 h. The blood glucose concentration quickly decreased to values ranging between 3.7 mmol/L and 6.4 mmol/L. Ten hours after being admitted, the ferret remained anorectic and lethargic with a persistent acidosis (pH: 7.149; bicarbonate: 14.3 mmol/L). Sodium bicarbonate, 0.82 mEq/kg BW, diluted with 15 mL 0.9% saline 0, IV over 5 h, was administered once.

6 d after admission, the ferret remained anorectic and weakness, and vomiting, starting 1 h after an insulin injection. However, the clinical signs had resolved within 1 h after the owner had placed maple syrup onto the ferret’s buccal mucosa. Upon arrival, the physical examination was normal. An acute hypoglycemic crisis was suspected. The ferret was hospitalized to monitor her blood glucose concentration over 36 h. Insulin was continued according to the regular dosing schedule for the first 12 h and was then stopped to monitor the effects on the blood glucose concentration (Figure 1) which remained within normal limits with and without insulin therapy. Based on these findings, insulin therapy was terminated (2). The serum biochemistry, which included a blood glucose concentration, was within normal limits. The differential diagnoses at this point included either a remission of the diabetes mellitus or the presence of an insulinoma.

To check for the presence of an insulinoma, abdominal ultrasonography and a serum immunoreactive insulin analysis (Vitavec Veterinary Laboratory Services, Markham, Ontario) were performed 5 d after the insulin administration had ceased. The serum immunoreactive insulin measurement had been previously validated in ferrets (5). Abdominal ultrasonography found no abnormalities. A blood sample was taken following a 6-hour fast. The blood glucose concentration which was measured with a laboratory analyzer (4.80 mmol/L; RR: 3.4 to 7.4 mmol/L) (2), insulin levels (35 pmol/L; RR: 33 to 311 pmol/L) (5), and insulin/glucose ratio (7.3 pmol/mmol; RR: 4.6 to 44.2 pmol/mmol) (5) were all within normal limits. In order to confirm the reliability of these results, 2 healthy ferrets were also sampled for serum insulin levels and the insulin/glucose ratios were calculated. The insulin levels were 24 and 71 pmol/L, and the insulin/glucose ratios were 4.2 and 10.6 pmol/mmol, respectively. Based on the normal blood glucose concentration, insulin levels and ultrasound results in the affected ferret, an insulinoma was ruled out as a cause of her clinical signs.

Ten months after the initial admission, the ferret was presented to the emergency service for an acute episode of lethargy, weakness, and vomiting, starting 1 h after an insulin injection. However, the clinical signs had resolved within 1 h after the owner had placed maple syrup onto the ferret’s buccal mucosa. Upon arrival, the physical examination was normal. An acute hypoglycemic crisis was suspected. The ferret was hospitalized to monitor her blood glucose concentration over 36 h. Insulin was continued according to the regular dosing schedule for the first 12 h and was then stopped to monitor the effects on the blood glucose concentration (Figure 1) which remained within normal limits with and without insulin therapy. Based on these findings, insulin therapy was terminated (2). The serum biochemistry, which included a blood glucose concentration, was within normal limits. The differential diagnoses at this point included either a remission of the diabetes mellitus or the presence of an insulinoma.

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Ten months after the initial admission, the ferret was presented for excision of the 2 cutaneous masses, located at the end of the tail and between digits 4 and 5 of the right thoracic limb. The ferret had remained active with a good appetite, and she had gained 300 g. No clinical signs suggestive of hypo- or hyperglycemia were reported by the owner. A blood glucose concentration measured with the same previous glucometer after a 4-hour fast, was within normal limits (3.8 mmol/L). Results of
a pre-operative CBC and serum biochemical analysis, including blood glucose concentration, were within normal limits.

Discussion

Spontaneous diabetes mellitus is uncommon in ferrets (6,7). Five cases of spontaneous diabetes mellitus have been reported in ferrets, including 1 case in a black-footed ferret (Mustela nigripes) (1,8–11). One reference reports the anecdotal use of insulin to treat ferrets for persistent hyperglycemia (12).

In human medicine, a distinction has been made between Type-1 and Type-2 diabetes mellitus (13). Type-1 diabetes mellitus usually occurs prior to or during adulthood and results from the autoimmune destruction of β-cells. There is little or no insulin secretion which leads to a marked hyperglycemia and ketoadidosis. These patients depend on exogenous insulin for their survival (13). Type-2 diabetes mellitus usually occurs later in life, and the endogenous insulin production is usually sufficient to prevent ketoadidosis (13). This classification remains unsatisfactory as it combines both an etiologic aspect (islet lesions) and a pathophysiologic status (insulin dependency) (14). Therefore, another classification, based simply upon pathophysiology with either lack of insulin secretion by β-cells or insulin resistance, has been used in veterinary medicine (14). Less commonly, hyperglycemia may be secondary to an excessive glucagon secretion from a glucagonoma (15,16).

Lack of insulin secretion can be caused by various etiologies: genetic predisposition, infectious, toxic, iatrogenic, or inflammatory damage of the pancreatic islets, or β-cell exhaustion because of chronic hyperfunction with insulin resistance (7,15,16). Most reported ferret cases involved iatrogenic diabetes mellitus secondary to a pancreatectomy (6,7). In 2 out of 4 diabetic ferrets in which histologic evaluation of the pancreas was done, signs of active pancreatitis were seen (9,11), including a marked decrease in the number of β-cells in 1 case (11) and the concurrent presence of an insulinoma in the other (9). Pancreatitis may be considered a consequence as well as a cause of diabetes mellitus in the 2 aforementioned cases (9,11). In the present case, no evidence of pancreatic inflammation or neoplasia was detected on ultrasonographic examination. However, histopathologic examination of the pancreas was not performed in the present case and the absence of pancreatic disease cannot be verified.

Risk factors for insulin resistance include genetic predisposition, obesity, physical inactivity, diet, stress, endocrine disorders, or diabetogenic drugs (7,15,16). The 2 remaining diabetic ferrets, in which histologic evaluation of the pancreas was performed, did not have any evidence of pancreatic inflammation or neoplasia. Adequate numbers of granules were detected within the pancreatic islet cells (1,10). This suggests that diabetes mellitus was a result of either inadequate release of insulin or peripheral insulin resistance. In the case presented here, 2 of the owner’s ferrets, both fed a diet high in refined sugar, developed diabetes mellitus (1). We hypothesize this inappropriate diet may have been a major factor in the disease pathophysiology. One reference describes cases of diabetes mellitus in ferrets fed a high-sugar diet (17). Ferrets are strict carnivores comparable to cats and minks (18). It has been suggested that carnivorous animals may have been selected for insulin resistance in order to maintain euglycemia on a high-protein, low-carbohydrate diet (19,20). In dogs, cats, and humans, it is believed that chronic ingestion of a high-carbohydrate diet may increase the demand on β-cells for insulin secretion leading to hyperinsulinemia, β-cell exhaustion, and insulin resistance (19).

It is reported that spontaneous diabetes mellitus has a guarded-to-poor prognosis in ferrets (6,7). Blood glucose concentration can be difficult to regulate in diabetic ferrets (6). To our knowledge, all ferrets reported with diabetes mellitus with ketoacidosis died or were euthanized (1,8,9,11). In examining case reports of diabetes mellitus without an initial ketoacidosis in ferrets, only 1 animal had a severe ketoacidosis after 2 mo of porcine lente insulin therapy and was euthanized (11), while another animal was successfully managed with insulin glargine injections (10). In our case, the ferret presented with ketoacidosis and had the diabetes mellitus spontaneously resolve with insulin therapy and a high-protein, low-carbohydrate diet. To our knowledge, this is the first report of non-iatrogenic, transient diabetes mellitus in a ferret.

Remission may be observed in some diabetic cats after several days to months of insulin therapy (16). Glucotoxicity has been reported in domestic cats. This phenomenon is described as an initially reversible suppression of insulin secretion which is followed by an irreversible suppression. The proposed explanation for the suppression of insulin secretion is a drop in β-cell density within the pancreas due to prolonged, elevated blood glucose concentrations (16,21,22). It is suggested that glycemic control with early insulin therapy could lead to a reversal of glucotoxicity and diabetic remission in cats (16). We speculate that a similar phenomenon may have occurred in this patient.

Diet is an important component of therapy in diabetic cats (16). Cats eating a high-protein, low-carbohydrate diet had greater reductions in both their blood glucose concentrations and their requirements for exogenous insulin (16,23). Furthermore, they were more likely to revert to a non-insulin-dependent state (24). As an explanation, a high protein, low carbohydrate diet would decrease the demand on β-cells to secrete insulin in cats (16).

Blood glucose concentrations were measured with the same portable blood glucose meter designed for use with human samples. This type of glucometer has been reported to underestimate blood glucose concentrations in ferrets (25). Therefore, the determination of blood glucose level with a laboratory analyzer is recommended when a low blood glucose concentration is obtained with this type of glucometer (25). In the present case, all results were normo- or hyperglycemic, and the use of this device did not preclude the diagnosis of diabetes mellitus.

Transient diabetes mellitus may occur in ferrets. Further studies are required to investigate the effects of a high-carbohydrate diet on the occurrence of diabetes mellitus and to examine the possibility of a glucotoxicity phenomenon in this species.

References


**Industry News**

**Nouvelles de l’industrie**

Hill’s Pet Nutrition aids dogs rescued from acreage in Alberta

Through the Hill’s Food, Shelter & Love® program, Hill’s Pet Nutrition is donating a full supply of Science Diet® brand pet food to provide premium quality nutrition for a group of dogs recently rescued from inhumane conditions at an acreage in southern Alberta.

The Alberta Society for the Prevention of Cruelty to Animals seized more than 200 dogs near Milk River in what they are describing as one of the worst cases of neglect they have ever seen. The Alberta SPCA found the dogs (a mix of Huskies, Irish Wolfhounds, Malamutes and Komondors) chained up outside, emaciated and starving, with matted fur and a list of other injuries. The dogs are currently receiving medical care and being spayed or neutered. The local animal welfare organizations caring for them are asking for donations, foster homes and volunteers.

To assist in the care of these rescued animals, Hill’s Pet Nutrition has donated an initial shipment of 2,100 pounds of pet food to the Red Deer & District SPCA through the Hill’s Food, Shelter & Love® program, which will be distributed to other local groups that are caring for the dogs. Hill’s will continue to coordinate with the Red Deer organization to ensure all future food needs for these animals are met.

“Like all of us who know the joy that comes from the loving bond we share with our pets, the condition these dogs were living in is truly shocking and deplorable,” said Frances Cheslo, Hill’s Shelter Program Manager. “We at Hill’s are so pleased to be a part of the effort to bring these innocent animals back to good health through superior nutrition so they can find the loving homes they deserve.”

Since 2007, the Hill’s Food, Shelter & Love® has donated more than $10 million worth of Hill’s Science Diet® brand pet food to shelters across Canada, supporting the adoption of more than 200,000 cats and dogs. Additional information on the Hill’s Food, Shelter & Love® program can be found on the Hill’s website. To request assistance during an emergency, shelters can contact sheltercanada@hillspet.com

Contact: Hill’s Pet Nutrition Canada Inc., Two Morneau Shepell Centre, 6th Floor, 895 Don Mills Road, Toronto, ON M3C 1W3; website: www.hillsvet.ca
Hypertrophic osteopathy associated with hepatocellular carcinoma in a dog

Victoria D. Randall, Carlos Souza, Daniel Vanderhart, Sarah Boston

Abstract — A 9-year-old spayed female dog diagnosed with hepatocellular carcinoma and hypertrophic osteopathy was negative for additional lesions on computed tomography of the thorax and abdomen. Resection of the affected liver lobe resulted in resolution of clinical signs. This is the first case of hypertrophic osteopathy secondary to hepatocellular carcinoma.

Résumé — Ostéopathie hypertrophique associée à un carcinome hépatocellulaire chez un chien. Un carcinome hépatocellulaire et de l’ostéopathie hypertrophique ont été diagnostiqués chez une chienne stérilisée âgée de 9 ans mais était négative par tomodensitométrie pour des lésions additionnelles au thorax et à l’abdomen. La résection du foie touché a produit une résolution des signes cliniques. C’est le premier cas d’ostéopathie hypertrophique secondaire à un carcinome hépatocellulaire.

A 9-year-old spayed female mixed breed dog, weighing 23 kg, was presented to the Oncology Department of the University of Florida for a liver mass previously identified on abdominal ultrasound by the referring veterinarian. One-month duration of decreased appetite and swelling in all 4 limbs were noted.

Case description
On presentation the dog was bright, alert, and responsive. She was ambulatory, but very stiff upon walking. All 4 limbs were painful to touch and had distal edematous swelling, extending from mid-tibia to mid-metacarpal and tarsal regions. The rectal temperature was elevated at 39.9°C. Mucoid ocular discharge and scleral hyperemia were noted in both eyes. The remainder of the physical examination was unremarkable.

Serum biochemistry showed elevations in alkaline phosphatase [470 U/L; reference range (RR): 8 to 114 U/L] and alanine aminotransferase (72 U/L; RR: 18 to 64 U/L). Complete blood (cell) count (CBC) showed 11 anisocytosis and 11 target cells present. Results from the hematology indicated a mature neutrophilia (13.0 × 10^3/μL; RR: 2.7 to 8.9 × 10^3/μL). The results of the urinalysis were unremarkable.

Abdominal ultrasound revealed a well-defined heteroechoic 9 cm × 7 cm lobular mass within the left aspect of the liver (Figure 1). This mass had multiple, irregular anechoic regions centrally causing distal acoustic enhancement. Color Doppler showed moderate vascularity within the peripheral aspect of the mass. Additionally, multiple well-defined, hypoechoic nodules measuring up to 8 mm were identified within the left division of the liver. A small volume of anechoic fluid was seen within the peritoneal cavity. Ultrasound-guided fine-needle aspiration of the liver mass was inconclusive for neoplasia, with only mild hepatocellular atypia present. Cytology of peritoneal effusion showed a non-septic exudate with no evidence of neoplastic cells.

Three-view thoracic radiographs revealed no intrathoracic abnormalities. Radiographs of both the left and right tarsi revealed well-defined, smooth, mixed lamellar and columnar osseous proliferation along the tibia, fibula, tarsal, and metatarsal bones bilaterally (Figure 2). Several smoothly margined, oval, up to 3.6 mm mineralized structures were noted just proximal to the calcaneus tuber bilaterally. Moderate soft tissue thickening was present surrounding the tarsi and metatarsi. These radiographic findings were consistent with hypertrophic osteopathy (HO) with possible fracture fragments of the osseous proliferation.

Computed tomography (CT), with and without intravenous positive contrast, was performed of the thorax, extremities, abdomen, and pelvis. The only intrathoracic abnormality was mildly enlarged sternal lymph nodes, which measured up to 1.8 × 0.8 × 0.8 cm. A well-defined, lobular, heterogenous mass was seen within the left lateral liver lobe causing medial displacement of the fundic portion of the stomach. Multiple, small, mineral attenuating foci were seen centrally within the mass. Following intravenous contrast administration, multiple
marginal and central vascular structures were seen during the arterial phase. Heterogenous contrast enhancement of the mass similar to that of the surrounding hepatic parenchyma was seen during the portal venous and venous phases. Multiple, irregular, but well-defined fluid attenuating regions that did not contrast enhance were seen within the central region of the mass. Multifocal hyper-attenuating, contrast enhancing splenic nodules were also seen. Computed tomography of the thoracic limbs included within the field of view, showed smooth, continuous, mixed columnar and lamellar periosteal proliferation along the antebrachii proximal to the mid aspect of the humeri similar to what was described on the radiographic images of the pelvic limbs (Figure 3). Based on these imaging features, a diagnosis of HO was made and the patient was treated with Deracoxib (Novartis Animal Health US, Greensboro, North Carolina, USA), 2 mg/kg body weight (BW), PO, q24h for 14 d.

Exploratory laparotomy was performed, revealing a nodular mass confined to the left lateral liver lobe, 2 moderately enlarged hypogastric lymph nodes, and an area of the mesentery that appeared to be grossly thickened and irregular. A left lateral liver lobectomy was performed using a thoracoabdominal (TA) stapling device. The enlarged lymph nodes were excised and a biopsy of the irregular area of the mesentery was performed. Initial recovery was uneventful and the patient was discharged 24 h later. Contact with the owner 7 d after discharge indicated that the lameness had resolved and the dog was no longer receiving Deracoxib.

Gross examination of the excised left liver lobe revealed an expansive, poorly demarcated mass with well-demarcated nodules. Histologically, the nodules contained a dense sheet of polygonal cells forming plates and cords separated by variable amounts of fibrosis. Mild anisocytosis and anisokaryosis were present with a mitotic index of 5 per 10, 400× fields. Based on these histological findings, a diagnosis of hepatocellular carcinoma (HCC) was made. The irregular portion of mesentery submitted for histopathology showed granulation tissue present. The lymph nodes were normal with no evidence of metastasis.

Seven months after surgery, the owner stated that the dog continued to behave normally. The limbs were no longer swollen and the dog showed no evidence of lameness and was not receiving any analgesic medication. Normal appetite and activity had resumed. Repeat radiographs of the limb and thorax, along with abdominal ultrasound were offered, but were declined by the client.

**Discussion**

This report demonstrates resolution of clinical signs associated with suspected HO following surgical excision of a primary liver tumor. Hypertrophic osteopathy is a rare disease characterized by periosteal proliferation along the diaphysis of long bones, resulting in cortical thickening (1,2). It most commonly occurs bilaterally, and often in all 4 limbs, along an area of periosteum that is not associated with tendon insertions or adjacent bones (3,4). The clinical signs of HO typically include swollen limbs, lameness, lethargy, ocular signs, and pain on palpation of limbs (5). Fever is often reported, and may be due to tumor-associated or immune-mediated pyrogenic cytokines (3,5). Regression of clinical signs has been reported to occur 2 wk after surgical excision or treatment of the primary cause, with the bone lesions regressing gradually over several months (1,4).

The pathogenesis of HO is not well understood, and several theories have been proposed (1). One theory suggests it may be due to increased poorly oxygenated blood flow to the limbs producing local passive congestion (4,6). Poor tissue oxygenation stimulates proliferation of connective tissue, including the periosteum and synovial membrane (4). This depression of blood flow has been theorized to be caused by a neural vascular reflex, originating in the thorax and carried by afferent vagal fibers.
This theory has been supported by studies showing regression of clinical signs after performing a vagotomy (1,4).

Hypertrophic osteopathy has been reported as developing secondary to both malignant and non-malignant diseases (7). The most commonly reported causes are primary and metastatic lung disease; however, infections such as spirocercosis, dirofilariasis, and bacterial endocarditis have been reported (1,3–5,7,8); reports of abdominal tumors in the literature are less common (1,3–5,7,8).

In this report, we describe a case in which hypertrophic osteopathy is present with no intrathoracic lesions, but instead a primary liver tumor. Hepatocellular carcinoma is the most common hepatic neoplasm in dogs (9,10). In humans, HCC is linked to hepatitis and cirrhosis, but in dogs and cats, the etiology is unclear (10,11). The prognosis for liver tumors is dependent on histology and morphology, and clinical presentation. There are 3 morphologic subtypes of HCC: diffuse, nodular, and massive (9). Massive tumors, defined as a solitary mass confined to a single liver lobe, tend to have a better prognosis due to their susceptibility to surgical resection, compared with nodular or diffuse tumors. Sixty-one percent of all canine HCC tumors have massive morphology (9–11). Right-sided liver tumors may have a poorer prognosis as the risk of intraoperative death increases due to hemorrhage and involvement of the caudal vena cava (10).

In both dogs and cats with hepatic tumors that have a massive morphologic appearance, surgical excision is the treatment of choice (10). In a study including 42 dogs, the median survival time after surgical excision of a massive liver tumor was not reached due to most of the dogs being either still alive or dead from an unrelated cause (9,10). Local tumor recurrence after a liver lobectomy of a massive HCC is 0% to 13% in dogs (10).

In summary, we described a patient which was diagnosed with HO secondary to HCC. Improvement of clinical signs occurred after surgical resection of the affected liver lobe. To our knowledge, this is the first report of HO secondary to a liver tumor in the dog.

Acknowledgment

The preparation of this publication was sponsored by the University of Florida’s Olive’s Way Fund.

References

Merial adds more horsepower with acquisition of two equine healthcare products

Merial, a leader in the animal health care industry, has just announced their completed acquisition of LEGEND® (hyaluronate sodium) and MARQUIS® (15% w/w ponazuril) from Bayer HealthCare. The addition of these two products to the Merial portfolio solidifies the company’s position as a leader in performance horse health care.

“Merial is committed to providing our customers with safe and effective products, ensuring optimal horse health, which ultimately lays the groundwork for peak performance,” says Randy Trumper, Director of Marketing, Companion Animals, Merial Canada Inc. “Legend and Marquis both have long histories of success and enhance our existing product offerings to equine veterinarians.”

Legend is the first Health Canada-approved prescription joint therapy labeled for both intra-articular (I.A.) and intravenous (I.V.) administration in horses. It is indicated in the treatment of joint dysfunction of the carpus or fetlock in horses due to non-infectious synovitis associated with equine osteoarthritis.1 Joint therapy is used to block the further release of inflammatory mediators. Legend was shown to reduce joint inflammation and the resulting lameness by decreasing production and release of inflammatory mediators.2

Legend has a track record of millions of doses sold with more than 20 years of treatment. In field studies, the overall response was judged to be excellent or good in 90 percent of the cases treated I.V. and in 96 percent of the cases treated I.A. with Legend.3

MARQUIS is the first Health Canada–approved prescription treatment for Equine Protozoal Myeloencephalitis (EPM). MARQUIS is indicated as an aid in reducing the clinical severity of EPM caused by Sarcocystis neurona in horses.1 If left untreated, EPM can lead to serious, permanent damage to the central nervous system.4

Horses become infected with EPM via contact with opossum feces through grazing or contaminated feed.4 The symptoms can be subtle and similar to other equine disorders, so it can be difficult to diagnose. When used as directed, Marquis was shown to cross the blood-brain barrier to kill S. neurona, stopping the parasite from inflicting further damage to the horse’s central nervous system.5,6

Merial is very excited about being able to offer these well-known quality equine products to veterinarians. Legend and Marquis are great complements to their existing portfolio of equine products. This includes Gastrogard®, Eqvalan®, Eqvalan® Gold and Merial brand equine vaccines Recombitek® rWNV-EWT, Potomavac™ Imrab.®

1 Canadian Product Label.
3 Freedom of Information NADA #140-883.

Contact: Merial Canada, 20000 Clark Graham, Baie D’Urfe, Quebec H9X 3R8; phone: 1-888-637-1555; website: www.merial.ca
Diode laser coagulation for the treatment of epistaxis in a Scottish fold cat
Takuma Aoki, Hiroo Madarame, Keisuke Sugimoto, Hiroshi Sunahara, Yoko Fujii, Eiichi Kanai, Tetsuro Ito

Abstract — We report the case of a 4-year-old, castrated 4.2-kg Scottish fold cat with recurrent epistaxis that was unresponsive to medical therapy. Diathermocoagulation of the nasal mucosa with a diode laser controlled the epistaxis and there was no significant recurrence of epistaxis during 1 year of follow-up.

Résumé — Coagulation à la diode laser pour le traitement de l’épistaxis chez un chat Scottish Fold. Nous signalons le cas d’un chat Scottish Fold castré âgé de 4 ans d’un poids de 4,2 kg atteint d’épistaxis récurrente qui n’a pas répondu au traitement médical. La diathermocoagulation de la muqueuse nasale à l’aide d’une diode laser a contrôlé l’épistaxis et il n’y pas eu de récurrence de l’épistaxis durant le suivi d’un an.

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E pistaxis in cats is caused by bleeding disorders, hypertension (1), hyperviscosity syndrome (2), hamartomas (3), neoplasia, and infectious rhinitis; however, its prevalence is low. In humans, especially children, recurrent epistaxis related to excessive low-grade inflammation of vessels and thin-walled arterioles (4) and hereditary hemorrhagic telangiectasia (5) has been reported. Although anterior epistaxis, such as bleeding from Kiesselbach’s plexus, is common in humans (6), the sites of bleeding have not been reported in cats with epistaxis.

While recurrent epistaxis is treated with silver nitrate cautery when the bleeding site has not been identified in humans, this approach is not suitable in cats because of possible septal perforation; a severe complication (4,5,7). However, electrocautery or diathermy with a pulsed dye (8), neodymium:yttrium-aluminium-garnet (Nd:YAG) (9), argon (10), or diode (11) laser may be attempted when the bleeding site has been identified. Chemical, electrical, diathermic, or laser coagulation for epistaxis has not been reported in cats.

We report a case of recurrent epistaxis in a young Scottish fold cat, and describe the bleeding site and its treatment with diode laser coagulation.

Case description
A 4-year-old, castrated male, Scottish fold cat weighing 4.2 kg was evaluated for mild sneezing and intermittent bilateral epistaxis preceded by right epistaxis without melena. The epistaxis had occurred occasionally from the time the cat was 1 year old, although the amount and frequency had been mild. Physical examination revealed a grade 4/6 systolic heart murmur in the left parasternal region. The indirect systolic blood pressure measured by Doppler was 237 mmHg when the cat was slightly excited. A complete blood (cell) count (CBC) revealed leukopenia [3780/μL; reference range (RR): 5500 to 19 500/μL], and serum biochemistry revealed an elevated creatinine level (185.6 μmol/L; RR: 70.7 to 159.1 μmol/L). The prothrombin time (8 s; RR: 8 to 11 s) and activated partial thromboplastin time (27 s; RR: 20 to 27 s) were normal. Tests for feline immunodeficiency and feline leukemia viruses were negative. Analysis of urine obtained by cystocentesis showed hematuria and proteinuria; however, the urine protein-to-creatinine ratio (UPC) was 0.21. The urine specific gravity was 1.030. The urine was not cultured. Echocardiography showed that the end-diastolic basilar septal thickness was 6.5 mm, and the left ventricular outflow tract velocity (2.52 m/s) was increased due to systolic anterior motion of the septal leaflet; hypertrophic obstructive cardiomyopathy (HOCM) was diagnosed. The cat was prescribed benazepril (Fortekor; Novartis Animal Health, Tokyo, Japan), 0.6 mg/kg body weight (BW) PO, q24h, for approximately 1 mo because hypertension was suspected as the cause of the epistaxis.

At 35 d after first presentation, computed tomography angiography (CTA) was performed because epistaxis occurred up to
once or twice a week even though the cat’s indirect systolic pressure was decreased to 196 mmHg. The CTA did not reveal any abnormalities such as a mass, chronic rhinitis, or foreign body. Nasal flushing samples were cultured, but no pathogens were detected. Real-time polymerase chain reaction (RT-PCR) tests (IDEXX, Tokyo, Japan) on nasopharyngeal and conjunctival swabs for feline herpes virus, feline calicivirus, Chlamydia felis, Mycoplasma felis, Bordetella bronchiseptica, and H1N1 influenza virus were all negative. The cat was prescribed benazepril (0.6 mg/kg BW, PO, q24h) and amlodipine (Amlodin; Sumitomo Dainippon Pharma, Osaka, Japan), 0.625 mg, PO, q24h, because hypertension was again suspected.

At 58 d after first presentation, a rhinoscopy was attempted because mild sneezing and epistaxis occurred approximately 2 wk after antihypertensive treatment. Caudal rhinoscopy revealed excessive and tortuous vessels in the nasopharynx that bled easily (Figure 1). The region containing the abnormal vessels was sampled for pathological investigation. Moderate bleeding was arrested with cold saline. Microscopically, we observed many irregularly shaped blood vessels of various wall thicknesses lined by a flattened mature endothelium (Figure 2).

Prednisolone (Predonine; Shionogi, Osaka, Japan) was probratively prescribed for 1 mo because vascular malformation was suspected. Prednisolone was started at 1.25 mg/kg BW, PO, q24h for 7 d, reduced to 1.25 mg/kg BW, q48h for 7 d, and then continued at 0.625 mg/kg BW, q48h for 2 wk. The frequency of epistaxis decreased to once a month; however, the owner decided to stop administering prednisolone because of its adverse effects: namely polyuria/polydipsia.

At 93 d after first presentation, diathermocoagulation was attempted with a diode laser via a caudal rhinoscopy. The cat was anesthetized with fentanyl (Fentanyl Injection; Janssen Pharmaceutical, Tokyo, Japan), 5 mg/kg BW, IV, and propofol (Propofol; Mylan Seiyaku, Tokyo, Japan), 5 mg/kg BW, IV, for induction and fentanyl (Janssen Pharmaceutical), 5 μg/kg BW per hour constant-rate infusion (CRI), and isoflurane (1.5% to 2.0%) for maintenance of anesthesia. Lactated Ringer’s solution (5 mL/kg BW per hour, IV) was given as a maintenance fluid. A diode laser (DVL-20; Asuka Medical, Kyoto, Japan) was used to cauterize the nasal mucosa. A flexible 6-mm endoscope (VQ TYPE 6092A, Olympus, Tokyo, Japan) was used to visualize the excessive and tortuous vessels in the nasopharynx. A 400-μm bare optical fiber was guided to the abnormal vessels through the channel of the endoscope. The tip of the bare optical fiber was partially peeled off and manually carbonated to coagulate the tissues by heat. Laser coagulation was performed at 2.5 to 6.00 W output power and was continued until the abnormal vessels had disappeared (Figure 3). The tip of the fiber was re-carbonated when the carbonized substance was dropped or burned off. If bleeding occurred from the vessels during laser coagulation, it was arrested using the carbonated tip. The duration of the operation was 85 min, and the cat recovered from anesthesia without complications. Fentanyl, 2 μg/kg BW per hour CRI, was continued for 24 h for analgesia, and cefalexin (Laryxin; Toyama Chemical, Tokyo, Japan), 18 mg/kg BW, PO, q12h, was prescribed as an antibacterial agent. Tramadol (Toramal; Nippon Shinyaku, Kyoto, Japan), 0.1 mg/kg BW, PO, q12h, was prescribed for analgesia for 3 d after surgery. The cat had a good appetite and did not appear to have lost his sense of smell, even immediately after surgery. Intermittent mild sneezing and a small amount of epistaxis occurred during the 10 d following laser treatment. Significant epistaxis had disappeared by the 1-year follow-up.

Discussion

Although epistaxis is rare, it can be caused by bleeding disorders, hypertension (1), hyperviscosity syndrome (2), hamartomas (3), neoplasia, infectious rhinitis, lymphoplasmacytic rhinitis, and foreign bodies in cats. In the present case, we did not detect any mass, infection, or foreign body. The indirect systolic blood pressure was above the reference range and chronic kidney disease, which is common in cats, might be considered as the cause of the hypertension (12). However, hypertension does

![Figure 1. Caudal rhinoscopy of the nasopharynx. Excessive and tortuous vessels were observed in the nasal mucosa.](image1)

![Figure 2. Nasal submucosa. Irregularly shaped blood vessels with various wall thicknesses lined by a flattened mature endothelium (hematoxylin and eosin staining). Bar = 100 μm](image2)
not appear to be the cause because epistaxis was observed even when the cat was young and a “white coat hypertension” was commonly observed in cats at the hospital (12). Indeed, the antihypertensive treatment did not resolve the cat’s epistaxis although medical control of hypertension might not have been sufficient.

The owner requested a more detailed examination via rhinoscopy because she was distressed by the nosebleeds that occurred when her cat sneezed. In addition, the cat might require antiplatelet and/or antithrombotic therapy in the future because he is affected by HOCM. The rhinoscopy revealed excessive and tortuous vessels in the nasopharynx indicative of posterior epistaxis, whereas anterior epistaxis, such as Kiesselbach’s plexus, is common in humans (6). A biopsy was attempted despite the risk of severe hemorrhage. Fortunately, the moderate hemorrhage that did occur was arrested by the use of cold saline. Indeed, protracted hemorrhage was reported as an uncommon complication in dogs that underwent rhinoscopy-assisted biopsy (13). The cat had experienced recurrent epistaxis from 1 y of age. Recurrent epistaxis is common in children, although its causes have not been elucidated. Several case reports have shown that thin-walled arterioles and capillaries with a surrounding inflammatory infiltrate are the prominent vessels, and neovascularization due to chronic low-grade inflammation has been proposed as a mechanism of recurrent epistaxis (4). In addition, hereditary hemorrhagic telangiectasia characterized by epistaxis and red-violet cutaneous lesions has been noted as a cause of epistaxis in humans, particularly children (5). In this cat, the latter disease does not appear to have been the cause of epistaxis because pathological investigation did not reveal any signs of telangiectasia and cutaneous lesions were not detected.

Inflammation is suggested as an alternative explanation because prednisolone was slightly effective in treating the epistaxis and sneezing, although allergic or lymphocytic-plasmacytic rhinitis is rare in cats. Therefore, neovascularization due to chronic low-grade inflammation might have been the cause of epistaxis in this cat. Steroids might have been inadequate in this case, however, as they might have induced heart failure (14) and/or aortic thromboembolism (15) in a cat affected by HOCM.

In humans with both of the diseases described above, electrocautery or diathermy is attempted when the bleeding site is identified, whereas silver nitrate cauterization is attempted when the bleeding site has not been identified (4,5,7). In this cat, silver nitrate cauterization might have been an option to arrest the nosebleeds because the bleeding sites during epistaxis were not identified, although excessive and tortuous vessels bleed easily. Silver nitrate, however, particularly at high concentrations, may cause severe complications, including septal perforation (16). These side effects might be more severe in cats because they have a thinner nasal septum than humans. Therefore diode laser coagulation was selected for use in this cat. This approach appears to be suitable for cats with epistaxis because the fiber is very thin and can easily pass through the channel of even a small flexible endoscope, although many different types of lasers, such as pulsed dye (8), Nd:YAG (9), and argon (10), are available to arrest bleeding. Indeed, as has been reported in humans (11), the diode laser induced sufficient diathermocoagulation in the abnormal vessels in the nasal mucosa of this cat. After diode laser coagulation, the cat’s epistaxis was resolved over the 1-year follow-up period, which significantly improved the quality of life of both the cat and his owner. However, the procedure may need to be repeated if epistaxis recurs.

**Figure 3.** A – Rhinoscopy during diathermocoagulation with a diode laser. The arrow indicates the carbonated tip of the laser fiber. This procedure was performed until the abnormal vessels had disappeared. B – Rhinoscopy after laser cautery. The disappearance of the abnormal vessels was confirmed.
Although the diode laser is not a novel tool and is commonly used for various bleeding abnormalities in veterinary practice, to our knowledge, this is the first report of successful laser coagulation with a diode laser to treat epistaxis in a cat. Laser coagulation with a diode laser can be considered a valid choice in the treatment of epistaxis, as observed even in healthy cats. However, diathermocoagulation of these abnormal vessels was effective in this cat. Further investigations are required to determine the relationship between abnormal vessels and epistaxis, the appropriate interval between repeat procedures, and the long-term benefits and possible side effects of laser coagulation.

References

Glenoid dysplasia and osteochondritis dissecans in a cat
Rebecca A. Schwarze, Cheryl A. Tano, Vincent W. Carroll

Abstract — A 2-year-old Maine coon cat was presented for a right forelimb lameness. Computed tomography of the shoulder revealed a shallow glenoid, osteophyte deposition at the caudal humeral head and medial glenoid, and an intra-articular osseous body. This cat had glenoid dysplasia and osteochondritis dissecans of the glenoid.

Résumé — Dysplasie glénoïde et ostéochondrite disséquante chez un chat. Un chat Maine coon âgé de 2 ans a été présenté pour une boiterie de la jambe avant droite. Une tomodensitométrie de l’épaule a révélé un dépôt ostéophyte glénoïde peu profond à la tête humérale caudale et à la glénoïde médiale ainsi qu’un corps osseux intra-articulaire. Le chat avait une dysplasie glénoïde et une ostéochondrite disséquante du glénoïde.

In this report we describe forelimb lameness, glenoid excision and osteophyte debridement via arthrotomy in a cat with glenoid dysplasia and osteochondritis dissecans (OCD). To the authors’ knowledge, this is the first report of glenoid dysplasia and OCD in the scapulohumeral joint (SHJ) of a cat. Osteochondrosis (OC) is a focal disorder of endochondral ossification, in which the articular cartilage of the epiphysis fails to form subchondral bone due to a failure of matrix calcification or vascular invasion (1–3). This region of retained cartilage is susceptible to injury. Fissures may extend to the articular surface and result in the formation of a cartilage flap, referred to as OCD (1,4–10). Osteochondrosis has been reported in humans, pigs, poultry, dogs, horses, cattle, cats, and rats and involves a multifactorial disease process (2,3,11–14). Suggested risk factors include heredity, rapid growth, trauma, anatomic conformation, and dietary imbalances such as an excess of calcium or vitamin D₃ (1–6). Glenoid dysplasia is a developmental anomaly of the scapula due to an incomplete ossification of the lower two-thirds of the bony glenoid and scapular neck, which is typically unilateral and solitary (15,16). The cartilage remains intact, suggesting defective ossification (15). Shoulder injuries and disease in the cat are rare compared with the dog (17–19).

Case description

A 2-year-old neutered male Maine coon cat, weighing 6.48 kg, was evaluated following a 9-month history of mild right forelimb lameness. When initially evaluated by the referring veterinarian, there was no localizable lameness and the cat was started on prednisone [1 mg/kg body weight (BW), PO, q24h] for a presumed immune-mediated polyarthritis. No improvement was noted and the cat was re-evaluated. Decreased range of motion of the right elbow and shoulder was noted, and there was pain on extension of each coxofemoral joint (CFJ). Orthogonal radiographs of the right and left thoracic limbs and pelvis were obtained and reviewed. The referring veterinarian noted significant abnormalities of the right scapulohumeral joint (SHJ) and both CFJs, consistent with bilateral hip dysplasia, and referred the cat for further diagnostics and treatment.

A physical examination indicated that the cat was apparently healthy with a body condition score of 6 out of 9. A mild right forelimb lameness was noted. Pain was elicited on right shoulder flexion. Decreased range of motion and pain on extension of each CFJ was noted. The remainder of the physical examination, hematology analyses and serum biochemical analyses, were all within reference ranges.

The patient was pre-medicated with buprenorphine (Hospira, Lake Forest, Illinois, USA), 0.01 mg/kg BW, IV. General anesthesia was induced with propofol (Hospira), 6 mg/kg BW, IV, and maintained with isoflurane in O₂ with an anesthetic vaporizer. Right shoulder orthogonal digital radiographs were taken and reviewed by a board-certified radiologist (EAF) on a diagnostic quality monitor (Dell UltraSharp U2410; Round Rock, Texas, USA) with image analysis software (ClearCanvas Workstation V7.1 SP1; ClearCanvas, Toronto, Ontario). There were large osteophytes at the caudal aspect of the humeral head and medial aspect of the glenoid extending along the medial aspect of the scapula (Figure 1). An intra-articular osseous body (OB) was seen in the caudal aspect of the SHJ. The glenoid was...
flattened and irregular in shape. Patchy areas of sclerosis were seen within the proximal diaphysis/metaphysis of the humerus; absence of subchondral humeral head lesion was confirmed radiographically. Computed tomography (CT) imaging of the right shoulder was obtained using a 4-slice helical CT scanner with a helical slice thickness of 1 mm (Toshiba Aquilion; Tustin, California, USA). An additional series was performed of the right shoulder at 0.5 mm slice thickness. Imaging was done with the patient in dorsal recumbency with the forelimbs extended cranially and parallel to one another at the level of the antebrachium and scapula. Images were reviewed (EAF) with the image analysis software using a bone setting (window with 500 Hounsfield units, window level 2500 Hounsfield units). Computed tomography scans were evaluated using a systematic approach and the following characteristics were noted: abnormal formation and flattening of the glenoid, large bony proliferation arising from the medial margin of the glenoid, an intra-articular OB at the caudal aspect of the glenoid, and patchy sclerosis within the proximal aspect of the humerus (Figure 2). Recovery from general anesthesia was uneventful and the patient was administered buprenorphine (0.01 mg/kg BW, IV) following extubation for pain management.

The cat was admitted for right glenoid excision and removal of the intra-articular OB. The cat was pre-medicated and general anesthesia was induced as previously noted. Cefazolin (Westward Pharmaceuticals, Eatontown, New Jersey, USA), 22 mg/kg BW, IV/90 min, was administered at the start of surgery. A cranio-lateral approach to the right SHJ by infraspinatus tenotomy was performed by a board-certified surgeon (CAT) (20). An arthrotomy allowed excision of the glenoid and removal of the intra-articular caudal OB. Intra-operative evaluation of the SHJ revealed abnormal formation of the glenoid with ulcerations and eburnations of the glenoid articular surface. Grossly, there were no visible abnormalities of the humeral articular surface. Partial removal of the large osteophyte on the medial aspect of the glenoid was done. The right glenoid and OB were submitted for histopathologic evaluation. The joint was closed routinely. The infraspinatus was reattached using a locking-loop suture. The deep fascial incision, subcuticular tissue, and skin were closed separately.

Post-operative orthogonal radiographs were obtained, confirming removal of the large caudal intra-articular OB, glenoid, and part of the medial osteophyte. Anesthetic recovery was unremarkable. Postoperative pain management was initially maintained with buprenorphine (0.01 mg/kg BW, IV/8 h), then (0.01 mg/kg BW, PO/8 h). The cat was discharged with robenacoxib (Novartis, Greensboro, North Carolina, USA), 1 mg/kg BW, PO, q24h, and amoxicillin trihydrate/clavulanate potassium (Zoetis, Kalamazoo, Michigan, USA), 62.5 mg, PO, q12h. Recommendations for the cat included restricted activity for 4 wk, followed by a gradual return to normal activity.

Samples of the glenoid and osseous body were fixed in 10% neutral buffered formalin and processed by routine methods. Sections were stained with hematoxylin and eosin (H&E). Histopathological review indicated retained viable growth cartilage cores within trabecular bone, not exhibiting normal endochondral ossification (Figure 3). Fragmentation, fibrillation, and clefting of the articular cartilage were noted along the medial aspect of the articular surface of the glenoid. Additionally, retained growth cartilage was noted along the articular-epiphyseal complex of the glenoid. The free osseous body was comprised of lamellar bone with an osteocartilagenous...
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imbalance were unlikely. The cat was in good body condition;
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In this report, the owner reported feeding a commercially
available diet at the recommended amount, indicating dietary
imbalance were unlikely. The cat was in good body condition;

At 1-year re-evaluation, no lameness or pain on range of motion
was noted. The shoulder extended to and flexed to normal limits.
At 1-month re-evaluation, no lameness or pain on range of motion
was noted on physical examination. There was a 10° reduction
in flexion and extension of the shoulder and crepitus was noted
at full flexion and extension.

Discussion

In this report, the owner reported feeding a commercially
available diet at the recommended amount, indicating dietary
imbalance were unlikely. The cat was in good body condition;
however, the cat’s breed may have suggested a faster rate of
growth than other feline breeds. There was no reported occur-
rence of trauma. Although multifactorial as previously discussed,
the pathogenesis of OC is not well understood; however, it has
been proposed that the earliest histopathological lesion of OC
is a focal necrosis of epiphyseal cartilage canal, resulting in
cartilage ischemia and failure of calcification during stages of
development (2,7,8,21,22). Lesions may develop in multiple
locations; however, they often occur in bilaterally symmetrical
sites, attributed to a symmetrical vascular pattern (1). Potential
sequelae to OC lesions may include resolution via granulation
tissue and subsequent intramembranous ossification, or mac-
roscopically, the formation of a subchondral cyst or fissures/
fragments (4,9,10,12).

In advanced stages, fissures or clefts may extend from this
site through the articular surface to create a flap or fragment
known as OCD (23). The initial focal areas of chondrocyte
necrosis may be seen prior to or in combination with the later
macroscopic lesions of OC (4,7,21). In this case, the presence
of retained growth cartilage within trabecular bone and the pres-
ence of fragmentation, fibrillation, and clefting of the medial
glenoid articular cartilage are consistent with OC/OCD. The
absence of observed necrotic cartilage cores within the trabecular

Osteochondritis dissecans results in clinical manifestations of
the disease: signs of synovitis, lameness and secondary osteoar-
thritis, or arthralgia due to synovial fluid contacting subchondral
bone or a displaced fragment (2,24,25). The fragment may be
displaced due to trauma, remain attached to cartilage, reattach
to subchondral bone, or become calcified and tear loose (26).
Osteochondritis dissecans fragments may be demonstrated on
radiographs, CT, magnetic resonance imaging, or arthrography
(25,27,30). Treatment options include conservative management
or surgical debridement. In younger animals, conservative man-
agement may be adequate if clinical signs are mild (31). Surgical
options may include flap removal or debridement of cartilage
not adhered to underlying tissues, followed by curettage, forage,
or abrasion of the underlying subchondral bone to promote
defect reconstruction with fibrocartilage (12).

Case reports of OC in the cat have been published. To date,
2 cases of OC have been reported on the humeral head (OCD),
1 on the patella, and 2 of the lateral femoral condyle (12,17,32).
The OCD of the humeral head was removed using a lateral
arthotomy approach to the shoulder, which resolved the lame-
ness (12,19,33). Scapulohumeral joint injuries are not common
in the cat. Scapulohumeral osteochondrosis (SH OC) also has
been reported in humans, dogs, and horses (17,28,34). In the
dog SH OC is common along the humeral head and has a good
prognosis with appropriate therapy; whereas in the horse, OC of
the SHJ has been reported along the caudal humeral head and
glenoid and is debilitating, with a poor prognosis for return to
a racing career (31,34). In this report, a cranialateral approach
to the scapulohumeral joint via infraspinatus tenotomy was
used to allow for fragment removal and greater exposure to the
glenoid (20,35).

The flattened or shallow appearance of the glenoid in the cat
in this report is consistent with changes described in glenoid
dysplasia (16). Glenoid dysplasia has been reported in humans,
dogs, and horses and radiographically appears as a flattened
glenoid cavity (34–38). Radiographs and CT of this case showed
abnormal formation and flattening of the glenoid, which is con-
sistent with dysplasia. These changes may result in instability or
secondary osteoarthritic changes (35,39). Glenoid dysplasia has
been reported to occur concurrently with hip dysplasia, and is
believed to be congenital (16,33).

To the author’s knowledge, this is the first report of OCD of
the feline glenoid in conjunction with glenoid dysplasia. The
overall outcome was good with a reduction of lameness and
good range of motion of the SHJ. Feline OCD is uncommon.
Additional investigation of the pathogenesis of feline OCD,
predominant locations, and outcomes following conservative
management versus surgical repair is warranted because there
are limited reports. Additionally, further investigation of the
epidemiology, pathogenesis, and the association of glenoid
dysplasia with hip dysplasia is warranted.

Acknowledgment

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ographic review and evaluation.
References


Have you been checking your e-mail inbox?

The Canadian Veterinary Medical Association (CVMA) communicates time-sensitive and relevant information and news to its members by e-mail based on the addresses we have on record in our database. If you are not receiving e-mail communication from us, it may be that we do not have a valid e-mail address for you.

Review/update your contact information and stay connected!

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Successful resolution of a preputial prolapse in an alpaca using medical therapy

Jennifer H. Koziol, Misty A. Edmondson, Dwight F. Wolfe, Jenna E. Bayne

Abstract — A 2-year-old intact male alpaca was presented for a post-breeding preputial prolapse of 5 days duration. The internal lamina of the prepuce was prolapsed approximately 6 cm and the exposed preputial epithelium was edematous and necrotic. Following 7 days of medical treatment, resolution of the preputial prolapse was achieved.

Réalisé — Résolution réussie d’un prolapsus du prépuce chez un alpaga à l’aide d’un traitement médical. Un alpaga mâle intact âgé de 2 ans a été présenté pour un prolapsus du prépuce d’une durée de 5 jours après l’accouplement. La membrane interne du prépuce avait subi un prolapsus d’environ 6 cm et l’épithélium exposé du prépuce était œdèmeux et nécrosé. Après 7 jours de traitement médical, la résolution du prolapsus a été obtenue.

U pon presentation of a young alpaca stud with a preputial prolapse to the J. T. Vaughan Large Animal Teaching Hospital, a literature search was performed which yielded only 1 report of preputial prolapse in camelids (1). That case was managed by replacement of the prolapsed tissues and placement of a purse string suture in the preputial orifice. Extrapolating from bovine medical treatments of preputial prolapse, the stud in the present case was managed in a manner less likely to interfere with future breeding.

Case description

A 2-year-old intact male alpaca weighing 59 kg was presented to J. T. Vaughan Large Animal Teaching Hospital for evaluation of a post-breeding preputial prolapse of 5 days duration. Two months earlier, immediately following the alpaca’s first breeding, a preputial prolapse was treated successfully by the referring veterinarian with topical application of emollient ointment and manual reduction of the prolapsed tissue. Following the initial injury, the owner was instructed to avoid use of the male for breeding for at least 2 mo. Two months after treat-
USA), 33.2 mg, ketamine (Boehringer Ingelheim Vetmedica, St. Joseph, Missouri, USA), 333.2 mg, butorphanol (Pfizer, New York, New York, USA), 3.32 mg, intravenously to allow further evaluation of the prepuce. The prolapsed preputial tissue was edematous and friable with superficial necrosis of the preputial epithelium and could not be manually reduced. The prolapsed tissue was gently cleansed with dilute povidine iodine scrub and water. An emollient mixture of 500 g of anhydrous lanolin, 60 mL of scarlet oil, and 2 g of tetracycline powder (2) was liberally applied to the prolapsed tissue. A 7.5 cm × 3 mm semi-rigid plastic tube was placed in the preputial orifice, and the prepuce was covered with a 9-cm stockinette and wrapped with compressive elastic bandage (Elasticon; Johnson and Johnson, New Brunswick, New Jersey, USA) (Figure 2). A brown gauze sling was placed around the abdomen allowing elevation of the prolapsed tissues.

Due to the history of recurring injury, the duration of prolapse, and the presence of devitalized tissue, the owner was given a poor prognosis for return to breeding and was presented with the following treatment options: i) continued medical management, ii) reduction of the preputial prolapse and castration, and iii) resection and anastomosis of the prepuce (3). The patient was re-assessed the following day to determine viability of prepuce and feasible treatment options. The owners wished to preserve the breeding integrity of the male, and medical management of the injury was continued. Treatments performed during hospitalization included bandage changes and emollient application to exposed preputial tissue every other day until manual reduction was achieved. Each treatment was carried out under sedation with butorphanol, ketamine, and xylazine as previously described. By the 7th day of treatment, the prolapsed tissue was much less edematous and could be manually reduced through the preputial orifice. No further bandages or retention techniques were required as no further prolapse of preputial tissue was observed during the remainder of the alpaca’s hospitalization. The alpaca was discharged to the owner’s care 10 d after admission with instructions to monitor the animal closely for recurrence, to seek re-evaluation at the J. T. Vaughan Large Animal Teaching Hospital 6 mo following discharge, and to avoid using the animal for breeding for 12 mo. The prognosis for return to breeding soundness was guarded due to the risk of recurrence of the presenting problem.

Discussion

The sheath in alpacas is located in the inguinal region and is flattened and triangular when viewed laterally. The prepuce is adherent to the glans penis until 2 or 3 y of age. The prepuce has a well-developed muscular apparatus, consisting of the cranial, lateral, and caudal preputial muscles that allow movement of the preputial orifice cranially during erection and mating behavior (4). Although multiple anecdotal reports by lay observers exist and preputial prolapse is described as a relatively frequent incident in textbooks (4), only 1 previous case has been reported in the literature. A common sequel to chronic prolapse of the prepuce in other species is the formation of adhesions and abscesses, which can impair return to normal breeding activity. The previous case report of a preputial prolapse in an alpaca was managed by application of a purse string suture in the preputial orifice (5).

This is the first such case presented to the Auburn University Large Animal Teaching Hospital. The owner’s desire to maximize the potential for return to breeding soundness led to intensive medical management of the injury. A semi-rigid plastic tube was placed in the preputial orifice to allow for urine egress. An emollient antiseptic ointment was used to prevent further desiccation of the tissue, treat possible infection of the affected area, and promote healing of the tissue. A stockinette was utilized to keep the emollient in place and allow for application of pressure bandage. The pressure bandage, with the aim of reducing edema, was placed using elastic tape with the compressive wrap being placed the entire length of the stockinette and wrapped...
tightly from the distal end of the prepuce proximally, anchoring the tape in the haired skin of the sheath. Finally, brown gauze was placed around the abdomen, allowing elevation of the prolapsed tissues close to the body wall to promote venous and lymphatic drainage of the edematous tissue. This type of medical management is necessary to maintain the health of the prolapsed prepuce in cases where significant tissue trauma and devitalization do not allow for immediate manual reduction. Furthermore, placement of a purse string suture in the sheath was not used in this case as this practice in bulls often leads to abscess formation and subsequent stenosis around the preputial orifice (2). While the reason for repeated prolapse of the tissue can only be speculated upon in this alpaca, bulls with poor conformation of the prepuce and sheath appear to spontaneously prolapse as a result of poor lymphatic drainage of the prepuce caused by posthitis or repeated contusions during natural service (2). Another possibility is that there was incomplete separation of the penis from the prepuce due to the younger age of the male and subsequent adhesion formation due to the traumatic release of the tissues during copulation. It is possible that during initial coitus the adhesion was released leading to trauma and subsequent prolapse of the tissue.

References


The stated goal of this book is to help already trained and licenced technicians throughout their work day. After perusing this volume, I would argue that it could be of assistance to anyone in the veterinary team. This book covers most areas of canine and feline veterinary medicine, from the basics of physical examination to more advanced and less frequently performed procedures such as bone marrow biopsy and chemotherapy.

From dental care and taking radiographs, to basic and advanced calculations, it seems there isn’t much that hasn’t been covered. Finding the information is easy, with a large table of contents, figure list, glossary, and list of abbreviations, index, and list of references. Being a third edition, it is meticulously edited. Most photographs are black and white, but there is a color plate section included to enhance the visual effect. The anesthesia and pharmacology sections address some of the newer agents available. Most of the information is laid out in tables and charts. Skills and procedures are highlighted separately. As with many texts, there is an electronic version, as well as a companion website. The website has the usual review and study materials, but also has 75 client education documents that can be edited.

As the authors point out, “patient care is at the heart of our profession: this encompasses medical care, but also physical and mental comfort.” Discussions on pain control and pain scoring, bedding, bandage and wound care, basic grooming, and tips on feeding both the reluctant and over-excited eater are just some of the topics that highlight this viewpoint. I personally enjoyed and bookmarked several “gems” that I had either forgotten or had not previously come across as described in this book. My favorite diagram was of external bony palpation landmarks. My favorite table was 3 pages on pediatric physical examination. This was followed by a page on the process of normal labor and 2 pages on geriatric physical examination.

Regardless of the scope of your practice or your position on the veterinary team, this reference has lots of useful information for a reasonable price.

Reviewed by Melissa Smith, BSc, MSc, DVM, Small Animal Practitioner, Bellamy Harrison Animal Hospital, Moose Jaw, Saskatchewan.
Clinical characteristics of horses and foals diagnosed with cleft palate in a referral population: 28 cases (1988–2011)

Sarah D. Shaw, Tracy E. Norman, Carolyn E. Arnold, Michelle C. Coleman

Abstract — The objective of this case series was to characterize the population, case presentations, and outcomes of 28 equids diagnosed with cleft palate over a 25-year period. The incidence of cleft palate was 0.04%. The median age at presentation was 2 mo (range: 1 d to 3 y). Fifty percent of the animals were 2 mo old, 21% were ≥ 2 mo but < 1 y old, and 29% were 1 y of age or older. Males and females were nearly equally represented. Short-term outcomes included euthanasia in 50%, surgical repair in 11%, supportive care in 4%, and no treatment in 32% of cases; 46% of the animals survived to discharge. Defects involving both the hard and soft palate and/or aspiration pneumonia generally had less favorable outcomes. Though cleft palate is rare in horses, it should be considered as a differential diagnosis in horses of all ages with nasal discharge, a cough, a history of recurrent respiratory infections, poor growth, or chronic submandibular lymphadenopathy. Endoscopic evaluation of the pharynx may aid in earlier diagnosis and prognostication for owners.

Résumé — Caractéristiques cliniques des chevaux et des poulains diagnostiqués avec une fente palatine dans une population de référence : 28 cas (1988–2011). L’objectif de cette série de cas était de caractériser la population, la présentation des cas et les résultats de 28 équidés diagnostiqués avec une fente palatine sur une période de 25 ans. L’incidence de la fente palatine était de 0,04 %. L’âge moyen à la présentation était de 2 mois (plage : 1 jour à 3 ans). Cinquante pour cent des animaux étaient âgés de < 2 mois, 21 % étaient âgés de ≥ 2 mois mais avaient < 1 an et 29 % avaient 1 an ou plus. Les mâles et les femelles affichaient une représentation pratiquement égale. Les résultats à court terme incluaient l’euthanasie dans 50 % des cas, la réparation chirurgicale dans 11 % des cas, des soins de soutien dans 4 % des cas et aucun traitement dans 32 % des cas; 46 % des animaux ont survécu au congé. Les défauts du palais dur et mou et/ou de la pneumonie par aspiration affichaient généralement des résultats moins favorables. Même si la fente palatine est rare chez les chevaux, elle devrait être considérée comme un diagnostic différentiel chez les chevaux de tous les âges avec un écoulement nasal, une toux, une anamnèse d’infections respiratoires récurrentes, une mauvaise croissance ou une lymphadénopathie sous-mandibulaire chronique. Une évaluation endoscopique du pharynx peut faciliter le diagnostic et la pronostication anticipés pour les propriétaires.

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Introduction

Congenital defects affect between 1% and 4% of foals (1). Cleft palate, or palatoschisis, is an uncommon congenital defect affecting an estimated 0.1% to 0.2% of the equine population (1). In a study of 608 congenitally deformed foals and fetuses, cleft palate was the most common craniofacial defect and was identified in 4% of this population (2). Cleft palate is well-described in humans and most domestic species, and has an estimated incidence rate of 0.6 per 1000 domestic animals, which is similar to that in humans (3). The human literature describes cleft palates as defects of the primary palate (the nares and lips) or the secondary palate (the hard and soft palate). In horses, cleft palate most commonly affects the caudal half to two-thirds of the soft palate (1). These secondary defects result from a failure of midline fusion of the lateral palate processes. This fusion occurs in a rostral to caudal direction at approximately day 47 of gestation in the horse (1). The causes of cleft palate are poorly understood. Suggested causes in domestic species include genetic factors, environmental, hormonal, and metabolic interactions, exposure to ionizing radiation or teratogens, vitamin and mineral deficiencies, and the administration of tranquilizers or corticosteroids during
pregnancy (4). Cleft palates in cattle and swine are associated with the ingestion of toxic plants, including lupine species, wild parsnip, poison hemlock, and the wild tobacco tree (1,4,5). In cattle, cleft palates often present concurrently with arthrogryposis (5). Cleft palates in cattle may be caused by an autosomal recessive trait, bovine viral diarrhea virus or akabane virus infections, or selenium and manganese deficiencies (1,5).

The most common clinical sign associated with cleft palate is dysphagia with bilateral nasal discharge of milk immediately after nursing (1,6). It is also common for foals to show clinical signs of aspiration pneumonia, including coughing, abnormal lung sounds, tachypnea, tachycardia, and pyrexia (1,6). Large defects involving the hard palate may be diagnosed with a thorough oral examination, but definitive diagnosis is obtained via endoscopic evaluation of the nasopharynx (1,6,7).

Surgical repair is best suited for symmetrical defects that involve ≤ 20% of the soft palate. Reported methods of correction for palatoschisis include a transoral approach, laryngotomy, pharyngotomy, and mandibular symphysiostomy. Complications including dehiscence of the palatal suture line, oronasal fistula formation, mandibular osteomyelitis, instability of the mandibular symphysis, lower lip dehiscence, incisional infection, hypoglossal nerve damage and chronic dysphagia are reported to occur in up to 90% of attempted repairs (1,5–8,13). Failure of the repair is typically due to tension on the soft palate created by the lack of available tissue (5–7,13). Intensive post-operative care is required to address associated aspiration pneumonia and nutritional needs (4,6–11). Postoperative recommendations include parenteral feeding or enteral feeding through a nasogastric tube for 7 to 10 d to reduce irritation of the surgical site. Broad-spectrum antimicrobial therapy is continued for 5 d, but may be required for a longer time in animals with aspiration pneumonia (7). Due to the development of aspiration pneumonia in all but the most mildly affected cases, conservative management alone is rarely successful, and therefore, not recommended (1,6).

Although cleft palate is a well-recognized condition, the literature consists mainly of case reports and small case series with limited information regarding case presentations and outcomes in a population of both foals and adult horses (4,8–13). The purpose of this case series was to describe the presenting complaints, diagnostics, comorbidity, treatments, and outcomes of a diverse population of equids diagnosed with cleft palate.

**Materials and methods**

This study was performed as a case series. Electronic medical records at the Veterinary Medical Teaching Hospital at Texas A&M University from March 1988 to April 2013 were searched for horses diagnosed with cleft palate based on keywords “palatoschisis” or “cleft palate.” Criteria for inclusion included availability of the complete medical record and confirmation of the palatal defect via endoscopic evaluation, or direct visualization at surgery or necropsy. Twenty-eight cases were included, representing 0.04% of all equine medical and surgical admissions to this hospital. The following information was extracted from the records: signalment, presenting complaint, morphology of the defect, diagnostics performed, treatment, and outcome until discharge from the hospital. The proportion of Quarter Horses that were admitted to the hospital during the study period and the proportion of Quarter Horses that were diagnosed with cleft palate were compared for statistical significance.

**Results**

**Case signalment**

Twenty-seven horses and foals and 1 miniature donkey foal with cleft palates were presented to the Veterinary Medical Teaching Hospital over a 25-year period (1988 to 2013). Fourteen animals were male, 13 were female, and 1 was a castrated male. The median age at presentation was 2 mo (range: 1 d to 3 y). Fourteen (50%) of the patients diagnosed with cleft palate at this referral hospital were < 2 mo of age. Six patients (21%) were > 2 mo but < 1 y old. Eight patients (29%) were 1 y of age or older.

Quarter Horses were the most commonly represented breed. Thirteen Quarter Horses (46%) were diagnosed with cleft palate. The proportion of Quarter Horses diagnosed with cleft palate was not significantly different than the proportion of Quarter Horses admitted to the hospital during the study period ($P = 0.81$). Other cases included 6 Thoroughbreds (21%), 3 Arabians (11%), 2 mixed breed horses (7%), and 1 each of: American Paint horse, American miniature horse, Tennessee Walking horse, and miniature donkey.

**History**

The presenting complaints of equids diagnosed with cleft palate included dysphagia with nasal regurgitation, persistent nasal discharge, cough, aspiration pneumonia, submandibular lymphadenopathy, a history of pneumonia or respiratory infections, poor growth, wry nose, and colic. The most common presenting complaint was dysphagia with nasal regurgitation, seen in 17 horses (61%). Persistent nasal discharge, noted between feedings, was seen in 8 horses (29%). Six horses (21%) presented with a cough. Three adult horses (11%) had a history of pneumonia or recurrent respiratory infections. Two horses (7%) had suspected aspiration pneumonia prior to presentation. One (4%) 3-year-old horse presented with the sole complaint of a submandibular lymphadenopathy. One foal presented with wry nose, and another with colic. Fifteen (53.5%) horses had more than 1 presenting complaint. Cases with multiple presenting clinical complaints included: nasal regurgitation and aspiration pneumonia ($n = 3$), nasal regurgitation and cough ($n = 2$), nasal regurgitation, cough, and poor growth ($n = 1$), nasal discharge and a history of pneumonia ($n = 1$), nasal discharge and cough ($n = 1$), nasal discharge and poor growth ($n = 1$), nasal regurgitation and colic ($n = 1$), cough, multiple respiratory infections and respiratory noise ($n = 1$), submandibular lymphadenopathy and a history of pneumonia ($n = 1$), nasal discharge and a history of pneumonia ($n = 1$), a palpable palatal defect and wry nose ($n = 1$), or nasal discharge and a deviated nasal septum ($n = 1$).

**Diagnostics and comorbidity**

Diagnosis of cleft palate was made via endoscopic evaluation of the nasopharynx in 26 (93%) cases. Two cases of cleft palate involving the hard palate were diagnosed via palpation of the defect and were confirmed at surgery.
Complete blood (cell) counts (CBCs) were performed on 9 (32%) animals. Abnormalities on CBC included leukocytosis (20,000 cells/µL; reference interval (RI): 5400 to 14,300 cells/µL) in 1 foal, leukopenia (4900 cells/µL) in 1 foal, and hyperfibrinogenemia (14.7 to 26.5 µmol/L; RI: 2.9 to 11.8 µmol/L) in 4 foals. A normal leukogram was identified in 3 foals.

Lateral thoracic radiographs were obtained for 9 (32%) cases. All 9 animals had radiographic abnormalities, ranging from mild cranioventral lung changes consistent with aspiration pneumonia, to severe lung consolidation with air bronchograms in the ventral lung. One 2-year-old filly had a mild interstitial and bronchial pattern with dorsocaudal distribution.

Necropsies were performed on 9 animals (32%), in which 7 (25% of total cases) were confirmed to have pneumonia consistent with aspiration of feed material.

In total, 12 horses (43%) were diagnosed with aspiration pneumonia; 9 (75%) of these were diagnosed antemortem. Euthanasia was elected in 8 of the 12 (67%) horses with aspiration pneumonia and in 7 of 16 (44%) horses without aspiration pneumonia.

**Defect morphology**

Eighteen (64%) cleft palates were described as a midline soft palate defect (see Figure 1). Five cases (18%) had a midline soft and hard palate defect (Figure 2). All 5 cases were < 1 y of age. Two horses (7%) had an asymmetrical soft palate defect (Figure 3). Two horses (7%) had what was described as a bilateral soft palate abnormality or soft palate hypoplasia. One case (4%) was classified as an unspecified soft palate defect.

**Short-term outcomes**

Thirteen (46%) of the 28 animals were euthanized upon diagnosis of cleft palate. Three of 5 foals with hard palate involvement were euthanized.

Surgery was attempted in 4 cases (14%), all of which were < 2 mo of age. One foal was euthanized during surgery due to severe bilateral palate hypoplasia. In the remaining 3 foals, a mandibular symphysiotomy approach was used to repair the palatal defects. Two foals had both soft and hard palate defects. Dehiscence was noted after 8 d in 1 foal, while the other foal was lost to follow-up. The third foal had a soft palate defect and experienced a small degree of dehiscence at the cranial aspect of the palatal repair 12 d after surgery; this foal healed with no further interventions.

One foal (4%) was discharged following supportive care with antibiotics to address bronchopneumonia and 1 filly (4%) died of colitis while awaiting surgery.
Nine animals (32%) received no medical or surgical treatment and were discharged from the hospital. These cases had neither clinical evidence of active aspiration pneumonia nor any significant clinicopathologic abnormalities where blood was analyzed. Surgical options were discussed with all owners at the time of diagnosis but declined. All 9 of these cases had soft palate involvement only.

Discussion

The incidence of cleft palate in this referral population was 0.04% based on all equine medical and surgical admissions during the study time period. This is a similar incidence to that reported in a previous publication of cleft palate in domestic animals. Mulvihill et al (3) reported 331 cases with a cleft palate in a population of 684,650 domestic animals presenting to 14 veterinary school clinics in North America (0.05% incidence).

Males and females were nearly equally represented in this case series, with slightly higher incidence amongst males than females. A gender difference is reported in the human literature, in which isolated cleft palate has been reported more commonly in females (3). Mulvihill et al (3) reported a larger number of cleft palates in female horses and cattle, but this was not statistically significant. The number of cases with cleft palate in this referral population was limited and likely to be insufficient to demonstrate a clear gender bias.

Cleft palate is often assumed to be a lethal congenital defect; however, 13 animals (46%) in this series survived to discharge, 9 of which were discharged without intervention. This is similar to recent reports, with between 67% and 100% survival to discharge (12,13). Long-term outcomes were not available in most cases in this series based on the 25-year study period and transient nature of horse ownership. However, 1 Thoroughbred filly started race training and another continued to train. One stallion with an asymmetrical soft palate defect continued to breed mares.

The presenting complaints identified in these cases were numerous. The most common complaint was dysphagia with nasal regurgitation, but this was seen predominantly in foals < 2 mo of age. Persistent nasal discharge alone was the second most common chief complaint at presentation and was only seen in animals 2 mo of age or older. These complaints are well-described in the literature in association with cleft palate. However, the clinical signs in some cases were nonspecific, such as submandibular lymphadenopathy, intermittent cough, and poor growth. Considering cleft palate as a differential diagnosis in horses of all ages with any of the clinical signs discussed is essential to making accurate diagnoses.

Three animals 1 y of age or older had a history of respiratory infections as foals. Given the frequency of changes in horse ownership, the true incidence of foal pneumonia in this population may have been greater than described here. Foals with clinical signs of pneumonia, especially those with pulmonary consolidations identified with thoracic radiography or ultrasonography, are often diagnosed with *Rhodococcus equi* infection. Thorough history gathering and endoscopic evaluation of the nasopharynx would aid in earlier diagnosis of cleft palate. In this series, animals that were younger at the time of diagnosis generally had less favorable outcomes and more severe defects.

While cleft palate is often considered a differential diagnosis for nasal regurgitation of milk in foals, in this series 8 cases (29%) were 1 y of age or older and 14 (50%) were < 2 mo of age. A recent retrospective case series found that of 55 horses diagnosed with cleft palate, 16.4% presented as athletic horses, 1 y of age or older (mean: 5 y; range: 1 to 14 y) (13). The most common clinical sign in those cases was abnormal noise originating in the upper airway. The palatal defects in those horses were located at the caudal edge of the soft palate under the epiglottis, and it was suggested that this small cleft defect may not interfere with athletic function in these cases (13).

Foals < 2 mo of age were more likely to present with larger defects, especially involving those of the hard palate. Defects involving the hard palate were not diagnosed in any animal over 1 y of age. Nine of the 13 animals (69%) that were euthanized upon diagnosis were < 2 mo of age. Of these 9 animals, 7 had evidence of concurrent aspiration pneumonia or systemic illness and 1 was diagnosed with a concomitant deviated nasal septum. Euthanasia was elected following discussions of medical and surgical management. Decisions were based on poor prognosis or financial limitations. Conversely, horses diagnosed with cleft palate at > 1 y of age were more likely to be managed conservatively (75%) than horses < 1 year of age (15%). None of these conservatively managed cases had involvement of the hard palate, suggesting they had more modest palatal defects.

It is possible that horses diagnosed at a later stage in development are more likely to have compensated for the defect, as supported in a recent publication by Barakzai et al (12). The authors of this study described a population of 15 adult horses with previously undiagnosed cleft palate. The outcomes in these 15 cases were favorable; 2 horses had successful racing careers, many were lightly ridden, and the survival rate was 100%. Upper airway and tracheal contamination with masticated feed was common in the population of horses described by Barakzai et al (12), but was not associated with clinical signs of lung disease other than coughing. Couetil and Hawkins (6) also reported 3 horses diagnosed with cleft palate in adulthood with no clinical signs of aspiration pneumonia. In contrast, 3 of 8 (38%) horses > 1 y of age in our population were diagnosed with aspiration pneumonia based on physical examination findings and radiographic changes consistent with pneumonia. However, all 3 horses had mild changes and 2 were discharged without therapy.

Many case reports and case series of cleft palate in the horse mainly focus on cases undergoing surgical repair and subsequent outcomes (4,7,9–11). Given the preference for performing surgical repair prior to 6 wk of age, a case selection bias toward a younger population might exist in these studies (4,7,9–11). In a series of 11 cases of cleft palate that underwent surgical repair, 9 (82%) were < 1 y of age (8).

Surgery was attempted in only 4 cases in this equine population. Owners of horses diagnosed with cleft palate were informed of the likelihood of failure associated with surgical repair, which may have influenced their decisions regarding surgical intervention. In addition, many animals had only mild
clinical signs and owners possibly chose not to pursue surgery based on potential risks and complications. The animals that underwent surgery in this population presented at 1 d, 13 d, 7 wk, and 1 y of age. Surgical repair was not possible in the yearling due to severe hypoplasia of the soft palate, and he was euthanized prior to anesthetic recovery. Survival to discharge following surgery was 100%. However, surgical repair failed 8 and 12 d after surgery in the 1-day and 7-week-old foals, respectively. Unfortunately, both the 1-day and 13-day old foals that underwent surgical repair were lost to follow-up and long-term follow-up beyond 6 wk was not available for the 7-week-old foal that underwent surgery.

It is recommended that surgery be performed in foals < 6 wk of age in order to optimize visualization of the defect, minimize medical complications, and avoid airway contamination with solid food (1,7,9–11). Semevolos and Ducharme (11) report complete healing of the cleft palate defect in 50% of cases after 1 or more surgeries, but also report an 87.5% complication rate. Repeated surgeries were not performed on any equid in this case series. Other studies have a lower success rate, consistent with the findings of this case series, reporting palatal suture line dehiscence and subsequent oronasal fistula formation in up to 90% of surgical cleft palate repairs (1,4,5,7–11). In contrast, Murray et al (13) found that surgery was significantly associated with survival. In that study, 13 of 26 horses that did not have surgery were euthanized, compared with 3 of 26 horses that had surgery. However, despite this high survival rate, both complications and incomplete healing occurred in 65% of patients. The reasons for the reported variations in complication rates and survival following surgery are unknown, but may be attributed to the number of surgeries per horse, the surgical approach, differences between inclusion criteria amongst studies, and case selection. Further studies are needed to more accurately identify prognostic indicators and factors associated with successful repair of cleft palate. A recent case report described a laryngeal tie-forward procedure in a miniature pony diagnosed with cleft palate at 1 y of age (14). This procedure resulted in advancement of the larynx, such that the defect was covered by the epiglottis, and subsequent resolution of the pony’s dysphagia and respiratory infections. This surgical approach is commonly used for dorsal displacement of the soft palate and may warrant further consideration for the treatment of small, caudal, palatal defects in horses.

Cleft palate is rare in horses, but should be considered in horses of all ages with nasal discharge, cough, history of recurrent respiratory infections, poor growth or submandibular lymphadenopathy. Prognosis remains guarded for horses diagnosed with cleft palate, with or without attempted surgical repair. However animals with smaller defects appear to have less co-morbidity, a lower incidence of pneumonia, and a longer lifespan. In some cases, these animals may have careers as performance animals.

References
Anaplasmosis in a dog on Vancouver Island

Jennifer Kowalski, Diane Cruickshank, Malcolm Macartney

In February of 2015, a 7-year-old, 33 kg, spayed female Labrador retriever dog was presented to our hospital with a 1-day duration of decreased appetite, lethargy, and a stiff and stilted gate. She had vomited once the previous day and the owners mentioned that she may have ingested something from the garbage. This dog also had a history of acquiring several ticks within the previous 2 wk and that 2 ticks had been removed by the owners just prior to her examination. The Pacific deer tick, *Ixodes pacificus*, is commonly encountered on dogs in this area of Vancouver Island in 2 seasonal periods; a winter (January-February) spike and then throughout the summer (June through September). This dog had no history of travel off Vancouver Island.

On distant examination, this dog had an obvious right hind leg lameness with a shifting of weight from this limb while walking. There were no obvious neurological deficits. Her temperature was 40.3°C, her heart rate was 170 beats/min, and her respiratory rate was normal. Her mucous membranes were pink and mildly tacky. There was no discernible pain or abnormalities on abdominal palpation. An orthopedic examination revealed no obvious pain response on flexion or extension of any limbs, nor any obvious swelling of any joints.

Abdominal radiographs were taken and in-house complete blood (cell) count (CBC) and serum chemistry were performed. The radiographs revealed spondylosis of several lumbar vertebrae but no other skeletal or soft tissue abnormalities were detected. The chemistry panel was unremarkable with all parameters within normal range. The CBC, however, revealed severe thrombocytopenia \[18 \times 10^9/L, \text{RI}: 148 \text{ to } 484 \times 10^9/L\] and the blood smear showed no platelet clumping to skew this finding. There was a leukopenia \[3.6 \times 10^9/L, \text{RI}: 5.05 \text{ to } 16.76 \times 10^9/L\] with a notable lymphopenia \[0.24 \times 10^9/L, \text{RI}: 1.05 \text{ to } 5.19 \times 10^9/L\], an absolute eosinopenia, and a normal neutrophil count \[3.5 \times 10^9/L, \text{RI}: 2.95 \text{ to } 11.64 \times 10^9/L\]. The red cell count was normal \[7.0 \times 10^{12}/L, \text{RI}: 5.65 \text{ to } 8.87 \times 10^{12}/L\].

Upon examination of the blood smear, it was readily apparent that there were cytoplasmic inclusion bodies (morulae, Figure 1) present in the neutrophils (seen in 27 out of 100 neutrophils counted).

A tentative diagnosis of anaplasmosis was made based on the history, clinical signs, and findings on the blood smear (1,2). Treatment included doxycycline 300 mg, q12h for 14 d and prednisone 12.5 mg, q12h for 5 d, then q24h for 7 d.

Serum was sent to Idexx Laboratory for a 4Dx SNAP test which is an enzyme-linked immunosorbent assay (ELISA) screening test for the presence of circulating antibodies to *Anaplasma phagocytophilum*, *A. platys*, *Ehrlichia canis*, and *E. ewingii*, *Borrelia burgdorferi*, and *Dirofilaria* antigen. The results were negative for all organisms. Upon consultation with the reference laboratory, a real-time polymerase chain reaction (PCR) test for *Anaplasma* spp. DNA was performed on the same serum sample. This test was positive for *Anaplasma* DNA, thus confirming the tentative diagnosis. The patient improved significantly after a few days of therapy and had an uneventful recovery.

This case is similar in many respects to a previously documented case of anaplasmosis in a dog on Vancouver Island (3). Clinicians are reminded that screening tests for antibodies may prove negative when animals present in the acute phase of anaplasmosis which may last 7 to 14 d (2,4) and that laboratory confirmation for the presence of DNA may be required to confirm presence of the organism. There are several reports of dogs that were positive by PCR but negative in tests for antibody to

Figure 1. Blood smear showing morulae (cluster of bacteria) in a neutrophil.
Anaplasma, including a recent report on 3 dogs from Saskatoon (5). In addition, there is a general sense that in many areas of North America, including southern Vancouver Island, ticks are more prevalent and the incidence of tick bites in dogs appears to be increasing. Veterinarians are advised to be vigilant in testing for tick-borne diseases in dogs with a history of illness following tick exposure. Veterinary technicians viewing smears in-house need to be aware that the presence of inclusion bodies in neutrophils is a significant clue in the diagnosis of anaplasmosis.

**References**


**New Products**

Company’s revolutionary wearable tech for dogs is now available for felines

PetPace, a leading provider of innovative wearable health monitoring technology, which recently released a smart health and wellbeing collar for dogs, today announced the launch of a matching collar designed specifically for cats. Now, cat parents, too, can enjoy peace of mind, knowing they will be alerted immediately when abnormal vitals, physiological or behavioral patterns are detected in their pets.

Designed for use on cats over 8 lb., PetPace uses non-invasive sensors to accurately and continuously monitor temperature, pulse, respiration, activity levels, calories and more throughout the day. The data, accessible to cat parents via a smartphone app, is then uploaded to a proprietary cloud-based engine which analyzes individual historical and breed-specific attributes. If the collar detects any abnormalities, an alert is sent in real-time to the cat owner and veterinarian, allowing for prompt attention and treatment of the issue.

“When you love something as much as owners love their pets, health is of the utmost importance,” said Dr. Asaf Dagan, Chief Veterinarian for PetPace. “Cats are truly part of the family, but there is a gap in our ability to detect their pain or medical conditions. PetPace closes this gap by enabling cats, for the first time, to ‘tell’ us how they feel, which lets owners rest assured that their cat’s disease or discomfort doesn’t go unnoticed,” he concluded.

Developed in cooperation with expert veterinarians, the PetPace collar and its data are also intended for use by veterinarians to aid in both in-hospital monitoring and follow-up monitoring after discharge from the hospital. The collar retails for $150 (US) with a $15/mo service fee.

**Contact:** PetPace, 25 Burlington Mall Road, Suite 301, Burlington, MA 01803 USA; website: www.petpace.com

**Running Obsession Spreads — To Dogs!**

A new book recently launched — a guide to running with dogs. Running for Dogs is the brainchild of Toronto-based writer Olga Zuberg and the Running for Dogs team, who’ve been researching the topic and organizing canine running competitions for over a year. Fitness with dogs has become very popular, and now the much-needed guide is coming to life.

The book is designed as an easy-to-follow guide to getting started on running with dogs. In fact, the author found that it takes only three runs for an average dog to pick up on running.

“I know how much dog owners love their pets, and that many would do anything in their power to help them have fulfilling lives,” said Olga. “Unlike popular assumption, dogs do need a safe and balanced training in order to run, just like humans do. Given my experience and research, I knew I could write a book that would not only be easy to follow, but also more helpful than currently available material”. Running for Dogs is the first such book to be aimed at ordinary pet dogs — entry-level canine runners.

Running for Dogs answers many common questions that dog owners have: Is my dog a suitable running companion? How far should my dog go? How do I start my dog on running? How do I prevent problems such as leash-pulling and jumping? And much more…

More information is available on www.blog.runningfordogs.com
A strong year in client numbers for much of Canada

Chris Doherty

The number of active clients is, without question, one of the most crucial metrics for any veterinary practice. Without a strong supply of clients, even the best run hospital will falter. While the manipulation of fees, supply costs, and wages can help a practice maximize profitability, the bottom line will always be driven by how many pet owners are walking through the front door.

Through the Annual Provincial Practice Owner’s Economic Surveys, the average number of active clients per full-time equivalent DVM can be measured in each of the provinces. For the purposes of this research, a full-time equivalent (FTE) is assumed to be 1750 hours worked per year.

Table 1 outlines these averages from 2012 to 2014. The past year was a strong one overall, with most provinces experiencing growth in the average number of active clients per FTE. Led by New Brunswick, with a 20.6% increase, 5 provinces enjoyed higher average numbers of active clients in 2014 compared with those in 2013. Manitoba and Prince Edward Island had jumps of 8.9% and 7.4%, respectively, while Nova Scotia’s average number of active clients per FTE climbed by 4.6%, and Alberta had a modest rise of 2.4%.

On the opposite side of the coin, however, Saskatchewan, British Columbia, and Ontario all witnessed declines in the average number of active clients per FTE. Ontario held the dubious honor of having the steepest downturn, with the number of clients falling by 7.1%. British Columbia’s average slipped by 2.1%, and Saskatchewan’s by 1.2%.

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Newfoundland & Labrador did not provide sufficient responding practices in 2013 to report on average number of active clients per FTE, and thus is listed as “na” in Table 1.

While most provinces will relish these findings, it is important to note that these surveys were being completed just as the price of crude oil began its plummet. As a result, the picture painted by the 2014 survey may be quite different from current reality, particularly in oil-rich provinces such as Alberta, Saskatchewan, and Newfoundland & Labrador. Given these economic developments, some practices will find that they must work even more diligently to get clients into the building.

One well-established method for retaining clients is through use of the telephone. By calling, staff members are able to actively engage clients and book an appointment time. Postcards and e-mails are comparatively passive, and place the onus on the client to contact the clinic to schedule an appointment.

Another benefit to phoning clients is the ability to respond to any questions or concerns they may have. Without the opportunity to immediately address them, clients’ queries may go unanswered; perhaps they are unsure as to why their pet requires a physical examination. A postcard will do little to answer this question. Although more labor-intensive than mailings, the return on investment of calling clients due for reminders is typically higher as a result of a greater success rate in scheduling appointments.

The superiority of the telephone as a method of contacting clients is evidenced through research performed by Terra Shastri of the Ontario Veterinary Medical Association. In her analysis, the number of clients booking an appointment in response to a postcard was compared to the number booking as a result of a phone call (or voicemail if the client did not answer). A postcard or letter resulted in an average of 19% of clients booking an appointment; a phone call garnered an average of 78.7% of clients booking an appointment.

This year may prove to be a difficult one for some, particularly if the price of crude oil remains depressed, thus weighing on provincial and national economies. The best defence against these circumstances continues to be a good offence. Getting on the phone and conveying the importance of veterinary visits to clients should be every practice’s game plan. Doing everything possible to keep active client numbers elevated will do more to help a practice weather difficult times than any other measure.

Notes: Average numbers of active clients per FTE were determined using the 2014 Provincial Practice Owner’s Economic Surveys. There was no Provincial Practice Owner’s Economic Survey in Quebec in 2014. Number of active clients per FTE are thus listed as “na” in Table 1.
was determined by taking each practice’s reported number of active clients, dividing by the total number of DVM hours worked within the practice, and multiplying by 1750. The resulting number of active clients per FTE was averaged among all practices within a province, to determine the provincial average number of active clients per FTE.

Notes: Le nombre moyen de clients actifs par ETP a été déterminé en se fondant sur les Sondages économiques provinciaux 2014 auprès des propriétaires de pratique. En 2014, il n’y a pas eu de Sondage économique provincial auprès des propriétaires de pratique au Québec. Le nombre de clients actifs par ETP a été déterminé en prenant le nombre de clients actifs déclaré, en divisant ce chiffre par le nombre total d’heures travaillées par les vétérinaires dans la pratique et en multipliant ensuite par 1750. La moyenne du nombre de clients actifs par ETP a ensuite été établie parmi toutes les pratiques d’une province afin de déterminer le nombre moyen de clients actifs par ETP à l’échelle de la province.

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1. B) Hemangiosarcoma is a relatively common neoplasm in older large breed dogs, and the right side of the heart is a common site of origin. The description of the mass as soft and dark red fits the typical gross appearance of hemangiosarcoma. Also, these neoplasms of vascular endothelial origin are prone to rupture, causing hemopericardium (cardiac tamponade) and sudden death.

B) L’hémangiosarcome est un néoplasme relativement commun chez les vieux chiens de grandes races et le côté droit du cœur est une localisation commune. La description de la masse comme étant molle et de couleur rouge foncé convient à l’apparence macroscopique typique de l’hémangiosarcome. Aussi, ces néoplasmes d’origine endothéliale vasculaire sont sujets aux ruptures, causant un hémopéricarde (tamponade cardiaque) et la mort subite.

2. C) Praziquantel is the only anthelmintic available to be used against tapeworms.

C) Le praziquantel est le seul anthelmintique disponible pour utilisation contre les ténias.

3. C) Fomepizole is the recognized therapy for early stage ethylene glycol poisoning. N-acetylcysteine is used to treat acetaminophen poisoning. Vitamin K is used to treat patients exposed to anticoagulant rodenticides. Misoprostol is a prostaglandin analogue used to treat nonsteroidal anti-inflammatory drug (NSAID) exposures, and pralidoxime hydrochloride is used to reverse the clinical problems associated with organophosphate intoxications.

3. C) Le fomépizole est le traitement reconnu pour les stades précoces d’empoisonnement par l’éthylène glycol. La N-acétylcystéine est utilisée pour traiter l’empoisonnement par l’acétaminophène. La vitamine K est utilisée pour traiter les patients exposés aux rodenticides anticoagulants. Le misoprostol est un analogue de prostaglandine utilisé pour traiter les expositions aux anti-inflammatoires non stéroïdiens et l’hydrochlorure de pralidoxime est utilisé pour inverser les problèmes cliniques associés aux intoxications d’organophosphorés.

4. B) Dilution of the injectate with three times the volume of saline is the most effective treatment for extravasated thiopental. None of the other actions listed will prevent tissue damage following accidental perivascular injection of thiopental.

B) La dilution du produit injecté avec trois fois le volume de saline constitue le traitement le plus efficace contre le thiopental extravasculaire. Aucune des autres actions énumérées n’empêchera le dommage tissulaire à la suite de l’injection périvasculaire accidentelle de thiopental.

5. B) The incubation period is very long. All other responses are true.

B) La période d’incubation est très longue. Toutes les autres réponses sont vraies.
Diagnostic Ophthalmology
Ophthalmologie diagnostique

Bianca S. Bauer, Lynne S. Sandmeyer, Bruce H. Grahn

History and clinical signs

A 2-year-old, neutered male Australian shepherd cross dog was examined at the ophthalmology service at the Western College of Veterinary Medicine (WCVM) for abnormal appearance of both globes. The dog was adopted as a stray dog 2 wk prior to examination and the new owners noted red eyes and visual deficits. Neuro-ophthalmic examination revealed absent menace and pupillary light reflexes in the right eye. A menace response was present in the left eye but the left direct and consensual pupillary light reflexes were incomplete. Palpebral and oculocephalic reflexes were present bilaterally. Schirmer tear test (Schirmer Tear Test Strips; Alcon Canada, Mississauga, Ontario) values were 28 and 20 mm/minute in the right and left eyes, respectively. The intraocular pressures were estimated with a rebound tonometer (T onvet; Tiolat, Helsinki, Finland) and were 5 and 8 mmHg in the right and left eyes, respectively. Fluorescein staining (Fluorets; Bausch & Lomb Canada, Markham, Ontario) was negative bilaterally. On distant examination bilateral moderate microphthalmia was noted (Figure 1).

Biomicroscopic examination (Osram 64222; Carl Zeiss Canada, Don Mills, Ontario) revealed moderate conjunctival hyperemia, microcornea, and mild corneal edema. The pupil was miotic and did not dilate following application of 0.5% tropicamide (Mydriacyl; Alcon Canada) and moderate aqueous flare was noted. Lenticular examination revealed mature cataract. Biomicroscopic examination of the left eye revealed microcornea, mild conjunctival hyperemia, a large typical iris coloboma, and immature cataract. This pupil dilated only partially following application of 0.5% tropicamide (Mydriacyl, Alcon Canada). Indirect ophthalmoscopic (Heine Omega 200; Heine Instruments Canada, Kitchener, Ontario) examination could not be performed in the right eye due to the miosis and lenticular opacification but was within normal limits in the left eye. Photographs of the right and left eyes following mydriasis are provided for your assessment (Figure 2).

What are your clinical diagnosis, differential diagnoses, therapeutic plan, and prognosis?

Discussion

Our clinical diagnoses were microphthalmos and multiple ocular anomalies (MOA) OU consistent with merle ocular dysgenesis (MOD). A secondary uveitis was also present OU with the right eye more affected than the left. Microphthalmos is a congenitally small eye. There is considerable variation in the extent of microphthalmia and the condition may be unilateral or bilateral. When unilateral, the degree of reduction of globe size is usually obvious but mild decreases that are bilateral may not be so obvious. In milder forms the condition is compatible with vision but microphthalmos is often blinding when in combination with MOA (1). Merle ocular dysgenesis occurs in breeds affected by the merle gene [i.e., Australian shepherds, Great Danes, collies, and dachshunds including mixed breeds (2)]. The merle gene is a color dilution gene that lightens the coat color. The most severe ocular anomalies occur in homozygous merles with abundant white hair coat involving the head region. The ocular abnormalities that occur with this condition include: microphthalmos, microcornea, iridal abnormalities (coloboma, hypoplasia), asymmetric pupil size, shape, or position (dyscoria and/or corectopia), persistent pupillary membranes, lens abnormalities (microphakia, cataract, coloboma, luxation/subluxation), scleral defects (coloboma, staphyloma) and retinal defects (detachment, retinal dysplasia). Affected dogs also have varying degrees of congenital deafness (3). Although the cause for this congenital anomaly remains unknown the embryogenesis of the ocular defect likely stems from a primary abnormality of the retinal pigment epithelium (RPE) or outer layer of the optic cup (4). In the Australian shepherd dog, the ocular disease is...
inherited as a recessive trait with incomplete penetrance, while the inheritance of the merle dilution is autosomal dominant (5). Merle-merle breedings are, therefore, not recommended.

Severe MOA with cataract can be accompanied by a phaco-lytic uveitis due to leakage of damaged, cataractous lens proteins into the anterior chamber. Clinical manifestations of anterior uveitis include epiphora, conjunctival hyperemia, corneal edema, miosis, ciliary spasm causing pain, and photophobia with or without aqueous flare. The diagnosis of uveitis is based on the presence of the aforementioned clinical signs and a low intraocular pressure. Uveitis should be treated with topical anti-inflammatory and anticholinergic therapy. Frequency of administration of anti-inflammatories (topical NSAIDs or steroids) should be every 6 to 12 h with the higher frequencies used in severe cases of uveitis. Topically applied anticholinergics (1% to 2% atropine) are useful for 3 reasons: they reduce protein and cellular leakage from inflamed uveal blood vessels, they dilate the pupil which protects the eye from development of posterior synechia, and they relax ciliary muscle spasm, which is a major factor in discomfort associated with uveitis (6). Topical anticholinergics can be used every 8 to 24 hours depending on the severity of the uveitis.

Given the extent of the uveitis OD and to further evaluate the posterior segment, an ocular ultrasound was performed and revealed a complete retinal detachment. An enucleation, or an evisceration and prosthesis, was recommended to the owners given the lack of vision in this eye and high risk for continued severe uveitis with the development of secondary glaucoma. The owners initially declined surgery and the dog was treated with a topical steroid, prednisolone acetate 1% (ratioPREDNISOLONE; Teva Canada Limited, Toronto, Ontario) every 6 h OD and topical atropine sulphate 1% (Isopto-atropine; Alcon Canada) every 12 h OD. The left eye was also treated with prednisolone acetate 1% every 12 h. Three weeks later the owners returned to pursue an enucleation and prosthesis for the right eye and the left eye was continued on prednisolone acetate 1% once daily indefinitely. Annual examinations with an ophthalmologist were recommended for the left eye for life to monitor for possible cataract progression or the recurrence of uveitis.

A major differential diagnosis in cases of microphthalmia and MOA with or without uveitis is phthisis bulbi secondary to chronic uveitis or trauma. Phthisis bulbi, however, can be ruled out in this dog given the merle coat pattern and clinical signs OU. The prognosis for MOD depends on the severity of the condition. No treatment is necessary in mild cases; however, when the lens is involved, medical and/or surgical treatment may be required. Affected dogs that have lenticular involvement with a normal posterior segment are candidates for phacoemulsification and intraocular lens implantation. In many cases of MOD, assessment by an ophthalmologist is recommended to fully evaluate the extent of the condition with the hopes for maintaining vision and saving the globes long-term.

References
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