Mémoire au sujet du Projet de loi n^{o} 128

Loi visant à favoriser la protection des personnes par la mise en place d'un encadrement concernant les chiens

CPSPC

Coalition pour la promotion de la sécurité des personnes et des chiens

Présenté à la Commission des institutions Le 22 mars 2018

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I. INTRODUCTION

La Coalition pour la promotion de la sécurité des personnes et des chiens (« CPSPC ») est un organisme à but non lucratif, fondé en juillet 2016, en réaction à la position adoptée par la Ville de Montréal à l'occasion du débat sur les chiens de type « pit bull » et de l'adoption du règlement.

Les nombreux écueils du Règlement 16-060 sur le contrôle des animaux (« règlement »), adopté le 27 septembre 2016 par la Ville de Montréal, ont motivé la Coalition pour la promotion de la sécurité des personnes et des chiens à se joindre au recours opposant la SPCA à la Ville de Montréal.

La CPSPC a rassemblé une équipe d'experts provenant de divers milieux (vétérinaires, spécialistes du comportement animal, sociologues, biologistes...) et les cabinets d'avocats *Goldwater, Dubé* et *Grey, Casgrain*.

La CPSPC est intervenue dans le litige opposant la Ville de Montréal à la SPCA afin de défendre les intérêts de ces propriétaires de chiens responsables.

La CPSPC a pour mission de soutenir la législation qui favorise la sécurité et la protection de la population et des chiens, d'éduquer le public, de responsabiliser les propriétaires et de promouvoir le bien-être des animaux par le biais d'alternatives à législation interdisant des races particulières (« LRP »).

Suite au dépôt du projet de loi 128 portant sur la mise en encadrement des chiens pour favoriser la sécurité des personnes, la CPSPC est fière de présenter son mémoire visant à améliorer la protection des collectivités. La LRP ne remplit pas la mission du gouvernement soit de promouvoir la sécurité et la protection des personnes et de la collectivité.

En effet, le projet de loi soumis à la Commission des institutions comporte plusieurs lacunes, dont notamment :

– Contravention à la *Loi sur la sécurité et le bien-être de l'animal*;

– Fardeau pour les vétérinaires de déterminer la dangerosité et la race d'un chien, fonctions qui peuvent être au-delà de leurs compétences;

– Caractère arbitraire de la sélection de certaines races particulières de chiens en dépit des études scientifiques qui démontrent que l'appartenance d'un chien à une race particulière n'a pas d'incidence sur sa dangerosité;

– Difficultés d'application de l'interdiction des races particulières vu l'absence de procédé efficace pour identifier les chiens comme tels.

Également, suivant l'adoption par la Ville de Montréal du règlement 16-060 sur le contrôle des animaux, lequel prévoyait des dispositions interdisant certaines races particulières de chiens, les objectifs de prévention et de sécurité des personnes n'ont pas été probants.

Nous aborderons finalement les recommandations suggérées par notre organisation afin de répondre à l'objectif de protection des personnes visé par le gouvernement.

a) L'inefficacité de la LRP

Le projet de loi 128 déposé par le gouvernement québécois prévoit que certains chiens appartenant ou identifiés à l'annexe I du projet de loi soient réputés « potentiellement dangereux ». Or, une législation basée sur l'exclusion de certaines races de chiens est problématique à plusieurs niveaux : d'abord, il n'existe aucun standard scientifique pour déterminer la race d'un chien par sa morphologie.

De plus, même l'analyse génétique ne permet pas de déterminer avec une certitude raisonnable l'appartenance d'un chien hybride à l'une des races ou types de chiens visés par la loi. Finalement, les études scientifiques démontrent que la composante génétique d'un animal ne peut servir d'indicateur de son comportement, encore moins la composition génétique qui détermine son apparence.

La présomption établie à l'article 17 de la loi où une race de chien est naturellement dangereuse est donc mal-fondée d'un point de vue scientifique. Par conséquent, le projet de loi dans sa forme actuelle serait inefficace afin de remédier aux incidents de morsures de chiens. En effet, les chiens visés par le projet de loi ne sont pas de façon inhérente plus dangereux que les autres chiens et provoquerait un faux sentiment de sécurité au sein de la population québécoise en plus de marginaliser les propriétaires de chiens visés par une telle interdiction.

b) Portée excessive de la loi

La loi doit être claire (sans équivoque) et accessible aux citoyens afin qu'ils sachent quelles activités ne sont pas permises.

Certaines dispositions du projet de loi 128 peuvent porter à confusion lors de l'application de la loi vu la difficulté de mise en application de celles-ci.

Par exemple, l'identification des races de chiens visés par l'annexe I comme étant réputés potentiellement dangereux n'est pas claire, car s'agissant souvent de chiens

croisés, l'appartenance au croisement ou type de chien est très difficile à identifier (Olsen, K., Levy et al.)[1]. Ainsi, cette liste revêt un caractère arbitraire, car l'inspecteur chargé d'appliquer la loi aura tendance de se tromper en identifiant de manière erronée le chien.

c) L'objectif doit avoir un lien rationnel avec la restriction imposée

L'objectif du projet de loi 128 vise à favoriser la protection des personnes par la mise en place d'un encadrement concernant les chiens. Vu les incidences de morsures de chien, l'objectif du projet de loi peut sembler avoir un lien rationnel vu le battage médiatique entourant les incidents de morsures impliquant les chiens de « type pitbull ».

Toutefois, la littérature scientifique actuelle n'appuie pas la thèse que certains chiens sont plus agressifs dus à leur race.

Le lien rationnel entre la restriction imposée que représente la LRP et l'objectif de favoriser la sécurité des personnes est donc absent vu qu'une telle législation ne réduit pas le risque de morsures.

d) Les avantages de la restriction et ses effets préjudiciables doivent être proportionnels, il doit y avoir un équilibre global

Au niveau national et international, la tendance internationale est l'abrogation de législation LRP. Nous nous penchons sur la situation de la province d'Ontario dans laquelle la LRP est en vigueur depuis 2005. Or, malgré la LRP en vigueur interdisant notamment les chiens de « type pitbull », le nombre de morsures n'a pas diminué[2].

En effet, le nombre d'hospitalisations liées à des morsures de chiens est en hausse depuis l'interdiction des chiens de « type pit bull » en 2005, lors de l'entrée en vigueur de la loi visant l'interdiction (767 cas en 2014, alors qu'en 2005, lors de l'entrée en vigueur de la loi visant l'interdiction de ces chiens, le nombre s'élevait à 486)[3].

Ainsi, nous soutenons que les avantages de la restriction sont moindres que le serait la mise en place d'un programme éducationnel pour tous les propriétaires de chiens et l'application d'une législation provinciale qui prévoit le port obligatoire de la laisse afin d'éviter les incidents de morsures.

[1] Voir annexe 4.
[2] Voir annexe 4.
[3] https://globalnews.ca/news/2527882/torontos-pit-bulls-are-almost-gone-so-why-are-there-more-dog-bites-than-ever/

À cet effet, le programme conçu par Bill Bruce pour la Ville de Calgary prévoit de corriger les comportements relativement mineurs, d'intervenir rapidement même lorsque les infractions sont mineures pour essayer de récupérer les propriétaires et leurs chiens.

Par ailleurs, alors que plusieurs études ont dénoté que les incidents de morsure impliquant des enfants ont souvent lieu avec des chiens appartenant à un membre de la famille, l'éducation demeure la meilleure avenue pour la réduction des risques de morsure.

Pour ce qui est des effets préjudiciables, l'euthanasie de milliers de chiens dont l'adoption serait d'ailleurs interdite selon les dispositions du présent projet de loi est bien sûr regrettable pour tous les propriétaires des chiens visés et les personnes qui aiment les animaux.

Également, l'application des mesures requiert des municipalités des ressources que certaines régions n'ont pas à leur disposition.

En conséquence, il est de notre avis que l'atteinte au droit de propriété et le caractère inhérent arbitraire de la LRP, en plus d'être inefficace, n'est pas raisonnable dans une société libre et démocratique notamment vu la position qu'a adopté l'Assemblée nationale en adoptant de façon unanime la *Loi sur la sécurité et le bien-être animal* en 2015.

e) Difficultés d'application de la LRP

Les difficultés d'identification de la race d'un chien basée sur l'identification visuelle telles que mentionnées précédemment ont également un impact négatif sur l'application d'une LRP.

Ni le vétérinaire, ni le personnel d'une municipalité ou les officiers de police ne sont en mesure d'identifier visuellement les chiens qui appartiennent véritablement aux Pitbulls ou à une autre race de chiens interdite. Ce manque de clarté de la loi a déjà été exposé dans le litige opposant la Ville de Montréal à la SPCA et la CPSPC.

Également, comme nous avons pu le constater lors de l'entrée en vigueur du règlement de la Ville de Montréal sur le contrôle des animaux, les propriétaires de chiens ignorent souvent même si leur chien appartient à la race qui serait interdite. Cette confusion provoquera inéluctablement des recours de la part des propriétaires de bonne foi.

Dans le cadre du litige nous opposant à la Ville de Montréal, nous avons pu mandater Dr David W. Silversides, professeur titulaire à la faculté de médecine vétérinaire de l'Université de Montréal à. Dr Silversides est un médecin vétérinaire

chevronné dont le champ d'expertise est la génétique. En ce sens, ce dernier a réalisé une expertise pour corriger les fausses croyances.

Dans son rapport, Dr Silversides conclut que l'utilisation de caractéristiques morphologiques pour déterminer la race d'un chien est susceptible de conduire à des résultats inexacts. Pour soutenir cette position, il explique que des différences physiques significatives entre les chiens peuvent survenir à partir d'une variation génétique très mineure. Cela signifie que deux chiens peuvent sembler très différents, mais rester presque génétiquement identiques.

> To summarize these findings, the morphological characteristics which are so important in defining purebred dog breeds have in general been found to be caused by a small number of genetic loci each with large phenotypic effects. Thus the dog's large morphological diversity is not a function of large genetic diversity. This realisation came as a surprise as it is in stark contrast with what is seen in humans, where relatively small amounts of morphological diversity are caused by a large number of genetic loci which individually contribute small but additive effects. The pit bull-type of dog breeds, which are generally described as being of medium size and stocky with rounded heads, share close genetic lineages with the French Bulldog (small size) and the Mastiff (large size) (Figure 1). Thus the physical characteristics of a particular dog, and especially in the case of mixed breed dogs, may not be an accurate indication of their breed composition and genetic heritage[4].

Il soutient : If this level of ambiguity in describing physical characteristics of purebred dog breeds exists between expert panels, it is difficult to conceive how physical characteristics, as judged by non-experts, can be relied upon to determine breed compositions of crossbred dogs with any degree of accuracy[5].

En conséquence, l'utilisation des caractéristiques morphologiques d'un chien pour déterminer sa composition raciale ou son patrimoine génétique, en particulier dans le cas d'un chien croisé, peut conduire à des conclusions erronées. Dr Silversides indique également : « These experiments suggest that behavioral traits can be selected for in canid species, but to be successful this would require a multi-year, multi-generation intensive, organized and consistent selection process[6]. »

f) L'identification de la race basée sur l'apparence physique du chien est non fiable

En vertu des articles 28 et suivants du projet de loi, un inspecteur ayant des « motifs raisonnables » de croire qu'un chien appartient à une race ou type de chiens prévus à l'annexe I du projet de loi pourra obtenir la saisie de cet animal. Le libellé même de ces articles sous-entend l'identification de la race à laquelle le chien appartient par

[4] David W. Silversides. Canine Breeds, Traits and Genetics (Juin 2017) à la p.8. (Annexe 2).
[5] *Ibid.* à la p. 8.
[6] *Ibid.* à la p. 12.

l'observation visuelle de ses caractéristiques physiques. Toutefois, les études scientifiques démontrent que cette méthode est problématique, particulièrement en ce qui concerne les pitbulls (Voith, et al., 2013)[7]. Par exemple, une étude américaine de 2015 démontre que parmi 120 chiens, 52 % furent identifiés par des vétérinaires et employés de refuges animaliers comme étant de « type pitbull » alors que seulement 21 % n'ont été identifiés comme tels par une analyse génétique (Olsen, et al., 2015).

De plus, une variation mineure dans le matériel génétique peut changer considérablement les attributs physiques d'un chien. En d'autres mots, deux chiens quasi identiques au plan génétique peuvent présenter des morphologies distinctes. Un chien pourrait donc être mal classifié en raison d'une simple variabilité génétique lui donnant l'apparence d'appartenir à une race différente.

Il est donc impossible de déterminer avec certitude la race d'un chien basé uniquement sur ses caractéristiques physiques. Conséquemment, il est fortement déconseillé de donner le pouvoir à un inspecteur de déterminer la race d'un chien sur simple observation visuelle. À défaut, l'application du projet de loi 128 pourrait donc résulter en ce qu'un nombre considérable de chiens soient arbitrairement et, surtout, erronément saisis et euthanasiés sous prétexte qu'au seul vu de leur physique, ce sont des chiens potentiellement dangereux.

g) L'analyse génétique ne permet pas de déterminer la race d'un chien hybride avec une certitude raisonnable

L'analyse génétique constitue aujourd'hui la seule méthode permettant de déterminer la race d'un chien avec une fiabilité raisonnable. Une étude publiée dans le journal *Science* fait état d'une technique permettant d'identifier correctement la race de 400 chiens parmi 404 en fonction de marqueurs génétiques (Parker, et al., 2004). Toutefois, la fiabilité de cette méthode est strictement limitée à l'identification des chiens de pure race. En effet, les caractéristiques morphologiques dominantes observées chez différentes races sont dues à des variations génétiques minimes (Ostrander, 2007). En comparaison les chiens mixtes présentent une diversité génétique considérablement plus élevée que les chiens de pure race. Les techniques d'analyses génétiques ne permettent donc pas de catégoriser un chien de race hybride de manière satisfaisante.

Selon le *American Veterinary Medical Association*, presque la moitié des chiens aux États-Unis sont de race mixte. Au Québec, ce sont 2% des chiens qui sont de pure race. Les 98% restants sont des chiens hybrides. Il est illusoire de penser que la population ou l'État a les moyens de faire faire les analyses ADN à cette fin. Or, à moins d'obtenir le certificat attestant du pedigree du chien, les propriétaires de chiens au Québec ne sont pas en mesure de déterminer si les articles 17 et 19 s'appliquent à eux. Par ailleurs, dans les cas d'adoption de chien, les propriétaires ne peuvent pas non plus se

[7] Voir Annexe 5.

fier aux informations inscrites dans le dossier du chien, car les refuges comme la SPCA ne sont pas plus en mesure d'identifier visuellement la race d'un chien, ce qui crée plusieurs erreurs d'identification.

h) La constitution génétique d'un chien n'est pas indicative de sa dangerosité

Le projet de loi 128 est également déficient au niveau scientifique en ce qu'elle prévoit que certaines races sont réputées dangereuses. Toutefois, il n'existe aucune preuve scientifique indiquant que certaines races soient naturellement dangereuses (DL, Yuying, & Serpall, 2008). En effet, le comportement d'un animal est le résultat des interactions entre son bagage génétique et l'environnement dans lequel il évolue. Des études animales démontrent que les traits comportementaux sont liés à une multitude de gènes ainsi que plusieurs facteurs environnementaux (Flint, 2003; Willis Owen & Flint, 2006). Le génotype d'un chien, et donc la race, n'est donc pas un outil efficace pour prédire le comportement de celui-ci.

i) Portée discriminatoire de la loi

En visant les races particulières de chiens prévues à l'annexe I du projet de loi, ce dernier a une portée discriminatoire en ce qu'elle vise de façon arbitraire les populations vulnérables tels que les itinérants et les personnes à faibles revenus. En effet, ceux-ci ne sont souvent pas en mesure de défrayer les coûts engendrés par une saisie de leur animal et devront donc abandonner toute contestation de la décision.

II. LES CAS PARTICULIERS

L'été 2016 a vu plusieurs incidents impliquant des chiens être médiatisés. Cette exposition médiatique a augmenté le sentiment d'insécurité auprès de la population et a encouragé l'adoption rapide d'un règlement qui visait à interdire certaines races ou types de chiens sur le territoire de la Ville de Montréal.

En réponse au climat social, la ville de Montréal a alors adopté un règlement sur le contrôle des animaux sans que celui-ci ne fasse l'objet de consultations publiques et incluant des dispositions interdisant des races particulières.

Après l'adoption du règlement 16-060 sur le contrôle des animaux de la Ville de Montréal, les propriétaires de chiens avaient jusqu'au 31 décembre 2016 pour déposer leur demande pour un permis spécial. Cette demande, pour être acceptée, était assortie de plusieurs conditions soit :

- La demande doit se faire en personne;
- la demande de permis accompagnée du paiement de 150$;
- la preuve de propriété du chien
- la preuve de résidence dans un des arrondissements de la Ville de Montréal;
- la preuve de stérilisation;
- la preuve de vaccination contre la rage;
- la preuve de micropuce; et
- le certificat de recherche de casier judiciaire avec attestation du Service de police de la Ville de Montréal de non-culpabilité dans les 5 ans avant la demande de permis ou renouvellement, d'une infraction de l'annexe IV;

Or, les propriétaires de chiens avaient alors un très court délai pour se conformer au règlement. Les informations fournies par les bureaux d'accès Montréal 311 variaient alors d'un bureau à l'autre relativement aux documents à fournir pour déposer la demande avant la date limite.

Également, les bureaux de l'administration ayant étant fermés dès le 22 décembre 2016, toutes les personnes à l'extérieur de la ville de Montréal durant la période des fêtes n'ont pas pu déposer leur demande à temps. Ce n'est que suite à l'intervention de l'Ombudsman de Montréal que les délais ont pu être prolongés jusqu'au 31 mars 2017.

Cependant, la difficulté d'identifier les chiens visés par l'interdiction et l'opacité du processus a fait en sorte que 590 propriétaires de chiens qui avaient remplis leur demande à temps pour le 31 mars 2017 ont reçu un avis de la Ville de Montréal les enjoignant de se débarrasser de leur chien puisqu'ils n'avaient pas effectué leur demande dans le délai requis.

Suite à notre intervention judiciaire, la Ville de Montréal s'est alors engagée à prolonger le délai pour compléter une demande déposée avant le 31 mars 2017 jusqu'au 19 décembre 2017. Toutefois, l'engagement a été renouvelé par la décision du conseil de Ville de suspendre les dispositions attaquées en justice avec le but ciblé de les abroger.

Or, ces échecs de la part de l'administration de la métropole de la province laissent indiquer que l'application de mesures visant l'interdiction de certaines races particulières de chiens était difficile, couteuse et lourde. Les résultats du règlement étaient d'autant plus imprévisibles dépendamment de l'information communiquée par le préposé de la ville au bureau d'accès Montréal, mais également de l'application de critères arbitraires tels que de répondre à un certain nombre de caractéristiques morphologiques.

a) Le règlement visant les races n'a pas réduit les morsures à Montréal

Contrairement aux données collectées par la patrouille de contrôle animal du Service de la concertation des arrondissements, on peut dénoter que le nombre de morsures pour l'année 2016 s'étend sur douze mois et totalise 263 signalements. Or, pour l'année 2017, les données collectées s'étendent pour la période de janvier 2017 au 30 septembre 2017. Pourtant, 196 signalements ont été rapportés durant cette période.

Également, le tableau préparé par la Ville de Montréal ne nous permet pas de confirmer que la personne qui a identifié la race et ou le type de chien impliqué dans un incident de morsure ait réellement les compétences pour le faire. En effet, ni les premiers répondants ni les membres de la patrouille canine n'ont la formation pour identifier avec certitude la race ou le type de chien. D'autre part, les personnes victimes de morsures de chiens ne sont pas plus informées sur la méthode pour identifier un chien selon sa race ou son type.

L'inefficacité du règlement de la Ville de Montréal à diminuer de manière concrète le nombre de morsures de chiens s'explique par l'absence de mise en place de programmes visant à éduquer et à former les propriétaires de chiens.

Plutôt que de marginaliser les propriétaires de chiens de type ou de races prohibées, nous devons comme société œuvrer à protéger la collectivité en instaurant de divers programmes d'éducation populaire sur les chiens et la manière d'interagir avec eux pour les parents, les enfants dès le primaire, pour les premiers répondants pour les inspecteurs canins, etc.

b) Les professionnels refusent d'utiliser des critères morphologiques pour identifier le type ou la race d'un chien en santé et sans problème de comportement

Dans le cadre de l'application du règlement de la Ville de Montréal, de nombreux propriétaires de chiens croisés ont rencontré beaucoup de difficultés pour obtenir la race ou le type de chien auquel appartenait leur chien. En effet, certains vétérinaires, suivant l'avis de l'Ordre des médecins vétérinaires du Québec, ont refusé d'identifier par de simples critères morphologiques la race ou le type du chien. Ce refus était basé sur l'absence de fondement scientifique dans l'identification visuelle d'un animal, sachant que deux chiens d'une même portée et partageant donc un bagage génétique très similaire, peuvent avoir des apparences diamétralement opposées selon quels gènes sont exprimés.

c) Les fonctionnaires chargés de l'application du règlement n'avaient pas les compétences requises pour identifier les chiens visés par l'interdiction

En effet, nous pouvons constater que lors de l'implantation du règlement sur le contrôle des animaux dans la Ville de Montréal, l'affichage de poste[8] pour faire partie de la patrouille canine, détachement d'inspecteur dédié à l'application du règlement, aucune exigence particulière n'était requise si ce n'est d'être titulaire d'un permis de conduite de classe 5.

d) Impact électoral et mobilisation sociale des montréalais

La mise en place du règlement interdisant certains types de chiens ou chiens hybrides n'a pas obtenu l'accord d'un nombre important des résidents de la ville de Montréal. Le 5 novembre 2017, les Montréalais ont préféré accorder leur vote au parti Projet Montréal plutôt que d'appuyer une administration qui souhaitait bannir certaines races de manière arbitraire. La plateforme de Projet Montréal a promu un programme de gestion animalière sans LRP.

e) Calgary, Alberta

Le programme conçu par Bill Bruce pour la Ville de Calgary a été conçu pour responsabiliser les propriétaires de chiens. En pénalisant et corrigeant les comportements relativement mineurs, le programme vise à redresser le comportement du chien et de son maître. Cette approche proactive se base sur l'enregistrement des chiens et des chats, l'éducation populaire donnée aux enfants jusqu'à l'âge adulte ainsi qu'aux propriétaires de chiens afin d'assurer la sécurité de chacun.

Par exemple, les amendes augmentent avec la gravité de l'infraction. Les propriétaires reçoivent un constat d'infraction de 350 $ si leurs chiens mordent et de 750 $ si les blessures sont suffisamment graves pour nécessiter des soins médicaux. Une morsure grave ou une attaque totale entraîne une amende de 1 500 $. Les employés du

[8] Consultation de l'offre d'emploi numéro: MHM-15-BHRES-789420-2 https://simenligne.ville.montreal.qc.ca/... (Page consultée le 14 mars 2018)

département du contrôle des animaux saisissent les chiens au comportement dangereux ou qui attaquent et les détiennent pendant 30 jours jusqu'à ce que l'audition de la demande pour euthanasier le chien saisi, le cas échéant.

Ce système mis en place vise tous les chiens de Calgary et assure donc la protection de la collectivité, car le pourcentage de chiens enregistrés est l'un des plus élevés au pays. Également, l'obligation de déclarer les incidents de morsures permet de constater que leur nombre a bel et bien diminué.

f) Ontario

Bien que la province de l'Ontario ait adopté une législation LRP interdisant notamment les pitbulls, le nombre de morsures n'a pas diminué[9].

En effet, le nombre d'hospitalisations liées à des morsures de chiens est en hausse depuis l'interdiction des chiens de « type pit bull » (767 cas en 2014, alors qu'en 2005, lors de l'entrée en vigueur de la loi visant l'interdiction de ces chiens, le nombre s'élevait à 486)[10].

[9] https://globalnews.ca/news/2527882/torontos-pit-bulls-are-almost-gone-so-why-are-there-more-dog-bites-than-ever/

[10] *Découverte*, Épisode du 11 septembre 2016, Ici Radio-Canada Télé

III. RECOMMANDATIONS SUGGÉRÉES

Après étude du projet de loi 128, nous avons colligé certaines modifications qui à notre avis, permettraient au projet de loi de remplir pleinement son objectif de favoriser la sécurité des personnes par la mise en place d'un encadrement concernant les chiens.

L'objet du projet de loi, énoncé à l'article 1, souligne l'importance d'assurer la sécurité des personnes par la mise en place d'un encadrement des chiens. Toutefois, le dispositif d'encadrement proposé ne répond pas aux causes sous-jacentes des incidents de morsures. De plus, un faux sentiment de sécurité sera créé car plusieurs pourraient croire que les races non-bannies ne sont pas dangereuses.

Article 2

Modification suggérée:

Article 2. Les dispositions de la *Loi sur le bien-être et la sécurité de l'animal* ~~ne peuvent être interprétées comme ayant pour effet d'empêcher l'application des dispositions de la présente loi et de ses règlements~~.s'appliquent à la présente loi.

L'article 2 du projet de loi prévoit que la *Loi sur le bien-être et la sécurité de l'animal* ne s'applique pas aux dispositions du projet de loi 128. Or, il nous apparait tout à fait illogique de tolérer les mauvais traitements à des chiens ou de ne pas garantir que leurs impératifs biologiques ne soient pas respectés alors même que les procédures prévues portent atteinte aux droits des propriétaires de chiens avant même qu'un expert ne se soit prononcé sur la dangerosité de leur chien.

Par exemple, malgré les lacunes dénotées sur l'identification des chiens visés par l'interdiction de certaines races particulières mentionnées à l'annexe I du projet de loi, un chien erronément identifié comme un chien réputé potentiellement dangereux ou interdit sera moins bien traité et ne pourra bénéficier de la protection de la loi.

Le projet de loi, en plus d'être arbitraire, affaiblit considérablement la portée de la *Loi sur le bien-être et la sécurité de l'animal*, pourtant adopté à l'unanimité par l'Assemblée nationale le 5 décembre 2015.

Il serait pertinent de rappeler ici les paroles du ministre Paradis, député de Brome-Missisquoi lors de l'adoption du projet de loi : « La seule voix dont disposaient les animaux et dont ils disposent encore, ce serait la voix des parlementaires qui seront appelés à voter sur ce projet de loi. Et je rappellerai la phrase de Gandhi : « On

reconnaît le degré de civilisation d'un peuple à la manière dont il traite ses animaux. » Le Québec avait beaucoup de progrès à accomplir[11]. »

Nous recommandons donc que la *Loi sur la sécurité et le bien-être de l'animal* s'applique également aux chiens nonobstant la mise en vigueur éventuelle du projet de loi 128.

En cas de saisie du chien, ceux-ci doivent donc être bien traités et leur placement ne devrait pas être restreint aux seuls refuges, chez les vétérinaires et fourrières autorisés par la *Loi sur la sécurité et le bien-être de l'animal*, mais également chez une tierce partie un foyer d'accueil qui s'engagerait par écrit à respecter certaines conditions le cas échéant.

Également, les chiens visés par l'Annexe I, en cas d'interdiction par le gouvernement, ne devraient pas être envoyés dans les laboratoires tel que le prévoit l'article 20 du projet de loi. Il est inquiétant qu'en 2018, l'Assemblée nationale pourrait même proposer une telle cruauté.

Article 5(1)

Les exemptions pour certains chiens dans l'article 5(1), devraient inclure des chiens de soutien émotionnel.

Des chiens de soutien professionnel sont reconnus comme ayant un statut différent des chiens de compagnie. Ces chiens jouent un rôle important au niveau du bien-être psychologique de leurs maîtres et sont reconnus pour ce rôle par un médecin ou psychologue

Ces chiens sont soumis à des règles différentes par des compagnies aériennes et par la Régie du logement.

De demander au maître de se soumettre à certaines exigences répressives du règlement (par exemple le port obligatoire de la muselière) pourrait certainement nuire au bénéfice positif au niveau émotionnel que ces animaux amènent aux bénéficiaires de leur soutien émotionnel.

Modification suggérée:

Article 5. Les chiens suivants ne sont pas visés par la présente loi :

[11] Journal des débats de l'Assemblée nationale, 3 décembre 2015, vol. 44, no. 137. http://www.assnat.qc.ca/en/travaux-parlementaires/assemblee-nationale/41-1/journal-debats/20151203/160799.html#_Toc437005318

1° un chien dont une personne a besoin pour l'assister et qui fait l'objet d'un certificat valide attestant qu'il a été dressé à cette fin par un organisme professionnel de dressage de chiens d'assistance;

2° un chien d'une équipe cynophile au sein d'un corps de police;

3° un chien utilisé dans le cadre des activités du titulaire d'un permis délivré en vertu de la Loi sur la sécurité privée (chapitre S-3.5);

4° un chien utilisé dans le cadre des activités d'un agent de protection de la faune.

5° un chien de soutien émotionnel reconnu par un médecin ou un psychologue.

Le gouvernement peut, par règlement, dans les cas et aux conditions qu'il détermine, exempter tout autre chien de l'application, en tout ou en partie, de la présente loi.

Article 6

Le terme « blessures » aux articles 6, 7 et 8 devrait être défini.

Modification suggérée:

Article 6. Le médecin vétérinaire peut ~~est tenu~~ de signaler sans délai à la municipalité locale concernée le fait qu'un chien a infligé une blessure à une personne ou à un animal domestique en lui communiquant, lorsqu'ils sont connus, les renseignements suivants :

1° le nom et l'adresse du propriétaire ou du gardien du chien;

2° tout renseignement, dont la race ou le type, permettant l'identification du chien;

3° le nom et les coordonnées de la victime ainsi que la description de la blessure qui lui a été infligée;

4° le nom et les coordonnées du propriétaire ou du gardien de l'animal domestique blessé ainsi que la description de la blessure qui lui a été infligée.

Le médecin vétérinaire est également tenu de signaler à la municipalité concernée tout chien pour lequel il a des motifs raisonnables de croire qu'il constitue un risque pour la santé ou la sécurité publique. Il lui communique les renseignements prévus aux paragraphes 1° et 2° du premier alinéa.

Le gouvernement peut également prescrire, par règlement, d'autres renseignements qui doivent être communiqués à la municipalité locale concernée.

<u>Une blessure est définie comme toute lésion physique de gravité suffisante pour nécessiter des soins médicaux.</u>

Le terme est trop vague et son sens ordinaire inclut des lésions très mineures, qui pourraient être infligés par un chien démontrant des comportements normaux qui ne sont pas dangereux.

Le sens ordinaire donné au terme « blessure » inclut donc toute modification de la structure d'un tissu occasionné par un choc ou un coup[12].

Ce qui comprend un hématome causé par un chiot de quelques semaines qui mordille en jouant ou une égratignure causée par un chien adulte qui saute sur quelqu'un en guise de salutation – tous deux des comportements canins normaux.

Or, ce qui devrait préoccuper le législateur, ce ne sont pas les lésions mineures qui pourraient être infligées de manière accidentelle, par un chien exhibant un comportement normal, mais plutôt les lésions de gravité suffisante pour nécessiter des soins médicaux (antibiotiques, points de suture, intervention chirurgicale)

Les vétérinaires ne devraient pas avoir l'obligation de dénoncer tous les incidents de morsures.

Également, les informations que reçoit le médecin vétérinaire ne sont pas des faits dont il a eu personnellement connaissance: il s'agit plutôt de ouï-dire qui pourait être utilisé à l'encontre de personnes alors que ce type de preuve est irrecevable en cour. En l'espèce, on peut même comparer la valeur de la dénonciation du vétérinaire à la municipalité à celle d'une photo prise par un radar-photo[13]. Or, dans les deux cas, les informations rapportées constituent un ouï-dire.

Modification suggérée:

Article 6. Le médecin vétérinaire ~~est tenu~~ ~~de~~ peut signaler sans délai à la municipalité locale concernée le fait qu'un chien a infligé une blessure à une personne ou à un animal domestique en lui communiquant, lorsqu'ils sont connus, les renseignements suivants :

1° le nom et l'adresse du propriétaire ou du gardien du chien;

[12] Définition Larousse de blessure : « lésion produite en un point quelconque du corps par un choc, un coup, une arme ou un corps dur quelconque. »
[13] *Directeur des poursuites criminelles et pénales c. Bove*, 2016 QCCQ 13829.

2° tout renseignement, ~~dont la race ou le type~~, permettant l'identification du chien;

3° le nom et les coordonnées de la victime ainsi que la description de la blessure qui lui a été infligée;

4° le nom et les coordonnées du propriétaire ou du gardien de l'animal domestique blessé ainsi que la description de la blessure qui lui a été infligée.

Article 7

Les vétérinaires et médecins ne devraient pas à avoir à spéculer sur la race ou le type du chien ayant infligé une blessure.

Les articles 7 et 8 imposent aux vétérinaires et aux médecins l'obligation de communiquer à la municipalité la race ou le type du chien ayant infligé la blessure signalée, ce qui les oblige à communiquer des informations peu fiables et purement spéculatives.

Les médecins et les vétérinaires seront consultés pour prodiguer des soins à la personne ou à l'animal qui a été victime de la morsure et donc devront se fier aux dires du patient[14] ou du client quant à la race du chien responsable de la blessure.

Or, l'identification de la race ou du croisement de races d'un chien en fonction de ses caractéristiques physiques est très peu fiable, et ce même lorsque l'identification est effectuée par des personnes ayant une expertise dans le domaine animalier (citer les études).

L'OMVQ lui-même soutient que ses membres ne devraient identifier la race d'un chien seulement lorsque l'animal détient un certificat d'enregistrement à un club canin reconnu. Il soutient également que que l'identification de la race ou du croisement de races d'un chien en fonction de ses caractéristiques physiques est très peu fiable et biaisée.

Prétendre être en mesure de correctement identifier la race à laquelle appartient un chien, particulièrement un chien croisé, en se référant à sa simple apparence physique pourrait contrevenir dans certains cas au devoir d'intégrité du médecin vétérinaire, tel qu'énoncé à l'article 9 du Code de déontologie des médecins vétérinaires[15].

[14] Or les études démontrent que les patients ont un biais défavorable contre certains types de chiens et les identifient erronément lors d'incidents de morsures. (Voir annexe 7).
[15] « Code de déontologie des médecins vétérinaires », RLRQ c. M-8, r.4

Article 9

La levée du secret professionnel doit être considérée comme une exception et non la règle.

Les médecins vétérinaires, en tant que professionnels, sont tenus au secret professionnel lequel est garanti par la *Charte québécoise*[16] à l'article 9. Or, les articles 6 et 9 prévoient l'obligation pour tous les médecins vétérinaires de lever le secret professionnel dès qu'un chien a infligé une blessure à une personne ou à un animal. Or, comme il a déjà été exposé, le terme de blessure étant très large, une telle disposition reviendrait à faire disparaitre le droit de chacun au respect du secret professionnel. Les exceptions légales et de common law permettant la levée du secret professionnel sont extrêmement circonscrites[17].

Modification suggérée:

Article 9. ~~Les obligations de signalement prévues aux articles 6 et 7 s'appliquent même à l'égard des renseignements protégés par le secret professionnel et malgré toute autre disposition relative à l'obligation de confidentialité à laquelle le médecin vétérinaire et le médecin sont tenus.~~

~~Aucune poursuite en justice ne peut être intentée contre un médecin vétérinaire ou un médecin qui, de bonne foi, s'acquitte de son obligation de signalement.~~

Article 17

La présomption prévue à l'article 17 doit être supprimée.

Les études scientifiques démontrent clairement que la race, le type et le croisement du chien n'a aucune corrélation avec son potentiel de dangerosité. Plus encore, ce type de législation qui ciblent des races particulières de chiens crée un faux sentiment de sécurité dans la population alors même que la majorité des morsures.

Modification suggérée:

Article 17. ~~Un chien dont la race, le type ou le croisement est visé à l'annexe I est réputé potentiellement dangereux.~~

~~Le gouvernement peut modifier l'annexe I.~~

[16] *Charte des droits et libertés de la personne*, RLRQ c. C-12.
[17] Voir à cet effet : *Code des professions*, RLRQ c. C-26, art. 60.4.; *Smith c. Jones*, [1999] 1 RCS 455.

Article 18

Le devoir de la municipalité de faire euthanasier un chien qui a causé la mort d'une personne ou lui a infligé une blessure grave doit être circonscrit selon les circonstances.

Modification suggérée:

Article 18. La municipalité locale ordonne au propriétaire ou au gardien d'un chien qui a mordu ou attaqué sans provocation une personne et qui a causé sa mort ou lui a infligé une blessure grave de faire euthanasier ce chien.

La municipalité ~~doit~~ peut faire euthanasier un tel chien dont le propriétaire est inconnu ou introuvable.

Pour l'application du présent article, constitue une blessure grave toute blessure physique pouvant entraîner la mort ou résultant en des conséquences physiques importantes.

Pour l'application du présent article, constitue une provocation l'insouciance ou l'acte intentionnel de provoquer ou faire réagir le chien.

Subsidiairement, l'article 18 devrait se lire avec « peut » afin de laisser aux municipalités une discrétion relativement à l'ordonnance d'euthanasie lorsque les circonstances le justifient. Par exemple, des incidents de morsure de chiens envers des personnes peuvent se manifester alors que le chien agit en tant que protecteur de son propriétaire notamment lors de la commission d'infractions criminelles de la part de la personne attaquée par le chien.

Modification suggérée:

Article 18. La municipalité locale peut ordonne[r] au propriétaire ou au gardien d'un chien qui a mordu ou attaqué une personne et qui a causé sa mort ou lui a infligé une blessure grave de faire euthanasier ce chien.

Article 19

L'article 19 doit être retiré vu qu'il pénalise de façon arbitraire les propriétaires de chiens visés par l'annexe I du projet de loi.

Modification suggérée:

Article 19. ~~Le gouvernement peut interdire tout chien qui est réputé potentiellement dangereux en vertu de l'article 17.~~

Article 20

La criminalisation des propriétaires de chiens interdits ne répond pas à l'objectif du présent projet de loi soit assurer la protection de la société par l'encadrement de chiens.

En effet, si certains propriétaires de chiens interdits vont remettre ces derniers aux refuges autorisés ou procéder à l'euthanasie de leurs chiens pourtant bien portants et n'ayant jamais manifesté de comportement agressif, d'autres propriétaires seront portés à violer la loi si elle est adoptée tel quel.

Modification suggérée:

Article 20. ~~Nul ne peut posséder, acquérir, garder ou élever un chien interdit.~~

~~Malgré le premier alinéa :~~

~~1° un établissement vétérinaire ainsi qu'un refuge, un service animalier, une fourrière ou toute personne ou organisme voué à la protection des animaux titulaire d'un permis visé à l'article 19 de la Loi sur le bien-être et la sécurité de l'animal peut recueillir temporairement un chien interdit aux fins de sa garde lorsqu'il a été saisi ou de sa disposition;~~

~~2° un établissement d'enseignement ou un établissement qui exerce des activités de recherche peut acquérir, posséder ou garder un chien interdit à des fins d'enseignement, d'étude ou de recherche.~~

Subsidiairement, vu le statut d'être doué de sensibilité conférée à l'animal, l'article 20 ne devrait pas prévoir comme exception que les chiens interdits puissent être utilisés pour des fins d'enseignement, d'études ou de recherche vu que leurs impératifs biologiques doivent être respectés.

Modification suggérée:

Article 20. Nul ne peut posséder, acquérir, garder ou élever un chien interdit.

Malgré le premier alinéa:

1° un établissement vétérinaire ainsi qu'un refuge, un service animalier,

une fourrière ou toute personne ou organisme voué à la protection des animaux titulaire d'un permis visé à l'article 19 de la Loi sur le bien-être et la sécurité de l'animal peut recueillir temporairement un chien interdit aux fins de sa garde lorsqu'il a été saisi ou de sa disposition;

2° un établissement d'enseignement ou un établissement qui exerce des activités de recherche peut acquérir, posséder ou garder un chien interdit à des fins d'enseignement, d'étude ~~ou de recherche~~.

Articles 21 à 23

Comme le prévoit les articles 21 à 23 du projet de loi, la municipalité a le pouvoir de rendre des ordonnances visant l'application de différentes mesures allant jusqu'à l'euthanasie de l'animal. Or, l'article 23 ne prévoit aucun mécanisme d'appel permettant de réviser la décision de la municipalité.

Vu le caractère quasi-judiciaire de la décision d'une municipalité de procéder à l'euthanasie d'un animal, il y a lieu de mitiger les avantages et inconvénients d'une telle décision pour la collectivité et l'individu.

Article 22

Un processus de révision de la décision doit être implanté par la municipalité.

Lorsqu'une ordonnance est rendue par la municipalité de déclarer un chien potentiellement dangereux ou de rendre une ordonnance d'euthanasie, il doit être permis au propriétaire ou gardien du chien visé par l'ordonnance de faire réviser la décision par le tribunal.

En effet, vu les conséquences néfastes que peuvent apporter l'ordonnance pour le propriétaire du chien visé et ledit chien, nous pensons qu'une telle décision a des conséquences considérables sur le noyau familial et devrait être susceptible d'une révision ou d'un appel.

Modification suggérée:

Ajouter un processus de révision de la déclaration ou de l'ordonnance de la municipalité.

Article 23

Un meilleur encadrement des pouvoirs de saisie de l'inspecteur est requis.

Modification suggérée:

Article 23. À l'expiration de ce délai, la municipalité peut saisir le chien aux fins de faire exécuter l'ordonnance, sauf l'euthanasie, dans les meilleurs délais. Le chien est remis au propriétaire ou au gardien dès que l'ordonnance a été exécutée, ~~sauf s'il a été saisi pour être euthanasié conformément à l'article 18~~.

Section IV Inspection, saisie et enquête

Cette partie du projet de loi énumère les pouvoirs octroyés à l'inspecteur de la municipalité dans l'exercice de ses fonctions. Or, bien que l'inspecteur ait à identifier si le comportement du chien est potentiellement dangereux, il n'y a aucune indication des critères à remplir afin d'exercer ces fonctions.

Or, autant l'identification visuelle de chiens qui seraient réputé potentiellement dangereux ou interdits est difficile et obtient généralement des résultats non-probants de la part même de vétérinaires et personnel spécialisé chez les animaux, autant les officiers de police ont eux-mêmes admis ne pas avoir la formation ou compétence requise pour procéder à l'évaluation du chien.

Pourtant, cette section de la loi prévoit des pouvoirs extrêmement larges pour l'inspecteur qui peut ainsi inspecter tout lieu et véhicule sans qu'une autorisation ou un mandat de perquisition ne soit nécessaire. Ainsi, l'inspecteur municipal aurait des pouvoirs plus grands que l'agent de la paix dans l'exercice de ses fonctions sans pour autant avoir reçu une formation lui permettant même d'avoir des « motifs raisonnables de croire ».

Article 24

La fonction d'inspecteur doit être exercée par un individu compétent et formé.

Vu l'étendue des pouvoirs conférés à l'inspecteur, le fonctionnaire ou l'employé désigné par la municipalité devrait recevoir une formation mixte en comportement canin et en santé afin de pouvoir notamment qualifier une blessure soit être en mesure de différencier une morsure d'une lacération.

Également, comme le témoigne Dr Esther Schalke dans son étude, l'évaluation du comportement d'un chien peut être biaisée par la personne qui l'évalue. En effet, le même comportement, par exemple un aboiement, peut être considéré comme un comportement agressif chez une personne qui a peur des gros chiens et comme un comportement normal pour un chien de plus petite taille ou évalué par une personne qui ne craint pas les animaux de grande taille.

Modification suggérée:

Article 24. Un fonctionnaire ou un employé désigné par la municipalité locale conformément à l'article 44 peut agir comme inspecteur sur le territoire de cette municipalité aux fins de veiller à l'application de la présente loi et de ses règlements.

L'inspecteur doit avoir reçu la formation pertinente relative au comportement canin.

Article 25

Le pouvoir de l'inspecteur de pénétrer dans un véhicule devrait être assujetti à l'obtention d'un mandat de perquisition vu le caractère privé que revêt le véhicule automobile.

En effet, la jurisprudence est constante à l'effet que l'expectative de vie privée et l'inviolabilité de la demeure s'étendent également à l'inspection et à la fouille du véhicule automobile. En ce sens, nous proposons que soit étendue au véhicule automobile la protection de la demeure inviolable sans l'obtention d'un mandat de perquisition tel que prévu dans le Code de procédure pénale.

Modification suggérée:

Article 25. Un inspecteur qui a des motifs raisonnables de croire qu'un chien se trouve dans un lieu ou dans un véhicule peut, avec l'autorisation de la personne visée par l'inspection, dans l'exercice de ses fonctions :

1° pénétrer à toute heure raisonnable dans ce lieu et en faire l'inspection;

2° faire l'inspection de ce véhicule ou en ordonner l'immobilisation pour l'inspecter;

3° procéder à l'examen de ce chien;

4° prendre des photographies ou des enregistrements;

5° ~~exiger de~~ demander à quiconque la communication, pour examen, reproduction ou établissement d'extrait, de tout livre, compte, registre, dossier ou autre document, s'il a des motifs raisonnables de croire qu'il contient des renseignements relatifs à l'application de la présente loi ou de ses règlements;

6° exiger de quiconque tout renseignement et toute explication relatifs à l'application de la présente loi ou de ses règlements.

À défaut d'autorisation, l'inspecteur ne peut obtenir communication des renseignements requis qu'en vertu d'un mandat de perquisition obtenu conformément au Code de procédure pénale (chapitre C-25.1).

Un juge, sur la foi d'une déclaration sous serment faite par l'inspecteur énonçant qu'il a des motifs raisonnables de croire que les informations relatives à un chien qui constitue un risque pour la santé ou la sécurité publique se trouvent dans le document, extrait, de tout livre, compte, registre, dossier ou autre document, peut délivrer un mandat, aux conditions qu'il y indique, autorisant cet inspecteur à exiger de quiconque la communication dudit renseignement.

Lorsque le lieu ou le véhicule est inoccupé, l'inspecteur y laisse un avis indiquant son nom, le moment de l'inspection ainsi que les motifs de celle-ci.

Article 26

Le véhicule automobile devrait être couvert par la même protection que la maison d'habitation.

Modification suggérée:

Article 26. Un inspecteur qui a des motifs raisonnables de croire qu'un chien auquel s'applique la présente loi ou ses règlements se trouve dans une maison d'habitation peut exiger que le propriétaire ou l'occupant des lieux lui montre le chien. Le propriétaire ou l'occupant doit obtempérer sur-le-champ.

L'inspecteur ne peut pénétrer dans la maison d'habitation qu'avec l'autorisation de l'occupant ou, à défaut, qu'en vertu d'un mandat de perquisition obtenu conformément au Code de procédure pénale (chapitre C-25.1).

Un juge, sur la foi d'une déclaration sous serment faite par l'inspecteur énonçant qu'il a des motifs raisonnables de croire qu'un chien qui constitue un risque pour la santé ou la sécurité publique se trouve dans la maison d'habitation, peut délivrer un mandat, aux conditions qu'il y indique, autorisant cet inspecteur à y pénétrer, à saisir ce chien et à en disposer conformément aux dispositions de la présente section.

L'inspecteur ne peut pénétrer dans la maison d'habitation ou le véhicule automobile qu'avec l'autorisation de l'occupant ou, à défaut, qu'en vertu d'un mandat de perquisition obtenu conformément au Code de procédure pénale (chapitre C-25.1).

Article 28

La mention à l'article 20 devrait être retirée.

Modification suggérée:

Article 28. Un inspecteur peut, dans l'exercice de ses fonctions, saisir un chien s'il a des motifs raisonnables de croire qu'une infraction au ~~premier alinéa de l'article 20~~ ou à une disposition d'un règlement qui régit la possession d'un chien a été commise.

Il peut également saisir un chien aux fins de le faire examiner par un médecin vétérinaire choisi par la municipalité locale lorsqu'il a des motifs raisonnables de croire qu'il constitue un risque pour la santé ou la sécurité publique.

Aucun chien ne devrait être interdit d'office en raison de sa race, son type ou le croisement dont il est issu. La mention à l'article 20 devrait donc être retirée.

Article 29

Une tierce-partie devrait être autorisée à garder le chien saisi si elle s'engage par écrit à respecter les conditions visant à assurer la sécurité publique.

En effet, les impératifs biologiques du chien doivent être respectés par la personne qui a la garde du chien saisi. Advenant que ces conditions ne peuvent être respectées et que le bien-être de l'animal est en risque, le propriétaire de l'animal devrait pouvoir proposer qu'une tierce-partie ait la garde du chien si l'inspecteur a des motifs raisonnables de croire que le chien ne constituera pas un risque pour la santé et la sécurité publique.

Modification suggérée:

Article 29. L'inspecteur a la garde du chien qu'il a saisi. Il peut détenir le chien saisi ou en confier la garde à une personne dans un établissement vétérinaire ou dans un refuge, dans un service animalier, dans une fourrière ou dans un lieu tenu par une personne ou un organisme voué à la protection des animaux titulaire d'un permis visé à l'article 19 de la Loi sur le bien-être et la sécurité de l'animal. Il peut également en confier la garde à une à une personne autre que le saisi.

~~La garde du chien saisi est maintenue jusqu'à ce qu'il en soit disposé conformément aux dispositions de la présente section ou, en cas de poursuite, jusqu'à ce qu'un juge en ait disposé autrement.~~

~~Une personne à qui a été confiée la garde d'un chien saisi en vertu du présent article ne peut être poursuivie en justice par le saisi pour les actes qu'elle accomplit de bonne foi dans le cadre de son mandat.~~

L'animal saisi peut être gardé à l'endroit de la saisie si le propriétaire ou l'occupant de cet endroit y consent par écrit, selon des modalités convenues entre les parties. À défaut par le propriétaire ou l'occupant de cet endroit de consentir à une telle garde ou de respecter les modalités qui s'y rattachent, l'inspecteur peut demander à un juge l'autorisation de garder l'animal saisi sur place, aux conditions et modalités que le juge considère appropriées.

S'il y a urgence, l'inspecteur peut, avant l'obtention de l'autorisation d'un juge, établir des mesures de garde intérimaires permettant d'assurer le bien-être et la sécurité de l'animal.

Une personne à qui a été confiée la garde d'un chien saisi en vertu du présent article ne peut être poursuivie en justice par le saisi pour les actes qu'elle accomplit de bonne foi dans le cadre de son mandat à l'exception du respect des impératifs biologiques de l'animal conformément à la Loi sur le bien-être et la sécurité de l'animal.

Article 31

Le juge devrait avoir compétence pour remettre le chien dont l'illégalité de la possession a été établie à une autre personne pour laquelle la possession de l'animal est légale.

En effet, bien que le présent projet de loi vise à encadrer les chiens dans toute la province, plusieurs municipalités ont déjà adopté des règlements encadrant le contrôle des animaux et rendant la possession de certains chiens illégale sur leur territoire. Or, le juge saisi d'un tel dossier devrait avoir discrétion afin de pouvoir remettre le chien saisi dont on a établi l'illégalité de la possession dans la municipalité soit au propriétaire de l'animal s'il s'engage à ce que le chien visé ne se trouve plus sur le territoire de la municipalité ou à une autre personne qui s'engagerait à ce que le chien visé ne se trouve plus sur le territoire de la municipalité.

Modification suggérée:

Article 31. Malgré l'article 30, lorsque l'illégalité de la possession empêche la remise du chien saisi au propriétaire, au gardien ou à une autre personne qui pretend y avoir droit, le juge en ordonne la confiscation sur demande du saisissant ou du poursuivant; si l'illégalité de la possession n'est pas établie, le juge désigne la personne à qui le chien peut alors être remis. Lorsque l'illégalité de la possession est établie, le juge peut désigner la personne à qui le chien peut être remis si cette personne s'engage à ce que le chien à être remis quitte le territoire de la municipalité où sa possession est illégale.

Un préavis de cette demande est signifié au propriétaire ou au gardien et à l'autre personne qui peut présenter la demande, sauf s'ils sont en présence du juge. Ce préavis peut, le cas échéant, être donné au constat d'infraction et indiquer que la demande de confiscation sera présentée lors du jugement.

La municipalité locale peut, selon le cas, faire euthanasier le chien confisqué, le vendre, le donner ou le confier à un refuge, à un service animalier, à une fourrière ou à toute personne ou organisme voué à la protection des animaux titulaire d'un permis visé à l'article 19 de la Loi sur le bien-être et la sécurité de l'animal. Elle peut également donner ou confier le chien confisqué à une personne qui s'engage par écrit à ce que le chien à être remis quitte le territoire de la municipalité où sa possession est illégale.

Article 32

Le propriétaire du chien ne devrait pas avoir à remettre d'avance pour la garde de son chien lorsqu'on ordonne le maintien de la saisie du chien.

L'article tel que rédigé impose un fardeau financier trop lourd pour les propriétaires ou gardiens de chiens saisis. À cette étape du processus, le juge n'a toujours pas statué sur la dangerosité de l'animal et la légitimité de la demande du saisissant et le propriétaire du chien ne devrait pas avoir à assumer les frais de garde à venir.

Cette disposition rend impossible pour les propriétaires de chiens à faible revenus de même obtenir une défense pleine et entière contre l'infraction à laquelle ils seraient accusés vu les frais importants que peuvent occasionner la saisie.

Modification suggérée:

Article 32. Dès la signification d'un constat d'infraction, l'inspecteur doit, sauf s'il y a entente avec le propriétaire ou le gardien du chien, demander à un juge la permission de disposer du chien.
Un préavis d'au moins trois jours francs de cette demande est signifié au propriétaire ou gardien du chien, lequel peut s'y opposer.

Le juge statue sur la demande en prenant en considération le risque que constitue le chien pour la santé ou la sécurité publique et, le cas échéant, les coûts engendrés par le maintien sous saisie. Il peut ordonner la remise du chien au propriétaire ou au gardien, le maintien sous saisie jusqu'à jugement final, le don, la vente ou l'euthanasie du chien.

S'il ordonne la remise, celle-ci ne peut se faire que sur paiement des frais de garde engendrés par la saisie.

S'il ordonne la vente de l'animal, le produit de la vente est remis au propriétaire ou au gardien déduction faite des frais de garde.

S'il ordonne le maintien sous saisie du chien jusqu'à jugement final, il ordonne au propriétaire ou au gardien de verser, selon les modalités qu'il fixe, et ~~en outre~~ des frais de garde engendrés par la saisie~~, une avance à l'inspecteur sur les frais de garde à venir~~. Le juge peut prononcer la confiscation du chien si le propriétaire ou le gardien ne respecte pas les modalités de versement des frais de garde engendrés par la saisie. Il est alors disposé du chien conformément au troisième alinéa de l'article 31.

Article 42

La mention au premier alinéa de l'article 20 doit être retirée.

Modification suggérée:

Article 42. La déclaration de culpabilité pour une infraction ~~au premier alinéa de l'article 20 ou~~ à une disposition d'un règlement qui régit la possession d'un chien opère confiscation du chien saisi. »

Article 43

Le délai pour le préavis est trop long et devrait être réduit à 3 jours.

Modification suggérée:

43. Toutefois, le défendeur qui conteste le fait que le chien est un chien interdit ou réputé potentiellement dangereux doit donner au poursuivant un préavis d'une demande d'examen du chien, au moins 3 jours avant la date prévue pour le début de la poursuite, sauf si le poursuivant renonce à ce délai.

L'article 172 du *Code de procédure pénale* s'applique à cette demande.

Section VI Responsabilités et pouvoirs des municipalités locales

Les municipalités locales ne devraient pas être contraintes à appliquer et financer des mesures controversées qu'elles ont fait le choix législatif de ne pas adopter

La mise en place de mesures ciblant certaines races, types ou croisements de chiens nécessite un investissement important de fonds publics pour financer la confiscation et l'euthanasie d'animaux, ainsi que les poursuites judiciaires contre des propriétaires de chiens responsables uniquement en raison de l'allure physique de leur

chien. Il est excessif d'exiger de la part des municipalités locales, qui ont fréquemment un budget très limité, qu'elles portent un tel fardeau financier, d'autant plus que le gouvernement provincial, an allant de l'avant avec des mesures ciblant certaines races de chiens, a opté pour une mesure controversée, dont l'efficacité est discutable.

En optant pour cette mesure, le gouvernement provincial a fait un choix purement politique qui ne devrait pas être imposé aux municipalités. En effet, les municipalités locales ont toujours eu le pouvoir, à l'intérieur des limites prévues par la législation provinciale habilitante, de choisir quelles mesures elles souhaitaient privilégier pour encadrer les chiens dangereux. Certaines municipalités au Québec ont décidé d'aller dans le sens des interdictions de race, alors que d'autres ont consciemment fait le choix d'opter pour un autre modèle. Plusieurs municipalités, dont Laval, Beaconsfield, Sherbrooke et Sainte-Adèle, ont même récemment fait le choix de ne plus interdire de races ou de types de chiens, constatant que de telles mesures sont difficilement applicables et n'offrent aucun résultat probant quant à la sécurité du public. Il est inacceptable de ne pas respecter l'autonomie des gouvernements municipaux en présente matière, surtout étant donné la controverse qui entoure l'efficacité de la mesure choisie par le gouvernement provincial.

Article 46

L'autonomie des municipalités et leur décision d'adopter un règlement non-discriminatoire envers les chiens doivent être respectées.

Modification suggérée:

Article 46. La présente loi n'empêche pas une municipalité locale d'adopter des normes plus sévères que celles prévues par la présente loi et ses règlements pourvu qu'elles ne soient pas incompatibles avec celles établies par cette loi ou ses règlements.

~~**Tout règlement municipal comportant une norme moins sévère que celle prévue par un règlement pris en vertu de la présente loi est réputé modifié et la norme du règlement municipal remplacée par celle établie par le règlement pris en vertu de la présente loi.**~~

Section VII Dispositions transitoires et finales

Les dispositions transitoires établissent des conditions que doivent respecter les propriétaires des chiens qui seraient visées par une interdiction prévue à l'article 19.

IV. RECOMMANDATIONS PROPOSÉES

La CPSPC recommande donc que le gouvernement retire du projet de loi les dispositions visant l'interdiction de certaines races spécifiques.

La CPSPC privilégie une approche de la protection des personnes fondée sur le comportement et la personnalité des chiens, non pas sur leur génétique, pour permettre à des vétérinaires et à des comportementalistes de déterminer leur risque de dangerosité.

La CPSPC recommande que cette dangerosité soit évaluée à la lumière des circonstances entourant l'attaque par un chien et les six niveaux de l'échelle de Dunbar utilisée à Calgary, laquelle s'intéresse à la gravité objective des morsures canines.

La CPSPC propose que des mesures de redressement soient prévues, d'une part, pour les chiens ayant mordu, comme par exemples des cours canins ou le port de la muselière obligatoires, et d'autre part, pour les chiens qualifiés de dangereux, comme par exemple la saisie et la rééducation des chiens.

La CPSPC soutient des mesures préventives, incitatives et coercitives qui renforcent immédiatement l'application des règlements actuels, dont le port obligatoire de la laisse pour tous les chiens, sauf dans le domaine privé et dans les aires d'exercice canin.

La CPSPC propose de miser sur la responsabilisation des propriétaires et de sanctionner le non-respect de ces mesures par des amendes salées qui pourraient être doublées ou même triplées pour les propriétaires négligents, déviants et récidivistes.

La CPSPC propose que ces amendes soient également modulées en regard de l'échelle de Dunbar en tenant compte des circonstances et des spécificités objectives entourant la morsure en cause.

La CPSPC recommande de faire des campagnes d'information et de sensibilisation pour favoriser l'adhésion, la compréhension et le respect des mesures incitatives et coercitives adoptées.

La CPSPC incite fortement le gouvernement à injecter les ressources nécessaires pour augmenter le nombre d'inspecteurs municipaux présents dans les parcs publics, particulièrement près des écoles.

La CPSPC insiste sur l'importance que ces ressources soient également utilisées pour former adéquatement les inspecteurs canins et les policiers à assurer le respect des mesures en place, à enquêter sur les circonstances entourant les incidents de morsures, à effectuer des interventions particulières et adaptées, à assurer le suivi nécessaire et efficace des plaintes et à veiller au respect de la *Loi sur la sécurité et le bien-être animal*, notamment en cas de négligence et de cruauté animale.

La CPSPC recommande de prévoir un droit de contestation des conclusions de l'enquête par l'inspecteur canin et des mesures de redressement imposées devant un tribunal compétent et impartial.

La CPSPC recommande de garantir le droit du propriétaire ou de l'occupant d'une maison d'habitation de refuser l'entrée à l'inspecteur canin qui n'est pas muni d'un mandat de perquisition, sauf circonstances exceptionnelles comme si la vie ou la sécurité de la personne ou de l'animal sont en danger.

La CPSPC recommande l'implantation d'un programme d'éducation par des professionnels qualifiés au bénéfice des jeunes enfants, des enfants en âge préscolaire, des parents et des propriétaires des chiens ayant pour objectifs la prévention et la réduction des risques de morsures et s'intéressant au langage et au comportement canin.

La CPSPC recommande l'implantation d'un registre national centralisé des morsures canines qui contiendrait les descriptions des circonstances entourant une morsure, la version des propriétaires impliqués et les résultats de l'échelle de Dunbar.

La CPSPC reconnaît l'importance de l'enregistrement des chiens et propose que le gouvernement québécois offre des incitatifs et des récompenses aux propriétaires qui enregistrent leurs chiens, comme le fait avec succès le modèle conçu par Bill Bruce pour la Ville de Calgary, par le biais de cartes-cadeaux.

La CPSPC recommande qu'à l'achat ou à l'adoption d'un chiot, le propriétaire devrait avoir l'obligation de suivre un cours d'éducation canine à renforcement positif pour chiot qui inclut les volets suivants : socialisation, manipulation, inhibition de la morsure et mordillements, langage et comportement canin et prévention des morsures.

La CPSPC propose l'implantation de programmes d'assurance-responsabilité et d'assurance-médicale obligatoires au travers un partenariat public-privé pour s'assurer que les assureurs acceptent que les propriétaires souscrivent universellement à un prix abordable.

La CPSPC estime que ces recommandations et mesures alternatives inspirées du modèle de Calgary sont efficaces, objectives, rassembleuses et uniformes sur tout le territoire québécois. Bien que ces mesures doivent évidemment être implantées de concert avec les municipalités et les acteurs concernés, nous suggérons que le gouvernement québécois occupe pleinement sa compétence en matière de gestion animalière en portant une attention particulière aux propriétaires vulnérables et en situation financière précaire,

V. CONCLUSION

En conclusion, nous soumettons à la Commission que les dispositions visant certaines races particulières de chiens ne protègent personne. Il n'y a aucune base scientifique pour discriminer entre les races de chiens en prétendant qu'une race pourrait être plus à risque qu'une autre.

Au contraire, ce qui serait efficace est de suivre la tendance internationale d'abroger des lois de ce genre, de ne pas interdire des races spécifiques en misant plutôt sur l'éducation, la responsabilisation et la prévention de TOUS les chiens dangereux comme le prône d'ailleurs le programme élaboré par Bill Bruce pour la ville de Calgary, lequel fonctionne, pour sa part, en termes de réduction de morsures.

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ANNEXE 1

CONSEIL D'ADMINISTRATION ET MEMBRES DE LA COALITION POUR LA PROMOTION DE LA SECURITE DES PERSONNES ET DES CHIENS (« CPSPC »)

Le conseil d'administration de la CPSPC est composé de :

Mlle Sabrina Sabbah (Présidente, Directrice du développement des affaires) détient un baccalauréat en administration des affaires de HEC Montréal (2003) ;

« *Je rêve d'un monde où l'on pourrait célébrer tous les chiens, et ce, peu importe leur race, leurs différents croisements et/ou leur apparence physique. Je souhaite qu'on puisse enfin les considérer pour ce qu'ils sont vraiment et qu'on cesse de les étiqueter pour ce qu'ils ne sont pas.*»

Mlle Marie-France Ouimet (Vice-présidente, Directrice des communications et Directrice des affaires juridiques) détient un baccalauréat en droit, est présentement étudiante à la maîtrise en droit à l'Université de Montréal et travaille chez Goldwater Dubé ;

« *Le droit reconnaît désormais le statut d' « êtres doués de sensibilité » aux animaux qui portent bien malgré eux les stigmates de l'ignorance et des préjugés humains. L'interdiction de races spécifiques est une pratique rétrograde et inefficace qui implique le massacre systématique de milliers de chiens innocents et inoffensifs qui sont amalgamés à tort sur la base de critères irrationnels et arbitraires.*»

Me Anne-France Goldwater (Directrice des affaires juridiques) détient un baccalauréat en droit civil de l'Université McGill (1980), est membre du Barreau du Québec depuis 1981 et de l'Association des avocats et avocates en droit familial. Elle est associée principale de Goldwater Dubé, récipiendaire du Prix alliée du Forum sur l'orientation et l'identité sexuelles de 2003 ;

« *Nos élus doivent comprendre que punir des chiens selon leur apparence ne protège personne. Monsieur Spot n'est pas dangereux. Il est un adorable « Lovebull » sociable et socialisé qui ne demande rien d'autre qu'être aimé et apprécié tel qu'il est!*»

Me Julius Grey (Directeur des droits de la personne) est associé principal chez Grey Casgrain Avocats et pratique dans plusieurs domaines du droit. Il a reçu son éducation des Universités McGill et Oxford. Il a été admis au Barreau du Québec en 1974. Me Grey a été membre de la Faculté de droit de l'Université McGill de 1977 à 2002 en plus d'enseigner à l'Université de Montréal et à la Canadian Human Rights School à Charlottetown (Î.-P.-É.). Il a été Président de la Fondation canadienne des droits de la personne de 1985 à 1988. En 2004, il a reçu la Médaille du Barreau, soit la plus haute distinction accordée par le Barreau du Québec ;

« *Les lois sur les races spécifiques sont à la fois cruelles et inutiles.*»

Me Geneviève Grey (Directrice des droits de la personne) détient un baccalauréat en droit civil de l'Université Laval (2012) et un baccalauréat en littérature anglaise et science politique de l'Université McGill (2008). Elle est membre du Barreau du Québec depuis 2013 et est avocate chez Grey Casgrain Avocats ;

Mlle Rachelle Urtnowski-Morin (Trésorière, Directrice du financement et marketing) complète présentement un baccalauréat en droit à l'Université de Montréal ;

Mme Jennifer Gailis, M.Sc., CTC, CPDT-KA (Directrice du bien-être animal), est une éducatrice de chiens accréditée, étant diplômée avec mention par la prestigieuse Academy for Dog Trainers. Elle est titulaire d'une maîtrise en comportement et en bien-être animal de l'Université de Guelph et un BSc de l'Université McGill. Jennifer a précédemment travaillé en refuge pour animaux et a dirigé le plus grand refuge d'urgence pour animaux victimes de cruauté au Québec. Elle perfectionne constamment ses compétences en participant à des séminaires, avec quelques entraîneurs parmi les plus réputés au monde, dont Bob Bailey, Ken Ramirez et Jean Donaldson. Jennifer est consultante en matière de bien-être et comportement animal et propriétaire/éducatrice chez Bravo Fido, à Montréal ;

« *Faire l'élevage de chiens agressifs et craintifs favorise la production de chiens qui seront, eux aussi, agressifs et craintifs, et ce, peu importe leur race. Lorsque ces chiens sont en plus élevés dans des milieux défavorisés et où il y a de l'abus, on augmente ce risque. Nous avons un problème dans cette province, non pas avec les races de chiens, mais bien avec les pratiques d'élevage et d'éducation.* »

M. Sébastien Larabée, CPDT-KA (Directeur du programme canin) est un éducateur canin qui travaille avec la méthode de renforcement positif. À travers ses services, il vise à aider ses clients à développer une compréhension globale du chien, ses besoins et son comportement. Dans les 5 dernières années, Sébastien a assisté à plusieurs cours et séminaires donnés par d'importants spécialistes en comportement canin et a acquis une solide expérience sur le terrain. Sébastien est le cofondateur, avec Jennifer Gailis, de Bravo Fido, et y offre des cours d'éducation canine aux chiens et à leurs gardiens ;

« *Il est impossible d'identifier la race d'un chien à l'œil nu. Sans un document attestant du lignage de l'animal, comme un pedigree par exemple, les seules affirmations que l'on soit en mesure de faire sont: c'est un chien, c'est un croisé.* »

Me Anouk Laurent (Secrétaire générale et Directrice du bien-être humain) est diplômée de la Faculté de droit de l'Université d'Ottawa (1988) et est membre du Barreau du Québec depuis 1989. De plus, elle est titulaire d'une maîtrise de l'Université de Paris-II (Assas), en droit européen et a complété avec le succès l'Executive Development Program de l'IMD à Lausanne (Suisse) en 2003. Elle a travaillé comme conseillère juridique pendant plus de 20 ans auprès d'entreprises publiques et privées en Europe et au Canada. Elle dédie maintenant son temps à la mise en place d'un refuge pour personnes itinérantes avec animaux à Montréal.

La CPSPC est composée de membres venant d'horizons variés :

Dr Robert Campbell est diplômé du Western College of Veterinary Medicine (2009). Il a effectué un internat de perfectionnement en médecine et chirurgie des petits animaux à l'Ontario Veterinary College. Dr Campbell a terminé sa formation spécialisée en médecine dentaire et chirurgie buccale à l'Université Cornell en juillet 2016 et est devenu diplômé du American Veterinary Dental College en septembre 2016. Ses intérêts professionnels incluent la chirurgie maxillo-facial suite aux traumas, la chirurgie oncologique maxillo-faciale, les réparations en fissure palatine ainsi que la parodontologie avancée, l'orthodontie et l'endodontie ;

Dr Allan Gilmour est diplômé de l'Ontario Veterinary College (1992) et a fait son stage à New Haven, dans le Connecticut, avant de retourner à Montréal où il a fondé et continue d'exploiter la Clinique de santé animale située dans l'arrondissement Notre-Dame-de-Grâce à Montréal ;

Dr Florence Erdmann est vétérinaire et directrice médicale à l'Hôpital vétérinaire de Pierrefonds, où elle travaille depuis 1999. Elle est membre du conseil d'administration du Nichoir ;

Dre Jade Zollo est vétérinaire et diplômée de l'Université de Montréal (2011). Elle pratique à la Clinique Vétérinaire Plateau Mont-Royal. Elle participe aux soirées de mentorat pour les organismes à but non lucratif, tel Dans la rue, pour aider à éduquer les futurs vétérinaires et aider les jeunes sans-abri quant aux risques possibles avec leurs animaux ;

« *En tant que vétérinaire, je suis à 100% en désaccord avec la LSR. Lors d'une consultation, je ne vais jamais déterminer le potentiel d'agressivité d'un patient en fonction de sa race. Je vais me fier à son historique, à ses expressions faciales et à son langage corporel. Les chiens nous en disent beaucoup plus que nous croyons, il suffit de regarder et d'écouter.* »

Dre Laurie Dunbar est diplômée de l'Ontario Veterinary College (1986) et est copropriétaire de l'Hôpital vétérinaire de Pierrefonds. Elle est certifiée praticienne en réadaptation canine (2008) et dirige les services de chirurgie et de réadaptation physique à l'hôpital. Elle s'intéresse particulièrement à la gestion de la douleur, à la thérapie au laser et à la réadaptation physique. Elle est très impliquée dans les organismes de sauvetage des animaux de l'Ouest-de-l'Île. La Dre Dunbar offre fréquemment des présentations à des groupes d'intérêt sur l'utilisation du laser thérapeutique, sur le conditionnement et le bien-être canin ;

« *J'ai traité des chiens merveilleux et gentils de toutes races, y compris des chiens de type pit bull. J'ai également rencontré des chiens agressifs, dont certains étaient des chihuahuas et des caniches. Les vétérinaires, autres professionnels de la santé animale et les éducateurs canins sont les mieux placés pour évaluer le comportement d'un chien et la menace qu'il présente pour le public, et ce, quelle que soit sa race.* »

M. Jean Lessard travaille avec les chiens depuis plus de 20 ans. Il travaille au sein du Centre vétérinaire Rive-Sud depuis 18 ans et du Centre vétérinaire Laval depuis 4 ans. De plus, M. Lessard écrit et présente l'émission télévisée *On s'aime en chien* diffusée sur Ici Explora. Il est membre du Pet Professional Guild, du International Association of Animal Behaviour Consultats et cofondateur du Regroupement québécois des intervenants en éducation canine. Il est également fondateur et coordonnateur de Chienposium depuis 2000, soit un colloque annuel sur le comportement et l'obéissance canins ;

« *Bannir une race ne fonctionne pas. Il a clairement été prouvé par tant de municipalités et de pays que je ne vois pas pourquoi on s'obstine à penser de la sorte. Et pour la sécurité publique, il y a un règlement, un seul, qui, s'il avait été vraiment respecté, aurait évité tous les accidents qu'on connaît : tenir le chien en laisse. C'est aussi simple que ça.* »

Me Linda Hammerschmid est associée principale depuis 1992 chez Hammerschmid & Associés, un cabinet spécialisé en droit de la famille. Elle détient un baccalauréat en sciences politiques et une licence en droit de l'Université de Montréal. Elle est membre du Barreau du Québec depuis 1982 ;

« *D'abord, ils ont visé les chiens de type pit bull. Ensuite, les Staffordshire Terriers, puis, les Rottweilers. Quelqu'un a ensuite décidé que ce serait maintenant au tour des Bergers, des Danois et des Dobermans de disparaître. Votre chien sera-t-il le prochain? STOPPONS la LSR maintenant!* »

Me Marie-France Comtois détient un baccalauréat en droit de l'Université de Montréal, est membre du Barreau du Québec depuis 2014 et complète présentement sa troisième année d'études en médecine à l'Université de Montréal.

Me Mélissa Desrosiers détient un baccalauréat en droit de l'Université du Québec à Montréal, est membre du Barreau du Québec depuis 2013 et pratique présentement en tant qu'enquêteur à la Chambre de la sécurité financière ;

« *Les LSR sont des mesures purement discriminatoires visant certains chiens, lesquels sont jugés « dangereux » en raison de leur apparence physique, et ce, malgré qu'il ait été prouvé scientifiquement que les chiens de type pitbull ne sont pas plus agressifs qu'aucune autre race de chien. Les échecs répétés de ce type de législation prouvent son inefficacité et permettent de conclure qu'une telle loi est inapplicable, notamment en raison de la grande difficulté (voir l'impossibilité) d'identifier un chien issu de races croisées.* »

Mme Érika-May Poulin Pasmore est une zoothérapeute avec plus de 15 ans d'expérience. Elle est titulaire d'une maîtrise en Counselling Psychology de l'Université McGill et est diplômée de l'École Internationale de Zoothérapie. Elle est membre de l'Ordre des Conseillers et conseillères d'orientation du Québec et de la Corporation des zoothérapeutes du Québec. Érika-May est fondatrice des services de zoothérapie KhaliZoo qui visent à soutenir la croissance et le rétablissement personnels des individus ayant des difficultés physiques, psychologiques et/ou émotionnelles grâce à l'assistance des animaux ;

Le **Fonds étudiant pour la défense juridique des animaux** (FEDJA) est affilié avec l'Animal Legal Defense Fund et est un groupe composé d'étudiants de premier cycle de la Faculté de droit de l'Université de Montréal ;

Mlle Alessandra Magini est manipulatrice d'animaux exotiques et offre des services de thérapie assistée, de gardiennage, de fauconnerie, de formation animale et de sauvetage pour les animaux exotiques. Elle a participé à de nombreux stages tels que la formation des chiens de police de la Ville de Montréal et ceux de l'aéroport YUL. Elle est cofondatrice de la Fox Community, un organisme à but non lucratif, et dirige la société PetFriend. Elle est également membre du comité de protection et d'éthique animale de l'Institut national de recherche scientifique (INRS, Centre Armand Frappier) ;

Mlle Mégane Bigot de la Touanne est Cofondatrice et Directrice marketing de Protection Pitbulls à Montréal. Mégane est également responsable marketing chez Alpha Do Distribution et assistante-gérante chez Montréal Affichage, une division de Promotions Propaganda ;

« *Sauver des chiens victimes de préjugés m'a démontré à quel point chacun d'eux est unique, et c'est pourquoi l'adoption est un geste simple, mais qui change les vies à jamais.*»

Mlle Jacynthe Lacombe a travaillé au Centre Multi Canin pendant 4 ans, puis à la tête du département canin et félin du Centre d'animaux Nature pendant 5 ans. Depuis plusieurs années, elle travaille en tant qu'assistante gérante à une des branches du plus important distributeur canadien de produits, services et accessoires pour la santé et le bien-être des animaux de compagnie de toutes sortes ;

Mme Liliana Benitez détient un baccalauréat en éducation spécialisée de l'INSPEE (Argentine) et est spécialisée en troubles envahissants du développement (TED) et en troubles du spectre de l'autisme. Elle est présentement professeure d'art en éducation spécialisée (niveaux primaires et secondaires) à Montréal, incluant des classes d'élèves possédant des TED, des troubles du spectre de l'autisme ou de la communication / du langage. Liliana a également suivi une formation en thérapie animale chez Bocalan Argentina (Argentine) et chez Zoothérapie Québec. Elle mène actuellement des ateliers et des consultations privées à domicile ;

Mme Zuzanna Kubica détient un baccalauréat en beaux-arts de l'Université Concordia (2002) et a suivi une formation de spécialiste en comportement canin. En 2003, Zuzanna a fondé Cœur Canin qui offre des programmes d'éducation pour chiens, des séminaires et des ateliers sur une variété de sujets reliés au comportement canin et des consultations privées à domicile ;

Mlle Mary-Jane Roy est diplômée du Collège Dawson. Elle mène plusieurs initiatives liées au bien-être animal et a été impliquée pro bono dans quelques cas relatifs aux droits des animaux ;

Mme Sophie Bienvenu est née en Belgique et a déménagé à Montréal en 2001. Elle est auteure et scénariste. *Chercher Sam,* son second roman publié en 2014, a bénéficié des faveurs des critiques et du public et fait partie de la liste des 100 critiques de littérature d'Ici Radio Canada. Mme Bienvenu lutte également pour les droits des personnes itinérantes et leurs chiens.

ANNEXE 2

Position Paper

Canine Breeds, Traits and Genetics, with Reference to Pit Bull-Type Dogs

Date: 2017.06.02

David W. Silversides
BSc, DVM, PhD

David W. Silversides

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Purpose of position paper

The goal of this document is to summarise the current state of knowledge concerning dog genetics, dog breeds and the genetics of physical and behavioral traits in dogs. It is hoped that this position paper will be useful in evaluating the current debate in city of Montreal and the province of Quebec, Canada regarding pit bull-type dogs, aggressive behavior in dogs and public policy.

Origins of dogs, dog breeds and purebred dogs

The dog holds pride of place as being the first animal to be domesticated, and the only animal to be domesticated before the advent of agriculture. The dog (*Canis lupus familiaris)* and the grey wolf (*Canis lupus*) share a common ancestor that diverged into dog and wolf lines between 15,000 and 32,000 years ago[1,2,3,4]. It is postulated that the most important positive selection event that precipitated the evolution of the wild wolf ancestor towards the modern dog was a change in behavior of the original dog ancestor (protodog) that caused it to lose its natural fear of humans. This allowed the protodog to live in association with man and to access new food resources not available to the ancestral wolf. It is further suggested as a corollary that negative selection against aggressiveness towards humans would have been necessary for this human-dog association to function.

Several points are worth noting regarding the genetic relationship between the grey wolf and the domestic dog. It is argued that the dog is not a separate species from the grey wolf but rather a subspecies. This is supported by the fact that the dog, the wolf and even the coyote, although displaying different physical traits and behaviors, share the same number of chromosomes (78) and can interbreed with success. This underscores the fact that although genetic differences between the dog and the wolf can be identified, these differences are found within a context of overwhelming genetic similarity. Furthermore, although the final word has not been written concerning the time and place of the first domestication event for the dog, a consensus is emerging that multiple domestication events occurred (2, 3 or more), in several locations including Europe and eastern Siberia. This picture of the evolution of the dog should become more focused with time as archeological and genetic studies are refined and coordinated[5].

With the advent of agriculture and the movement of primitive human tribes from caves to villages, the domestication of the dog continued. Dogs were useful to humans as sentinels, guards, hunting partners, beasts of burden, shepherds, companions and for amusement. Through relatively natural selection in response to local environments, geographical isolation and desired functions, these “village” dogs developed into

traditional "types" of dogs known as "natural breeds" or "landraces". These traditional types of dogs include sight hounds, scent hounds, mastiffs, spaniels, terriers and lapdogs, as documented historically. The development of these natural breeds reflected first and foremost function, with physical characteristics supporting the appropriate behavioral attributes needed for the particular human-dog association. Natural breeds based on function would provide the "foundation" or "basal" breeds from which the modern "purebred" dog breeds would be derived. Indeed, this emphasis on function is still generally reflected in the organisation of modern purebred dog breeds into functional groups by the different national and international kennel clubs. For example, the American Kennel Club (AKC)[6] groups purebred dog breeds into the following (more or less) functional groups: herding, hound, working, sporting, non-sporting, terrier, toy and miscellaneous.

The advent of modern purebred dog breeds is a recent historical development. Within the last 200 years, dog hobby breeders and fanciers in Victorian England took a page from poultry and cattle breeders and developed dog breed clubs. An initial period of crossbreeding of natural breeds of dogs was performed to establish a particular set of desirable traits. This was followed by intensive inbreeding within a small founder population of dogs to fix the desired traits within the breeding population. What constituted the set of "desirable traits" was based on a combination of physical, behavioral and novelty attributes of the animal. A "pure" or "fancy" dog breed was then defined by an organised breed club with a closed pedigree or stud book and a description of the set of desirable (and undesirable) characteristics to define the breed in question. A dog satisfying these criteria was now considered "purebred". The Kennel Club in England was established in 1873 as the first dog club to formalise this process of documented breed descriptions and pedigrees, and has since been used as a model for other kennel clubs throughout the world. The closed stud book of purebred dog breeds requires that the two parents of an offspring must be already registered in the book before the offspring can be registered. This ensures consistency and purity of the desired traits for the now "pure" breed. However, the cost of this uniformity of traits (which is desirable for the breeders) is a uniformity in genetics which can be problematic for the animals. Because of the propensity of breeding clubs to keep records, the historical derivation of most modern breeds is generally well documented. More recently, DNA evidence from modern purebred dogs has been used to trace the development and genetic relatedness of modern dog breeds.[7]

At present, there are an estimated 400 to 500 different breeds of purebred dogs recognized by the different breed clubs throughout the world. For example, the American

Kennel Club (AKC) recognises 189 different breeds of purebred dogs, while the Canadian Kennel Club (CKC) recognises 175 different breeds of purebred dogs. The original Kennel Club in England recognises 210 breeds of purebred dogs. It should be noted that for modern purebred dogs, the choice of which animals will serve as the parents of the next generation of dogs is a function of human decisions and artificial selection based on which current animals prove successful in the show ring. Being successful in the show ring is a function of current interpretations of breed standards. It should be further noted that for purebred dogs on the modern show ring circuit, aggressive behavior towards other dogs or towards humans is not and cannot be tolerated and is thus strongly selected against.

Origins of pit bull-type dog breeds

It must be stated, emphasized and understood that there is no such purebred dog breed as a "pit bull". Rather, the name pit bull refers to a type of dog that has certain physical characteristics as well as historical connotations (see: Purebred pit bull-type dogs, below), and includes several present-day purebred breeds of dog.

Humanity has had a long historical relationship with blood sports involving animals, and dogs have figured in this relationship. In medieval Europe, large "Molossus" type dogs of Greek and Roman ancestry were bred and trained as fighting dogs particularly for bear-baiting. Although these Molossus dogs no longer exist, they did contribute to the genetics and physical characteristics of the Mastiff, St-Bernard, Great Pyrenee, Rottweiler, Great Dane, Newfoundland, Bernese Mountain Dog, Bulldog, Bull Terrier and Staffordshire Terrier (Figure 1). When there were no longer enough bears to support bear-baiting, focus switched to bull-baiting. As the Molossus dog type was now deemed too large and slow for the new job, it was bred to smaller dog types (including possibly the greyhound) to produce a new bull-baiting dog, nowadays called the Old English Bulldog. In Germany, a similar dog, the Bullenbeisser ("bull-biter") was also developed. Compared to bear-baiting dogs, the bull-baiting dogs were quicker, smaller and more compact with shorter legs and more powerful jaws (Figure 2). The Old English Bulldog contributed to the derivation of the modern English Bulldog, the American Bulldog, the French Bulldog (by crossing to terriers), the Boxer (by crossing to the Bullenbeisser), and to the modern pit bull-type dogs by crossing to terrier-type dogs. In a similar fashion, the German Bullenbeisser contributed to the Alano Espanol breed, the Dogo Argentino, and the Boxer.

Bull-baiting was banned in England by the Cruelty to Animals Act of 1835, which made blood sports involving animals illegal. This resulted in the decline and eventual disappearance of the Old English Bulldog and the Bullenbeisser. Ironically this also resulted in the development of the "pit bull-type" dog for the clandestine sport of dog

fighting. Pit bull-type dogs were derived from crossing the larger bulldog types to smaller terrier dog types to give a compact well muscled type of animal initially called "Bull and Terrier" dogs and eventually just called called pit bulls (Figure 3). In the United States, the first jurisdiction to ban dog fighting was New York, in 1867. In Canada, dog fighting was banned in 1892.

Purebred pit bull-type dogs

The establishment of purebred breeds of the pit bull-type warrants its own discussion. "Pit bull-type" refers to a general conformation of a medium-sized short-haired dog with a square shaped head and a bulky (muscular) body type that can include several different purebred breeds of dogs, depending on the governing body involved. Purebred breeds falling within the pit bull-type include the American Staffordshire Terrier (and American Pit Bull Terrier), the Staffordshire Bull Terrier, the Bull Terrier, the American Bully and sometimes the American Bulldog. For a list of pit bull-type dog breeds recognized by selected kennel clubs, see **Table 1**.

Example of the derivation of a pit bull-type dog: the Bull Terrier

The Bull Terrier (as well as the Staffordshire Bull Terrier) was derived by crosses of the Old English Bulldog (now extinct) with the White English Terriers (now extinct) to give the "Bull and Terrier" dog in the early 1800s. The genetics of additional breeds were then crossed into the Bull and Terrier dog: crosses with the Collie and Borzoi (to give the characteristic flattened or "Roman" nose of the Bull Terrier), the Dalmatian, the Spanish Pointer and the Whippet, resulting eventually in the Bull Terrier. Modern genetic studies suggest that the ancestors of the Irish terrier breeds have left a significant genetic trace in the DNA of modern pit bull-type dogs.[7]

Mixed breed dogs

Dogs that are not purebred are called crossbred animals, mixed breed animals or mongrel animals. Crossbred and mixed breed dogs in North America are most often derived originally from intentional or more usually unintentional crosses between purebred dog breeds. Mongrel dogs are not strictly speaking derived from purebred dog breeds but rather reflect natural or landrace breeds. Adding to the confusion it must be acknowledged that crossbred, mixed breed and mongrel are terms that are used interchangeably. It is estimated that just over half of the dogs in the United States (53%) are of mixed breed. Estimates of breed contributions most commonly found within crossbred dogs include (in order of frequency): German Shepherd, Labrador Retriever, Chow Chow, Boxer, Rottweiler, Poodle, American Staffordshire Terrier, Golden Retriever and Cocker Spaniel[8].

Canine genetics

In 2005, the DNA sequence for the nuclear genome of a female Boxer dog named Sasha was placed in the public domain. It consists of about 2.4 billion base pairs (basic biochemical units) of DNA, organised on 39 pairs of chromosomes (78 chromosomes in total). Within these chromosomes reside the 20,000 or so protein coding genes needed for creating a dog and for being a dog. Technical advances in the last 10 or so years have allowed researchers to compare DNA sequences between modern dogs and modern wolves, to address questions of dog evolution. Additional molecular studies have been performed comparing DNA sequences between modern dog breeds and within dog breeds, to address questions of the genetics of breed composition[7], physical traits and disease traits[9]. Most of these studies rely on the identification of single nucleotide polymorphisms (SNPs) between study groups, to map specific traits to specific chromosomes, genes, and mutations. Within the last 6 years, and following technical advances in the study of the human genome and human trait analysis, the number of known SNP markers used in dog genetic studies has increased significantly from several thousands to hundreds of thousands to 1.1 million in recent iterations of the techniques. It is observed in dogs, as it is in humans, that the source of genetic variation between individuals is a combination of single nucleotide polymorphisms (SNPs) plus more exotic types of genetic variation including gene copy number variations, insertion and deletions of large blocks of DNA, and the presence of transposable DNA elements. To date, whole genome association studies of SNPs within the dog genome have been the most informative, perhaps because they have been the easiest and least expensive type of comprehensive study to perform. SNP genetic variations within and between dog breeds (and indeed between the dog and the wolf) have been quantified and are presented in **Table 2.** It is observed that the genetic differences that can be identified between dog breeds (and indeed between the dog and the wolf) are found within a context of overwhelming genetic similarity.

What have these molecular genetic studies revealed about the dog? Synopses of the findings are presented in the following sections.

Genetic bottlenecks

The dog diverged genetically from the grey wolf 15,000 or more years ago. This resulted in a small population of protodogs and a severe reduction in genetic variation within the genomes of these animals. This reduced genetic variation is referred to as the ancestral genetic “bottleneck” of dogs. As this original population expanded to eventually generate the landrace breeds of dogs, this ancestral genetic bottleneck was relaxed due to the occurrence of natural mutations, and a degree of genetic variation was re-established.

Purebred dogs arose within the last 100 to 200 years with the advent of breed clubs, breed standards and closed stud books. Breed standards represent lists of somewhat arbitrary and mostly physical criteria for the artificial selection of the parents of the next generation. Closed stud books have the genetic consequence that each purebred dog breed becomes a "closed" genetic system composed of relatively inbred individuals. This compares to the "open" genetics of the landrace and foundation breeds of dogs originally used for purebred derivation, as well as the crossbred and mongrel animals that still engage in natural reproductive choice. All purebred dogs studied show less genetic variability between individuals than what is seen between individuals of the modern grey wolf. The genetic variation within purebred dog breeds can be compared to that seen in the inbred mouse lines used in medical research, which are known for their lack of genetic variation. The genetic variation between purebred dog breeds is comparable to that which is seen between people within the human population. Different purebred dog breeds are known to have different degrees of genetic variation, or lack thereof. The Boxer, recognized as a purebred breed by the American Kennel Club in 1904, was derived originally from one founder female and two founder male animals[10]. There is a recognized lack of genetic variation within the Boxer breed and it was for this reason that it was chosen as the first dog breed to have its genome sequenced. The Jack Russell Terrier is noted for its relative genetic diversity and was only recently granted purebred status by the Kennel Club in England (in 2015).

Genetic source of simple genetic diseases in dogs

The reduced genetic variation seen in purebred dogs is a direct result of closed stud books and small population sizes and is compounded by popular sire effects resulting from success in the show ring. Although this gives the uniformity of traits required by the breed standards, in genetic terms there are consequences. Reduced genetic variation involves reduced numbers of heterozygous (variable) loci and increased numbers of homozygous (non variable, both dominant and recessive) loci. Increased homozygous recessive loci can and do result in high frequencies of recessive genetic diseases, a feature characteristic of purebred dogs (as well as purebred cats, horses, and cattle) that is less prevalent in crossbred animals or within the human population. The genome wide SNP association trials of the last 6 or so years have been and continue to be very successful in identifying the genes and the mutations involved in these Mendelian (simple) genetic diseases in dogs[11]. The simplified genetic composition of the purebred dog breeds, and their high frequencies of simple recessive genetic diseases has been recognized in Europe as a valuable resource for advancing the understanding of dog and therefore human genetic diseases[12]. The MyDogDNA® SNP panel test[13] is a commercial assay that looks at 7,000

SNPs in canine genomic DNA to analyse 93 disease associations found in pure and crossbred dogs.

Genetic source of phenotypic variation in dogs

Whole genome SNP association studies in the dog have also been most useful in identifying the genetic basis of the morphological differences seen between the different purebred dog breeds. This has resulted in the identification of the genes and mutations responsible for breed defining physical traits in purebred dog breeds[7,14,15] (reviewed in[9]). For example:

Size: The dog as a species can display a remarkable range of body size. The adult Chihuahua can weight as little as 2 kg, while the English Mastiff can weigh as much as 100 kg. This gives a weight differential of 50X between these breeds, and yet the Chihuahua and the Mastiff are both dogs, they both belong to the species *Canis lupus familiaris,* and they both share the same genome. This range of body weight is unseen in other domesticated species or even within other mammalian species. Surprisingly this large size effect was found to be caused by mutations in a small number of genes (6 mentioned), each with large additive contributions[9]. Interestingly, these mutations are not ancestral as they are not seen in the gray wolf; they are believed to have occurred spontaneously within individual dogs and were then selected for within breeds and transferred between breeds by human intervention and artificial selection.

Leg length: Chondrodysplasia or short legs is seen in a number of dog breeds including the Dachshund and the Bulldog. Copy number variations of one gene (FGF4) are responsible for chondrodysplasia. This is an ancestral mutation that has been identified in wolves. The genetics of long legs as seen in the Borzoi, Irish Wolfhound and Scottish Deerhound awaits characterisation.

Head shape: Dog breeds can be distinguished by head morphology. The Labrador Retriever breed has a "normal" shaped head, the Bulldog has a rounded head with a shortened nose while the Collie has a slim head with a long nose. While these variations from the normal would be defined as congenital anomalies in other species and indeed in humans, they were actively selected for during the development of several dog breeds because of their "novelty". Whole genome SNP association studies are beginning to unravel the genetics of dog head shape, and suggest that the expression of a number of genes during development are responsible for the variations in head shape that are seen.

Length of tail: Dogs with genetically short tails have a mutation in the T gene. Genetic short tail is seen in a number of breeds including the Bulldog.

Hair coloration and patterns: There is a small list of genes and mutations responsible for primary hair pigmentation in dogs, accompanied by an additional list of modifying genes.

These genes and mutations have been characterized within the last 10 years. Dog coat length, growth pattern and curl can be largely explained by mutations in three genes.

To summarize these findings, the morphological characteristics which are so important in defining purebred dog breeds have in general been found to be caused by a small number of genetic loci each with large phenotypic effects. Thus the dog's large morphological diversity is not a function of large genetic diversity. This realisation came as a surprise as it is in stark contrast with what is seen in humans, where relatively small amounts of morphological diversity are caused by a large number of genetic loci which individually contribute small but additive effects. The pit bull-type of dog breeds, which are generally described as being of medium size and stocky with rounded heads, share close genetic lineages with the French Bulldog (small size) and the Mastiff (large size) (Figure 1). Thus the physical characteristics of a particular dog, and especially in the case of mixed breed dogs, may not be an accurate indication of their breed composition and genetic heritage. As an example of this ambiguity, WisdomPanel®[16] (see: Genetic description of dog breeds, below) lists 61 purebred medium-sized breeds that they can identify via DNA analysis[17]. The American Kennel Club classifies 5 of these breeds as large rather than medium, 1 as small and does not list 8 breeds of the WisdomPanel® list. The Labrador Retriever, representing the current most popular dog breed in North America according to the American Kennel Club, is listed by the AKC as a medium-sized breed but it is listed as a large breed on the WisdomPanel® list. If this level of ambiguity in describing physical characteristics of purebred dog breeds exists between expert panels, it is difficult to conceive how physical characteristics, as judged by non-experts, can be relied upon to determine breed compositions of crossbred dogs with any degree of accuracy[18].

Genetic description of dog breeds

Genome wide SNP analysis of different purebred dog breeds were performed to understand the genetics of purebred dog breed derivations and to determine if SNP based DNA signatures could be used to identify and differentiate different dog breeds[1,7,15]. This scientific information has been patented, packaged and commercialized in the form of a DNA test for determining dog pedigrees. The WisdomPanel® analysis looks at 321 marker SNPs that were shown to be associated with breed structure in purebred dogs.

Genetic breed groups defined by the WisdomPanel® analysis include:[16]

Asian
Guard dogs*
Hounds
Mountain dogs
Sporting dogs
Wild dogs
Companion dogs
Herding dogs
Middle east and African dogs
Sight hounds
Terrier dogs

*The "pit bull-type" dogs are found within the Guard dog group.

The WisdomPanel® Guard dog group contains 20 breeds (pit bull-type in bold)[17], and reflects the "Molossus" derived types of dogs described genetically by Parker et al.[7] :

American Bulldog	**American Staffordshire Terrier**
Bull Terrier	**Miniature Bull Terrier**
Staffordshire Bull Terrier	
Argentine Dogo	Boerboel
Boston Terrier	Boxer
Bulldog	Bullmastiff
Cane Corso	Doberman Pinscher
Dogue De Bordeaux	French Bulldog
Great Dane	Mastiff
Neapolitan Mastiff	Presa Canario
Rottweiler	

Results of a WisdomPanel® DNA analysis are presented in the form of a four generation "best fit" pedigree representing the dog breeds and breed types that likely contributed to the genetics of the dog in question. This type of ancestry study is often interpreted as percent breed composition for mixed breed dogs.

It is the author's opinion that this type of DNA analysis for pedigree analysis and breed identification of dogs is most useful, accurate and satisfactory for purebred animals, where results should be clear and unambiguous. However, modern purebred dogs should already be well documented by pedigree so that for these animals this type of DNA analysis should not be necessary for breed determination. The author suggests that DNA pedigree analysis and breed determination of crossbred animals will be less satisfactory, as results will be presented in terms of percentage probabilities and resolution can be at the dog group level rather than the breed level. Although this type of DNA analysis may be satisfactory to the scientist (who is quite happy to deal with ambiguities and probabilities), interpretation of ambiguous results by dog owners, city administrators and policy makers will more than likely be problematic. As the pit bull-type of dog shares close genetic heritage with other dog breeds ranging from the French Bulldog, the Boxer, the (British) Bulldog to the Great Dane, this represents a major source of ambiguity for DNA-based tests for pedigree analysis and breed determination. The position of the American Kennel Club (AKC) on DNA-based pedigree testing is that first of all, they do not take a position and second of all, they do not accept the results of these tests. It should also be kept in mind that the companies offering this type of DNA service for pedigree and breed determination are for-profit commercial enterprises that out of respect for their shareholders' investments are obliged to market their product in a positive fashion.

The genetics of mixed breed dogs

Non purebred dogs (crossbred, mixed breed, mongrel) are notable in that they do not breed true, i.e. their physical characteristics are not passed intact from one generation to the next. Puppies will receive 50% of their genetic material (i.e. DNA) from one parent and 50% from the other. Littermates will have *on average* 50% of their genetic complement in common with each other. If the litter came from a purebred line, then the percentage of DNA in common between puppies will be increased, corresponding to the level of inbreeding of the parents. If the litter came from matings between breeds or from mixed breed animals then the puppies within the litter can show considerable differences in physical characteristics, in large part due to the small number of genetic loci of large phenotypic effects involved in physical characteristics in the dog. Visual identification of a mixed breed dog's parentage varies considerably between observers and correlates only about 25% of the time with DNA pedigree analysis[18,19,20].

Genetics of behavior studies in humans[21]

To better interpret the genetics of behavior in dogs (see: Genetics of behavior studies in dogs, below), it is useful to look at the state of our knowledge of the genetics of behavior within the human context.

There is a historical assumption that all human traits (including behavior) are ultimately heritable, i.e. we are a product of our DNA. This assumption is at best simplistic. To date, the DNA association studies that have been so successful in identifying single gene trait associations with simple genetic diseases (in humans and dogs) or with physical traits (in dogs) have not generated equivalent results when applied to human behavioral traits or indeed to our more complex (and more common) genetic diseases. Targeted SNP association studies for a multitude of human behaviors have resulted in multiple DNA correlations, and in general these studies have failed to be replicated. More recently, whole genome SNP association studies for behavioral traits have resulted in a general lack of association that has been called the "missing heritability problem"[22]. It is now suggested that complex human traits such as behavior may be the result of hundreds of thousands (to millions) of variations in DNA sequences (loci). As each individual DNA variation (locus) contributes only a very small amount to the overall heritability of the trait in question, individually it represents a value too small to be detected by current molecular genetic methods.

It may be that the assumption that all human behavior is heritable (i.e. a direct product of our DNA) is in fact fundamentally flawed. Although the ability to learn a language for communication is a genetic trait, learning to communicate in English (or French, or Chinese, or any other language) is a trained and cultural behavior. In other words, important aspects of behavior as such may not be coded at the DNA level. The relatively new discipline of epigenetics states that how the genome functions is influenced by external non-genetic factors such as the environment, imprinting, socialisation, culture and training. We are back to the classical "Nature vs Nurture" debate, where nature

refers to genetics and nurture refers to socialization (see glossary: Nature versus Nurture).

Authors' opinion:
"Children are not born to be child soldiers. But they can be trained to be."

Genetics of behavior studies in dogs[23,24,25]

A number of studies on dog behavior have been published in an attempt to link specific behavioral traits with specific dog breeds. Most of these studies are based on owner questionnaires such as the behavioral questionnaire C-BARQ (Canine Behavioral Assessment and Research Questionnaire)[26]. Aggression is one behavioral trait that has been evaluated and quantified to determine if it is associated with one or more particular dog breeds. Aggression was subdivided into aggression directed against strange dogs, against familiar dogs, against strange people and against familiar people. The only convincing correlations from these studies was an association between aggression and dog size, with small dog breeds (Chihuahuas, French Bulldogs, Dachshunds) displaying more aggression than other dog breeds[23].

Although these behavioral questionnaires for dog behavior are standardized, quantifiable and unquestionably useful, they do not address the fundamental question of dog behavior, dog breeds and the contribution of genetics. In an early DNA SNP association study, Jones and co-workers[14] claimed associations of genetic regions on dog Chromosome 1 with herding behavior, and regions on Chromosomes 15 and 22 with the behavior "boldness vs. timidity". Candidate genes were postulated but no causal mutations were identified, and the work has not been replicated. In light of the problems with SNP association studies and behavioral traits in humans, it is unlikely that there will be a gene or genes identified as the cause of aggressiveness in dogs.

A recent meta-analysis of four decades of scientific reports of behavioral studies in dogs, Hradecka and coworkers[27] (2015) concluded that the heritability of behavioral traits in general between dog breeds was low. These authors noted contradictory conclusions in the articles cited that addressed breed heritability of dog aggression. Mehrkem and co-workers[28] (2014) similarly reviewed the scientific literature regarding dog aggression and dog breeds. The conclusion of these authors, based on the conflicting reports reviewed, was that it is difficult to derive a clear conclusion regarding aggression and dog breeds.

Given the current dog breed structures and reproductive practices, it is unlikely that aggression as a behavior can be fixed or even associated genetically within a particular dog breed.

Authors' opinion:
"Puppies are not born to be aggressive. But they can be trained to be."

Genetic selection for behavior: The domestication of the Silver Fox

Starting in 1959, Russian geneticists initiated a breeding program for Silver Foxes where one group of animals was selected for "tameability" (tolerance of humans) and a second group was selected for "wildness"[29]. After 20 generations of selection, one third of the tolerance group of animals were acting like domesticated dogs: they were eager for human attention, retained juvenile traits (whining, barking, submission, raised tail), had broad skulls and displayed a variety of pigmentation patterns. Animals that were selected for wildness remained wild and continued to shun human contact. These experiments suggest that behavioral traits can be selected for in canid species, but to be successful this would require a multi-year, multi-generation intensive, organized and consistent selection process. For purebred dogs, such an organized selection process exists. For the purebred dog breeds, success in the show ring equates with reproductive success. Success in the show ring involves, among other things, an intensive, organized and consistent selection process *against* aggressive behavior, since aggressive dogs are simply not tolerated, will not win ribbons, and will have negligible reproductive impact on the breed in question. As an example of a purebred animal of the pit bull-type, the Bull Terrier was recognized as a purebred dog breed by the AKC in 1885 and by the CKC in 1889. Calculating 2 to 3 years between generations, this represents between 40 to 60 generations of Bull Terriers being *negatively* selected for aggressive behavior. Evidence for an equivalent multi-year, multi-generation, intensive, organized and consistent breeding program selecting for aggressiveness in pit bull-type dog breeds simply does not exist.

Summary

1. Purebred dog breeds have undergone multiple years and multiple generations of systematic genetic selection for non-aggressive behavior.

2. In North America, the genetics of most mixed breed dogs comes from purebred dog stock.

3. There is no pit bull breed of dog. There are several breeds of dogs that belong to the pit bull-type of dog, with some disagreement as to which breeds these are.

4. The genetics governing the morphological differences seen between different dog breeds involves a small number of genetic loci each with a large phenotypic effect. This suggests that the physical characteristics of mixed breed dogs will be unreliable for determining a dog's pedigree and breed determination. This suggestion is born out experimentally.

5. The history of the development of dog breeds suggests that using DNA analysis for pedigree and breed determination of dogs of "mixed" breed ancestry will, by definition, generate "mixed" results, i.e. results that are inconclusive or difficult to interpret.

6. There is no evidence of a genetic association between aggressiveness and pit bull-type dog breeds.

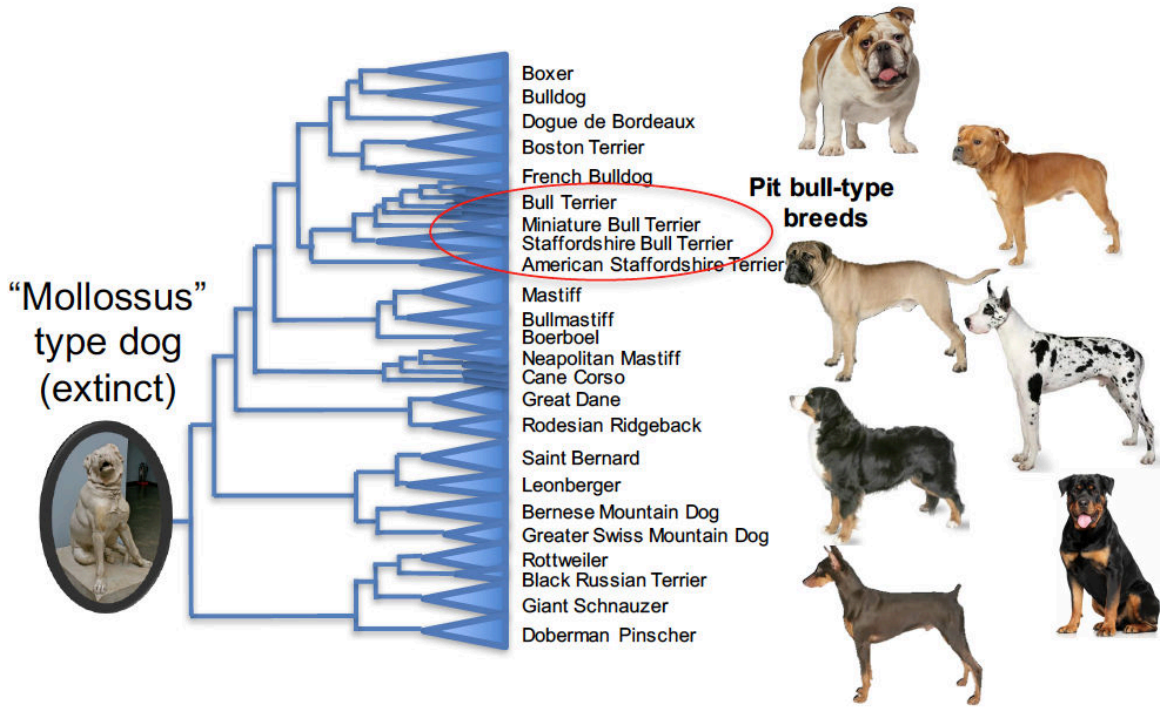
7. There is evidence that dog aggression (towards other dogs and towards people) has an association with dog breeds, with small dog breeds (Chihuahuas given as an example) scoring higher for aggression compared to medium and large sized dog breeds. There is no evidence that this breed-associated aggression is a genetic trait, beyond the genetics of size.

Conclusions

1. In the author's opinion, there is no genetic basis for justifying breed-specific legislation restricting particular dog breeds such as the pit bull-type of dog.

2. In the author's opinion, trying to address problems involving the aberrant behavior of individual "bad" dogs (and bad dog owners) by using breed-specific legislation is based on fundamentally flawed logic. It has little chance of making our streets safer, and a large chance of causing collateral damage for "good" dogs and good dog owners. Indeed, it has the subtlety, precision and finesse of trying to address problems involving aberrant mailboxes by using a jackhammer.

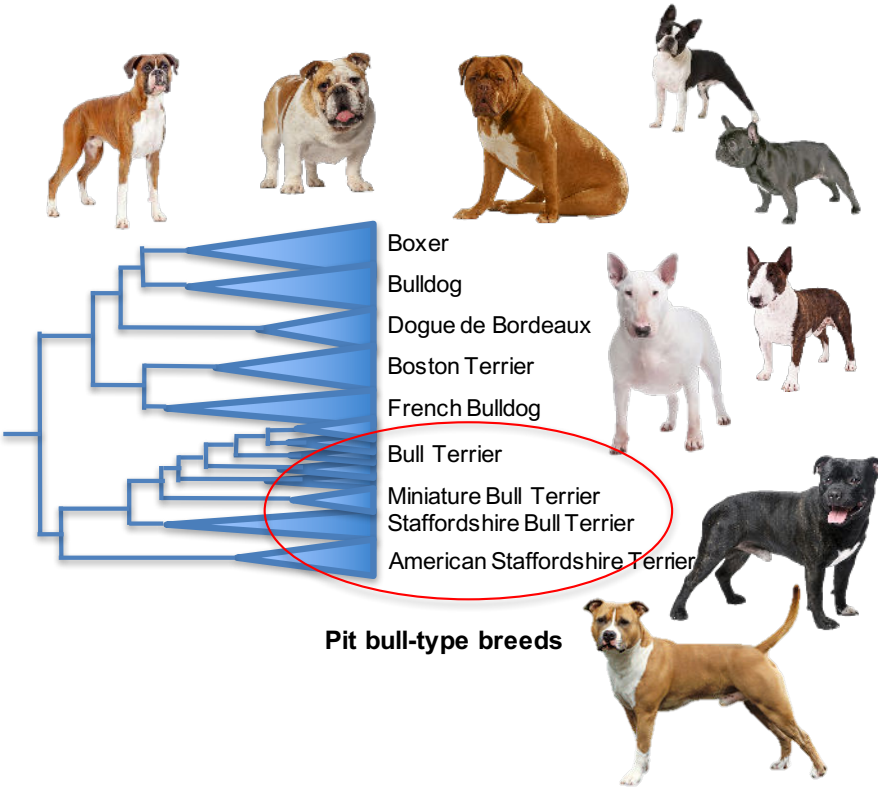
Figure 1: Pit bull-type and related breeds.
Genetic contribution of "Mollossus" type dog.



Via DNA analysis, adapted from Parker 2017. DWS 2017.

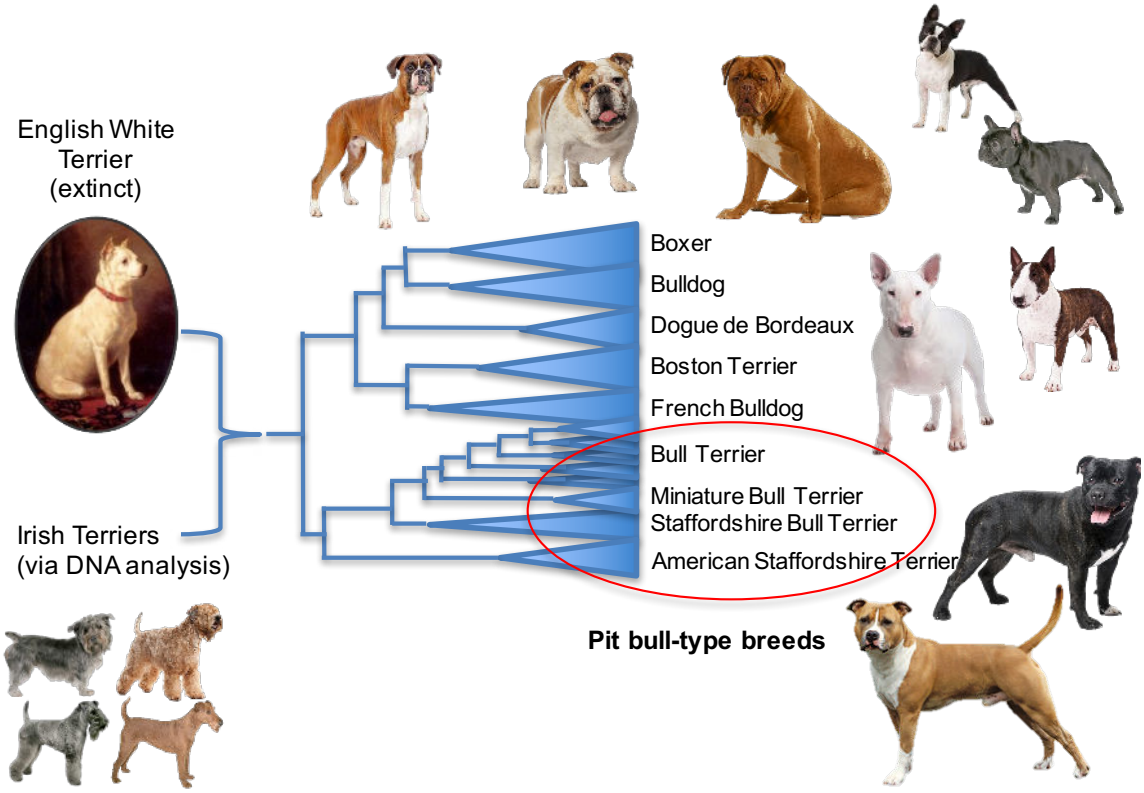
Figure 2: Pit bull-type and related breeds.
Genetic contribution of Old English Bulldog.

Old English Bulldog (Deutscher Bullenbeisser) (extinct)



Via DNA analysis, adapted from Parker 2017. DWS 2017.

Figure 3: Pit bull-type and related breeds.
Genetic contribution of Terriers.



Via DNA analysis, adapted from Parker 2017. DWS 2017.

TABLE 1: List of pit bull-type dog breeds, as recognized by selected kennel clubs.

American Kennel Club (AKC)[6] (United States)

Selection by physical appearance and temperament.

	Inception (Group)	Size, energy	Popularity rank
Bull Terrier	1885 (Terrier)	medium, high	55
Miniature Bull Terrier	1991 (Terrier)	small, medium	126
American Staffordshire Terrier	1936 (Terrier)	medium, medium	77
Staffordshire Bull Terrier	1974 (Terrier)	medium, medium	79
Bulldog*	1886 (non-sporting)	medium, medium	4
French Bulldog*	1898 (non-sporting)	small, medium	6
Boxers*	1904 (working)	medium, high	10
Bullmastiff*	1934 (working)	large, medium	43

*not considered pit bull-type, but of similar genetic derivation.

United Kennel Club (UKC) (United States)

Selection by physical appearance and performance.

	Inception
American Pit Bull Terrier	1898 (equivalent to American Staffordshire Terrier)
Bull Terrier	1948
Miniature Bull Terrier	1993
American Bully	2013

Kennel Club (England)

Selection by physical appearance and temperament.

	Inception
Bull Terrier	1880
Staffordshire Bull Terrier	1935
Miniature Bull Terrier	1943

Canadian Kennel Club (Canada)

Selection by physical appearance and temperament.

	Inception
Bull Terrier	1889
American Staffordshire Terrier	1941
Staffordshire Bull Terrier	1953

TABLE 2: Genetic variation as quantified by SNPs (nucleotide differences), within and between dog breeds.

	Genetic differences [nucleotides, (%)]	Genetic similarity %
Between individuals within a dog breed	**1/1653, (0.06%)**	**99.94%**
Between dog breeds	**1/900, (0.11%)**	**99.89%**
Between the dog and the wolf	**1/580, (0.17%)**	**99.83%**
Between individual human beings	**1/1000, (0.10%)**	**99.90%**
Between humans and chimpanzees	**1/100, (1.0%)**	**99.0%**

Glossary

Artificial selection (of dogs) - refers to genetic selection with human intervention. This is the selection of the genetics of the next generation of dogs by humans purposefully choosing the parents. Selection criteria can include physical characteristics as well as performance and can be influenced by novelty. See: **Natural selection (of dogs).**

Base pairs - the information units of DNA, consisting of the biochemical letters A, C, G, T.

Bear-baiting - the blood sport involving dogs fighting a bear. See: **Blood sport** and **Bull-baiting**.

Breed club - refers to an organized club for purebred dogs that defines a dog breed's characteristics (usually physical), and maintains a stud or pedigree book for the breed.

Blood sport - an organized competition, usually between animals, for the amusement of humans. The object is for one animal to defeat (draw blood, indeed often to kill) another animal. Blood sports are illegal within the western world.

Breed structure - the historical (and thus genetic) relationship between modern purebred dog breeds.

"Bull and Terrier" dog - crosses between Old English Bulldogs and White English Terriers (both now extinct) to give the dog type that was the predecessor of the modern pit bull-type dogs. DNA evidence now suggests also a contribution from Irish terriers.

Bull-baiting - the blood sport involving dogs fighting a bull. This was common in medieval Europe but was banned in England by the Cruelty to Animals Act of 1835.

Bullenbeisser ("bull-biter") - the bulldog type of dog that was developed in Germany for bull-baiting.

Chromosome - a long molecule of DNA that acts as a scaffolding for gene sequences. The dog has 78 chromosomes in its genome, representing 39 pairs of chromosomes. Chromosomes come in pairs (one maternal copy, one paternal copy) because our genetic system is duplicated (doubled). This forms the basis of our heredity.

Clade - a grouping of (dog) breeds based on DNA similarities, and reflecting breed derivations.

Closed stud book - the written and official record of the genealogy of particular animals (dogs) within a particular breed. "Closed" refers to the fact that in order to register a dog

in the stud book, both parents of the animal must already be registered in the stud book. See: **Breed club** and **Artificial selection (of dogs).**

Crossbred dog - a dog that is the result of a mating between two purebred parents of different breeds. Crossbred animals often do not necessarily resemble their parents, and their physical attributes do not breed true. Crossbred animals have increased genetic variation and less problems with simple genetic diseases compared to purebred animals. See: **Purebred dog**.

Dominant - a genetic trait that is dominant results in an identifiable phenotype even when only a single copy for the trait is present.

DNA - a molecule found within cells that contains biological information and that codes for biological function. The information within DNA is passed from one generation to the next.

Epigenetics - "over" or "above" genetics. Epigenetics results in phenotypes that are not coded for by the primary DNA sequence. Epigenetics involves the influence and interaction of the environment on the functioning of the genome. See: **Nature versus Nurture**, and **"Missing heritability" problem**.

Gene - a fundamental unit of biological information found within DNA and usually coding for a protein molecule. There are about 20,000 coding genes found within the dog genome. "Gene" is a contraction of "genesis" or origin. We have two copies of each gene (one maternal copy, one paternal copy) because our genetic system is duplicated (doubled). This forms the basis of our heredity.

Genetic bottleneck - a reduction in genetic variation found within a population of animals. For the dog, an ancient genetic bottleneck was associated with the first domestication events, while more recent genetic bottlenecks have been associated with the advent of purebred dog breeds and closed stud books.

Genetic variation - a measure of the genetic differences at the DNA level found between individuals within a population. Natural selection tends to increase genetic variation. Artificial selection, as is practised in purebred dog breeds, tends to decrease genetic variation.

Genome - the sum total of DNA that is required to define an individual or a species.

Genotype - refers to a specific DNA sequence that codes for a particular phenotype (see: **Phenotype**). Genotypes in the form of DNA can be passed on to the next generation.

Heterozygous - "hetero-" refers to dissimilar, "zygote" refers to the early embryo. A genetic trait (DNA sequence) that is heterozygous refers to one in which its two copies

are dissimilar. Increased heterozygosity translates as decreased inbreeding and increased genetic variation. See: **Homozygous**.

Homozygous - homo refers to "the same", zygote refers to the early embryo. A genetic trait that is homozygous refers to one in which its two copies are the same. Increased homozygosity translates as increased inbreeding and reduced genetic variation. See: **Heterozygous**.

Landrace - original or historical type of animal that developed physical and behavioral traits suited to its particular environment.

Locus (singular), **loci** (plural) - a locus is a genetic address for a particular gene or mutation. A particular locus (gene, mutation) can give rise to a particular phenotype or visible trait. A locus consists of two copies of the gene in question, one that is maternally derived on the other that is paternally derived. A locus can be homozygote (both copies identical) or heterozygote (the two copies are different).

LUPA - a consortium of European countries that is using the dog as a genetic model for advancing our understanding of human genetic diseases. "Lupa" is Latin for female wolf.

Mendelian genetics - also called "classical" genetics or "simple" genetics. Simple or Mendelian genetics involves the study of phenotypes resulting from DNA variations at only one site or locus on a chromosome, i.e. genetics at its most simple. When phenotypes involve the input of multiple genes, the genetics is said to be complex or quantitative.

"Missing heritability" problem - the observation that, in humans, simple genetics (i.e. single genetic variations) do not account for much of the heritability (susceptibility) to common medical diseases and to behavioral traits. It is now felt that common medical diseases and behavioral traits are the cumulative results of multiple genetic variations (thousands and even hundreds of thousands) within the genome, which individually contribute only a very small effect to the trait in question. A further complication of estimates of heritability is the epigenetic contribution of the environment on the functioning of the genome. See: **Nature versus Nurture**.

Molossus - an ancient or landrace dog type of Greek and Roman ancestry that was large in stature. Molossus type dogs contributed to the development of modern breeds including the Mastiffs, Great Pyrenees, Great Dane, Newfoundland and Bulldog, among other breeds. The Molossus as a dog breed no longer exists.

MyDogDNA - a commercial company that uses SNP technology (see: **SNP**) to identify genetic disease mutations based on analysis of dog DNA.

Natural selection (of dogs) - genetic selection via the environment. Selection of the genetics of the next generation of dogs by the survival and reproductive success of the parents. See: **Artificial selection (of dogs).**

Nature versus Nurture - the Nature versus Nurture debate is a historical debate as to the source of trait differences between individuals, with particular reference to behavioral traits. Nature refers to the heritable (i.e. genetic) contribution to a given trait. Nurture refers to the environmental contribution to a given trait, which is acquired. The field of epigenetics states that the environment (nurture) can influence the functioning of an animal's genome (nature). A conclusion that can be made is that with respect to behavioral traits, the distinction between behavior that is inherited and behavior that is acquired is not black and white but consists of multiple shades of grey.

Phenotype - a characteristic or trait that is visible and is derived from a genetic basis, an environmental basis, or a combination of the two. "Pheno-" refers to "phenomenon" or "that which is seen".

Pit bull - a type of dog that is usually medium in size, short-haired, stocky (muscular) in build, with a square head. Purebred breeds of the pit bull-type include the Bull Terrier (and Miniature Bull Terrier), the Staffordshire Bull Terrier, the American Staffordshire Terrier, the American Pit Bull Terrier, and sometimes the American Bulldog. There is no breed of dog that is a "pit bull"; there are several breeds of dogs that belong to the pit bull- type of dog, with some controversy among experts as to which breeds these are.

Protodog - the original ancestor of the dog when it diverged from the common ancestor of the modern wolf and modern dog. This would have been an animal that resembled the ancestral wolf physically but had learned to live in proximity to man by a change in behavior.

Purebred dog - a dog with certain defined physical characteristics (phenotype) adhering to a breed description and registered in an official pedigree or stud book, i.e. whose genealogy is documented. The parents of a purebred dog were themselves purebred animals. Purebred dogs tend to breed true to their breed descriptions, have reduced genetic variation (due to increased inbreeding), and more simple recessive genetic diseases than crossbred dogs. See: **Crossbred dog**.

Recessive - a genetic trait that is recessive refers to the fact that two copies of the gene or mutation responsible for the trait must be present in order to have a visible phenotype. If only one copy of a recessive trait is present, the animal is a "carrier" for that trait, but there is no visible phenotype.

Sasha - the name of the female Boxer dog whose genome was sequenced and made public in 2005.

Simple genetics - see **Mendelian genetics**.

SNP - Simple Nucleotide Polymorphism. This is the most simple form of genetic variation, where one version of a gene contains one nucleotide, and a second version of the same gene contains a different nucleotide at the corresponding place. With the advent of sequencing at the genome level, SNPs have been relatively easy to identify and have been useful for studying phenotypes based on simple genetics. SNPs have been less useful for studying and understanding complex phenotypes such as complex diseases and behavioral traits.

Traits - identifiable characteristics (or phenotypes), such as physical or behavioral characteristics that define an animal. Genetic traits refer to genotypes as in the genes and/or mutations that code for physical traits. See: **Phenotype** and **Genotype**.

WisdomPanel® - a commercial company that uses SNP technology to perform ancestry studies based on dog DNA. Ancestry studies are often interpreted as percent breed composition for mixed breed dogs.

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• Sciences de la santé

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- Expression des gènes dans les gonades.
- Technologies reliées aux souris transgéniques et détection de l'expression du transgénimes.
- Études génomiques (identification et manipulation de certaines séquences spécifiques de gènes du génome mammalien).
- Les études sur la détermination du sexe chez les mammifères, utilisant le poc et la souris transgénique comme modèles d'étude.
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2016

Sexage et phylogénie, à partir des gènes CHD (-Z et -W) et COX-1, des oiseaux de proie du Québec et de perroquets d'attrait vétérinaire

Diplômé(e) : Gilbert, Karol'Ann
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2007
Purified pre-sertoli cells express genes involved in cell proliferation and cell signalling during a critical window in male sex determination

Diplômé(e) : Cory, Aron Thomas
Cycle : Maîtrise
Diplôme obtenu : M. Sc.

2006
Caractérisation phénotypique et génotypique d'une lignée de souris transgéniques démontrant de l'infertilité mâle

Diplômé(e) : Paquet, Marilène
Cycle : Maîtrise
Diplôme obtenu : M. Sc.

2006
Identification de gènes exprimés dans les cellules de la granulosa de follicules dominants chez l'espèce bovine

Diplômé(e) : Fayad, Tania May
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2006
Études comparatives, évolutives et recherche de gènes importants pour la détermination du sexe chez les mammifères

Diplômé(e) : Boyer, Alexandre
Cycle : Doctorat
Diplôme obtenu : Ph. D.

2005
Analyse de l'expression génique dans les cellules de la granulosa de follicules dominants chez l'espèce bovine

Diplômé(e) : Ndiaye, Kalidou Dit Mamadou
Cycle : Doctorat
Diplôme obtenu : Ph. D.

2004
Étude comparative de gènes impliqués lors de la détermination et de la différenciation du sexe chez les mammifères

Diplômé(e) : Paradis, Véronique
Cycle : Maîtrise
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ANNEXE 3

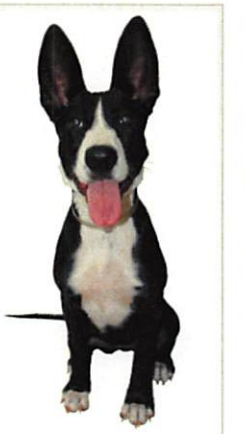
Dog Breed Identification: What kind of dog is that?

While many people like to know "What kind of dog is that?" just to satisfy their curiosity, dog breed designations have also been used in an attempt to predict future behavior, match pets to families, find lost dogs, and even to restrict the ownership of certain types of dogs.

Dogs come in all shapes and sizes, and frequently without pedigrees to describe their heritage. The breeds of dogs with unknown or mixed-breed lineages are frequently guessed based on their physical appearance, but it is not known how accurate these visual breed assessments are.

We conducted a national survey of dog experts to compare their best guesses for the breeds of dogs in a series of photographs. These visual assessments were compared to DNA breed profiles for the dogs.

More than 5,000 dog experts, including breeders, trainers, groomers, veterinarians, shelter staff, rescuers, and others completed the survey. You are invited to view pictures of the 100 dogs in our study, their actual DNA breed results, and what our survey responders guessed their breeds were.



"Mom always said I have my father's ears."

See the results >>

Read the study abstract (PDF)

This study is being conducted by Dr. Julie Levy with the assistance of Merial Veterinary Scholar Kathleen Croy and is made possible by a grant from the National Canine Research Council.

You can help us save more homeless cats and dogs through groundbreaking research and crucial training for students and shelter veterinarians. ***Please donate today!***

Tagged as: breed, canine, DNA, dog, dogs, research, survey

What kind or dog is that? Accuracy of dog breed assessment by canine stakeholders

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Research supported the National Canine Research Foundation, Maddie's Fund, and Merial

It is common for animal shelter staff, veterinarians, dog owners, and others to guess the breed of dogs based on physical appearance. Breed identification is used on legal forms, in searching for lost dogs, and for prediction of behavioral and health traits. Previous studies suggest that visual breed identification in animal shelters is unreliable, but it is unknown what the reliability among other canine stakeholders is. The purpose of this study was to determine the accuracy of visual breed identification compared to DNA breed profiles.

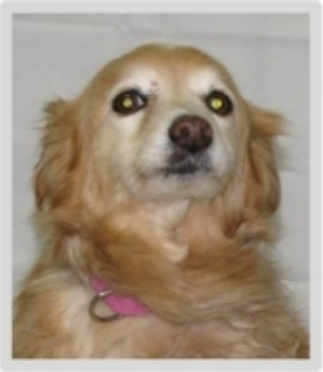
DNA breed signatures for 100 shelter dogs were developed using single nucleotide polymorphism genotypes (Mars Wisdom Panel), followed by a Bayesian generative model to infer each dog's heritage. Self-identified "dog-experts," including breeders, exhibitors, trainers, groomers, behaviorists, rescuers, shelter staff, veterinarians, and veterinary technicians were recruited to complete an anonymous Internet survey in which they selected the most likely breed from a drop-down menu for 20 randomly selected dogs depicted in photographs. Breed identification was considered correct if a breed representing at least 25% of a dog's genetic makeup was selected.

A total of 5,922 respondents representing all US states and territories completed the survey. Respondents correctly identified a prominent breed an average of 27% of the time. Each of the dogs had an average of 53 different predominant breeds selected. No one correctly identified a breed for 6% of the dogs, and 22% of the dogs had the correct breed chosen less than 1% of the time. Only 15% of the dogs were correctly identified more than 70% of the time.

These results indicate that, regardless of profession, visual identification of the breeds of dogs with unknown heritage is poor. Faulty breed identifications may have lasting consequences, especially in areas where certain breeds are regulated or prohibited. An alternative method for describing the appearance of dogs should be developed.

DNA and Survey Results: What Kind of Dog is That?

The Dogs ()




Dog 01

25% Toy Fox Terrier

25% Harrier

15.33% Anatolian Shepherd

14% Chinese Crested

Top Responses

Golden Retriever

Pomeranian

Shetland Sheepdog

Cocker Spaniel

Chihuahua


Dog 02

50% Catahoula Leopard Dog

25% Siberian Husky

9.94% Briard

5.07 Airedale Terrier

Top Responses

Labrador Retriever

American Staffordshire Terrier

No Predominant Breed

Border Collie

Pointer (includes English Pointer)


Dog 03

25% American Staffordshire

25% German Shepherd

25% Lhasa Apso

25% Dandie Dinmont Terrier

Top Responses

Labrador Retriever

German Shepherd Dog

Rhodesian Ridgeback

No Predominant Breed

American Staffordshire Terrier

Dog 04

25% Border Collie

25% Tibetan Spaniel

12.02% Catahoula Leopard Dog

9.28% Shiba Inu

Top Responses

Wheaten Terrier, Soft Coated

Bearded Collie

Briard

Cairn Terrier

Tibetan Terrier

Dog 05

25% Miniature Pinscher

25% Great Pyrenees

10.79% Afghan Hound

10.09% Nova Scotia Duck Tolling Retriever

Top Responses

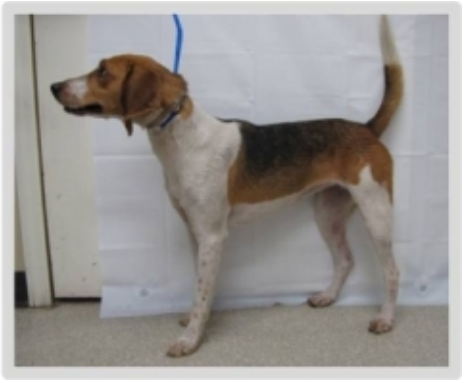
Australian Cattle Dog

German Shorthaired Pointer

Pointer (includes English Pointer)

Border Collie

No Predominant Breed



Dog 06

50% American Foxhound

50% Beagle

Top Responses

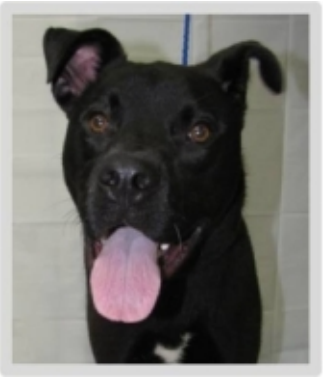
Beagle

Foxhound (including American, English, Treeing Walker Coonhound)

Harrier

Black and Tan Coonhound

Pointer (includes English Pointer)



Dog 07

25% Irish Water Spaniel

25% Siberian Husky

25% Boston Terrier

8.33% Bull Mastiff

Top Responses

Labrador Retriever

American Staffordshire Terrier

No Predominant Breed

German Shepherd Dog

Staffordshire Bull Terrier

Dog 08

25% Boxer

25% Alaskan Malamute

21.95% Sealyham Terrier

19.67% Pointer

Top Responses

Boxer

American Staffordshire Terrier

Staffordshire Bull Terrier

Greyhound

No Predominant Breed

Dog 09

50% American Bulldog

50% American Staffordshire Terrier

Top Responses

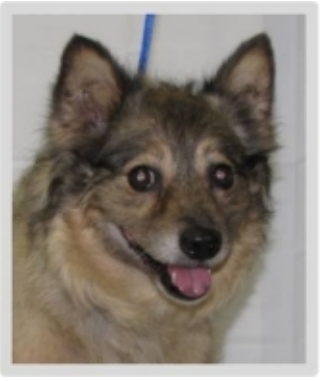
American Staffordshire Terrier

American Bulldog

Boxer

Staffordshire Bull Terrier

Bull Terrier (including miniature)




Dog 10

50% American Eskimo

25% Beagle

25% Labrador Retriever

Top Responses

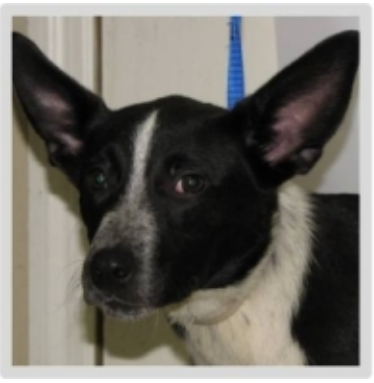
Keeshond

Shetland Sheepdog

Pomeranian

German Shepherd Dog

No Predominant Breed




Dog 11

25% Australian Cattle Dog

25% American Staffordshire Terrier

3.56% Bull Mastiff

2.89% Newfoundland

Top Responses

Australian Cattle Dog

Border Collie

Corgi (including Cardigan, Pembroke)

No Predominant Breed

Boston Terrier


Dog 12

25% Labrador Retriever

12.5% Chow Chow

12.5% Beagle

24.89% Puli

Top Responses

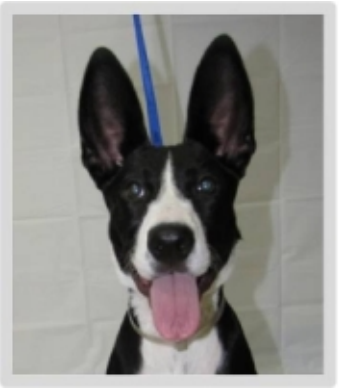
Labrador Retriever

Shar-Pei, Chinese

Chow Chow

No Predominant Breed

Rhodesian Ridgeback




Dog 13

25% German Shepherd

25% Staffordshire Bull Terrier

13.36% Weimeraner

7.29% German Wirehaired Pointer

Top Responses

Border Collie

German Shepherd Dog

Basenji

Great Dane

Boston Terrier


Dog 14

50% Australian Shepherd

50% American Eskimo

Top Responses

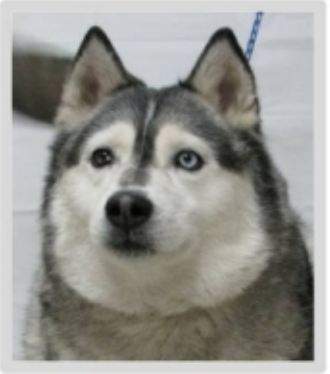
Australian Shepherd

Australian Cattle Dog

Border Collie

Anatolian Shepherd Dog

Collie




Dog 15

50% Siberian Husky

20.35% Chow Chow

7.5% Bloodhound

4.03% Samoyed

Top Responses

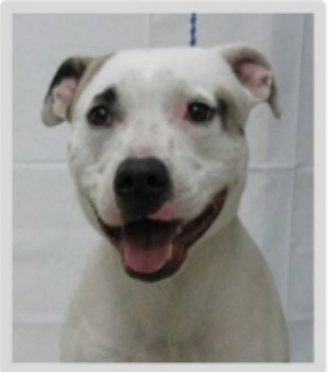
Siberian Husky

Malamute, Alaskan

American Eskimo Dog

Alaskan Klee Kai

Akita




Dog 16

25% American Staffordshire

25% Staffordshire Bull Terrier

8.83% Flat Coated Retriever

3.14% Irish Wolfhound

Top Responses

American Staffordshire Terrier

American Bulldog

Staffordshire Bull Terrier

Bull Terrier (including miniature)

No Predominant Breed


Dog 17

25% Rottweiler

12.5% Boxer

12.5% German Shorthaired Pointer

11.09% Manchester Terrier

Top Responses

American Bulldog

Dalmatian

Labrador Retriever

Boxer

American Staffordshire Terrier


Dog 18

25% Labrador Retriever

25% Swedish Vallhund

12.5% German Spitz

12.5% Weimeraner

Top Responses

Australian Cattle Dog

Catahoula Leopard Dog

Blue Tick Coonhound

Beagle

No Predominant Breed


Dog 20

50% American Eskimo

25% Cane Corso

25% Chinese Sharpei

Top Responses

German Shepherd Dog

No Predominant Breed

Belgian Malinois

Labrador Retriever

Beagle


Dog 22

25% Chow Chow

12.5% German Shepherd

12.5% Alaskan Malamute

14.22% Cairn Terrier

Top Responses

No Predominant Breed

German Shepherd Dog

Boxer

Catahoula Leopard Dog

American Staffordshire Terrier


Dog 23

25% American Staffordshire

25% Boxer

25% Soft Coated Wheaton Terrier

18.66% Great Dane

Top Responses

American Staffordshire Terrier

Staffordshire Bull Terrier

American Bulldog

Bull Terrier (including miniature)

Boxer


Dog 24

50% Chihuahua

25% Keeshond

25% Beagle

Top Responses

Dachshund (including miniature, standard, smooth coat, wirehair, longhair)

Chihuahua

No Predominant Breed

Labrador Retriever

Corgi (including Cardigan, Pembroke)


Dog 25

75% Italian Greyhound

18.69% Entlebucher Mountain Dog

3.9% Bernese Mountain Dog

2.24% Rhodesian Ridgeback

Top Responses

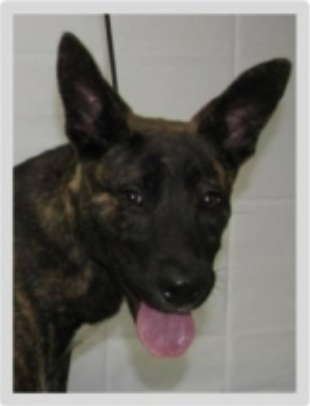
Jack Russell Terrier (includes Russell Terrier)

Fox Terrier (including smooth, wire, toy)

Whippet

Parson Russell Terrier

Italian Greyhound




Dog 26

25% German Shepherd

25% Chinese Sharpei

12.5% Short Haired Dachshund

12.65% Dogo Argentino

Top Responses

Akita

Basenji

German Shepherd Dog

No Predominant Breed

Australian Cattle Dog


Dog 28

32.5% Boxer

25% Weimeraner

14.49% Borzoi

10.8% Keeshond

Top Responses

Beagle

Foxhound (including American, English, Treeing Walker Coonhound)

No Predominant Breed

Black and Tan Coonhound

Jack Russell Terrier (includes Russell Terrier)

Dog 29

25% American Staffordshire

25% Staffordshire Bull Terrier

25% Russell Terrier

25% Basset Hound

Top Responses

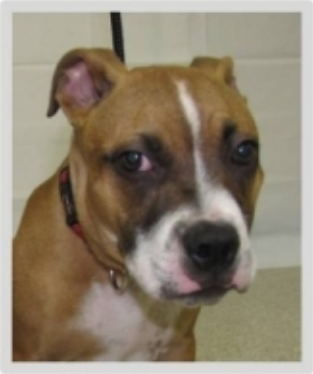
No Predominant Breed

American Staffordshire Terrier

Chihuahua

Boxer

Labrador Retriever



Dog 30

25% American Staffordshire

25% French Bulldog

12.5% Samoyed

11.96% Afghan Hound

Top Responses

Boxer

American Staffordshire Terrier

American Bulldog

Staffordshire Bull Terrier

No Predominant Breed

Dog 31

25% Tibetan Mastiff

12.5% Boxer

15.1% Golden Retriever

5.86% Wheaten Terrier

Top Responses

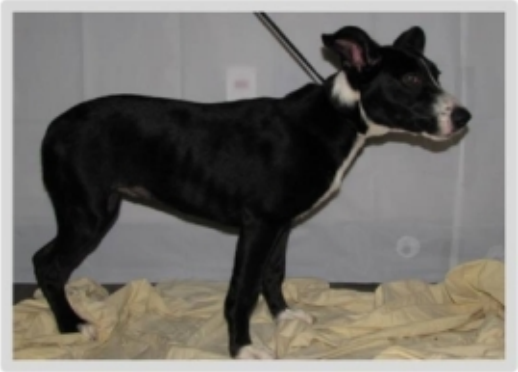
Rottweiler

German Shepherd Dog

No Predominant Breed

Australian Shepherd

Cocker Spaniel

Dog 33

37.5% German Shepherd

12.5% Rottweiler

12.5% Weimeraner

11.44% Irish terrier

Top Responses

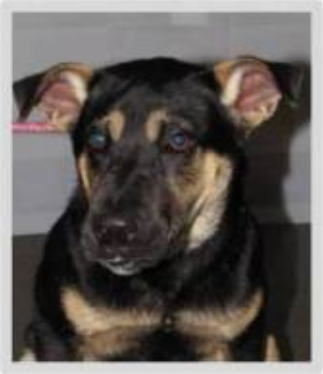
Border Collie

No Predominant Breed

Great Dane

American Staffordshire Terrier

Boston Terrier




Dog 35

25% Chow Chow

12.5% German Shepherd

12.5% Boxer

9.39% Newfoundland

Top Responses

German Shepherd Dog

Rottweiler

No Predominant Breed

Dobermann Pinscher

Black and Tan Coonhound


Dog 36

25% Labrador Retriever

25% Manchester Terrier

25% Belgian Sheepdog

12.5% Boston Terrier

Top Responses

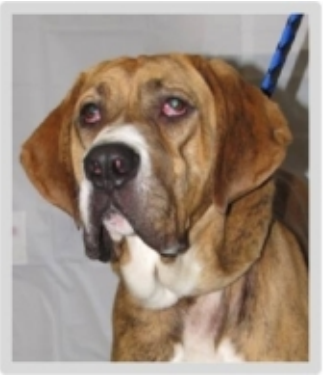
American Staffordshire Terrier

Labrador Retriever

No Predominant Breed

Beagle

Staffordshire Bull Terrier




Dog 37

25% Bloodhound

25% Boxer

10.12% Bull Mastiff

7.26% American Foxhound

Top Responses

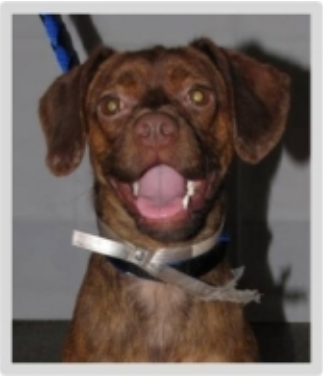
Bloodhound

Mastiff

Boxer

Bull Mastiff

Cane Corso




Dog 38

50% Cocker Spaniel

25% Boston Terrier

25% Miniature Pinscher

Top Responses

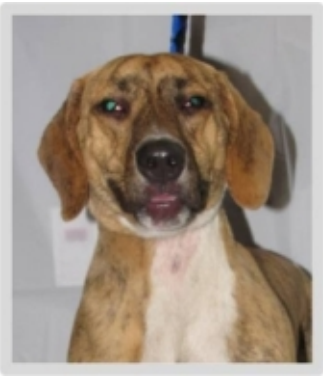
No Predominant Breed

Boxer

Pug

Beagle

Chihuahua




Dog 39

25% American Foxhound

25% Bull Mastiff

19.89% Scottish Deerhound

19.04% Sealyham Terrier

Top Responses

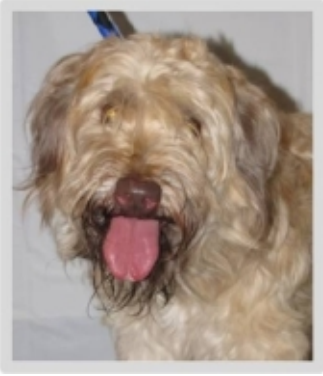
Plott Hound

Catahoula Leopard Dog

Labrador Retriever

No Predominant Breed

Boxer




Dog 40

100% Wheaten Terrier

Top Responses

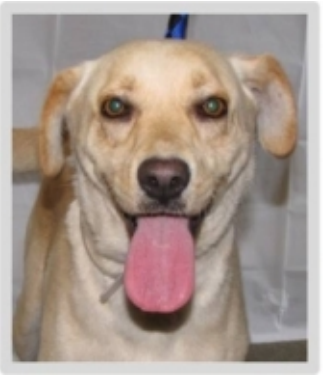
Wheaten Terrier, Soft Coated

Poodle (including toy, miniature, standard)

Bearded Collie

Cocker Spaniel

No Predominant Breed




Dog 41

25% Labrador Retriever

25% Cane Corso

25% Chow Chow

25% Miniature Pinscher

Top Responses

Labrador Retriever

Golden Retriever

Beagle

No Predominant Breed

Canaan Dog


Dog 42

25% Staffordshire Bull Terrier

25% Chinese Sharpei

25% Havanese

6.56% Australian Terrier

Top Responses

American Staffordshire Terrier

No Predominant Breed

American Bulldog

Boxer

Bulldog (English)


Dog 43

25% Siberian Husky

25% American Bulldog

11.89% German Spitz

5.91% Standard Schnauzer

Top Responses

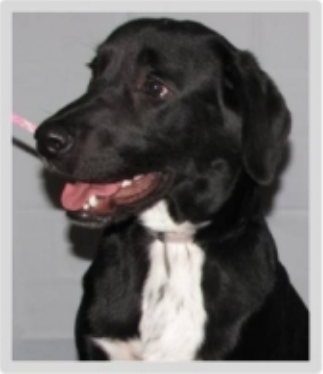
Golden Retriever

Chow Chow

No Predominant Breed

Pomeranian

Nova Scotia Duck Tolling Retriever




Dog 44

50% Labrador Retriever

50% Dalmatian

Top Responses

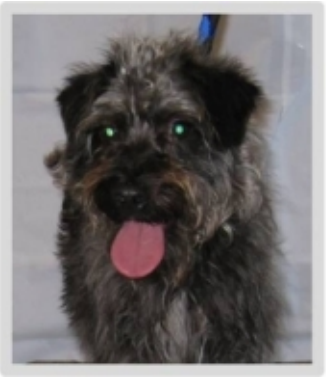
Labrador Retriever

Border Collie

Flat Coated Retriever

No Predominant Breed

Golden Retriever




Dog 46

50% Miniature Poodle

12.5% Manchester Terrier

19.89% Welsh Terrier

5.85% Chinese Crested

Top Responses

Schnauzer (including miniature, standard, giant)

Cairn Terrier

Affenpinscher

Poodle (including toy, miniature, standard)

No Predominant Breed


Dog 47

50% American Bulldog

25% Rottweiler

12.43% Neopolitan Mastiff

8.11% Akita

Top Responses

Rottweiler

No Predominant Breed

American Staffordshire Terrier

Plott Hound

Labrador Retriever


Dog 48

50% Yorkshire Terrier

50% Pomeranian

Top Responses

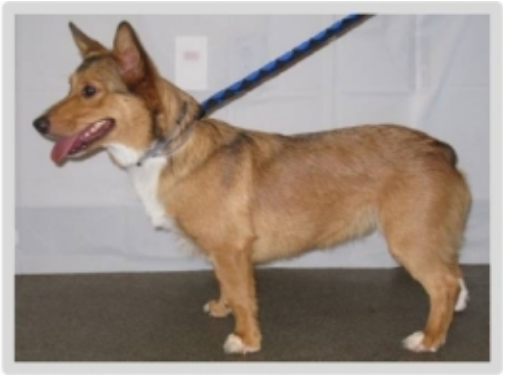
Yorkshire Terrier

Miniature Pinscher

Jack Russell Terrier (includes Russell Terrier)

Australian Terrier

No Predominant Breed



Dog 49

100% Pembroke Welsh Corgi

Top Responses

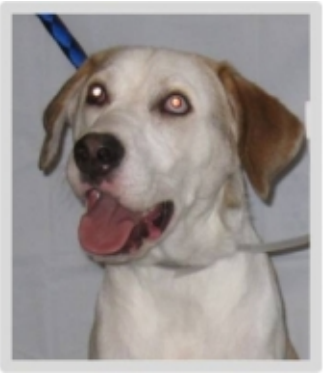
Corgi (including Cardigan, Pembroke)

Swedish Vallhund

Shetland Sheepdog

Welsh Terrier

Basenji



Dog 51

25% Novia Scotia Duck Tolling Retriever

25% Irish Water Spaniel

25% Fox Terrier

12.22% English Springer Spaniel

Top Responses

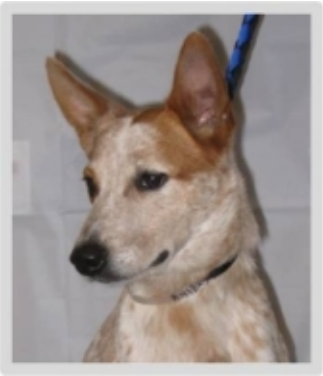
Labrador Retriever

Foxhound (including American, English, Treeing Walker Coonhound)

Pointer (includes English Pointer)

Catahoula Leopard Dog

Beagle



Dog 52

75% Australian Cattle Dog

10.26% Lancashire Heeler

6.02% Old English Sheepdog

5.97% Belgian Malinois

Top Responses

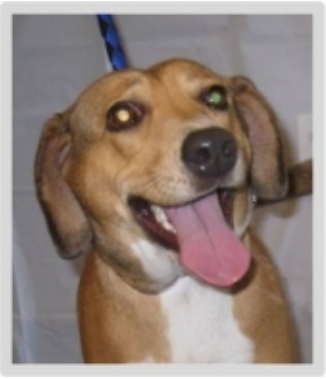
Australian Cattle Dog

Australian Kelpie

Basenji

Catahoula Leopard Dog

Australian Shepherd




Dog 53

25% Labrador Retriever

25% Weimeraner

25% Australian Cattle Dog

9.65% Beagle

Top Responses

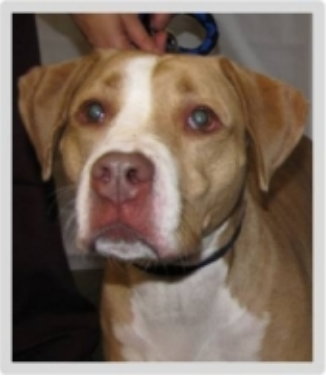
Beagle

Foxhound (including American, English, Treeing Walker Coonhound)

Labrador Retriever

No Predominant Breed

Harrier




Dog 54

25% Bulldog

12.5% Mastiff

12.5% Boxer

10.42% Tibetan Mastiff

Top Responses

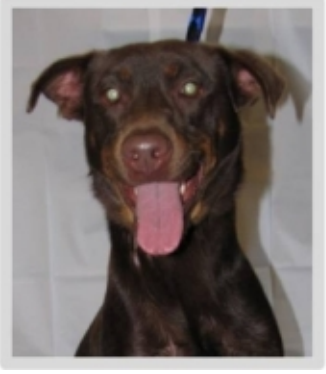
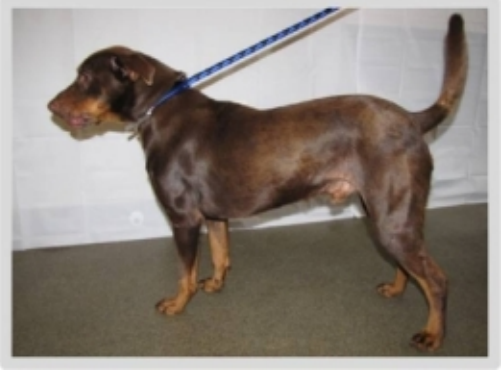
American Staffordshire Terrier

Boxer

American Bulldog

Staffordshire Bull Terrier

No Predominant Breed

Dog 55

25% Great Dane

25% Schipperke

12.5% Chow Chow

12.5% Collie

Top Responses

Dobermann Pinscher

Labrador Retriever

No Predominant Breed

Rottweiler

Dachshund (including miniature, standard, smooth coat, wirehair, longhair)


Dog 57

25% Beauceron

25% Siberian Husky

25% American Staffordshire Terrier

12.73% Schipperke

Top Responses

Labrador Retriever

German Shepherd Dog

No Predominant Breed

Golden Retriever

Anatolian Shepherd Dog


Dog 58

25% Boxer

25% Entlebucher Mountain Dog

25% German Spitz

9.14% Golden Retriever

Top Responses

Boxer

Great Dane

American Staffordshire Terrier

American Bulldog

Staffordshire Bull Terrier


Dog 59

50% American Bulldog

50% American Staffordshire Terrier

Top Responses

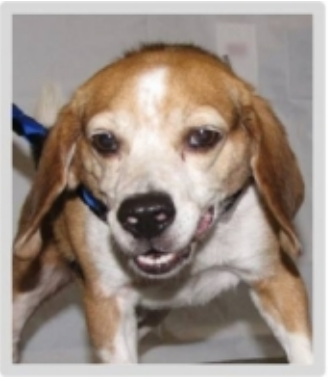
American Staffordshire Terrier

Staffordshire Bull Terrier

Boxer

American Bulldog

Mastiff




Dog 60

100% Beagle

Top Responses

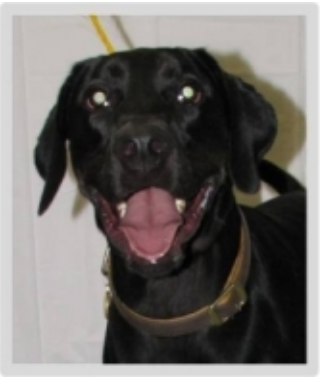
Beagle

Basset Hound

No Predominant Breed

Foxhound (including American, English, Treeing Walker Coonhound)

Pug




Dog 61

50% Doberman Pinscher

25% Labrador Retriever

12.5% Bulldog

5.83% Irish Water Spaniel

Top Responses

Labrador Retriever

Great Dane

Greyhound

No Predominant Breed

Black and Tan Coonhound


Dog 62

25% Chow Chow

25% American Staffordshire Terrier

25% Siberian Husky

13.71% Australian Terrier

Top Responses

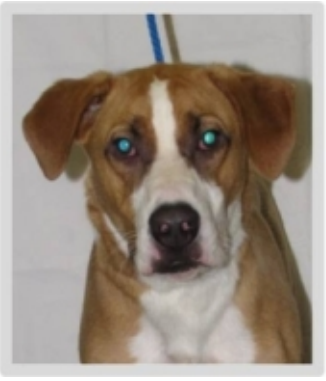
Schipperke

No Predominant Breed

Corgi (including Cardigan, Pembroke)

Basenji

Australian Kelpie




Dog 63

25% Bulldog

12.5% Bullmastiff

7.35% Basset Hound

7.2% Keeshond

Top Responses

No Predominant Breed

Boxer

Foxhound (including American, English, Treeing Walker Coonhound)

Labrador Retriever

American Staffordshire Terrier


Dog 64

50% Russell Terrier

50% Plott Hound

Top Responses

Beagle

No Predominant Breed

German Shepherd Dog

Corgi (including Cardigan, Pembroke)

Basenji


Dog 65

50% RedBone Coonhound

25% German Shepherd

12.5% Labrador Retriever

10.02% Curly-Coated Retriever

Top Responses

German Shepherd Dog

No Predominant Breed

Akita

Belgian Malinois

Australian Shepherd


Dog 66

50% Cocker Spaniel

25% Pomeranian

16.91% Lowchen

3.5% Field Spaniel

Top Responses

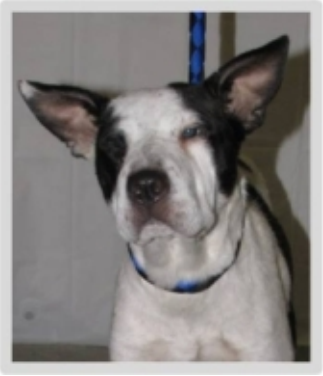
Cocker Spaniel

Labrador Retriever

Beagle

No Predominant Breed

Flat Coated Retriever




Dog 67

25% American Bulldog

25% Staffordshire Bull Terrier

10.49% English Cocker Spaniel

7.41% Chinese Sharpei

Top Responses

No Predominant Breed

Bull Terrier (including miniature)

Shar-Pei, Chinese

American Staffordshire Terrier

Border Collie


Dog 68

25% American Staffordshire Terrier

25% French Bulldog

25% American Foxhound

22.13% Belgian Tervuren

Top Responses

German Shepherd Dog

No Predominant Breed

Rhodesian Ridgeback

Anatolian Shepherd Dog

Belgian Malinois


Dog 69

25% Labrador Retriever

25% Bulldog

25% Australian Cattle Dog

13.95% Australian Terrier

Top Responses

Labrador Retriever

Flat Coated Retriever

No Predominant Breed

Border Collie

Golden Retriever


Dog 71

25% Miniature Pinscher

25% Brittany Spaniel

25% Chinese Crested

12.83% German Spitz

Top Responses

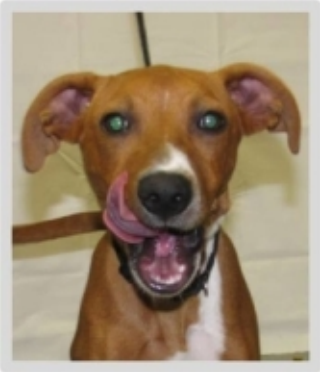
Chihuahua

No Predominant Breed

Labrador Retriever

Border Collie

Schipperke




Dog 72

25% American Bulldog

25% Portuguese Water Dog

25% Saluki

1.99% Bichon Frise

Top Responses

No Predominant Breed

Vizsla

Rhodesian Ridgeback

Redbone Coonhound

American Staffordshire Terrier


Dog 73

25% American Staffordshire Terrier

12.5% Miniature Bull Terrier

10.63% Miniature Poodle

9.38% American Bulldog

Top Responses

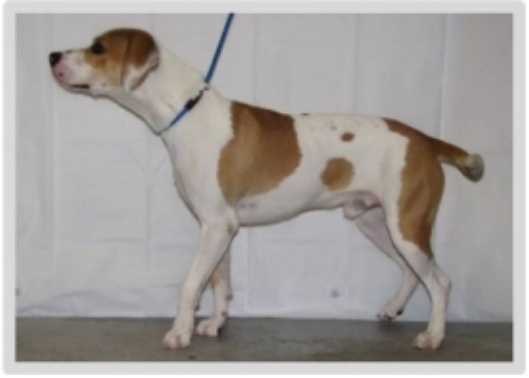
Labrador Retriever

No Predominant Breed

American Staffordshire Terrier

Rhodesian Ridgeback

Boxer

Dog 74

25% Boxer

25% Beagle

25% English Toy Terrier

14.66% Saint Bernard

Top Responses

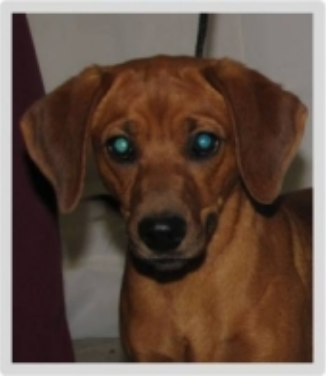
Pointer (includes English Pointer)

Beagle

Foxhound (including American, English, Treeing Walker Coonhound)

No Predominant Breed

Brittany




Dog 76

50% Short Haired Dachshund

25% Boxer

11.51% Silky Terrier

5.64% Labrador Retriever

Top Responses

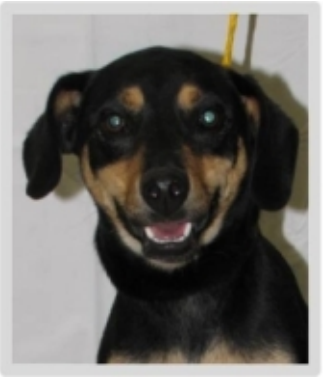
Dachshund (including miniature, standard, smooth coat, wirehair, longhair)

Beagle

No Predominant Breed

Vizsla

Redbone Coonhound




Dog 77

25% Golden Retriever

25% Basset Hound

11.22% Cairn Terrier

10.55% German Shepherd

Top Responses

Black and Tan Coonhound

Dobermann Pinscher

Rottweiler

No Predominant Breed

German Shepherd Dog


Dog 79

25% Doberman Pinscher

25% Wire Haired Dachshund

12.5% Samoyed

12.5% Miniature Schnauzer

Top Responses

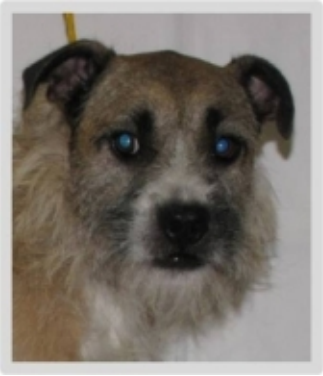
No Predominant Breed

American Staffordshire Terrier

Boxer

Beagle

Collie




Dog 81

50% Chihuahua

9.12% Dogue de Bordeaux

8.07% Yorkshire Terrier

6.93% Great Pyrenees

Top Responses

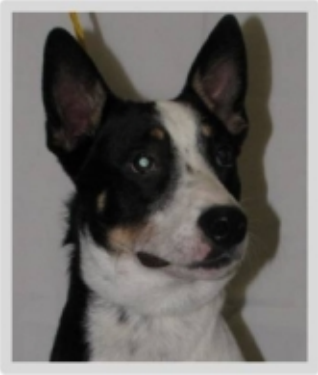
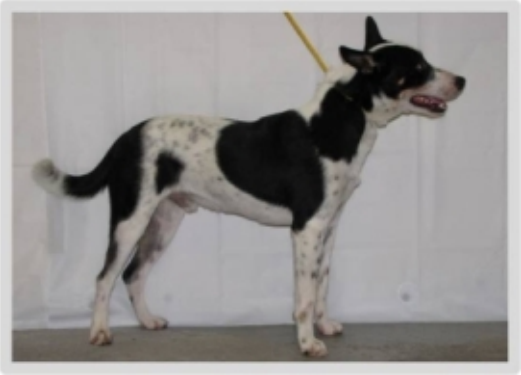
Border Terrier

Brussels Griffon

No Predominant Breed

Jack Russell Terrier (includes Russell Terrier)

Cairn Terrier

Dog 82

25% Australian Cattle Dog

17.15% Miniature Bull Terrier

14.98% Scottish Deerhound

12.8% Australian Shepherd

Top Responses

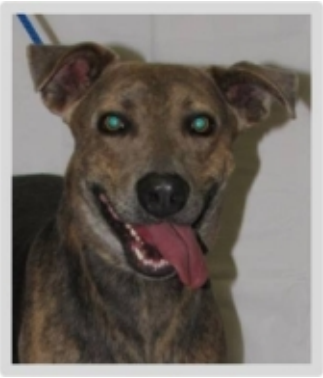
Australian Cattle Dog

Border Collie

Australian Kelpie

No Predominant Breed

Australian Shepherd




Dog 83

25% Boxer

25% Italian Greyhound

25% Miniature Short Haired Dachshund

8.41% Staffordshire Bull Terrier

Top Responses

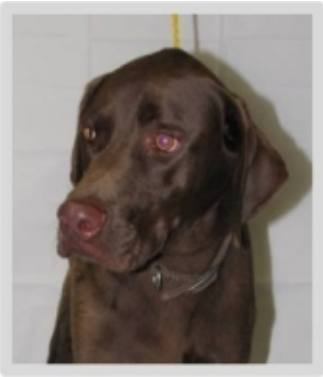
German Shepherd Dog

No Predominant Breed

Catahoula Leopard Dog

Greyhound

Plott Hound




Dog 84

75% Weimeraner

25% Labrador Retriever

Top Responses

Labrador Retriever

Weimaraner

German Shorthaired Pointer

Pointer (includes English Pointer)

Great Dane


Dog 85

25% Beauceron

12.5% German Shepherd

12.5% Siberian Husky

12.14% Komondor

Top Responses

German Shepherd Dog

Siberian Husky

Malamute, Alaskan

Australian Shepherd

Border Collie


Dog 88

25% Plott Hound

25% Boston Terrier

25% German Spitz

11.68% Saluki

Top Responses

American Bulldog

American Staffordshire Terrier

Boxer

Dalmatian

Argentine Dogo


Dog 89

25% Bulldog

25% Boxer

12.98% Blue Tick Coonhound

10.9% Weimeraner

Top Responses

American Staffordshire Terrier

Rottweiler

Staffordshire Bull Terrier

American Bulldog

Labrador Retriever


Dog 92

25% Australian Cattle Dog

25% Border Collie

9.77% Miniature Pinscher

9.57% Labrador Retriever

Top Responses

No Predominant Breed

Beagle

Labrador Retriever

Jack Russell Terrier (includes Russell Terrier)

Australian Shepherd


Dog 93

25% Weimeraner

8.28% Beagle

8.23% Cane Corso

4.18% Rottweiler

Top Responses

Australian Shepherd

Border Collie

No Predominant Breed

Australian Cattle Dog

Cocker Spaniel


Dog 94

25% Golden Retriever

25% Poodle

18.98% Dandie Dinmont Terrier

10.35% Glen of Imaal Terrier

Top Responses

No Predominant Breed

Beagle

Greyhound

Foxhound (including American, English, Treeing Walker Coonhound)

Rhodesian Ridgeback


Dog 95

25% American Staffordshire Terrier

25% Dogue de Bordeaux

3.66% Irish Terrier

2.17% Dandie Dinmont Terrier

Top Responses

American Staffordshire Terrier

No Predominant Breed

Staffordshire Bull Terrier

Labrador Retriever

Shar-Pei, Chinese


Dog 96

50% American Staffordshire Terrier

6.95% Vizsla

5.86% Miniature Pinscher

0.89% Collie

Top Responses

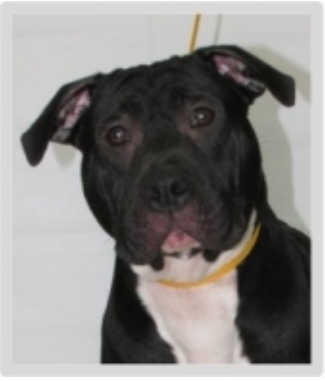
American Staffordshire Terrier

No Predominant Breed

Staffordshire Bull Terrier

Basenji

Miniature Pinscher




Dog 97

50% American Staffordshire Terrier

25% Bullmastiff

8.73% Collie

2.48% Bulldog

Top Responses

American Staffordshire Terrier

Staffordshire Bull Terrier

American Bulldog

Shar-Pei, Chinese

Mastiff


Dog 98

25% Norwegian Elkhound

25% Miniature Short Haired Dachshund

14.38% Sealyham Terrier

10.35% Dogue de Bordeaux

Top Responses

No Predominant Breed

German Shepherd Dog

Plott Hound

Black and Tan Coonhound

American Staffordshire Terrier


Dog 99

25% American Staffordshire Terrier

25% Collie

21.41% Black Russian Terrier

19.86% Norwegian Buhund

Top Responses

Labrador Retriever

No Predominant Breed

Pointer (includes English Pointer)

Brittany

Foxhound (including American, English, Treeing Walker Coonhound)


Dog 100

25% Rottweiler

25% American Eskimo

25% Portuguese Water Dog

15.23% Bulldog

Top Responses

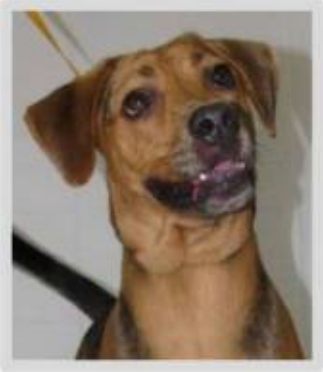
Labrador Retriever

No Predominant Breed

German Shepherd Dog

Rhodesian Ridgeback

Golden Retriever




Dog 101

25% Curly Coated Retriever

25% Jindo

13.31% Norfolk Terrier

11.43% Russell Terrier

Top Responses

Black and Tan Coonhound

German Shepherd Dog

Bloodhound

No Predominant Breed

Foxhound (including American, English, Treeing Walker Coonhound)


Dog 102

50% Golden Retriever

25% Flat Coated Retriever

16.24% German Spitz

9.8-% Norfolk Terrier

Top Responses

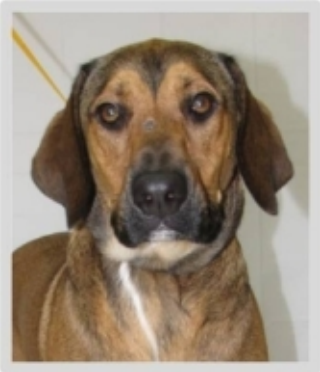
Border Collie

Saluki

Flat Coated Retriever

Afghan Hound

Springer Spaniel (including English, Welsh)



Dog 103

25% Labrador Retriever

25% Tibetan Mastiff

13.96% American Eskimo

11.45% Long Haired Dachshund

Top Responses

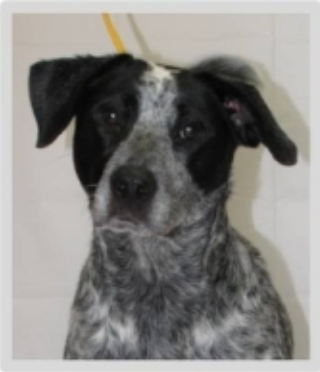
Bloodhound

Black and Tan Coonhound

Rhodesian Ridgeback

No Predominant Breed

German Shepherd Dog



Dog 104

25% Australian Cattle Dog

25% Labrador Retriever

25% Jindo

17.69% Great Dane

Top Responses

Australian Cattle Dog

German Shorthaired Pointer

Pointer (includes English Pointer)

Blue Tick Coonhound

English Setter

Dog 106

25% Miniature Short Haired Dachshund

25% Siberian Husky

20.11% Black and Tan Coonhound

12.73% Irish Setter

Top Responses

Dachshund (including miniature, standard, smooth coat, wirehair, longhair)

Basset Hound

Corgi (including Cardigan, Pembroke)

No Predominant Breed

German Shepherd Dog


Dog 107

50% Basset Hound

25% French Bulldog

16.62% Cane Corso

10.45% Wire Fox Terrier

Top Responses

Basset Hound

Beagle

Clumber Spaniel

No Predominant Breed

Foxhound (including American, English, Treeing Walker Coonhound)


Dog 108

25% American Staffordshire Terrier

25% Shetland Sheepdog

25% Yorkshire Terrier

10.8% Manchester Terrier

Top Responses

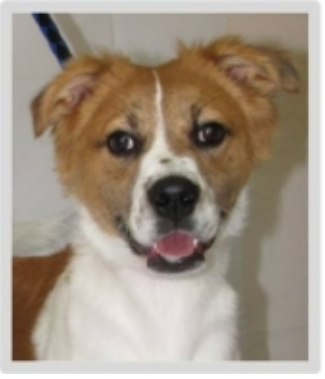
No Predominant Breed

American Staffordshire Terrier

Labrador Retriever

American Bulldog

Jack Russell Terrier (includes Russell Terrier)




Dog 109

25% Beauceron

25% Boxer

15.03% Ibizian Hound

12.96% Chinese Crested

Top Responses

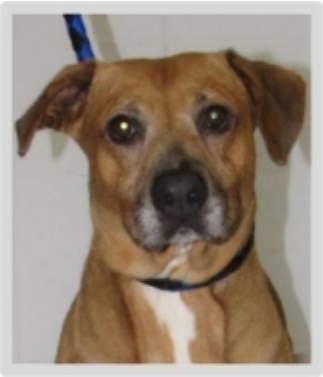
Brittany

No Predominant Breed

Springer Spaniel (including English, Welsh)

Border Collie

Australian Shepherd




Dog 110

50% Staffordshire Bull Terrier

25% Collie

25% Small Munsterlander

Top Responses

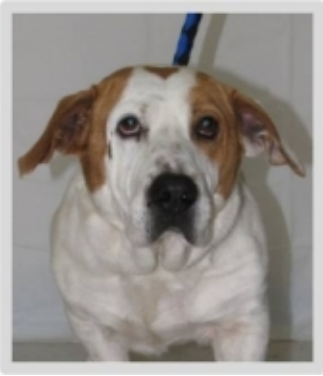
Labrador Retriever

No Predominant Breed

Rhodesian Ridgeback

Boxer

German Shepherd Dog




Dog 111

25% Basset Hound

25% American Staffordshire Terrier

25% Chow Chow

25% English Cocker Spaniel

Top Responses

Basset Hound

Clumber Spaniel

Bulldog (English)

No Predominant Breed

Beagle


Dog 112

25% German Short Haired Pointer

25% Labrador Retriever

12.5% Miniature Poodle

11.06% Pointer

Top Responses

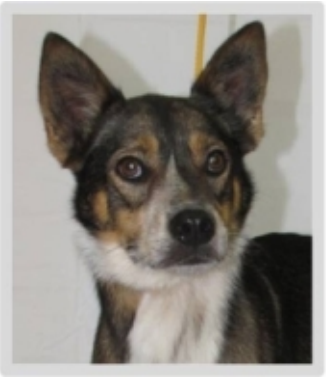
Pointer (includes English Pointer)

Brittany

Foxhound (including American, English, Treeing Walker Coonhound)

German Shorthaired Pointer

Beagle




Dog 114

25% Chow Chow

25% Puli

25% Bull Terrier

25% Miniature Schnauzer

Top Responses

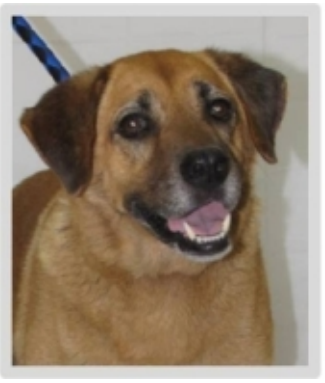
No Predominant Breed

Australian Cattle Dog

Australian Kelpie

Collie

Basenji




Dog 115

25% Chow Chow

25% American Foxhound

25% Shetland Sheepdog

25% Miniature Poodle

Top Responses

German Shepherd Dog

Golden Retriever

No Predominant Breed

Labrador Retriever

Anatolian Shepherd Dog


Dog 116

25% Chow Chow

25% Catahoula Leopard Dog

25% Dalmatian

25% Scottish Terrier

Top Responses

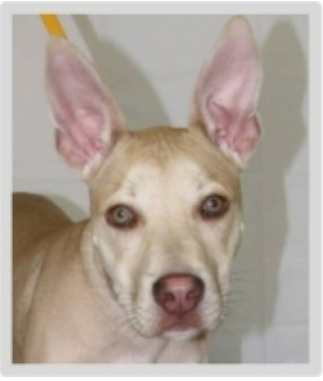
No Predominant Breed

Chow Chow

Basenji

American Staffordshire Terrier

Akita



Dog 117

50% American Bulldog

25% American Staffordshire Terrier

9.28% Pembroke Welsh Corgi

7.97% Irish Wolfhound

Top Responses

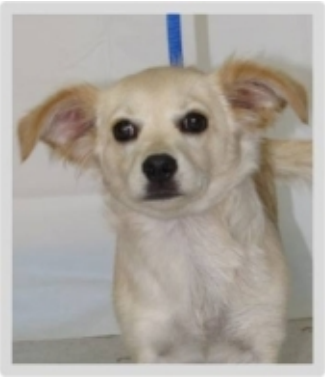
Pharaoh Hound

Ibizan Hound

No Predominant Breed

Basenji

Great Dane



Dog 119

25% English Cocker Spaniel

25% Belgian Sheepdog

11.35% Chow Chow

10.32% Puli

Top Responses

Chihuahua

Papillon

No Predominant Breed

Pomeranian

Cocker Spaniel

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ANNEXE 4

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Inconsistent identification of pit bull-type dogs by shelter staff

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ABSTRACT

Shelter staff and veterinarians routinely make subjective dog breed identification based on appearance, but their accuracy regarding pit bull-type breeds is unknown. The purpose of this study was to measure agreement among shelter staff in assigning pit bull-type breed designations to shelter dogs and to compare breed assignments with DNA breed signatures. In this prospective cross-sectional study, four staff members at each of four different shelters recorded their suspected breed(s) for 30 dogs; there was a total of 16 breed assessors and 120 dogs. The terms American pit bull terrier, American Staffordshire terrier, Staffordshire bull terrier, pit bull, and their mixes were included in the study definition of 'pit bull-type breeds.'

Using visual identification only, the median inter-observer agreements and kappa values in pairwise comparisons of each of the staff breed assignments for pit bull-type breed vs. not pit bull-type breed ranged from 76% to 83% and from 0.44 to 0.52 (moderate agreement), respectively. Whole blood was submitted to a commercial DNA testing laboratory for breed identification. Whereas DNA breed signatures identified only 25 dogs (21%) as pit bull-type, shelter staff collectively identified 62 (52%) dogs as pit bull-type. Agreement between visual and DNA-based breed assignments varied among individuals, with sensitivity for pit bull-type identification ranging from 33% to 75% and specificity ranging from 52% to 100%. The median kappa value for inter-observer agreement with DNA results at each shelter ranged from 0.1 to 0.48 (poor to moderate). Lack of consistency among shelter staff indicated that visual identification of pit bull-type dogs was unreliable.

Introduction

As pet dog ownership in the United States passes 70 million, mixed breed dogs have nearly overtaken purebreds in the proportion of owned dogs (American Veterinary Medical Association, 2012). Even when purebred dogs are acquired, it is most commonly for companionship and not for the working roles for which they were historically developed. Despite the decreased focus on purpose-bred dogs, breed assignment continues to influence how dogs are viewed and managed (Simpson et al., 2012). This is true even when the actual breed of dog, if any, is unknown.

Guessed breed designations are often included in veterinary records, dog licenses, animal shelter records, pet adoption websites, lost-and-found notices, housing applications, and insurance policies (Voith et al., 2013). Visual breed assessments have been shown to be erroneous more frequently than not[1] (Voith et al., 2009, 2013). The past few decades have seen an increase in ownership restrictions applied to certain breeds of dogs and dogs that resemble them. The restrictions are based on the assumptions that certain breeds are inherently dangerous, that those breeds can be reliably identified, and that restricting these breeds would improve public safety.

When dogs bite people and other animals, the suspected breed of dog reported by witnesses is often listed in official bite reports filed by hospitals or animal control facilities.[1] Media coverage of dog

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E-mail address: levyjk@ufl.edu (J.K. Levy).

[1] Croy, K.C., Levy, J.K., Olson, K.R., Crandall, M., Tucker, S.J., 2012. What kind of dog is that? Accuracy of dog breed assessment by canine stakeholders (Abstract). In: 5th Annual Maddie's Shelter Medicine Conference, Orlando, USA. http://sheltermedicine.vetmed.ufl.edu/education/research-studies/current-studies/dog-breeds/ (accessed 27 June 2015).

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bite-related injuries has been shown to be more extensive and to report the suspected breed more frequently when witnesses report a pit bull or guard-line breed as involved.[2] The sources and reliability of this breed reporting have been questioned (Collier, 2006; Patronek and Slavinski, 2009; Voith et al., 2009, 2013; Patronek et al., 2010, 2013).

A study of all dog bite-related fatalities that occurred during the 10-year period 2000–2009 reported that 90% of the dogs involved were described in at least one media account with a single breed descriptor, potentially implying that the dog was purebred (Patronek et al., 2013). However, approximately 46% of the dogs in the US are mixed breed dogs (American Veterinary Medical Association, 2012), and it seemed unlikely to the authors that purebred dogs would be disproportionately represented among the dogs involved in these incidents. Further, in only 18% of the cases were the authors able to make a valid determination that the dog involved was a member of a distinct, recognized breed (Patronek et al., 2013). Nevertheless, unverified reports of the dog breeds involved in serious and fatal incidents have been used to develop opinions regarding perceived danger levels of different breeds[1] (Voith et al., 2009, 2013; Patronek et al., 2013).

These opinions have led to restrictions or outright bans on certain breeds by municipalities, insurance companies, homeowner associations, and animal shelters. It has been estimated that as of 2009, restrictions regarding ownership of dozens of breeds were in place in more than 300 jurisdictions in the US (Berkey, 2009). Most restrictions name 'pit bull' as a regulated 'breed,' but many also include Rottweilers, Doberman Pinschers, German shepherd dogs, and Chow Chows, among more than 30 others.

'Pit bull' is not a recognized breed, but a term applied to a heterogeneous group whose membership may include purebred dogs of various breeds, along with dogs presumed to be mixes of those breeds. Use of this descriptor varies according to the recognized breeds included and the opinions of the observers (Patronek et al., 2013). Nevertheless, dog owners, animal shelters, insurance companies, veterinarians, and the public frequently use the term 'pit bull' casually and in official documents, as though it describes a single, recognized breed. The lack of a universally accepted definition of 'pit bull' and reliance upon the opinion of observers complicate identification of dogs targeted for regulatory control by 'breed bans' (Hoffman et al., 2014). Most, but not all, breed-specific ordinances in the US include with the term 'pit bull' the American pit bull terrier, American Staffordshire terrier, and Staffordshire bull terrier, along with dogs that, based upon their appearance, are deemed to resemble these breeds.

Since actual pedigree information is not usually available, determining the likely breed of dogs that may fall under breed-based restrictions requires a subjective assessment of the dog's appearance. Recently, DNA analysis has been used to investigate the breed heritage of individual dogs targeted in breed restriction cases. However, the largest testing service does not offer a DNA test for identification of American pit bull terriers. Additionally, it does not provide a test for 'pit bulls', since the term variously refers to a loose collection of breeds and their mixes or to dogs with similar morphology rather than a group of dogs with a controlled gene pool.

Shelter staff members and veterinarians routinely make subjective breed assessments as part of daily shelter operations. They also may be tasked with providing expert opinions regarding the likely breed of individual dogs involved in breed regulation cases. Depending upon the regulatory environment and/or the beliefs of shelter managers, the stakes may be high for dogs identified as pit bulls and for their owners[3] (Voith et al., 2009).

The primary objective of this study was to determine the level of agreement among shelter workers in designating pit bull-type breeds for shelter dogs. A secondary objective was to compare shelter workers' breed assignments with DNA breed signatures.

Materials and methods

Study sites

Four Florida animal shelters were recruited. These shelters admitted 2520–10,154 dogs in the calendar year prior to the study. At each shelter, managers assigned three staff members and one shelter veterinarian whose regular duties included assignment of breed designations to newly admitted dogs to participate in the study as dog breed assessors. Each assessor completed a questionnaire regarding their shelter experience and previous training in dog breed identification. In addition to the veterinarians, assessor job titles included animal control officers, kennel staff, veterinary assistants/technicians, and customer service staff. The assessors might or might not have had previous knowledge of the dogs selected for the study.

Dogs

At each study site, 30 healthy dogs 2 months of age and older were selected by the research team to phenotypically represent a variety of age, body size, body types, coat length, and coat color. In the case of related dogs (dams and litters), only one dog from each family was selected. Only dogs that staff considered safe to handle were eligible for inclusion. The breed previously assigned to each dog at the time of shelter admission was recorded for comparison. The cage card for each dog was covered so that the breed previously assigned at intake was not visible to the dog breed assessors. The study protocol was approved by the Institutional Animal Care and Use Committee at the University of Florida on 7 March 2011.

Subjective breed assessment

At each shelter, the four dog breed assessors were given a list of the selected dogs and asked to assign a primary breed for each dog based on its physical appearance. Assessors could assign a secondary breed if they felt that it was indicated and could select 'mixed breed' if they felt there were no defining characteristics that allowed a specific breed identification. Assessors were allowed to list any breed and were not provided with a predetermined list of breeds to choose from. They were escorted as a group by a research team member to the front of each dog's kennel and did not move to the next dog until all assessors had recorded their breed designations. The assessors were not allowed to confer with anyone or to view any intake paperwork, cage cards, computer records, or references while the study was in progress.

For the purposes of this study, the terms American pit bull terrier, American Staffordshire terrier, Staffordshire bull terrier, pit bull, and their mixes were included in the study definition of 'pit bull-type breeds' because these terms are frequently included in laws regulating dog ownership based on breed or phenotype. For each dog, the breed assigned by the shelter prior to the study and the breeds assigned by each shelter staff member during the study were coded by the investigators as 'pit bull-type' if any of these breed terms were included as the primary or secondary breed identification. The breed identification was coded as 'not pit bull-type' if none of these breed terms was included.

Dog physical assessments

Following the shelter staff breed assessment, each dog was photographed, weighed, measured from the floor to the top of the shoulder, and assessed by the research veterinarian for body condition using three categories (underweight, ideal weight, overweight). Physical characteristics including coat length, coat type, coat color, ear type, tail type, age (juveniles ≤6 months, adults 6 months and older), sex, and reproductive status were recorded.

DNA assessment of dog breeds

Three milliliters of whole blood was collected from each dog into EDTA tubes for DNA analysis. Samples were shipped to a commercial DNA analysis laboratory (Wisdom Panel Professional Canine Genetic Analysis, Mars Veterinary)[3] at room temperature by overnight courier on the day of collection. DNA was extracted and typed

[2] Delise, K., 2007. Pit bulls prohibited. In: The Pit Bull Placebo: The Media, Myths and Politics of Canine Aggression. Animals. Anubis Publishing, Denver, pp. 8–55. (Chapter 8) http://nationalcanineresearchcouncil.com/uploaded_files/publications/230603563_Pit%20Bull%20Placebo.pdf (accessed 27 June 2015).

[3] See: Mars Veterinary, 2014. Mars Wisdom Panel website. FAQs: I don't think my dog looks like the breeds detected in the Wisdom Panel analysis. Can you help me understand this? http://www.wisdompanel.com/why_test_your_dog/faqs/#35 (accessed 27 June 2015).

at 321 different single nucleotide polymorphisms (SNPs) across the genome using selective hybridization and PCR amplification, followed by a discriminatory single base-pair primer extension reaction. The SNP genotypes were detected by mass spectrometry. The laboratory then used a Bayesian generative model to infer the family tree of a dog from comparison of detected genotypes with 226 breed signatures developed previously from more than 9700 pure bred dogs. Inference was performed on 11 different family tree models, and the best-fit model was selected using the deviance information criterion (Martin et al., 2010).

Results from the DNA analysis laboratory included major breed composition percentages in increments of 12.5%. If breed compositions were identified in amounts <12.5%, these breeds were listed as 'minor breeds.' American pit bull terrier and pit bull were not included in the 226 breed signatures. Dogs were coded as 'pit bull-type' if the breed American Staffordshire terrier or Staffordshire bull terrier was identified to comprise at least 12.5% of the breed signature.

Statistical analysis

Agreement among shelter staff for identification of pit bull-type dogs and between shelter staff and DNA breed signatures was assessed with the kappa statistic according to the following criteria: $\kappa < 0.01$, poor agreement; 0.01–0.20, slight agreement; 0.21–0.40, fair agreement; 0.41–0.60, moderate agreement; 0.61–0.80, substantial agreement; 0.81–1.00, almost perfect agreement (Landis and Koch, 1977). Findings were considered to be significant when $P < 0.05$. The 95% confidence intervals (CI) for sensitivity and specificity estimates were calculated using the exact method. All analyses were performed with statistical software (Stata, StataCorp).

Results

Staff members and dogs selected for the study

A total of 16 shelter staff members, including four shelter veterinarians, participated in the study. All staff members had at least 3 years of shelter experience, but only one reported any formal training in dog breed identification (Table 1). The 120 dogs selected for the study comprised 20–25% of the dogs present in each of the four shelters on the day of the study visit and represented a range of ages, sexes, and phenotypes (Table 2). Juveniles included two puppies estimated to be 2 months of age, 12 estimated to be 3–4 months of age, and 12 estimated to be 5–6 months of age, based on dentition.

Inter-observer agreement for visual breed identification

Using visual identification only, the median inter-observer agreements and kappa values in pair-wise comparisons of each of the five staff breed assignments (one admission breed and four assessor breeds) for pit bull-type dog vs. not pit bull-type dog ranged from 76 to 83% and from 0.44 to 0.52, respectively (Table 3).

Table 1
Occupation and training of shelter staff members responsible for assigning breeds of dogs in four Florida animal shelters.

	n	%
Current job title		
Veterinarian	4	25
Veterinary technician	4	25
Animal control officer	2	13
Customer service	3	19
Animal care	3	19
Years of shelter experience		
<3	0	0
3–5	9	56
6–10	4	25
11–15	2	13
>15	1	6
Breed identification training[a]		
Formal training	1	6
Mentored on the job	14	88
Studied breed book	5	31
Other dog experience	12	75
No training	4	25

[a] Total responses >100% because respondents could select more than one item.

Table 2
Demographic features of 120 dogs selected for visual and DNA breed assignments in four Florida animal shelters.

Characteristic	*n*	%
Age		
Juveniles (≤6 months)	26	22
Adults (>6 months)	94	78
Sex		
Females	52	43
Males	68	57
Body weight (kg)		
<11	26	22
11–20	47	39
21–30	35	29
31–40	11	9
>40	1	1
Height (cm)		
≤20	1	1
21–30	13	11
31–40	17	14
41–50	48	40
51–60	34	28
>60	7	6
Body condition		
Underweight	8	7
Ideal weight	97	81
Overweight	15	12

DNA breed signatures

Using DNA identification, of the 120 dogs chosen for participation in this study, 25 (21%) were identified with pit bull-type heritage (comprising at least 12.5% American Staffordshire terrier or Staffordshire bull terrier) by DNA breed signatures. The breed signatures in these dogs belonged to American Staffordshire terrier in 19 dogs, Staffordshire bull terrier in four dogs, and both breeds in two dogs. According to the breed signatures, none of these 25 dogs were purebred or contained more than 50% contribution of either breed.

Agreement between visual and DNA-based breed assignments

The median inter-observer agreements and kappa values in pairwise comparisons of each of the five staff breed assignments (one intake breed assignment and four breed assessor assignments) with the DNA breed signature for pit bull-type or not pit bull-type ranged from 67 to 78% and from 0.1 to 0.48, respectively (Table 3). Selected examples of breed identification by staff assessment and DNA analysis are provided (Table 4).

Of the 25 dogs identified as pit bull-type dogs by breed signature, 12 were identified by shelter staff as pit bull-type dogs at the time of admission to the shelter (prior to the study visit), including five labeled American Staffordshire terrier mix, four pit bull mix, two pit bull, and one American Staffordshire terrier. During the study, 20/25 dogs were identified by at least one of the four staff assessors as pit bull-type dogs, and five were not identified as pit bull-type dogs by any of the assessors. Overall, the mean sensitivity of visual identification of pit bull-type dogs was 50% (95% CI, 44–56%). The breeds assigned to these dogs by the four staff assessors included pit bull (67%), American pit bull terrier (8%), American Staffordshire terrier (25%), and their mixes.

Of the 95 dogs (79%) that lacked breed signatures for pit bull heritage breeds, six (6%) were identified by shelter staff as pit bull-type dogs at the time of shelter admission, and 36 (38%) were identified as pit bull-type dogs by at least one shelter staff assessor at the time of the study visit. Overall, the mean specificity of visual identification of non-pit bull-type dogs was 83% (95% CI, 78–89%).

Table 3
Inter-observer agreement for identification of pit bull-type dogs based on breed assignment by staff at the time of shelter admission, breed assignment made by four shelter staff assessors, and DNA breed signature.

	Median % agreement among staff members in visual identification of pit bull-type dogs (range)	Median κ (range)	Median % agreement between staff members and DNA breed signature for identification of pit bull-type dogs (range)	Median κ (range)
Shelter 1	80 (70–93)	0.44 (0.13–0.79)	77 (73–80)	0.38 (0.26–0.44)
Shelter 2	76 (59–90)	0.44 (0.19–0.61)	67 (53–77)	0.10 (0.07–0.22)
Shelter 3	83 (77–90)	0.52 (0.23–0.67)	75 (67–87)	0.24 (0.07–0.52)
Shelter 4	77 (70–93)	0.46 (0.23–0.82)	78 (77–87)	0.48 (0.38–0.60)

Table 4
Examples of staff member breed assessments and DNA breed signatures for several study dogs.

Dog	Photo	Intake breed	Staff 1	Staff 2	Staff 3	Veterinarian	Prominent DNA breeds (%)
Dog 7		Labrador retriever mix	American Staffordshire Labrador retriever	American Staffordshire Labrador retriever	American Staffordshire Labrador retriever	Pit bull Labrador retriever	Irish water spaniel (25) Siberian Husky (25) Boston terrier (25)
Dog 8		Boxer mix	Boxer Labrador retriever	American Staffordshire Chow Chow	Boxer Labrador retriever	American Staffordshire Greyhound	Boxer (25) Alaskan Malamute (25)
Dog 9		American Staffordshire mix	American Staffordshire	American Staffordshire mix	Pit bull	American pit bull terrier	American bulldog (50) American Staffordshire (50)
Dog 11		Australian cattle dog mix	Australian cattle dog Border collie	Catahoula Labrador retriever	Australian cattle dog Border collie	Australian cattle dog Border collie	Australian cattle dog (25) American Staffordshire (25)
Dog 59		Pit bull	Pit bull mix	Pit bull	American pit bull terrier mix	Pit bull mix	American bulldog (50) American Staffordshire (50)
Dog 62		Terrier mix	Jack Russell terrier Hound	Basenji Labrador retriever	Shar-Pei Rat terrier	Chihuahua mix	Chow Chow (25) American Staffordshire (25) Siberian Husky (25)

Accuracy in breed assignment as determined by sensitivity and specificity based on DNA breed signatures varied among individual staff assessors, with sensitivity for pit bull-type breed identification ranging from 33 to 75% and specificity ranging from 52 to 100% (Table 5). Veterinarians were not more likely than other shelter staff members to assign breeds that were consistent with the DNA breed signature.

Discussion

A key finding of this study was that agreement among different shelter staff members evaluating the breeds of the same shelter dogs at the same time was only moderate. Lack of consistency among shelter staff in breed assignment confirmed that visual identification of pit bull-type dogs was unreliable.

There is no standardized breed signature for the mixed breed dog known as the 'pit bull,' and the surrogate DNA breed signatures used in this study were for the American Staffordshire terrier and the Staffordshire bull terrier. One in five dogs genetically identified with pit bull heritage breeds were missed by all shelter staff at the time of the study. One in three dogs lacking DNA evidence for pit bull heritage breeds were labeled pit bull-type dogs by at least one shelter staff member.

These findings are consistent with previous reports of poor inter-observer agreement among individuals attempting to identify the predominant breeds of dogs. In a large Internet survey, a national sample of 5922 self-identified 'dog-experts,' including breeders, exhibitors, trainers, groomers, behaviorists, rescuers, shelter staff, veterinarians, and veterinary technicians, was recruited to complete an anonymous Internet survey in which they selected the most likely breed for dogs depicted in photographs.[1] One hundred dogs were included in the Internet survey, and each respondent was randomly shown photographs (front facial and lateral whole body) of 20 of these dogs. Based on the photographs and information about the height, weight, sex, and age of each dog, respondents selected from a drop-down menu of 181 breed options, including 'no predominate breed.' An average of 53 different breeds was selected for each dog, ranging from a low of 11 breeds selected for a purebred Beagle to a high of 84 different breeds for a single mixed-breed dog. In another study, 923 survey takers involved in dog-related professions and activities watched 1 minute color videos of 20 different dogs, and based on the images and information about age, weight, and sex, recorded one or two predominant breeds or 'mix' (Voith et al., 2013). Agreement among survey participants was poor, with at least half of respondents agreeing on the breed for only 7/20 dogs.

Our findings are also consistent with previous reports comparing visual breed identification with results of DNA breed profiles. In a study of 20 dogs adopted from 17 different agencies, the agency's breed designation matched DNA breed profiles in only four dogs (Voith et al., 2009). In the subsequent study using videos of the same dogs, visual breed identifications matched DNA results less than half of the time in 14/20 dogs in the study (Voith et al., 2013).

Table 5
Sensitivity for identification of 25 pit bull-type dogs and specificity for identification of 95 non-pit bull-type dogs as determined by DNA breed signature at the time of shelter admission and by four shelter staff members.

	Number identified by staff as pit bull-type	Sensitivity, % (95% CI)	Specificity, % (95% CI)
Shelter 1			
Admission breed	5	5/8, 63 (25–91)	22/22, 100 (85–100[a])
Assessor 1	8	4/8, 50 (16–84)	18/22, 82 (60–95)
Assessor 2	6	3/8, 38 (9–76)	19/22, 86 (65–97)
Assessor 3	6	4/8, 50 (16–84)	20/22, 91 (71–99)
Veterinarian	6	4/8, 50 (16–84)	20/22, 91 (71–99)
Shelter 2			
Admission breed	3	1/3, 33 (1–91)	25/27, 93 (76–99)
Assessor 1	6	1/3, 33 (1–91)	22/27, 81 (62–94)
Assessor 2	15	2/3, 67 (9–99)	14/27, 52 (32–71)
Assessor 3	13	2/3, 67 (9–99)	16/27, 59 (39–78)
Veterinarian	9	2/3, 67 (9–99)	20/27, 74 (54–89)
Shelter 3			
Admission breed	5	2/6, 33 (4–78)	21/24, 88 (68–97)
Assessor 1	4	3/6, 50 (12–88)	23/24, 96 (79–100[a])
Assessor 2	7	3/6, 50 (12–88)	20/24, 83 (63–95)
Assessor 3	6	2/6, 33 (4–78)	20/24, 83 (63–95)
Veterinarian	8	2/6, 33 (4–78)	18/24, 75 (53–90)
Shelter 4			
Admission breed	6	4/8, 50 (16–84)	20/22, 91 (71–99)
Assessor 1	4	4/8, 50 (16–84)	22/22, 100 (85–100[a])
Assessor 2	7	4/8, 50 (16–84)	19/22, 86 (65–97)
Assessor 3	8	5/8, 62.5 (24–91)	19/22, 86 (65–97)
Veterinarian	11	6/8, 75 (35–97)	17/22, 77 (55–92)

CI, 95% confidence interval by exact method.
[a] One-sided 97.5% confidence interval.

Dogs were selected for the Internet survey if they were reported to have at least one breed that comprised at least 25% of their DNA profile.[1] Visual identifications were considered correct if at least one named breed matched at least one breed in the DNA profile. On average, visual breed identifications matched DNA breed signatures for only 27% of dogs; 6% of dogs were never correctly identified. Although these previous studies included dogs with pit bull-type DNA breed signatures in 10% (Voith et al., 2009, 2013) and 23%[1] of the dogs tested, respectively, the topic of identification of pit bull-type dogs was not specifically discussed.

Participants in two of the studies overestimated their ability to correctly identify breeds visually. In the Internet survey, 68% of respondents predicted they would correctly identify breeds at least half of the time, but only 4% actually did.[1] In the study using videos, after the survey was completed, respondents attended an educational session in which the heredity of phenotypic attributes was discussed and images of breed crosses that looked nothing like their parents were displayed (Voith et al., 2013). Despite being presented with evidence of the poor correlation of physical appearance with breed composition in mixed breed dogs, some respondents clung to their opinions that the DNA results must be wrong; authors of the study called for the completion of similar studies to confirm the findings in additional dogs (Voith et al., 2013).

The commercial DNA testing laboratory used in this study reported an average accuracy of 84% in first-generation crossbred dogs of known parentage.[3] The breed distribution tested represented 45% of American Kennel Club registrations. The accuracy of the test in dogs with more than two breeds and in dogs lacking any purebred heritage is unknown.

Most shelter management software programs have pre-populated drop-down menus of dog breeds that staff members select from when dogs are admitted to the shelter. The two commercial shelter software programs used in the study shelters listed 200–250 dog breed terms, including pit bull terrier, pit bull mix, American pit bull terrier, American Staffordshire terrier, and Staffordshire bull terrier. Breed is a required field for the creation of new dog records, and staff do not have the option of leaving it blank if they are uncertain of the breed assignment.

As demonstrated in the current study, guessing breeds based on visual appearance is fraught with error. In a previous study, the offspring of a cross between a purebred Basenji and a purebred Cocker Spaniel did not physically resemble either parent (Scott and Fuller, 1965). When those offspring were backcrossed to either of the parental breeds, even more variability in physical phenotype occurred. This occurs because dog breeds contain a variety of genetic variants for specific traits and these are not reliably expressed in a 1:1 ratio when mixed with other breeds.[3]

Breed designations have been used in attempts to predict future behavior or personality, such as activity level, trainability, friendliness, or propensity for aggression, but recent studies have demonstrated that the behavior of individual dogs varies widely both within a breed and between breeds (Svartberg, 2006; Martinez et al., 2011; Casey et al., 2013, 2014). In addition, modern purebred dogs often lack the behaviors that were historically selected for when dogs were bred and used for specific functional tasks (Svartberg, 2006). There have been no reports correlating the behavior of crossbred dogs with that expected of the parental breeds. A pair of large studies examining patterns of aggression in dogs found no association between aggression and specific breeds (Casey et al., 2013, 2014). These reports found that aggression tended to occur in a single context, such as a strange person entering the house or encountering an unfamiliar dog on a walk, rather than being generalized over a wide variety of circumstances. There was a low association between inter-dog aggression and human-directed aggression. Together these findings suggest that dogs are more likely to show aggression in response to situational perceived 'threats' rather than to have a general trait of aggression.

The lack of a correlation between the appearance and behavior of individual dogs with that of their crossbred parents highlights the fact that inherited genes determine what could happen, and not necessarily what will happen. Pedigree analysis can explain the degree of relatedness but does not necessarily predict which morphological or behavioral traits are expressed in mixed-breed dogs. This is an important concept to consider when educating the public either in the areas of law or adoption. Mixing breeds is not like mixing paint.

The regulation of certain dog breeds is controversial, with little evidence that breed bans have resulted in decreased serious or fatal dog bite-related injuries (Klaassen et al., 1996; Rosado et al., 2007; Overall, 2010; Patronek et al., 2010). Regulation of particular breeds has been challenged in court, as has the breed identification of individual dogs[4] (Patronek and Slavinski, 2009). In 2011, the US Department of Justice ruled that the Federal Americans with Disabilities Act supersedes any local breed restrictions and allows disabled persons to keep service dogs of restricted breeds (VanKavage, 2011).

In many jurisdictions, animal shelter staff members and veterinarians are considered to be experts in breed identification and are asked to visually assess dogs to determine whether they should be categorized as pit bulls or other regulated 'breeds' based on their physical features alone[4–6] (Simpson et al., 2012). As more cases of

[4] See: Iowa State Legislature, 2006. State of Iowa Citizen's Aide/Ombudsman. Investigation of Maquoketa's Pit Bull Ban Ordinance and Enforcement 2006. https://www.legis.iowa.gov/docs/CAO/Invstgtv_Reports/2007/CIWPA007.PDF (accessed 27 June 2015).
[5] See: Miami-Dade, 2014. Municipal Code Sec. 5–17, In: Chapter 5 Animals and Fowl, http://library.municode.com/index.aspx?clientID=10620&stateID=9&statename=Florida (accessed 27 June 2015).
[6] See: Denver, 2015. Denver, Colorado – Code of Ordinance-Tile II, InL Chapter 8, Pit Bulls Prohibited, https://library.municode.com/index.aspx?clientID=10257&stateID=6&statename=Colorado (accessed 27 June 2015).

breed identification involve DNA analysis and are challenged in court, veterinarians could be called to testify or even be held liable should their breed identification opinions be found to be in error (Berkey, 2009; Simpson et al., 2012). The results of this study confirm that shelter staff members, including veterinarians, frequently disagree with each other on whether dogs fall into the pit bull-type category, and their assessments of whether or not a dog was a pit bull-type only moderately agree with DNA breed profiles.

Limitations of our study include unknown sensitivity and specificity of the DNA breed testing and lack of a DNA test for American pit bull terrier. There is also no DNA test for 'pit bull,' since this term refers to a phenotype, not a pedigree. The test for the Bayesian analysis used by providers of the DNA testing relied on breed signatures of purebred dogs selected for the database and not a representative randomized sample of all dogs, which might be a source of inaccuracy. In addition, relatively little information exists regarding the accuracy of the DNA test for identifying the breed composition of mixed breed dogs. Nonetheless, the key finding in this study was that the poor agreement among staff members in pit-bull type dog identification indicates that many errors in visual breed identification were made, even if it was not possible to determine with certainty which of those identifications were wrong.

Conclusions

The marked lack of agreement observed among shelter staff members in categorizing the breeds of shelter dogs illustrates that reliable inclusion or exclusion of dogs as 'pit bulls' is not possible, even by experts. This has special significance to the topic of restrictive breed regulations, since such regulations are based on the faulty assumptions that (1) certain breeds or phenotypes are inherently dangerous, and (2) that those breeds and their mixes can be identified by observation. Since injuries from dogs have not decreased following bans on particular breeds, public safety is better served by focusing on recognition and mitigation of risk factors for dog bites, such as supervising children, recognizing canine body language, avoiding approaching an unfamiliar dog in its territory, neutering dogs, and providing adequate socialization and companionship for dogs and identification and management of individual dangerous dogs and reckless dog owners.

Conflict of interest statement

None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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ANNEXE 5

Comparison of Visual and DNA Breed Identification of Dogs and Inter-Observer Reliability

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Abstract Until the recent advent of DNA analysis of breed composition, identification of dogs of unknown parentage was done visually, and visual identification is still the most common method of breed identification. We were interested in how often visual identification of dogs by people, assumed to be knowledgeable about dogs, matched DNA breed identification and how often these people agreed with each other (inter-observer reliability). Over 900 participants who engaged in dog related professions and activities viewed one-minute, color video-clips of 20 dogs of unknown parentage and were asked to identify the dogs' predominant breeds. For 14 of the dogs, fewer than 50% of the respondents visually identified breeds of dogs that matched DNA identification. Agreement among respondents was also very poor. Krippendorf's alpha was used to examine the reliability of the most predominant breed (selected across all dogs identified as mixed breeds) for all respondents, yielding alpha=0.23. For only 7 of the 20 dogs was there agreement among more than 50% of the respondents regarding the most predominant breed of a mixed breed and in 3 of these cases the most commonly agreed upon visual identification was not identified by DNA analysis.

Keywords Inter-observer Reliability of Dog Breed Identification, Visual and DNA Identification of Mixed Breed Dogs

1. Introduction

The breed by which a dog is identified has important implications and ramifications. Breed identification is used in public health journals, veterinary medical records, lost and found notices, licensing documents and animal shelter descriptions. How a dog is identified also influences how people interpret a dog's behavior. World-wide, public and private regulations and restrictions have been enacted that regulate dog ownership, euthanasia, availability of liability insurance, and access to housing. These rules may specify specific breeds, mixes of these breeds, or any dog that resembles these breeds. We were interested in how often visual identification of dogs by people assumed to be knowledgeable about dogs matched DNA breed identification, and how often these people agreed with each other (inter-observer reliability).

Estimates of the prevalence of specific breeds of dogs that engage in injurious behaviors appear in numerous published articles related to public health, canine behavior, andveterinary medicine. Data concerning dog breeds, particularly pertaining to human injuries, are frequently tabulated from newspaper accountsor retrospective reviews of hospital and animal control records[1-10]. Sometimes dogs in these reports are identified by owners according to what they believe is the most predominant breed of their dog[4],[6],[9] or from information entered in veterinary medical records based on the staffs' assessments[9],[11]. Generally, published reports supply no data on who identifiedthe dogs' breeds[12]. Adding to the confusion, data are often published in a manner that combines dogs identified as purebreds with purebred crosses, e.g. the German Shepherd Dogand German Shepherd cross would bedepicted as German Shepherds[4],[7]; all dogs identified as pit bull breeds and pit bull hybrids would be categorized as a pit bull[10]. Although such publications may include cautionary statements that thebreed identifications were unverified, potentially inaccurate, and that data on the numbers and breeds of dogs in the source population were unknown[3-7], breed frequencies are still included in the publications.

With the intention of providing public safety, regional and national governments have attempted to regulate dog ownership, how a dog is maintained, and impose euthanasia policies based on the perceived breed composition of a dog, be it a purebred or mixed breed[12-20]. Insurance premiums and housing restrictions are also based on a dog's

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breed composition[8],[19],[20]. Until the recent advent of DNA analysis of breed composition[21-25] identification of dogs of unknown parentage was done visually, and visual identification is still the most common method of breed identification, even by law enforcement, animal care and control agencies, and veterinarians[19],[20],[26]. As examples, see the animal control ordinances of Prince George's County Maryland, Denver Colorado, and Victoria, Melbourne Australia[27-29].

Our personal observations of discrepancies among people who attempt to visually identify the breed composition of dogs prompted this study. We were interested in how often visual identification by people assumed to be knowledgeable about dogs was in agreement with DNA identification, and how often people agreed with each other (inter-observer reliability). We felt this was important because of the potential ramifications of misclassification of dog breeds in published databases which drive public and private policies as well as people's perceptions of the behavior of individual dogs.

People who engage in professions or services that involve dogs are one source of identification of dogs of unknown parentage. They are in a position to provide their opinion to owners about the possible breed or predominant breed of their dogs. They may also directly assign a breed identity to dogs and enter their opinions on office forms and/or records. Either way, these identifications have the potential to be entered into national databases which are used for prevalence statistics on dogs' breeds.

2. Methods

The protocol for the study was approved by the Institutional Review Board and Institutional Animal Care and Use Committee of the Western University of Health Sciences, Pomona California.

2.1. Source of Participants

The participants were recruited by contacting organizations involved in dog-related activities, such as veterinary medical groups, animal control/sheltering agencies, dog clubs, and regional and national conferences related to veterinary medicine and dog-related activities. Permission was requested to administer an anonymous, voluntary, dog breed identification quiz and survey (collectively referred to as the questionnaire), followed by an educational presentation. It was asked that the participants be at least 18 years old and able to understand and write English. At the time of the presentations, the participants were also informed that participation was anonymous, voluntary, could be discontinued at any time and that their responses were part of a research project. These sessions were administered in person, by either the Principle Investigator or a trained research assistant, at 30 locations in the following states: Arizona, California, Colorado, Louisiana, Massachusetts, Missouri, Ohio, Tennessee, Texas, Utah, and Washington. Many of these sites were at regional or national meetings with participants from several states.

2.2. Source of Dogs

Twenty privately-owned dogs of unknown parentage were selected for the study from a pool of dogs that had been volunteered by their owners to participate in dog breed identification studies[26]. Forty of 50 volunteered dogs met the entrance criteria of being mature enough to have fully erupted canine teeth, having been obtained from a shelter, rescue, animal control or similar adoption agency, and being available on a specific day to be videotaped and have blood drawn. The 40 dogs were assigned to one of 4 weight ranges: ≤20 lbs. (9.07 kg), 21-40 lbs. (9.52-18.14 kg), 41-60 lbs.(18.60- 27.22 kg), and > 60 lbs. (27.22 kg). Five dogs were randomly selected from each weight range and entered into the study. The study dogs included 7 castrated males, 12 spayed females and 1 intact female. They had been adopted from 17 different locations in North America but currently residing in Southern California. Figure 1 depicts each study dog against a white screen with a black-lined grid of one-foot squares. The pictures are freezed frames from the videotapes that were shown to the participants. Detailed descriptions of each dog are provided Table 1.

2.3. DNA Analysis

Two ml samples of heparinized blood from each dog were immediately refrigerated and sent on the same day on cold packs by overnight shipment to MARS VETERINARY™ Lincoln, Nebraska for DNA analysis. There were 130 American Kennel Club (AKC) registered purebreds in their database and the laboratory reported "an average of 84% accuracy in the first-generation crossbred dogs of known parentage"[22],[23]. Contributions of ancestral breeds less than 12.5% were not reported. The laboratory had in their database the AKC breed American Staffordshire Terrier but not any breeds identified as Pit Bull or American Pit Bull Terrier. Because of the common ancestry, historical reciprocal registrations, and similar morphology, we used visual identifications of American Staffordshire Terrier, Pit Bull, and American Pit Bull Terrier as matches to the DNA identification of American Staffordshire Terrier. For several years, the American Kennel Club (AKC) allowed dogs to be registered as Staffordshire Terriers (later changing the name to American Staffordshire Terrier) if the dogs were already registered as American Pit Bull Terriers in the United Kennel Club (UKC) or American Dog Breeders Association (ADBA) registries. Until 2010, the UKC permitted registration of AKC and ADBA dogs as American Pit Bull Terriers. AKC registered American Staffordshire Terriers are still allowed to be registered as American Pit Bull Terriers in the ADBA[30-33].We are not, however, suggesting that they are identical.

For each dog, the breeds identified by DNA were classified as Major or Minor based on the relative

percentage of the breed represented in that dog. Breeds reported at the highest percentage of DNA in a dog were classified as Major; breeds reported at lower percentages in that dog were classified as Minor. A dog could have more than one Major DNA breed identification, e.g., three breeds each represented at 25%. If only one breed was detected in a dog by DNA analysis, that breed was considered the Major breed, even if it was only 12.5% of the dog's composition. Results of the DNA analyses of breed identification of each dog are in Table 1. None of the dogs were reported to be purebreds by DNA analysis.

2.4. Administration of Study Questionnaire

Administration of the questionnaire and following educational program took about 55 minutes. The participants were shown one minute, color video-clips of each of the 20 dogs which were allowed to move about in front of a white screen with a black-lined grid of one-foot squares. Full bilateral and frontal views and a close up of the head were depicted. The participants were told the age, weight, and sex of each dog as they viewed the videos. After each video-clip, the respondents were given as much time as they requested to write in their answers. The video-clips were not re-shown. The respondents were required to generate their answers. They did not have access to resource materials and were asked not to solicit breed identifications fromeach other. In our experience, most dogs are often visually identified quickly as either a single breed or a single breed mix, generally without consulting resources. The video-clips were always shown the same order (Dog 1-20) which was the order that the owners, at their convenience, had brought their dogs to be videotaped.

2.5. The Survey and Quiz Questions

Participants were asked to indicate: their current and past professional activities; if they now or ever have been asked what breed a dog appears to be; if their opinions have ever been used to assign possible breed identities for the purposeof records (e.g. shelters, medical, licensing, other businesses); and personal descriptive questions such as their age and sex, how many dogs they have, and if they have ever competed in any dog related activities, such as showing, agility, hunting, etc.

For each dog, the respondents were asked:
-"Do you think this dog is probably a purebred?"
□ YES □ NO
-"If YES, (you think this IS probably a purebred) What breed do you think it is?"
-"If NO, (you do NOT think this a purebred) What do you think is the most predominant breed?"
-"What do you think is the second most predominant breed. (If you are unable to determine a second breed, write "Mix" here. Otherwise, name a breed.)"

In this article, identification as "not a purebred" is used synonymously with "mixed-breed". The answer to the most predominant breed of a Mixed Breed is referred to as the Primary Visual Identification (PVI) and an answer to the second most predominant breed is referred to as the Secondary Visual Identification (SVI).

Figure 1. Pictures of the 20 study dogs against a backdrop of 1 foot square grid of 1 foot squares

Table 1. Descriptions of the 20 Study Dogs and Percent of Major and Minor Breeds Identified by DNA Analysis

Dog ID	Sex	Approximate Age	Weight – lbs. (kg)	Major Breeds Identified by DNA	Minor Breeds Identified by DNA
1	FS	3 Years	51 (23.1)	American Staffordshire Terrier**; Saint Bernard**	Chinese Shar-Pei*
2	FS	9 Years	31 (14.1)	American Eskimo Dog**; Golden Retriever**; Nova Scotia Duck-Tolling Retriever**; Rottweiler**	
3	MC	5 Years	60 (14.1)	English Springer Spaniel**; German Wirehaired Pointer**	
4	MC	2.5 Years	26 (11.8)	Lhasa Apso**	Australian Cattle Dog*; Bischon Frise*; Italian Greyhound*; Pekingese*; Shih Tzu*
5	FS	12 Years	51 (23.1)	Australian Shepherd Dog*; Chow Chow*; Dalmatian*; German Shepherd*; Siberian Husky*	
6	FS	5 Years	54 (24.5)	Chow Chow*; Dachshund*; Nova Scotia Duck -Tolling Retriever*	
7	MC	10 Months	15 (6.8)	American Water Spaniel*; Black Russian Terrier*; Pomeranian*; Shih Tzu*; Tibetan Terrier*	
8	FS	2 Years	41 (18.6)	Chow Chow**; French Bull Dog**	Clumber Spaniel* Dalmatian* ; Gordon Setter*; Great Dane*
9	FS	7 Years	66 (30)	Dalmatian**	Boxer*; Chow Chow* ; Newfoundland*
10	MC	5.5 Years	10 (4.5)	Australian Shepherd Dog**; Pekingese**	
11	MC	3 Years	62 (28.1)	American Staffordshire Terrier**; German Shepherd Dog**	Bull Terrier* Chow Chow*
12	FS	1.5 Years	52 (23.6)	Australian Shepherd Dog*; Boxer*; Dachshund*; Dalmatian*; Glen of Imaal Terrier*	
13	MC	3.5 Years	79 (35.8)	Alaskan Malamute*	
14	FS	3.5 Years	74 (33.6)	German Shepherd Dog**; Standard Schnauzer**	English Setter*
15	FS	7 Years	70 (31.8)	Chow Chow*; Golden Retriever*; Gordon Setter*; Saint Bernard*	
16	F	5.5 Months	20 (9.1)	Australian Shepherd Dog*; Boxer*; Golden Retriever*	
17	FS	2 Years	18 (8.2)	Cavalier King Charles Spaniel*; Chihuahua*; Shih Tzu*	
18	FS	10 Months	13 (5.9)	Miniature Pinscher***;	Dachshund*
19	FS	12 Years	36 (16.3)	Border Collie**	Bassett Hound*; Cocker Spaniel*
20	MC	6 Years	21 (9.5)	Shih Tzu**	Cocker Spaniel*; Miniature Schnauzer*;Pekingese*

Percent of breed composition detected by DNA: *12.5%; **25%; *** 50% FS, female spay; MC, male castrate; FI, female intact.

Dogs of unknown parentage are generally designated by only one breed, e.g., Chow mix, German Shepherd mix[26]. We believe that when a dog is so identified, the assumption is that the named breed is the most predominant breed in the dog's ancestry. Therefore, we wanted to know how often our respondents' visual identification of the most predominant breed matched breeds identified at the highest percentage by DNA analysis. Secondarily, we were interested in whether or not a breed visually identified as the most predominant matched any breed identified by DNA, regardless of the percentage of DNA composition. And thirdly, we examined whether any visual identification, either the first or second breed identified, matched any percentage of DNA breed identified.

3. Results

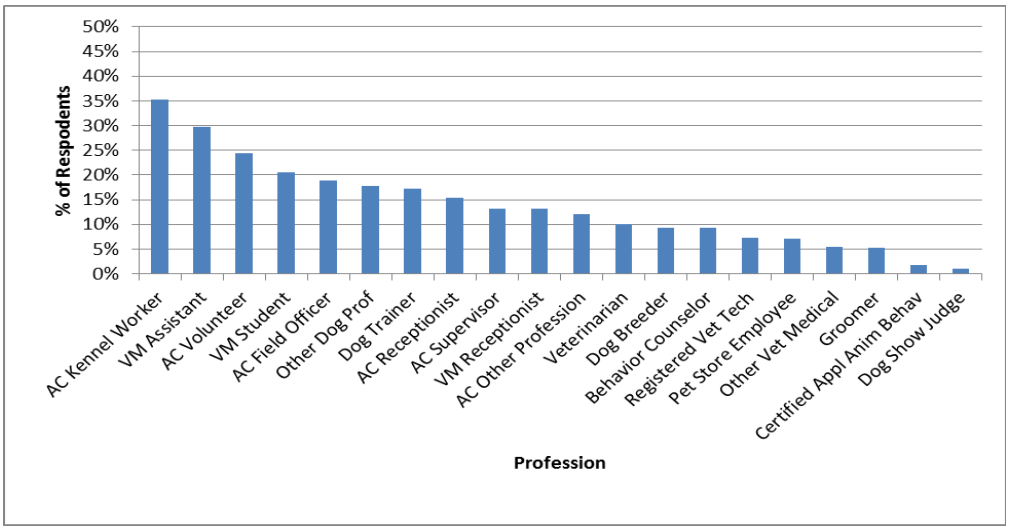
Nine hundred eighty six people completed all or part of a questionnaire. The questionnaires of 63 respondents were excluded from analysis for the following reasons: did not answer or answered "No" to the question "Are you now, or have you ever been asked what breed a dog appears to be."; did not provide any information regarding their professions; or indicated they were less than 18 years old. Respondents were asked to indicate on the questionnaire if a specific dog was theirs or if they knew a dog's DNA composition; data pertaining to these dogs were not included in the study, although data provided by the respondent pertaining to other dogs were included. All responses pertaining to a specific dog were tabulated, unless the answer was illegible.

3.1. Profile of Respondents

Most respondents indicated involvement in more than one dog-related profession/service, either sequentially or simultaneously.The majority of respondents were or had been in animal control/sheltering and/or veterinary medical fields, see Figure 2.

People in animal control and veterinary medical fields were significantly more likely to have their opinions of a dog's breed used for record keeping purposes than not have their opinions so used ($p<or= 0.001$). Volunteers, veterinary medical students, and behavior counselors were significantly

less likely to assign breed identities for record keeping (p= 0.002) rather than have their opinions used for record keeping. See Table 2.



Most respondents engaged in multiple occupations, either sequentially or simultaneously, therefore the cumulative percent is over 100 %. AC, Animal care and control or similar agency; VM, Veterinary Medical; Vet Tech, Veterinary Technician; Certified Appl Anim Behav, Certified Applied Animal Behaviorist

Figure 2. Percent of 923 respondents engaged in each profession/service activity

Table 2. Comparison of Percent of Respondents That Assigned and Did Not Assign Breed Identities for Record Keeping Purposes Within Each Profession/Service

	All Respondents	GROUP A	GROUP B	Chi-Square*	*p*
Current or Past Profession		Opinions Used to Assign Breed Identities in Records	Opinions NOT used to Assign Breed Identities in Records	(comparing Group A to B)	
Kennel Worker	35.2%	40.7%	17.6%	39.295**	<0.001
Supervisor	13.2%	16.7%	2.3%	30.403**	<0.001
Field Officer	19.0%	24.1%	2.7%	49.907**	<0.001
Receptionist/Office Assistant (Animal Care)	15.4%	18.2%	6.3%	18.281**	<0.001
Volunteer	24.5%	22.1%	32.1%	9.176**	0.002
Other Animal Care	12.1%	14.1%	5.9%	10.653**	0.001
Veterinarian	10.1%	11.3%	6.3%	4.488**	0.034
Receptionist/Office Assistant (Vet Office)	13.2%	13.7%	11.8%	0.535	0.465
Registered Veterinary Technician (RVT)	7.3%	9.1%	1.4%	15.033**	<0.001
Veterinary Assistant	29.7%	31.2%	24.9%	3.206	0.073
Veterinary Student	20.6%	18.2%	28.1%	9.916**	0.002
Other Vet Medical	5.5%	5.1%	6.8%	0.886	0.346
Trainer	17.2%	17.0%	18.1%	0.155	0.693
Groomer	5.3%	5.3%	5.4%	0.008	0.927
Pet Store Employee	7.2%	7.7%	5.4%	1.296	0.255
Behavior Counselor	9.2%	10.8%	4.1%	9.170**	0.002
Certified Applied Animal Behaviorist	1.7%	1.7%	1.8%	0.01	0.920
Dog Show Judge	1.1%	1.0%	1.4%	0.204	0.652
Dog Breeder	9.3%	7.4%	15.4%	12.659**	<0.001
Other Dog-Related Profession	17.8%	16.5%	21.7%	3.105	0.078
Total Sample Size	923	702	221		

Notes: *statistical tests in this table compare the percentage of respondents selecting a profession as a current or past profession (shown) to those that did not (not shown) by respondent segment. **significant at the p=0.05 level

Chi-Square tests, adjusted for all pairwise comparisons using the Bonferroni correction, were used to compare two segments of the respondents: Group A (n=702) those whose opinions, currently or in the past, were used for record keeping purposes (documentation) and Group B (n=221)those whose opinions were not so used. There were no significant statistical differences between Groups A and B regarding: the respondents' gender, if they participated in other dog related activities (such as dog shows, agility, hunting, etc.), or if they lived with or owned dogs ($p>0.05$). A t-test indicated no significant difference regarding age. See appendix for comparisons of participants' personal demographics.

3.2. Comparison of Visual Identification and DNA Breed Identification

The DNA analysis indicated none of the dogs were purebreds and most respondents identified the study dogs as mixed breeds. See Table 3. However, 7 of the 20 dogs were visually identified as probably purebreds by ten percent or more (range 10% - 25.4%) of the respondents. An average of 9.2 % (1701/18408) of the responses were "yes" to the question "Do you think this dog is probably a purebred?".

A positive match between visual and DNA identification occurred if (1) the respondent indicated that the dog was not a purebred and (2) also specified a breed identified by DNA.The following were NOT considered matched responses:

if the dog was visually identified as a purebred (even if the breed identified was one identified as part of the dog's composition by DNA analysis) OR if the dog was visually identified as not a purebred but identified as breed that was not reported by DNA analysis.

For each dog, the percent of respondents whose visual identification matched the DNA identification was calculated by dividing the number of matched responses for a dog (numerator) by the sum of matched and unmatched responses (denominator). For each dog, we looked at how often visual and DNA identification matched at the three progressively less stringent levels:

- Level 1: Respondent indicated that the dog was NOT a Purebred AND the most predominant breed (Primary Visual Identification/ PVI) matched at least one of the Major DNA Identifications for that dog.
- Level 2: Respondent indicated that the dog was NOT a Purebred AND the PVI matched any DNA Identification (Major or Minor) of that dog.
- Level 3: Respondent indicated that the dog was NOT a Purebred AND EITHER PVI or SVI (second most predominant breed) visual identification matched any DNA Identification of that dog.

There were few significant statistical differences between those who had their opinions used for record keeping purposes (Group A) and those who did not have their opinionsso used (Group B) regarding the frequency with which visual and DNA identification matching occurred at any of the 3 levels of matching stringency. See appendix for comparisons of the two groups at the 3 levels of matching stringency. We concluded the few differences between groups A and B to be of no practical significance and combined the groups for subsequent analysis.

Table 3. Number and Percent of Respondents That Answered "Yes," They Thought the Dog was a Purebred

Dog ID	Yes/Total	Percent
1	18/918	2.0%
2	63/917	6.9%
3	92/917	10.0%
4	17/919	1.8%
5	120/920	13.0%
6	36/920	3.9%
7	79/919	8.6%
8	75/922	8.1%
9	234/921	25.4%
10	134/919	14.6%
11	116/922	12.6%
12	81/922	8.8%
13	71/921	7.7%
14	36/922	3.9%
15	59/921	6.4%
16	32/922	3.5%
17	48/921	5.2%
18	172/922	18.7%
19	25/919	2.7%
20	193/919	21.0%
Overall	1703/18403	9.2%

DNA analysis indicated that none of the dogs were purebred

The combined data showed that as the stringency levels for matching deceased, the percentage of matches increased. However the agreement between visual and DNA identification was low at all three levels, see Table 4. There were no matches of visual and DNA identifications at Level 1 for five dogs, no matches for four dogs at Level 2, and at Level 3, the most liberal criteria, no matches for one dog. For 8 dogs, fewer than 5% of the respondents' visual identifications matched any DNA identification at Level 3; for only 6 dogs did more than 50% of the respondents' visual identifications match any DNA identification.

3.3. Inter-Observer Reliability of Visual Identification of Most Predominant Breed of Dogs Identified as Mixed Breeds

Agreement among the respondents was also very poor, see Table 5 and see appendix. There was agreement among more than 50% of the respondents regarding the most predominant breed of a mixed breed for only 7 dogs and for 3 of these dogs the visual identification did not match any (either major or minor) DNA breed identification

Krippendorff's alpha was used to examine the reliability of the most commonly visually identified predominant breed (selected across all dogs identified as mixed breeds) for all respondents, yielding alpha=0.23 which is generally considered to represent low levels of inter-observer reliability[34],[35].The data was treated dichotomously, the respondents either provided the same answer (breed) or not.

Table 4. Percent and Number of Respondents Whose Visual Identification Matched DNA Breed Identification for Each Dog at 3 Levels of Matching Stringency

	LEVEL 1: PVI Matched a Major DNA Breed Identification		LEVEL 2: PVI Matched Any DNA Breed Identification		LEVEL 3: PVI or SVI Matched Any DNA Breed Identification	
Dog ID	Percent	Yes / Total	Percent	Yes / Total	Percent	Yes / Total
1*	33.20%	290/873	35.70%	312/873	62.80%	550/876
2	43.00%	369/859	43.00%	369/859	53.10%	457/860
3	7.20%	62/863	7.20%	62/863	11.90%	103/863
4	0.10%	1/852	9.40%	80/852	12.40%	106/852
5	72.90%	653/896	72.90%	653/896	81.90%	734/896
6	0.00%	0/856	0.00%	0/856	0.10%	1/856
7	1.90%	17/872	1.90%	17/872	4.60%	40/872
8	0.00%	0/862	0.60%	5/862	1.90%	16/862
9	70.40%	639/908	70.50%	640/908	73.00%	664/909
10	0.00%	0/884	0.00%	0/884	0.10%	1/884
11*	53.70%	471/877	53.70%	471/877	64.50%	566/877
12	0.10%	1/831	0.10%	1/831	0.40%	3/831
13	0.00%	0/859	0.00%	0/859	0.00%	0/859
14	29.50%	260/880	29.50%	260/880	47.50%	418/880
15	0.20%	2/890	0.20%	2/890	0.70%	6/890
16	27.10%	218/805	27.10%	218/805	31.80%	256/805
17	56.60%	496/877	56.60%	496/877	75.30%	661/878
18	0.00%	0/869	0.00%	0/869	0.10%	1/869
19	10.80%	89/821	11.00%	90/821	14.60%	120/821
20	33.30%	283/849	38.20%	324/849	44.90%	381/849

PVI, Primary Visual Identification; SVI, Secondary Visual Identification; Any DNA Breed Identification, Major or Minor Breed relative representation in a dog. *American Staffordshire Terrier (AST), Pit Bull and Pit Bull Terrier visual identifications were considered matches to DNA analysis breed identification of AST. Percentages in bold indicate over 50% of the visual identifications matched DNA identifications.

Table 5. Breed of Dog Most Often Visually Identified as Primary (PVI) in Dogs Also Visually Identified as a Mixed Breed

Dog ID	Breed Identified by Greatest Percentage of Respondents	Percent Identifying That Breed	Number of Respondents
1	Labrador Retriever	39.9%	855
2	Golden Retriever	39.3%	796
3	Border Collie	45.7%	771
4	Pug	37.0%	835
5	**GERMAN SHEPHERD DOG**	**59.1%**	777
6	German Shorthaired Pointer	33.0%	820
7	**CORGI**	**56.7%**	793
8	**PIT BULL/AST* (39.5%/12.1%)**	**51.6%**	787
9	**DALMATIAN**	**94.8%**	674
10	Yorkshire Terrier	16.6%	751
11	**GERMAN SHEPHERD DOG**	**61.2%**	762
12	Labrador Retriever	16.4%	750
13	German Shorthaired Pointer	14.4%	790
14	German Shepherd Dog	30.8%	844
15	**LABRADOR RETRIEVER**	**86.9%**	831
16	Australian Shepherd Dog	23.9%	774
17	**CHIHUAHUA**	**55.5%**	831
18	Cairn Terrier	23.5%	697
19	Collie	14.6%	796
20	Shih Tzu	43.2%	657

*AST, American Staffordshire Terrier. PVI=Most Predominant Visual Identification. Breeds in UPPERCASE and bold indicate over 50% of the respondents were in agreement

4. Discussion

This study reveals a wide disparity between DNA and visual identification of the predominant breeds comprising a dog. It also indicates a low level of agreement among people regarding breed composition. Those of us in the animal care services have always remarked on the differences of opinions regarding what breed a dog is but few are aware of how little agreement there is or how often one's own opinion could be wrong.

The wide range of responses by the participants are compatible with research and theories pertaining to judgments of probability based on partial information[36-42]. Identification of the breed composition of a dog requires recognition and recall, both of which are influenced by a multitude of variables, such as perception, knowledge base, memory, recent or salient experiences with the subject matter, and cognitive abilities involving categorization, sorting, matching and recombination of features.

Identification is affected by what features (stimuli) a person notices and how much weight the person attributes to those features. For example, some people may attend to the hair coat and color pattern of a dog, while others focus on size, shape of head, or whether or not the tail is curled. The ease with which people notice a feature enhances recall and increases the weight that is placed on that feature. For example, so much significance is placed on any black pigmentation of a dog's tongue that, regardless of the morphology of the dog, it is usually identified as a Chow Chow or Chow mix. The frequency with which people are exposed to the names of specific breeds of dogs and their perception of the population of specific breeds will also influence prediction. Interestingly, the literature indicates that well educated professionals are as susceptible to judgmental biases as are the lay public[36],[37],[43],[44].

The low percentage of agreement between visual and DNA identification may be partially explained by perception biases. However, DNA identification of the proportion of purebred breeds in mixed breed dogs is not perfect either, nor do the laboratories that provide such analyses claim to be infallible. The average accuracy of identification of the breeds in an individual dog can be expected to decrease as the heterogeneity of its ancestors increases. Canine Heritage™ states that their accuracy of identification of known registered purebred dogs is 99%[45]. Wisdom Panel™ currently reports a 90% average accuracy of identification ofF1 crosses of known registered purebred dogs[46].

After completing the quiz, the DNA results were revealed to the participants. However, it was not until we showed them pictures of the F1 and F2 crosses of registered purebred dogs[47] did the participants begin to realize that mixed breed dogs may not look like theirpurebred parents or grandparents. The mixed breeds bore little, if any resemblance, to their purebred parents or grandparents. Crosses of purebred dogs (particularly beyond the firstgeneration) can result in unique combinations and a collage of features.In fact, the pictures of Scott and Fuller's dogs looked more like breeds other than their immediate ancestors. Many current breeds were derived by crossing existing breeds or by selecting for morphological variations within a breed until a "new" breed was established[25],[30]. It actually shouldn't be surprising that visual identification of mixed breeds does not always agree with DNA based breed identification. A recent genetic study in dogs determined that very few regions of the canine genome encode morphological traits associated with breed-defining physical traits[48]. Dogs have on the order of 20,000 to 25,000 genes and fewer than 1% of the dog's genes control the external morphological features associated with specific breeds of dogs, such as ear shape and size, whether the ears are floppy, length of the legs, length of the coat, coat color and shape of the head and length of muzzle. A dog could genetically be 50%a German Shepherd Dog and lack the genomic regions responsible for the German ShepherdDog size, coat color, muzzle length and ear properties.

Even after Scott and Fuller's pictures were shown, there was reluctance to consider that the DNA results might be correct. This is compatible with observations that people often adhere to their beliefs even when data is present that contradicts their beliefs and the confidence with which people adhere to these beliefs may actually increase when presented with contradictory data[36],[44],[49].

Misidentification of a dog's breed composition is not a trivial matter. How a dog is identified can affect many people and dogs. Dog ownership is common worldwide[50-53].In the United States approximately 40% of households have at least one dog,there is an increasing trend to obtain dogs from animal shelters/humane societies, and ownership of mixed breeds is increasing compared to purebreds[50],[51].

4.1. Limitations of the Study

It is possible that the breeds of these 20 dogs in this study are unusually difficult to identify visually. Similar studies should be conducted with other samples of dogs and by other researchers.

5. Conclusions

The disparities between visual and DNA identification of the breed composition of dogs and the low agreement among people who identify dogs raise questions concerning the accuracy of databases which supply demographic data on dog breeds, as well as the justification and ability to implement laws and private restrictions pertaining to dogs based on breed composition.

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APPENDIX

Table 6. Comparisons of Respondents' Personal Demographics by Whether or Not Their Opinions Were Used to Assign Dog Breed

			GROUP A n=702	GROUP B n=221	Stat Test Result	
		All Respondents	Opinions Used to Assign Breed Identities in Records	Opinions NOT Used to Assign Breed Identities in Records	(comparing Group A to B)	*p*
Respondent Gender	Female	75.7%	74.2%	80.8%	χ^2=3.687	0.055
	Male	24.3%	25.8%	19.2%		
	N	875	677	198	N/A	
Respondent Age	Mean	37.6	37.3	38.9	t=-1.427	0.155
	Median	35.0	35.0	38.0		
	Standard Deviation	12.5	12.0	14.0		
	N	826	642	184		
Participation in Dog-Related Activities	Yes	30.3%	29.8%	31.7%	χ^2=0.279	0.597
	No	69.7%	70.2%	68.3%		
	N	909	701	208	N/A	N/A
Own/Reside with Dogs	Yes	82.9%	83.8%	79.8%	χ^2=1.806	0.179
	No	17.1%	16.2%	20.2%	N/A	N/A
	N	890	687	203	N/A	N/A

χ2=Chi-Square. t=Student t-test. N= Number answering this question. Not all participants answered each of the questions

Table 7. Comparison and Percent of Level 1 Matches for Groups A and B

	GROUP A Opinions Used for Records	GROUP B Opinions NOT Used for Records		
Dog ID	% (n / N)	% (n / N)	Chi-Square	*p*
1*	33% (224 / 679)	33.2% (66 / 199)	0.002	0.963
2	40.8% (273 / 669)	48.7% (96 / 197)	3.907**	0.048
3	7.4% (50 / 674)	6.2% (12 / 193)	0.326	0.568
4	0% (0 / 664)	0.5% (1 / 202)	Fisher's Exact Test=0.233	
5	72.8% (500 / 687)	73.2% (153 / 209)	0.015	0.904
6	0% (0 / 669)	0% (0 / 192)	NA	
7	2.4% (16 / 671)	0.5% (1 / 205)	Fisher's Exact Test=0.142	
8	0% (0 / 672)	0% (0 / 194)	NA	
9	69.8% (484 / 693)	72.1% (155 / 215)	0.399	0.528
10	0% (0 / 679)	0% (0 / 210)	NA	
11*	51.6% (350 / 678)	59.6% (121 / 203)	4.002**	0.045
12	0.2% (1 / 653)	0% (0 / 192)	Fisher's Exact Test=1.000	
13	0% (0 / 671)	0% (0 / 196)	NA	
14	28.2% (192 / 680)	33.2% (68 / 205)	1.849	0.174
15	0.3% (2 / 684)	0% (0 / 210)	Fisher's Exact Test=1.000	
16	27.5% (176 / 640)	23.1% (42 / 182)	1.423	0.233
17	54.6% (371 / 680)	61.6% (125 / 203)	3.127	0.077
18	0% (0 / 671)	0% (0 / 203)	NA	
19	11.9% (77 / 647)	6.3% (12 / 190)	4.822**	0.028
20	32.4% (213 / 657)	35.9% (70 / 195)	0.82	0.365

*American Staffordshire Terrier (AST), Pit Bull and Pit Bull Terrier visual identifications were considered matches to DNA analysis breed identification of AST n/N number of matches for that dog/Number of respondents that answered the question for that dog.**significant at $p < 0.05$ level

Table 8. Comparison and Percent of Level 2 Matches for Groups A and B

	GROUP A Opinions Used for Records	GROUP B Opinions NOT Used for Records		
Dog ID	% (n / N)	% (n / N)	Chi -Square	*p*
1*	35.9% (244 / 679)	34.2% (68 / 199)	0.209	0.647
2	40.8% (273 / 669)	48.7% (96 / 197)	3.907**	0.048
3	7.4% (50 / 674)	6.2% (12 / 193)	0.326	0.568
4	10.1% (67 / 664)	6.4% (13 / 202)	2.467	0.116
5	72.8% (500 / 687)	73.2% (153 / 209)	0.015	0.904
6	0% (0 / 669)	0% (0 / 192)	NA	
7	2.4% (16 / 671)	0.5% (1 / 205)	Fisher's Exact Test=0.142	
8	0.6% (4 / 672)	0.5% (1 / 194)	Fisher's Exact Test=1.000	
9	70% (485 / 693)	72.1% (155 / 215)	0.35	0.554
10	0% (0 / 679)	0% (0 / 210)	NA	
11*	51.6% (350 / 678)	59.6% (121 / 203)	4.002**	0.045
12	0.2% (1 / 653)	0% (0 / 192)	0.294	0.587
13	0% (0 / 671)	0% (0 / 196)	NA	
14	28.2% (192 / 680)	33.2% (68 / 205)	1.849	0.174
15	0.3% (2 / 684)	0% (0 / 210)	Fisher's Exact Test=1.000	
16	27.5% (176 / 640)	23.1% (42 / 182)	1.423	0.233
17	54.6% (371 / 680)	61.6% (125 / 203)	3.127	0.077
18	0% (0 / 671)	0% (0 / 203)	NA	
19	12.1% (78 / 647)	6.3% (12 / 190)	5.042	0.025
20	37.7% (248 / 657)	39% (76 / 195)	0.096	0.757

*American Staffordshire Terrier (AST), Pit Bull and Pit Bull Terrier visual identifications were considered matches to DNA analysis breed identification of AST n/N number of matches for that dog/Number of respondents that answered the question for that dog. **significant at $p < 0.05$ level

Table 9. Comparison and Percent of Level 3 Matches for Groups A and B

	GROUP A Opinions Used for Records	GROUP B Opinions NOT Used for Records		
Dog ID	**% (n / N)**	**% (n / N)**	**Chi -Square**	***p***
1*	62.5% (425 / 680)	62.2% (125 / 201)	0.006	
2	52.2% (350 / 670)	54.3% (107 / 197)	0.263	
3	12.5% (84 / 674)	9.8% (19 / 193)	0.983	
4	13.4% (89 / 664)	8.4% (17 / 202)	3.587	
5	82.8% (569 / 687)	78.9% (165 / 209)	1.626	
6	0.1% (1 / 669)	0% (0 / 192)	Fisher's Exact Test=1.000	
7	5.4% (36 / 671)	2% (4 / 205)	Fisher's Exact Test=0.054	
8	2.1% (14 / 672)	1% (2 / 194)	Fisher's Exact Test=0.545	
9	72.6% (503 / 693)	74.5% (161 / 216)	0.319	
10	0.1% (1 / 679)	0% (0 / 210)	Fisher's Exact Test=1.000	
11*	63% (427 / 678)	68.5% (139 / 203)	2.052	
12	0.5% (3 / 653)	0% (0 / 192)	Fisher's Exact Test=1.000	
13	0% (0 / 671)	0% (0 / 196)	NA	
14	45.4% (309 / 680)	53.2% (109 / 205)	3.776	
15	0.6% (4 / 684)	1% (2 / 210)	Fisher's Exact Test=0.630	
16	31.9% (204 / 640)	28.6% (52 / 182)	0.721	
17	73.7% (502 / 681)	78.3% (159 / 203)	1.762	
18	0.1% (1 / 671)	0% (0 / 203)	Fisher's Exact Test=0.630	
19	15.9% (103 / 647)	8.9% (17 / 190)	5.813	
20	44.1% (290 / 657)	46.7% (91 / 195)	0.388	

*American Staffordshire Terrier (AST), Pit Bull and Pit Bull Terrier visual identifications were considered matches to DNA analysis breed identification of AST .n/N number of matches for that dog/Number of respondents that answered the question for that dog. **significant at $p < 0.05$ level

Table 10. The Top 5 Breeds/Types Most Often Visually Identified as "The Most Predominant" in Each of the 20 Dogs Identified as Mixed Breeds and Corresponding DNA Breed Identification

Dog ID	The five most frequently visually identified breeds/type and % of respondents indicating that breed	N	Major Breeds Identified by DNA	Minor Breeds identified by DNA
1	Labrador Retriever 39.9% ; Pit Bull 27.4% ; Rhodesian Ridgeback 9.6% ; **American Staffordshire Terrier** 6.5% ; **Chinese Shar-Pei** 2.6%	855	**American Staffordshire Terrier** ** ; Saint Bernard **	**Chinese Shar-Pei** *
2	**Golden Retriever** 39.3% ; Labrador Retriever 7.3% ; Border Collie 7% ; Australian Shepherd 6.8% ; **American Eskimo Dog** 6.5%	796	Rottweiler ** ; **American Eskimo Dog** ** ; **Golden Retriever** ** ; Nova Scotia Duck-Tolling Retriever **	
3	Border Collie 45.7% ; Flat-Coated Retriever 8.9% ; Australian Shepherd 8% ; **English Springer Spaniel**, **Springer Spaniel** 8% ; Labrador Retriever 5.7%	771	**English Springer Spaniel** ** ; German Wirehaired Pointer **	
4	Pug 37% ; Corgi 12.9% ; **Pekingese** 9.1% ; Chihuahua 8.5% ; Beagle 6.1%	835	Lhasa Apso **	Bischon Frise * ; Australian Cattle Dog * ; Italian Greyhound * ; **Pekingese** * ; Shih Tzu *
5	**German Shepherd Dog** 59.1% ; **Siberian Husky** 24.5% ; Shepherd, Sheepdog 4.5% ; Akita 4.2% ; Australian Cattle Dog, Blue, Red, Queensland Heeler 2.7%	777	**German Shepherd Dog*** ; Australian Shepherd Dog * ; **Siberian Husky** * ; Chow Chow * ; Dalmatian *	
6	German Shorthaired Pointer 33% ; Pointer, English Pointer 18.4% ; Australian Cattle Dog, Blue, Red, Queensland Heeler 11.1% ; Labrador Retriever 4.9% ; Catahoula Leopard Dog 3.3%	820	Chow Chow * ; Dachshund * ; Nova Scotia Duck-Tolling Retriever *	
7	Corgi 56.7% ; Chihuahua 14.1% ; German Shepherd Dog 4.3% ; Pembroke Welsh Corgi 3.5% ; Shetland Sheepdog 2.4%	793	American Water Spaniel*; Black Russian Terrier*; Pomeranian * ; Tibetan Terrier * ; Shih Tzu * ;	
8	Pit Bull 39.5% ; Labrador Retriever 13.7% ; American Staffordshire Terrier 12.1% ; Bulldog 9% ; Jack Russell Terrier 5.3%	787	Chow Chow **; French Bull Dog **	Clumber Spaniel *; Dalmatian*; Gordon Setter * ; Great Dane *
9	**Dalmatian** 94.8% ; Pit Bull 1.8% ; Labrador Retriever 0.7% ; Australian Cattle Dog, Blue, Red, Queensland Heeler 0.4% ; Pointer, English Pointer 0.4%	674	**Dalmatian** **	Boxer * ; Chow Chow * ; New Foundland *
10	Yorkshire Terrier 16.6% ; Schnauzer 10.4% ; Terrier 9.6% ; Chihuahua 9.1% ; Cairn Terrier 8.9%	751	Australian Shepherd Dog **; Pekingese ** ;	
11	**German Shepherd Dog** 61.2% ; Belgian Malinois 7.3% ; Shepherd, Sheepdog 7.1% ; Akita 2.8% ; Belgian Sheepdog, Belgian Shepherd 2.8%	762	American Staffordshire Terrier **; **German Shepherd Dog** **	Bull Terrier*; Chow Chow*
12	Labrador Retriever 16.4% ; Pharaoh Hound 15.7% ; German Shepherd Dog 12.8% ; Basenji 8.9% ; Greyhound 6.9%	750	Australian Shepherd Dog *; Boxer * ; Dachshund*; Dalmatian*;Glen of Imaal Terrier *	
13	German Shorthaired Pointer 14.4% ; Pointer, English Pointer 13.3% ; American Foxhound, Foxhound 8.6% ; Coonhound 7.5% ; Treeing Walker Coonhound, Treeing Walker Hound 6.7%	790	Alaskan Malamute *	
14	**German Shepherd Dog** 30.8% ; Australian Shepherd 27.1% ; Australian Cattle Dog, Blue, Red, Queensland Heeler 8.4% ; Catahoula Leopard Dog 7.6% ; Rottweiler 5.2%	844	**German Shepherd Dog** **; Standard Schnauzer **	English Setter*
15	Labrador Retriever 86.9% ; Rottweiler 5.1% ; Border Collie 1.4% ; German Shepherd Dog 1.2% ; Australian Shepherd 0.8%	831	Chow Chow*; Golden Retriever *; Gordon Setter*; St. Bernard*	
16	**Australian Shepherd** 23.9% ; Cocker Spaniel 8.5% ; Border Collie 8.3% ; Spaniel 7.5% ; German Shepherd Dog 5%	774	**Australian Shepherd Dog** * ; Boxer *; Golden Retriever*	
17	**Chihuahua** 55.5% ; Beagle 9.1% ; Jack Russel Terrier 7.6% ;**Cavalier King Charles Spaniel** 4.2% ; Pekingese 4%	831	**Cavalier King Charles Spaniel** * ; **Chihuahua** *; Shih Tzu*	
18	Cairn Terrier 23.5% ; Terrier 11% ; Wire Fox Terrier 9.3% ; West Highland White Terrier 8.5% ; Yorkshire Terrier 6.7%	697	Miniature Pinscher ***	Dachshund *

19	Collie 14.6% ; Beagle 13.9% ; German Shepherd Dog 11.4% ; **Border Collie** 11.2% ; Smooth Coated Collie 9%	796	**Border Collie** **	Bassett Hound *; Cocker Spaniel *
20	**Shih Tzu** 43.2% ; Lhasa Apso 25.9% ; **Cocker Spaniel** 4.4% ; Maltese 3.2% ; Terrier 3%	657	**Shih Tzu** **	**Cocker Spaniel** * ; Miniature Schnauzer*; Pekingese *

* 12.5% breed composition by DNA. ** 25% breed composition by DNA. *** 50% breed composition by DNA
For calculations of inter-observer reliability of each dog, only the answers of respondents who indicated that the dog was not a purebred and committed to what they thought was the most predominant breed in that dog were used

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ANNEXE 6

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Canine Research

Who is minding the bibliography? Daisy chaining, dropped leads, and other bad behavior using examples from the dog bite literature

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Peer-reviewed publications in the scientific literature are trusted to represent a high standard of discourse on any topic, and other scientists as well as the media may draw on them, and indeed depend on them, for reliable and accurate information. The literature review and other material contained in an Introduction form the foundation that supports the entire structure of any scientific article. An Introduction summarizes prior attempts to address the question at hand or related ones; clarifies the underlying assumptions on the subject (including the social or humane benefit of doing the research in the first place); and establishes that the authors are sufficiently familiar with the strengths, weaknesses, and gaps in the existing literature. Similarly, the citations in a Discussion help anchor a study's Results to a larger body of work, which allows the authors to highlight how their findings are consistent with, or deviate from, findings of others. A Discussion also lays out the premises from which the authors reason to their conclusions. However, if citations are used without due attention to the actual degree of evidence-based support they contain, or if key points asserted as fact are not supported with credible citations at all, the resulting argument and conclusions may be akin to a thread hanging from a poorly woven garment—1 small tug and the entire piece begins to unravel.

Given that guidelines for reporting scientific information (e.g., the CONSORT guidelines for reporting a randomized clinical trial [CONSORT, 2016], and the STROBE guidelines for observational studies [STROBE, 2016]) emphasize accuracy and completeness in the reporting of Methods and Results, one might be tempted to assume that an Introduction, Discussion, and the References which anchor those sections are relatively free of problems in scientific articles. We are not so sure such an assumption is appropriate. After carefully reading over 150 scientific articles on the topic of dog bites and performing a number of these "tugs," we are concerned that an insufficient degree of attention is being paid to these components of an article. Problems with citations include cases where an author's use of a citation does not match what was actually said or done in the original; placement of a citation in a way that implies that an off-hand comment or speculation made by an author in the Introduction or Discussion is instead a concrete finding based on data from the Results; or even attributing findings or other information to an article that actually includes no mention of the topic to which the citation refers.

To illustrate several common types of errors we have found, we will use citations about the force (also variably referred to as pressure or power in these articles) supposedly exerted by the jaws of domestic dogs as used in the literature about dog bites. Why bite force? First, the inconsistencies in the literature were easy to spot and remember. Second, these statistics have an emotional salience that lends themselves to hyperbole within an article, and therefore repetition by others. Third, the accuracy of the citations was easy to verify. Fourth, there were an ample number of citations to assess. Finally, this is a topic of relevance to the animal behavior literature.

In Figure 1, we diagram the relationships of over a dozen of different scientific papers from 1969 to 2009, and 2 legal cases from the United States Court of Appeals for the Fourth Circuit, that each make statement(s) about the force exerted by a dog's jaw during

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biting and use a citation to support the statement(s). We tracked each citation to 1 of 7 original sources and did not find verifiable evidence (or data obtained from a controlled experiment) about bite force in any of the articles. In 2 of the original sources, statements about bite force were found, but there were neither data nor a citation to support those statements (Chambers & Payne, 1969; Presutti, 1997). In 4 other original sources, none contained any statement or data about bite force, despite being cited by other scientific articles as though they had (Pinckney & Kennedy, 1980; Boenning et al., 1983; Wolff, 1998; Presutti, 2001). The final original source was not a scientific article at all, but a newspaper article that again provided no source for the data presented (Ferrigno, 1985). Tracked forward, that same newspaper article was cited (indirectly) in 2 decisions from the United States Court of Appeals for the Fourth Circuit (Melgar v. Greene, 2010; Vathekan v. Prince George's County, 1998). We say indirectly because the citation in the Court of Appeals opinion was to an article in a peer-reviewed human rights journal (Rosenthal, 1994) that had used the 1985 news article as its source. An even more convoluted series of connected, sequential citations goes from Monroy et al. (2009) to Wilberger & Pang (1983) to Callaham (1980) to Chambers & Payne (1969).

What other problems does this demonstrate? Chambers and Payne, in their 1969 article, used language that was very specific about how bite force may increase as a result of the training of US Air Force sentry dogs, and mentioned that at times, the bite force could be adequate to perforate the sheet metal gauntlet that is worn by handlers during training. As Figure 1 shows, Chambers' and Payne's perspective about events during military sentry dog training has morphed from its original meaning as it has been sequentially cited. Perforating the sheet metal gauntlet has become "sufficiently powerful to perforate sheet metal" (Wilberger & Pang, 1983) and the original notation of sentry dogs became "attack dogs" (Miller et al., 1993), which later morphed into generalizing about what occurs during "dog attacks" (De Munnynck & Van de Voorde, 2002).

What is the explanation for these inaccuracies? In some cases, indiscriminate sourcing may simply be a function of haste or a true lack of familiarity with the relevant literature. In other cases, what we refer to as "daisy chaining" appears responsible. This occurs when an author cites another author regarding a particular piece of information, but the cited author is not the primary source of that information, and was merely repeating it from what an earlier publication cited. Or put differently, citing someone else's Introduction (which itself may be citing yet another's Introduction), rather than someone's actual Results! Indeed, in 1 case (Akhtar et al., 2006), 1 chain of citation was tracked through 3 previous, sequential publications (Lackmann et al., 1992; Wilberger & Pang,

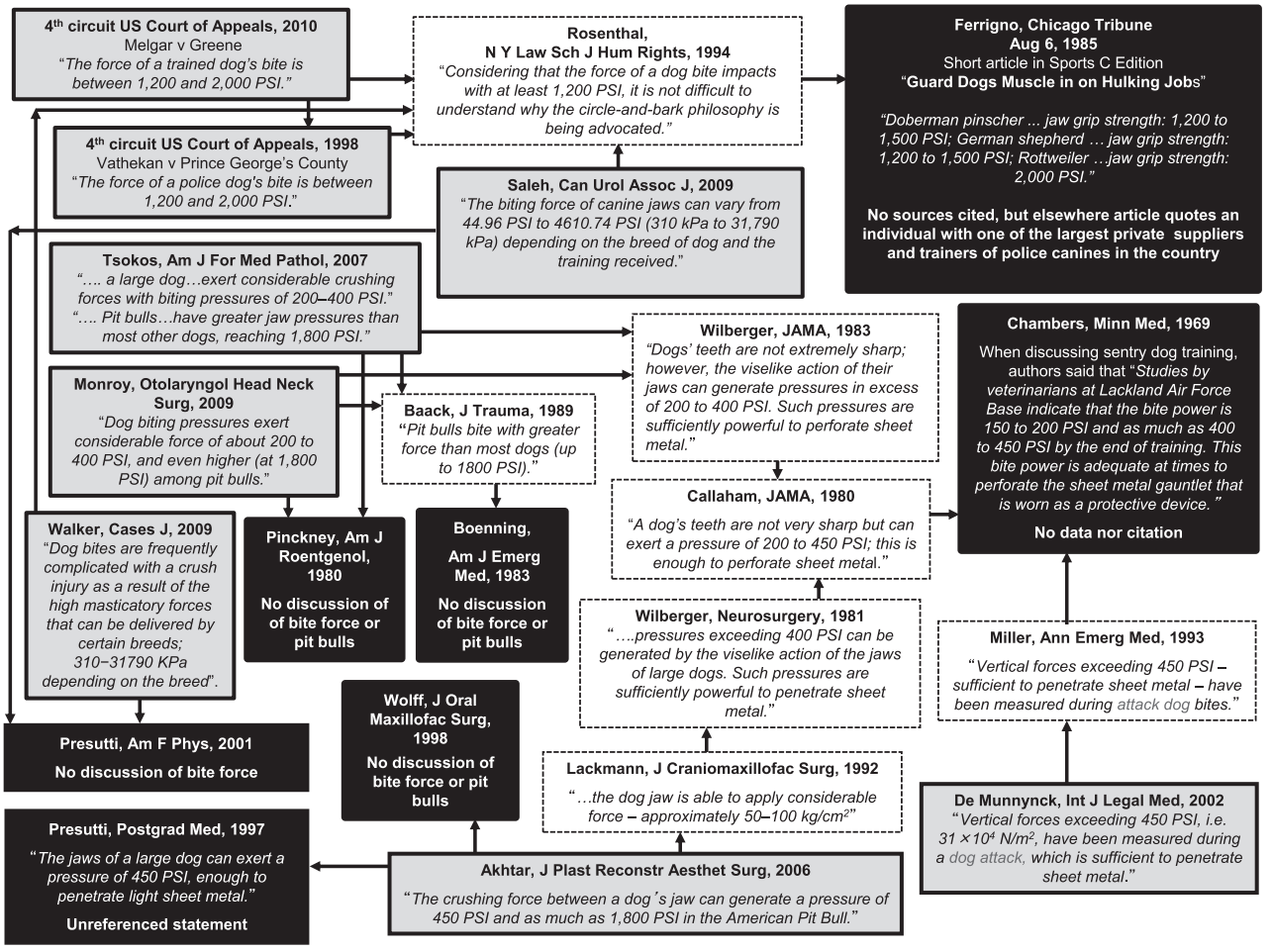

Figure 1. Diagram of cited text concerning canine bite force and citation pathways from most recent source (gray boxes) to intermediate (white boxes) and/or final sources (black boxes). Arrows show direction from latest to original source. Note that in some cases, in the original quote, pounds per square inch was spelled out in full. For space, we have abbreviated in the diagram. PSI, pounds per square inch.

1981; Callaham, 1980) before reaching the final article which contained no verifiable data about bite force, and whose original meaning had been subtly altered at each stage of the "daisy chain" (Chambers & Payne, 1969).

Other cases are even more perplexing. Four articles specifically claim that the bite force of a "pit bull" type dog can be as much as 1,800 pounds per square inch (Monroy et al., 2009; Tsokos et al., 2007; Akhtar et al., 2006; Baack et al., 1989). There is not a single original source reporting a Result that substantiates this claim. And what are we to make of cases where a source that literally did not contain any information about bite force was cited (e.g., Monroy et al., 2009 citing Pinckney & Kennedy, 1980; Baack et al., 1989 citing Boenning et al., 1983; Akhtar et al., 2006 citing Wolff, 1998; Saleh et al., 2009 citing Presutti 2001; Walker et al., 2009 citing Presutti 2001)?

Some might argue that this is much ado about nothing, but we contend the effect is not innocuous if the result is to misrepresent or invent data; to elevate someone else's off-hand comments, opinions, speculative musings, or non-published data to the level of peer-reviewed findings (so-called "data laundering") simply by citing them in a peer-reviewed forum; to create an impression (or sense of alarm) in the mind of the reader that is not justified by the Results of an actual study; or to inadvertently provide the opportunity for others to perpetuate the errors through subsequent citation, conferring "virtual immortality" on them. In a worst case scenario, in addition to distorting the scientific literature, inaccuracies can make their way into legal decisions which have very real-life consequences, as shown for the 2 cases in the United States Court of Appeals for the Fourth Circuit (Melgar v. Greene, 2010; Vathekan v. Prince George's County, 1998).

In an ideal world, the peer-review process would be a firewall to limit the extent of these occurrences. In reality, the peer-review process is a poor gatekeeper. Reviewers and journal editors, unless they are already very knowledgeable about the nuances of a particular subfield, may not recognize the error(s). Few reviewers are in a position to access and read all of the papers being cited, particularly for a lengthy article with many references. However, without such diligence, the "daisy chaining" of citations and the problems this introduces may never be recognized.

This leaves it to parties at the opposite end of the publication chain to exercise due diligence. For authors, this means using only primary sources to ensure that meaning has not been lost or distorted during subsequent citation by others. It also means refraining from the all-too-common practice of citing what an author said or speculated (e.g., in an Introduction or Discussion) because that lends the impression that such statements were supported by something the author actually did (e.g., as shown by data in the Results). In the age of electronic databases, this type of verification is no longer the daunting task it once was, and journals could require assurances that all references are original and/or have been verified by authors at the time of submission. Similarly, guidelines from expert bodies promoting evidence-based medicine could provide instructions on best practices for writing Introductions and Discussions, as they currently do for the reporting of Methods and Results. For readers, until such assurances are provided, perhaps "trust but verify" is the safest approach.

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Ethical considerations

The ethical approval is not required for this study.

Conflict of interest

Gary Patronek is a paid consultant to the National Canine Research Council, a subsidiary of Animal Farm Foundation. Janis Bradley is an employee of the National Canine Research Council. Donald Cleary is an unpaid Policy and Research Consultant for the National Canine Research Council, and Treasurer of Animal Farm Foundation, Inc.

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ANNEXE 7

Creedon and Ó'Súilleabháin *Irish Veterinary Journal* (2017) 70:23
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Irish Veterinary Journal

RESEARCH Open Access

Dog bite injuries to humans and the use of breed-specific legislation: a comparison of bites from legislated and non-legislated dog breeds

Nanci Creedon[1*] and Páraic S. Ó'Súilleabháin[2]

Abstract

Background: The primary objective of this study was to investigate if differences in dog bite characteristics exist amongst legislated and non-legislated dog breeds listed under breed-specific legislation in Ireland (age when bitten, anatomical bite locations, triggers for biting, victim's relationship with the dog, geographical location and owner presence, history of aggression, reporting bite incident to authorities, medical treatment required following the bite, and type of bite inflicted). A second objective of the current study was to investigate dog control officer's enforcement and perceptions of current legislation. Data for statistical analyses were collated through a nationally advertised survey, with Pearson Chi-square and Fisher's Exact Test statistical methods employed for analyses. A total of 140 incident surveys were assessed comprising of non-legislated (n = 100) and legislated (n = 40) dog bite incidents.

Results: Legislated breeds were significantly more likely to be perceived as aggressive and less fearful as triggers for biting compared to non-legislated breeds (P = 0.003). Non-legislated breeds were more likely to inflict a bite with the owner present on own property and on a business premises compared to legislated breeds (P = 0.036). Non-legislated breeds were more likely to not be reported to the authorities before (P = 0.009), and after (P = 0.032) the bite occurred compared to legislated breeds. There were no significant differences observed between both groups for; age when the victim was bitten, bite location, relationship with the dog, history of aggression, outcome for the dog, if the dog bit again, and seeing a professional trainer or behaviourist. No significant difference was observed between both legislated and non-legislated groups for medical treatment required following the bite, and the type of bite inflicted.

Conclusion: The present study results did not observe evidence of any differences between legislated and non-legislated for both the medical treatment to victims required following the bite, and the type of bite inflicted. The significant differences in bites being reported to authorities, perceived triggers for biting, and biting locations suggests distinctly differing perceptions relating to risk between legislated and non-legislated dog breeds. Further consequences relating to the introduction of breed-specific legislation in Ireland are discussed.

Keywords: Breed-specific legislation, Bite, Public policy, Dog breed, Medical treatment, Bite severity, Dog bite reporting

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Background

In order to minimise potential risks associated with dog bites, governments typically utilise dog breed-specific legislation or non-breed specific legislation. Breed-specific legislation prohibits ownership or places restrictions on dog breeds categorised as 'dangerous' or 'able to inflict greater injuries' [1]. Non-breed specific legislation includes restrictions targeting irresponsible owners based on exhibited behaviour of their dogs, typically including an educational component [2].

To limit serious dog bite injuries and potential fatalities in Ireland, the Control of Dogs Act 1986 was amended with the inclusion of restrictions on breeds (Control of Dogs Act 1998 Regulations) [3]. The Control of Dogs Act 1998 Regulations places restrictions targeting 11 dog breeds, including dogs that are mixes or possess any strain of listed breeds. The breeds include; American Pit Bull Terrier, Bull Mastiff, Doberman Pinscher, English Bull Terrier, German Shepherd, Japanese Akita, Japanese Tosa, Rhodesian Ridgeback, Rottweiler, Staffordshire Bull Terrier and every dog type known as a Bandog. It was initially thought that the aforementioned breeds (including mixes and strains) possess a greater disposition towards aggression, and as such should be restricted as a public health measure [4]. More recently, it is proposed that legislated dogs have a greater capability of inflicting more severe injuries compared to other non-legislated dogs [5].

Societal attitudes towards dogs are changing in Ireland with increases in dogs being housed in closer proximity to people. While this might suggest a greater threat for dog bites due to this closer proximity, evidence suggests that 'resident dogs' who are not fully integrated into family units as being involved in a significant proportion of dog bite fatalities [6]. In other words, dogs who are in close proximity to people form attachments to them, rely on their guidance, and as such account for a lesser rate of dog bite fatalities compared to resident dogs. A further study on dog bites in Ireland found that the breeds most commonly involved in attacks were breeds in the highest numbers within the population [7]. This is supported by further research on dog biting populations which relate to popularity in a geographical location [8]. Recent research has found that dog bite hospitalisations have continued to rise over a 15-year period following the introduction of the current breed-specific legislation in Ireland [1]. The study suggested breed-specific legislation as not being a valid method of reducing incidence rates, and suggested that it may be contributing in part to the rise in dog bites as a result of reinforcing stereotypes of risk pertaining to dog breeds [1].

Research from various other nations have suggested a lack of any efficacy and validity of targeting dog breeds as a dog bite mitigation strategy [8–14]. Conversely, research has observed some reductions in dog bites in a municipality following the enactment of breed-specific legislation [15]. However, once jurisdictions were used as their own controls in a pre/post comparison of incidence of dog-bite hospital admissions, there was no significant reduction in hospitalisations after breed-specific legislation was enacted [15]. A further study reported some reduction in dog bite incidence following the enactment of breed-specific legislation [16]. However, aside from several significant limitations outlined in the study, it is difficult to determine which aspects of the legislation have led to reductions. In other words, the enforcement of accompanying breed-neutral components could have led to some reductions, rather than the actual measures targeting dog breeds. Indeed, employing the statistical methodology of number-needed-to-treat (NNT; commonly used to determine the effectiveness of an intervention) reveals one aspect which makes the targeting of dog breeds at best, impractical. It has been reported that in order to prevent 1 dog-bite hospitalisation in a city or town, in excess of 100,000 dogs of the identified breeds would have to be removed completely from the population [17]. Figures would need to be doubled to prevent a second dog-bite hospitalisation, and so on [17]. Given breed-specific legislation also does not involve complete bans in certain nations (e.g., muzzle restrictions in Ireland), the figures would be considerably higher given the frequency of dog bites in the home when a muzzle is not public policy [17].

Research indicates no fundamental difference in aggression between legislated breeds, and other dog breeds frequently stereotyped as 'friendly' [18–20]. However, it remains the case that other group differences between legislated and non-legislated breeds could infer a greater risk of these dog breeds to public health. It is frequently proposed that while legislated breeds may not bite as frequently, in the event of a bite they can inflict greater injury compared to non-legislated breeds of similar size. However, a recent review has investigated claims which have been made in relation to a dog's bite force ability, and in particular the force sometimes attributed to dog breeds and types frequently legislated for [21]. The review found that research literature have been 'daisy chaining' citations which actually do not possess any data, and some not containing any information pertaining to bite force at all [21]. As such, the present study sought to determine if differences exist between legislated and non-legislated dog breeds regarding a host of dog bite characteristics, which included dog bite severity and bite type. In doing so, a primary aim of the present study was to examine various biting characteristics and circumstances attributed to both legislated and non-legislated dog breeds through the collation of survey data from dog bite victims. Given the potential for

reinforced stereotypes of aggression and specified behaviour attributed to these breeds, a second aim of the current study was to investigate dog control officer's perceptions of current legislation which target these dog breeds. Given their central role in the enforcement of legislation targeting specific dog breeds, an examination of their perceptions were crucial to a more complete understanding of the relationship between public health and targeting specific breeds under current legislation.

Methods

Sample

The primary study sample constituted a retrospective survey of participants who have ever suffered a dog bite injury within the Republic of Ireland. Surveys were completed and collected between 24 June 2015 and 19 March 2016. The survey was promoted on television, radio, print media, medical centres, and social media throughout Ireland. Any member of the public who had been bitten in the Republic of Ireland, at any stage in their lives, by a dog aged 6 months or older was invited to participate in the survey. The survey data was collated online where all promotional materials relating to the survey directed to. Given legislated breeds do not fall into the small breed category under Kennel Club breed categorisations [22], small breeds were not examined. As previously outlined, this was done in order to increase the validity of comparisons between breeds of similar size. To limit the potential confounding of puppy mouthing, bites from dogs under 6 months were not collated. To control the potential limitation of inaccurate breed identification [23], mixed and unknown dog breeds were not examined. The final sample consisted of 140 dog bite incidents, were categorised as legislated (n = 40) and non-legislated (n = 100) dog breed bites.

The secondary sample consisted of dog control officers throughout the Republic of Ireland (N = 23). Each officer was provided with a web address such that they could anonymously complete their survey. All dog control officers who operate all county and city dog pounds in the Republic of Ireland were contacted. Of the officers contacted, 17 decided to take part with the remaining declaring they did not wish to take part (n = 1), did not have the knowledge to respond to the questions (n = 1), and repeatedly failing to get the correct officer to take part (n = 4). Officers indicated that the following groups operate the dog shelter; Irish Society for Prevention of Cruelty to Animals (ISPCA; n = 3), local authority government (n = 9), private enterprise (n = 4), and not disclosed (n = 1).

Survey sesign

Survey questions included: age when bitten, anatomical location of bite, trigger for the bite, relationship with the dog, owner presence when bite occurred, history of aggressive behaviour, if the dog was reported to the authorities before the bite, if the incident was reported to the authorities after the bite occurred, what was the outcome when reported, (if known) did the dog go on to bite again, and (if known) did the dog owner seek advice from a dog trainer or behaviourist. Relationship with the dog was subdivided into four categories, which included two categories examining if the dog was owned by the victim for either greater than or less than 3 months. This distinction in duration of possession was made based on literature indicating potential duration of time required for a dog to fully acclimatise to their environment [24].

Given the potential for misinterpretation, two measures to determine specific details surrounding the reported bite were employed. Firstly, details surrounding the medical treatment required were of crucial importance. Participants described their injuries in detail in words through an open-ended question, which were later assessed by a certified accident and emergency nurse. These detailed descriptions were then coded by the health care professional into four categories; none (home maintenance); doctor visit, antibiotics and tetanus shot; stitches and regular wound dressing; surgery, fractures and repeat hospital visits. Secondly, the type of bite as indicated by participants within the Dunbar Bite Scale was collated [25]. Both Level 1 bites (no teeth contact) and Level 6 bites (fatality) were not collated. Level 6 bites were not collated given the focus of the present study on examining dog bite incidents from the victim's perspective. Additionally, there was no availability of information relating to any human fatalities due to dog bite in Ireland. Level 2 bites refers to skin-contact by teeth but no skin-puncture; Level 3 bites refer to a single bite including one to four puncture wounds with no puncture deeper than half the length of the canine's teeth; Level 4 bites refers to one to four puncture wounds from a single bite with at least one puncture deeper than half the length of the dog teeth; Level 5 bites refer to a multiple-bite incident with at least two Level 4 bites or multiple attack incidents with at least one Level 4 bite in each.

Data analysis

The statistical package SPSS 22 was used to perform statistical analysis [26]. Data on the variables were organised in cross-tabulations and examined with Pearson's Chi-square test ($P \leq 0.05$ chosen as accepted significance level). An a priori computation was conducted to calculate required sample size ($1 - \beta = .80$; $\alpha = .05$; $N = 44$, $w = .5$; $N = 122$, $w = .3$; $N = 1091$, $w = .1$; [27]. Present sample size (N = 140) was sufficiently powered to detect medium to large effect sizes. Where the assumption of sample size for cell count was violated in the analysis, Fisher's Exact Test is reported. Statistical residual

outputs were examined to determine locations of any significant effects. Descriptive statistics are displayed in tables to aid discussion. Unknown responses while highlighted descriptively within tables and where relevant were treated as missing data and excluded from the relevant analyses. This approach has been used in existing research [e.g. 10].

Results

Breeds, age categories, bite locations and gtriggers for biting

The leading numbers of reported dog bite breeds within the study are illustrated within Table 1. This is descriptive and breed risks cannot be inferred from this as total populations within each category are unknown. An investigation of potential differences between legislated and non-legislated breeds revealed no significant difference with respect to age when bitten (P = 0.698; see Table 2). A significant effect for bite location was also not observed (P = 0.073). Examination of perceived triggers for biting revealed a significant difference between groups (P = 0.003). An investigation of residuals revealed a number of factors contributed to this effect. Firstly, the biting trigger for non-legislated breeds (94.1%) were more likely to be reported as being afraid compared to legislated breeds (5.9%). Secondly, legislated breeds (46.7%) were more likely than expected to be reported as angry as a trigger for biting compared to non-legislated breeds (53.3%). Finally, non-legislated breeds (92.9%) were more likely to bite when guarding an object compared to legislated breeds (7.1%).

Table 1 Sample sizes and incident percentages for dog breeds reported for dog bites in order of frequency for medium and large breeds[a]

Breed (Non-legislated)	Incidents n(%)	Breed (Legislated)	Incidents n(%)
Border Collie	26(18.5)	German Shepherd	28(20)
Labrador Retriever	14(10)	Rottweiler	6(4.2)
Cocker Spaniel	5(3.5)	American Staffordshire Terrier	3(2.1)
Shetland Sheepdog	5(3.5)	Akita	2(1.4)
Boxer	4(2.8)	Doberman Pinscher	1(0.7)
English Springer Spaniel	4(2.8)		
Golden Retriever	4(2.8)		
Irish Red Setter	4(2.8)		
Poodle	4(2.8)		
Rough Collie	3(2.1)		
Scottish terrier	3(2.1)		
Beagle	2(1.4)		
Welsh Terrier	2(1.4)		
Bearded Collie	1(0.7)		
Black and Tan Hound	1(0.7)		
Bulldog	1(0.7)		
Chesapeake Bay Retriever	1(0.7)		
Clumber Spaniel	1(0.7)		
English Pointer	1(0.7)		
Foxhound	1(0.7)		
German Shorthaired Pointer	1(0.7)		
Greyhound	1(0.7)		
Irish Terrier	1(0.7)		
Leonberger	1(0.7)		
Old Danish Pointer	1(0.7)		
Old English Sheepdog	1(0.7)		
Pyrenean Mastiff	1(0.7)		
Shiba Inu	1(0.7)		
Siberian husky	1(0.7)		
Tibetan Terrier	1(0.7)		
Weimaraner	1(0.7)		
Wheaton terrier	1(0.7)		
Whippet	1(0.7)		

[a]Note: Breed risks cannot be inferred from this data as total populations are unknown

Victim's relationship with dog, geographical location and owner presence

No greater likelihood of group differences with respect to relationship with the dog was observed (P = 0.082). Examination of geographical location and owner presence revealed a significant effect (P = 0.036; see Table 3). Examination of residuals revealed that bites were more likely to occur when the owner was present on own property for non-legislated breeds (95%) than for legislated breeds (5%). In addition, non-legislated breeds (100%) were more likely to bite on a business premises (e.g. vets, groomers) compared to legislated breeds (0%; see Table 3).

Behavioural history and authority involvement

No significant difference in the likelihood of legislated or non-legislated having a history of aggression was observed (P = 0.349). A significant difference was observed between both legislated and non-legislated groups with respect to being reported to authorities before the bite (P = 0.009; see Table 4). Non-legislated breeds (79.5%) were more likely to not be reported to any authorities before biting compared to legislated breeds (20.5%). In addition, a significant difference in post bite reporting was observed (P = 0.032). Following the bite, non-legislated breeds (80%) were less likely to be reported to any authorities compared to legislated breeds (20%). No

Table 2 Sample sizes and incident percentages for age categories, anatomical bite locations, and triggers for biting

Age (years)	Non-Legislated	Legislated	Bite location	Non-Legislated	Legislated	Trigger for bite	Non-Legislated	Legislated
	n (%)[a]	*n* (%)[a]		*n* (%)[a]	*n* (%)[a]		*n* (%)[a]	*n* (%)[a]
0–14	36(36)	20(50)	Hand/lower arm	40(40)	15(37.5)	Do not know	22(22)	14(35)
15–29	23(23)	9(22.5)	Lower leg/ft/ankle	28 (28)	6(15)	Dog was angry	8(8)	7(17.5)
30–44	22(22)	7(17.5)	Upper leg/torso	16(16)	10(25)	Dog was afraid	16(16)	1(2.5)
45–59	17(17)	4(10)	Neck/head/face	13(13)	5(12.5)	Dog was guarding its home	11(11)	6(15)
60–74	1(1)	0	Multiple locations	1(1)	4(10)	Dog was guarding an object	13(13)	1(2.5)
75–99	1(1)	0	Upper arm/ shoulder	2(2)	0	Dog was fighting with another dog	8(8)	1(2.5)
						Dog was playing	8(8)	1(2.5)
						Dog was in pain	6(6)	1(2.5)
						Security dog carrying out duties	1(1)	3(7.5)
						Dog was chasing (predatory behaviour)	1(1)	0
						Multiple reasons	6(6)	2(5)
						Dog was instructed to attack	0	1(2.5)
						Dog was guarding puppies	0	2(5)

[a]Only valid responses are used for analyses, therefore totals may not add to total sample size (*N* = 140)

significant difference in known outcome for the dog was observed ($P = 0.121$). Legislated and non-legislated dogs were no more likely than one another to bite again ($P = 0.238$). In addition, no significantly greater likelihood of seeing a professional trainer or behaviourist was observed between both groups ($P = 0.579$).

Type of bite and medical treatment required

Regarding type of bite, neither legislated breeds nor non-legislated breeds were more likely than the other to inflict a differing bite type with greater severity ($P = 0.604$; see Table 5). In addition, neither legislated breeds nor non-legislated breeds were more likely to inflict a bite requiring greater medical attention than the other ($P = 0.122$; see Table 5).

Dog control officer survey

With the exception of one officer's shelter who reported not recording information pertaining to breeds, dog breed identification was reported to be conducted through subjective measures, including visual identification (see Table 6). Over half (59%) of the dog control officers felt that breed-specific legislation is effective. Similarly, over half (56%) reported that they believed legislated breeds had the capability to inflict greater injuries and more severe damage if biting compared to non-legislated breeds of similar size. In addition, 19% of officers surveyed felt legislated breeds were more aggressive than non-legislated breeds. With respect to accepting surrenders, one officer reported that their shelter did not accept surrenders of legislated dog breeds from the public. A further officer indicated that the shelter they operate only allow the rehoming of certain legislated breeds.

Table 3 Sample sizes and incident percentages for victim's relationship with dog, geographical location, and owner presence

Victims relationship with the dog	Non-Legislated	Legislated	Geographical location and owner presence	Non-legislated	Legislated
	n (%)[a]	n (%)[a]		n (%)[a]	n (%)[a]
Unfamiliar dog	36(37.1)	23(62.2)	Dog bit on public property, owner was absent	13(17.3)	6(23.1)
Familiar Dog	38(39.2)	9(24.3)	Dog bit on own property, owner was absent	12(16)	7(26.9)
Own dog (in possession more than 3 months)	18(18.6)	4(10.8)	Dog bit on public property, owner was present	10(13.3)	8(30.8)
Own dog (in possession less than 3 months)	5(5.2)	1(2.7)	Dog bit on own property, owner was present	19(25.3)	1(3.8)
			Dog bit owner	16(21.3)	4(15.4)
			Dog bit on dog business premises, professional present	5(6.7)	0

[a]Only valid responses are used for analyses, therefore totals may not add to total sample size (*N* = 140)

Table 4 Sample sizes and incident percentages for behavioural history and authority involvement

History of aggression	Non-Legislated n (%)[a]	Legislated n (%)[a]	Reported before bite	Non-legislated n (%)[a]	Legislated n (%)[a]	Reported after bite	Non-legislated n(%)[a]	Legislated n(%)[a]
No history of aggression	28(28)	6(15)	Not reported before bite	58(58)	15(37.5)	Not reported after bite	72(72.7)	18(45)
Yes, had behaved aggressively	20(20)	10(25)	Do not know	40(40)	20(50)	Do not know	20(20.2)	15(37.5)
Yes, had bitten	15(15)	4(10)	Yes, reported to police	2(2)	3(7.5)	Yes, reported to police	4(4)	5(12.5)
Do not know	37(37)	20(50)	Yes, reported to animal control	0	2(5)	Yes, reported to animal control	3(3)	2(5)

[a]Only valid responses are used for analyses, therefore totals may not add to total sample size (*N* = 140)

Discussion

Present findings suggest no difference between biting legislated and non-legislated dog breeds for; age when the victim was bitten, bite location, relationship with the dog, history of aggression, known outcome for the dog, if the dog bit again, and seeing a professional trainer or behaviourist. Both Border Collies and German Shepherds are observed as being involved in a greater number of bite incidents within this sample. Given complete dog breed populations are unknown for all breeds listed, risk relating to frequency of bites from any breeds within this study cannot be computed. Indeed, in line with research examining dog bite populations, the breeds reported for biting are comparatively in line with the more popular dog breeds within a population in Ireland [7]. Regarding breed grouping comparisons, legislated breeds were perceived as biting due to being more aggressive and less fearful than non-legislated breeds. In addition, non-legislated breeds were more likely to be reported as being triggered to bite due to guarding an object. While dogs similarly signal their intent to bite [28], there was a significant difference observed between groups. The impact of public perceptions and stereotypes of risk relating to dog breeds cannot be understated [29]. While providing an agenda for future work, the observed effect may be due to the perceptions of breed risk rather than exhibited behaviour. Legislated breeds could well be perceived as aggressive and less fearful given their reinforced stereotype. While speculative, legislated breed owners may be more likely to address unwanted guarding behaviour compared to non-legislated breed owners.

Examination of geographical location and owner presence revealed significant findings. Non-legislated breeds were observed as more likely to inflict a bite on a business premises compared to legislated breeds. Bites were also more likely to occur with the owner present on own property for non-legislated breeds compared to legislated breeds. Intriguingly, this may suggest differing perceptions of responsibility for owners of dogs from both groups. Owners from legislated breeds may be more likely to take precautions (e.g. continuous supervision) with their dogs compared to non-legislated owners. Individuals may thus perceive non-legislated breeds as safer and having a greater tolerance, which is reinforced by their non-legislated status. This is supported by authority involvement findings where non-legislated breeds were significantly less likely to be reported to any authorities both before, and after the bite occurred. This suggests a significantly lesser risk is associated with non-legislated breeds, thus potentially reinforcing the authorities' perception of risk relating to these breeds.

No significant difference was observed between legislated and non-legislated dog breeds for the medical attention required following a bite. In addition, no significant difference was observed between legislated and non-legislated breeds for the type of bite inflicted. In other words, legislated breeds were found not to have a greater likelihood of inflicting greater injury and a differing bite type compared to non-legislated breeds. While a greater ability to inflict bites of greater severity and requiring more medical attention is frequently attributed to legislated breeds, these results do not provide evidence in support of these assertions.

Table 5 Sample sizes and incident percentages for type of bite and medical treatment required

Type of bite	Non-Legislated n (%)[a]	Legislated n (%)[a]	Medical treatment required	Non-legislated n (%)[a]	Legislated n (%)[a]
Level 2	23(23)	9(22.5)	No treatment/at home treatment	47(47)	12(30)
Level 3	47(47)	22(55)	GP visit/antibiotics/tetanus shot	28(28)	17(42.5)
Level 4	25(25)	6(15)	Stitches/staples/glue/regular wound dressing	21(21)	11(27.5)
Level 5	5(5)	3(7.5)	Serious medical treatment/surgery/fractures/repeat hospital visits	4(4)	0

[a]Only valid responses are used for analyses, therefore totals may not add to total sample size (*N* = 140)

Table 6 Sample sizes and incident percentages for dog control officer survey

	n (%)[a]
How is a dog's breed identified?	
Officer visually identifies the breeds	5(29)
Officer visually identifies the breeds and asks owner	6(35)
Officer visually identifies, asks owner and checks records	5(29)
Do not record breed	1(6)
Do you currently accept surrenders of legislated dog breeds from the public?	
Yes	15(94)
No	1(6)
Missing	1
Do you allow the rehoming of legislated dog breeds?	
Yes	15(94)
No (some breeds)	1(6)
Missing	1
Do you believe breed specific legislation is effective in reducing dog bites in Ireland	
Yes	10(59)
No	7(41)
In your experience, do you believe legislated dog breeds can inflict greater injuries or physical damage compared to non-legislated breeds of similar size?	
Yes	
No	9(56)
Missing	7(44)1
In your experience, are legislated dog breeds more aggressive than non-legislated breeds?	
Yes	3(19)
No	13(81)
Missing	1

Regarding dog control, one officer reported not recording dog-breed information. The remaining officers relied upon subjective measures, including visual identification methods of determining breeds. A landmark study conducted by Scott and Fuller [30], found that the offspring of two different purebred dogs frequently bear no resemblance whatsoever to either breed. As such, it is unclear how officers would be capable of accurately identifying mixed breed dogs. Over half of the officers surveyed reported feeling that current breed-specific legislation is effective in reducing dog bites. Over half of officers also believed that legislated breeds have an ability to inflict greater injuries compared to non-legislated breeds of similar size. Less than a quarter of officers felt legislated breeds were in fact more aggressive than non-legislated breeds. While a number of officers did not complete the survey; one officer reported that their shelter does not accept surrenders of legislated breeds from the public, with a further not allowing the rehoming of legislated dog breeds.

It is important to not understate the potential knock-on effect targeting dog breeds may have. Assumptions about the supposed 'aggressive' or 'able to inflict greater injury' nature of legislated breeds or the 'less capable of inflicting significant injury' or 'docile' temperament of non-legislated breeds, may be associated with differing interactions across breeds. Consider a scenario where a dog begins to bark following encroachment on its personal space by a human. If the dog is a legislated breed, the individual may perceive such behaviour as symptomatic of the 'aggressive nature' of such breeds. On the other hand, the individual may fail to recognise such warning signals from a non-legislated breed. In both instances, the individual may not recognise the trigger, interpret the dog's behaviour correctly, or respond appropriately, thereby increasing the risk of this interaction resulting in the dog biting. In other words, the criterion for interacting with a dog may be incorrectly rule governed by its breed rather than actual exhibited behaviour, which in turn is being reinforced by the breed-specific legislation.

Potential limitations which also provide an agenda for future work must be duly noted. Methodologies which employ any retrospective self-report measures can be particularly open to threats from recall bias. Indeed, while every attempt to minimise such threats to memory recall by incorporating detailed and specified survey questions [31], potential threats due to recall may have occurred. Additionally, while only reported pure-bred dogs were assessed, the potential threat of breed misidentification cannot be ruled out. Indeed, further effects may also emerge with an increase in sample size. While the present study was adequately powered to detect medium to large effects, further significant small effect sizes may emerge with an increased sample. Indeed, a further consideration is the implications and relevance of examining small dog breeds in future research. Much research has indicated that small dog breeds are frequently identified as displaying higher levels of aggression compared to larger dog breeds [32]. Indeed, human fatalities have also been inflicted by small breed dogs, and as such future research examining associations with smaller dog breeds would be of importance. Further research is also warranted in addressing knowledge of determining the emotional responsivity of dogs. Research would be required to replicate present findings, and potentially provide further analyses relating to the differing contexts which may have characterised the expressed aggression.

Conclusions

The present study provides evidence that the targeting of dog breeds as a dog bite mitigation strategy may pose

significant negative consequences relating to perceptions of risk and reporting behaviour. Its introduction in Ireland poses further wide reaching negative consequences; animal welfare concerns relating to dog pounds not rehoming and accepting surrenders of these breeds (see Table 6), restrictions affecting disability/assistance dogs, and owner housing restrictions [33] among others. A legislative dog-bite mitigation strategy whose purpose is to provide safeguards to the public through a reporting system, should avoid putting divisive mechanisms across responsible dog-owner populations. Doing so will make the identification of dogs likely to bite difficult and as observed within this study, will lead to a distinct bias in dog bites reported to authorities. The increased perception of threat from specific breeds, and the lack of perceived threat from other breeds are essentially two sides to the same counterproductive coin. The increasing trend in dog-bite hospitalisations in Ireland is alarming [1], yet unsurprising. Evidence based breed-neutral alternatives exist, which target multi-factorial risk factors, and as such should be enacted [34–37]. It is recommended a public policy mechanism which categorises potentially dangerous dogs based on their exhibited behaviour is enacted [38].

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Availability of data and materials
The datasets generated during and/or analysed during the current study are not publicly available as they contain the email addresses for many of the participants. They are available from the corresponding author on reasonable request.

Authors' contributions
NC and PÓ both designed, analysed, interpreted and contributed to the writing of this manuscript. NC gathered and promoted the data collection. Both authors read and approved the final manuscript for submission.

Ethics approval and consent to participate
This research project was approved by the research ethics committee at Newcastle University. Each participant was provided information on the purpose of the survey, and informed that they could withdraw from participation at any time.

Consent for publication
Not applicable.

Competing interests
P. S. Ó'Súilleabháin is currently involved in non-financial advocacy, which lobbies government and agencies regarding evidence based legislation relating to human–canine interaction, but in addition to N. Creedon has no financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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ANNEXE 8

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Short Communication

Human hospitalisations due to dog bites in Ireland (1998–2013): Implications for current breed specific legislation

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ABSTRACT

The aim of this study was to examine the efficacy of the current breed specific legislation in Ireland by investigating all dog bite hospital admissions throughout Ireland since that legislation was introduced. Data for statistical analyses were acquired through the National Hospital In-Patient Enquiry Scheme. In years 1998–2013, a total of 3164 human hospitalisations (admissions for dog bite) occurred in Ireland. Incidence of hospitalisations increased over this period ($P < 0.001$). Male humans were at greater risk than females of dog bite hospitalisation ($P = 0.015$). Children under 10 years were identified as an at-risk group. The present legislation is not effective as a dog bite mitigation strategy in Ireland and may be contributing to a rise in hospitalisations.

Governments frequently utilise dog breed specific legislation or non-breed specific legislation to reduce injuries and fatalities from dog bites. Breed specific legislation prohibits ownership or places restrictions on certain breeds of dogs categorised as 'dangerous' or 'able to inflict greater injuries'.[1] Non-breed specific legislation frequently includes measures promoting responsible dog ownership coupled with an education programme.[2]

Breed-specific legislation is increasingly viewed as inappropriate and lacking a scientific basis (AVMA, 2001; Collier, 2006; Ott et al., 2008; Cornelissen and Hopster, 2010; Patronek et al., 2013). No differences have been found in aggression or factors leading to biting between dog breeds frequently legislated for and other breeds, suggesting that there is no validity in breed specific lists (Collier, 2006; Ott et al., 2008). Patronek et al. (2013), investigating 256 dog bite related fatalities in the USA over a 10 year period, found that fatalities were associated with preventable factors under the control of both the owners and victims.

This study examined whether reductions in the incidence of dog bite hospitalisations have occurred since the introduction of the latest breed-specific legislation in Ireland (Control of Dogs Act 1998 Regulations[3]). Dog bite hospitalisations were defined as human beings admitted as day or in-patients with a primary diagnosis of dog bite, not including those who attended accident and emergency departments. Data were collated and made available by the Healthcare Pricing Office.[4] Statistics were made available from the introduction of the latest legislation in 1998 until 2013 for all hospitals in Ireland (Table 1). The analysis was conducted using SPSS (IBM) and examined the annual incidence, expressed as number of dog bite hospitalisations of human beings per 100,000 population.[5]

There was a total of 3164 human hospitalisations due to dog bite from 1998 to 2013, with a 45% increase in numbers hospitalised; the incidence increased by 21% over the same period. The effect of year on number of hospitalisations was assessed using Poisson regression, with year as the unit of analysis and year number fitted as a continuous variable. The natural log of population size was fitted as the offset. Visual observation and Durbin–Watson statistics suggested no autocorrelation in incidence between years; thus, the analysis did not account for autocorrelation in residuals.

The incidence of dog bites increased significantly with year ($P < 0.001$; incidence 1.015; 95% confidence interval, CI, 1.007–1.022); thus, incidence was estimated as being 1.5% higher than the previous year. Pearson's correlation coefficient revealed a significant positive correlation between incidence and year ($r = 0.52$, $P = 0.02$). Incidences were calculated for human males and females separately based on population estimates.[6] *A* Wilcoxon signed-rank test revealed that males (median incidence 4.98 dog bite

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[1] See: Irish Statute Book: http://www.irishstatutebook.ie/1998/en/si/0442.html (accessed 21 October 2014).

[2] See: The Responsible Pet Ownership Bylaw: http://www.calgary.ca/CSPS/ABS/Pages/Animal-Services/Responsible-pet-ownership-bylaw.aspx (accessed 21 October 2014).

[3] See: Irish Statute Book: http://www.irishstatutebook.ie/1998/en/si/0442.html (accessed 21 October 2014).

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[5] See: Central Statistics Office, Population and Migration Estimates: http://www.cso.ie/en/releasesandpublications/er/pme/populationandmigrationestimatesapril2014/#.VD_h5xYm9Wh (accessed 21 October 2014).

[6] See: Central Statistics Office, StatBank: http://www.cso.ie/px/pxeirestat/statire/SelectTable/Omrade0.asp?Planguage=0 (accessed 21 October 2014).

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1090-0233/

Table 1
Descriptive statistics for dog bite hospitalisations and population sizes in Ireland by year from 1998 to 2013.

Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Dog bite incidence[a]		4.65	4.90	3.77	4.76	4.16	4.55	4.92	3.94	4.42	5.07	4.01	4.24	5.03	5.68	5.43	5.64
Total number of hospitalisations		172	182	143	183	163	181	199	163	187	222	180	192	229	260	249	259
Population[b]		3,703,100	3,714,600	3,789,500	3,847,200	3,917,200	3,979,900	4,045,200	4,133,800	4,232,900[c]	4,375,800	4,485,100	4,533,400	4,554,800	4,574,900	4,585,400[d]	4,593,100[d]
Patient type	Day	[e]	8	[e]	[e]	[e]	8	[e]	9	15	8	8	[e]	9	[e]	13	17
	In-patient	[e]	174	[e]	[e]	[e]	173	[e]	154	172	214	172	[e]	220	[e]	236	242
Dog bite incidence[a]	Male	5.44	4.68	3.40	5.59	4.01	4.86	4.62	4.03	5.10	5.66	4.24	4.21	5.70	6.21	5.51	6.11
	Female	3.86	5.05	4.14	3.93	4.31	4.24	5.21	3.86	3.73	4.49	3.78	4.26	4.36	5.16	5.35	5.17
Total hospitalisations	Male	100	87	64	107	78	96	93	83	108	124	95	95	129	141	125	139
	Female	72	95	79	76	85	85	106	80	79	98	85	97	100	119	124	120
Age group	0–9	100	90	73	95	82	94	102	73	83	102	83	92	101	120	101	109
	10–19	15	18	19	26	23	17	22	12	18	29	22	22	30	31	22	46
	20–29	11	12	[e]	8	9	[e]	12	10	14	18	20	12	15	19	15	12
	30–39	11	[e]	11	6	6	18	[e]	9	10	11	10	14	26	17	22	26
	40–49	10	14	10	15	13	10	13	22	16	19	8	16	16	17	24	19
	50–59	7	18	9	9	13	8	15	16	13	17	17	14	14	23	27	21
	60–69	7	10	6	8	[e]	15	14	9	6	[e]	11	13	14	17	14	12
	70–79	[e]	[e]	[e]	7	9	9	11	[e]	20	11	[e]	[e]	[e]	[e]	14	14
	80 years and older	[e]	8	6	9	[e]	[e]	[e]	[e]	7	[e]	[e]	[e]	[e]	[e]	10	[e]
In-patient mean length of stay (days)		2.7	2.3	2.4	2.2	2.6	2.6	2.3	2.2	2.6	2.1	2.1	1.8	2.8	2.0	2.7	2.3

[a] Number of dog bite hospitalisations per 100,000 population of human beings.
[b] Population numbers are rounded to the nearest 100 by the Central Statistics Office (http://www.cso.ie/en/releasesandpublications/er/pme/populationandmigrationestimatesapril2014/#.VD_h5xYm9Wh).
[c] Up to and including 2005, the annual population estimates are on a de facto basis (people present in the country on census night). From 2006 onwards, the concept of usual residence (people usually resident and present in the State on census night *plus* absent people who are usually resident in Ireland) is used.
[d] Preliminary.
[e] Missing data.

hospitalisations per 100,000 population) had greater annual incidence across years in comparison to females (median incidence 4.29 per 100,000; $P = 0.015$). Across years, an average 14% of the population was children <10 years of age, but this age group accounted for 49% of all hospitalisations.

The objective of the Control of Dogs Act 1998 Regulations is to reduce the incidence and severity of bites from specific dog breeds (11 total, including mixes and strains) deemed capable of inflicting injury requiring hospitalisation more frequently than all other breeds. The regulation of these breeds should have resulted in a decreased incidence of hospitalisations, whereas a significant increase in incidence was observed. The absence of a marked decrease in incidence could be due to increased medical attention seeking behaviour over the study period; however, this appears unlikely, given the severity of bites within the present study requiring hospital admission beyond treatment solely in accident and emergency departments.

Current regulations may be contributing to increases in hospitalisations due to dog bites. Regulating breeds places restrictions on dogs that pose little risk and ignores the possibility that any breed is capable of inflicting serious injuries; for example, fatalities have been caused by dogs that fall into the toy breed categorisation (Collier, 2006). Ott et al. (2008) indicated that the breeds currently regulated in Ireland do not possess higher levels of aggression in comparison with other domestic breeds. Breed legislation can mislead the general public into believing that unregulated breeds are less capable of inflicting serious and fatal injuries (Clarke et al., 2013).

Regulating dogs based on breed to reduce injuries resulting in hospitalisations and fatalities is contrary to scientific evidence (AVMA, 2001; Cornelissen and Hopster, 2010) and compounded by research highlighting the inaccuracy of breed identification, making current regulations unenforceable (Voith et al., 2013). For example, a dog genetically may be 50% a legislated breed and yet lack the genes responsible for coat, muzzle length, size and ear properties assumed to be typical of the breed (Voith et al., 2013), rendering accurate breed identification impossible. Simpson et al. (2012) recommended refraining from attempting to identify a dog's breed or mix of breeds due to the high frequency of misidentification. Incorrect breed identification may also have serious legal implications for the identifier, not least in terms of reputation, court costs and damages.

If non-breed specific legislation is not enacted in Ireland, the author contends hospitalisations will continue to rise, resulting in fatalities. Prior to the abolition of breed specific legislation in The Netherlands during 2006 and 2007, hospitalisation incidence was 1.5 dog bite hospitalisations per 100,000 population annually (Cornelissen and Hopster, 2010). In Ireland during the same period, incidences were an average of 4.75 dog bite hospitalisations per 100,000 population annually and rising (5.64 per 100,000 in 2013). Non-breed specific legislation has been successful worldwide (Oswald, 1991) and the introduction of such legislation in Ireland is recommended. An education programme for children is warranted and should adhere to science-based principles (Ó Súilleabháin, 2015).

Conflict of interest statement

The author of this publication is currently involved in non-financial advocacy, which lobbies government and agencies regarding legislation relating to human–dog interaction, but has no financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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ANNEXE 9

THE AMERICAN SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS

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September 15, 2017

To Whom it May Concern,

I have been retained by Plaintiffs in Montreal SPCA v. City of Montreal to provide a review of certain elements of arguments in this case. I have not received compensation for preparing this report. Specifically, I have been asked to provide information on key issues related to this case, outlined below.

Background

I have undergraduate degrees in psychology and biology from Wesleyan University in Connecticut and a doctorate in comparative and physiological psychology from Washington University in St. Louis with dissertation work on canid behavior and aggression. I became a Senior Vice President for The American Society for the Prevention of Cruelty to Animals (ASPCA) in August of 2005, after serving for 21 years in various capacities at the Humane Society of the United States, including Vice President for Field services and Vice President for Research and Educational Outreach. In addition to my position with the ASPCA, I am Affiliate Assistant Professor, Small Animal Clinical Sciences, in the College of Veterinary Medicine at the University of Florida, Gainesville, Florida where I teach classes within the Masters Program in Veterinary Forensic Sciences, including a class in Forensic Applied Animal Behavior which focuses on the application of current scientific knowledge of animal behavior to the law.

I am a Fellow of the Denver University Center for Human-Animal Interaction and the Oxford (U.K.) Center for Animal Ethics. I am a member of the advisory council of the Association of Prosecuting Attorneys . For nearly forty years I have worked closely with humane societies, animal care and control agencies, dog trainers and law-enforcement, serving as an expert on dog behavior, dog aggression, dog-bite prevention, illegal dogfighting and the interactions between people and animals. I have been an advisor on animal-related public health problems to many city and state governments, law enforcement agencies, utility companies, the Centers for Disease Control, the International Association of Chiefs of Police, the National Sheriffs Association and the U.S. Postal Service.

I was a member of the American Veterinary Medical Association's Task Force on Human/Canine Interaction, established to review the dog bite problem and appropriate community responses. I have served as an expert witness in many civil and criminal trials dealing with dangerous dogs, including the first trials to result in manslaughter and murder convictions of owners of dogs involved in fatal attacks and the high-profile

murder/manslaughter trials in the San Francisco dog-mauling death of Diane Whipple. I have provided training on dangerous dog issues and bite prevention for hundreds of professionals in animal care and control, law enforcement, emergency services and public health. I have served as a subject matter expert in the development of statewide law enforcement training on officer safety in encounters with dogs for California, Colorado, Ohio, Tennessee and Texas

I was a contributor to **The domestic dog: Its evolution, behaviour and interactions with people** (1995: Cambridge University Press, and 2nd edition 2016), **The Humane Society of the United States' Complete Guide to Dog Care** (1998: Little Brown) and **Animal Law and Dog Behavior** (1999: Lawyers & Judges Publishing). I co-edited **Cruelty to Animals and Interpersonal Violence** (1998: Purdue University Press) and am author of **Animal Cruelty Prosecution: Opportunities for Early Response to Crime and Interpersonal Violence** (2006: National District Attorneys Association) and co-author of **Forensic Investigation of Animal Cruelty: A Guide for Veterinary and Law Enforcement Professionals** (2006: HSP) and **Investigating & Prosecuting Animal Abuse: A Guidebook on Safer Communities** (2013, National District Attorneys Association) . I developed the **Dogfighting Toolkit for Law Enforcement: Addressing Dogfighting in Your Community(2011)** under a grant from Community Oriented Policing Services of the U.S. Department of Justice.

Response to Inquiries

1. Has breed specific legislation (BSL) has been effective in reducing risk or severity of dog bites where it has been adopted?

Problems associated with canine aggression are the result of complex interactions of genetic, physiological, developmental, environmental and social factors. For many years the most expedient political solution has been to apply the 'disease' model and attempt to eliminate the 'vector' by banning or otherwise restricting particular breeds, usually those that have been associated with the extremely rare phenomenon of fatal attacks on humans. This approach has been resoundingly and universally opposed by professionals in veterinary medicine, animal behavior, animal care and control and animal protection as an approach that is **ineffective, costly, epidemiologically unsound, and unfair to responsible owners of affected breeds** (AVMA Task Force, 2001; Patronek et al., 2010).

There have been relatively few attempts to systematically evaluate the impact of BSL on dog bites. The most recent epidemiological review of the impact of breed-specific bite rates (Creedon and O'Suilleabhain, 2017) notes that dog bite hospitalizations have continued to rise in Ireland over the 15 year period since the introduction of BSL in that country They further note (p.71) that "research from various other nations have suggested a lack of efficacy and validity of dog breeds as a dog bite mitigation strategy", summarizing results from Italy, Spain, the Netherlands, Belgium, the United Kingdom and Canada (Bandow, 1996; Mariti et al., 2003; DeKeuster et al. 2006; Rosdado et al., 2007; Cornellison & Hopster, 2010; Clarke & Fraser, 2013).

In the UK, the Dangerous Dog Act of 1991 did not reduce the number of dog bites to humans caused by restricted breeds over the following 2 years (Klassen et al., 1996). Longer term analysis showed bites to have increased 25% since passage of the act (Collier, 2006). A more recent analysis of UK statistics shows that hospital admissions for injuries caused by dogs are up 76% in the 10 years under the Act (Siddique, 2015). Martinez et al. (2011) report that breeds classified as dangerous in Spain did not display aggressiveness more often than those not listed. Schalke *et al.* (2008) and Ott *et al*. (2008) looked at the results of temperament tests in Germany of 415 dogs receiving compulsory standardized tests and found no significant differences between Golden Retrievers and restricted breeds, resulting in the withdrawal of breed-specific legislation in Lower Saxony (Schalke et al., 2008). Patronek et al. (2010) report additional recent instances of breed-specific regulations being removed in the Netherlands and Italy.

The most comprehensive survey of the impact of BSL in 36 Canadian communities was conducted by Clarke and Fraser (2013). They concluded (p. 149):

" The data also provided a basis for comparing reported dog bite rates in municipalities with and without BSL. Neither the simple non-parametric comparison, nor the comparison after adjusting for the effect of enforcement in the regression analysis, provided any evidence that municipalities with BSL had fewer dog bites."

They found that increased enforcement of breed-neutral regulations (such as leash- and containment laws) led to the most noticeable drop in dog-bite injuries. Ledger et al. (2005) reached a similar conclusion from Canadian data.

Ontario's pit bull ban was introduced in 2005. Although bites attributed to banned dogs have declined in Toronto, overall reported dog bites have been rising since 2012, and in 2013 and 2014 reached their highest levels this century, even as dogs considered to be pit bulls and similar dogs neared local extinction. Bites from German shepherds (Toronto's #4 dog, after Labradors, Shih Tzus and golden retrievers) were most common in 2004 and 2014. Bites from restricted dogs were less common in 2014 than ten years earlier, but bites from American bulldogs and boxers were more common as shown in Figure 1 (Cain, 2016)

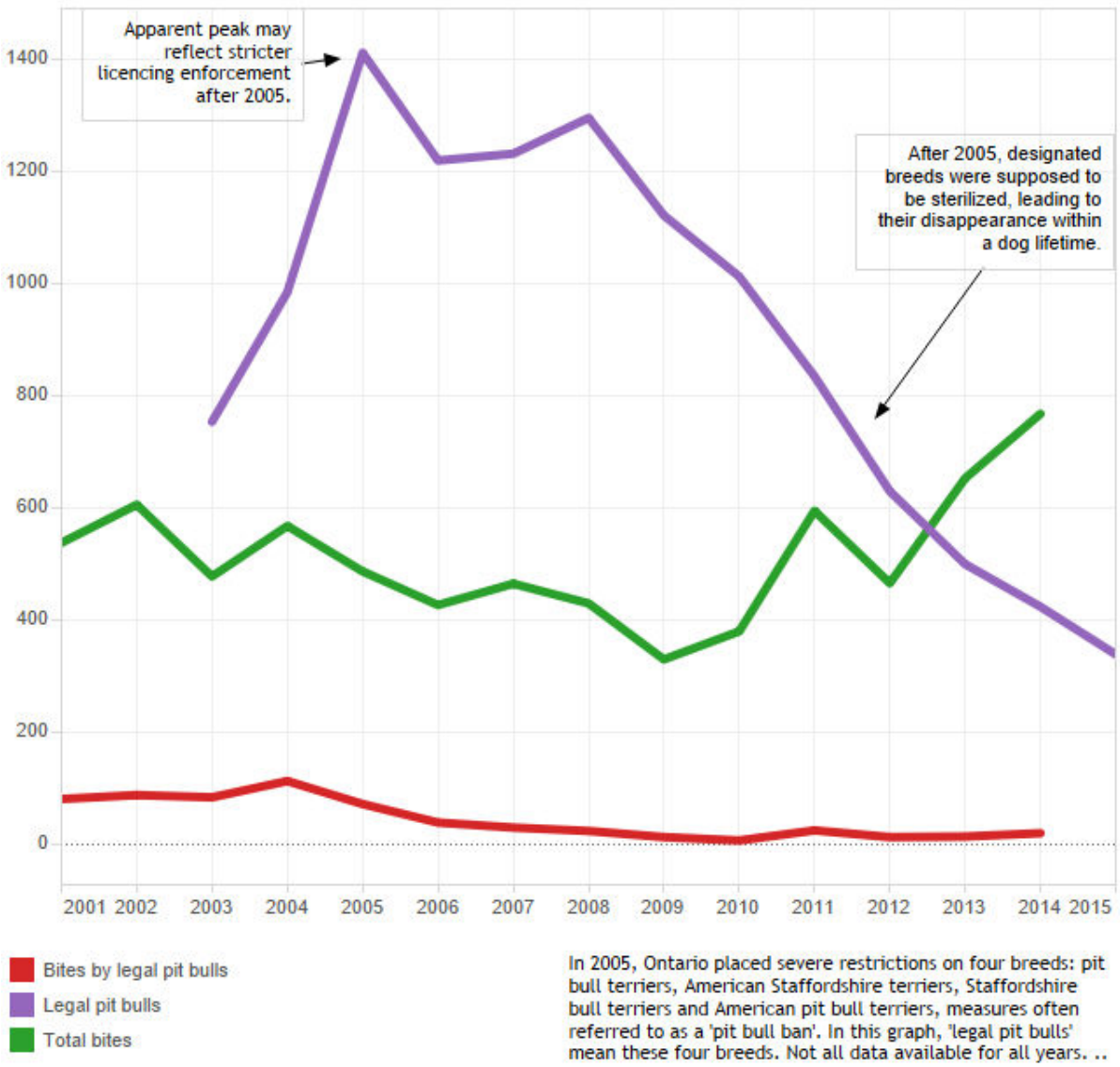


Figure 1: from Cain, P. *Toronto's pit bulls are almost gone. So why are there more dog bites than ever?* Global News, Feb 20, 2016.

An additional review of data from the Ontario Ministry of Health (Lacoursier, 2016) shows a similar rise in hospitalizations due to dog bites following adoption of BSL, which were on the decline before BSL was adopted. (Figure 2)

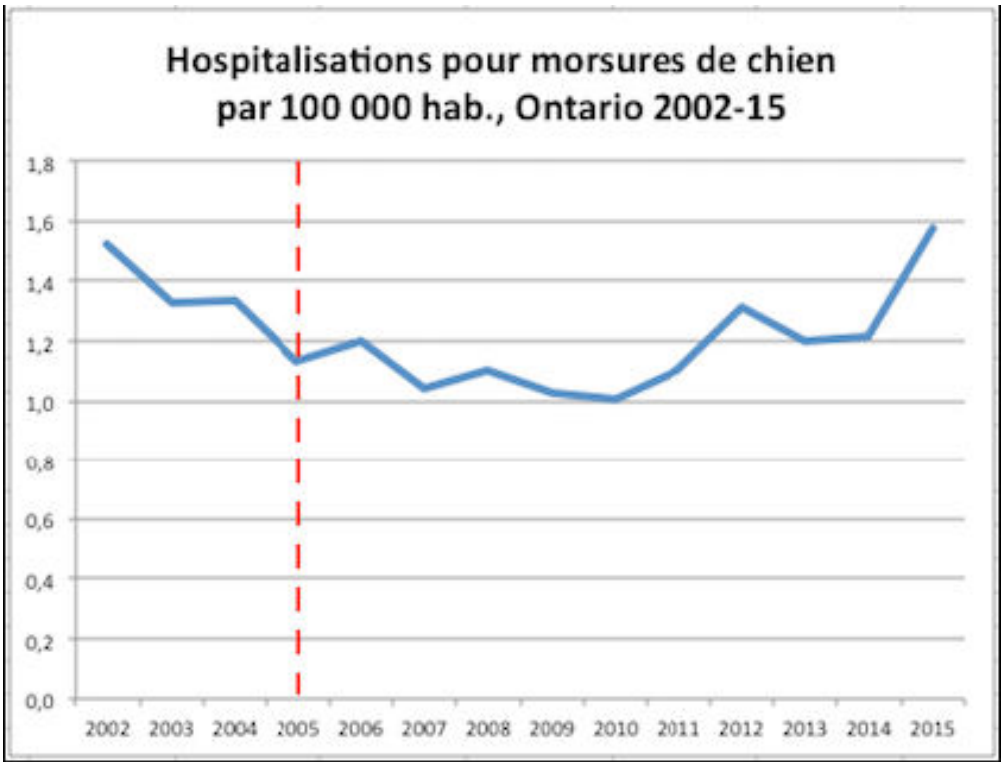
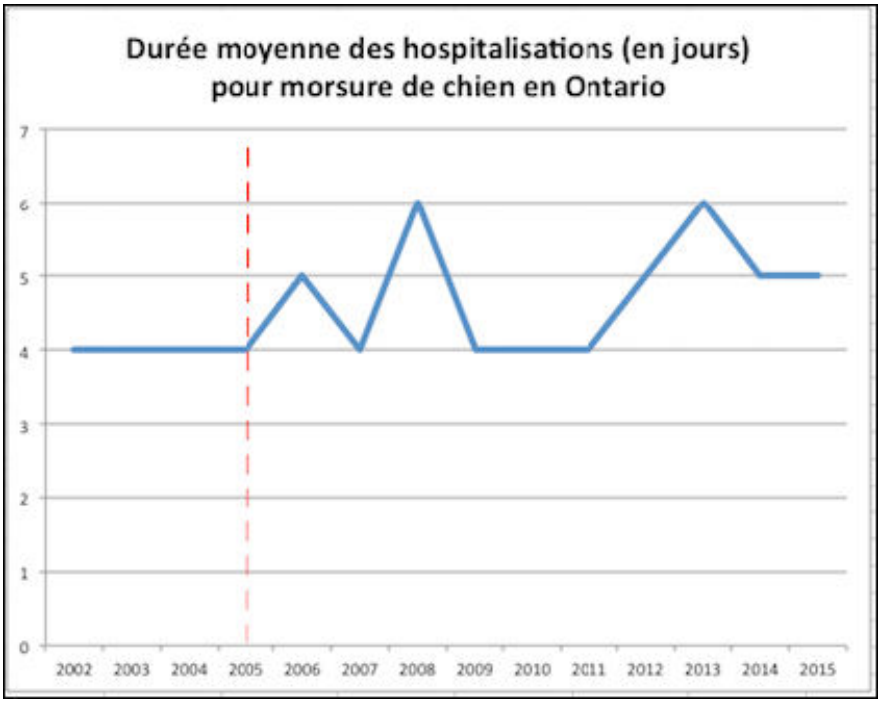


Figure 2: After 2005 (when BSL was adopted in Ontario) increase in the number of hospitalisations per 100,000 people due to dog bites (the number was at 1.1 people per 100,000 before BSL and has increased up to 1.6 per 100,000 in 2015 (with a steady increase since 2010)

The average length of stay for hospitalizations from dog bites also increased following adoption of BSL (Figure 3) and has never dropped below pre-BSL levels.



2. Are there any properly conducted epidemiological studies or data that provide any scientific basis for adopting BSL?

3. Can you comment on the methodology used to collect data and draw conclusions in the *Rhagavan* study?

Creedon and O'Suilleabhain, (2017) cite only two refereed studies purported to suggest a reduction in bites following BSL. However, they note that the Villalbi et al., (2010) study from Catalonia failed to show any reduction when jurisdictions were properly used as their own controls in a pre/post comparison.

Raghavan *et al*. (2012) is the only other study identified suggesting that BSL may reduce bites. They looked at a variety of urban and rural jurisdictions in Manitoba, Canada where "pit bull" bans were identified and examined differences in dog-bite injury hospitalization rates with and without breed-specific legislation (BSL). No actual measures of the degree of implementation or enforcement of BSL were used (e.g. numbers of citations, animals seized, etc.) only whether a community had such legislation on the books and when it was enacted.

Although the authors suggest that, "BSL may have resulted in a reduction of DBIH [dog bite injury hospitalizations] in Winnipeg," the most directly applicable comparison data do not support that conclusion. The only urban population studied other than Winnipeg was Brandon, the second largest city in Manitoba. Brandon has had non-breed-specific dangerous dog legislation since 1994. All the other data analyzed came from rural settings with no documentation of the actual degree of implementation of BSL. No significant differences were observed in the dog-bite injury hospitalization rates in Winnipeg relative to Brandon after the implementation of BSL in Winnipeg, with an average overall incidence of 2.84 DBIH per 100,000 person-years in Winnipeg compared to 2.50 in Brandon. The results for victims aged 0 to 20 years followed the same pattern, with an incidence of 5.26 DBIH per 100,000 person years and a rate of 5.99 in Winnipeg pre-BSL and 5.02 post-BSL ($P = 0.247$, NS).

Creedon and O'Suilleabhain, (2017) offer additional criticisms of this study noting (p.71) "aside from several significant limitations outlined in the study, it is difficult to determine which aspects of the legislation have led to reductions. In other words, the enforcement of accompanying breed-neutral components could have led to some reductions, rather than the actual measures targeting dog breeds."

4. Are certain types or breeds of dogs over represented in dog bite statistics, and if so, why is this the case?

One of the most debated issues involving the assessment of canine aggression is the use of dog bite epidemiology to develop breed-specific profiles of the association between breed and incidence of dog to human aggression (Lockwood, 1995; Patronek *et al*., 2010). From an epidemiological perspective, it is difficult to draw scientifically sound conclusions about the relative dangers posed by different breeds. Accurate breed-specific bite rates are hard to obtain. Such statistics require good information for both the

numerator (number of all bites attributed to each specific *reliably identified* breed) and the denominator (number of animals of that breed in the population). None of these conditions are met in most bite epidemiological studies. Most bites go unreported, with estimates of the percent of bites captured by existing reporting systems ranging from 10% in Kansas City, MO, to 36% in Pittsburgh, PA (Chang *et al.,* 1997), and from 44 to 83% in different Atlanta communities (Tan *et al.*, 2000). Bites requiring medical attention are more likely to be reported, which can lead to an over-representation of larger breeds in bite statistics.

The source of breed identification of biting dogs is rarely specified in bite reports. Breeds are often unverified and Voith *et al*. (2009, 2013) have demonstrated that even people who work with dogs on a daily basis in an expert capacity show little inter-observer reliability in breed identification, and cannot reliably identify breed mixtures. As a result, dogs whose appearance may lead to identification as a particular breed may in fact have little or no genetic relationship to that breed.

Overall and Love (2001) provide a meta-analysis of eleven US dog bite epidemiological studies from 1970 to 1996 and did not find a clear trend for breeds coming to the top of the list. The only breed appearing in the top group on most lists was the German shepherd.

Dog-related human fatalities are usually investigated and publicized in much greater detail than the estimated 4 million non-fatal dog bites occurring each year. In part for this reason, such incidents have had a disproportionate influence on public policy if the objective of such policies is to reduce the overall incidence of human injury attributed to dogs (Bradley, 2006; Cunningham, 2005; Hattaway, 1997). Only 20-30 such instances occur annually in the US, comprising less than .01% of all dog bites and involving less than .004% of the US dog population. Such instances are usually not simply a conventional dog bite that ends in a human death. Fatal dog attacks represent a "perfect storm" combining many factors associated with bite risk (i.e. the wrong dog, in the wrong hands, with improper rearing and supervision, and a vulnerable and unprotected victim) (Gladwell, 2006; Patronek et al., 2013). Therefore breed-specific policies based on this exceedingly rare and aberrant occurrence should not be used as the basis for public policy (AVMA Task Force, 2001; Sacks *et al*., 1996, 2000)

Because such data is so frequently misused to justify breed-specific legislation and other restrictions, following the publication of Sacks *et al*. (2000) the American Veterinary Medical Association (AVMA) issued a "To Whom it May Concern" letter noting:

> "In contrast to what has been reported in the news media, the data contained within this report **CANNOT be used to infer any breed-specific risk** for dog bite fatalities (e.g., neither pit bull-type dogs nor Rottweilers can be said to be more "dangerous" than any other breed based on the contents of this report). To obtain such risk information it would be necessary to know the numbers of each breed currently residing in the United States. Such information is not available."

Patronek *et al.* (2013) conducted a more detailed analysis of 256 dog bite related fatalities (DBRFs) occurring between 2000 and 2009 using additional data that had not been available in previous studies (including Sacks *et al.* 1996; 2000). Unlike previous studies, they limited valid determination of breed to those cases with documented pedigree,

parentage information or DNA analysis as well as assessment of breed attribution by a Certified Applied Animal Behaviorist. The authors conclude these data support the recommendations of the AVMA Task Force on Canine Aggression and Human-Canine Interaction (AVMA Task Force, 2001) and the CDC, who have consistently stressed the multifactorial nature of dog bites and the need for multiple approaches to address this complexity rather than a focus on breed.

5. Why are certain types or breeds of dogs over represented in media reports on dog bites?

The media always been most interested in presenting dramatic stories that reinforce popular cultural stereotypes. This has been particularly true of any coverage related to dogs identified as "pit bulls" since the onset of "pit bull hysteria" in the late 1980's (Dickey, 2016).

VanKavage (2009) gives an example from one week in August 2007. Four serious dog-related incidents occurred that week. First, a dog identified as Labrador mix attacked a 70 year old man sending him to the hospital in critical condition. Police shot the dog when it charged them. The story was covered only in one article in the local paper. The next day a 16 month old child was killed by a dog identified as a mixed-breed dog. The attack was reported on twice by local papers. The following day a 6 year old boy was hospitalized after his ear was torn off by a dog identified as a mix-breed dog. The attack was covered in a single story in the local paper.

Finally, one day later a 59 year-old woman was attacked by two dogs identified as "pit bulls" who had broken their chains and attacked her Jack Russell terrier. She was hospitalized for injuries sustained trying to break up the fight. This incident was reported in 230 articles in national and international papers and three major TV networks.

In addition to this reporting bias, media usually make little attempt to confirm breed identification reported in their coverage. In their review of 256 dog bite related fatalities Patronek et al. (2013) compared breed identifications reported by the media with those made by law enforcement or animal control. Media reports were often discordant , differing from law enforcement or animal control records in 34.9% of cases. DNA or pedigree [based on certificates from recognized registries] data was available for only 19 dogs and 7 of these were discordant with media reports (36.8%). There were 45 cases (only 17.6%) in which there was consistent concordance of breed by pedigree, parentage, DNA or vet, animal control and media. These cases included 20 recognized breeds and 2 known mix breeds.

6. What scientific value can be placed on studies conducted by human doctors or surgeons claiming certain breeds or types of dogs are responsible for more severe or more frequent bites on humans?

Physicians with no special expertise in epidemiology, ethology or canine behavior are, in general, unqualified to make statements regarding breed-specific bite risks and often simply echo unfounded public myths and assumptions. One of the best demonstrations of this is the writing of Bini et al. (2011), which has been referenced by others in support of BSL. By their own admission, the authors have no qualifications or expertise in dogs, dog behavior or the epidemiology of dog bites. In a reply to a letter published in the Annals

of Surgery (Delise, 2012), they respond as follows: "*We represent a group of trauma surgeons who are tasked with taking care of a range of traumatic conditions.* ***We make no claims on being veterinary or forensic experts****. We do however treat a wide variety of injuries caused by animals and* ***thus feel qualified to discuss the clinical aspects of care****."*

Nevertheless, in their original paper, they go into great detail about non-clinical aspects of dog bites. Much of the material in their paper was not data arising from their study, but information gleaned from the Internet, including YouTube, but not from any controlled study of dogs. It is essential that this paper be evaluated in terms of what the authors' data actually showed, as opposed to what the authors might have chosen to conclude. The data simply do not support the scope of the conclusions the authors have made with respect to breed.

The actual study data were obtained retrospectively from medical records of patients treated by the trauma and emergency surgery service at the hospital over a 15 year period, and thus the data are only as accurate as the sources collecting that information over that period. This is a major concern for any retrospective study, especially when subjective assessments may be involved. Bini et al reported information on 228 biting incidents, of which information about breed was available for only 82, or about 36%. In Table 4 (p 794), they report 29 dogs as presumptively being a "pit bull". Thus, they were able to identify only 29 dogs out of the 228 dog attacks as being a "pit bull" type dog: 12.7% of the total. The information about presumed breed was obtained from animal control reports. It is impossible to verify what breed the dogs were, or whether they were pure or mixed breed. The data regarding breed **does not support the contention that pit bull type dogs were heavily over-represented** (i.e., a prevalence of only 12.7%) among the breeds of dogs involved in the incidents they studied.

Recognizing the serious implications of the lack of data about presumed breed for nearly two-third of the cases, the authors further state: *"We should state that our study is limited by its retrospective nature and the limited number of cases in which the breed of dog responsible for the attack could be determined. This lack of information may compromise the validity of our results implicating the pit bull as a major culprit in severe dog bites admitted to our trauma center"(p 796).*

These caveats should be applied to <u>any</u> breed-specific risk analysis made by physicians without expertise in the appropriate area.

7. What are the common factor(s) that appear in cases of fatal dog attacks?

Patronek *et al.* (2013) applied a rigorous analysis of fatal dog attacks to identify preventable human actions that were associated with such attacks. They identified six factors that were associated with fatalities:

1. No able bodied person was present to control the dog
2. The victim was compromised in ability to interact appropriately either because of age (very young or old) or impairment
3. The dog was a "resident dog", i.e. not kept as a socialized household pet
4. Reproductively intact dog
5. Prior history of mismanagement (dog reported 'at large')

6. Prior history of abuse or neglect of the dog

They note that four or more of the above factors were present in 80.5% of the fatal attacks that were reviewed. All of these factors can be addressed by focusing on responsible dog ownership, regardless of breed.

8. What evidence-based measures exist to reduce the risk and severity of dog bites?

Veterinary, animal welfare, animal care and control and public health agencies have consistently agreed that the most effective approach to reducing dog bites is to focus on responsible and humane ownership of dogs, as well as the responsible supervision of children and animals when they interact and the enforcement of laws that target irresponsible pet ownership, regardless of breed (AVMA, 2001). One of the earliest and best demonstrations of this came from Multnomah Count, Oregon where, in 1986, a five-year-old boy was fatally mauled by a pit bull. Rather than reflexively pass BSL, a new ordinance was passed that identified and regulated potentially dangerous dogs. In the first three years of the program, 1,652 dogs were classified as potentially dangerous, and restrictions were placed on the ownership of these animals. A pretest-posttest evaluation methodology examining the rate of recidivism was used to measure the program's effectiveness in limiting the opportunity for identified potentially dangerous dogs to repeat their behavior. In the five years prior to the implementation of the program, 25% of those dogs that had caused injury to people or other animals through attacking or biting repeated that same behavior within one year. After the implementation of the program, that rate of repeat incidence has been reduced to 7% (Oswald, 1991).

Similarly Cain (2016) reports that in Calgary, where officials avoided breed-based bans while promoting education of dog owners and children, combined with enforcement, bites have dropped dramatically since the mid-1980s.

The clear consensus from many disciplines is that BSL does not work and, in fact, statistically cannot be effective (Patronek et al., 2010). We do know how communities can reduce dog bite problems without impacting responsible owners of dogs of any potentially banned or regulated breed:

1. By strengthening and enforcing laws against animal cruelty in general and dog fighting in particular
2. By eliminating the mass-production of poorly bred, unhealthy and unsocialized animals in large-scale 'puppy mills'.
3. By introducing and enforcing strong animal control laws that place the burden of responsibility for an animal's actions on its owner and providing communities with sufficient resources to enforce these laws
4. By encouraging programs that educate the public about responsible dog ownership and the problems of dog bite.

Sincerely

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"The pit bull type is particularly ambiguous as a "breed" encompassing a range of pedigree breeds, informal types and appearances that cannot be reliably identified." (p. 2)

"Visual determination of dog breed is known to be unreliable." (p. 3)

Berkey, J. (2009). Dog Breed Specific Legislation: The cost to people, pets and veterinarians, and the damage to the human-animal bond. Proceedings of Annual AVMA Convention. July 11-14. Seattle: AVMA.

"Your dog's visual appearance may vary from the listed breed(s) due to the inherent randomness of phenotypic expression in every individual" (p. 3)

"Breed identification of a mixed breed dog based on its phenotype is unscientific, and is likely to be contradicted by a DNA test." (p. 3)

"A study to be published in the Journal of Applied Animal Welfare Science points to a substantial discrepancy between visual identifications of dogs by adoption agency personnel and the breeds identified in the same dogs through DNA analysis." (p. 3)

"It is impossible to breed label dogs of unknown origin and genetics solely on the basis of their appearance." (p. 4)

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"Identification of the breed makeup of a dog is highly imprecise due to the processes currently being used. DNA tests are available to identify breeds of dogs but these are limited to the breeds that have been catalogued." (p. 3)

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"I'm not sure what a "pit bull characteristic" is because the term pit bull does not refer to any specific breed of dog. […] It is my professional opinion that this group of dogs must be the most genetically diverse dog breed on the planet."

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"Though [Voith] can't yet reveal what the results are, she does say, "My ongoing studies indicate there is often little correlation between how people visually identify dogs and DNA- reported results."" (p. 2)

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"It is not easy to visually identify the breeds of dogs of unknown parentage accurately. Sometimes dogs just don't look like either parent." (p. 1)