JOINT BVA AND BSAVA RESPONSE TO EFRA COMMITTEE’S INQUIRY INTO DANGEROUS DOGS: BREED SPECIFIC LEGISLATION

1) BVA is the national representative body for the veterinary profession in the United Kingdom and has over 17,000 members. Our primary aim is to represent, support and champion the interests of the veterinary profession in this country, and we therefore take a keen interest in all issues affecting the profession, including animal health and welfare, public health, regulatory issues and employment matters.

2) The British Small Animal Veterinary Association (BSAVA) exists to promote excellence in small animal practice through education and science and is the largest specialist division of BVA representing over 11,000 members.

3) We welcome the opportunity to respond to this inquiry on the effectiveness of breed-specific legislation. We are fully supportive of the Government’s aims to protect the public from dog attacks and recognise the complexity surrounding the issue of dangerous dogs. However, we view the problems presented by dangerous dogs as a predominantly social issue. The manner in which a dog behaves in general, including how and when it displays aggression, is largely dependent on its socialisation, rearing and training and environmental circumstances. All dogs are capable of showing aggression and it is erroneous to assume that dogs which are not classed as ‘dangerous dogs’ will not exhibit such behaviour. As such, we do not support breed-specific legislation and consider its outcomes ineffective.

4) Fundamentally, we believe the UK Government should take a more holistic approach to minimising the occurrence of dog bites through:

- Promoting education on responsible dog ownership and how to achieve safe interactions between owners, family members, the public and dogs;
- Taking measures to address the early signs of aggression in all dogs and tackling irresponsible ownership before it becomes a problem (eg. through control notices and acceptable behaviour contracts);
- Moving towards legislation based on a ‘deed not breed’ principle, including the compulsory registration of all dogs, alongside a system of specific Dog Control Notices (DCNs);
- Informing dog bite prevention programmes with evidence generated from further investigation into dog bite incidence. This could be achieved through:
  - Commissioning a comprehensive review of existing research and reports relating to dog bite injuries so as to ensure any proposed measures are evidence-based and suitably targeted to deliver effective societal and economic outcomes in the interest of public health and animal welfare.
  - Establishing a system to support reporting of dog bites to a centralised dog bite database.
  - Encouraging further research into all risk factors for aggression in dogs.
5) **Question 1: How effective is the Government’s current approach to protecting the public from dangerous dog attacks?**

BVA and BSAVA do not support breed-specific legislation. It should be noted that the Federation of Veterinarians of Europe also take this position.¹ There is no evidence that the breed-specific legislation contained in Section 1 of the Dangerous Dogs Act (1991) has been effective in reducing the incidence of aggressive behaviour in dogs or bite-related injury. Injuries caused by the particular breeds defined as “dangerous” in the legislation, together with other “bull” or perceived “fighting” types of breeds have gained particular attention from the media and public, since some injuries caused have been severe and in some cases have resulted in death.

Whilst some studies have identified particular breeds as showing a higher risk of causing bite injury, or displaying aggression (see Scientific Report, Appendix 1), there is a lack of consistency in findings between studies. No studies suggest an increased incidence of aggression or biting injury in breeds listed in the Dangerous Dogs Act (1991) Section 1, nor in other ‘fighting’ or ‘bull’ type breeds. Whilst pitbulls may be argued to cause considerable damage should they bite, there is no evidence from hospital data that this is any more the case than for any other large breed dogs, such as Mastiff or Rottweiler. The severity of bite should aggression occur is not considered to be a reasonable argument for breed specific legislation: such an argument is analogous to the suggestion that large cars should be banned because they could cause more damage if they hit a pedestrian. The variability in breeds identified as having increased risk for aggression across studies (Scientific Report, Appendix 1), together with the greater consistency between studies in identifying environmental and human-behavioural factors, suggest that breed-specific legislation is not a rational approach. Similar findings have been reported in government commissioned inquiries and other research. Furthermore, physical appearance is not always a reliable indicator of breed type as identified by DNA breed identification (Voith et al. 2009).

In terms of assessing effectiveness of current legislation, the initial assessment of the Dangerous Dogs Act also reported that there had been no significant reduction in dog bites²,³. Between March 2005 and February 2015, in England, the number of hospital admissions due to dog bites increased 76 percent from 4,110 to 7,227⁴ and Hospital Episode Statistics (HES) between 2009 and 2015 demonstrate that the number of hospital admission from dog bites has continued to rise during this period.⁵

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¹ FVE. Position on Dangerous Dogs. Available at: [http://www.fve.org/news/position_papers/animal_welfare/fve_00_039_dangerous_dogs.pdf](http://www.fve.org/news/position_papers/animal_welfare/fve_00_039_dangerous_dogs.pdf)
6) Defining particular breeds as “dangerous” is misleading from current evidence, but also tends to create the assumption in the public that aggression is related to breed type, and consequently that those breeds not listed are “not dangerous” and will not exhibit aggressive-type behaviour. We believe that the manner in which a dog behaves is partly as a result of its inherited characteristics, but more importantly the socialisation, rearing and training provided by the owner and environmental factors and specific circumstances. As such, we feel that measures to address the problem of dogs showing aggression should provide the tools to tackle irresponsible ownership before it becomes a problem. We would also recommend that a comprehensive review of the existing research is undertaken to assess the demographic and societal factors that influence dog bite incidents so as to accurately assess current and recent norms and enable evidence-based interventions to be developed. We would also suggest that research into all risk factors for aggression in dogs be supported.

7) At present, determining which dogs pose the greatest risk to the public would require access to accurate breed specific bite rate data. In practice this would require knowing the number of dogs in the UK of a specific breed and type/crossbreed, as well as the number of dogs within this breed that have bitten. In the UK, to achieve this there would need to be a compulsory dog registration system and a requirement for all bites to be recorded. Without this quality of data, current legislation is based on an incomplete or skewed data set. However, we recognise that recording all dog bites may not be achievable. At present, the NHS records ‘bites and strikes’ data and it should also be possible to collect data on breeds and breed types that have come to the attention of local authorities for being dangerously out of control.

8) Unintended welfare consequences for animals seized
Further, whilst we recognise that current breed-specific legislation is primarily intended to safeguard human welfare, consideration must also be given as to how current legislation may negatively impact on the welfare of those dogs who are seized under existing legislative requirements. The RSPCA’s 2016 report Breed Specific Legislation: A Dog’s Dinner highlighted three areas of concern in terms of the welfare of seized dogs:

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• **Seizure** – can be stressful for dogs, resulting in anxiety and a potential increased risk of aggression towards those trying to seize the animal.7

• **Kennelled environments** - research has shown that many animals find kennelled life challenging and it is difficult to sufficiently meet the welfare needs of dogs in kennelled environments. In addition, studies have shown that specific aspects of this environment eg. noise levels, lack of environmental enrichment, small kennel sizes may influence dogs’ behaviour patterns and social interactions. 8,9,10

• **Conditions of exemption posing risk** – dogs on the Index of Exempted Dogs must comply with a series of conditions such as being muzzled and on a lead when in a public space. Keeping a dog on a lead at all times in public or isolating dogs to particular areas, is likely to reduce their ability to show a normal range of behaviours and therefore negatively impact on their welfare. Ultimately this could prove counterproductive, as dogs are more likely to show aggression when exposed to unexpected or unknown events.11 Muzzling can also compromise welfare by limiting the ability to interact with dogs and people, and preventing dogs from visibly expressing important facial communication signals, reducing another dog or human’s ability to read body language and react appropriately.

9) It is also important to recognise that dogs who suffer from welfare compromise in these circumstances may undergo behaviour change demonstrating fear or frustration that is perceived to be aggressive. In these situations, behaviour influenced by the existing requirements of legislation (seizure, kennelling etc.) could skew the decision-making process as to whether a dog poses a risk to public safety.

10) **Question 2: What changes, if any, should be made to the current approach and legislation?**

The manner in which a dog behaves is partly as a result of its inherited characteristics, but more importantly is a result of the socialisation, rearing and training provided by its owner, the environment in which the dog is kept and a given set of circumstances. We therefore favour a preventive approach to the problem of dog control, which includes not only measures to educate the public about responsible ownership, but also measures

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11 BVA, 2017. Policy position on dogs in public amenity spaces. Available at: [https://www.bva.co.uk/uploadedFiles/Content/News_campaigns_and_policies/Policies/Companion_animals/Policy%20position%20on%20dogs%20in%20public%20amenity%20spaces.pdf](https://www.bva.co.uk/uploadedFiles/Content/News_campaigns_and_policies/Policies/Companion_animals/Policy%20position%20on%20dogs%20in%20public%20amenity%20spaces.pdf)
(such as control notices, acceptable behaviour contracts, etc.) to address the early signs of aggression in all dogs and tackle irresponsible ownership before it becomes a problem.

11) **New legislation as part of a community approach to support responsible ownership**
Section 1 of the Dangerous Dogs Act (1991) should be repealed. As an alternative, we would welcome new legislation that includes the compulsory registration of all dogs, alongside a system of specific Dog Control Notices (DCNs), as in Scotland, where there is a requirement for a trained council officer to assess and impose restrictions on an owner, on a case-by-case basis, if a dog is out of control – representing a ‘deed not breed’ approach. DCNs may therefore represent a proportionate, evidence-based way of addressing unacceptable dog behaviour and reinforcing the importance of responsible ownership.

12) In principle, DCNs may therefore be a useful way forward, having the following potential advantages:

- Orders would be served immediately, avoiding the costs associated with prosecution, and the welfare consequences to dogs of kennelling post seizure.
- Orders could be specific to the circumstances of individual cases, with flexibility in the type of measures suggested and potentially the timescale over which measures should be applied.

However, there are some issues to consider with this approach:

- As discussed above multiple factors influence the behaviour of individual dogs, some or all of which may not be apparent to an enforcing officer serving an order.
- Such a system would only be effective and reasonable if local authorities had the resources to successfully implement a system of Dog Control Notices and enforcing officers had sufficient training to understand the principles of dog behaviour, such that appropriate cases are identified, and appropriate elements of control orders applied.
- There would also need to be resources in place to support owners eg. through appropriately trained and experienced dog trainers.

13) **Education**
The further development of standardised resources and information campaigns to inform the public about responsible ownership should form part of any legislative overhaul of breed-specific legislation. There should be wider engagement with the general public on this issue, with a nationwide public campaign to raise awareness, to encourage responsible ownership and to promote safe interaction between people and dogs. There are already a number of initiatives which could be used as resources upon which to base any such campaign, including the Blue Dog Programme, Fediaf educational materials, the Kennel Club’s Safe and Sound scheme and the AWF/RSPCA Puppy Contract and Puppy Information Pack.

14) We would also support the introduction of animal welfare into the national curriculum, and, as part of this, materials on responsible ownership and the safe interaction between people and dogs.
Research and recording of bites

We would support further research into all risk factors for aggression in dogs. In addition, in order to develop effective dog bite prevention programmes based on a sound understanding of dog bite prevalence amongst the UK’s dog population, we would encourage the recording of dog bites on a centralised database to investigate the complex factors surrounding dog bites. Such recording could include information such as the severity of the bite, type of dog, circumstances etc.

Careful analysis of research results relating to dog bites is required and should include relevant factors surrounding the incident to ensure misinterpretation is minimised and measures to tackle prevention are evidence-based and pragmatic. Whether dog bites are more prevalent in particular societal groups eg children, or whether this is dependent on reporting norms, should also be considered. We are aware of existing evidence available on prevalence of dog bites in relation to age.

Given the range of socio-economic factors and demographics that contribute to the incidents of dog bites, it would be worthwhile to consider if guidance is required on the supervision of dogs with regard to vulnerable groups such as young children or individuals who are elderly.

It would seem essential to commission a comprehensive review of existing research and reports relating to dog bite injuries. Elements of a review should include not just dog bite incidents and surrounding circumstances but also demographics; socio-economic factors; the impact on public services - whether relating to health of enforcement, including a cost-benefit analysis; and any effects on animal welfare. Outputs from such a review would ensure any proposed measures are evidence-based and suitably targeted to deliver effective societal and economic outcomes of benefit to both public health and animal welfare. A similar piece of work exploring responsible dog ownership as a whole was submitted the Welsh Government in 2016, the Review of Responsible Dog Ownership in Wales and its Terms of Reference would be a useful starting point for consideration in the scoping of any future review of existing research and reports relating to dog bite injuries.

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14 HSCIC, 2012. HES on dog bites and strikes. Available at: https://files.digital.nhs.uk/publicationimport/pub06xxx/pub06338/hes-on-dog-bite.pdf
15 Total number of hospital admission episodes for dog bites and strikes in England from December 2015 to April 2016, by age group. Available at: There is already evidence on this in relation to age https://www.statista.com/statistics/297523/dog-bite-victims-occurrences-in-england-by-age/
16) **Question 3: How can local authorities and police forces be best supported in reducing the number of dangerous dog-related incidents?**

We recognise that a considerable amount of resources have been involved in the enforcement of Section 1 of the Dangerous Dogs Act (1991), through the police, courts, and in the housing of dogs pending trials and appeals. Repealing this section of the Act would enable resources to be directed towards cases in which behavioural assessment does indicate that individual dogs represent a risk to public safety and effective enforcement of Section 3 of the Dangerous Dogs Act, as well as the Anti-social Behaviour, Crime and Policing Act (2014). As outlined above, it would also be desirable to direct resources into accurate monitoring of aggressive incidences and education programmes.

Our view that socio-economic factors have a part to play in the incident of dog bites is underpinned by research which indicates that the incident of dog bites in deprived areas is higher than in less deprived areas.\(^{16}\) It would be worthwhile to consider the demographics of dog bite injuries and provide local authorities with the most need for resources, ring-fenced funding to address local issues. Allocating funding for education in these areas may also be worthwhile, perhaps initially on a pilot basis. In addition, undertaking cost-benefit analyses for these areas may result in savings for local NHS services.

However, it is also important to avoid the oversimplification of effective interventions across different demographics; dog bite incidents and aggression in dogs should be recognised as complex public health issues that require a ‘One Health’ collaborative, cross-organisational approach.\(^{17}\) In some cases, aggression in dogs may be indicative of wider issues within a household or their use as status or weapon dogs\(^{18}\) and dogs may need to be removed from a household or its owner in order to safeguard their own health and welfare.\(^{19,20}\) In this sense, social services, local authorities and police forces and welfare organisations should work collaboratively to identify early animal health and welfare risk factors, as well as wider human health and social care issues. With this in mind, appropriate knowledge exchange and training, as well as clear channels of communication and reporting between social services, local authorities and police forces and welfare organisations would be useful in order to ensure the early identification of both animal and human health and welfare risk factors.


\(^{19}\) The Links Group. Available at: [http://www.thelinksgroup.org.uk/](http://www.thelinksgroup.org.uk/)

17) Greater public awareness of Section 3 of the Dangerous Dogs Act
We would also support increased public awareness of the fact that Section 3 of the Dangerous Dogs Act applies to all dogs that are dangerously out of control through greater public education. Improved awareness of this section of the legislation would reinforce that all owners have a legal responsibility to ensure that their dog, regardless of breed or breed-type, does not become dangerously out of control.

18) Training
As part of current legislation and any future legislative overhaul, it is crucial that enforcing officers receive sufficient training to understand the principles of dog behaviour and ensure appropriate elements of existing legislation are applied. In the context of potential Dog Control Notices, sufficient training on the principles of dog behaviour will be crucial to ensure that appropriate cases are identified and appropriate elements of control orders are applied.

19) Question 4: What lessons could the UK learn from other countries dealing with similar issues?

The Australian Veterinary Association (AVA) have developed a policy and model legislative framework, recognising that breed-specific legislation is not an effective solution to combatting dog bites. Their approach supports a ‘deed not breed’ approach, advocating the identification of potentially dangerous animals and early intervention to prevent them from inflicting harm. Their model includes:

- Identification and registration of all dogs
- A national reporting system for dog bites with mandatory reporting of all dog bites into a centralised database
- Temperament testing to understand the welfare needs and potential risks in individual animals
- Education programmes for children, parents, pet owners and breeders
- Sufficient enforcement of all dog control regulation

20) Similarly, the Animal and Bylaw Service of Calgary, Canada, do not support breed-specific legislation and instead advocate responsible pet ownership, focussing on five principles. The Responsible pet ownership bylaw encourages pet owners to adhere to the following principles:

- licensing and providing permanent identification for pets
- spaying or neutering pets
- providing training, physical care, socialisation and medical attention for companion pets
- not allowing pets to become a threat or nuisance in the community
- procuring their pet ethically and from a credible source

To be compliant with this bylaw, cat and dog owners must be licensed at 3 months of age
and costs are recovered to deliver education programmes, volunteer animal socialisation programmes increase public awareness of dog safety.\textsuperscript{21} It is reported that dog bites in Calgary have decreased across the 1985-2008 period, despite an increase in the population.\textsuperscript{22}

21) In June 2001, the American Veterinary Medical Association also published proposed alternatives to breed-specific legislation in their report entitled, A Model Community Approach to Dog Bite Prevention. This report was developed by a task force comprising representative from various veterinary bodies, as well as the American Medical Association, the American Academy of Paediatrics and the American College of Emergency Physicians.

22) We are also aware that Fediaf educational materials are used in other countries as an educational tool.

23) Concluding remarks
We do not support breed-specific legislation and feel that breed-specific legislation is ineffective. It is critical that careful consideration should be given to providing clear, evidence-based legislation in this area to both safeguard public safety and animal welfare.

24) Ultimately, we believe the UK Government should take a more holistic approach to preventing dog bites and this can be achieved through:

- Promoting education on responsible dog ownership and how to achieve safe interactions between owners, family members, the public and dogs;
- Taking measures to address the early signs of aggression in all dogs and tackling irresponsible ownership before it becomes a problem (eg. through control notices and acceptable behaviour contracts);
- Moving towards legislation based on a ‘deed not breed’ principle, including the compulsory registration of all dogs, alongside a system of specific Dog Control Notices (DCNs);
- Informing dog bite prevention programmes with evidence generated from further investigation into dog bite incidence. This could be achieved through
  - Commissioning a comprehensive review of existing research and reports relating to dog bite injuries so as to ensure any proposed measures are evidence-based and suitably targeted to deliver effective societal and economic outcomes in the interest of public health and animal welfare.
  - Establishing a system to support reporting of dog bites to a centralised dog bite database.
  - Encouraging further research into risk factors for aggression in dogs.

\textsuperscript{21} \url{http://www.calgary.ca/CSPS/ABS/Pages/Animal-Services/Responsible-pet-ownership-bylaw.aspx}
BSAVA scientific committee welcome the opportunity to provide evidence in response to the Efra Committee Inquiry into Dangerous Dogs: Breed-specific legislation. In this document we present some important background material about the occurrence of aggressive behaviour in dogs.

There is considerable expertise on canine aggression in the UK, as well as a growing body of research evidence about risk factors, and we would argue that specific consideration of the reform of legislation should be conducted utilising these resources. We emphasise the importance of scientific knowledge and evidence in this document, and would encourage that EFRA Committee take an evidence-based approach to the issue of canine aggression and dog bites.

1.0 Summary
It is apparent that the current Dangerous Dogs legislation is not sufficiently effective in protecting the public from dog bites and is need of amendment. Scientific evidence does not support a breed-focused approach to legislation in this area. Section 1 of the Dangerous Dogs Act (DDA) 1991 has led to prosecutions based on physical appearance with no regard for behaviour or actual degree of risk posed by individual dogs to the public. Legislation based on ‘deed not breed’ (i.e. individual behaviour of animals, and degree of responsibility of owners) is suggested to have greater benefits in identifying and controlling animal– owner combinations which represent a risk to the public, and prevent the anomaly of court resource spent identifying physical ‘type’ rather than assessing behaviour.

The consultation document focuses on the risks posed by ‘status’ dogs in inner cities. Whilst being a considerable problem locally, these dogs represent a small minority of those showing human-directed aggression. Evidence suggests that the majority of dog bites result from dogs showing aggression to family members or other familiar people. There is also a population of dogs (of any breed) which show aggression to unfamiliar people and represent a risk to members of the public in public places. The risk factors leading to aggressive behaviour in dogs in these different circumstances are different. Thus, solutions for these different problems should be considered separately. Whilst public order offences may be suitable for those individuals in inner cities using dogs to threaten or intimidate others, this approach may not be considered suitable for reducing the aggression shown by dogs towards owners or family members. In the latter case, reduction of bite occurrence is more likely through education about dog behaviour and communication.

Any legislative reform should be mindful of animal welfare. For example, long term kennelling of dogs between seizure and prosecution of their owners is an animal welfare concern which should be addressed as part of the review process.

2.0 Background
Aggression directed towards people is the most common ‘behaviour problem’ referred to veterinary specialist clinics (Blackshaw 1991; Bamberger and Houpt, 2006). Although only a very small proportion of dog bites result in the death of victims (Sacks et al. 2000), the physical and psychological consequences of injuries (Calkins et al. 2000; Peters et al. 2004), and the financial consequences of bite injuries (Weiss et al. 1998) make human-directed aggression an important public health concern. Gilchrist et al. (2008) have estimated that 15.8 bites occur per 1000 people
2.1 What causes aggression in dogs?
The occurrence of aggression in dogs is widely misunderstood by the general public, for example with the widespread belief that dogs show aggression vindictively (Bradshaw and Casey 2007) or to achieve a higher relative ‘ranking’ in an abstract hierarchy involving human and canine members of the family (Bradshaw et al. 2009). Historically, there has been a simplistic perception that dogs are either aggressive or non-aggressive, and that by identifying the ‘bad’ dogs in the population, injury from aggression can be prevented. However, understanding of behavioural development has developed considerably, and it is widely accepted that multiple factors contribute to the development of aggressive behaviour (De Keuster and Jung 2009). Although particular underlying characteristics, such as cognitive biases (Paul et al. 2005) appear to predispose to aggressive behaviour in dogs (unpublished data, University of Bristol), it is clear that these interact considerably with individuals’ learning experiences in the development of discrete behavioural signs.

There are numerous citations suggesting that the majority of aggressive incidents occur to family members by owned dogs (e.g. Schalamon et al. 2006). Since aggression is essentially a learnt response shown by dogs to specific cues / combinations of cues and contexts, the factors leading to its occurrence will be unique in every case (Luescher and Reisner 2008). Dogs are capable of complex associative learning, and will both discriminate specific events that may constitute a risk to themselves and valued resources, and learn behavioural strategies which ‘work’ best to resolve situations of perceived threat. For example, a dog that is fearful of going outside because of firework phobia, may learn to show aggression specifically when owners try and force it outside to toilet last thing at night. The specific context in which an aggressive behaviour occurs towards familiar people, therefore, is likely to be related to specific individual learning experiences, and be unique to each case.

In contrast, aggression to unfamiliar people will commonly develop through limited experience of people from outside the family group. In particular, experiences during the early ‘socialisation’ or sensitive period for learning, influences the behavioural development of dogs (Jagoe and Serpell 1995). This type of aggressive behaviour may be general (i.e. all unfamiliar people), particular types of people (e.g. of one gender, or those wearing something unusual such as rucksacks on their back) or in specific circumstances (e.g. coming into the garden). Limited positive experience of a wide range of people, particularly in the early part of life, predisposes dogs to developing this type of behaviour (Appleby et al. 2002).

Medical or physiological factors may also cause, or contribute to, the development of aggressive behaviour in individual dogs (Fatjo and Bowen 2009). Because of the multiple factors involved in the development of aggression, it is widely suggested that aggressive potential should be evaluated for dogs at the individual level (Collier 2006; Luescher and Reisner 2008; De Keuster and Jung 2009).

2.2 Risk factors for canine aggression
2.2.1 Types of study
Despite human-directed aggression being a serious public health issue, there has been limited systematic research into potential risk factors. Published studies have often utilised existing populations in which inherent biases exist. Whilst these studies give some useful evidence,
interpretations of such datasets should be made with some caution. Studies have broadly investigated four population types: victims of dog bites reported in hospitals; clinical populations of dogs whose owners seek advice for aggressive behaviour; surveys of the dog owning population; and standard testing of dogs’ responses to challenging situations designed to elicit aggression.

Media attention has focussed on data from hospital statistics, with a reported increase in bite incidences (e.g. Emanuel 2010). However, these data only represent those cases of human-directed aggression in which victims have sought medical attention, which are a minority of cases (Baxter 1984; Chang et al. 1997; De Keuster et al. 2006; Morgan and Palmer 2007). In a survey of bite victims, Cornelissen and Hopster (2009) found that 62% of bites were not medically treated, and that owners bitten by their own dog were less likely to seek medical assistance. Large breed dogs and types easily recognised are likely to be over-represented in the hospital population (Overall and Love 2001), for example with German Shepherds being a breed found to have the highest risk in one study (Kahn et al. 2003). In hospital data, more bites appear to be inflicted on children (Matthews and Lattal 1994; Kahn et al. 2004), especially between 5 and 9 years of age (Kahn et al. 2003; Rosado et al. 2009), possibly because treatment is more likely to be necessary (Voelker 1997). Methods and rates of bite incident reporting have not been consistent over time in hospital data, making temporal comparisons difficult to interpret (i.e. the apparent increase in bite incidents may reflect differences in reporting rather than occurrence).

Aggressive behaviour accounts for a considerable proportion of the caseload of veterinary behaviourists (Fatjo et al. 2007). A wide range of breeds are reported to show aggressive behaviour in this context, with increased risks apparently varying between studies. This may occur because of population biases in such populations: referral populations, for example tend to have an over-represented proportion of pedigree as compared to cross breed animals. In contrast to hospital-based data, in a population of owners attending veterinary practices, aggression is reported to be more likely to occur towards adults (Guy et al. 2001a). However, dogs also appear to be most likely to bite a familiar person within the home environment (Patrick and O’Rourke 1998; Ozanne-Smith et al. 2001).

Additional valuable data is provided by surveys of dog bite victims. For example, Cornelissen and Hopster (2009) surveyed households in the Netherlands to identify cases of dog bites. In this population, there was no difference in risk between adults and children under 18 years, but most cases of aggression were again from owned or familiar dogs, a finding also recorded by O’Sullivan et al. (2008) in a survey of bite victims in Ireland.

Evidence is also available from studies investigating the use of standardised ‘temperament tests’ in which susceptibility to show aggression is putatively investigated (e.g. Kroll et al. 2004; Schöning and Bradshaw 2005; Planta and De Meester 2007). These studies also tend to have biased populations, as testing is often conducted on animals considered ‘at risk’, which have shown aggression, or which are of breeds considered ‘dangerous’ in the country of study.

2.2.2 Dog associated risk factors

Current evidence suggests that male dogs are more likely to show aggression than females (Bamberger and Houpt 2006; Fatjo et al. 2007; Reisner et al. 2007; Rosado et al. 2009), although Schöning and Bradshaw (2005) found that the male bias applied more to dog-dog than to dog-human aggression. Breed characteristics of dogs showing aggression are variable between studies and are influenced by population biases and methods of measurement. For example,
German Shepherd type dogs are cited as having a higher risk of causing bite injury in some hospital based datasets (e.g. Kahn et al. 2006; Rosado et al. 2009).

Variable results as to breed risk for aggression has been found in clinical and survey data. For example, in one study by Cornelissen and Hopster (2009), nine breed types had a bite risk index greater than one (Sheep and cattle dogs, Pinschers and Schnauzers, Terriers, Belgian shepherds, Bouvier des Flanders, Doberman, German Shepherds, Jack Russell terriers and Rottweilers). In contrast, Duffy et al. (2008) found a higher incidence of aggression in Dachshunds, Chihuahuas and Jack Russell terriers. In their clinical population, Fatjo et al. (2007) found an increased risk of aggression towards people in Cocker Spaniels, Catalan Sheepdogs, Belgian Shepherd and Beagle.

In a study conducted in Lower Saxony, Germany, screening temperament tests were used to compare dogs considered to be of ‘dangerous’ breed type with other breeds. No differences in test results were identified between eleven breeds (Schalke et al. 2008). Furthermore, no difference in test results was obtained when dogs of restricted breed types were compared with Golden Retrievers (Ott et al. 2008). These findings led to the withdrawal of breed specific legislation in Lower Saxony.

No evidence exists that the currently listed ‘dangerous’ breeds in DDA 1991 Section 1 show an increased frequency of biting behaviour as compared to other breeds (Collier 2006; Kuhne and Struwe 2006). As discussed in 2.1, the quality of the early environment of dogs is also an important factor in risk of undesired behaviour in adults. For example, Appleby et al. (2002) identified the importance of early environment as a risk factor for aggressive behaviour in a clinical population.

2.2.3 Human-associated risk factors
Multiple studies have identified that human-directed aggression is most likely to occur in the home from known or family dogs (e.g. Kahn et al. 2006; Rosado et al. 2009). The importance of human behaviour in the occurrence of dog bites and dog aggression has been highlighted in numerous studies. For example, Rosado et al. (2009) found that specific circumstances such as manipulating dogs in an aversive way (e.g. grabbing or restraining), or interference with fighting dogs to be a significant risk factor for bite injury. Cornelissen and Hopster (2009) found that 60% of bite victims had been interacting with the dog at the time of biting. Cullinan et al. (2004) found that the consistency of owners is a significant factor in the development of aggression. In a retrospective study, Reisner et al. (2007) identified that bites to children were more likely to be associated with children approaching or interacting with dogs, such as falling over them or stepping on them, or associated with dogs’ food or toys. In a study examining hospital records of bite incidences, Bernado et al. (2000) suggested that in 65% of cases where children were bitten the incident was “provoked” (i.e. the child was doing something to the dog). Similarly, Kahn et al. (2003) found that bites to children often occurred when children initiated interaction with dogs, particularly if unsupervised.

Lack of obedience training has been associated with aggression (Schöning and Bradshaw 2005) and with the wider occurrence of undesired behaviours (e.g. Bennett and Rohf 2007), although this link has not been found in other studies (e.g. Blackwell et al. 2008). Logically, increased obedience may aid owners in avoiding situations in which dogs have an established aggressive response (e.g. calling them back when an unfamiliar person approaches), and may influence owners overall relationship with their dog. However, aggressive responses can develop regardless of obedience to specific cues in other contexts (De Keuster and Jung 2009). Furthermore, the type
of training used by owners to achieve obedience may be a factor in development, with punishment-based techniques being associated with the occurrence of aggression (Blackwell et al. 2008; Herron et al. 2009) and undesired behaviours (Hiby et al. 2006).

2.3 Strategies for prevention of human-directed aggression in dogs.
Strategies for reducing aggression have involved those focussing on educative programmes, and the use of legislation to control ‘dangerous’ dogs. Without comparable data at different time points, it is impossible to accurately determine the efficacy of breed specific legislation. However, there are no reports that dog bite injuries have been reduced by a breed specific approach in the countries in which this was adopted, and some hospital reports suggest an increasing number of bite injuries (Emanuel 2010). Some studies investigating validation of education programmes as methods of reducing the risk of human-directed aggression have been reported (Chapman et al. 2000; Speigel 2000; De Keuster and Butcher 2008). For example, Meints and De Keuster (2009) found a significant change in the behaviour of young children in a potentially risky situation with a dog after watching the ‘Blue Dog’ education CD (www.thebluedog.org). Prevention programmes have also focussed on reducing the risk of aggressive behaviour in dogs by ensuring adequate positive early experiences with people (Gazzano et al. 2008; Seksel 1997; Seksel 2008; Seksel et al. 1999).

2.4 Conclusions from evidence reviewed
Aggression in dogs is a common and serious problem. Whilst some studies have identified particular breeds as showing a higher risk of causing bite injury, or displaying aggression, there is a lack of consistency in findings between studies. No studies suggest an increased incidence of aggression or biting injury in breeds listed in the DDA 1991 Section 1, nor in other ‘fighting’ or ‘bull’ type breeds. Whilst pitbulls may be argued to cause considerable damage should they bite, there is no evidence from hospital data that this is any more the case than for any other large breed dogs, such as Mastiff or Rottweiler. The severity of bite should aggression occur is not considered to be a reasonable argument for breed specific legislation: such an argument is analogous to the suggestion that large cars should be banned because they could cause more damage if they hit a pedestrian.

Risk factors identified in studies in different populations have identified a number of human related factors as important risks for aggression and biting. Although comparable data is lacking, there has been no apparent decrease in the proportion of dogs showing aggressive behaviour in clinical populations, nor in hospital statistics for bite injuries since the introduction of the DDA in 1991. Some evidence for efficacy is available for altering the behaviour of both dogs and people through education programmes. Teaching children how to behave around dogs, and ensuring good socialisation of puppies, appear to reduce the risk of human directed aggression.

The existing evidence, therefore, does not support continuation of breed-specific legislation, but rather the investigation of alternative long-term strategies for reducing the risk of bite injuries.

References
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