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A CRITIC AT LARGE

Troublemakers

What pit bulls can teach us about profiling.

by Malcolm Gladwell

1.

One afternoon last February, Guy Clairoux picked up his two-and-a half-year-old son, Jayden, from day care and walked him back to their house in the west end of Ottawa, Ontario. They were almost home. Jayden was straggling behind, and, as his father's back was turned, a pit bull jumped over a back-yard fence and lunged at Jayden. "The dog had his head in its mouth and started to do this shake," Clairoux's wife, JoAnn Hartley, said later. As she watched in horror, two more pit bulls jumped over the fence, joining in the assault. She and Clairoux came running, and he punched the first of the dogs in the head, until it dropped Jayden, and then he threw the boy toward his mother. Hartley fell on her son, protecting him with her body. "JoAnn!" Clairoux cried out, as all three dogs descended on his wife. "Cover your neck, cover your neck." A neighbor, sitting by her window, screamed for help. Her partner and a friend, Mario Gauthier, ran outside. A neighborhood boy grabbed his hockey stick and threw it to Gauthier. He began hitting one of the dogs over the head, until the stick broke. "They wouldn't stop," Gauthier said. "As soon as you'd stop, they'd attack again. I've never seen a dog go so crazy. They were like Tasmanian devils." The police came. The dogs were pulled away, and the Clairouxes and one of the rescuers were taken to the hospital. Five days later, the Ontario legislature banned the ownership of pit bulls. "Just as we wouldn't let a great white shark in a swimming pool," the province's attorney general, Michael Bryant, had said, "maybe we shouldn't have these animals on the civilized streets."

Pit bulls, descendants of the bulldogs used in the nineteenth century for bull baiting and dogfighting, have been bred for "gameness," and thus a lowered inhibition to aggression. Most dogs fight as a last resort, when staring and growling fail. A pit bull is willing to fight with little or no provocation. Pit bulls seem to have a high tolerance for pain, making it possible for them to fight to the point of exhaustion. Whereas guard dogs like German shepherds usually attempt to restrain those they perceive to be threats by biting and holding, pit bulls try to inflict the maximum amount of damage on an opponent. They bite, hold, shake, and tear. They don't growl or assume an aggressive facial expression as warning. They just attack. "They are often insensitive to behaviors that usually stop aggression," one scientific review of the breed states. "For example, dogs not bred for fighting usually display defeat in combat by rolling over and exposing a light underside. On several occasions, pit bulls have been reported to disembowel dogs offering this signal of submission."

In epidemiological studies of dog bites, the pit bull is overrepresented among dogs known to have seriously injured or killed human beings, and, as a result, pit bulls have been banned or restricted in several Western European countries, China, and numerous cities and municipalities across North America. Pit bulls are dangerous.

Of course, not all pit bulls are dangerous. Most don't bite anyone. Meanwhile, Dobermans and Great Danes and German shepherds and Rottweilers are frequent biters as well, and the dog that recently mauled a Frenchwoman so badly that she was given the world's first face transplant was, of all things, a Labrador retriever. When we say that pit bulls are dangerous, we are making a generalization, just as insurance companies use generalizations when they charge young men more for car insurance than the rest of us (even though many young men are perfectly good drivers), and doctors use generalizations when they tell overweight middle-aged men to get their cholesterol checked (even though many overweight middle-aged men won't experience heart trouble). Because we don't know which dog will bite someone or who will have a heart attack or which drivers will get in an accident, we can make predictions only by generalizing. As the legal scholar Frederick Schauer has observed, "painting with a broad brush" is "an often inevitable and frequently desirable dimension of our decision-making lives."

Another word for generalization, though, is "stereotype," and stereotypes are usually not considered desirable dimensions of our decision-making lives. The process of moving from the specific to the general is both necessary and perilous. A doctor could, with some statistical support, generalize about men of a certain age and weight. But what if generalizing from other traits—such as high blood pressure, family history, and smoking—saved more lives? Behind each generalization is a choice of what factors to leave in and what factors to leave out, and those choices can prove surprisingly complicated. After the attack on Jayden Clairoux, the Ontario government chose to make a generalization about pit bulls. But it could also have chosen to generalize about powerful dogs, or about the kinds of people who own powerful dogs, or about small children, or about back-yard fences—or, indeed, about any number of other things to do with dogs and people and places. How do we know when we've made the right generalization?

2.

In July of last year, following the transit bombings in London, the New York City Police Department announced that it would send officers into the subways to conduct random searches of passengers' bags. On the face of it, doing random searches in the hunt for terrorists—as opposed to being guided by generalizations—seems like a silly idea. As a columnist in New York wrote at the time, "Not just 'most' but nearly every jihadi who has attacked a Western European or American target is a young Arab or Pakistani man. In other words, you can predict with a fair degree of certainty what an Al Qaeda terrorist looks like. Just as we have always known what Mafiosi look like—even as we understand that only an infinitesimal fraction of Italian-Americans are members of the mob."

But wait: do we really know what mafiosi look like? In "The Godfather," where most of us get our knowledge of the Mafia, the male members of the Corleone family were played by Marlon Brando, who was of Irish and French ancestry,

James Caan, who is Jewish, and two Italian-Americans, Al Pacino and John Cazale. To go by "The Godfather," mafiosi look like white men of European descent, which, as generalizations go, isn't terribly helpful. Figuring out what an Islamic terrorist looks like isn't any easier. Muslims are not like the Amish: they don't come dressed in identifiable costumes. And they don't look like basketball players; they don't come in predictable shapes and sizes. Islam is a religion that spans the globe.

"We have a policy against racial profiling," Raymond Kelly, New York City's police commissioner, told me. "I put it in here in March of the first year I was here. It's the wrong thing to do, and it's also ineffective. If you look at the London bombings, you have three British citizens of Pakistani descent. You have Germaine Lindsay, who is Jamaican. You have the next crew, on July 21st, who are East African. You have a Chechen woman in Moscow in early 2004 who blows herself up in the subway station. So whom do you profile? Look at New York City. Forty per cent of New Yorkers are born outside the country. Look at the diversity here. Who am I supposed to profile?"

Kelly was pointing out what might be called profiling's "category problem." Generalizations involve matching a category of people to a behavior or trait—overweight middle-aged men to heart-attack risk, young men to bad driving. But, for that process to work, you have to be able both to define and to identify the category you are generalizing about. "You think that terrorists aren't aware of how easy it is to be characterized by ethnicity?" Kelly went on. "Look at the 9/11 hijackers. They came here. They shaved. They went to topless bars. They wanted to blend in. They wanted to look like they were part of the American dream. These are not dumb people. Could a terrorist dress up as a Hasidic Jew and walk into the subway, and not be profiled? Yes. I think profiling is just nuts."

3.

Pit-bull bans involve a category problem, too, because pit bulls, as it happens, aren't a single breed. The name refers to dogs belonging to a number of related breeds, such as the American Staffordshire terrier, the Staffordshire bull terrier, and the American pit bull terrier—all of which share a square and muscular body, a short snout, and a sleek, short-haired coat. Thus the Ontario ban prohibits not only these three breeds but any "dog that has an appearance and physical characteristics that are substantially similar" to theirs; the term of art is "pit bull-type" dogs. But what does that mean? Is a cross between an American pit bull terrier and a golden retriever a pit bull-type dog or a golden retriever-type dog? If thinking about muscular terriers as pit bulls is a generalization, then thinking about dangerous dogs as anything substantially similar to a pit bull is a generalization about a generalization. "The way a lot of these laws are written, pit bulls are whatever they say they are," Lora Brashears, a kennel manager in Pennsylvania, says. "And for most people it just means big, nasty, scary dog that bites."

The goal of pit-bull bans, obviously, isn't to prohibit dogs that look like pit bulls. The pit-bull appearance is a proxy for the pit-bull temperament—for some trait that these dogs share. But "pit bullness" turns out to be elusive as well. The supposedly troublesome characteristics of the pit-bull type—its gameness, its determination, its insensitivity to pain—are chiefly directed toward other dogs. Pit bulls were not bred to fight humans. On the contrary: a dog that went after spectators, or its

handler, or the trainer, or any of the other people involved in making a dogfighting dog a good dogfighter was usually put down. (The rule in the pit-bull world was "Man-eaters die.")

A Georgia-based group called the American Temperament Test Society has put twenty-five thousand dogs through a ten-part standardized drill designed to assess a dog's stability, shyness, aggressiveness, and friendliness in the company of people. A handler takes a dog on a six-foot lead and judges its reaction to stimuli such as gunshots, an umbrella opening, and a weirdly dressed stranger approaching in a threatening way. Eighty-four per cent of the pit bulls that have been given the test have passed, which ranks pit bulls ahead of beagles, Airedales, bearded collies, and all but one variety of dachshund. "We have tested somewhere around a thousand pit-bull-type dogs," Carl Herkstroeter, the president of the A.T.T.S., says. "I've tested half of them. And of the number I've tested I have disqualified one pit bull because of aggressive tendencies. They have done extremely well. They have a good temperament. They are very good with children." It can even be argued that the same traits that make the pit bull so aggressive toward other dogs are what make it so nice to humans. "There are a lot of pit bulls these days who are licensed therapy dogs," the writer Vicki Hearne points out. "Their stability and resoluteness make them excellent for work with people who might not like a more bouncy, flibbertigibbet sort of dog. When pit bulls set out to provide comfort, they are as resolute as they are when they fight, but what they are resolute about is being gentle. And, because they are fearless, they can be gentle with anybody."

Then which are the pit bulls that get into trouble? "The ones that the legislation is geared toward have aggressive tendencies that are either bred in by the breeder, trained in by the trainer, or reinforced in by the owner," Herkstroeter says. A mean pit bull is a dog that has been turned mean, by selective breeding, by being cross-bred with a bigger, human-aggressive breed like German shepherds or Rottweilers, or by being conditioned in such a way that it begins to express hostility to human beings. A pit bull is dangerous to people, then, not to the extent that it expresses its essential pit bullness but to the extent that it deviates from it. A pit-bull ban is a generalization about a generalization about a trait that is not, in fact, general. That's a category problem.

4.

One of the puzzling things about New York City is that, after the enormous and well-publicized reductions in crime in the mid-nineteen-nineties, the crime rate has continued to fall. In the past two years, for instance, murder in New York has declined by almost ten per cent, rape by twelve per cent, and burglary by more than eighteen per cent. Just in the last year, auto theft went down 11.8 per cent. On a list of two hundred and forty cities in the United States with a population of a hundred thousand or more, New York City now ranks two hundred-and-twenty-second in crime, down near the bottom with Fontana, California, and Port St. Lucie, Florida. In the nineteen-nineties, the crime decrease was attributed to big obvious changes in city life and government—the decline of the drug trade, the gentrification of Brooklyn, the successful implementation of "broken windows" policing. But all those big changes happened a decade ago. Why is crime still falling?

The explanation may have to do with a shift in police tactics. The N.Y.P.D. has a computerized map showing,

in real time, precisely where serious crimes are being reported, and at any moment the map typically shows a few dozen constantly shifting high-crime hot spots, some as small as two or three blocks square. What the N.Y.P.D. has done, under Commissioner Kelly, is to use the map to establish "impact zones," and to direct newly graduated officers—who used to be distributed proportionally to precincts across the city—to these zones, in some cases doubling the number of officers in the immediate neighborhood. "We took two-thirds of our graduating class and linked them with experienced officers, and focussed on those areas," Kelly said. "Well, what has happened is that over time we have averaged about a thirty-five-per-cent crime reduction in impact zones."

For years, experts have maintained that the incidence of violent crime is "inelastic" relative to police presence—that people commit serious crimes because of poverty and psychopathology and cultural dysfunction, along with spontaneous motives and opportunities. The presence of a few extra officers down the block, it was thought, wouldn't make much difference. But the N.Y.P.D. experience suggests otherwise. More police means that some crimes are prevented, others are more easily solved, and still others are displaced—pushed out of the troubled neighborhood—which Kelly says is a good thing, because it disrupts the patterns and practices and social networks that serve as the basis for lawbreaking. In other words, the relation between New York City (a category) and criminality (a trait) is unstable, and this kind of instability is another way in which our generalizations can be derailed.

Why, for instance, is it a useful rule of thumb that Kenyans are good distance runners? It's not just that it's statistically supportable today. It's that it has been true for almost half a century, and that in Kenya the tradition of distance running is sufficiently rooted that something cataclysmic would have to happen to dislodge it. By contrast, the generalization that New York City is a crime-ridden place was once true and now, manifestly, isn't. People who moved to sunny retirement communities like Port St. Lucie because they thought they were much safer than New York are suddenly in the position of having made the wrong bet.

The instability issue is a problem for profiling in law enforcement as well. The law professor David Cole once tallied up some of the traits that Drug Enforcement Administration agents have used over the years in making generalizations about suspected smugglers. Here is a sample:

Arrived late at night; arrived early in the morning; arrived in afternoon; one of the first to deplane; one of the last to deplane; deplaned in the middle; purchased ticket at the airport; made reservation on short notice; bought coach ticket; bought first-class ticket; used one-way ticket; used round-trip ticket; paid for ticket with cash; paid for ticket with small denomination currency; paid for ticket with large denomination currency; made local telephone calls after deplaning; made long distance telephone call after deplaning; pretended to make telephone call; traveled from New York to Los Angeles; traveled to Houston; carried no luggage; carried brand-new luggage; carried a small bag; carried a medium-sized bag; carried two bulky garment bags; carried two heavy suitcases; carried four pieces of luggage; overly protective of luggage; disassociated self from luggage; traveled alone; traveled with a companion; acted too nervous; acted too calm; made eye contact with

officer; avoided making eye contact with officer; wore expensive clothing and jewelry; dressed casually; went to restroom after deplaning; walked rapidly through airport; walked slowly through airport; walked aimlessly through airport; left airport by taxi; left airport by limousine; left airport by private car; left airport by hotel courtesy van.

Some of these reasons for suspicion are plainly absurd, suggesting that there's no particular rationale to the generalizations used by D.E.A. agents in stopping suspected drug smugglers. A way of making sense of the list, though, is to think of it as a catalogue of unstable traits. Smugglers may once have tended to buy one-way tickets in cash and carry two bulky suitcases. But they don't have to. They can easily switch to round-trip tickets bought with a credit card, or a single carry-on bag, without losing their capacity to smuggle. There's a second kind of instability here as well. Maybe the reason some of them switched from one-way tickets and two bulky suitcases was that law enforcement got wise to those habits, so the smugglers did the equivalent of what the jihadis seemed to have done in London, when they switched to East Africans because the scrutiny of young Arab and Pakistani men grew too intense. It doesn't work to generalize about a relationship between a category and a trait when that relationship isn't stable—or when the act of generalizing may itself change the basis of the generalization.

Before Kelly became the New York police commissioner, he served as the head of the U.S. Customs Service, and while he was there he overhauled the criteria that border-control officers use to identify and search suspected smugglers. There had been a list of forty-three suspicious traits. He replaced it with a list of six broad criteria. Is there something suspicious about their physical appearance? Are they nervous? Is there specific intelligence targeting this person? Does the drug-sniffing dog raise an alarm? Is there something amiss in their paperwork or explanations? Has contraband been found that implicates this person?

You'll find nothing here about race or gender or ethnicity, and nothing here about expensive jewelry or deplaning at the middle or the end, or walking briskly or walking aimlessly. Kelly removed all the unstable generalizations, forcing customs officers to make generalizations about things that don't change from one day or one month to the next. Some percentage of smugglers will always be nervous, will always get their story wrong, and will always be caught by the dogs. That's why those kinds of inferences are more reliable than the ones based on whether smugglers are white or black, or carry one bag or two. After Kelly's reforms, the number of searches conducted by the Customs Service dropped by about seventy-five per cent, but the number of successful seizures improved by twenty-five per cent. The officers went from making fairly lousy decisions about smugglers to making pretty good ones. "We made them more efficient and more effective at what they were doing," Kelly said.

5.

Does the notion of a pit-bull menace rest on a stable or an unstable generalization? The best data we have on breed dangerousness are fatal dog bites, which serve as a useful indicator of just how much havoc certain kinds of dogs are causing. Between the late nineteen-seventies and the late nineteen-nineties, more than twenty-five breeds were involved in fatal attacks in the United States. Pit-bull breeds led the pack, but the variability from year to year is considerable. For instance, in the period from

1981 to 1982 fatalities were caused by five pit bulls, three mixed breeds, two St. Bernards, two German-shepherd mixes, a pure-bred German shepherd, a husky type, a Doberman, a Chow Chow, a Great Dane, a wolf-dog hybrid, a husky mix, and a pit-bull mix—but no Rottweilers. In 1995 and 1996, the list included ten Rottweilers, four pit bulls, two German shepherds, two huskies, two Chow Chows, two wolf-dog hybrids, two shepherd mixes, a Rottweiler mix, a mixed breed, a Chow Chow mix, and a Great Dane. The kinds of dogs that kill people change over time, because the popularity of certain breeds changes over time. The one thing that doesn't change is the total number of the people killed by dogs. When we have more problems with pit bulls, it's not necessarily a sign that pit bulls are more dangerous than other dogs. It could just be a sign that pit bulls have become more numerous.

"I've seen virtually every breed involved in fatalities, including Pomeranians and everything else, except a beagle or a basset hound," Randall Lockwood, a senior vice-president of the A.S.P.C.A. and one of the country's leading dogbite experts, told me. "And there's always one or two deaths attributable to malamutes or huskies, although you never hear people clamoring for a ban on those breeds. When I first started looking at fatal dog attacks, they largely involved dogs like German shepherds and shepherd mixes and St. Bernards—which is probably why Stephen King chose to make Cujo a St. Bernard, not a pit bull. I haven't seen a fatality involving a Doberman for decades, whereas in the nineteen-seventies they were quite common. If you wanted a mean dog, back then, you got a Doberman. I don't think I even saw my first pit-bull case until the middle to late nineteen-eighties, and I didn't start seeing Rottweilers until I'd already looked at a few hundred fatal dog attacks. Now those dogs make up the preponderance of fatalities. The point is that it changes over time. It's a reflection of what the dog of choice is among people who want to own an aggressive dog."

There is no shortage of more stable generalizations about dangerous dogs, though. A 1991 study in Denver, for example, compared a hundred and seventy-eight dogs with a history of biting people with a random sample of a hundred and seventy-eight dogs with no history of biting. The breeds were scattered: German shepherds, Akitas, and Chow Chows were among those most heavily represented. (There were no pit bulls among the biting dogs in the study, because Denver banned pit bulls in 1989.) But a number of other, more stable factors stand out. The biters were 6.2 times as likely to be male than female, and 2.6 times as likely to be intact than neutered. The Denver study also found that biters were 2.8 times as likely to be chained as unchained. "About twenty per cent of the dogs involved in fatalities were chained at the time, and had a history of long-term chaining," Lockwood said. "Now, are they chained because they are aggressive or aggressive because they are chained? It's a bit of both. These are animals that have not had an opportunity to become socialized to people. They don't necessarily even know that children are small human beings. They tend to see them as prey."

In many cases, vicious dogs are hungry or in need of medical attention. Often, the dogs had a history of aggressive incidents, and, overwhelmingly, dog-bite victims were children (particularly small boys) who were physically vulnerable to attack and may also have unwittingly done things to provoke the dog, like teasing it, or bothering it while it was eating. The strongest connection of all, though, is

between the trait of dog viciousness and certain kinds of dog owners. In about a quarter of fatal dog-bite cases, the dog owners were previously involved in illegal fighting. The dogs that bite people are, in many cases, socially isolated because their owners are socially isolated, and they are vicious because they have owners who want a vicious dog. The junk-yard German shepherd—which looks as if it would rip your throat out—and the German-shepherd guide dog are the same breed. But they are not the same dog, because they have owners with different intentions.

"A fatal dog attack is not just a dog bite by a big or aggressive dog," Lockwood went on. "It is usually a perfect storm of bad human-canine interactions—the wrong dog, the wrong background, the wrong history in the hands of the wrong person in the wrong environmental situation. I've been involved in many legal cases involving fatal dog attacks, and, certainly, it's my impression that these are generally cases where everyone is to blame. You've got the unsupervised three-year-old child wandering in the neighborhood killed by a starved, abused dog owned by the dogfighting boyfriend of some woman who doesn't know where her child is. It's not old Shep sleeping by the fire who suddenly goes bonkers. Usually there are all kinds of other warning signs."

6.

Jayden Clairoux was attacked by Jada, a pit-bull terrier, and her two pit-bull–bullmastiff puppies, Agua and Akasha. The dogs were owned by a twenty-one-year-old man named Shridev Café, who worked in construction and did odd jobs. Five weeks before the Clairoux attack, Café's three dogs got loose and attacked a sixteen-year-old boy and his four-year-old half brother while they were ice skating. The boys beat back the animals with a snow shovel and escaped into a neighbor's house. Café was fined, and he moved the dogs to his seventeen-year-old girlfriend's house. This was not the first time that he ran into trouble last year; a few months later, he was charged with domestic assault, and, in another incident, involving a street brawl, with aggravated assault. "Shridev has personal issues," Cheryl Smith, a canine-behavior specialist who consulted on the case, says. "He's certainly not a very mature person." Agua and Akasha were now about seven months old. The court order in the wake of the first attack required that they be muzzled when they were outside the home and kept in an enclosed yard. But Café did not muzzle them, because, he said later, he couldn't afford muzzles, and apparently no one from the city ever came by to force him to comply. A few times, he talked about taking his dogs to obedience classes, but never did. The subject of neutering them also came up—particularly Agua, the male—but neutering cost a hundred dollars, which he evidently thought was too much money, and when the city temporarily confiscated his animals after the first attack it did not neuter them, either, because Ottawa does not have a policy of preëmptively neutering dogs that bite people.

On the day of the second attack, according to some accounts, a visitor came by the house of Café's girlfriend, and the dogs got wound up. They were put outside, where the snowbanks were high enough so that the back-yard fence could be readily jumped. Jayden Clairoux stopped and stared at the dogs, saying, "Puppies, puppies." His mother called out to his father. His father came running, which is the kind of thing that will rile up an aggressive dog. The dogs jumped the fence, and Agua took Jayden's head in his mouth and started to shake. It was a textbook dog-biting case: unneutered, ill-trained, charged-up dogs,

with a history of aggression and an irresponsible owner, somehow get loose, and set upon a small child. The dogs had already passed through the animal bureaucracy of Ottawa, and the city could easily have prevented the second attack with the right kind of generalization—a generalization based not on breed but on the known and meaningful connection between dangerous dogs and negligent owners. But that would have required someone to track down Shridev Café, and check to see whether he had bought muzzles, and someone to send the dogs to be neutered after the first attack, and an animal-control law that insured that those whose dogs attack small children forfeit their right to have a dog. It would have required, that is, a more exacting set of generalizations to be more exactingly applied. It's always easier just to ban the breed.

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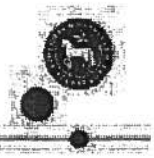

Afdækning af årsager til aflivning af familiehunde i Danmark

Jørgen Damkjer Lund
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Det Biovidenskabelige Fakultet
Københavns Universitet

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Dyrenes Beskyttelse

Forord

Nærværende undersøgelse kom i stand gennem et samarbejde mellem *Dyrenes Beskyttelse* og *Institut for Produktionsdyr og Heste* under *Det Biovidenskabelige Fakultet, Københavns Universitet* (tidligere *Den Kgl. Veterinær- og Landbohøjskole*).

En undersøgelse udført af fagdyrlæge Jørgen Mikkelsen og publiceret i 1999 viste, at op imod ¼ af de hunde, som bliver aflivet på danske dyreklinikker, bliver aflivet på grund af adfærdsproblemer. Der er nu gået 8 år siden denne undersøgelse blev foretaget, og der har siden da været en stigende interesse for adfærd og adfærdsproblemer hos hunde. Samtidigt tilbyder flere og flere hjælp til hundeejere, der har problemer med deres hunds adfærd. Det var derfor interessant at undersøge, om andelen af hunde, som bliver aflivet på grund af adfærdsproblemer, har ændret sig markant.

I de senere år har der været en stigende interesse for de såkaldte "muskelhunde", hvoraf nogle af racerne har en baggrund som kamphunde – f.eks. *Amerikansk staffordshire terrier*. Fra forskellige sider har der været forlydender om, at disse racer udgør en stærkt stigende andel af de hunde, som aflives på danske dyreklinikker. Det har derfor været et af formålene med nærværende undersøgelse at se nærmere på, hvor stor en andel kamphunde udgør, af de hunde som aflives.

Udover at undersøge, hvor mange og hvilke hunde som i dag aflives på grund af adfærdsproblemer, har formålet med nærværende undersøgelse været at undersøge forekomsten af en række medicinske eller fysiske lidelser hos forskellige hunderacer. Ved at kombinere de indsamlede data med de data, som blev indsamlet ved den tidligere undersøgelse, blev det muligt at få statistisk signifikante resultater for mange racer.

Målet var at indsamle data vedrørende 1.500 hunde eller mere, som blev aflivet på danske dyreklinikker. Dette mål blev dog ikke helt nået, da der kun blev indsamlet data for 1.236 hunde. Jeg forventede ikke at opnå data for samme antal hunde, som Jørgen Mikkelsen gjorde i sin undersøgelse. Der var på det spørgeskema, som blev anvendt ved nærværende undersøgelse, en række supplerende spørgsmål, som dyreklinikkerne skulle tage stilling til. Desuden kunne skemaet se uoverskueligt ud, da det i videst mulig omfang var opbygget af felter, hvor på forhånd definerede kategorier kunne afkrydses. Dette kan have skræmt mange klinikker fra at melde sig til at deltage i undersøgelsen. Nogle af de klinikker, som valgte at deltage, meldte til gengæld, at skemaet var meget hurtigt og nemt at udfylde, hvilket også var formålet med den valgte udformning. Og den største del af de deltagende klinikker har da også været meget trofaste. Faktisk gik indsamlingen af data hele tiden bedre efter en lidt træg start.

Først og fremmest tak til *Dyrenes Beskyttelse*, som har finansieret nærværende undersøgelse, samt Jørgen Mikkelsen, *Åbyhøj Dyreklinik*, der har stillet det originale datasæt fra hans undersøgelse til min rådighed, så en sammenligning med resultaterne fra nærværende undersøgelse blev mulig.

Dernæst tak til projektets faglige følgegruppe, som foruden Jørgen Mikkelsen bestod af dyrlæge Ingeborg Mølbak, *Dyrehospitalet i København*, dyreværnsinspektør, dyrlæge Lotte Brink, *Dyrenes Beskyttelse* samt professor Jan Ladewig og lektor Björn Forkman, *Institut for Produktionsdyr og Heste, Det Biovidenskabelige Fakultet, Københavns Universitet*. Jan Ladewig og Björn Forkman har været behjælpelige med kritisk gennemlæsning og kommentarer til manuskriptet til denne rapport. Desuden tak til direktionssekretær Bodil Riis, *Dyrenes Beskyttelse*, som har læst sproglig korrektur manuskriptet.

Tak til dyrlægestuderende Anna Johansson, som har hjulpet mig med at ringe rundt til de dyreklinikker/-hospitaler, som var blevet skriftligt kontaktet i forbindelse med undersøgelsen, men ikke meldte tilbage, om de kunne tænke sig at deltage i undersøgelsen.

Tak til *Dansk Hunderegister* for at stille oplysninger om postnummer, race, køn og tidspunktet for registrering for alle hunde i registret til min rådighed.

Tak til *Dansk Kennel Klub* for omtale af undersøgelsen i medlemsbladet *Hunden* ved undersøgelsens start, til *Dansk Veterinærtidsskrift* for at bringe en artikel om undersøgelsen i maj-nummeret 2006 samt til Lise Lotte Christensen, *Dansk Kennel Klub*, som før undersøgelsens start, var behjælpelig med at finde oplysninger frem om antallet frem om udviklingen i antallet af hunde stambogsført i *Dansk Kennel Klub*.

Sidst, men ikke mindst, tak til de 42 dyreklinikker/-hospitaler, som har været behjælpelige med at udfylde de mange spørgeskemaer, som danner grundlag for nærværende undersøgelse.

Jørgen Damkjer Lund, 2007

Resumé

Hovedformålene med undersøgelsen var 1) at undersøge, om andelen af hunde aflivet på danske dyreklinikker, som blev aflivet på grund af adfærdsproblemer, har ændret sig væsentligt fra den tilsvarende andel fundet af fagdyrlæge Jørgen Mikkelsen i en undersøgelse publiceret i 1999, samt 2) at afdække faktorer, som kan have betydning for, om ejeren vælger at lade hunden aflive. Jørgen Mikkelsens undersøgelse var baseret på data indsamlet i perioden fra juli 1997 til april 1998.

Nærværende undersøgelse blev udført som case-kontrol-undersøgelse baseret på 1.236 spørgeskemaer udfyldt på 42 dyreklinikker/-hospitaler i perioden fra 16-3-2006 til 24-3-2007. Til at belyse raceforskelle med hensyn til aflivning af forskellige årsager, anvendtes en kontrolgruppe bestående af hunde registreret i *Dansk Hunderegister* korrigeret for antallet af hunde, som måtte forventes døde eller aflivet uden at være frameldt registret.

Andelen af hunde, hvor adfærdsproblemer var årsag eller medvirkende årsag til aflivningen, var 22,0 %, mens den tilsvarende andel i Jørgen Mikkelsens undersøgelse fra 1999 var 23,8 %. Forskellen er dog ikke statistisk signifikant. Derimod sås en signifikant stigning fra 71,5 % til 78,8 % i andelen af hunde, hvor medicinske eller fysiske lidelser var årsag eller medvirkende årsag til aflivningen, samt et signifikant fald fra 7,4 % til 5,6 % i andelen af hunde, hvor andre forhold end sygdom eller adfærd var årsag eller medvirkende årsag. Da der i nogle tilfælde var angivet mere end én årsag til aflivning, summerer andelene af hunde aflivet af de forskellige årsager op til mere end 100 %.

Ca. 2/3 af de hunde, som blev aflivet på grund af adfærdsproblemer, var hanhunde, og 2/3 blev aflivet på grund af aggressionsproblemer, hvilket svarer helt til undersøgelsen fra 1999. Andelen af hunde, hvor frygtsomhed eller angst var årsag eller medvirkende årsag til aflivningen, var dog signifikant højere i nærværende undersøgelse (3,4 % vs. 2,1 %), mens andelen af hunde, der blev aflivet på grund af problemer med at være alene hjemme, var signifikant lavere (2,4 % vs. 3,7 %). Desuden sås en signifikant stigning i andelen af hunde aflivet på grund af andre adfærdsproblemer end aggression, frygtsomhed/angst eller problemer med at være alene (5,5 % vs. 4,0 %).

Blandt de hunde, hvor adfærdsproblemer var årsag eller medvirkende årsag til aflivningen, sås i nærværende undersøgelse en signifikant større andel af hunde, hvor aggression var kombineret med andre adfærdsproblemer (12,6 % vs. 8,1 %).

Ved sammenligningen af årsager til aflivning inden for de forskellige racer anvendtes en kombination af data fra nærværende undersøgelse og data fra Jørgen Mikkelsens undersøgelse fra 1999. Ved beregning af odds ratio (OR) for aflivning blev racen *Labrador retriever* anvendt som referencegruppe.

Hos følgende racer var andelen (%) af hunde, hvor aggression var årsag eller medvirkende årsag til aflivningen, særlig høj: *Sankt bernhardshund* (45,0 %; OR = 17,0), *Chow chow* (41,2 %; OR = 12,2), *Samojedhund* (38,9 %; OR = 5,8), gruppen af *Pinschere* (33,3 %; OR = 5,8) samt *Rottweiler* (31,8 %; OR = 11,2).

En stor hund kan gøre mere skade, hvis den optræder aggressivt, end en lille hund og har derfor større risiko for at blive aflivet, hvis den optræder aggressivt. Men der var også mindre racer, hvor

andelen af hunde aflivet på grund af aggression var høj – f.eks. *Cocker spaniel* (26,0 %; OR = 6,4) og *Dansk/svensk gårdhund* (25,5 %; OR = 3,9), som bliver stadigt mere populær.

Hos visse hunderacer blev en meget stor del af hundene aflivet på grund af bestemte medicinske eller fysiske lidelser. For eksempel blev 46,2 % af alle *Schnauzere* aflivet på grund af neoplasier (OR = 3,1), 31,3 % af alle *Cavalier king charles spaniels* på grund af hjerte-/lungelidelser (OR = 5,4) og 28,6 % hundene tilhørende racen *Newfoundland* på grund af problemer med muskler eller led (OR = 3,4).

Andelen af kamphunde og kamphundeblandinger, som blev aflivet på grund af aggression, var i nærværende undersøgelse 4,7 gange større andelen andre racehunde og blandinger aflivet af denne årsag.

14,8 % af de hunde, som blev aflivet på grund af adfærdsproblemer, var forsøgt behandlet for disse problemer forud for aflivningen. Denne andel var ikke signifikant forskellig fra andelen forsøgt behandlet i undersøgelsen fra 1999 (16,3 %). Men blandt de hunde, som var forsøgt behandlet, var signifikant flere hunde ordineret lydighedstræning (5,9 % vs. 2,0 %), og signifikant flere hunde havde modtaget anden behandling end medikamentel behandling, neutralisering eller lydighedstræning (10,4 % vs. 4,9 %). Denne anden behandling omfatter blandt andet adfærdsrådgivning af ejeren samt adfærdsterapi.

Blandt de hunde, som blev aflivet på grund af medicinske eller fysiske lidelser, sås i forhold til resultaterne fra undersøgelsen fra 1999 en signifikant større andel af hunde, som blev aflivet på grund af problemer med muskler eller led (20,1 % vs. 7,5 %) samt neoplasier (17,5 % vs. 12,8 %) og en signifikant mindre andel aflivet med diagnosen alderdomssvækkelse (29,3 % vs. 32,6 %).

Sammenlignet med tæver (T) sås hos hanhunde (H) signifikant mindre andel aflivet på grund af lidelser i genitalapparatet (H/T=0,19), neoplasier (H/T=0,57) og endocrine lidelser (H/T=0,52). Til gengæld blev en signifikant større andel af hanhundene aflivet på grund af problemer med muskler eller led (H/T=1,22), aggression (H/T=1,74) samt anden adfærd end aggression, frygtsomhed eller angst samt separationsproblemer (H/T=1,93).

Når hunde, hvor neutraliseringsstatus ikke var angivet, blev regnet som intakte, sås i sammenligning med undersøgelsen fra 1999 en signifikant stigning fra 12,2 % til 19,0 % i andelen af hanhunde, som var kastrerede, samt en signifikant stigning fra 10,3 % til 20,2 % i andelen af tæver, der var steriliserede. Stigningen i andelen af neutraliserede hunde er interessant i lyset af, at en undersøgelse fra 2006 har vist, at neutralisering, i modstrid med den gængse opfattelse, kan øge risikoen for adfærdsproblemer.

Sammenlignet med kastrerede hanhunde (N) sås hos intakte hanhunde (I) en signifikant lavere andel aflivet på grund af aggression (I/N=0,69), frygtsomhed eller angst (I/N=0,49) samt andre adfærdsproblemer end aggression, frygtsomhed/angst og separationsproblemer (I/N=0,58). Blandt intakte hanhunde sås desuden en signifikant mindre andel aflivet på grund af endocrine lidelser (I/N=0,44).

Sammenlignet med steriliserede tæver (N) sås hos intakte tæver (I) en større andel aflivet på grund af lidelser i genitalapparatet (I/N=6,21) samt separationsproblemer (I/N=3,76). Desuden sås en tendens til, at en større andel af de intakte tæver blev aflivet på grund af aggression (I/N=1,57;

p=0,0577). Til gengæld blev en signifikant mindre andel af de intakte tæver aflivet på grund af hjerte-/lungelidelser (I/N=0,61) samt problemer med muskler eller led (I/N=0,53).

Den øgede opmærksomhed på adfærdsproblemer i de senere år har tilsyneladende ikke haft effekt på andelen af hunde, som aflives på grund af adfærdsproblemer. Årsagen kan være, at hovedparten af de adfærdsproblemer, som fører til aflivning, er aggression. En meget stor del af ejerne af de aggressive hunde oplyste til dyrlægen, at de oplevede, at hunden ikke advarede før snappen eller bid (28,8 %), at aggressionen ikke kunne forudsiges (34,8 %), og/eller at adfærden forekom uprovokeret (34,8 %). Det har formentligt betydet, at ejerne ikke følte sig trygge ved hunden, hvilket kan have haft indflydelse på beslutningen om at få hunden aflivet.

Aggressionsproblemer afviger fra andre adfærdsproblemer – dels ved, at en aggressiv hund er til fare for sine omgivelser, dels ved, at hvis aggressionen er uforudsigelig og ikke skyldes medicinske eller fysiske lidelser, kan den være vanskelig at behandle. Det er ikke muligt med sikkerhed at sige, om behandlingen har hjulpet, før hunden snapper eller bider igen. Dette er et særligt stort problem, hvis hunden kan finde på at optræde aggressivt over for børn. Hvis antallet af hunde, som bliver aflivet på grund af aggressionsproblemer, skal nedbringes væsentligt, må der derfor gøres en stor indsats for at forebygge problemerne.

Hovedparten af stigningen i andelen af hunde, hvor frygtsomhed eller angst var årsag eller medvirkende årsag til aflivningen, set i forhold til undersøgelsen fra 1999, sås blandt de yngste hunde. Det tyder på, at der er sket en stigning i andelen af hunde, som ikke er blevet tilstrækkeligt socialiseret, hvilket bør give anledning til bekymring.

Andelen af hunde med kamphundebaggrund blandt de aflivede hunde var lidt højere, end man skulle forvente ud fra deres andel af de hunde, som var registreret i *Dansk Hunderegister* (2,10 % vs. 1,69 %), men kamphunde og kamphundeblandinger var ved aflivningen betydeligt yngre end andre racer og blandinger, hvilket formentligt delvist skyldes, at hovedparten af kamphundene i Danmark er meget unge på grund af den stærkt stigende interesse for visse kamphunderacer. Den skæve aldersfordeling betyder, at kamphundenes andel af de aflivede hunde må forventes at stige i de kommende år, mens andelen af de aflivede kamphunde, som bliver aflivet på grund aggression, må forventes at falde.

Undersøgelsen viste, at forskelle på den relative hyppighed af aldersrelaterede lidelser og problemer, herunder adfærdsproblemer, mellem de enkelte racer, betyder, at der er store forskelle mellem racerne på, hvor længe hundene kan forvente at leve. Specielt hos racer, hvor en stor del af hundene aflives i en ung alder på grund af adfærdsproblemer, er den forventede levealder lav. For eksempel kan mindre end 50 % af hunde tilhørende racen *Sankt bernhardshund* forvente at nå en alder af 5 år.

Stigningen på 170 % i andelen af hunde, som blev aflivet på grund af problemer med muskler eller led, set i forhold til undersøgelsen fra 1999, er så markant, at årsagen bør undersøges nærmere. Desuden bør både opdrættere og hundeejere være opmærksomme på, at der hos visse racer tilsyneladende er en særlig stor hyppighed af bestemte lidelser eller problemer.

Blandt de aflivede hunde var andelen af hunde, som udelukkende blev aflivet på grund af andre årsager end sygdom eller aggression, meget lav. Derfor var genplacering som alternativ til aflivning

kun relevant for relativt få hunde. Den udbredte antagelse, at mange hunde aflives af bekvemmelighedsårsager, kunne ikke bekræftes.

Der var relativt store forskelle mellem landsdelene med hensyn til fordelingen af årsager til aflivning. For eksempel sås den laveste andel af hunde aflivet på grund af aggression på Bornholm (10,4 %) samt i København, Frederiksberg og omegn (12,4 %), mens den højeste andel sås i et område bestående af Sønderjylland og dele af Syd- og Vestjylland (23,7 %).

De fundne forskelle mellem landsdelene med hensyn til fordelingen af årsager til aflivning kan afspejle geografiske forskelle med hensyn til hundenes rolle i familien samt racefordelingen blandt hundene. I forbindelse med en forebyggende indsats med henblik på at nedbringe antallet af hunde, der aflives på grund af adfærdsproblemer, bør følgende forhold derfor undersøges nærmere: 1) folks bevægegrunde for at anskaffe sig hund, 2) hvilke forventninger forskellige hundeejere har til hunden og dens plads i familien, 3) hvilke overvejelser ejerne gjorde sig, da de valgte en hund af lige netop den race, samt 4) hvorledes det er muligt at nå forskellige målgrupper.

Indholdsfortegnelse:

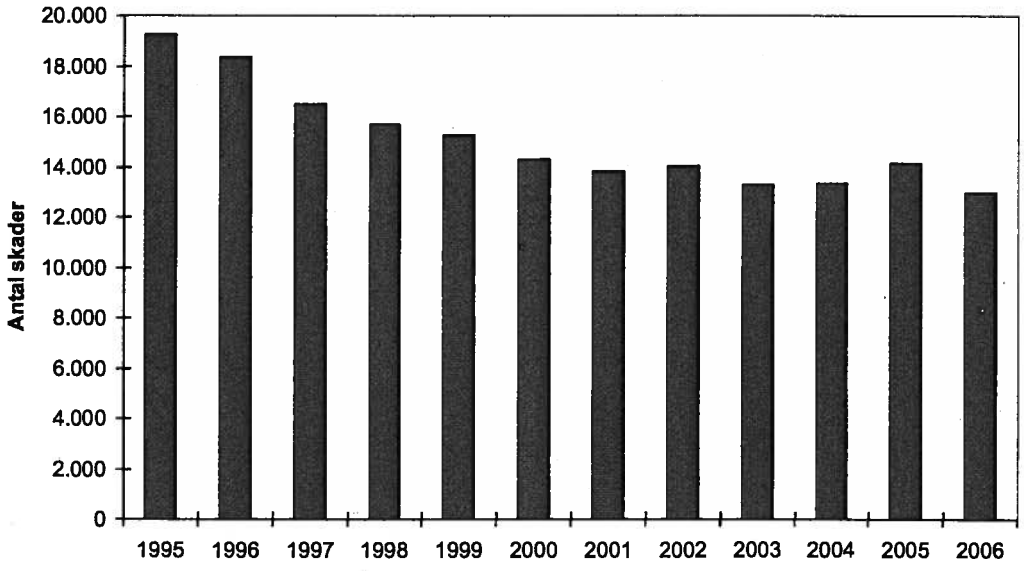
1. Baggrund

1.1. Aflivning på grund af adfærdsproblemer

I en undersøgelse fra 1999 (26) foretaget af Jørgen Mikkelsen var adfærdsproblemer årsag eller medvirkende årsag til knap 1/4 af alle aflivninger af familiehunde på ca. 200 danske dyreklinikker i Danmark. For 2/3 af hundene, som blev aflivet pga. adfærdsproblemer, var årsagen aggressiv adfærd. Og 2/5 af hundene blev aflivet, inden de var fyldt 3 år.

Forudsat, at langt de fleste familiehunde ender deres dage hos dyrlægen, og at populationen af hunde er nogenlunde stabil, betyder det, at op mod 1/4 af alle danske hunde på et tidspunkt i deres liv vil give så alvorlige adfærdsproblemer for deres ejere, at hunden bliver aflivet. Hvis 1) der er 550.000 hunde i Danmark (9), 2) en hund i gennemsnit lever i 10 år, og 3) langt de fleste hunde ender deres dage hos dyrlægen, vil lavt regnet 10 - 15.000 hunde hvert år blive aflivet pga. adfærdsproblemer.

Figur 1.1. Anmeldte skader forvoldt af hunde



Kilde: Forsikringsoplysningen

Siden ovennævnte undersøgelse blev lavet, er der kommet langt mere fokus på adfærd og adfærdsproblemer hos hunde. Stadigt flere - både med og uden en veterinær baggrund - tilbyder hjælp til mennesker, som har problemer med deres hunds adfærd.

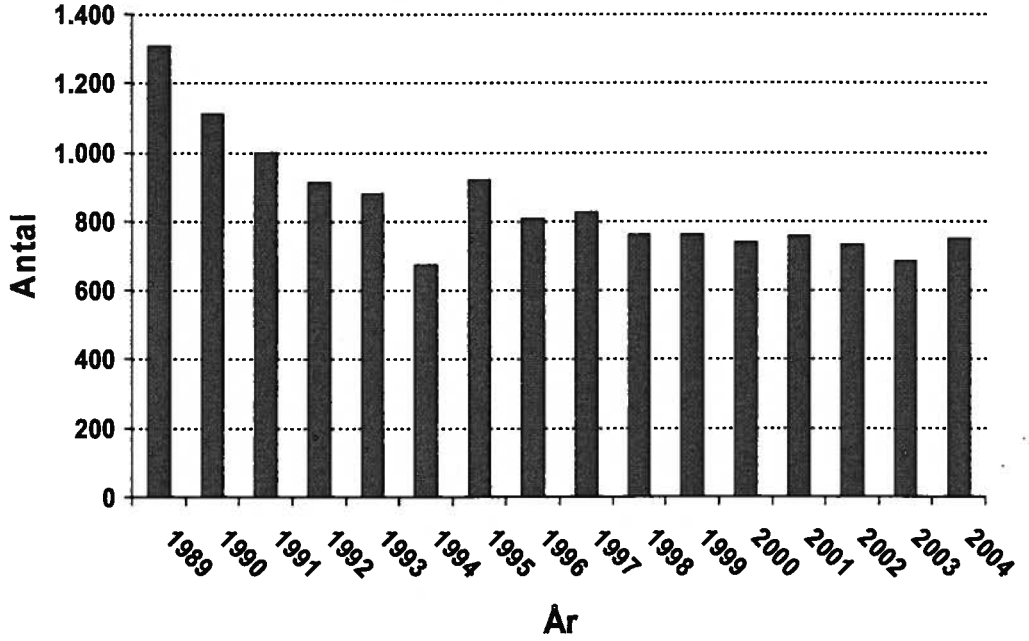
Men samtidigt er sket store ændringer i populariteten af de forskellige hunderacer. F.eks. ses en stigende interesse for fysisk stærke hunderacer – populært kaldet "muskelhunde". Der er ofte tale om racer, der har en baggrund som kamphunde. Disse racer synes især at tiltale yngre mennesker, og man må forvente, at de ofte ikke ved, hvad de har med at gøre. Desuden synes antallet af hunde i Danmark igen at stige efter flere år, hvor der har været et konstant fald.

1.2. Forekomst af bidskader

Den hyppigste årsag til, at hunde bliver aflivet pga. adfærdsproblemer, er som nævnt ovenfor, at de har optrådt aggressivt (26). Det skyldes formentlig, at en aggressiv hund kan være til fare for sine omgivelser. Antallet af bidskader kan give en indikation af, hvorledes forekomsten af aggressiv adfærd hos hunde har udviklet sig i de senere år - og dermed til dels også, hvordan det kan tænkes at have påvirket antallet af aflivninger.

Ifølge *Forsikringsoplysningen* er antallet af anmeldelser af skader forvoldt af hunde generelt gået ned de seneste 12 år. Således er der sket et fald fra 19.273 i 1995 til 12.934 i 2006 (13) (figur 1.1). Dette svarer til en nedgang på 33 %. Den største del af nedgangen skete dog før 2000 - 2001.

Figur 1.2. Antallet af bidskader i perioden 1989 - 2004



Kilde: Ulykkesregistret. Indberetninger fra 5 skadestuer

I 2000 var der 546.000 hunde i Danmark (9), og de forvoldte tilsammen 14.273 anmeldte skader svarende til 26,1 skader/1.000 hunde/år.

Halvdelen af de anmeldte skader er typisk bidskader. I 2003 fik omkring 7.000 mennesker erstatning efter at være blevet bidt af en fremmed hund.

Ifølge *Ulykkesregistret, Statens Institut for Folkesundhed* udgør bidskader 64 % af skader forvoldt af hunde, som medfører skadestuekontakt (19). Over perioden 1990 - 1999 blev antallet af bidskader indberettet fra 5 skadestuer næsten halveret (figur 1.2). På landsplan faldt antallet af registrerede skader fra 9.000 til 5.000. Fra 1998 til 2003 har antallet imidlertid ligget nogenlunde konstant (19) - svarende til 9,2 bidskader/1.000 hunde/år eller 9,3 bidskader/10.000 indbyggere/år (baseret på befolkningstallet i Danmark 1. januar 2003 (10)).

Over perioden 1990 – 2003 faldt antallet af børn under 15 år, der søgte hjælp på en skadestue som følge af hundebid, fra 2.513 til 1.015 (36). Dette svarer til et fald på hele 60 %. I 2000 var antallet af børn, der søgte hjælp på en skadestue 1.295 svarende til 2,4 børn/1.000 hunde/år.

Bidskader sker i 59 % af tilfældene hos mænd. Skaderne er nogenlunde ligeligt fordelt på de forskellige aldersgrupper. Dog ses de lidt mere sjældent hos personer over 60 år (19). Bidskaderne er kun i 2 % af tilfældene så alvorlige, at de fører til indlæggelse. Bidskader, der fører til indlæggelse, rammer fortrinsvis børn i aldersgruppen 0 – 5 år (19).

Hos børn i aldersgruppen 0 – 4 år findes skaderne i 68 % af tilfældene på hals og hoved. Hos børn i aldersgruppen 10 – 14 år er det 25 % af skaderne, som er rettet mod disse legemsdele, og hos voksne er det ca. 10 % (19).

Der findes ikke i Danmark en samlet opgørelse af, hvilke racer der forårsager flest bidskader. Men ifølge en australsk undersøgelse (35) har *Schæferhund, Dobermann, Bull Terrier* og *Rottweiler* 4 - 5 gange højere risiko for at forårsage bidskader end andre almindelige racer. Man skal dog være forsigtig med at overføre disse resultater til danske forhold – bl.a. på grund af mulige forskelle i racesammensætningen, måden at holde hund på samt linier inden for de racer, som holdes.

1.3. Antal og racesammensætning af hunde i Danmark

Ved den seneste opgørelse i 2000 var der som nævnt ovenfor 546.000 familiehunde i Danmark (9), og der var hund i hver femte danske familie (tabel 1.1). Ser man på hold af familiedyr generelt, er der en udpræget sammenhæng mellem kæledyr og familier med børn. Således holdt kun 28 % af familierne uden børn familiedyr, mens andelen af familier med børn, der holdt familiedyr, var 58 %. Desuden medførte stigende børnetal stigende grad af familiedyr i familien (9).

Tabel 1.1. Antal familier med hunde og antal hunde (*Danmarks Statistik* (9))

Opgjort 2000	Antal familier med hunde	Antal hunde	Pct. familier med hunde
Hunde i alt	**449.000**	**546.000**	**20**
små	154.000	175.000	7
mellem	136.000	162.000	6
store	191.000	209.000	8

Antallet af hunde har gennem en længere årrække været stigende, men i starten af 90'erne indtrådte en stagnation i det samlede antal. I 1991 blev bestanden af hunde således anslået til at være 590.000 (33).

Nu synes hundens popularitet igen at stige, idet der i løbet af en periode på halvandet år er blevet registreret ca. 70.000 nye hunde i *Dansk Hunderegister*. Dette svarer til en stigning i antallet af registrerede hunde på 14 %. Ifølge *Dansk Hunderegister* er de 10 mest udbredte hunderacer i øjeblikket (2005):

1. Labrador retriever (66.000)
2. Schæferhund (42.000)
3. Golden retriever (21.000)

4. Dansk-svensk gårdhund (13.000)
5. Cocker spaniel (12.900)
6. Ruhåret hønsehund (12.800)
7. Rottweiler (10.300)
8. Cairn terrier (10.100)
9. West highland white terrier (9.900)
10. Ruhåret gravhund (9.300)

1.4. Trends i de forskellige hunderacers popularitet

1.4.1. Generelle tendenser

Racefordelingen blandt hundene i Danmark har ændret sig dramatisk gennem årene. Således har antallet af hunde af visse store racer - f.eks. *Schæferhund, Rottweiler, Dobermann* og *Boxer* - stambogsført i *Dansk Kennel Klub* været faldende gennem de seneste 20 år (oplysninger fra *Dansk Kennel Klubs* medlemsblad *Hunden).*

Schæferhunden er dog stadig populær, idet den er den næsthyppigst forekommende race blandt hunde registreret i *Dansk Hunderegister* - dog efter at have ligget på førstepladsen i mange år. Førstepladsen er nu overtaget af *Labrador retriever,* hvis popularitet gennem årene har ligget på et højt niveau, men har svinget lidt op og ned. *Golden retriever* er stadig meget populær, men antallet af stambogsførte hunde er faldet til ca. 1/3 i perioden fra 1973 til 2002. I samme periode har der været et moderat fald i antallet af *Ruhåret hønsehund,* som er meget populær blandt jægere.

Blandt de små racer har der været et konstant fald i antallet af stambogsførte *Dværgpudler* og *Cocker spaniels* gennem de sidste 30 år. Racerne *West highland white terrier* og *Cairn terrier* blev derimod utroligt populære op gennem 80'erne, hvor der skete næsten en firdobling i antallet af stambogsførte hunde. Gennem 90'erne faldt antallet dog lidt igen og synes nu at ligge på et stabilt højt niveau. Til sammenligning er antallet af stambogsføringer af *Yorkshire terrier* i perioden fra 1986 til 2002 faldet til ca. 1/5.

I perioden 1973 - 2002 skete der generelt et fald i antallet af stambogsføringer af *Korthåret gravhund* - bortset fra en mindre stigning i starten af 80'erne. Antallet af stambogsføringer af *Langhåret gravhund* og *Langhåret dværggravhund* toppede henholdsvis i starten og midten af 80'erne. Siden er antallet faldet gradvist. Siden midten af 80'erne er der også sket et fald i antallet af stambogsføringer af *Ruhåret gravhund,* men knap så udtalt.

I de seneste år har der været stigende interesse, især blandt yngre personer, for visse hunderacer, som er fysisk stærke – heriblandt racer, der har en baggrund som kamphunde. Desuden er der i øjeblikket en stærkt stigende interesse for de helt små hunde som f.eks. *Chihuahua* og *Mops.*

Generelt kan man sige, at når der ses bort fra hunde af blandingsrace, domineres bestanden af hunde stadig af relativt få racer, som dog for de flestes vedkommende nyder dalende popularitet. Blandt de mindre hyppigt forekommende racer synes folks interesse at stige og sprede sig over flere og flere racer, og for mange af disse racers vedkommende synes folks interesse at være bestemt af modeluner. Det er et problem, idet folks kendskab til disse racers egenskaber må forventes at være

manglende eller i bedste fald begrænset.

1.4.2. Hunde med kamphundebaggrund
En af de racer, som er blevet meget populære i de senere år, er *Amerikansk staffordshire terrier*, som i praksis er svær at skelne fra *Pit bull terrier*, der er forbudt at holde i Danmark. De to racer er nært indbyrdes beslægtede, idet begge nedstammer fra racen *Staffordshire bull terrier*, der oprindeligt kommer fra England. Da racen kom til USA, blev den splittet op i to racer: *Pit bull terrier* og *Amerikansk staffordshire terrier*. Den sidstnævnte race blev stambogsført. Eksempler på andre racer, der går under betegnelsen kamphund er:

Akita inu, Alano español, Amerikansk bulldog, Anatolsk hyrdehund, Boerboel, Boston terrier, Bull mastiff, Bull terrier, Ca de bestiar, Cao fila de sao miguel, Cane corso italiano, Centralasiatisk ovtcharka, Kaukasisk ovtcharka, Dogo argentino, Dogo canario, Dogue de bordeaux, Engelsk bulldog, Fila brasilleiro, Great japanese dog, Manchester terrier, Mastiff, Mastin espanol, Mastino napolitano, Shar pei og *Tibetansk mastiff*. Dertil kommer *Tosa*, der ligesom *Pit bull terrier* er forbudt at holde i Danmark. Det er ligeledes forbudt at holde blandinger, hvor en af disse (eller begge) racer indgår (4). Når kamphunde omtales i denne rapport, er det disse racer, som der henvises til. Det er uden for formålet med denne rapport at tage stilling til, om de enkelte racer bør betragtes som kamphunde eller ej.

1.4.3. Import af hunde
Modeluner kan pludselig skabe en efterspørgsel efter bestemte racer, der er så stor, at den ikke kan dækkes med hunde opdrættet i Danmark. Det betyder, dels at priserne på hvalpe stiger, og dels at der kommer både legal og illegal import af hvalpe fra udlandet.

I forbindelse med køb af importerede hvalpe, kan den kommende ejer ikke på forhånd sikre sig, at hvalpen er blevet tilstrækkeligt socialiseret til mennesker, samt at den ikke er taget for tidligt fra sin moder. Hvis hvalpen er taget for tidligt fra sin moder, er der øget risiko for tidlig død og udvikling af alvorlige adfærdsproblemer (31).

En af de racer, som importeres i stort omfang, er *Amerikansk staffordshire terrier*. Det er et problem, fordi hundenes genetiske baggrund kan være usikker. I nogle tilfælde kan der for eksempel være tale om *Pit bull terrier* eller blandinger med denne race. Det betyder, at der kan findes et antal hunde af racen *Pit bull terrier* eller blandinger med denne race i Danmark – selv om det er forbudt at holde disse hunde (4).

Om importerede hunde generelt har større risiko for at blive aflivet pga. adfærdsproblemer end dansk opdrættede hunde, vides imidlertid ikke.

1.5. Hunde af blandingsrace
I 1999 udgjorde hunde af blandingsrace ca. 16 % af samtlige hunde registreret i *Dansk Hunderegister (21)*. Men i registret regner man med, at selvom registreringen er lovpligtig, så er det kun ca. 80 % af en årgang, som faktisk bliver registreret. I forbindelse med racehunde, som kommer fra opdrættere under *Dansk Kennel Klub*, er registreringsproceduren påbegyndt allerede, når hvalpen overdrages til dens nye ejer. Derfor vil alle hunde, som kommer fra disse opdrættere, være

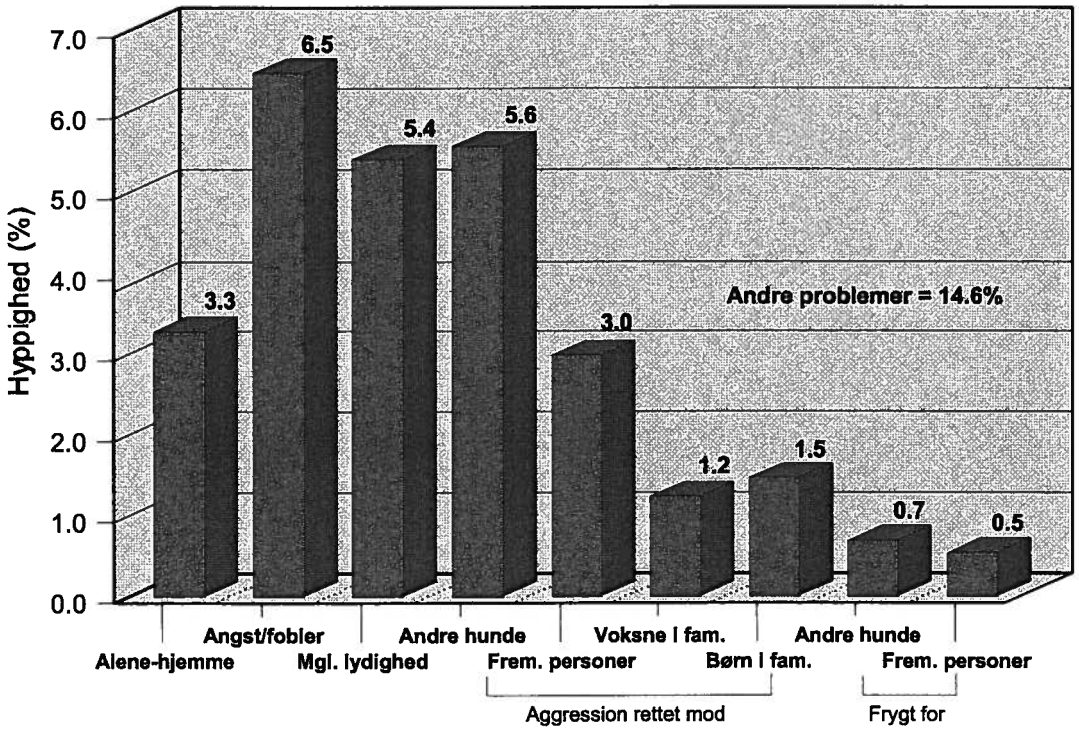
registreret. Men man må regne med, at det ikke er alle hvalpe, som kommer fra uorganiserede opdrættere – herunder hvalpe af blandingsrace, som bliver mærket og registreret. Så andelen af blandingshunde er reelt højere end de 16 % ifølge *Dansk Hunderegister*. Således regner man med, at blandingshunde udgør ca. 1/3 af samtlige hunde i Danmark.

1.6. Forekomst af adfærdsproblemer

Ifølge en amerikansk undersøgelse (8) havde 87 % af de adspurgte hundeejere i gennemsnit 4,73 adfærdsproblemer med deres hunde, mens 13 % angav, at de ikke havde nogen problemer. Selvom der næppe er stor forskel på danske og amerikanske hunde, kan resultatet af denne undersøgelse ikke umiddelbart overføres til danske forhold - bl.a. fordi der kan være stor forskel på danskeres og amerikaneres holdning til og tolerance over for problemadfærd hos hunde.

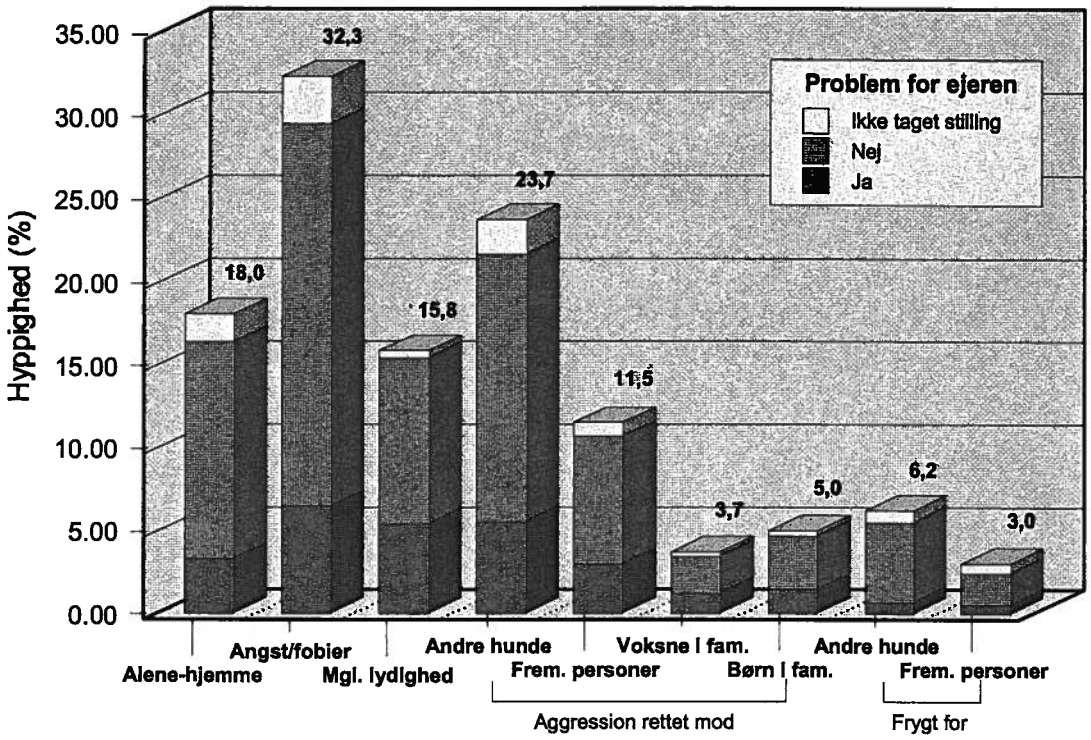
I 2000 - 2001 blev gennemført den første store undersøgelse af forekomsten af adfærdsproblemer hos familiehunde i Danmark (21). Knap 28 % af de adspurgte hundeejere erkendte, at de havde problemer med deres hunds adfærd, mens 17 % angav, at de tidligere havde haft problemer.

Figur 1.3. Prævalens af adfærdsproblemer erkendt af ejeren



Kilde: Lund, 2000 (21)

Figur 1.4. Prævalens af mulig problemadfærd



Kilde: Lund, 2000 (21)

Det hyppigste adfærdsproblem var angst for skud, torden o.l. (figur 1.3). Ordnet efter faldende hyppighed fulgte 1) aggression rettet mod andre hunde, 2) manglende lydighed, 3) alene-hjemme problemer, 4) aggression rettet mod fremmede mennesker, 5) aggression rettet mod børn i familien, 6) aggression rettet mod voksne i familien, 7) frygtsomhed over for andre hunde og 8) frygtsomhed over for fremmede mennesker.

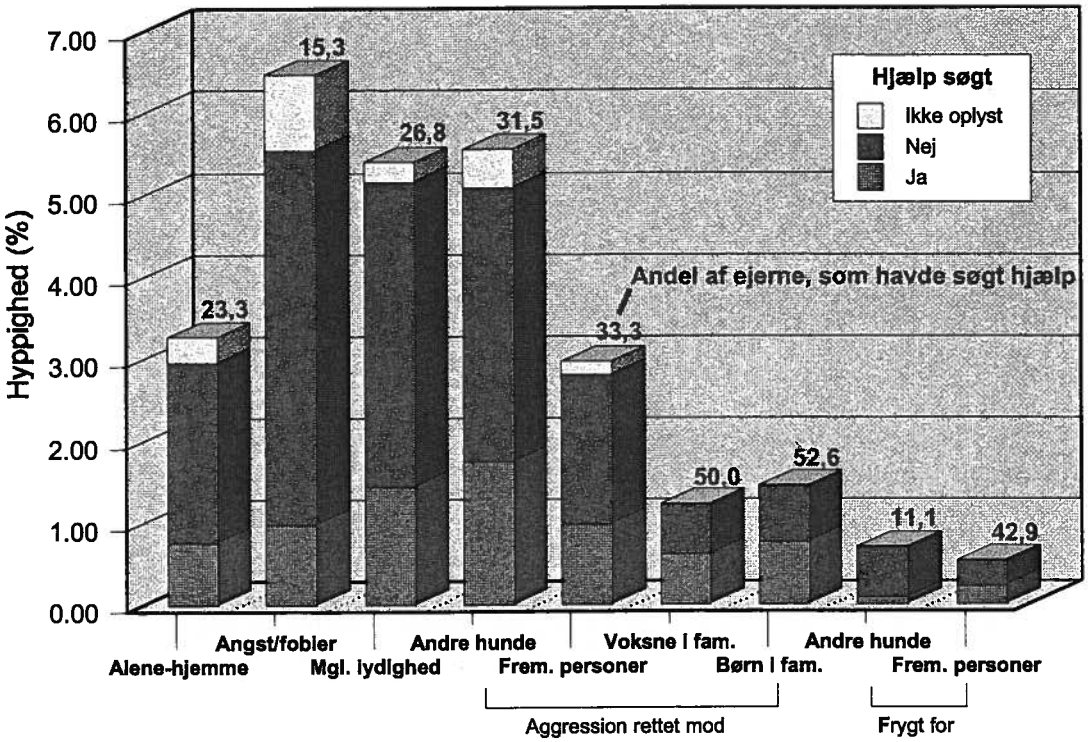
I forbindelse med adfærdsproblemer er det vigtigt at skelne mellem hundens faktiske adfærd, og om ejeren opfatter denne adfærd som et problem. Således opfattede kun mellem 1/5 og 1/3 af de ejere, hvis hunde udviste adfærd, som er karakteristisk for de hyppigst forekomne adfærdsproblemer, dette som et problem (figur 1.4).

1.7. Hjælp til løsning af adfærdsproblemer

I ovennævnte undersøgelse havde kun 22,9 % af de hundeejere, der erkendte at have problemer med deres hunds adfærd, søgt hjælp til at få problemerne løst. Figur 1.5 viser, for de enkelte typer af adfærdsproblemer, den andel af hundeejerne, der havde søgt hjælp.

I undersøgelse fra 1999 (26) af årsager til aflivning af hunde blev kun 16 % af de hunde, som blev aflivet pga. adfærdsproblemer, forsøgt behandlet inden aflivningen. I hovedparten af tilfældene bestod behandlingen udelukkende af lydighedstræning, kastration, behandling med psykofarmaka og/eller hormonbehandling. Mindre end 5 % af de hunde, som blev aflivet pga. adfærdsproblemer, havde modtaget andre former for behandling – herunder professionel veterinær adfærdsrådgivning til ejeren og adfærdsterapi. Dette på trods af, at det er muligt at tilbyde adfærdsterapi, som kan bedre eller løse mange problemer.

Figur 1.5. Hjælp søgt i forbindelse med adfærdsproblemer



Kilde: Lund, 2000 (21)

Risikoen for aflivning pga. adfærdsproblemer vil naturligvis være afhængig af, hvilke problemer der er tale om. Alene-hjemme problemer, der som nævnt ovenfor er blandt de hyppigst forekommende adfærdsproblemer i Danmark, fører relativt sjældent til aflivning, men hvis hunden er aggressiv over for mennesker eller andre hunde, udgør den en reel fare for sine omgivelser. Forudsat, at hundens aggression opfattes som et problem af ejeren, er der derfor forholdsvis stor risiko for, at hunden bliver aflivet.

1.8. Mere fokus på adfærdsproblemer

I 1998 var adfærdsproblemer årsagen til omkring hver 4. aflivning af hunde på danske dyreklinikker (26). Siden har der været langt mere fokus på adfærd og adfærdsproblemer hos hunde. Der er kommet mange hundebøger om opdragelse og træning af hunde, og på internettet er der meget information om problemer med hunde. Desuden har antallet af personer, der tilbyder hjælp til ejere af hunde med adfærdsproblemer, været stigende.

I 1996 blev *Dansk Selskab for Klinisk Veterinær Etologi* (DSKVE) stiftet. *DSKVE* er et forum for dyrlæger med interesse for klinisk veterinær etologi og har bl.a. til formål at fremme kendskabet til veterinær etologi - såvel blandt kolleger som blandt offentligheden - samt at medvirke til efteruddannelse inden for det etologiske område. Det betyder, at folk i stigende grad vil kunne få kvalificeret hjælp i forbindelse med adfærdsproblemer, når de henvender sig til dyrlægen. I undersøgelsen fra 1999 (26) blev overraskende mange hunde aflivet på grund af adfærdsproblemer, uden de forinden var forsøgt behandlet. Dette forhold er dog formentlig på vej til at ændre sig markant med stiftelsen af *DSKVE*.

Alt andet lige må det derfor forventes, at antallet af aflivninger pga. adfærdsproblemer er faldende. Men siden 1998 er sket ændringer i racefordelingen blandt de hunde, som har størst risiko for at blive aflivet pga. adfærdsproblemer, dvs. hunde der er yngre end 3 år. Folks interesse spreder sig over langt flere racer end før. Specielt har der som nævnt ovenfor i de senere år været en stigende interesse for de såkaldte "muskelhunde", hvortil hører racer med en baggrund som kamphunde. Disse racer tiltaler tilsyneladende især yngre mennesker, som typisk vil være førstegangshundeejere. Desuden har den stærkt stigende interesse for visse hunderacer betydet, at der har været en stigende import af hvalpe fra udlandet - f.eks. Østeuropa.

Spørgsmålet er så, hvorledes denne udvikling har påvirket antallet af aflivninger af hunde i Danmark.

Den hyppigste årsag til aflivning af hunde på grund af adfærdsproblemer er aggression - specielt over for mennesker (26). Udviklingen i antallet af skadestuekontakter som følge af hundebid kan derfor give en indikation af, hvordan hyppigheden af aggressiv adfærd hos hunde - og dermed til dels også hyppigheden af aflivninger pga. aggression - har udviklet sig siden 1998.

Som nævnt ovenfor har antallet af skadestuekontakter som følge af hundebid imidlertid ligget nogenlunde konstant i perioden fra 1998 til 2003. Der har dog været et fald i antallet af skadestuekontakter blandt børn under 15 år. Så den øgede opmærksomhed omkring adfærdsproblemer hos hunde synes ikke at have påvirket hyppigheden af aggression hos hunde, der fører til personskade - og formentlig ofte aflivning af hunden. Men hundenes aggression rettes markant mindre hyppigt mod børn og hyppigere mod voksne end tidligere.

Hvis man skal gøre en indsats for at nedbringe antallet af hunde, som bliver aflivet på grund af adfærdsproblemer, er det nødvendigt at informere ejerne om, hvorledes de undgår at få problemer med hunden, samt hvad de skal gøre, hvis der alligevel opstår problemer.

Omkring 3 ud af 10 hundeejere har efter deres egen opfattelse problemer med deres hunds adfærd (21). Men kun mellem 1/4 og 1/3 af disse hundeejere vil søge hjælp for at få problemerne løst.

Aggressiv adfærd rettet mod andre hunde eller mod mennesker, angst og fobier samt separationsadfærd, når hunden er alene hjemme, er blandt de hyppigst forekomne former for problemadfærd. Men afhængig af, hvilken adfærd der er tale om, opfatter kun mellem 1/5 og 1/3 af de ejere, hvis hunde viser denne adfærd, dette som et problem.

Det er bemærkelsesværdigt, at mange ejere, hvis hunde optræder aggressivt over for mennesker og andre hunde, ikke opfatter hundens adfærd som et problem. En del af forklaringen kan være, at når hunden bider, snapper eller viser truende adfærd, kan det ske i mange forskellige situationer, og adfærden kan vises med forskellig hyppighed og intensitet, når disse situationer forekommer. Det betyder, at det kan være svært for ejeren at erkende, at der er problemer med hunden.

I den forbindelse er den store interesse for racer, der har en baggrund som kamphunde – f.eks. *Amerikansk staffordshire terrier*, bekymrende. Et af problemerne med disse racer er, at de kan have en nedsat følsomhed over for pacificeringsadfærd (12), hvilket betyder, at de oftere vil optræde aggressivt over for andre hunde. Efter sigende er hunde med en baggrund som kamphunde begyndt at dukke op hos landets dyrlæger pga. problemer med deres adfærd samt på landets dyreinternater.

En meget stor del af aflivningerne pga. adfærdsproblemer skal formentlig findes blandt de hunde, hvis ejere ikke opfatter hundens adfærd som et problem og får det løst, inden skaden er sket - f.eks. at hunden har bidt. I mange tilfælde kunne aflivning formentlig være undgået, hvis ejeren i tide havde søgt hjælp til at få problemerne løst.

En stor del af forskellen i forekomsten af adfærdsproblemer mellem den amerikanske (8) og danske undersøgelse (21) kan måske forklares ved, at amerikanerne er mere opmærksomme end danskere på deres hundes adfærd og mere tilbøjelige til at opfatte uhensigtsmæssig adfærd som et problem. Man skal dog være opmærksom på, at i modsætning til danske hvalpe sælges en del af de amerikanske gennem "pet shops", hvilket medfører en øget risiko for udvikling af adfærdsproblemer (30).

Selvom der ikke sælges hvalpe gennem "pet shops" i Danmark, findes der et antal hundehandlere, som opkøber hvalpe i udlandet med henblik på videresalg - typisk til en pris, som ligger under prisen for en dansk opdrættet hvalp. Hvor stort omfanget er af salg af hvalpe fra hundehandlere, samt hvor ofte de senere bliver aflivet pga. adfærdsproblemer, vides dog ikke.

Undersøgelsen fra 1999 (26) giver et billede af årsagerne til aflivning af familiehunde i 1998, men meget har - som nævnt ovenfor - formentlig ændret sig siden. Desuden siger undersøgelsen ikke noget om de faktorer, der har indflydelse på, om familien vælger at få hunden aflivet, hvilket kan have stor betydning, hvis hunden bliver aflivet pga. adfærdsproblemer. Der er derfor behov for at få belyst, dels hvordan antallet af aflivninger pga. adfærdsproblemer har udviklet sig, dels hvad det er for forhold, som er afgørende for, om familien vælger at få hunden aflivet.

2. Formålet med undersøgelsen

Formålet med undersøgelsen er, at:

- Undersøge, hvordan de forskellige hunderacer fordeler sig i landet - herunder, hvor hyppigt racer med en kamphundebaggrund forekommer, samt om de optræder særligt hyppigt bestemte steder i landet
- Undersøge den relative hyppighed af årsager til aflivning af hunde på danske dyreklinikker
- Sammenligne den relative hyppighed af aflivning på grund af adfærdsproblemer med undersøgelsen fra 1999 (26)
- Identificere egenskaber hos hunden, som har betydning for risikoen for aflivning

3. Design af undersøgelsen

3.1. Case-kontrol undersøgelse

Undersøgelsen blev udført som et case-kontrol-studium med longetudinal sampling. Case-gruppen bestod af hunde aflivet på danske dyreklinikker. Oplysninger om hundene blev indsamlet ved hjælp af spørgeskemaer udfyldt af smådyrspraktiserende dyrlæger på landets dyreklinikker. Som kontrolgruppe blev anvendt hunde registreret i *Dansk Hunderegister*. Case-gruppen blev sammenlignet med kontrolgruppen for at finde ud af, om visse racer oftere bliver aflivet på grund af en bestemt årsag end man skulle forvente ud fra deres andel af den danske hundepopulation.

3.2. Case-gruppen

3.2.1. Spørgeskemaet

Til brug ved indsamling af data blev udarbejdet et spørgeskema (bilag 1), som kunne udfyldes på klinikken i forbindelse med hver hund, som blev aflivet på klinikken.

For at få så mange dyreklinikker som muligt til at deltage i undersøgelsen, blev det ved udformningen af skemaet forsøgt at holde det arbejde, som klinikken bliver bedt om at udføre i forbindelse med den enkelte hund, på et minimum, samtidigt med, at der var mulighed for at lade sygeplejersken/receptionisten hjælpe med udfyldelsen. Det var således ikke meningen, at skemaet skulle gennemgås med hundeejeren.

Spørgeskemaet blev desuden udformet, så det var muligt at sammenligne de indsamlede oplysninger med resultaterne fra Jørgen Mikkelsens undersøgelse fra 1999 (26). I forbindelse med hunde, som blev aflivet på grund af adfærdsproblemer, blev der dog søgt ekstra oplysninger, som kunne forventes at have haft betydning i forbindelse med beslutningen om aflivning. Desuden var det muligt nærmere at specificere andre årsager eller medvirkende årsager til aflivning end medicinske/fysiske problemer eller adfærdsproblemer. Ved undersøgelsen fra 1999 blev ikke skelnet mellem skelletale lidelser og muskellidelser. Ved nærværende undersøgelse blev disse lidelser delt op i muskellidelser og problemer med led i ben, hofter, hals eller ryg.

Skemaet indeholdt to obligatoriske afsnit - ét om oplysninger vedrørende hunden (afsnit 1) og ét om årsagen eller årsagerne til aflivningen (afsnit 2). Desuden var 7 afsnit (A-D), som skulle udfyldes afhængigt af, hvilke årsager der var til, at hunden blev aflivet. Der var således et særligt afsnit for hver type problem angivet i afsnit 2 samt et afsnit vedrørende eventuel behandling forsøgt forud for aflivningen.

Spørgeskemaet indeholdt således spørgsmål om følgende forhold:

- Ejerens postnummer og hundens race, køn, seksuelle status (intakt eller neutraliseret) og alder - samt i forbindelse med hunde af blandingsrace også vægt og anslået skulderhøjde (afsnit 1)
- Årsagen til aflivning
    - Medicinske eller fysiske lidelser inklusiv alderdomssvækkelse
    - Aggressiv adfærd
        - ◊ Udtryk (truende adfærd, snappen eller bid)
        - ◊ Objekt (voksne i familien, børn i familien, fremmede mennesker, andre hunde)
        - ◊ Hyppighed (hvor ofte hunden har optrådt aggressivt)
        - ◊ Forudsigelighed (provokeret/uprovokeret, bestemte situationer, truende/undvigende adfærd før snappen/bid)
    - Frygtsomhed og angst
    - Problemer med at være alene hjemme, herunder typen af adfærd, som hunden viste
    - Andre problemer med hundens adfærd
    - Andre forhold end sygdom eller adfærd

- Eventuelle forsøg på behandling inden aflivningen på grund af adfærdsproblemer samt typen af behandling

3.2.2. Kontrakt til dyrlægerne
Dansk Selskab for Klinisk Veterinær Etologi (DSKVE) blev af fagdyrlæge Jørgen Mikkelsen informeret om undersøgelsen på foreningens generalforsamling d. 24-3-2006. Samtidig fik de deltagende dyrlæger mulighed for at tilkendegive, om de havde lyst til at deltage i undersøgelsen. Desuden blev de dyrlæger, som er medlemmer af *DSKVE* og tilknyttet en dyrlægepraksis, kontaktet skriftligt med henblik på at få dyreklinikken/dyrehospitalet til at deltage i undersøgelsen, da *DSKVE*'s medlemmer måtte forventes at have særligt stor interesse for undersøgelsen. Formålet var at få gang i dataindsamlingen hurtigst muligt. For yderligere at gøre opmærksom på undersøgelsen blev projektet beskrevet i *Dansk Veterinærtidsskrift* (22), som udkom d. 1-5-2006.

For at få stor geografisk spredning blandt de deltagende dyrlæger, så undersøgelsen kan blive så repræsentativ som muligt, blev ca. 200 dyrlægepraksis kontaktet skriftligt. De blev tilfældigt udvalgt blandt de praksis, som står opført på "De Gule Sider" på internettet samt har en hjemmeside eller annoncerer på nettet, fordi det så var muligt at gøre henvendelsen personlig.

Dyrlæger, som ikke reagerede på den første henvendelse, blev forsøgt kontaktet igen telefonisk af dyrlægestuderende Anna Johanson for at overtale dem til at deltage i undersøgelsen.

3.3. Kontrolgruppen

3.3.1. Valg af kontrolgruppe
Ved Jørgen Mikkelsens undersøgelse fra 1999 (26) bestod kontrolgruppen af den næstfølgende hund, som kom til klinikken, efter hver enkelt aflivning – uanset årsagen til konsultationen. Idéen var, at kontrolgruppen derved kom til at afspejle racefordelingen af hunde i de områder, hvor de deltagende dyreklinikker lå.

Men et af problemerne med en sådan kontrolgruppe er, at der formentlig er raceforskelle med hensyn til, hvor ofte hunden kommer til dyrlægen, blandt andet på grund af, at visse lidelser optræder hyppigere hos nogle racer end andre – f.eks. hud- og ørelidelser samt problemer med hofter og led. Det betyder, at odds ratios for aflivning - f.eks. på grund af adfærdsproblemer - hos racer, hvor disse lidelser optræder særligt hyppigt, bliver underestimeret set i forhold til andre racer

Desuden kan det ske, at racer, som hyppigt bliver aflivet pga. adfærdsproblemer, men udgør en relativt lille del af den samlede hundepopulation, af tilfældige årsager kun optræder med få individer (eller slet ingen) i kontrolgruppen. Derved vil det ikke blive muligt at vurdere disse racers odds ratio for aflivning set i forhold til andre racer.

Ved denne undersøgelse er hunde registreret i *Dansk Hunderegister* anvendt som kontrolgruppe, da den formentligt giver et mere præcist billede af racefordelingen af hunde i Danmark – dog må hunde af blandingsrace forventes at være underrepræsenteret i registret.

Ved at anvende hunde registreret i *Dansk Hunderegister* som kontrolgruppe blev det desuden muligt at sammenligne odds ratios for aflivning af andre årsager end adfærdsproblemer inden for de forskellige racer.

3.3.2. Kontakt til Dansk Hunderegister
Dansk Hunderegister blev ansøgt om adgang til følgende oplysninger om de enkelte hunde i registeret:

- Den registrerede ejers postnummer
- Hundens race og køn
- Fødselsdato

3.4. Statistisk analyse
Data fra de indsamlede spørgeskemaer blev indlæst i databaseprogrammet Paradox version 9. Samtlige statistiske analyser blev foretaget ved hjælp af statistikprogrammet SAS version 9.2.

Fordelingen af registrerede hunde i Danmark er beregnet på grundlag af hunde opført i *Dansk Hunderegister* i begyndelsen af 2006 samt antallet af husstande i de forskellige postområder 1-1-2006 ifølge *Post Danmark* (28).

Gennemsnit, medianer og kvartiler er beregnet ved hjælp af proc UNIVARIATE. Beregning af 95 % konfidensintervaller (CI95) for proportioner blev foretaget ved hjælp af proc FREQ. Forskelle mellem andelen af hunde aflivet af forskellige årsager i Jørgen Mikkelsen undersøgelse fra 1999 og i nærværende undersøgelse blev testet ved hjælp af en Chi-square test (proc FREQ). 95 % konfidensintervallet angiver usikkerheden på et estimat. Man kan sige, at hvis man går ud og lavede en tilsvarende undersøgelse omfattende en tilsvarende population, og omstændighederne er de samme, vil man med 95 % sikkerhed komme til et resultat, som ligger inden for konfidensintervallet.

Aldersfordelinger blev sammenlignet ved hjælp af Wilcoxon test for to uafhængige stikprøver (proc NPAR1WAY).

Overlevelsestabeller og overlevelseskurver blev beregnet ved hjælp af proc LIFETEST. Beregningerne er foretaget på grundlag af aldersfordelingen blandt de aflivede hunde fordelt på race og racetype, størrelse samt køn. Ved beregningerne anvendtes en kombination af data fra nærværende undersøgelse samt data fra Jørgen Mikkelsens undersøgelse fra 1999 (26).

Forudsat 1) at alle hunde ender deres dage hos dyrlægen, samt 2) at racefordelingen i populationen af hunde er nogenlunde stabil over tid, vil de aflivede hunde i en given periode være en approksimation til dødeligheden hos en kohorte, som følges fra fødsel til død. Denne kohortes gennemsnitlige levetid er en approksimation til populationens gennemsnitlige levetid forudsat, at dødeligheden i populationen samt populationens størrelse er uændret over tid (15).

Overlevelsesfunktionen er beregnet som:

$$S_a = 1 - \frac{\sum_{i=0}^{a-1} N_i}{N_t}$$

a = alderen ved starten af aldersintervallet *i*

S_a = den estimerede overlevelse ved starten af aldersintervallet *i*

N_i = antal dødsfald/aflivninger inden for aldersintervallet *i*

N_t = samtlige dødsfald/aflivninger inden for observationsperioden

Hazardfunktionen er udtryk for hældningskoefficienten for tangenten til et givent punkt *t* på kurven beskrevet ved overlevelsesfunktionen, og er et estimat for øjeblikkelige risiko for, at en hændelse vil indtræffe (for eksempel aflivning) til tiden *t*, forudsat at individet har overlevet til tiden *t*. Hazardfunktionen angiver antallet af hændelser pr. tidsinterval og er således en rate - ikke en sandsynlighed.

Overlevelseskurver blev sammenlignet ved hjælp af Log-Rank Test samt Wilcoxon Test (proc LIFETEST).

Ved sammenligningen af andelen af hunde inden for de enkelte racer, som blev aflivet på grund af forskellige årsager, anvendtes en kombination af data fra nærværende undersøgelse og data fra Jørgen Mikkelsens undersøgelse fra 1999. Ved hjælp af en Chi-square test (proc FREQ) blev testet, om andelen af hunde aflivet af en given årsag inden for de forskellige racer afveg signifikant fra andelen af hunde aflivet af denne årsag inden for racen *Labrador retriever*.

Odds ratio (OR) for aflivning blev foretaget med hunde registreret i *Dansk Hunderegister* som kontrolgruppe. Da hunde normalt registreres i *Dansk Hunderegister* inden 4 måneders alderen, men sjældent afmeldes i tilfælde af aflivning/død, afspejler hunde i registret kun delvis hunde, som stadig findes i populationen, derfor stadig er i risiko for aflivning. Antallet af registrerede hunde blev derfor korrigeret for det antal hunde, som må forventes aflivet ud fra den forventede overlevelse hos de forskellige hunderacer. Dette er sket ved, at antallet af hunde ved udgangen af et givent år er estimeret som antallet af hunde registreret i løbet af året plus det forventede antal overlevet fra hvert af de foregående år fra registrets start i 1993:

$$N_y = R_y + \sum_{i=1993}^{y-1} \sum_{j=i}^{y} \left(S_{i,j} \times R_i \right)$$

y = registreringsår

N_t = antal registrerede hunde i den danske hundepopulation ved udgangen af året *y*

R_y = antal hunde registreret i løbet af året *y*

R_i = antal hunde registreret i løbet af året *i*

$S_{i,j}$ = andelen af hunde registreret i løbet af året *i*, som er forventet overlevet til året *j*

Ved beregning af OR for aflivning på grund af de forskellige lidelser/problemer anvendtes en kombination af data fra nærværende undersøgelse samt data fra Jørgen Mikkelsens undersøgelse fra 1999. Der blev stratificeret for studium, idet racefordelingen fra undersøgelsen fra 1999 blev sammenlignet med den forventede fordeling blandt registrerede hunde i den danske hundepopulation i 1998, mens racefordelingen i den nærværende undersøgelse blev sammenlignet med den forventede fordeling i 2005. Ved beregningerne vedrørende raceforskelle blev *Labrador retriever* anvendt som referencegruppe. Når ses bort fra stratificering, kan OR beregnes på følgende måde:

	Racer, som sammenlignes	
	Race i focus	Referencegruppe
Aflivede hunde	a	c
Hunde registret i DHR	b	d

$$OR = \frac{a/b}{c/d} = \frac{a \times d}{b \times c}$$

Ved sammenligningen af 1) racehunde med hunde af blandingsrace, 2) kamphunde/kamphunde-blandinger med andre racer/blandinger, 3) hanhunde med tæver samt 4) intakte med neutraliserede hunde blev beregnet, hvor meget andelen af hunde aflivet af en given årsag i den ene gruppe afveg fra den tilsvarende andel i den anden gruppe. Hvis de to andele var identiske, ville den beregnede værdi blive 1. Sammenligningen blev foretaget på følgende måde følgende måde (proc FREQ):

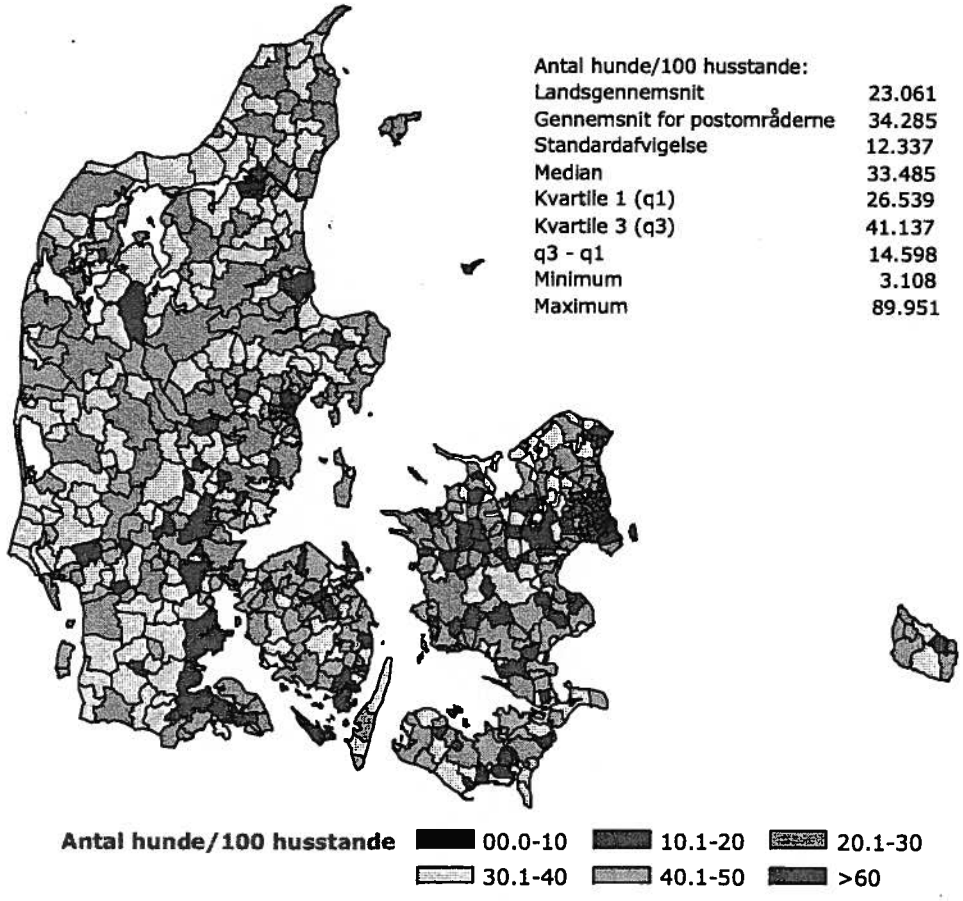
Årsag til aflivning	Proportioner, som sammenlignes	
	Gruppe 1	Gruppe 2
Given årsag	a	c
Andre årsager	b	d
	a + b	c + d

$$P1/P2 = \frac{a/(a+b)}{c/(c+d)} = \frac{a \times (c+d)}{c \times (a+b)}$$

Forskellen mellem de to proportioner blev testet ved hjælp af en Chi-square test.

Ved sammenligningerne anvendtes en kombination af data fra nærværende undersøgelse og data fra Jørgen Mikkelsens undersøgelse fra 1999 - undtagen i forbindelse med sammenligningen af kamphunde/kamphundeblandinger med andre racer/blandinger, da kamphunde kun var repræsenteret ved ganske få individer i sidstnævnte undersøgelse.

Figur 4.1. Fordeling af registrerede hunde i Danmark



4. Resultater

4.1. Beskrivelse af kontrolgruppen

4.1.1. Fordelingen af hunde i Danmark

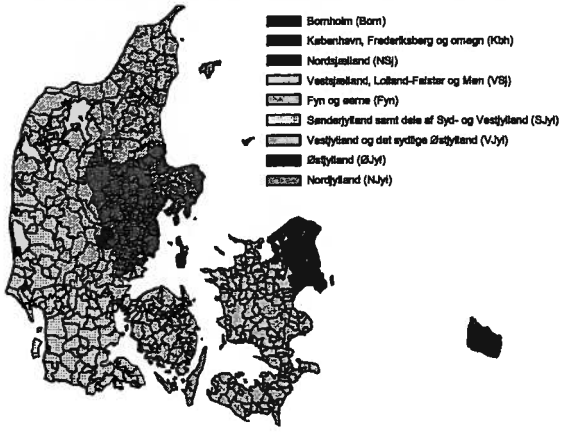
Der er ca. 600.000 hunde registreret i DHR (2006). Figur 4.1 viser, hvorledes hundene er fordelt efter postområde. Generelt ses en lav hyppighed af hunde pr. husstand i de store byer som København, Århus, Odense og Esbjerg. Der er imidlertid store forskelle mellem racerne på, hvordan de fordeler sig i landet (tabel 4.1). For eksempel optræder jagthunderace som *Ruhåret hønsehund*, *Korthåret hønsehund* og *Kleiner mynsterlænder* med særlig stor hyppighed i Vestjylland, men forekomsten er lav på Sjælland. Omvendt optræder racer som *Cavalier king charles spaniel* og *Rottweiler* med særlig stor hyppighed på Sjælland. Det samme gælder racer med kamphunde baggrund set under ét.

4.1.2. Årlig tilgang af hunde

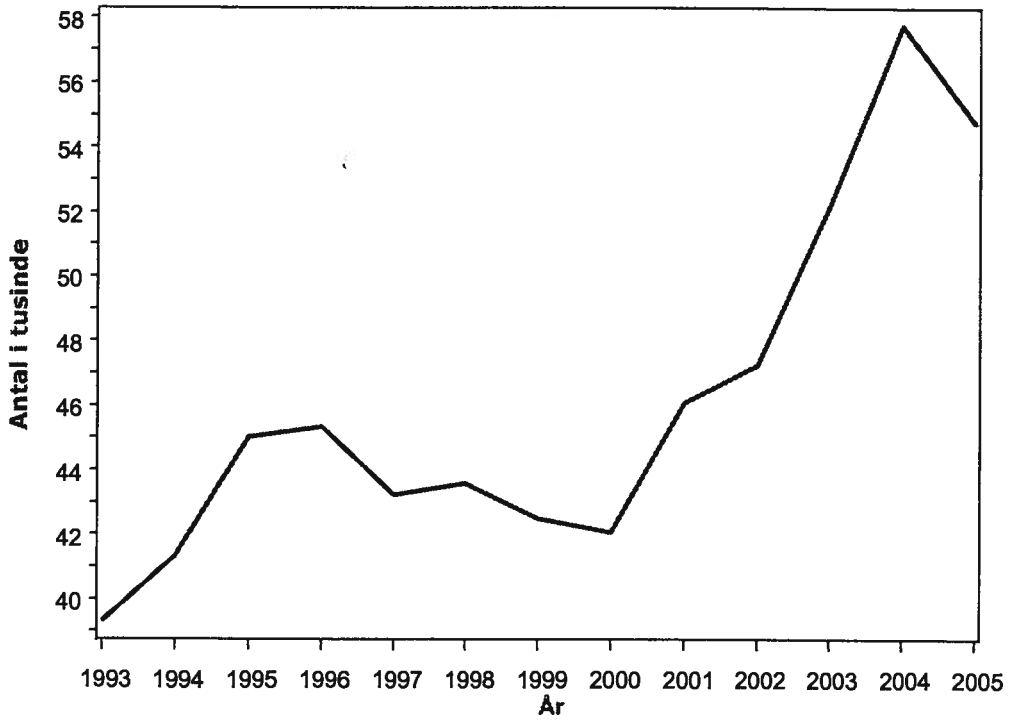
Figur 4.2 viser den årlige tilgang af hunde, som registreres i DHR. Fra registrets start i 1993 til 1996 skete en stigning i den årlige tilgang af hunde fra 39.000 til 45.000, hvorefter der skete et fald til 42.000 i 2000. Det fald afløstes imidlertid af en markant stigning til knap 58.000 hunde pr. år i 2004, som dog afløstes af et mindre fald til 55.000 hunde i 2005.

Tabel 4.1. De 20 mest udbredte hunderacer i Danmark
(racens andel af hunde registreret i DHR er angivet i %)

Race	Kbh	NSj	VSj	Born	Fyn	SJyl	VJyl	ØJyl	NJyl	Hele
Labrador retriever	9,24	11,92	16,63	9,63	16,11	12,37	13,21	12,45	11,78	13,12
Schæferhund	6,82	8,16	8,09	8,18	7,63	7,49	7,76	8,03	8,03	7,75
Golden retriever	3,55	3,86	3,27	3,18	3,89	4,67	4,23	3,97	4,93	3,97
Dansk/svensk gårdhund	3,00	3,06	3,04	5,20	2,08	2,88	2,39	2,75	2,15	2,74
Cocker spaniel	2,49	2,17	2,18	1,05	2,34	2,40	2,78	2,55	2,77	2,44
Ruhåret hønsehund	0,67	1,12	2,10	2,59	2,35	3,66	3,42	2,19	2,80	2,29
Rottweiler	2,16	1,98	2,82	0,93	1,86	1,55	1,44	1,85	1,74	1,99
Cairn terrier	2,70	2,48	1,58	0,97	1,85	1,57	1,91	2,17	1,63	1,95
West highland white terrier	2,78	2,39	1,75	0,69	1,55	1,83	1,71	2,08	1,39	1,93
Ruhåret gravhund	1,75	2,24	1,57	1,08	1,90	1,51	1,62	1,82	2,02	1,75
Engelsk springer spaniel	0,94	1,14	2,14	2,82	2,29	1,38	1,98	2,13	1,17	1,71
Kleiner mynsterlænder	0,43	0,49	0,64	0,98	1,23	1,91	2,20	1,48	1,63	1,22
Korthåret gravhund	0,76	0,75	0,85	1,92	1,50	1,50	1,41	1,13	1,46	1,15
Korthåret hønsehund	0,38	0,61	0,94	2,51	1,11	2,15	1,32	0,87	1,84	1,15
Cav. king charles spaniel	1,71	1,31	1,38	0,30	0,52	0,73	1,28	1,01	0,74	1,11
Beagle	1,24	0,92	1,02	0,92	0,94	1,05	1,07	0,97	1,02	1,04
Langhåret dværg gravhund	0,90	1,00	0,95	1,31	0,74	0,76	1,12	1,13	1,34	0,99
Flat coated retriever	0,93	0,99	0,99	1,33	1,02	0,85	0,91	0,90	0,82	0,93
Collie	0,74	1,07	0,95	0,95	0,71	0,84	1,03	0,79	0,85	0,87
Border Collie	0,84	1,22	0,88	0,97	0,78	0,94	0,75	0,75	0,87	0,86
Andre racehunde	33,03	30,78	27,03	24,76	28,15	26,70	27,74	28,40	28,87	28,64
Blandinger	22,95	20,34	19,19	27,73	19,45	21,25	18,73	20,58	20,14	20,42



Figur 4.2. Årlig tilgang af hunde



4.1.3. Forholdet mellem race- og blandingshunde

Knap 80 % af hundene i DHR er registreret som racehunde og 11,5 % som hunde af blandingsrace. For 9 % af hundene er racen ikke registreret, men hovedparten af disse hunde er registreret før 2000, hvorefter andelen af blandinger steg til ca. 19 % og hunde, hvor racen ikke er registreret, til nær 0 %. Dette viser, at sidstnævnte hunde må formodes at være hunde af blandingsrace, som så må udgøre omkring 20 % af samtlige hunde i registret.

4.1.4. Racefordelingen af hunde

Antallet af forskellige hunderacer, som årligt er registret i DHR, er steget fra ca. 185 til ca. 240 i perioden 1993 til 2005 (figur 4.3). Men de 20 hyppigst forekomne racer udgør mere end 50 % af samtlige racehunde (tabel 4.1). Det er specielt hunderacer med en skulderhøjde på 40 til 60 cm, som danskere viser stigende interesse for (figur 4.5).

Andelen af hunde af racen *Labrador retriever* registreret i DHR har vist en jævn stigning fra 11 % af samtlige hunde i 1993 til 15 % i 2005 (figur 4.4). Andelen af *Schæferhunde* har derimod i samme periode vist et jævnt fald fra 11 % til 6,5 %. Andelen af *Golden retriever* har til gengæld ligget nogenlunde konstant omkring 4 % af samtlige hunde og andelen af *Cocker spaniel* nogenlunde konstant omkring 2,5 %

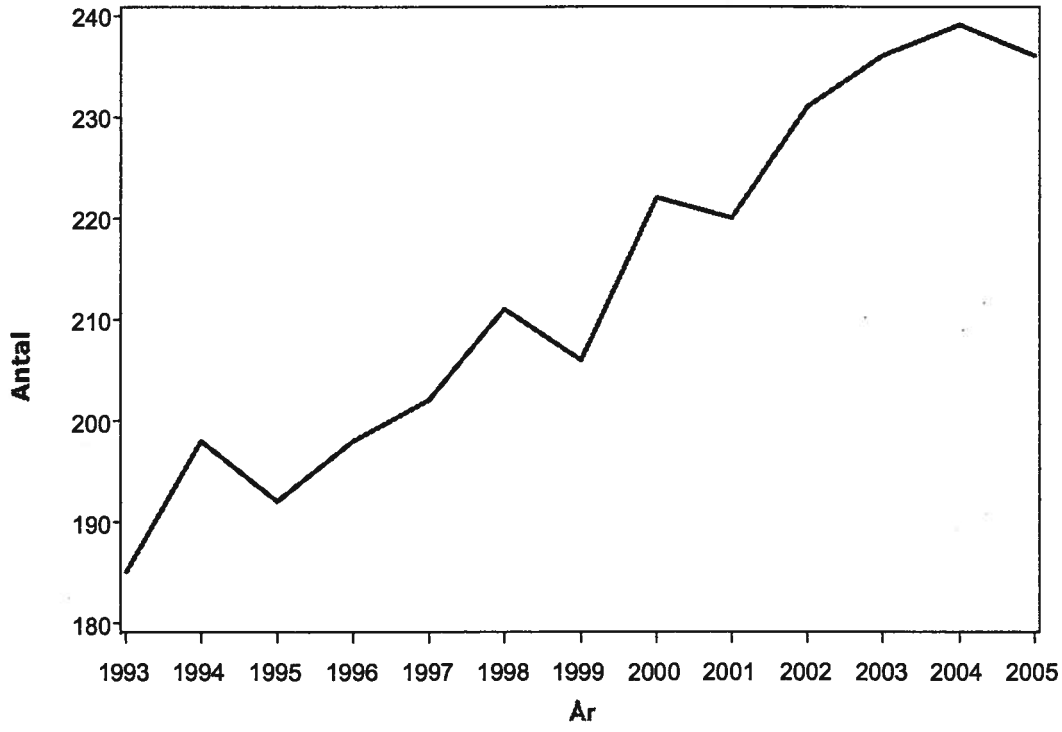
Af andre af de mest populære racer er sket et markant fald i andelen af *Ruhåret hønsehund* fra godt 3 % til knap 1,5 % af de registrerede hunde, mens der er sket en markant stigning i andelen af

Dansk/svensk gårdhund fra 1,5 % til 3,5 %. Andelen af *Rottweiler* har vist svagt stigende tendens, idet den har ligget på mellem 1,7 % og 2,1 %.

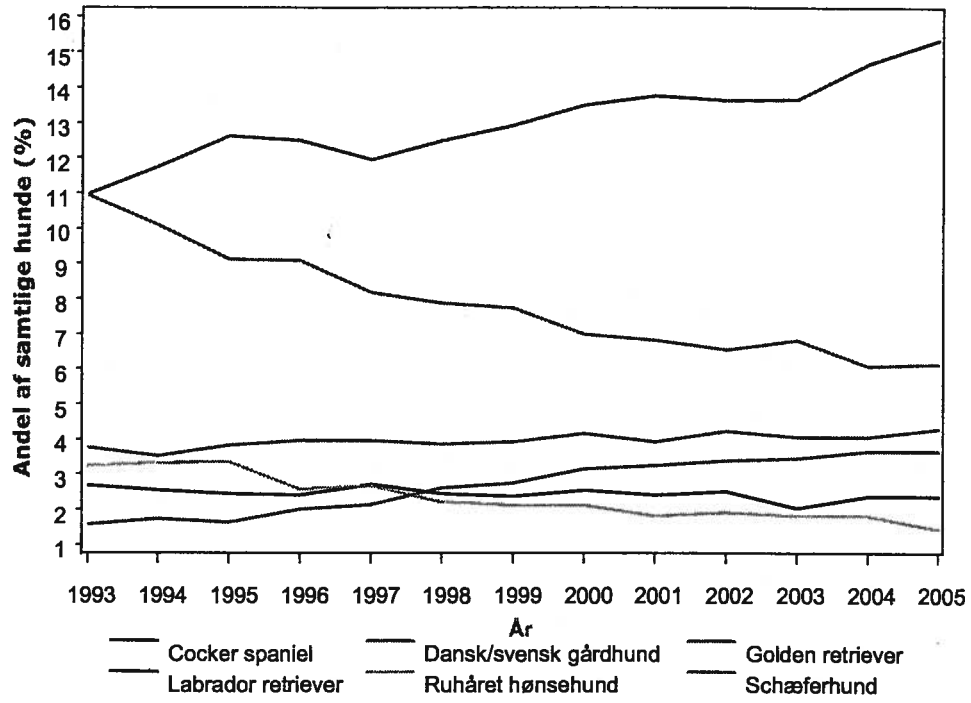
Mens andelen af *Cairn terrier* har svinget mellem 1,8 % og 2,1 % af en årgangs registreringer, skete i 2002 – 2003 en markant stigning i andelen af *West highland white terrier* fra 1,7 % til knap 2,5 %. Denne stigning efterfulgtes dog af et fald til godt 1,8 % i 2005. I 2000 – 2002 sås en tilsvarende stigning i andelen af registrerede *Engelsk springer spaniel* fra 1,3 % til 2,1 %. Også for denne race afløstes stigningen af et fald, dog knap så markant som for *West highland white terrier*.

Ligesom for *Ruhåret hønsehund* har der været et generelt fald i andelen af *Kleiner mynsterlænder*, som er faldet fra 1,7 % i 1994 til 1,0 % 2005. Efter at have ligget relativt konstant i en årrække faldt andelen af *Ruhåret gravhund* pludseligt fra 2,0 % i 2000 til 1,6 % i 2002.

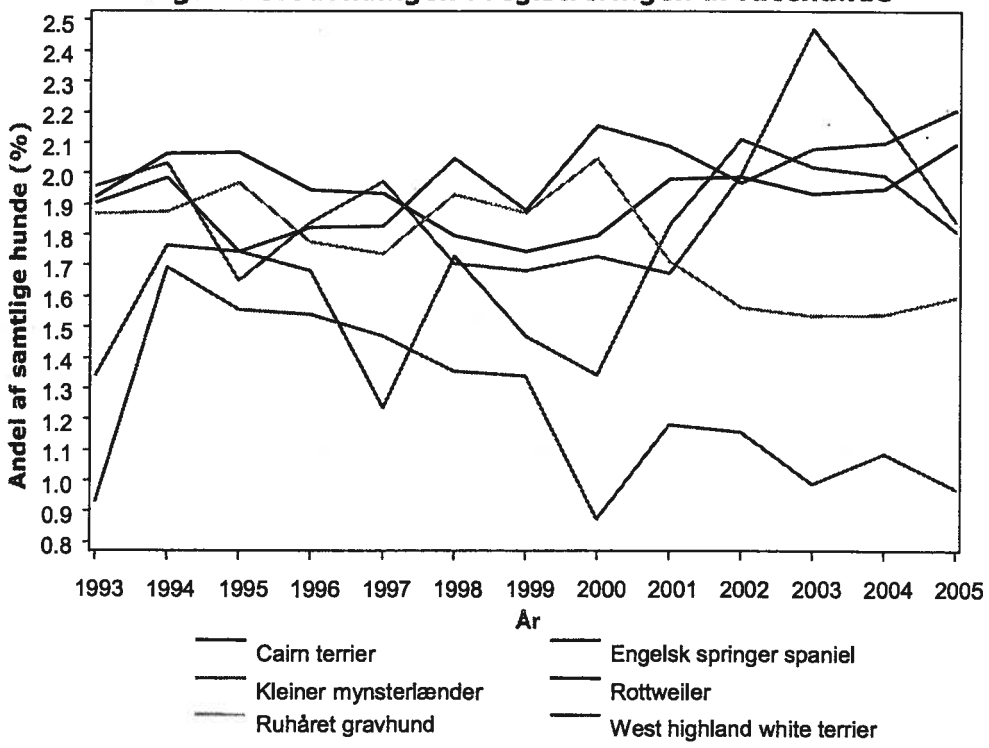
Figur 4.3. Antal forskellige racer



Figur 4.4.Udviklingen i registreringen af racehunde



Figur 4.5.Udviklingen i registreringen af racehunde



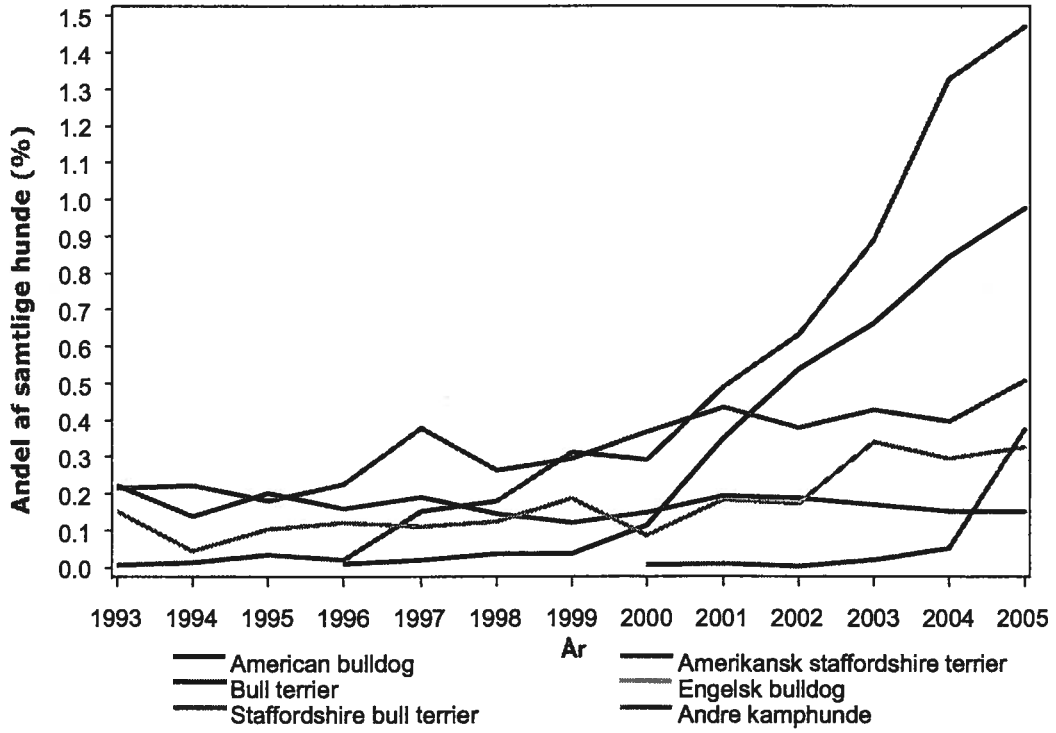
4.1.5. Forekomst af "kamphunde"

Figur 4.6. viser udviklingen i antallet af hunde tilhørende racer med baggrund som kamphunde. Før 1996 blev der næsten ikke registreret nogen hunde af racen *Amerikansk staffordshire terrier* i Danmark, men siden er andelen af årlige registreringer af denne race steget til knap 1,5 % af samtlige hunde i 2005 (tabel 4.2a). Andelen af hunde af racen *American Bulldog* er fra 1999 steget til omkring 0,9 % og hunde af racen *Staffordshire bullterrier* fra 2002 til godt 0,3 %. Andelen af registreringer af *Engelsk bulldog* har ligget relativt konstant omkring 0,1 procent indtil 2001 og har siden vist en svagt stigende tendens. Interessen for *Bull terrier* har ligget nogenlunde konstant i hele perioden fra 1993 til 2005. Ses på interessen for andre kamphunde racer set under ét, har interessen kun været svagt stigende fra 0,2 % af registreringerne i 1993 til godt 0,4 % i 2005.

Tabel 4.2a. Registrering af kamphunde

Race	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
American bulldog	.	.	.	0,01	0,02	0,04	0,04	0,11	0,35	0,54	0,66	0,85	0,98
Amerikansk staffordshire terrier	0,01	0,01	0,04	0,02	0,15	0,18	0,31	0,29	0,49	0,63	0,89	1,33	1,47
Bull terrier	0,22	0,14	0,20	0,16	0,19	0,14	0,12	0,15	0,19	0,19	0,17	0,15	0,15
Engelsk bulldog	0,15	0,05	0,10	0,12	0,11	0,12	0,19	0,09	0,18	0,17	0,34	0,30	0,33
Staffordshire bull terrier	.	.	.	.	.	.	.	0,00	0,01	0,00	0,02	0,05	0,38
Andre kamphunde	0,22	0,22	0,18	0,23	0,38	0,26	0,29	0,37	0,43	0,38	0,43	0,42	0,53
Total	0,60	0,42	0,52	0,53	0,85	0,75	0,95	1,01	1,67	1,91	2,51	3,09	3,83

Figur 4.6. Udviklingen i registreringen af kamphunde

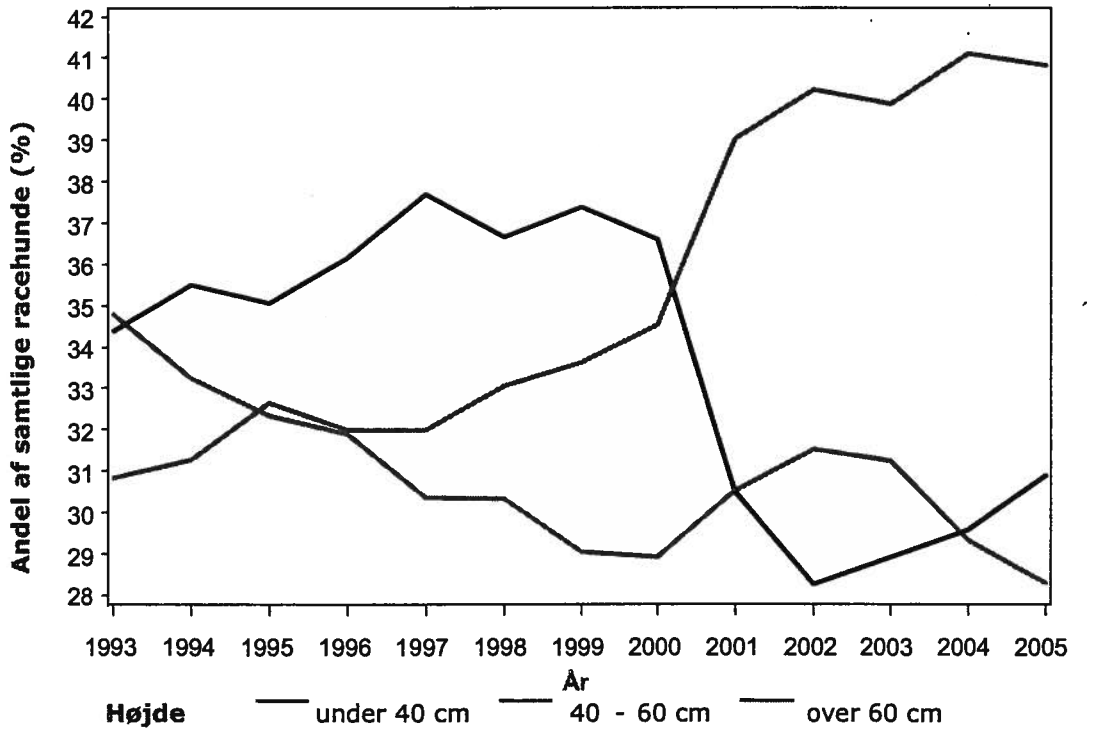


Tabel 4.2b. Forekomst af kamphunde og kamphundeblandinger i forskellige landsdele

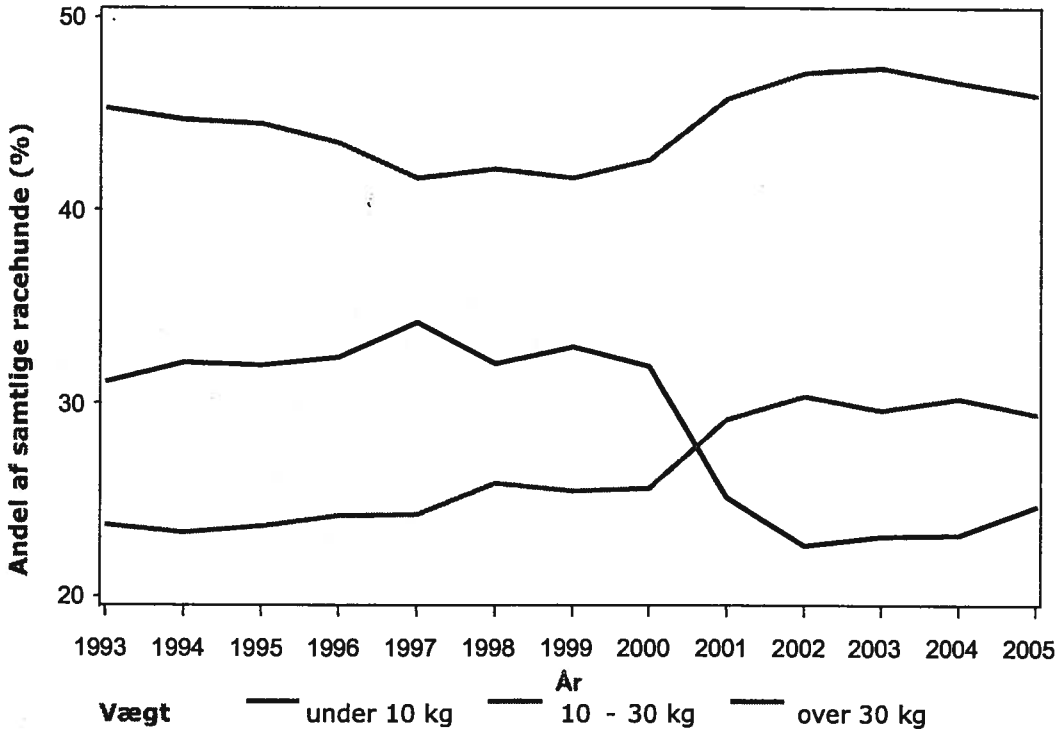
Landsdel	Kamphunde	%	Kamphundebl	%
København, Frederiksberg og omegn	2838	3,44	36	0,04
Nordsjælland	745	1,75	12	0,03
Vestsjælland, Lolland-Falster, Møn	2231	1,89	30	0,03
Bornholm	36	0,60	0	0,00
Fyn og øerne	910	1,56	13	0,02
Sønderjylland, dele af Syd- og Vestjyll	773	1,00	8	0,01
Vestjylland, det sydlige Østjylland	515	0,79	14	0,02
Østjylland	1161	1,27	19	0,02
Nordjylland	997	1,63	11	0,02

Der er mere end 10.000 registrerede kamphunde i Danmark (10.206 i 2005), men de er meget ujævnt fordelt i landet (tabel 4.2b). Kamphunde udgør således næsten 3,5 % af de registrerede hunde i København, Frederiksberg og omegn. Jo længere man bevæger sig sydvest i landet, jo mindre bliver andelen af kamphunde. De forekommer hyppigere på Sjælland end på Fyn samt hyppigere på Fyn end i Jylland. Den laveste forekomst af kamphunde ses i sydvestlige Jylland.

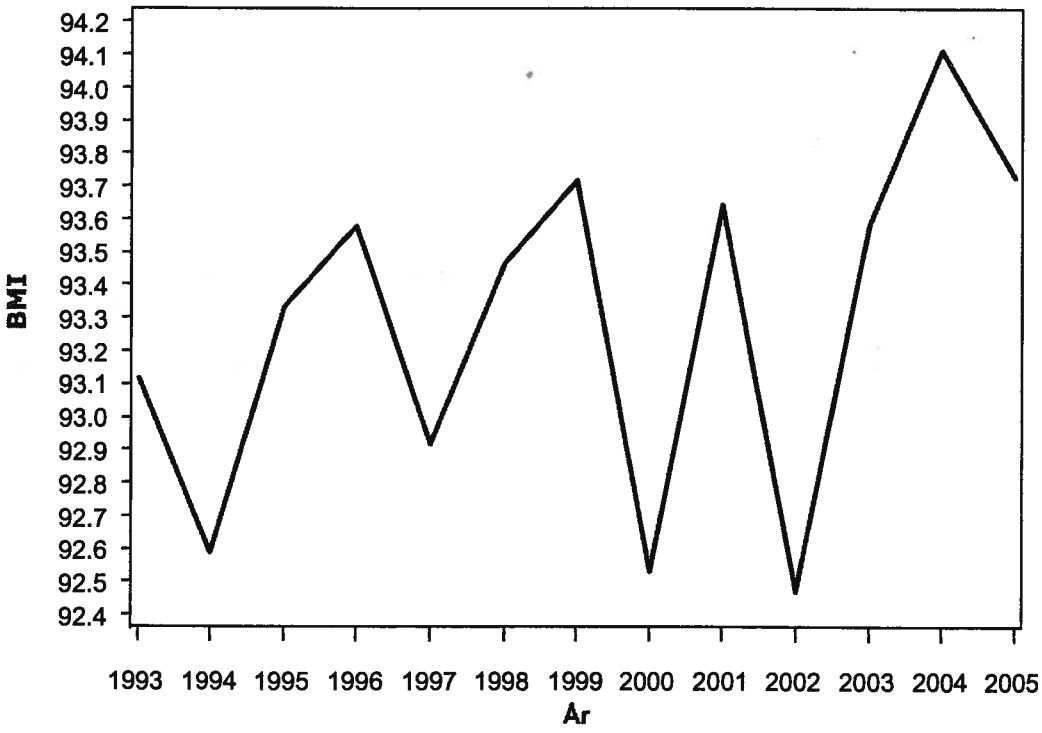
Figur 4.7. Fordeling på størrelsesklasser



Figur 4.8. Fordeling på vægtklasser



Figur 4.9. Body Mass Index



4.1.6. Racernes fordeling på størrelse og vægt

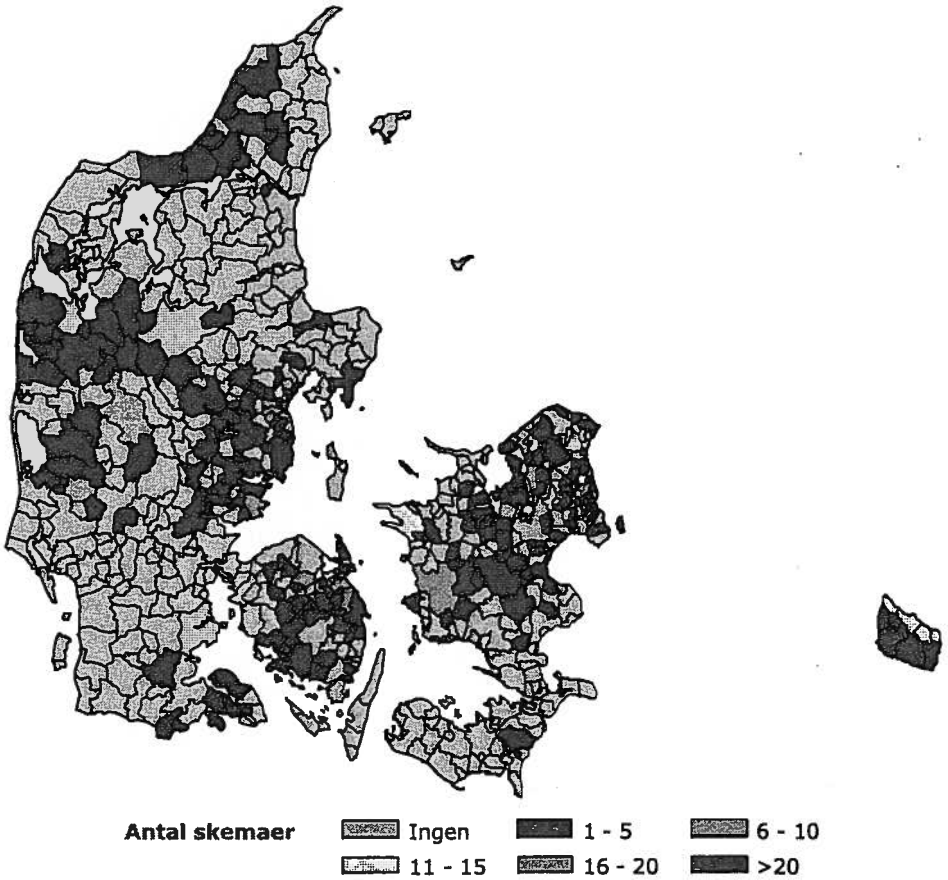
Som det ses på figur 4.7 er der i perioden fra 1993 til 2005 set en stigning i andelen af hunde tilhørende racer med en skulderhøjde på mellem 40 – 60 cm blandt de hunde, som årligt registreres. Særligt markant var stigningen fra 2001 til 2002, hvor den skete på bekostning af hunde tilhørende racer med en skulderhøjde under 40 cm. Andelen af hunde tilhørende racer med en skulderhøjde over 60 cm faldt jævnt fra 1993 til 2000, men steg midlertidigt fra 2000 til 2002.

Når der ses på hundenes kropsvægt, ses de samme trends: en stigning i andelen af hunde tilhørende racer mellem 10 – 30 kg samt et fald i andelen af hunde tilhørende racer under 10 kg (figur 4.8) i perioden fra 2000 til 2002.

Mens hunde tilhørende racer med en skulderhøjde over 60 cm i de fleste årgange udgjorde den laveste andel af hundene, udgjorde hunden tilhørende racer med en kropsvægt over 30 kg den største andel i alle årgange. Dette skyldes at de anvendte højdekategorier og de anvendte vægtkategorier ikke deler racerne på samme måde.

Body Mass Index'et for de årligt registrerede hunde har ikke ændret sig nævneværdigt i løbet af perioden fra 1993 til 2005, idet indekset kun har svinget frem og tilbage mellem ca. 92,5 og 94,1 (figur 4.9).

Figur 4.10. Fordeling af indsamlede spørgeskemaer



4.2. Indsamlede data

I alt blev indsamlet 1236 spørgeskemaer udfyldt på 42 dyreklinikker/-hospitaler i perioden 16-3-2006 til 24-3-2007. Det var god geografisk spredning på postområder blandt de aflivede hunde, men hovedparten var koncentreret bestemte steder i landet (figur 4.10). Der var særlig mange hunde fra Bornholm.

Ved undersøgelsen fra 1999 blev indsamlet 2493 spørgeskemaer vedrørende aflivede hunde fordelt på 120 dyreklinikker/-hospitaler i perioden juli 1997 til april 1998. Desværre blev der ikke indsamlet oplysninger om, i hvilket postområde ejerne boede.

4.3. Årsager til aflivning af hunde

4.3.1. Typer af årsager

For 78,8 % af hundene var medicinske eller fysiske lidelser årsag eller medvirkende årsag til aflivningen (tabel 4.3a). Denne andel var signifikant højere end den tilsvarende andel (71,5 %) i undersøgelsen fra 1999. Derimod var der ikke signifikant forskel på andelen af hunde aflivet pga. adfærdsproblemer mellem de to undersøgelser (22,0 % vs. 23,8 %). For kun 5,6 % af hundene var andre forhold end sygdom eller adfærd årsag eller medvirkende årsag til aflivningen. Denne andel var signifikant lavere end den tilsvarende andel (7,4 %) i undersøgelsen fra 1999.

Tabel 4.3b viser, hvorledes de forskellige aflivningsårsager fordelte sig i forskellige dele af landet (2007). Der var store forskelle mellem landsdelene med hensyn til den relative hyppighed af aflivningsårsager. For eksempel var andelen af hunde aflivet på grund af aggression næsten dobbelt så stor i Sønderjylland (og tilstødende områder) set i forhold til andelen i København, Frederiksberg og omegn (23,3 % vs. 12,4 %).

Tabel 4.3a. Hyppighed af årsager til aflivning

Årsag	Studium	P	P_{low}	P_{upp}	Pr
Medicinsk/fysisk lidelse	2007	78,8	76,5	81,1	0,0000
	1999	71,5	69,7	73,3	.
Adfærdsproblemer	2007	22,0	19,7	24,4	0,2360
	1999	23,8	22,1	25,5	.
Andre forhold end sygdom eller adfærd	2007	5,6	4,3	6,9	0,0413
	1999	7,4	6,4	8,5	.
Årsag ikke oplyst	2007	0,9	0,4	1,4	0,4884
	1999	0,7	0,4	1,0	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse;
Pr = p-værdi for forskel mellem studier

Tabel 4.3b. Fordeling af aflivningsårsager i forskellige landsdele

Landsdel	N	Andel	Med-fys lidel	Aggres-sion	Frygt angst	Separa-tion	Anden adfærd	Andre probl
København, Frederiksberg og omegn	177	14,3	80,2	12,4	1,7	3,4	5,1	6,2
Nordsjælland	66	5,3	77,3	18,2	4,6	1,5	6,1	6,1
Vestsjælland, Lolland-Falster, Møn	151	12,2	76,8	13,3	3,3	3,3	9,9	7,3
Bornholm	154	12,5	83,8	10,4	2,6	0,7	5,8	7,1
Fyn og øerne	187	15,1	75,4	19,8	5,4	3,2	7,0	3,7
Sønderjylland, dele af Syd- og Vestjyll	43	3,5	72,1	23,3	7,0	2,3	2,3	2,3
Vestjylland, det sydlige Østjylland	164	13,3	76,2	14,6	3,1	2,4	3,7	4,9
Østjylland	213	17,2	77,5	15,5	1,9	1,9	1,9	4,2
Nordjylland	61	4,9	78,7	13,1	6,6	3,3	8,2	9,8
Ikke oplyst	20	1,6	85,0	10,0	5,0	.	5,0	5,0

Også med hensyn til andelen af hunde, som blev aflivet på grund af frygtsomhed eller angst, skilte Sønderjylland sig ud, idet hele 6,98 % af hundene blev aflivet på grund af disse årsager – mod for eksempel kun 1,69 % i Københavnsområdet og 1,88 % i Østjylland. Med hensyn til andelen af hunde, der blev aflivet på grund af problemer med at være alene hjemme, sås ligeledes store forskelle mellem landsdelene. Andelen var høj (> 3 %) i Københavnsområdet, i Vestsjælland, på Fyn og i Nordjylland, mens den var lav på Bornholm (0,65 %) og i Nordsjælland (1,52 %) samt relativ lav i Østjylland (1,88 %).

4.3.2. Medicinske/fysiske problemer

Hele 20,1 % af hundene blev aflivet pga. problemer med muskler eller led, hvilket er en signifikant stigning på omkring 170 % i forhold til undersøgelsen fra 1999 (tabel 4.4a). Ligeledes sås signifikante stigninger i andelen af hunde aflivet pga. neoplasier fra 12,8 % til 17,5 % og andelen af hunde aflivet pga. hjerte-/lungelidelser fra 4,9 % til 6,6 %. Derimod sås et fald i andelen af hunde aflivet med diagnosen alderdomssvækkelse fra 32,6 % til 29,3 %.

Derudover sås en stigning i andelen af hunde aflivet pga. følgende lidelser: lever-/nyrelidelser (4,4 % til 5,6 %), hudlidelser (3,9 % til 4,5 %), endocrine lidelser (2,4 % vs. 2,8 %) samt centralnervøse lidelser (3,2 % til 4,4 %). Disse forskelle var dog ikke statistisk signifikante. Andelen af hundene aflivet pga. genitale lidelser var stort set uændret (2,7 % til 2,6 %).

I nærværende undersøgelse var problemer med led årsag eller medvirkende årsag til aflivning for 19,9 % af hundene, mens kun problemer med muskler kun var årsag eller medvirkende årsag for 1,0 %. Blandt de hunde, som blev aflivet på grund af ledproblemer (N=246), var typen af led ikke angivet for 4,9 %. Blandt de hunde, hvor typen var angivet, havde 64,5 % problemer med benene, 53,0 % hofteproblemer og 30,8 % problemer med ryggen. Kun 2,1 % havde problemer med led i halsen (tabel 4.4b).

Tabel 4.4a. Medicinske/fysiske årsager til aflivning af hunde

Lidelse	Studium	P	P_{low}	P_{upp}	Pr
Hjerte/lunge	2007	6,6	5,2	8,0	0,0335
	1999	4,9	4,0	5,7	.
Lever/nyre	2007	5,6	4,3	6,9	0,0982
	1999	4,4	3,6	5,2	.
Genital	2007	2,6	1,7	3,5	0,8170
	1999	2,7	2,1	3,4	.
Neoplasier	2007	17,5	15,3	19,6	0,0001
	1999	12,8	11,4	14,1	.
Muskler/led	2007	20,1	17,9	22,4	0,0000
	1999	7,5	6,4	8,5	.
Hud	2007	4,5	3,3	5,6	0,4053
	1999	3,9	3,1	4,6	.
Endocrin	2007	2,8	1,9	3,8	0,4752
	1999	2,4	1,8	3,1	.
CNS	2007	4,4	3,2	5,5	0,0602
	1999	3,2	2,5	3,9	.
Alderdomssvækkelse	2007	29,3	26,8	31,8	0,0408
	1999	32,6	30,8	34,5	.
Andre lidelser	2007	10,7	9,0	12,4	0,0000
	1999	4,9	4,0	5,7	.
Lidelse ikke oplyst	2007	0,3	0,0	0,6	.
	1999	.	.	.	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

Tabel 4.4b. Type af ledproblemer

Problemer med led i	P	P_{low}	P_{upp}
Ben	53,0	46,6	59,4
Hofter	64,5	58,4	70,7
Hals	2,1	0,3	4,0
Ryg	30,8	24,9	36,7
Ikke oplyst	4,9	2,2	7,6

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

4.3.3. Adfærdsproblemer

4.3.3.1. Typer af adfærdsproblemer

Andelen af hunde, som blev aflivet pga. aggressionsproblemer, var mindre end i undersøgelsen fra 1999 (15,0 % vs. 16,6 %) (tabel 4.5). Desuden sås signifikant stigning i andelen af hunde, der blev aflivet pga. frygtsomhed eller angst (2,1 % til 3,5 %), et signifikant fald i andelen af hunde aflivet pga. problemer med at være alene hjemme (3,7 % til 2,4 %) samt en signifikant stigning i andelen af hunde aflivet pga. andre problemer med deres adfærd (4,0 % til 5,5 %).

Tabel 4.5. Adfærdsmæssige årsager til aflivning

Årsag	Studium	P	P_{low}	P_{upp}	Pr
Aggression	2007	15,0	13,0	17,0	0,2302
	1999	16,6	15,1	18,0	.
Frygtsomhed/angst	2007	3,4	2,4	4,4	0,0123
	1999	2,1	1,5	2,6	.
Separationsproblemer	2007	2,4	1,6	3,3	0,0484
	1999	3,7	2,9	4,4	.
Anden adfærd	2007	5,5	4,2	6,7	0,0485
	1999	4,0	3,3	4,8	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

4.3.3.2. Aggressionsproblemer

Hos de hunde, hvor adfærdsproblemer var årsag eller medvirkende årsag til aflivningen, bestod adfærdsproblemet i 55,6 % af tilfældene udelukkende i, at de optrådte aggressivt, hvilket er et ikke-signifikant fald i forhold til den tidligere undersøgelse (tabel 4.6). Samtidigt sås dog en signifikant stigning i andelen af hunde, som samtidigt udviste andre adfærdsproblemer (8,1 % til 12,6 %). Dvs. at andelen af hunde, som optrådte aggressivt, stort set var uændret (68,2 % vs. 69,6 %).

Tabel 4.6. Andelen af aggressionsproblemer i forhold til alle adfærdsproblemer

Adfærd	Studium	P	P_{low}	P_{upp}	Pr
Aggression alene	2007	55,6	49,6	61,5	0,1016
	1999	61,5	57,5	65,4	.
Aggression + anden adfærd	2007	12,6	8,6	16,5	0,0397
	1999	8,1	5,9	10,4	.
Anden adfærd alene	2007	31,9	26,3	37,4	0,6668
	1999	30,4	26,7	34,1	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

I omkring 90 % af tilfældene var hundenes aggression rettet mod mennesker (tabel 4.7), hvilket er i overensstemmelse med undersøgelsen fra 1999 (89,5 % vs. 91,8 %). Imidlertid sås en stigning i andelen af hunde, som var aggressive over for andre hunde (30,8 % til 34,9 %). Forskellen var dog ikke signifikant.

Tabel 4.7. Genstand for aggressionen

Objekt	Studium	P	P_{low}	P_{upp}	Pr
Mennesker	2007	89,5	85,0	94,1	0,3793
	1999	91,8	89,1	94,5	.
Andre hunde	2007	34,9	27,8	42,0	0,3328
	1999	30,8	26,3	35,3	.
Genstand ikke oplyst	2007	7,0	3,3	10,7	0,0009
	1999	1,7	0,5	3,0	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

Blandt de hunde, som var aggressive over for mennesker (N = 154), var køn/alder af genstanden for aggressionen kun oplyst i knap 2/3 af tilfældene (tabel 4.8), men af disse tilfælde (N = 99) var børn den hyppigste genstand for aggressionen (67,7 % af hundene). Herefter fulgte mænd (39,4 % af hundene) og kvinder (32,3 % af hundene).

Tabel 4.8. Genstand for aggressionen

Genstand	P	P_{low}	P_{upp}
Mænd	39,4	29,8	49,0
Kvinder	32,3	23,1	41,5
Børn	67,7	58,5	76,9
Genstand ikke oplyst	35,7	28,1	43,3

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Tabel 4.9. Aggressiv adfærd

Aggressiv adfærd	P	P_{low}	P_{upp}
Snappen eller bid uden truende adfærd	56,0	48,1	63,9
Snappen eller bid samt truende adfærd	38,0	30,2	45,8
Kun truende adfærd	6,0	2,2	9,8
Adfærd ikke oplyst	18,5	12,9	24,1

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

For 18,5 % af hundene aflivet på grund af aggression (N = 184) var deres aggressive adfærd ikke oplyst. Hele 56,0 % af de hunde, hvis adfærd var oplyst (N = 150), snappede eller bed mennesker eller andre hunde uden først at udvise truende adfærd i form af knurren og visen tænder (tabel 4.9), mens 38,0 % udviste truende adfærd, før de snappede eller bed. Kun 6,0 % af hundene blev aflivet

udelukkende pga. truende adfærd. For hele 38,0 % af de aggressive hunde var bid angivet som eneste aggressive adfærd (tabel 4.10).

Tabel 4.10. Aggressiv adfærd

Aggressiv adfærd	P	P_{low}	P_{upp}
Knurrer kun	3,3	0,5	6,2
Viser kun tænder	1,3	0,0	3,2
Snapper kun	8,7	4,2	13,2
Bider kun	38,0	30,2	45,8
Knurrer og viser tænder	1,3	0,0	3,2
Knurrer og snapper	7,3	3,2	11,5
Knurrer og bider	4,7	1,3	8,0
Viser tænder og snapper	2,7	0,1	5,2
Viser tænder og bider	1,3	0,0	3,2
Snapper og bider	9,3	4,7	14,0
Knurrer, viser tænder og snapper	8,7	4,2	13,2
Knurrer, viser tænder og bider	2,7	0,1	5,2
Knurrer, snapper og bider	2,0	0,0	4,2
Viser tænder, snapper og bider	0,0	.	.
Knurrer, viser tænder, snapper og bider	8,7	4,2	13,2
Adfærd ikke oplyst	18,5	12,9	24,1

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Generelt oplevede ejerne de aggressive hundes adfærd som ukontrollabel. Kun 19,0 % af ejerne angav, at hundens adfærd forekom i særlige situationer (tabel 4.11), mens 34,8 % angav, at den forekom uforudsigeligt, 34,8 %, at den forekom uprovokeret, og 28,8 %, at hunden ikke advarede før bid eller snappen.

Tabel 4.11. Forudsigelighed af aggressionen

Forhold ved aggressionen	P	P_{low}	P_{upp}
Forekommer uforudsigeligt	34,8	27,9	41,7
Forekommer uprovokeret	34,8	27,9	41,7
Advarer ikke før bid/snappen	28,8	22,3	35,3
Forekommer i særlige situationer	19,0	13,4	24,7

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse

4.3.3.3. Problemer med frygtsomhed eller angst

Blandt de hunde, hvor frygtsomhed eller angst var årsag eller medvirkende årsag til aflivningen (N = 42), blev årsagen til hundens adfærd oplyst i 97,6 % af tilfældene. Af de hunde, hvor årsagen blev oplyst (N = 41), blev 61,0 % karakteriseret som generelt frygtsomme/bange (tabel 4.12). Hele 53,7 % blev aflivet pga. frygtsomhed over for mennesker, mens 19,5 % blev aflivet pga. frygtsomhed over for andre hunde. 46,3 % af hundene var angst for lyde, mens 26,8 % var angst for andre ting.

Tabel 4.12. Frygtsomhed og angst

Adfærd	P	P_{low}	P_{upp}
Frygtsomhed over for mennesker	53,7	38,4	68,9
Frygtsomhed over for andre hunde	19,5	7,4	31,6
Angst for lyde	46,3	31,1	61,6
Angst for andre ting	26,8	13,3	40,4
Generelt frygtsom/bange	61,0	46,0	75,9
Årsag ikke oplyst	2,4	0,0	7,0

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse

4.3.3.4. Separationsproblemer

Hunde, hvor problemer med at være alene hjemme var årsag eller medvirkende årsag til aflivningen, udgjorde kun en lille del af de aflivede hunde (N=30)(tabel 4.13). Blandt de 90 % af hundene, hvis adfærd var oplyst (N = 27), udviste hele 73,3 % destruktiv adfærd (ødelæggelse af genstande i hjemmet), mens 33,3 % hylede, 23,3 % gøede og 23,3 % var urenlige (urinering eller defækering indendørs).

Tabel 4.13. Typer af separationsadfærd

Adfærd	P	P_low	P_upp
Gøen	23,3	8,2	38,5
Hylen	33,3	16,5	50,2
Destruktion	73,3	57,5	89,2
Urenlighed	23,3	8,2	38,5
Anden adfærd	10,0	0,0	20,7
Adfærd ikke oplyst	10,0	0,0	20,7

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse

4.3.3.5. Andre adfærdsproblemer

Som nævnt ovenfor var andre adfærdsproblemer end aggression, frygtsomhed/angst og separationsproblemer kun årsag eller medvirkende årsag for en mindre del af hundene (5,5 %; N=67). Blandt de 65 af hundene, hvis adfærd var oplyst, var de hyppigste aflivningsårsager, at hunden var urenlig (26,2 %), optrådte for voldsomt (24,6 %), var for aktiv (23,1 %), ødelagde ting

(16,9 %), var ulydig (16,9 %), var meget opmærksomhedskrævende (13,8 %), bed eller snappede, uden det blev karakteriseret som aggression (9,2 %), samt gøede for meget (7,7 %)(tabel 4.14). Herefter fulgte (N < 5) larm (naboklager), hypersexualitet, samt at hunden ikke kunne lide børn, og at hunden ikke kunne med andre hunde i husstanden.

Tabel 4.14. Andre adfærdsproblemer

Adfærd	P	P_{low}	P_{upp}
For aktiv	23,1	12,8	33,3
Kan ikke lide børn	3,1	0,0	7,3
Gør for meget	7,7	1,2	14,2
Bider/snapper	9,2	2,2	16,3
Er ulydig	16,9	7,8	26,0
Er urenlig	26,2	15,5	36,8
Kan ikke med andre hunde i husstanden	3,1	0,0	7,3
Meget opmærksomhedskrævende	13,8	5,4	22,2
Ødelægger ting	16,9	7,8	26,0
Optræder for voldsomt	24,6	14,1	35,1
Larmer (naboklager)	4,6	0,0	9,7
Hypersexualitet	3,1	0,0	7,3
Skader sig selv	0,0	.	.
Anden adfærd	27,7	16,8	38,6
Adfærd ikke oplyst	3,0	0,0	7,1

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

4.3.3.6. Behandling forsøgt i forbindelse med adfærdsproblemer

Af de hunde, som blev aflivet pga. adfærdsproblemer (N = 270), var 14,8 % forsøgt behandlet forud for aflivning (tabel 4.15). Andelen af hunde forsøgt behandlet afveg ikke signifikant fra den tilsvarende andel (16,3 %) i undersøgelsen fra 1999.

Tabel 4.15. Behandling forsøgt forud for aflivning

Studium	P	P_{low}	P_{upp}	Pr
2007	14,8	10,6	19,1	0,5886
1999	16,3	13,3	19,3	.

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse;
RR = relativ risiko; Pr = p-værdi

Af de hunde, der blev aflivet pga. problemer med deres adfærd, havde 5,2 % modtaget medikamentel behandling og 4,8 % var blevet neutraliseret (tabel 4.16). Hyppigheden af disse typer af behandling afveg ikke signifikant fra hyppigheden i undersøgelsen fra 1999 (henholdsvis 5,8 % og 6,5 %). Derimod sås signifikante stigninger i andelen, som var blevet anbefalet lydighedstræning (2,0 % til 5,9 %), og andelen af hunde, som havde modtaget anden form for behandling, herunder adfærdsrådgivning af ejeren og adfærdsterapi (4,9 % til 10,4 %).

Tabel 4.16. Type af behandling i forbindelse med adfærdsproblemer

Behandling	Studium	P	P_{low}	P_{upp}	Pr
Medikamentel behandling	2007	5,2	2,6	7,9	0,7328
	1999	5,8	3,9	7,7	.
Neutralisering	2007	4,8	2,3	7,4	0,3493
	1999	6,5	4,5	8,4	.
Lydighedstræning	2007	5,9	3,1	8,8	0,0028
	1999	2,0	0,9	3,2	.
Anden behandling	2007	10,4	6,8	14,1	0,0028
	1999	4,9	3,2	6,7	.
Behandling ikke oplyst	2007	0,4	0,0	1,1	0,5712
	1999	0,2	0,0	0,5	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

4.3.4. Andre forhold end sygdom eller adfærd

Som nævnt ovenfor blev langt den største del af hundene aflivet på grund af adfærdsproblemer eller sygdom herunder alderdomssvækkelse. For kun en lille del af hundene (5,6 %; N = 69) var andre forhold årsag eller medvirkende årsag til aflivningen (tabel 4.17). For de af hundene, hvor årsagen var oplyst (N = 60), var de hyppigste årsager til aflivning, som ikke skyldtes sygdom eller adfærd, at familien manglede tid til hunden (23,3 %), familien skulle flytte (21,1 %), ejeren var død (20,0 %), sygdom i husstanden (20,0 %) og skilsmisse (8,3 %). Herefter fulgte (N < 5), at familien ikke måtte have hund i beboelsen, allergi i husstanden, ny baby i husstanden samt økonomiske årsager.

4.4. Racefordeling

Godt ¾ af de aflivede hunde var racehunde, mens ca. ¼ var hunde af blandingsrace (tabel 4.18). Fordelingen på race- og blandingshunde var ikke signifikant forskellig fra fordelingen fundet i undersøgelsen fra 1999.

Der var imidlertid markante forskelle i fordelingen blandt racehunde (tabel 4.19). Blandt racer repræsenteret ved mere end 10 individer sås i forhold til undersøgelsen fra 1999 en betydelig større andel af gruppen bestående af *Cairn terrier*, *West highland white terrier* og *Skotsk terrier* (4,13 % vs. 2,21 %), *Dansk/svensk gårdhund* (2,02 % vs. 0,88 %), *Beagle* (1,62 % vs. 0,68) og *Cavalier king charles spaniel* (0,81 % vs. 0,24 %) samt en betydelig mindre andel af *Schæferhund* (7,77 %

vs. 12,80 %), *Gravhunde* (3,72 % vs. 6,82 %) og *Pudler* (2,99 % vs. 4,73 %). Andelen af *Labrador retriever* (9,71 %) lå derimod på nogenlunde samme niveau som i undersøgelsen fra 1999 (9,43 %) og betydeligt under andelen af denne race blandt hunde registreret i *Dansk Hunderegister* (13,25 %).

Tabel 4.17. Andre forhold end sygdom eller adfærd

Årsag	P	P_{low}	P_{upp}
Skilsmisse	8,3	1,3	15,3
Familien skal flytte	21,7	11,2	32,1
Ejer har skiftet arbejde	0,0	.	.
Ny baby i husstanden	3,3	0,0	7,9
Må ikke have hund i beboelsen	5,0	0,0	10,5
Allergi i husstanden	5,0	0,0	10,5
Sygdom i husstanden	20,0	9,9	30,1
Ejeren død	20,0	9,9	30,1
Manglende tid til hunden	23,3	12,6	34,0
Svarer ikke til ejers forventninger	0,0	.	.
Økonomiske årsager	1,7	0,0	4,9
Anden årsag	0,0	.	.
Forhold ikke oplyst	13,0	5,1	21,0

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse

Tabel 4.18. Andelen af racehunde

Studium	P	P_{low}	P_{upp}	Pr
2007	75,7	73,3	78,1	0,5004
1999	76,7	75,0	78,3	.

P = proportion (%); P_{low} = nedre konfidensgrænse;
P_{upp} = øvre konfidensgrænse;
Pr = p-værdi for forskel mellem studier

Andelen af hunde tilhørende racer med kamphundebaggrund udgjorde 2,10 % (N=26) af de aflivede hunde i nærværende undersøgelse, mens andelen af disse racer udgjorde 1,69 % i *Dansk Hunderegister* (tabel 4.20). De relativt få kamphundeblandinger (N=7) var dog stærkt overrepræsenteret blandt de aflivede hunde set i forhold til deres andel i *Dansk Hunderegister*.

Tabel 4.19. Racefordeling

Race	2007	1999	DHR
Labrador retriever	9,71	9,43	13,25
Schæferhund	7,77	12,80	7,77
Cairn, West highl white & Skotsk terrier	4,13	2,21	4,28
Gravhunde (alle racer)	3,72	6,82	5,09
Golden retriever	3,24	4,45	3,98
Cocker spaniels (alle racer)	3,16	3,37	2,75
Pudler (alle racer)	2,99	4,73	1,51
Hønsehunde (alle racer)	2,91	2,89	3,96
Rottweiler	2,91	2,97	1,99
Dansk/svensk gårdhund	2,02	0,88	2,75
Beagle	1,62	0,68	1,04
Fox terriers (alle racer)	1,54	1,89	0,90
Engelsk springer spaniel	1,38	0,76	1,81
Boxer	1,13	1,36	0,85
Newfoundland	1,13	0,84	0,72
Collie	0,97	1,08	0,87
Schnauzere (alle racer)	0,89	0,60	0,80
Cavalier king charles spaniel	0,81	0,24	1,12
Papillon	0,81	0,88	0,76
Belgiske hyrdehunde (alle racer)	0,73	0,64	0,50
Yorkshire terrier	0,73	0,96	0,77
Chow chow	0,65	0,36	0,28
Flat coated retriever	0,65	0,80	0,93
Kleiner mynsterlænder	0,65	0,52	1,23
Pekingeser	0,49	0,88	0,44
Pomeranian	0,40	0,92	0,53
Samojedhund	0,40	0,52	0,62
Sankt bernhardshund	0,40	0,60	0,35
Settere (alle racer)	0,40	0,44	0,59
Border collie	0,32	0,24	0,86
Pinschere (alle racer)	0,24	1,20	0,63
Andre racehunde	16,83	9,71	16,13

Tabel 4.20. Forekomst af kamphunde

Race	2007	%	DHR	%
Kamphunde	26	2,10	10206	1,69
Kamphundeblandinger	7	0,57	143	0,02
Andre racer/blandinger	1203	97,33	592857	98,28

4.5. Fordeling på vægtklasser

Blandt de aflivede hunde var der forskelle mellem nærværende undersøgelse og undersøgelsen fra 1999 med hensyn til fordelingen på vægtklasser (tabel 4.21). Der sås således en moderat tilbagegang i andelen af hunde i størrelsesklasserne '< 10 kg' og '10 – 30 kg' og en fremgang i andel af hunde i klassen '> 30 kg', dog var andelen betydelig mindre end den tilsvarende andel i *Dansk Hunderegister*.

Tabel 4.21. Fordeling på vægtklasse (racehunde)

Kropsvægt	2007	1999	DHR
< 10 kg	20,92	23,76	19,96
10 - 30 kg	39,48	41,81	30,20
> 30 kg	39,59	34,43	49,84

4.6. Kønsfordeling

Der var en lille, ikke signifikant overvægt af hanhunde (51,9 %) i forhold til tæver (48,1 %) blandt de aflivede hunde (tabel 4.22), når ses bort fra hunde, hvis køn ikke var angivet (3,96 %; N = 49). Overvægten af hanhunde (53,8 %) var lidt større og signifikant i undersøgelsen fra 1999, men kønsfordelingen var ikke signifikant forskellig fra fordelingen i nærværende undersøgelse.

Tabel 2.22. Andelen af hanhunde

Studium	P	P_{low}	P_{upp}	Pr	Pr2
2007	51,9	49,1	54,7	0,1915	0,2722
1999	53,8	51,9	55,8	0,0002	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for afvigelse fra 1:1; Pr2 = p-værdi for forskel mellem studier

For 27,6 % af hanhundene og 23,1 % af tæverne var ikke oplyst, om de var intakte eller neutraliserede. Når hunde, hvor neutraliseringsstatus ikke var angivet, blev regnet som intakte, var 19 % af hanhundene kastreret og 20,5 % af hundene steriliseret (tabel 4.23). I undersøgelsen fra 1999 var andelen af neutraliserede hanhunde og tæver henholdsvis 12,2 % og 10,3 %. For begge køn var andelen af neutraliserede hunde signifikant højere i nærværende undersøgelse set i forhold til undersøgelsen fra 1999.

Tabel 4.23. Andelen af neutraliserede hunde

Køn	Studium	P	P_{low}	P_{upp}	Pr
Hanhunde	2007	19,0	15,9	22,1	0,0001
	1999	12,2	10,4	14,0	.
Tæver	2007	20,5	17,2	23,8	0,0000
	1999	10,3	8,5	12,1	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse; Pr = p-værdi for forskel mellem studier

4.7. Aldersfordeling

4.7.1. Aldersfordeling opdelt på aflivningsårsag

Aldersfordelingen blandt alle aflivede hunde afveg (sammenligning af medianer) signifikant fra den tilsvarende fordeling i undersøgelsen fra 1999 (figur 4.11). I nærværende undersøgelse var en lavere andel af hundene i aldersgruppen 3 – 6 år og en større andel i aldersgruppen 11 – 13 år.

Når ses på aldersfordelingen af hunde, som blev aflivet pga. medicinske/fysiske problemer, var der en nøje overensstemmelse mellem nærværende undersøgelse og undersøgelsen fra 1999 (figur 4.12). Andelen af hunde yngre end 7 år var meget lav, men gradvist stigende for ældre hunde indtil 11 – 12 års alderen, hvorefter antallet faldt igen.

Mht. hunde, der blev aflivet pga. adfærdsproblemer, lå andelen af hunde yngre end 3 år meget højt i begge undersøgelser (figur 4.13). I undersøgelsen fra 1999 faldt antallet af aflivede hunde jævnt med alderen for hunde ældre end 1 år. I nærværende undersøgelse viste antallet af hunde imidlertid en to-toppet fordeling: en top for hunde i alderen 2 – 3 år og en mindre top for hunde i alderen 6 – 9 år.

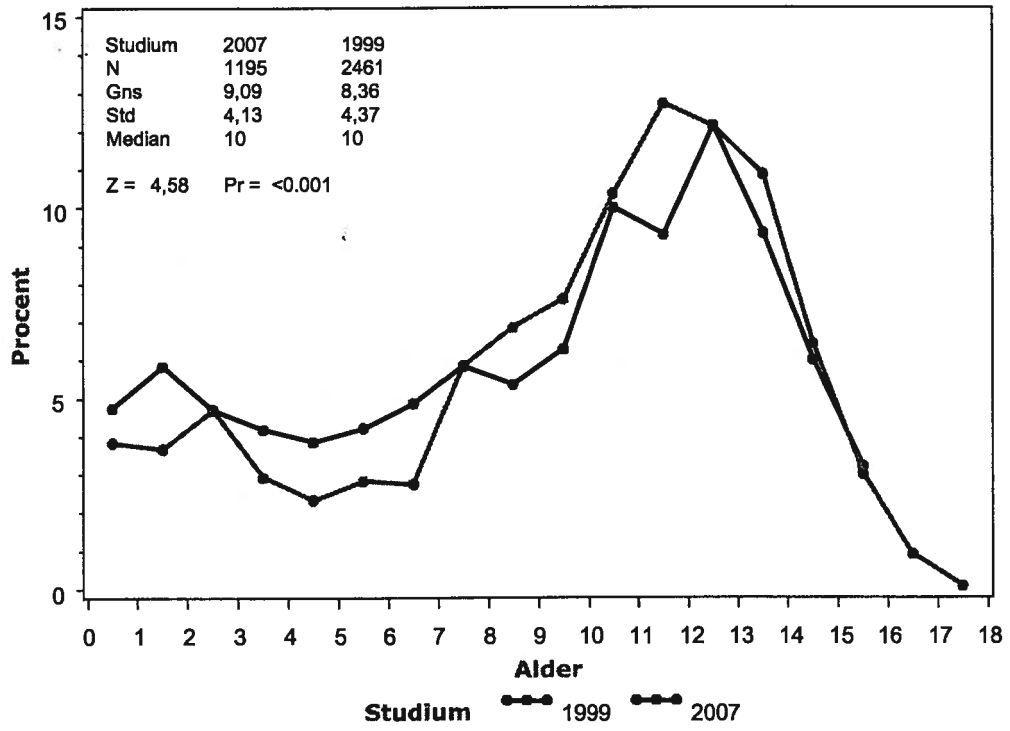
Aldersfordelingen af hunde aflivet på grund af andre problemer end sygdom eller adfærd var tre-toppet i undersøgelsen fra 1999 (toppunkter i aldersgrupperne 3 – 4 år, 6 – 7 år samt 10 – 11 år)(figur 4.14). I nærværende undersøgelse blev ligeledes fundet en tre-toppet fordeling, men top 2 og top 3 var forskudt henholdsvis et og to år i forhold til den tidligere undersøgelse, således at der var en tendens til, at hundene var ældre i nærværende undersøgelse (p = 0,052).

4.7.2. Aflivningsårsager som funktion af alder

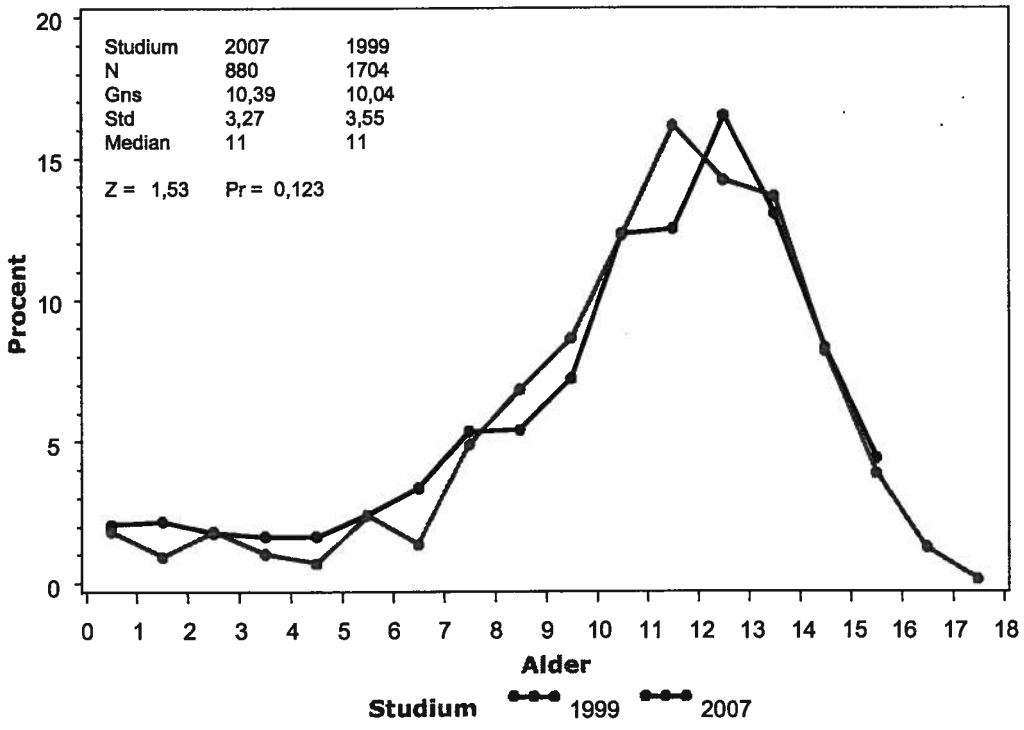
Figur 4.15 – 4.21 viser andelen af hunde, der blev aflivet af forskellige årsager, som funktion af deres alder. Andelen af hunde, som blev aflivet på grund af medicinske eller fysiske lidelser, steg med alderen fra 30 – 40 % blandt de yngre hunde til op mod 100 % blandt de ældste (figur 4.15). Der var god overensstemmelse mellem nærværende undersøgelse og undersøgelsen fra 1999 – på nær en mindre top for hunde i 5 – 6 års alderen i nærværende undersøgelse.

Blandt de hunde, hvor problemer med muskler eller led var årsag eller medvirkende årsag til aflivningen, var der imidlertid markant forskel mellem de to undersøgelser (figur 4.16). Inden for næsten alle aldersgrupper lå andelen af hunde aflivet på grund af disse problemer væsentligt højere i nærværende undersøgelse end i undersøgelsen fra 1999.

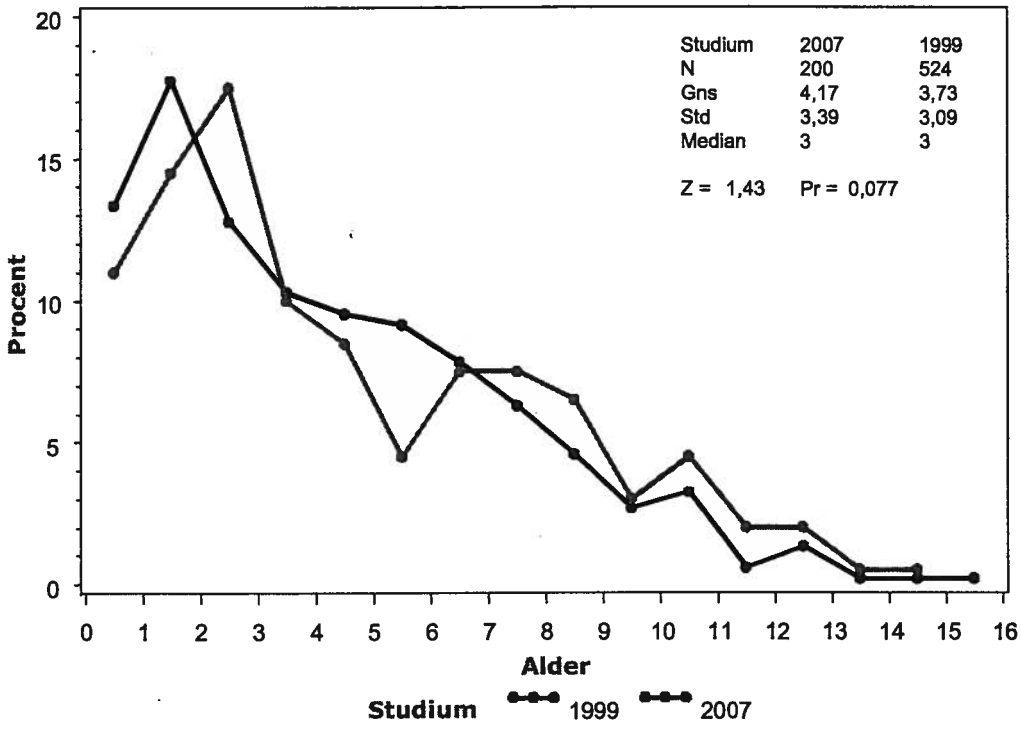
Figur 4.11. Aldersfordeling – alle lidelser/problemer



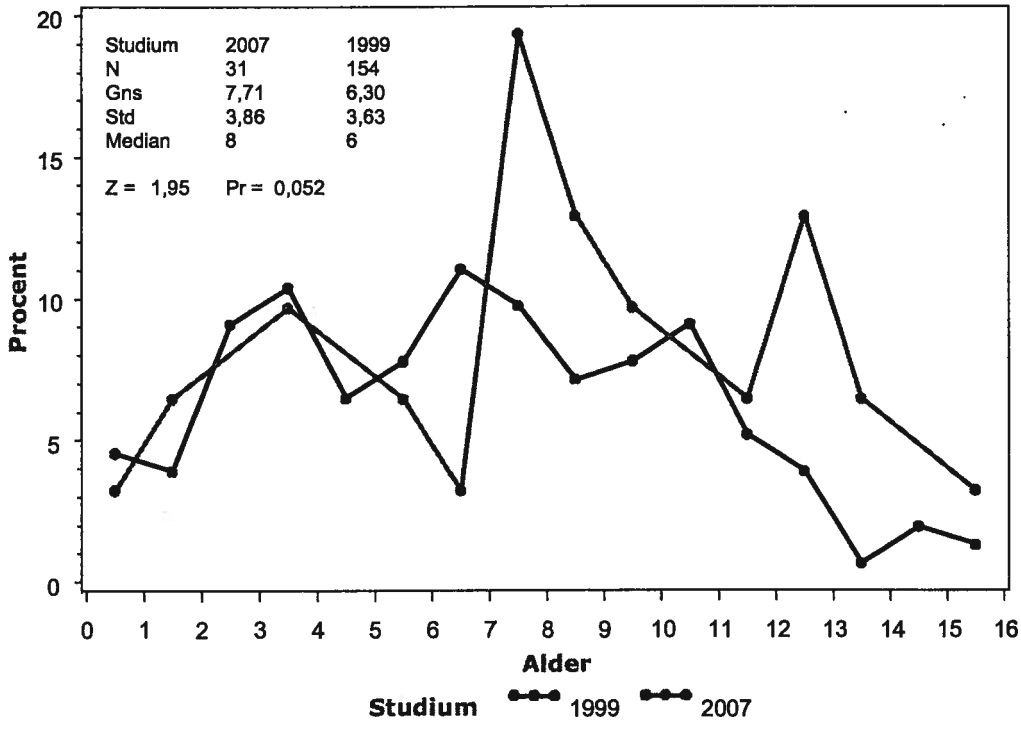
Figur 4.12. Aldersfordeling – kun medicinske/fysiske lidelser



Figur 4.13. Aldersfordeling – kun adfærdsproblemer



Figur 4.14. Aldersfordeling kun andre problemer



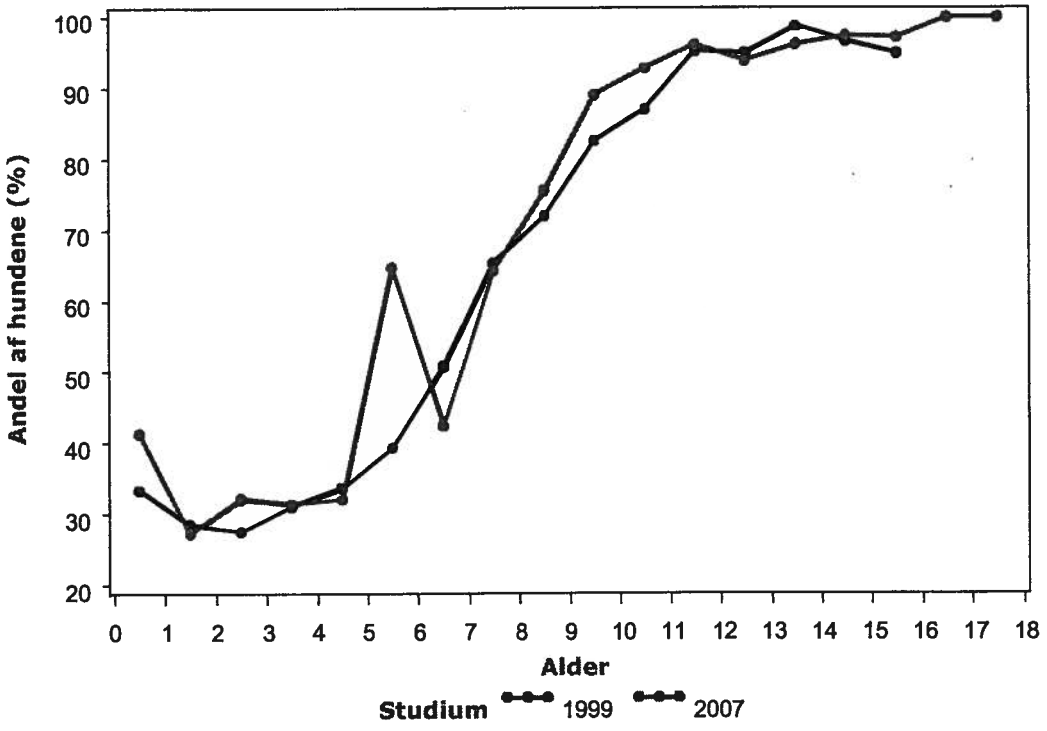
Blandt hunde i aldersgrupperne 1 - 5 år samt 6 – 7 år lå andelen af hunde aflivet på grund af aggression højere i nærværende undersøgelse end i undersøgelsen fra 1999, men blandt hunde mindre end et år gamle samt blandt hunde i alderen 5 – 6 år lå andelen lavere (figur 4.17).

Blandt hunde yngre end 3 år gamle lå andelen af hunde, hvor frygtsomhed eller angst var medvirkende årsag til aflivningen, meget højt i nærværende undersøgelse set i forhold til undersøgelsen fra 1999 (figur 9.18). For næsten 1/5 af alle hunde yngre end 1 år blev frygtsomhed eller angst angivet som aflivningsårsag.

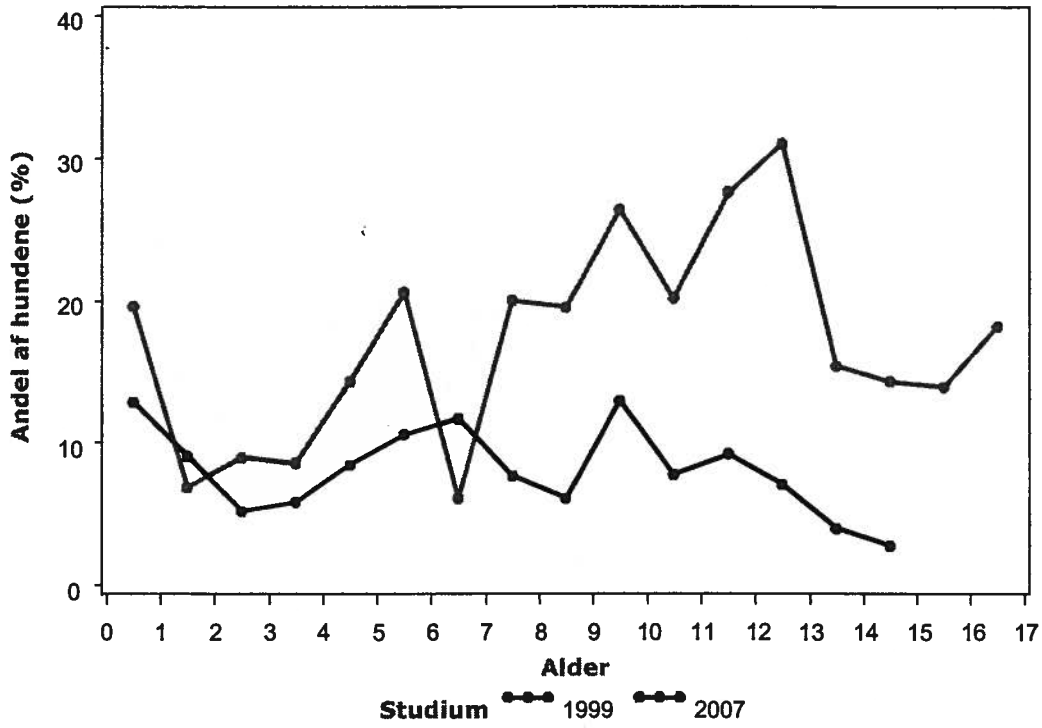
Blandt hunde yngre end 2 år lå andelen af hunde aflivet på grund af separationsproblemer også meget højt (figur 4.19), men med hensyn til disse problemer var der en relativ god overensstemmelse mellem nærværende undersøgelse og undersøgelsen fra 1999.

Blandt hunde i alderen 1 – 2 år sås imidlertid en meget høj andel af hunde aflivet på grund af andre adfærdsproblemer end aggression, frygtsomhed/angst eller separationsproblemer set i forhold til den tilsvarende andel i undersøgelsen fra 1999 (figur 4.20). Andelen af hunde aflivet på grund af andre forhold end sygdom eller adfærd som funktion af deres alder, lå på et lavere niveau og lidt forskudt set i forhold til den tilsvarende andel i undersøgelsen fra 1999 (figur 4.21).

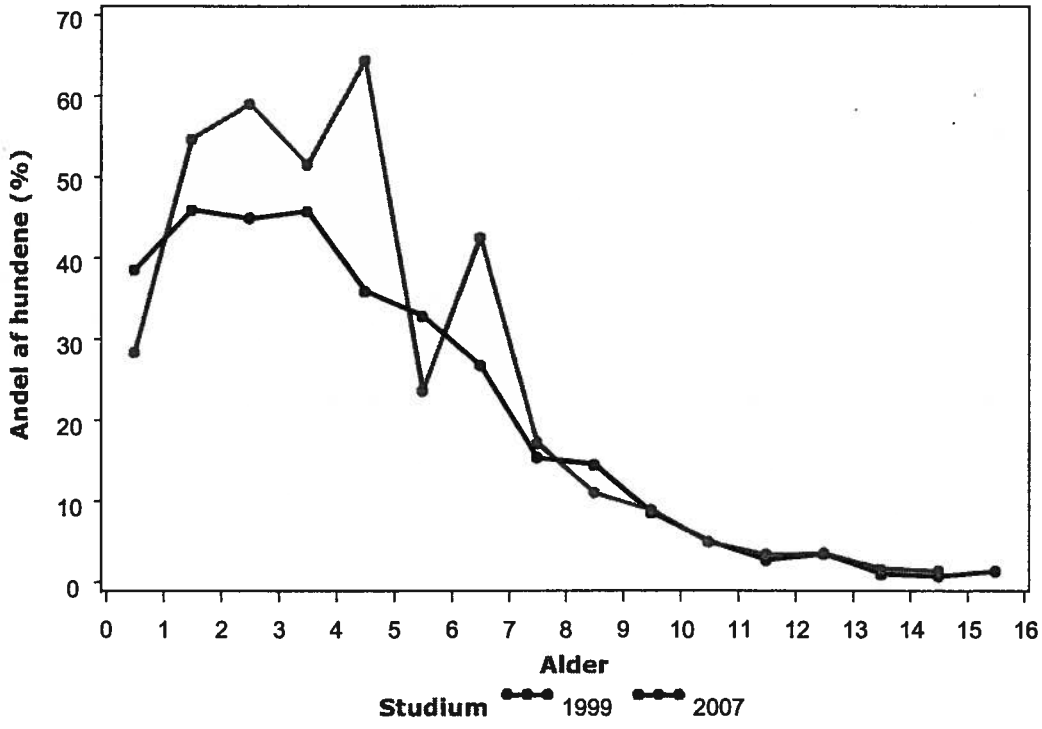
Figur 4.15. Medicinske/fysiske lidelser som funktion af alder



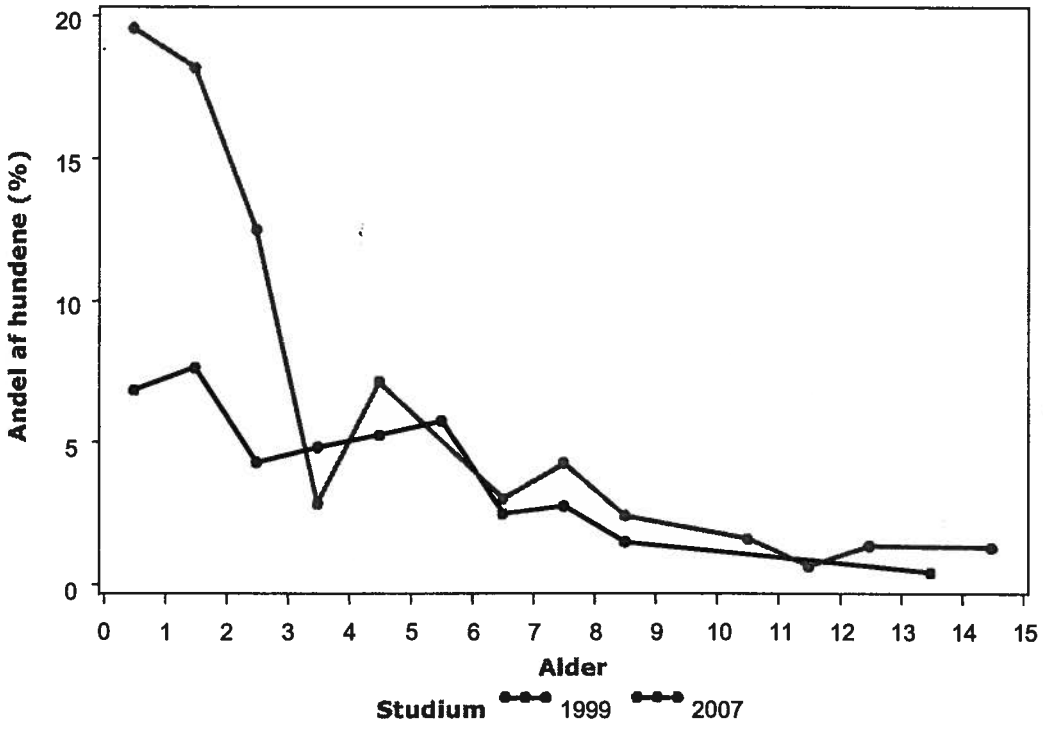
Figur 4.16. Problemer m. muskler/led som funktion af alder



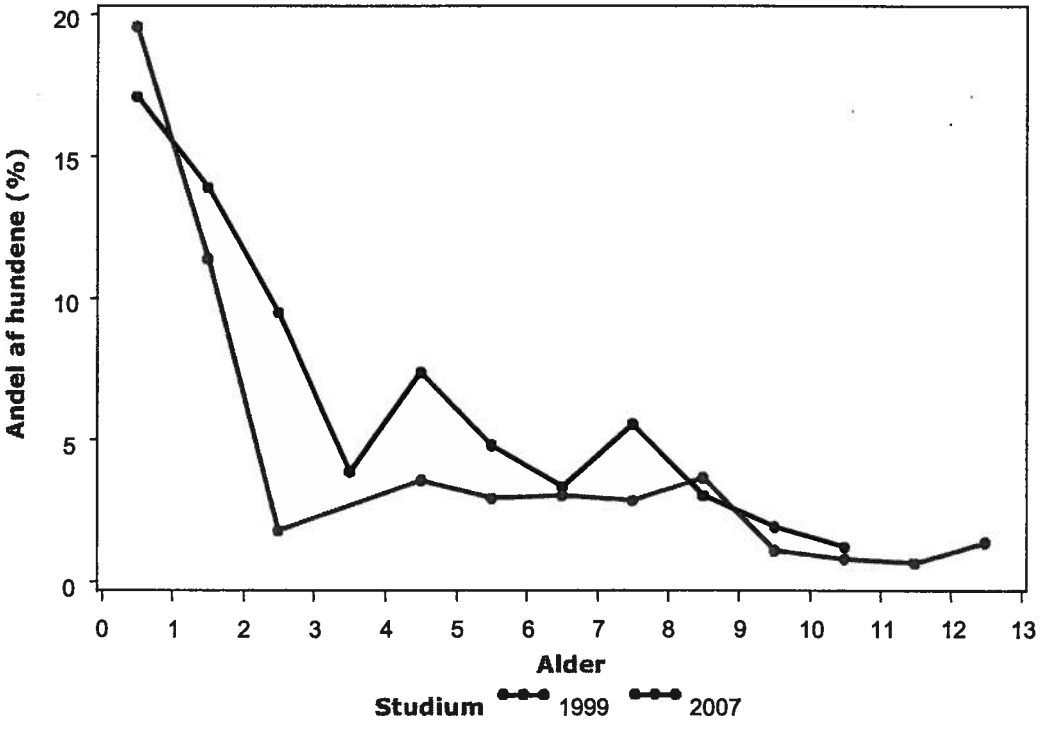
Figur 4.17. Aggression som funktion af alder



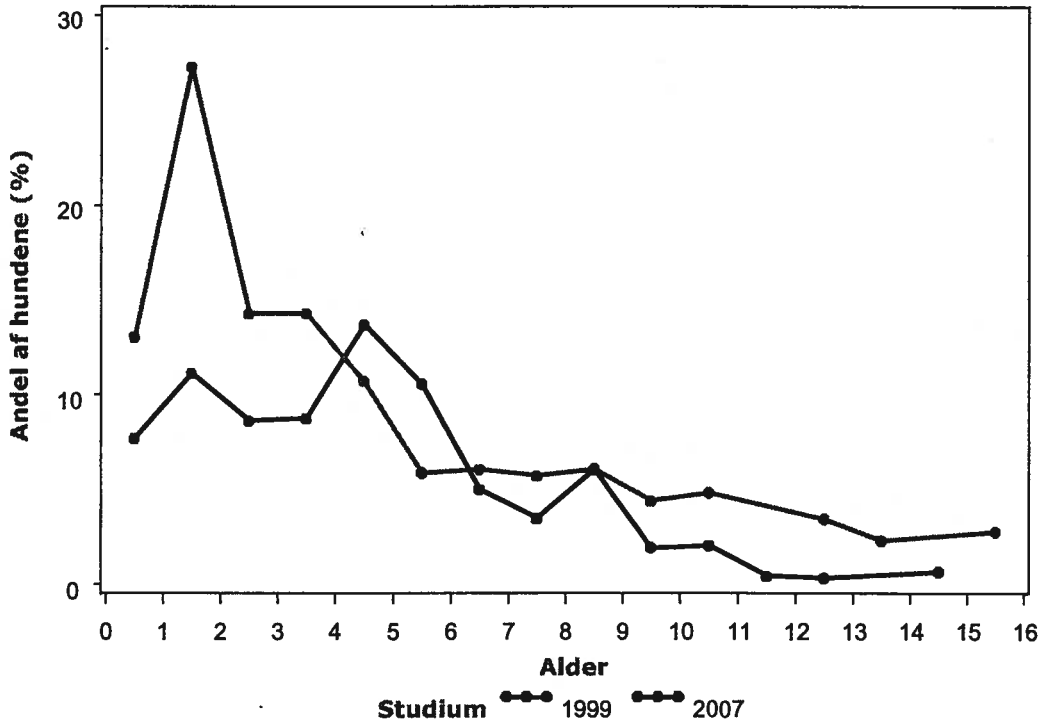
Figur 4.18. Frygtsomhed/angst som funktion af alder



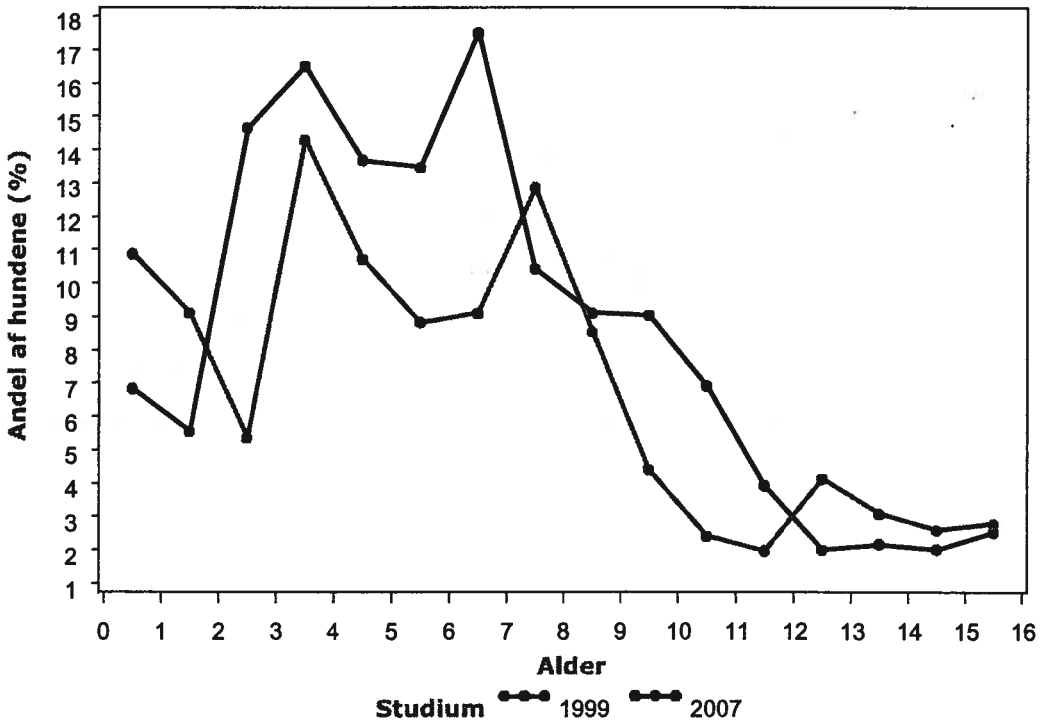
Figur 4.19. Separationsproblemer som funktion af alder



Figur 4.20. Anden adfærd som funktion af alder



Figur 4.21. Andre aflivningsårsager som funktion af alder



Tabel 4.24. Racehundes og blandingers aflivningsalder

Race	Gns	25 %	50 %	75 %	Max
Racehunde	8,8	6,0	10,0	12,0	17,0
Blandinger	7,9	3,0	9,0	12,0	16,0

Tabel 4.25. De enkelte racers aflivningsalder

Race	Gns	25 %	50 %	75 %	Max
Yorkshire terrier	11,3	10,0	12,0	14,0	15,0
Pudler (alle racer)	11,2	10,0	12,0	14,0	15,0
Fox terriers (alle racer)	10,6	9,0	11,5	13,0	16,0
Pomeranian	10,5	10,0	12,0	13,0	15,0
Golden retriever	10,0	9,0	11,0	12,0	15,0
Beagle	10,0	7,0	11,0	13,0	15,0
Collie	9,9	9,0	11,0	12,0	14,0
Kleiner mynsterlænder	9,9	9,0	12,0	13,0	14,0
Schnauzere (alle racer)	9,9	8,0	10,0	11,0	14,0
Gravhunde (alle racer)	9,8	7,0	10,0	13,0	15,0
Cairn, West highl white & Skotsk terrier	9,7	8,0	10,0	12,0	17,0
Labrador retriever	9,6	8,0	11,0	12,0	16,0
Papillon	9,3	5,0	11,5	13,0	15,0
Settere (alle racer)	9,0	6,0	10,0	12,0	15,0
Pekingeser	9,0	6,0	10,0	13,0	16,0
Flat coated retriever	8,6	6,5	10,0	10,5	13,0
Cocker spaniels (alle racer)	8,4	6,0	9,0	11,0	16,0
Hønsehunde (alle racer)	8,2	5,0	9,0	11,0	15,0
Dansk/svensk gårdhund	8,1	5,0	8,0	12,0	16,0
Engelsk springer spaniel	8,1	5,0	9,0	12,0	14,0
Cavalier king charles spaniel	7,9	6,0	7,5	10,0	14,0
Samojedhund	7,8	5,0	8,0	11,0	14,0
Schæferhund	7,6	4,0	8,0	11,0	15,0
Newfoundland	7,6	6,0	8,0	10,0	12,0
Belgiske hyrdehunde (alle racer)	7,5	2,5	8,0	13,0	15,0
Border collie	7,4	3,0	8,0	12,0	14,0
Boxer	7,2	4,0	8,0	10,0	13,0
Pinschere (alle racer)	6,9	3,0	7,0	10,0	14,0
Rottweiler	6,4	4,0	7,0	9,0	13,0
Chow chow	5,6	2,0	5,0	9,0	10,0
Sankt bernhardshund	5,0	2,0	4,0	7,0	11,0
Andre racehunde	8,3	5,0	9,0	12,0	16,0

4.7.3. Aldersfordeling opdelt på race og kropsvægt

Generelt blev hunde af blandingsrace aflivet i en tidligere alder end racehunde (tabel 4.24), men blandt racehunde var der meget store forskelle med hensyn til racernes gennemsnitlige aflivningsalder – fra 5,0 år hos *Sankt bernhardshund* til 11,3 år hos *Yorkshire terrier* (tabel 4.25). Blandt de racer, der blev aflivet i en tidlig alder, var foruden *Sankt bernhardshund* racerne *Chow chow* og *Rottweiler*. Blandt de racer, som blev aflivet i en relativ sen alder, var foruden *Yorkshire terrier* racerne *Pudel*, *Fox terrier*, *Pomeranian* og *Beagle* – men også relativt store racer som *Golden retriever*. Der var dog en tendens til, at de små racehunde (< 10 kg) blev aflivet omkring 1 år senere end både mellemstore (10 – 30 kg) og store (> 30 kg) racehunde (tabel 4.26). Kamphunde og kamhundeblandinger blev aflivet i en markant tidligere alder end andre racehunde og blandinger (tabel 4.27). Således var de i gennemsnit kun halvt så gamle.

Tabel 4.26. Aflivningsalder efter vægtklasse (racehunde)

Kropsvægt	Gns	25 %	50 %	75 %	Max
< 10 kg	9,7	7,0	11,0	13,0	17,0
10 - 30 kg	8,6	5,0	10,0	12,0	16,0
> 30 kg	8,5	6,0	9,0	12,0	16,0

Tabel 4.27. Kamphundes/kamphundeblandingers aflivningsalder

Type	Gns	25 %	50 %	75 %	Max
Kamphunde/blandinger	4,2	2,0	3,0	6,0	13,0
Andre racer/blandinger	8,7	6,0	10,0	12,0	17,0

4.7.4. Aldersfordeling opdelt på køn

Den gennemsnitlige levealder for tæver var længere end levealderen for hanhunde (tabel 4.28), men mens der var 2 års forskel på 25 % kvartilen for de to køn (dvs. de hunde, som blev aflivet tidligst), var der kun 1 års forskel på aldersmedianen og ingen forskel på 75 % kvartilen. Så hanhundene "indhentede" tæverne, efter en stor del af hanhundene var blevet aflivet i en tidlig alder.

Tabel 4.28. Hanhundes og tævers aflivningsalder

Køn	Gns	25 %	50 %	75 %	Max
Hanhunde	8,2	5,0	9,0	12,0	17,0
Tæver	9,0	7,0	10,0	12,0	16,0

4.8. Hundes forventede levealder

Som det fremgår af overlevelseskurverne baseret på aldersfordelingerne blandt hundene i henholdsvis nærværende undersøgelse og undersøgelsen fra 1999 (se *Statistisk analyse*), blev

hundene generelt ældre i nærværende undersøgelse (figur 4.22 & tabel 4.29). Specielt sås en lavere dødsrate op til 7-års alderen.

Tabel 4.29. Overlevelse til 5- og 10-års alderen af hunde i 1999 og 2007

Studium	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
1999	0,77	0,75	0,78	0,50	0,48	0,52
2007	0,83	0,80	0,85	0,57	0,54	0,59

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Som nævnt ovenfor, var den gennemsnitlige alder ved aflivning lavere blandt hunde af blandingsrace ca. 1 år lavere end blandt racehunde. Som ses af figur 4.23 var dødsraten hos blandinger højere op til omkring 4-års alderen, hvorefter den lå på samme niveau som hos racehunde indtil 6-års alderen. Herefter havde racehunde den højeste dødsrate.

Tabel 4.30. Racehundes og blandingers overlevelse til 5- og 10-års alderen

Type	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
Racehunde	0,81	0,80	0,83	0,54	0,52	0,55
Blandinger	0,70	0,67	0,73	0,48	0,44	0,51

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Blandt racehundene var der stor forskel på overlevelseskurverne for de enkelte racer (figur 4.24 – 4.28). Mens henholdsvis 67 % og 71 % af hundene tilhørende racerne *Labrador retriever* og *Golden retriever* kunne forvente at overleve indtil 10-års alderen, var dette kun tilfældet for henholdsvis 42 % og 38 % af hundene tilhørende racerne *Schæferhund* og *Belgiske hyrdehunde* (tabel 4.31). Indtil 9-års alderen var dødsraten hos *Schæferhund* højere end hos de to førstnævnte racer (figur 4.24). Hos *Belgiske hyrdehunde* var dødsraten særlig høj, indtil hundene var omkring 5 år gamle.

Overlevelseskurverne for racerne *Gravhund*, *Cocker spaniel* og *Engelsk springer spaniel* lignede meget hinanden (figur 4.25). Dog lå kurverne noget forskudt fra hinanden. Således kunne knap 62 % af *Gravhundene* forvente at nå en alder af 10 år, mens dette kun var tilfældet for henholdsvis 48 % og 46 % af hundene tilhørende racerne *Cocker spaniel* og *Engelsk springer spaniel*. Kurven for *Settere* var noget afvigende, formentlig på grund af manglende data for hunde i nogle årgange.

Kun 47 % af hundene tilhørende racen *Sankt bernhardshund* kunne forvente at nå 5-års alderen (tabel 4.31) på grund af en meget høj dødsrate i alle aldersgrupper (figur 4.26). Kun 11 % kunne forvente at nå en alder af 10 år. Også hos *Chow chow* var der en meget høj dødsrate blandt unge hunde. Kun 24 % af hundene kunne forvente at nå en alder af 10 år. Hos *Rottweiler* var dødsraten nogenlunde konstant, og kun godt 21 % af hundene kunne forvente at nå en alder af 10 år. Dødsraten hos *Samojedhund* var ligeledes nogenlunde konstant, men noget lavere end hos *Rottweiler*. Således kunne 35 % af hundene forvente at nå en alder af 10 år.

Overlevelseskurverne for *Dansk/svensk gårdhund* og gruppen *Pinschere* (som *Dansk/svensk gårdhund* normalt henregnes under) forløb nærmest parallelt med en næsten konstant dødsrate

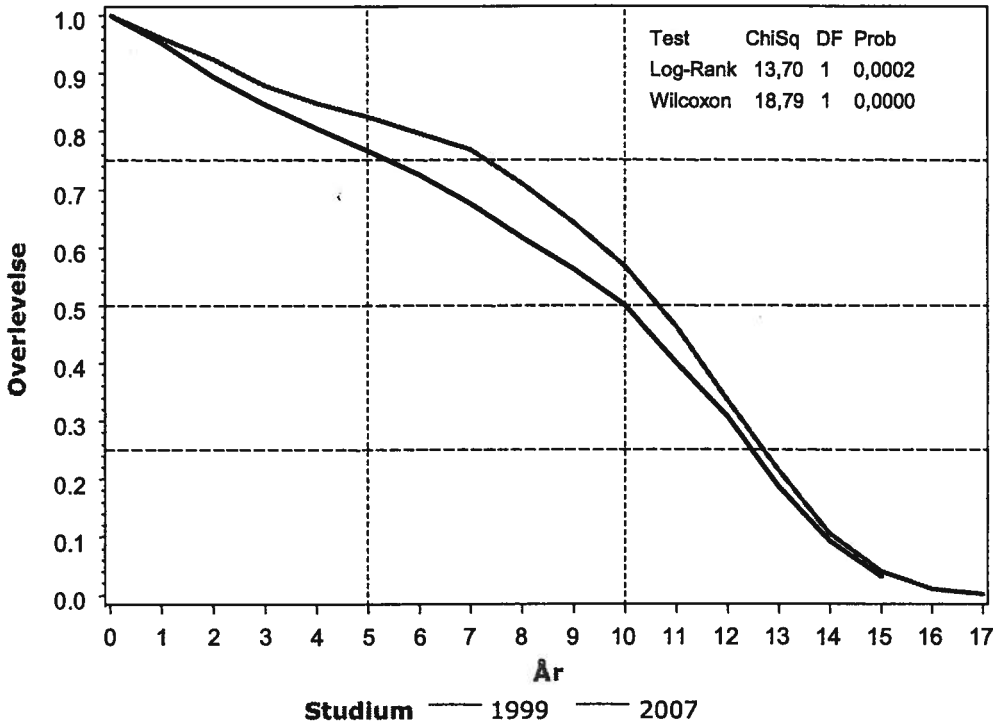
(figur 4.27). Kun henholdsvis 37 % og 27 % af hundene tilhørende disse racer kunne forvente at nå en alder af 10 år (tabel 4.31). I modsætning hertil kunne hele 76 % af pudlerne og 69 % af hundene tilhørende gruppen af *Schnauzere* forvente at nå en alder af 10 år.

Tabel 4.31. Overlevelse af forskellige racer til 5- og 10-års alderen

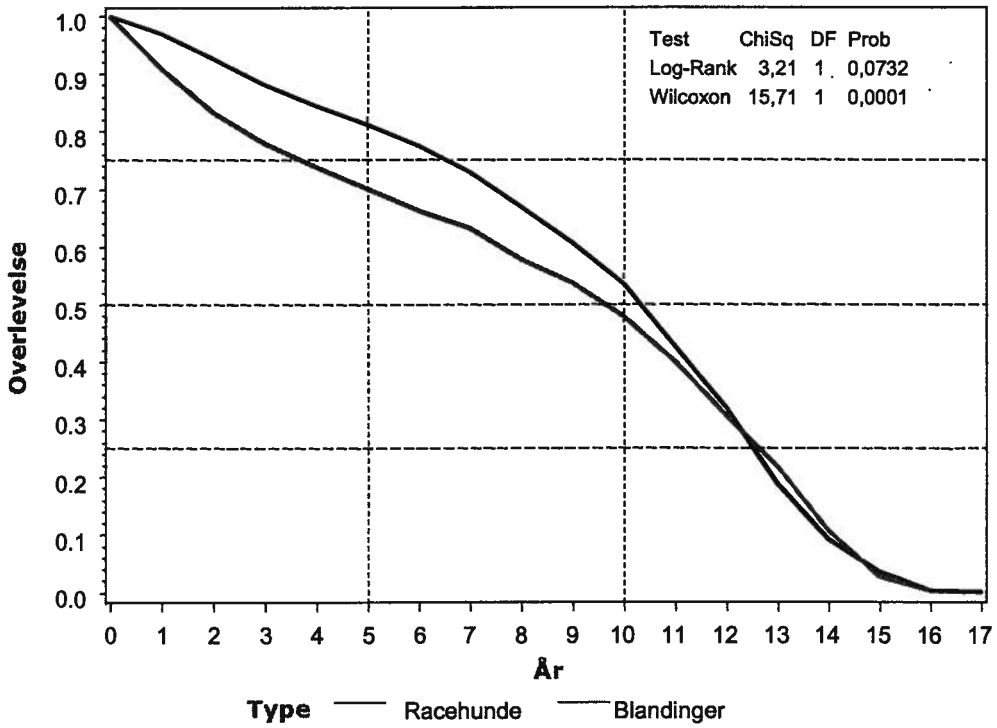
Race	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
Schnauzere (alle racer)	0,96	0,76	0,99	0,69	0,48	0,83
Fox terriers (alle racer)	0,94	0,85	0,98	0,71	0,59	0,81
Yorkshire terrier	0,94	0,78	0,98	0,76	0,57	0,87
Pudler (alle racer)	0,93	0,88	0,96	0,76	0,69	0,82
Beagle	0,91	0,76	0,97	0,63	0,45	0,76
Cairn, West highl white & Skotsk te	0,90	0,82	0,94	0,60	0,50	0,69
Pomeranian	0,89	0,70	0,96	0,82	0,62	0,92
Golden retriever	0,89	0,82	0,93	0,71	0,63	0,77
Gravhunde (alle racer)	0,88	0,83	0,92	0,62	0,55	0,68
Collie	0,87	0,72	0,94	0,74	0,58	0,85
Flat coated retriever	0,86	0,66	0,94	0,54	0,34	0,70
Kleiner mynsterlænder	0,86	0,62	0,95	0,67	0,43	0,83
Labrador retriever	0,85	0,81	0,88	0,67	0,61	0,71
Newfoundland	0,83	0,66	0,92	0,31	0,17	0,47
Settere (alle racer)	0,80	0,50	0,93	0,53	0,26	0,74
Engelsk springer spaniel	0,80	0,63	0,90	0,46	0,29	0,61
Hønsehunde (alle racer)	0,79	0,70	0,86	0,45	0,35	0,54
Cocker spaniels (alle racer)	0,79	0,70	0,85	0,48	0,38	0,56
Cavalier king charles spaniel	0,79	0,47	0,93	0,29	0,09	0,52
Dansk/svensk gårdhund	0,78	0,63	0,88	0,37	0,23	0,51
Papillon	0,78	0,60	0,89	0,63	0,44	0,77
Pekingeser	0,78	0,57	0,89	0,52	0,32	0,69
Samojedhund	0,76	0,49	0,90	0,35	0,14	0,57
Schæferhund	0,74	0,69	0,78	0,42	0,37	0,47
Boxer	0,73	0,58	0,83	0,42	0,28	0,55
Border collie	0,70	0,33	0,89	0,40	0,12	0,67
Pinschere (alle racer)	0,70	0,51	0,82	0,27	0,14	0,43
Rottweiler	0,68	0,58	0,76	0,21	0,14	0,29
Belgiske hyrdehunde (alle racer)	0,63	0,40	0,78	0,38	0,19	0,56
Chow chow	0,59	0,33	0,78	0,24	0,07	0,45
Sankt bernhardshund	0,47	0,24	0,67	0,11	0,02	0,28
Andre racehunde	0,77	0,73	0,81	0,48	0,43	0,53
Blandinger	0,70	0,67	0,73	0,48	0,44	0,51

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

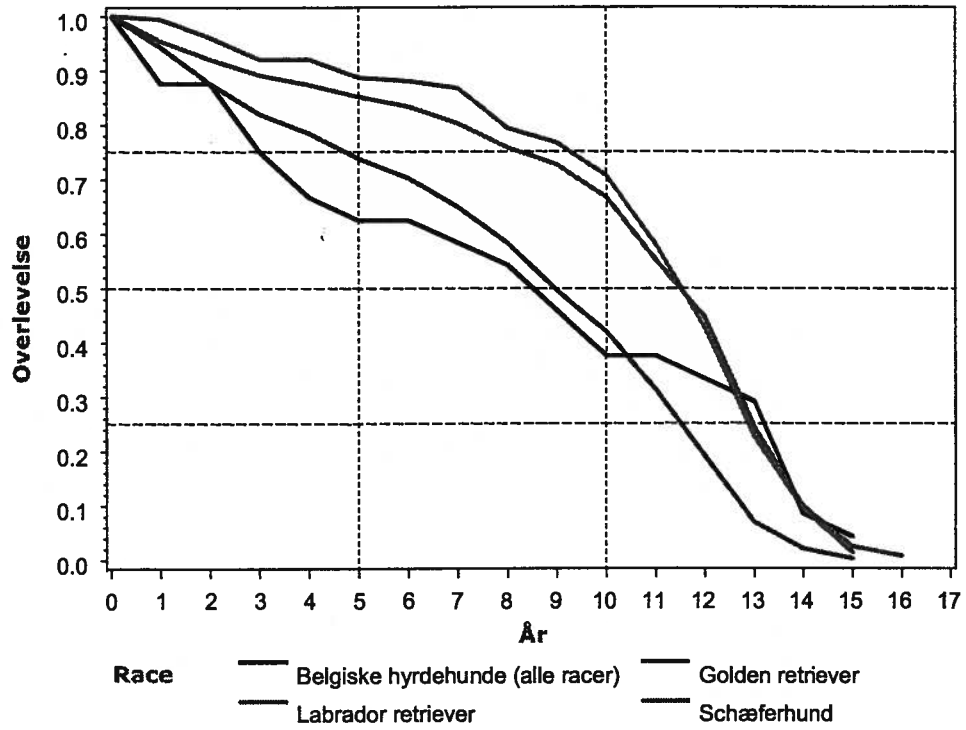
Figur 4.22. Hundes forventede levealder 1999 og 2007



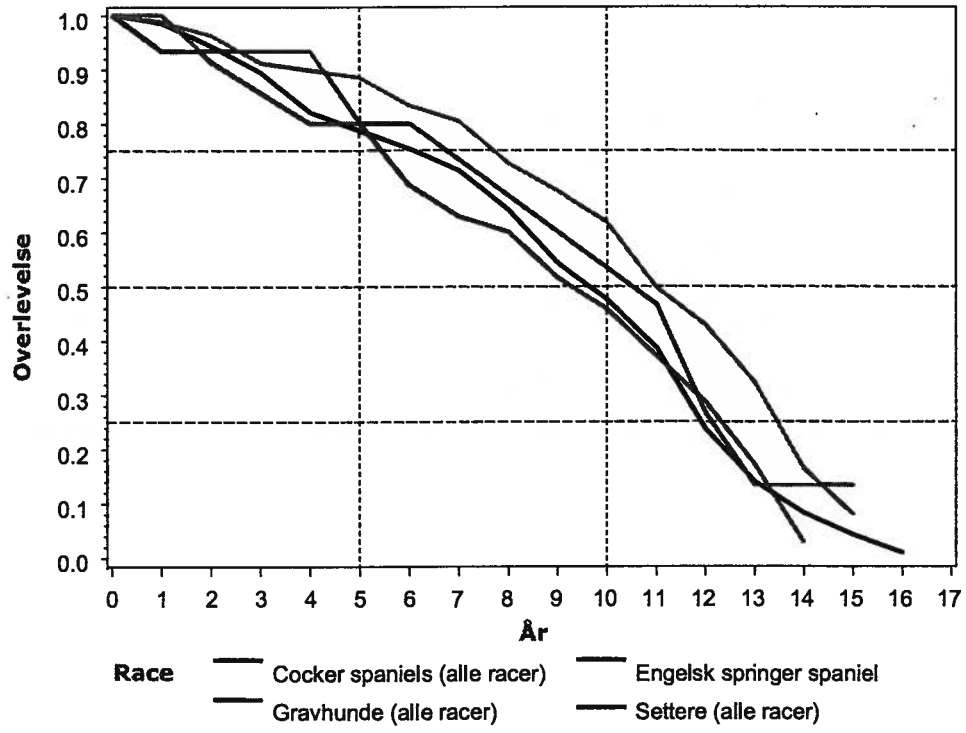
Figur 4.23. Racehundes og blandingers forventede levealder



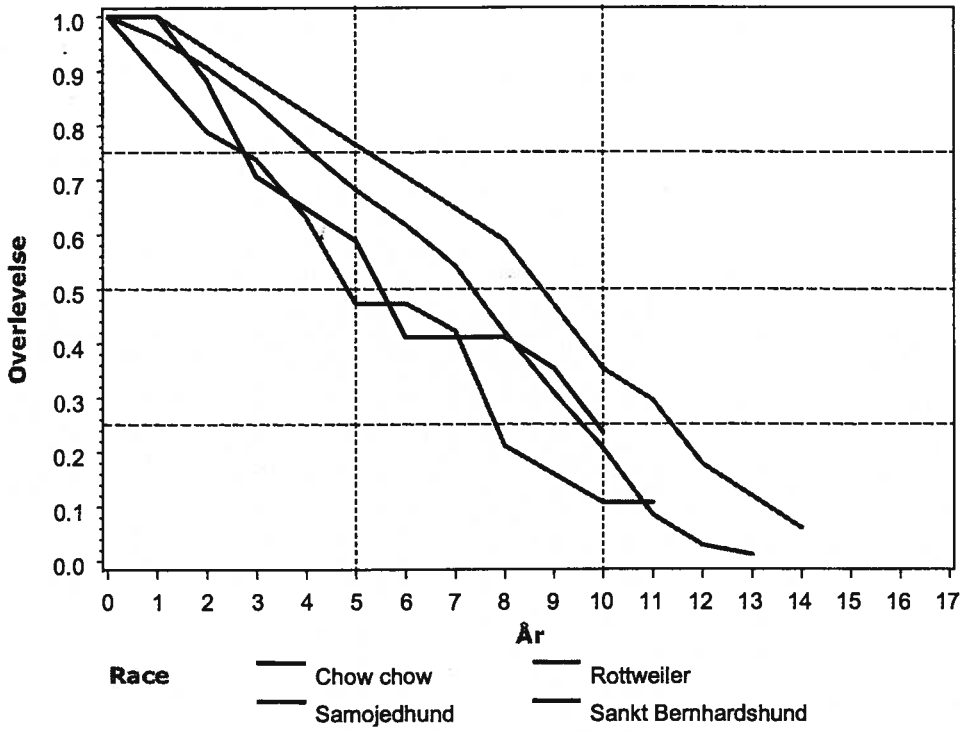
Figur 4.24. Racehundes forventede levealder 1



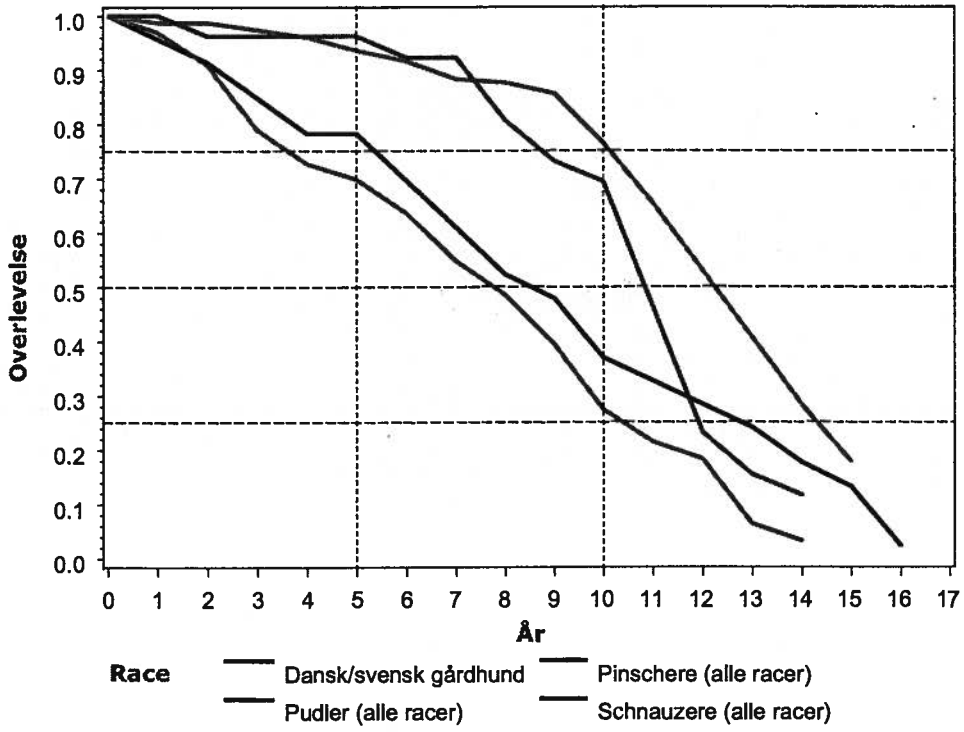
Figur 4.25. Racehundes forventede levealder 2



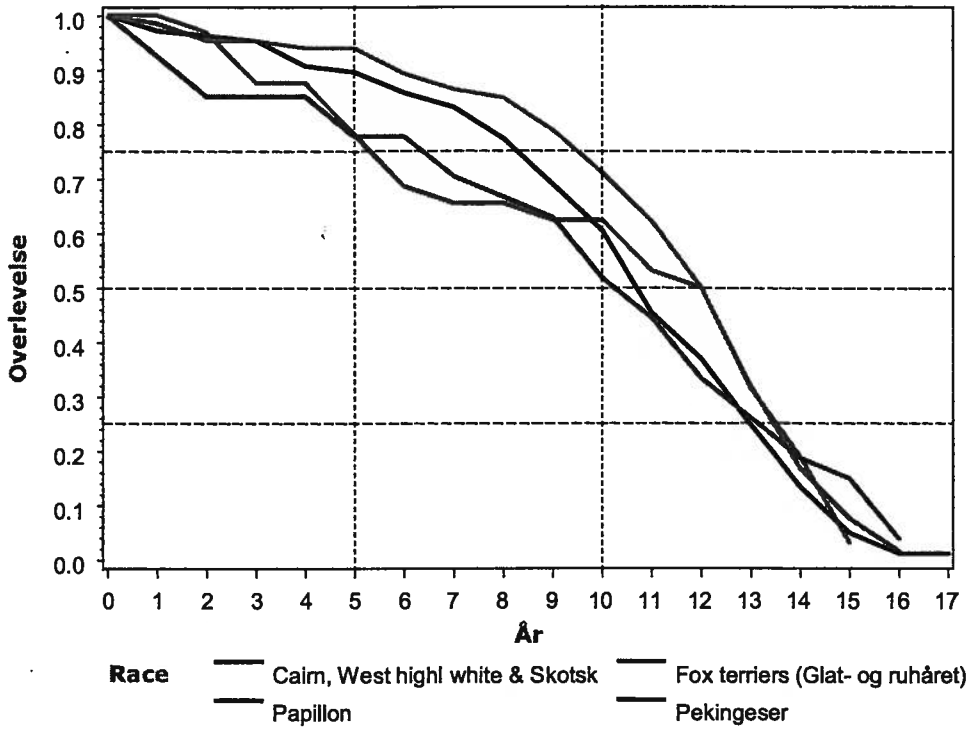
Figur 4.26. Racehundes forventede levealder 3



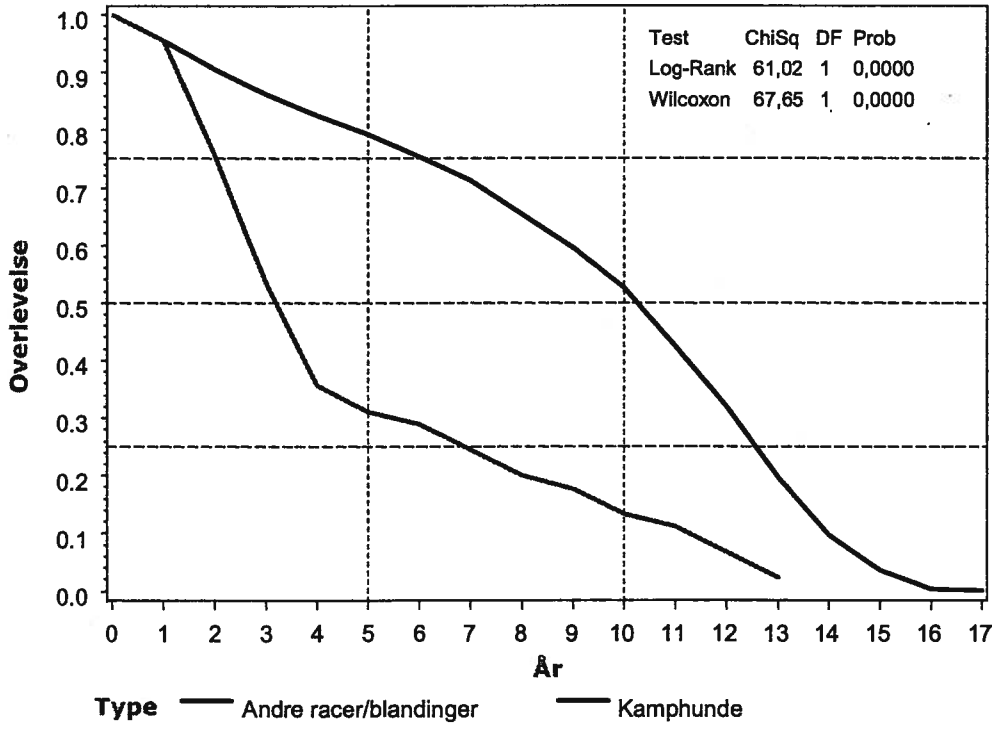
Figur 4.27. Racehundes forventede levealder 4



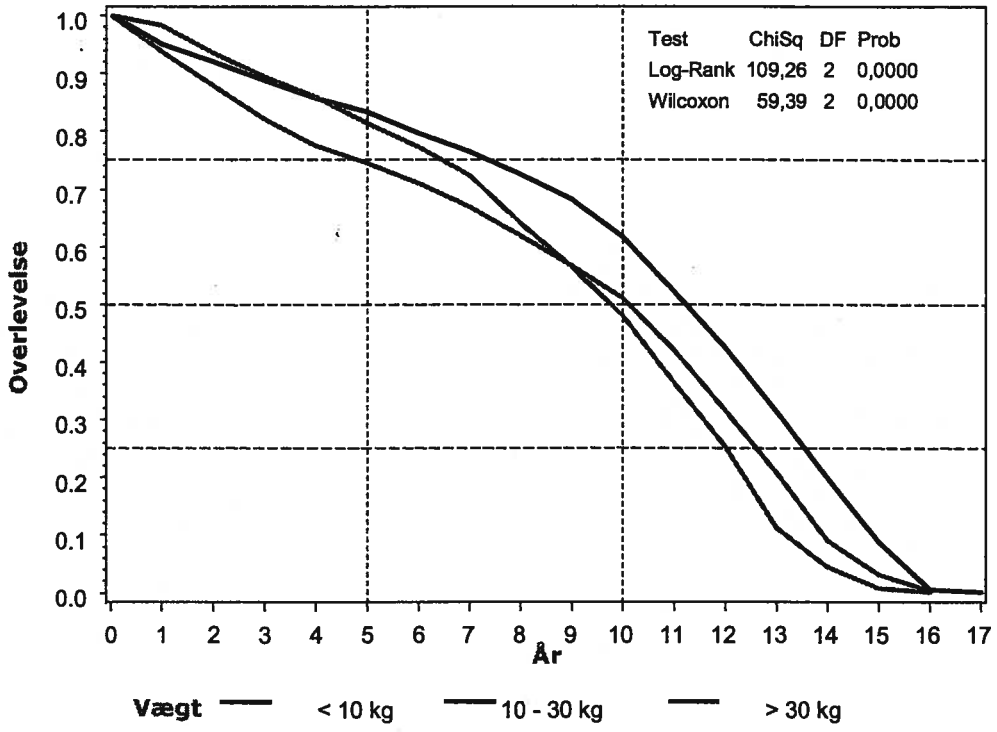
Figur 4.28. Racehundes forventede levealder 5



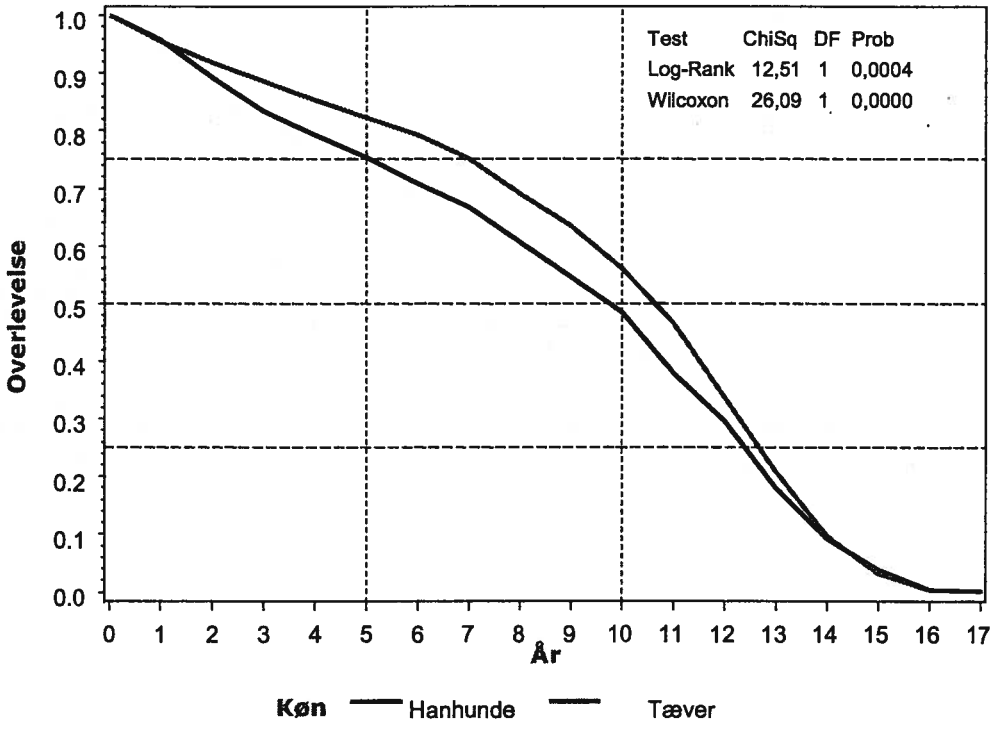
Figur 4.29. Kamphundes/kamphundebland. forventede levealder



Figur 4.30. Små, mellem og store hundes forventede levealder



Figur 4.31. Hanhundes og tævers forventede levealder



Hos *Foxterrier* en overlevelse, der meget minder om overlevelsen hos *Labrador retriever* (figur 4.28), idet henholdsvis 71 % og 67 % af hundene kunne forventes at nå en alder af 10 år. Gruppen bestående af *Cairn terrier*, *West highland white terrier* og *Skotsk terrier* havde en dødelighed, som meget mindede om dødeligheden hos *Fox terrier*, men de to overlevelseskurver lå noget forskudt i forhold til hinanden. Derfor kunne kun 60 % af hundene forvente at nå 10-års alderen. Hos *Papillon* sås en høj dødsrate i aldersgruppen 2 – 6 år, som medførte, at kun 78 % af hundene kunne forvente at blive 5 år gamle. Til gengæld faldt dødsraten markant efter hundene havde nået denne alder, hvorfor hele 63 % kunne forvente at nå 10-års alderen. Overlevelseskurven for *Pekingeser* fulgte i nogen grad kurven for *Papillon*, men dødsraten var mere konstant hos *Pekingeser* – dvs. lavere rate blandt hunde mellem 2 og 6 år og højere rate blandt hunde mellem 6 og 10 år. Tabellerne 4.29 og 4.30 viser henholdsvis overlevelsestabellen og hazardtabellen (se *Statistisk analyse*) for 20 racer eller racegrupper.

Overlevelseskurven for kamphunde og kamphundeblandinger afveg signifikant fra kurven for andre racer og blandinger (figur 4.29). Mens 79 % af hunde tilhørende sidstnævnte gruppe kunne forvente at leve indtil 5-års alderen, var dette kun tilfældet for mindre end 31 % af kamphundene og kamphundeblandingerne (tabel 4.32), hvilket skyldtes, at dødsraten i aldersgruppen 1 – 4 år var ekstrem høj.

Det skal dog bemærkes, at hovedparten af kamphundene i Danmark er unge hunde, da visse kamphunderacer nyder stærkt stigende popularitet. Derfor vil hovedparten af de hunde, som aflives, også være unge, mens de, som får lov at leve videre, endnu ikke er gamle nok til at blive aflivet på grund af lidelser, som især rammer ældre hunde. Den beregnede overlevelse giver derfor ikke et retvisende billede af, hvor gamle kamphundene kan forvente at blive.

Tabel 4.32. Kamphunderacers og –blandingers overlevelse til 5- og 10-års alderen

Type	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
Kamphunde	0,31	0,18	0,45	0,13	0,05	0,25
Andre racer/blandinger	0,79	0,78	0,80	0,53	0,51	0,54

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Der var signifikant forskel på overlevelseskurverne på de forskellige vægtklasser af hunde (figur 4.33). Hunde med en kropsvægt under 10 kg kunne forvente at leve længere end hunde på 10 kg eller derover.

Tabel 4.33. Forskellige vægtklassers overlevelse til 5- og 10-års alderen

Vægtklasse	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
< 10 kg	0,83	0,80	0,86	0,62	0,58	0,65
10 - 30 kg	0,75	0,72	0,77	0,51	0,49	0,53
> 30 kg	0,81	0,79	0,83	0,48	0,45	0,51

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

Sammenlignet med hunde med en kropsvægt over 30 kg havde hunde mellem 10 kg og 30 kg en højere dødsrate op til 4-års alderen, men herefter havde hunde over 30 kg den største dødsrate. Således kunne 75 % af hundene mellem 10 – 30 kg og 81 % af hundene over 30 kg forvente at nå 5-års alderen, men flere af hundene mellem 10 – 30 kg (49 %) end af hundene over 30 kg (45 %) kunne forvente at nå 10-års alderen (tabel 4.33).

Der var ligeledes signifikant forskel på overlevelseskurverne for henholdsvis hanhunde og tæver (figur 4.31). Generelt kunne tæver forvente at leve længere end hanhunde. Op til 5-års alderen sås den højeste dødsrate blandt hanhunde, men efter 11-års alderen sås den højeste dødsrate blandt tæver. Kun 75 % af hanhundene kunne forvente at nå 5-års alderen, mens 82 % af tæver kunne forvente at nå denne alder (tabel 4.34).

Tabel 4.34. Hanhundes og tævers overlevelse til 5- og 10-års alderen

Køn	5 år	P_{low}	P_{upp}	10 år	P_{low}	P_{upp}
Hanhunde	0,75	0,73	0,77	0,48	0,46	0,51
Tæver	0,82	0,80	0,84	0,56	0,54	0,58

P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse

4.9. Årsager til aflivning hos forskellige racer og hos blandinger

I forhold til hunde af blandingsrace (B) blev en signifikant større andel af racehundene (R) aflivet på grund af hjerte- og lungelidelser (R/B=1,53) samt på grund af centralnervøse lidelser (R/B=1,86)(tabel 4.37). Desuden blev en større andel af racehundene aflivet på grund af lever- og nyrelidelser. Denne tendens nærmede sig signifikans (p=0,0682). Til gengæld blev en signifikant mindre andel af racehundene aflivet på grund af aggression (R/B=0,78), frygtsomhed eller angst (R/B=0,56), separationsproblemer (R/B=0,50) samt andre adfærdsproblemer (R/B=0,59).

Tabel 4.38 viser, hvordan de forskellige årsager til aflivning fordeler sig inden for de enkelte racer. Med fed skrift er markeret, hvis andelen af hunde aflivet af en given årsag inden for racen afviger signifikant fra den tilsvarende andel blandt hunde af racen *Labrador retriever*. Hos følgende racer var andelen af aflivede hunde signifikant højere end hos *Labrador retriever* (racerne er ordnet efter faldende andel):

Centralnervøse lidelser: *Border collie* (20,0 %), *Cavalier king charles spaniel* (12,5 %), *Belgiske hyrdehunde* (12,0 %) og *Gravhunde* (6,9 %).

Endocrine lidelser: *Cavalier king charles spaniel* (12,5 %) og *Schnauzere* (11,5). Hos *Golden retriever* sås derimod en signifikant lavere andel (0,0 %).

Genitale lidelser: *Belgiske hyrdehunde* (12,0 %), *Chow chow* (11,8 %) og *Newfoundland* (8,6 %).

Hjerte- og lungelidelser: *Cavalier king charles spaniel* (31,3 %), *Pomeranian* (17,9 %), *Yorkshire terrier* (15,2 %), *Papillon* (12,5 %), *Boxer* (10,4 %), *Pudler* (9,0 %) og *Gravhunde* (8,8 %). Hos *Schæferhund* sås derimod en signifikant lavere andel (1,4 %).

Hudlidelser: *Pekingeser* (14,3 %), *Cavalier king charles spaniel* (12,5 %), gruppen bestående af *Cairn terrier*, *West highland white terrier* og *Skotsk terrier* (9,4 %) og hos *Schæferhund* (8,2 %).

Tabel 4.35. Overlevelsestabel for 20 forskellige hunderacer/racegrupper

År	Lab	Sch	Gol	Bel	Coc	Gra	Spr	Set	Rot	San	Sam	Cho	Dsh	Pud	Pin	Scn	Cws	Fox	Pap	Pek
0	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1	0,95	0,94	0,99	0,88	0,98	0,99	1,00	0,93	0,96	0,89	1,00	1,00	0,96	0,99	0,97	1,00	0,97	0,98	1,00	0,93
2	0,92	0,88	0,96	0,88	0,94	0,96	0,91	0,93	0,91	0,79	0,94	0,88	0,91	0,99	0,91	0,96	0,96	0,95	0,97	0,85
3	0,89	0,82	0,92	0,75	0,89	0,91	0,86	0,93	0,84	0,74	0,88	0,71	0,85	0,97	0,79	0,96	0,95	0,95	0,88	0,85
4	0,87	0,78	0,92	0,67	0,82	0,90	0,80	0,93	0,76	0,63	0,82	0,65	0,78	0,96	0,73	0,96	0,91	0,94	0,88	0,85
5	0,85	0,74	0,89	0,63	0,79	0,88	0,80	0,80	0,68	0,47	0,76	0,59	0,78	0,93	0,70	0,96	0,90	0,94	0,78	0,78
6	0,83	0,70	0,88	0,63	0,75	0,83	0,69	0,80	0,62	0,47	0,71	0,41	0,70	0,92	0,64	0,92	0,86	0,89	0,69	0,78
7	0,80	0,65	0,87	0,58	0,71	0,80	0,63	0,73	0,54	0,42	0,65	0,41	0,61	0,88	0,55	0,92	0,83	0,86	0,66	0,70
8	0,76	0,58	0,79	0,54	0,64	0,73	0,60	0,67	0,42	0,21	0,59	0,41	0,52	0,88	0,48	0,81	0,77	0,85	0,66	0,67
9	0,73	0,50	0,77	0,46	0,54	0,67	0,51	0,60	0,31	0,16	0,47	0,35	0,48	0,86	0,39	0,73	0,69	0,79	0,63	0,63
10	0,67	0,42	0,71	0,38	0,48	0,62	0,46	0,53	0,21	0,11	0,35	0,24	0,37	0,76	0,27	0,69	0,60	0,71	0,63	0,52
11	0,55	0,31	0,58	0,38	0,39	0,50	0,37	0,47	0,08	0,11	0,29		0,33	0,65	0,21	0,46	0,45	0,62	0,53	0,44
12	0,45	0,19	0,43	0,33	0,24	0,43	0,29	0,27	0,03		0,18		0,28	0,53	0,18	0,23	0,37	0,50	0,50	0,33
13	0,24	0,07	0,23	0,29	0,14	0,32	0,17	0,13	0,01		0,12		0,24	0,41	0,06	0,15	0,25	0,32	0,31	0,26
14	0,10	0,02	0,09	0,08	0,08	0,16	0,03	0,13			0,06		0,17	0,28	0,03	0,12	0,13	0,17	0,19	0,19
15	0,02	0,00	0,01	0,04	0,04	0,08		0,13					0,13	0,18			0,05	0,08	0,03	0,15
16	0,01				0,01								0,02				0,01	0,02		0,04
17																	0,01			

Lab=Labrador retriever; Sch=Schæferhund; Gol=Golden retriever; Bel=Belgiske hyrdehunde; Coc=Cocker spaniel; Gra=Gravhunde (alle racer); Spr=Engelsk springer spaniel; Set=Settere (alle racer); Rot=Rottweiler; San=Sankt bernhardshund; Sam=Samojedhund; Cho=Chow chow; Dsh=Dansk/svensk gårdhund; Pud=Pudler (alle racer) Pin=Pinschere (alle racer); Scn=Schnauzere (alle racer); Cws=Cairn, West highland white & Skotsk terrier; Fox=Fox terrier (ru- og glathåret); Pap=Papillon; Pek=pekingeser

Tabel 4.36. Hazardtabel for 20 forskellige hunderacer/racegrupper

År	Lab	Sch	Gol	Bel	Coc	Gra	Spr	Set	Rot	San	Sam	Cho	Dsh	Pud	Pin	Scn	Cws	Fox	Pap	Pek
0	0,05	0,06	0,01	0,13	0,02	0,01	0,00	0,07	0,04	0,11	0,00	0,00	0,04	0,01	0,03	0,00	0,03	0,02	0,00	0,08
1	0,04	0,07	0,03	0,00	0,04	0,02	0,09	0,00	0,06	0,13	0,06	0,13	0,05	0,00	0,06	0,04	0,01	0,03	0,03	0,08
2	0,03	0,06	0,04	0,15	0,05	0,05	0,06	0,00	0,07	0,07	0,06	0,22	0,07	0,01	0,14	0,00	0,01	0,00	0,10	0,00
3	0,02	0,05	0,00	0,12	0,09	0,02	0,07	0,00	0,11	0,15	0,07	0,09	0,08	0,01	0,08	0,00	0,05	0,02	0,00	0,00
4	0,03	0,06	0,04	0,06	0,04	0,02	0,00	0,15	0,10	0,29	0,07	0,10	0,00	0,03	0,04	0,00	0,01	0,00	0,11	0,09
5	0,02	0,05	0,01	0,00	0,04	0,06	0,15	0,00	0,10	0,00	0,08	0,35	0,12	0,02	0,09	0,04	0,04	0,05	0,13	0,00
6	0,04	0,08	0,02	0,07	0,06	0,03	0,09	0,09	0,13	0,12	0,09	0,00	0,13	0,04	0,15	0,00	0,03	0,03	0,05	0,10
7	0,06	0,11	0,09	0,07	0,11	0,10	0,05	0,10	0,25	0,67	0,10	0,00	0,15	0,01	0,12	0,13	0,07	0,02	0,00	0,05
8	0,04	0,16	0,03	0,17	0,17	0,07	0,15	0,11	0,31	0,29	0,22	0,15	0,09	0,02	0,21	0,10	0,12	0,07	0,05	0,06
9	0,09	0,16	0,08	0,20	0,13	0,09	0,12	0,12	0,40	0,40	0,29	0,40	0,26	0,11	0,36	0,05	0,13	0,10	0,00	0,19
10	0,19	0,29	0,20	0,00	0,21	0,22	0,21	0,13	0,84	0,00	0,18	2,00	0,13	0,16	0,25	0,40	0,29	0,14	0,16	0,15
11	0,21	0,48	0,30	0,12	0,47	0,15	0,26	0,55	1,00	2,00	0,50		0,14	0,21	0,15	0,67	0,21	0,22	0,06	0,29
12	0,59	0,96	0,61	0,13	0,52	0,29	0,50	0,67	1,00		0,40		0,17	0,27	1,00	0,40	0,40	0,44	0,46	0,25
13	0,85	1,09	0,83	1,11	0,52	0,65	1,43	0,00	2,00		0,67		0,32	0,36	0,67	0,29	0,60	0,63	0,50	0,33
14	1,24	1,56	1,50	0,67	0,67	0,69	2,00	0,00			2,00		0,29	0,46	2,00	2,00	0,95	0,75	1,43	0,22
15	1,20	2,00	2,00	2,00	1,33	2,00		2,00					1,43	2,00			1,33	1,33	2,00	1,20
16	2,00				2,00								2,00				0,00	2,00		2,00

Lab=Labrador retriever; Sch=Schæferhund; Gol=Golden retriever; Bel=Belgiske hyrdehunde; Coc=Cocker spaniel; Gra=Gravhunde (alle racer); Spr=Engelsk springer spaniel; Set=Settere (alle racer); Rot=Rottweiler; San=Sankt bernhardshund; Sam=Samojedhund; Cho=Chow chow; Dsh=Dansk/svensk gårdhund; Pud=Pudler (alle racer) Pin=Pinschere (alle racer); Scn=Schnauzere (alle racer); Cws=Cairn, West highland white & Skotsk terrier; Fox=Fox terrier (ru- og glathåret); Pap=Papillon; Pek=pekingeser

Lever- og nyrelidelser: *Fox terrier* (12,1 %) og gruppen bestående af *Cairn terrier, West highland white terrier* og *Skotsk terrier* (11,3 %). Hos *Schæferhund* sås derimod en signifikant lavere andel (1,9 %).

Problemer med muskler eller led: *Newfoundland* (28,6 %). Hos følgende racer sås derimod en lavere andel: *Pudler* (5,2 %), *Cocker spaniel* (4,9 %), *Fox terrier* (4,5 %), *Boxer* (4,2 %) og *Schnauzere* (0,0 %).

Neoplasier: *Schnauzere* (46,2 %). Hos følgende racer sås derimod en lavere andel: *Schæferhund* (12,3 %), *Gravhunde* (10,2 %), *Hønsehunde* (6,5 %), *Collie* (5,1 %) og *Belgiske hyrdehunde* (0,0 %).

Andre lidelser: *Pekingeser* (21,4 %) og *Hønsehunde* (12,0 %).

Aggression: *Sankt bernhardshund* (45,0 %), *Chow chow* (41,2 %), *Samojedhund* (38,9 %), *Pinschere* (33,3 %), *Rottweiler* (31,8 %), *Border collie* (30,0 %), *Belgiske hyrdehunde* (28,0 %), *Cocker spaniel* (26,0 %), *Dansk/svensk gårdhund* (25,5 %), *Schæferhund* (22,2 %), hunde af blandingsrace (19,1 %), *Papillon* (15,6 %) og *Gravhunde* (13,9 %).

Frygtsomhed eller angst: Ingen signifikante afvigelser.

Separationsproblemer (problemer med at være alene hjemme): *Settere* (12,5 %).

Andre adfærdsproblemer: *Engelsk springer spaniel* (11,1 %) og hunde af blandingsrace (6,5 %).

Andre forhold end sygdom eller adfærd: *Cavalier king charles spaniel* (18,8 %), *Dansk/svensk gårdhund* (12,8 %) og hunde af blandingsrace (10,2 %). Hos *Golden retriever* sås derimod en lavere andel (1,3 %).

Tabel 4.39 viser det estimerede antal registrerede hunde i Danmark i perioden 1993 til 2005. Antallet af hunde inden for de enkelte racer er beregnet på grundlag af antallet af hunde registreret i *Dansk Hunderegister*, idet der er korrigeret for det forventede antal hunde, som må forventes aflivet inden for racen (se *Statistisk analyse*). Racefordelingerne 1997 og 2005 blev anvendt som kontrolgruppe i forbindelse med odds ratio for aflivning af forskellige årsager hos de enkelte racer sammenlignet med *Labrador retriever*. Beregninger blev foretaget med to strata: 1) data fra undersøgelsen fra 1999, hvor den estimerede racefordeling i 1997 blev anvendt som kontrolgruppe, og 2) data fra nærværende undersøgelse, hvor fordelingen fra 2005 blev anvendt.

Tabel 4.40 viser odds ratios for aflivning på grund af forskellige årsager. Odds ratios signifikant mindre end 1 er fremhævet med fed skrift, og odds ratios signifikant større end 1 er fremhævet med fed skrift og understreget. Hos følgende racer sås odds ratios for aflivning signifikant større end 1 (ordnet efter faldende OR):

Centralnervøse lidelser: *Belgiske hyrdehunde* (9,1), *Boxer* (4,8), *Gravhunde* (4,8), *Pudler* (4,1), *Beagle* (3,7) og *Schæferhund* (3,6).

Endocrine lidelser: *Pudler* (5,7), *Schnauzere* (4,8), *Samojedhund* (4,2) og *Gravhunde* (2,6).

Genitale lidelser: *Chow chow* (9,8), *Belgiske hyrdehunde* (9,7), *Fox terrier* (6,4), *Pudler* (6,2), *Newfoundland* (5,4) og *Pomeranian* (5,0).

Hjerte- og lungelidelser: *Pudler* (8,9), *Pomeranian* (7,7), *Fox terrier* (5,9), *Cavalier king charles spaniel* (5,4), *Boxer* (5,3), *Yorkshire terrier* (5,1), *Papillon* (4,6), *Gravhunde* (4,4) og *Newfoundland* (3,3).

Hudlidelser: *Pekingeser* (10,7), *Boxer* (5,9), *Schæferhund* (5,1) og gruppen bestående af *Cairn terrier, West highland white terrier* og *Skotsk terrier* (2,7).

Lever- og nyrelidelser: *Fox terrier* (6,0), *Pudler* (5,9), *Boxer* (3,2), *Yorkshire terrier* (3,0), *Cocker spaniel* (2,3) og *Gravhunde* (2,1).

Problemer med muskler eller led: *Newfoundland* (3,4), *Chow chow* (3,2), *Rottweiler* (3,1) og *Schæferhund* (2,5).

Neoplasier: *Pudler* (4,1), *Schnauzere, Fox terrier* (2,7), *Boxer* (2,6) og *Rottweiler* (2,1). Hos følgende racer sås derimod OR's signifikant mindre end 1: *Dansk/svensk gårdhund* (0,3) og *Hønsehunde* (0,3).

Andre lidelser: *Pekingeser* (8,3), *Fox terrier* (4,5), *Gravhunde* (2,9), *Pudler* (2,5) og *Schæferhund* (2,3) samt hunde af blandingsrace (1,9).

Aggression: *Sankt bernhardshund* (17,0), *Chow chow* (12,2), *Rottweiler* (11,2), *Belgiske hyrdehunde* (8,2), *Cocker spaniel* (6,4), *Pudler* (6,4), *Schæferhund* (6,2), *Pinschere* (5,8), *Samojedhund* (5,8), *Pekingeser* (5,1), *Fox terrier* (4,8), hunde af blandingsrace (4,8), *Gravhunde* (4,2), *Dansk/svensk gårdhund* (3,9), *Papillon* (3,5), *Boxer* (3,1) og *Golden retriever* (2,1).

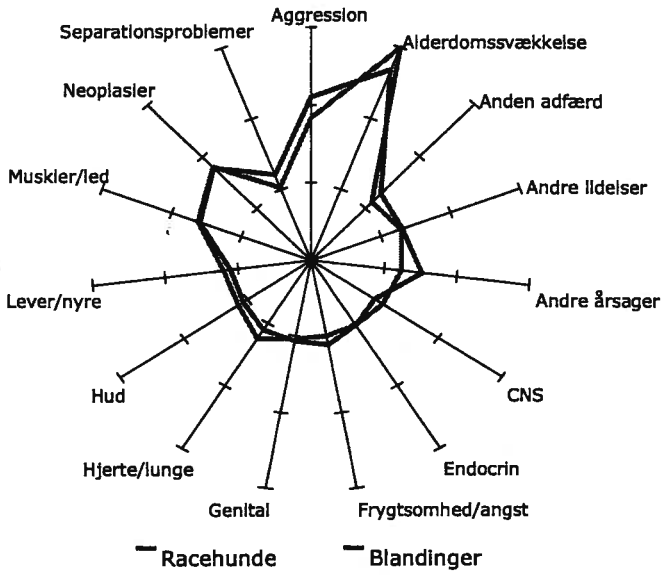
Frygtsomhed eller angst: *Sankt bernhardshund* (10,4), *Collie* (4,2) og hunde af blandingsrace (2,3).

Separationsproblemer (problemer med at være alene hjemme): *Pinschere* (4,1), *Boxer* (4,0) og hunde af blandingsrace (2,8).

Andre adfærdsproblemer: *Rottweiler* (4,5), *Beagle* (3,7), hunde af blandingsrace (3,6), *Cocker spaniel* (3,3), *Engelsk springer spaniel* (3,3), *Schæferhund* (3,0) og *Gravhunde* (2,5).

Andre forhold end sygdom eller adfærd: *Pudler* (4,6), *Pekingeser* (4,5), *Pomeranian* (3,3), hunde af blandingsrace (3,0), *Rottweiler* (2,6) og *Gravhunde* (2,4).

Figur 4.32. Racehunde/blandinger



Tabel 4.37. Andelen racehunde (R) sammenlignet med andelen af blandinger (B) aflivet af forskellige årsager

Lidelse/ problem	R (%)	Lower	Upper	B (%)	Lower	Upper	R/B	Pr
Hjerte/lunge	5,9	5,0	6,8	3,9	2,6	5,1	1,53	0,0191
Lever/nyre	5,1	4,3	5,9	3,6	2,4	4,9	1,41	0,0682
Genital	2,6	2,0	3,1	3,1	1,9	4,2	0,84	0,4234
Neoplasier	14,4	13,1	15,7	14,1	11,8	16,4	1,02	0,8235
Muskler/led	11,7	10,6	12,9	11,4	9,3	13,4	1,03	0,7530
Hud	4,4	3,6	5,1	3,2	2,0	4,3	1,37	0,1217
Endocrin	2,6	2,0	3,1	2,6	1,6	3,7	0,98	0,9416
CNS	4,0	3,3	4,7	2,2	1,2	3,1	1,86	0,0097
Alderdomssvækkelse	32,6	30,9	34,3	27,8	24,9	30,8	1,17	0,0072
Andre lidelser	6,8	5,9	7,7	6,8	5,1	8,5	1,00	0,9781
Aggression	14,9	13,6	16,2	19,1	16,5	21,7	0,78	0,0034
Frygtsomhed/angst	2,1	1,6	2,6	3,7	2,5	5,0	0,56	0,0065
Separationsproblemer	2,6	2,0	3,2	5,2	3,8	6,7	0,50	0,0002
Anden adfærd	3,8	3,1	4,5	6,5	4,8	8,1	0,59	0,0009
Andre årsager	5,7	4,9	6,6	10,2	8,2	12,2	0,56	0,0000

Lower = nedre konfidensgrænse; Upper = øvre konfidensgrænse; Pr = p-værdi for forskel mellem andele

Tabel 4.38. Andelen (%) af hunde aflivet af forskellige årsager

Race	N	Alderdom	Central nerv	Endokrin	Genitalia	Hjer Lung	Hud lidel	Liver Nyre	Musk Skel	Neoplasi	Andre lidel	Aggression	Frygt Angst	Separation	Anden adf	Andre forh
Beagle	37	40,5	8,1	2,7	0,0	5,4	2,7	0,0	8,1	16,2	5,4	10,8	2,7	5,4	8,1	5,4
Belgiske hyrdehunde (alle racer)	25	32,0	**12,0**	4,0	**12,0**	0,0	4,0	4,0	8,0	**0,0**	0,0	**28,0**	4,0	4,0	0,0	0,0
Border collie	10	**0,0**	**20,0**	10,0	10,0	10,0	0,0	0,0	10,0	10,0	0,0	**30,0**	0,0	0,0	0,0	10,0
Boxer	48	**20,8**	6,3	4,2	0,0	**10,4**	8,3	8,3	4,2	22,9	4,2	10,4	2,1	6,3	0,0	4,2
Cairn, West highl white & Skotsk terrier	106	**24,5**	3,8	6,6	0,9	7,5	**9,4**	**11,3**	9,4	12,3	9,4	8,5	1,9	0,0	3,8	8,5
Cavalier king charles spaniel	16	**6,3**	**12,5**	**12,5**	0,0	**31,3**	**12,5**	12,5	6,3	6,3	6,3	6,3	0,0	0,0	0,0	**18,8**
Chow chow	17	**0,0**	0,0	0,0	**11,8**	0,0	0,0	5,9	17,6	17,6	0,0	**41,2**	0,0	5,9	0,0	0,0
Cocker spaniels (alle racer)	123	**27,6**	1,6	0,0	1,6	4,1	4,1	7,3	**4,9**	14,6	7,3	**26,0**	1,6	3,3	5,7	4,1
Collie	39	56,4	5,1	0,0	2,6	5,1	2,6	5,1	15,4	**5,1**	5,1	7,7	7,7	0,0	5,1	5,1
Dansk/svensk gårdhund	47	**12,8**	4,3	4,3	2,1	6,4	2,1	6,4	6,4	6,4	4,3	**25,5**	2,1	6,4	6,4	**12,8**
Engelsk springer spaniel	36	**27,8**	8,3	0,0	0,0	5,6	5,6	5,6	11,1	16,7	2,8	8,3	5,6	5,6	**11,1**	8,3
Flat coated retriever	28	32,1	3,6	3,6	3,6	0,0	3,6	0,0	10,7	32,1	7,1	0,0	0,0	0,0	3,6	10,7
Fox terriers (alle racer)	66	**33,3**	1,5	3,0	6,1	9,1	0,0	**12,1**	**4,5**	19,7	10,6	12,1	3,0	0,0	1,5	6,1
Golden retriever	151	49,0	2,0	**0,0**	4,0	5,3	3,3	4,6	12,6	14,6	2,6	9,9	1,3	2,0	2,0	**1,3**
Gravhunde (alle racer)	216	**34,3**	**6,9**	3,7	2,3	**8,8**	1,9	5,6	11,6	**10,2**	8,8	**13,9**	1,4	2,3	3,7	6,9
Hønsehunde (alle racer)	108	**31,5**	5,6	3,7	2,8	3,7	3,7	3,7	10,2	**6,5**	**12,0**	8,3	3,7	4,6	3,7	10,2
Kleiner mynsterlænder	21	42,9	0,0	4,8	4,8	0,0	0,0	4,8	4,8	19,0	9,5	4,8	0,0	0,0	4,8	9,5
Labrador retriever	355	48,2	2,8	2,8	2,3	3,7	3,1	4,8	14,6	17,5	5,6	5,9	2,5	2,8	2,8	5,1
Newfoundland	35	**20,0**	0,0	2,9	**8,6**	8,6	5,7	5,7	**28,6**	14,3	0,0	5,7	0,0	2,9	2,9	2,9
Papillon	32	34,4	6,3	0,0	0,0	**12,5**	0,0	3,1	12,5	12,5	3,1	**15,6**	3,1	3,1	6,3	0,0
Pekingeser	28	**28,6**	3,6	0,0	3,6	0,0	**14,3**	3,6	10,7	14,3	**21,4**	14,3	0,0	0,0	3,6	10,7
Pinschere (alle racer)	33	**12,1**	0,0	3,0	3,0	6,1	0,0	9,1	3,0	9,1	6,1	**33,3**	3,0	9,1	9,1	6,1
Pomeranian	28	42,9	3,6	0,0	7,1	**17,9**	3,6	7,1	7,1	3,6	7,1	7,1	0,0	3,6	3,6	10,7
Pudler (alle racer)	155	42,6	3,2	4,5	3,9	**9,0**	0,6	7,7	**5,2**	20,0	3,9	10,3	1,9	1,3	1,9	6,5
Rottweiler	110	**14,5**	2,7	2,7	1,8	2,7	1,8	3,6	19,1	16,4	5,5	**31,8**	0,9	2,7	5,5	6,4
Samojedhund	18	**22,2**	0,0	11,1	0,0	0,0	0,0	5,6	22,2	16,7	5,6	**38,9**	0,0	0,0	5,6	0,0
Sankt bernhardshund	20	**15,0**	0,0	0,0	0,0	0,0	5,0	0,0	0,0	15,0	0,0	**45,0**	10,0	5,0	0,0	5,0
Schnauzere (alle racer)	26	30,8	7,7	**11,5**	0,0	3,8	7,7	0,0	**0,0**	**46,2**	0,0	3,8	3,8	0,0	0,0	11,5
Schæferhund	415	**27,7**	5,3	1,4	2,2	**1,4**	**8,2**	**1,9**	17,8	**12,3**	7,0	**22,2**	1,2	2,7	4,3	4,3
Settere (alle racer)	16	25,0	0,0	6,3	0,0	0,0	6,3	12,5	18,8	25,0	0,0	6,3	6,3	**12,5**	0,0	6,3
Yorkshire terrier	33	48,5	6,1	0,0	0,0	**15,2**	0,0	12,1	3,0	15,2	9,1	3,0	0,0	0,0	6,1	3,0
Andre racehunde	450	**28,9**	3,1	1,6	2,2	**9,6**	5,3	4,7	10,7	13,8	9,3	**15,6**	2,7	2,4	4,7	5,6
Blandinger	881	**27,8**	2,2	2,6	3,1	3,9	3,2	3,6	11,4	14,1	6,8	**19,1**	3,7	5,2	**6,5**	**10,2**

Værdier signifikant ($p<0,05$) mindre end de tilsvarende værdier hos Labrador retriever er fremhævet med fed skrift
Værdier signifikant ($p<0,05$) større end de tilsvarende værdier hos Labrador retriever er fremhævet med fed skrift og understreget

Tabel 4.39. Estimeret racefordeling af registrerede hunde i Danmark

Race	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Beagle	466	894	1308	1684	2082	2535	2897	3159	3492	3760	4076	4380	4679
Belgiske hyrdehunde (alle racer)	215	421	663	860	1003	1181	1326	1389	1474	1522	1554	1598	1624
Border collie	171	368	575	854	1108	1447	1710	2000	2363	2662	2987	3359	3717
Boxer	455	861	1238	1665	1916	2178	2359	2500	2704	2790	2977	3010	3042
Cairn, West highl white & Skotsk terrier	1724	3532	5340	7141	8822	10306	11630	12855	14132	15358	16798	18168	19139
Cavalier king charles spaniel	267	546	856	1206	1592	1928	2342	2670	3060	3439	3841	4345	4901
Chow chow	181	375	518	612	695	732	733	760	791	816	821	783	797
Cocker spaniels (alle racer)	1227	2427	3620	4781	5805	6713	7488	8280	9063	9744	10261	10973	11462
Collie	420	818	1230	1722	2080	2458	2828	3048	3310	3595	3786	3983	4043
Dansk/svensk gårdhund	619	1286	1934	2677	3353	4219	4972	5758	6611	7484	8394	9485	10353
Engelsk springer spaniel	526	1255	1986	2617	2991	3581	3985	4272	4781	5426	6128	6801	7211
Flat coated retriever	428	910	1379	1861	2130	2502	2725	2994	3209	3418	3645	3807	3834
Fox terriers (alle racer)	310	759	1131	1500	1861	2210	2592	3105	3477	3812	4159	4461	4648
Golden retriever	1477	2922	4572	6243	7815	9296	10759	12279	13762	15415	17116	18815	20356
Gravhunde (alle racer)	1746	3407	5242	6822	8330	9765	11098	12378	13353	14354	15356	16323	17115
Hønsehunde (alle racer)	2236	4705	7158	8888	10418	11513	12380	13181	13777	14254	14819	15187	14946
Kleiner mynsterlænder	365	1036	1626	2163	2636	3071	3497	3702	4076	4471	4752	5071	5241
Labrador retriever	4311	8886	14075	18994	23292	27760	32197	36624	41413	46094	51147	56988	62083
Newfoundland	378	773	1154	1450	1829	2016	2277	2408	2564	2704	2760	2856	2903
Papillon	320	634	989	1328	1650	1903	2092	2298	2527	2769	2981	3246	3469
Pekingeser	205	377	566	737	888	1013	1171	1292	1476	1604	1761	1893	1971
Pinschere (alle racer)	291	582	869	1071	1207	1369	1523	1626	1722	1840	1995	2133	2218
Pomeranian	263	525	768	994	1214	1428	1598	1782	1990	2185	2391	2624	2748
Pudler (alle racer)	850	1564	1999	2349	2768	3121	3614	4391	5020	5880	6592	7225	7820
Rottweiler	747	1536	2256	2995	3611	4271	4781	5340	5824	6170	6604	7045	7412
Samojedhund	383	635	939	1237	1430	1593	1773	1907	2047	2104	2239	2317	2353
Sankt bernhardshund	173	264	406	549	631	714	827	839	857	874	887	914	897
Schnauzere (alle racer)	293	564	847	1156	1419	1727	2005	2285	2588	2949	3353	3718	3975
Schæferhund	4300	8235	11804	15146	17729	20024	22079	23561	25078	26256	27674	28601	28943
Settere (alle racer)	310	652	1020	1293	1567	1735	1850	1983	2078	2140	2225	2236	2195
Yorkshire terrier	521	919	1302	1606	1895	2196	2472	2728	3012	3242	3464	3688	3875
Andre racehunde	5787	11122	16774	22393	27828	33214	38353	43490	49515	55909	62978	71139	79188
Blandinger	7320	15145	23979	32859	41227	49286	56444	62467	68756	73919	79391	84453	86216
Total	39285	78935	120120	159454	194824	229004	260377	289348	319900	348957	379912	411626	435375

4.10. Årsager til aflivning hos kamphunde og kamphundeblandinger

Tabel 4.41 viser andelen af de aflivede kamphunde/kamphundeblandinger, som blev aflivet på grund af forskellige lidelser og problemer, set i forhold til den tilsvarende andel hos andre racer/blandinger. Ingen kamphunde og kamphundeblandinger blev aflivet på grund af hjerte-/lungelidelser eller på grund af genitale, endocrine, eller centralnervøse lidelser.

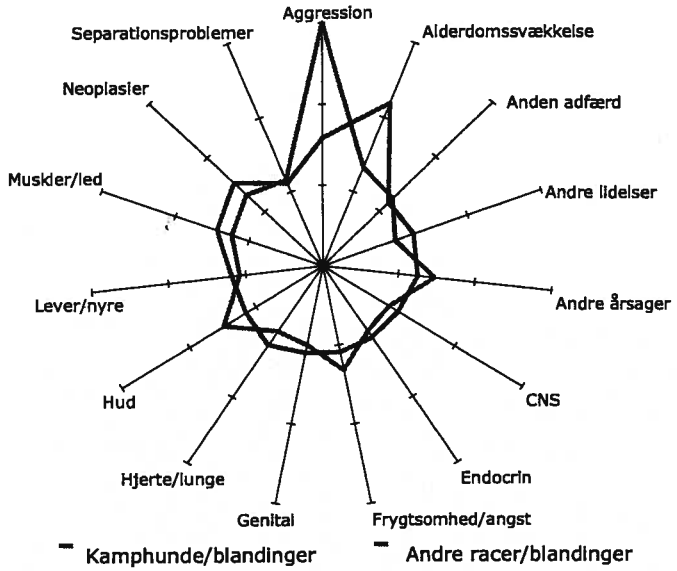
Tabel 4.40. Odds ratios for årsager til aflivning (ref=Labrador retriever)

Race	N	Alderdom	Centralnerv.	Endokrin.	Genital	Hjer./Lung	Hoved/lidel.	Liver/Nyre	Muskel/Skel.	Neoplasi	Andre lidel.	Aggression	Flygt/Angst	Separation	Anden adf.	Andre forh.
Beagle	37	1,0	**3,7**	1,2		1,8	1,1		0,7	1,2	1,2	2,2	1,3	2,3	**3,7**	1,3
Belgiske hyrdehunde (alle racer)	25	1,3	**9,1**	3,0	**9,7**		2,8	1,5	1,2			**8,2**	3,2	2,5		
Border collie	10		3,6	1,8	2,5	1,5			0,3	0,3		2,9				1,1
Boxer	48	0,8	**4,8**	3,2		**5,3**	**5,9**	**3,2**	0,6	**2,6**	1,4	**3,1**	1,6	**4,0**		1,4
Cairn, West highl white & Skotsk terrier	106	0,4	1,2	2,1	0,3	1,7	**2,7**	2,0	0,6	0,6	1,4	1,2	0,6		1,2	1,4
Cavalier king charles spaniel	16	0,1	2,7	2,7		**5,4**	2,4	1,7	0,3	0,2	0,7	0,7				2,4
Chow chow	17				**9,8**			2,3	**3,2**	2,1		**12,2**		3,8		
Cocker spaniels (alle racer)	123	0,9	0,9		1,1	1,7	2,1	**2,3**	0,6	1,3	2,0	**6,4**	1,0	1,7	**3,3**	1,1
Collie	39	**1,6**	2,7		1,5	1,9	1,2	1,4	1,6	0,4	1,2	1,7	**4,2**		2,7	1,3
Dansk/svensk gårdhund	47	0,2	1,3	1,3	0,8	1,5	0,6	1,2	0,4	0,3	0,7	**3,9**	0,7	2,0	1,9	2,3
Engelsk springer spaniel	25	0,4	1,7			0,6	0,7	0,5	0,6	0,4	0,4	0,4	1,8	1,6	**3,3**	1,3
Flat coated retriever	28	0,7	1,3	1,3	1,5		1,2		0,8	1,8	1,2				1,3	1,9
Fox terriers (alle racer)	66	**1,6**	1,3	2,6	**6,4**	**5,9**		**6,0**	0,8	**2,7**	**4,5**	**4,8**	2,9		1,3	2,8
Golden retriever	151	1,3	0,9		2,2	1,8	1,4	1,2	1,1	1,1	0,6	**2,1**	0,7	0,9	0,9	0,3
Gravhunde (alle racer)	216	1,3	**4,8**	**2,6**	1,9	**4,4**	1,1	**2,1**	1,6	1,1	**2,9**	**4,2**	1,1	1,5	**2,5**	**2,4**
Hønsehunde (alle racer)	108	0,5	1,8	1,2	1,0	0,8	1,1	0,6	0,7	0,3	1,8	1,0	1,2	1,2	1,2	1,5
Kleiner mynsterlænder	21	0,5		1,0	1,2			0,6	0,2	0,6	1,0	0,4			1,0	1,0
Labrador retriever	355	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Newfoundland	35	0,6		1,7	**5,4**	**3,3**	3,1	1,7	**3,4**	1,3		1,3		1,4	1,7	0,7
Papillon	32	1,0	3,2			**4,6**		0,9	1,3	1,0	0,8	**3,5**	1,7	1,5	3,2	
Pekingeser	28	1,3	2,9		3,4		**10,7**	1,6	1,7	1,8	**8,3**	**5,1**			2,9	**4,5**
Pinschere (alle racer)	18	0,4			2,6	1,6		2,4	0,5	0,7	1,1	**5,8**		**4,1**	2,4	
Pomeranian	28	1,4	2,1		**5,0**	**7,7**	1,9	2,4	0,8	0,3	2,0	1,9		2,0	2,1	**3,3**
Pudler (alle racer)	155	**3,2**	**4,1**	**5,7**	**6,2**	**8,9**	0,7	**5,9**	1,2	**4,1**	**2,5**	**6,4**	2,7	1,7	2,4	**4,6**
Rottweiler	110	0,7	2,3	2,2	1,7	1,6	1,3	1,6	**3,1**	**2,1**	2,1	**11,2**	0,8	2,0	**4,5**	**2,6**
Samojedhund	18	0,4		**4,2**				1,0	1,7	0,9	0,9	**5,8**			2,1	
Sankt bernhardshund	20	0,8					4,7			2,2		**17,0**	**10,4**	4,1		2,2
Schnauzere (alle racer)	26	0,8	3,2	**4,8**		1,2	2,9			**3,1**		0,8	1,8			2,7
Schæferhund	415	1,0	**3,6**	1,0	1,7	0,7	**5,1**	0,7	**2,5**	1,3	**2,3**	**6,2**	0,9	1,6	**3,0**	1,4
Settere (alle racer)	16	0,4		2,1			1,9	2,0	1,3	1,2		0,8	2,1	3,3		0,9
Yorkshire terrier	33	1,3	2,9			**5,1**		**3,0**	0,3	1,1	2,0	0,6			2,9	0,7
Andre racehunde	476	0,6	1,2	0,6	1,0	**2,8**	1,8	1,1	0,7	0,9	**1,7**	**3,0**	1,2	1,0	1,9	1,2
Blandinger	881	0,9	1,2	1,5	2,0	1,6	1,6	1,2	1,3	1,3	**1,9**	**4,8**	**2,3**	**2,8**	**3,6**	**3,0**

Odds ratios signifikant (p<0,05) mindre end 1 er fremhævet med fed skrift
Odds ratios signifikant (p<0,05) større end 1 er fremhævet med fed skrift og understreget

Knap 2/3 (63,6 %) af gruppen af kamphunde og kamphundeblandinger blev aflivet på grund af aggression. Denne andel var 4,7 gange større end andelen af andre racer og blandinger, som blev aflivet af denne årsag. Af de 21 kamphunde og kamphundeblandinger, som blev aflivet på grund af aggression, var 35,0 % kun aggressive over for andre hunde, 35,0 % kun aggressive over for mennesker og 30,0 % aggressive over for både andre hunde og mennesker (for 1 hund var objektet for aggressionen ikke oplyst). De tilsvarende andele for andre racehunde og blandinger var henholdsvis 7,3 %, 69,5 % og 23,2 %.

Figur 4.33. Kamphunde/kamphundeblandinger



Tabel 4.41. Andelen af kamphunde/kamphundeblandinger (K) sammenlignet med andelen af andre racer/blandinger (A) aflivet af forskellige årsager

Lidelse/ problem	K (%)	Lower	Upper	A (%)	Lower	Upper	K/A	Pr
Hjerte/lunge	.	.	.	6,7	5,3	8,1	.	0,1231
Lever/nyre	3,0	0,0	8,9	5,7	4,3	7,0	0,54	0,5174
Genital	.	.	.	2,7	1,8	3,6	.	0,3425
Neoplasier	3,0	0,0	8,9	17,8	15,6	19,9	0,17	0,0273
Muskler/led	9,1	0,0	18,9	20,4	18,1	22,6	0,45	0,1106
Hud	9,1	0,0	18,9	4,3	3,2	5,5	2,10	0,1900
Endocrin	.	.	.	2,9	2,0	3,9	.	0,3202
CNS	.	.	.	4,5	3,3	5,7	.	0,2133
Alderdomssvækkelse	6,1	0,0	14,2	29,8	27,3	32,4	0,20	0,0030
Andre lidelser	.	.	.	11,0	9,2	12,7	.	0,0441
Aggression	63,6	47,2	80,0	13,5	11,6	15,5	4,70	0,0000
Frygtsomhed/angst	9,1	0,0	18,9	3,2	2,2	4,2	2,80	0,0673
Separationsproblemer	3,0	0,0	8,9	2,4	1,5	3,3	1,26	0,8195
Anden adfærd	9,1	0,0	18,9	5,3	4,1	6,6	1,71	0,3453
Andre årsager	15,2	2,9	27,4	5,3	4,1	6,6	2,85	0,0152

Lower = nedre konfidensgrænse; Upper = øvre konfidensgrænse; Pr = p-værdi for forskel mellem andele

4.11. Årsager til aflivning hos hanhunde og tæver

Blandt de hunde, hvor årsagen til aflivning kun var medicinske eller fysiske lidelser, var kønsfordelingen nær 1:1 – både i nærværende undersøgelse og i undersøgelsen fra 1999 (tabel 4.42). Blandt de hunde, hvor årsagen kun var adfærdsproblemer, var der imidlertid signifikant flere hanhunde end tæver. I nærværende undersøgelse var andelen af hanhunde lidt lavere end i den tidligere undersøgelse (62,4 % vs. 66,1 %). Forskellen var dog ikke signifikant. Også blandt de hunde, hvor adfærdsproblemer var kombineret med andre lidelser/problemer, var en klar overvægt af hanhunde i begge undersøgelser (59,6 % vs. 64,6 %). Kønsforskellen var dog kun signifikant i undersøgelse fra 1999.

I undersøgelsen fra 1999 var kønsfordelingen tæt på 1:1 blandt de hunde, som kun blev aflivet på grund af andre problemer end sygdom eller adfærd. I nærværende undersøgelse var imidlertid overvægt af hanhunde (56,3 %), som dog ikke var signifikant.

Sammenlignet med tæver (T) sås hos hanhunde (H) en signifikant mindre andel aflivet på grund af lidelser i genitalapparatet (H/T=0,19), neoplasier (H/T=0,57) og endocrine lidelser (H/T= 0,52)(tabel 4.43). Til gengæld blev en signifikant større andel af hanhundene aflivet på grund af problemer med muskler eller led (H/T=1,22), aggression (H/T=1,74) samt anden adfærd end aggression, frygtsomhed eller angst samt separationsproblemer (H/T=1,93).

Sammenlignet med kastrerede hanhunde (N) sås hos intakte hanhunde (I) signifikant mindre andel aflivet på grund af aggression (I/N=0,69), frygtsomhed eller angst (I/N=0,49) samt anden adfærd end aggression, frygtsomhed eller angst samt separationsproblemer (I/N=0,58)(tabel 4.44). Der var blandt intakte hanhunde desuden en signifikant lavere andel aflivet på grund af endocrine lidelser (I/N=0,44).

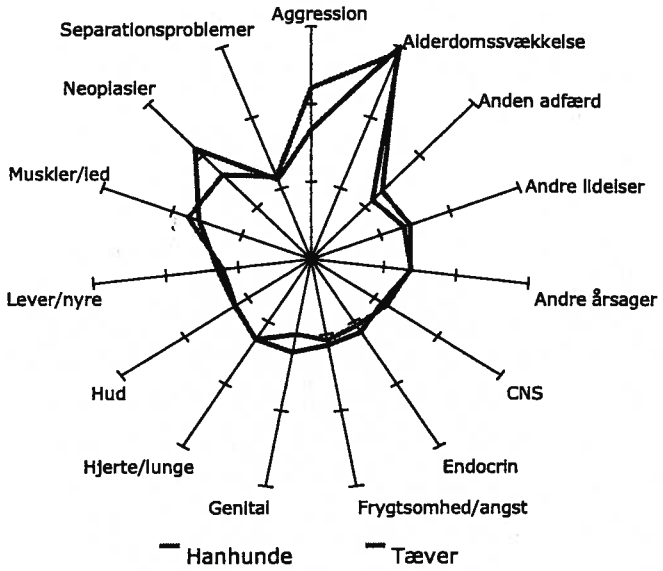
Sammenlignet med steriliserede tæver (N) sås hos intakte tæver (I) en signifikant mindre andel aflivet på grund af hjerte-/lungelidelser (I/N=0,61) samt problemer med muskler eller led (I/N=0,53)(tabel 4.45). Til gengæld blev en signifikant større andel af de intakte tæver aflivet på grund af lidelser i genitalapparatet (I/N=6,21) samt separationsproblemer (I/N=3,76). Desuden sås en tendens til, at en større andel af de intakte tæver blev aflivet på grund af aggression (I/N=1,57; p=0,0577).

Tabel 4.42. Andelen af hanhunde ved forskellige årsager til aflivning

Problem	Studium	P	P_{low}	P_{upp}	Pr	Pr2
Kun med/fys problemer	2007	49,3	45,9	52,6	0,6603	0,7436
	1999	49,9	47,5	52,3	0,9609	.
Kun adfærdsproblemer	2007	62,4	55,7	69,2	0,0005	0,3575
	1999	66,1	62,1	70,1	0,0000	.
Kun andre problemer	2007	56,3	39,1	73,4	0,4795	0,4566
	1999	49,0	41,0	57,0	0,8071	.
Adfærdsproblemer + andet	2007	59,6	46,9	72,4	0,1451	0,6040
	1999	64,6	51,1	78,1	0,0433	.
Andre kombinationer	2007	26,7	4,3	49,0	0,0707	0,0106
	1999	73,3	51,0	95,7	0,0707	.
Årsag til aflivning ikke angivet	2007	54,5	25,1	84,0	0,7630	0,8163
	1999	50,0	25,5	74,5	1,0000	.

P = proportion (%); P_{low} = nedre konfidensgrænse; P_{upp} = øvre konfidensgrænse;
Pr = p-værdi for afvigelse fra 1:1; Pr2 = p-værdi for forskel mellem studier

Figur 4.34. Hanhunde og tæver

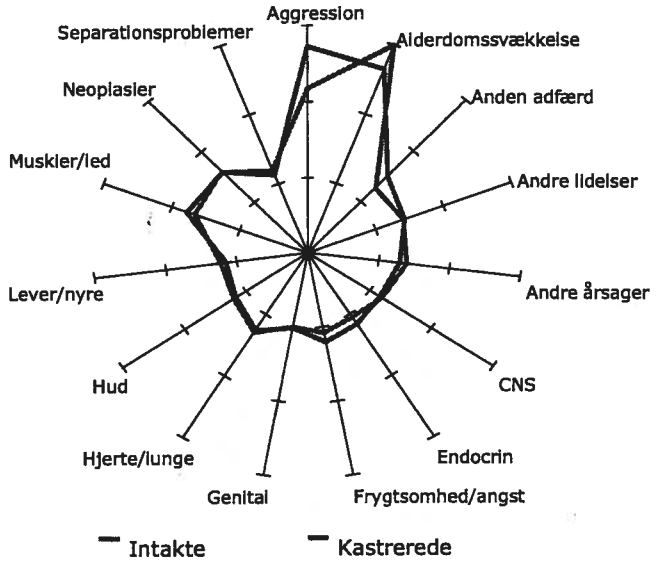


Tabel 4.43. Andelen af hanhunde (H) sammenlignet med andelen af tæver (T) aflivet af forskellige årsager

Lidelse/ problem	H (%)	Lower	Upper	T (%)	Lower	Upper	H/T	Pr
Hjerte/lunge	5,4	4,4	6,4	5,4	4,3	6,5	1,01	0,9691
Lever/nyre	4,3	3,4	5,2	5,3	4,3	6,4	0,80	0,1368
Genital	0,9	0,5	1,3	4,6	3,6	5,6	0,19	0,0000
Neoplasier	10,7	9,3	12,1	18,8	16,9	20,6	0,57	0,0000
Muskler/led	12,9	11,4	14,4	10,6	9,1	12,1	1,22	0,0313
Hud	4,0	3,1	4,9	4,0	3,1	5,0	1,00	0,9813
Endocrin	1,8	1,2	2,4	3,5	2,6	4,4	0,52	0,0017
CNS	4,0	3,1	4,9	3,0	2,2	3,8	1,33	0,1082
Alderdomssvækkelse	30,9	28,8	32,9	32,2	30,0	34,4	0,96	0,3941
Andre lidelser	7,5	6,3	8,7	6,2	5,1	7,4	1,21	0,1289
Aggression	19,9	18,1	21,7	11,4	9,9	12,9	1,74	0,0000
Frygtsomhed/angst	2,1	1,5	2,8	3,0	2,2	3,8	0,72	0,1148
Separationsproblemer	3,5	2,7	4,3	2,9	2,1	3,7	1,20	0,3171
Anden adfærd	5,8	4,8	6,9	3,0	2,2	3,8	1,93	0,0000
Andre årsager	6,6	5,5	7,7	6,8	5,6	8,0	0,97	0,8164

Lower = nedre konfidensgrænse; Upper = øvre konfidensgrænse; Pr = p-værdi for forskel mellem andele

Figur 4.35. Intakte og kastrerede hanhunde

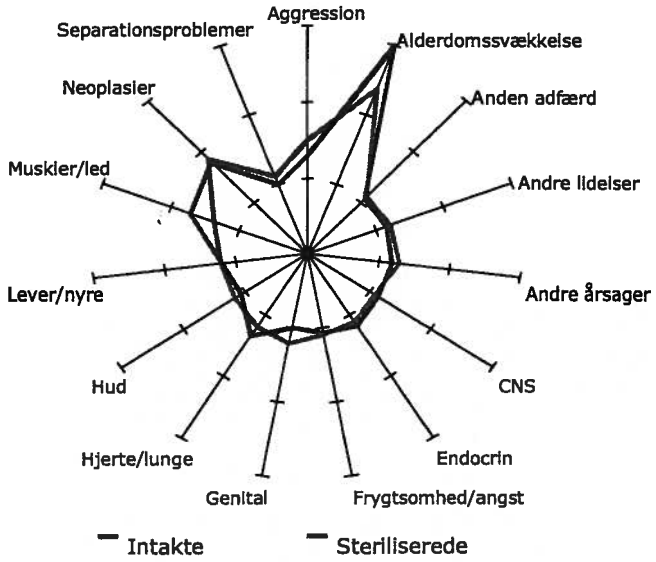


Tabel 4.44. Andelen af intakte (I) sammenlignet med andelen af kastrerede hanhunde (N) aflivet af forskellige årsager

Lidelse/ problem	I (%)	Lower	Upper	N (%)	Lower	Upper	I/N	Pr
Hjerte/lunge	5,4	4,2	6,5	4,7	2,2	7,2	1,14	0,6590
Lever/nyre	4,3	3,3	5,4	3,3	1,2	5,4	1,33	0,4108
Genital	0,8	0,4	1,3	1,1	0,0	2,3	0,75	0,6510
Neoplasier	10,4	8,9	12,0	10,1	6,6	13,7	1,03	0,8825
Muskler/led	11,3	9,6	12,9	13,0	9,1	17,0	0,86	0,3931
Hud	3,9	2,9	4,8	3,3	1,2	5,4	1,19	0,6290
Endocrin	1,4	0,8	2,0	3,3	1,2	5,4	0,44	0,0309
CNS	3,9	2,9	4,8	3,3	1,2	5,4	1,19	0,6290
Alderdomssvækkelse	32,1	29,8	34,5	26,8	21,6	32,0	1,20	0,0800
Andre lidelser	7,3	5,9	8,6	7,6	4,5	10,7	0,95	0,8355
Aggression	19,2	17,2	21,2	27,9	22,6	33,2	0,69	0,0010
Frygtsomhed/angst	2,0	1,3	2,7	4,0	1,7	6,3	0,49	0,0393
Separationsproblemer	3,8	2,8	4,8	2,9	0,9	4,9	1,31	0,4656
Anden adfærd	5,1	4,0	6,2	8,7	5,4	12,0	0,58	0,0171
Andre årsager	7,0	5,7	8,3	5,4	2,8	8,1	1,28	0,3464

Lower = nedre konfidensgrænse; Upper = øvre konfidensgrænse; Pr = p-værdi for forskel mellem andele

Figur 4.36. Intakte og steriliserede tæver



Tabel 4.45. Andelen af intakte (I) sammenlignet med andelen af steriliserede tæver (N) aflivet af forskellige årsager

Lidelse/ problem	I (%)	Lower	Upper	N (%)	Lower	Upper	I/N	Pr
Hjerte/lunge	5,0	3,8	6,1	8,2	4,7	11,7	0,61	0,0469
Lever/nyre	5,4	4,2	6,6	5,2	2,3	8,0	1,05	0,8727
Genital	5,4	4,1	6,6	0,9	0,0	2,1	6,21	0,0028
Neoplasier	19,2	17,1	21,4	18,1	13,1	23,1	1,06	0,6867
Muskler/led	8,7	7,2	10,2	16,4	11,6	21,1	0,53	0,0003
Hud	4,2	3,1	5,3	2,2	0,3	4,0	1,96	0,1341
Endocrin	3,2	2,2	4,1	4,7	2,0	7,5	0,67	0,2224
CNS	2,8	1,9	3,7	3,9	1,4	6,4	0,72	0,3660
Alderdomssvækkelse	30,2	27,8	32,7	43,5	37,2	49,9	0,69	0,0001
Andre lidelser	5,7	4,5	7,0	4,3	1,7	6,9	1,33	0,3819
Aggression	11,5	9,8	13,3	7,3	4,0	10,7	1,57	0,0577
Frygtsomhed/angst	2,9	2,0	3,9	2,2	0,3	4,0	1,36	0,5050
Separationsproblemer	3,2	2,3	4,2	0,9	0,0	2,1	3,76	0,0458
Anden adfærd	3,2	2,2	4,1	2,6	0,5	4,6	1,22	0,6365
Andre årsager	7,0	5,6	8,4	4,7	2,0	7,5	1,48	0,2008

Lower = nedre konfidensgrænse; Upper = øvre konfidensgrænse; Pr = p-værdi for forskel mellem andele

5. Diskussion

5.1. Bias og fejlkilder

I forbindelse med undersøgelser, som er baseret på spørgeskemaer, vil der altid være det problem, at man ikke kan være sikker på, at de forskellige spørgsmål er besvaret ærligt og objektivt. Ved nærværende undersøgelse og Jørgen Mikkelsens undersøgelse fra 1999 er skemaerne udfyldt af dyrlægen eller veterinærsygeplejersken/receptionisten på klinikken på grundlag af dels registrerede stamoplysninger om hunden, dels oplysninger fra ejeren.

Fordelen ved at lade dyrlægen eller veterinærsygeplejersken/receptionisten udfylde skemaerne er, at mange af de ejere, som får deres hund aflivet, mere eller mindre, regelmæssigt er kommet på dyreklinikken, som derfor ofte kender hunden, ejeren, samt forhistorien til de problemer, som ejeren henvender sig med. Det betyder, at spørgeskemaets forskellige spørgsmål må forventes at være mere objektivt besvaret, end hvis skemaet udfyldtes af ejeren, som ofte helt naturligt vil være følelsesmæssigt påvirket af at se sig nødsaget til at få sin hund aflivet.

Der er dog risiko for, at nogle hundeejere ikke har været helt ærlige, når de har oplyst klinikken om, hvorfor de ønsker at få hunden aflivet. Hundeejerne kan mere eller mindre bevidst have angivet en grund, som de opfattede som mere acceptabel, end den egentlige årsag.

Ofte betragtes allergi i familien som en hyppig "undskyldning", når ejeren ønsker at afhænde sin hund. Dette kan dog ikke bekræftes af nærværende undersøgelse, hvor allergi i familien kun var årsag eller medvirkende årsag til aflivning i 3 tilfælde.

Med jævne mellemrum er der i medierne debat om aggressive hunde. Det har der også været i de sidste par år. Det kan derfor ikke afvises, at ejerne i nogle tilfælde har oplyst aggressionsproblemer som årsag til, at de ønsker hunden aflivet, selvom den reelle årsag var en anden. Der er dog ikke grundlag for at antage, at dette er sket i større omfang. Dels ligger andelen af hunde aflivet på grund af aggressionsproblemer i nærværende undersøgelse tæt på den tilsvarende andel i undersøgelsen fra 1999, hvilket ikke kunne forventes, hvis oplysninger fra ejeren var bestemt af øjeblikkelige holdninger til, hvad der er en acceptabel grund til at lade sin hund aflive. Dels har en stor del af ejerne til klinikken oplyst nærmere omstændigheder omkring hundens adfærd, hvilket ikke kunne forventes, hvis den oplyste aflivningsårsag ikke var reel.

Ved sammenligning af nærværende undersøgelse og undersøgelsen fra 1999 er der det problem, at de deltagende dyreklinikker/-hospitaler i de to undersøgelser kan være forskelligt fordelt geografisk. Det betyder, at fundne forskelle helt eller delvist kan afspejle regionale forskelle eller forskelle mellem land- og byområder – for eksempel med hensyn til racefordeling og ejernes tolerance over for problemer med deres hunde.

Hvis 1) der er væsentlig forskel på de to undersøgelser med hensyn til den geografiske fordeling af dyreklinikkerne, 2) der er geografiske forskelle i racefordelingen, og 3) et givent problem, som kan føre til aflivning af hunden, optræder med forskellig hyppighed hos forskellige racer, vil racen optræde som confounder, så en tilsyneladende ændring i den relative hyppighed af problemet mellem de to ikke afspejler en reel ændring over tid, når ses på Danmark som helhed.

Den geografiske fordeling af de deltagende dyreklinikker (samt de hundeejere, som har fået deres hunde aflivet på klinikkerne) har også betydning for, i hvor høj grad det er muligt at generalisere

resultaterne fra undersøgelsen til at gælde forholdene i Danmark som helhed. Selvom der i nærværende undersøgelse er en god geografisk spredning af de hunde, som er blevet aflivet, synes det som om områder i og omkring de store byer – især Københavnsområdet – er underrepræsenteret, selvom tætheden af klinikker her er stor. Det kan have betydning, da der er stor forskel mellem racefordelingen i land og i by. For eksempel optræder nogle af de mest anvendte jagthunderacer (for eksempel *Ruhåret hønsehund*) ikke særligt hyppigt i byområder, hvor visse kamphunderacer (for eksempel *Amerikansk staffordshire terrier*) til gengæld optræder hyppigt.

Ved beregning af odds ratio (OR) for aflivning af forskellige årsager, er hunde registreret i *Dansk Hunderegister* anvendt som kontrolgruppe. De registrerede hunde repræsenterer hunde fra hele landet, mens de aflivede hunde i nærværende undersøgelse og undersøgelsen fra 1999 ikke dækker hele landet – trods en god geografisk spredning i nærværende undersøgelse og formenligt også i undersøgelsen fra 1999, som var baseret på oplysninger fra flere klinikker. Dette kan have haft indflydelse på resultaterne i forbindelse med sammenligningen af hyppigheden af aflivningsårsager hos de forskellige racer.

For at gøre det så nemt så muligt for dyreklinikken/-hospitalet at udfylde spørgeskemaet, var medicinske eller fysiske lidelser ved nærværende undersøgelse inddelt i kategorier, som blot skulle afkrydses. På det skema, som blev anvendt ved undersøgelsen fra 1999, skulle den, der udfyldte skemaet, selv skrive aflivningsårsagen/-årsagerne i forbindelse med medicinske og fysiske lidelser. De oplyste aflivningsårsager blev efterfølgende inddelt i kategorier. Dette kan have påvirket resultaterne ved sammenligningen af de to undersøgelser, da der kan have været en tendens til, at der ved nærværende undersøgelse oftere er angivet mere end en aflivningsårsag for den enkelte hund.

Det må forventes, at der ofte er flere forhold, som spiller ind, når ejeren beslutter sig for at lade hunden aflive, og disse forhold kan vægte forskelligt. Når flere aflivningsårsager angives, er det dog ikke muligt at afgøre, hvilken årsag der er den primære, og hvilke som er sekundære.

Det er ikke alle hunde, som bliver tilmeldt *Dansk Hunderegister*, selvom det er lovpligtigt at få hunden registreret, inden den er 4 måneder gammel (2). Omkring 2000 regnede man i registret med, at 80 % af hundene i en årgang bliver registreret (Torben Elmedal, pers. com.).

Hvalpe fra opdrættere under anerkendte stambogsførende organisationer (som for eksempel *Dansk Kennel Klub*) må forventes alle at blive registreret, da registreringsproceduren sættes i gang, inden hvalpen overdrages til sin nye ejer. Derimod er der formentligt en del hvalpe fra private opdrættere, herunder hvalpe af blandingsrace, som ikke bliver registreret. Det samme gælder importerede hvalpe, hvoraf mange tilhører racer, hvor efterspørgslen er så stor, at den ikke kan dækkes af hunde opdrættet i Danmark, hvorfor prisen på hvalpe stiger – for eksempel racerne *Chihuahua* og *Amerikansk staffordshire terrier*. Derfor må racefordelingen af hunde registreret i *Dansk Hunderegister* forventes ikke præcist at afspejle racefordelingen blandt hunde i Danmark. Dette kan have haft indflydelse på de beregnede odds ratios for aflivning.

5.2. Årsager til aflivning af hunde

5.2.1. Medicinske/fysiske årsager

Når ses bort fra alderdomssvækkelse, var de hyppigste medicinske/fysiske årsager til aflivning problemer med muskler eller led (20,1 %) og neoplasier (17,5 %). Til sammenligning var lidelser i bevægeapparatet og tumorer årsag til henholdsvis 13 % og 18 % af dødsfaldene/aflivningerne blandt hunde, hvor dødsårsagen var kendt, i en svensk undersøgelse fra 2005 (6). I den svenske undersøgelse var trauma, herunder bil- og togulykker samt drukning, den næsthyppigste dødsårsag (17 %). Hunde døde på grund af trauma vil dog kun optræde i nærværende undersøgelse, hvis de blev indbragt til dyrlægen i live og efterfølgende aflivet. Det betyder, at en sammenligning af andelene af hunde døde på grund af trauma i den svenske og i nærværende undersøgelse ikke er mulig. Desuden må andelen af hunde døde på grund af andre årsager end trauma forventes at være overestimeret i nærværende undersøgelse set i forhold til den svenske.

Blandt medicinske eller fysiske årsager til aflivning sås i forhold til undersøgelsen fra 1999 en meget markant stigning fra 7,5 % til 20,1 % i andelen af hunde aflivet på grund af problemer med muskler eller led. Denne stigning er så markant, at den vanskeligt lader sig forklare ved eventuelle forskelle mellem nærværende undersøgelse og den tidligere undersøgelse med hensyn til fordelingen af de deltagende dyrlæger eller forskelle med hensyn til udformning af spørgeskemaerne, som blev anvendt.

Et eller andet, som har betydning for risikoen for aflivning på grund af problemer med muskler eller led, har tilsyneladende ændret sig siden den første undersøgelse blev foretaget. En mulighed er, at der blandt hundeejere og dyrlæger er sket en ændring i opfattelsen af, hvor megen lidelse forbundet med sådanne problemer der er acceptabel ud fra et dyrevelfærdsmæssigt synspunkt. På den anden side må smertebehandlingen i forbindelse med disse problemer forventes hele tiden at blive bedre (Jørgen Mikkelsen, pers. com.), hvilket, alt andet lige, betyder, 1) at færre og færre hunde må forventes at blive aflivet på grund af disse problemer, så en større del af hundene med disse problemer vil blive aflivet af andre årsager, samt 2) at hundene, der bliver aflivet, bliver ældre og ældre.

Hvis den øgede andel af hunde aflivet på grund af problemer med muskler eller led skyldes en generel holdningsændring med hensyn til, hvor megen lidelse der er acceptabel, må forventes, at de hunde, som aflives på grund af disse problemer, er blevet yngre. Den gennemsnitlige alder ved aflivning på grund af problemer med muskler eller led har imidlertid ikke ændret sig siden undersøgelsen fra 1999. Ydermere var stigningen i andelen af aflivede hunde på grund af disse problemer ligeligt fordelt på alle aldersklasser.

Desværre blev der ved undersøgelsen fra 1999 ikke skelnet mellem problemer med muskler og problemer med led. Men i nærværende undersøgelse var andelen af hunde, hvor ledproblemer var årsag eller medvirkende årsag til aflivningen, ca. 20 gange større end andelen af hunde aflivet på grund af muskelproblemer. Hvis forholdet mellem skelletale problemer og muskelproblemer var i samme størrelsesorden i undersøgelsen fra 1999, vil en sammenligning mellem de to undersøgelser derfor reelt være en sammenligning af andelene af skelletale/ledproblemer.

Nogle ledproblemer (f.eks. hofteledsdysplasi) er multifaktorielle, idet risikoen for, at de udvikles hos en hund, og i hvilken grad det sker, er bestemt af blandt andet genetiske forhold, fodring, vækstthastighed samt graden og intensiteten af fysisk udfoldelse.

Et af de forhold, som kan have ændret sig i de senere år, er sammensætningen af kommercielt fremstillet hundefoder (Lars Madsen, pers. com.). På grund af forekomsten af BSE blev anvendelse af kød- og benmel i dyrefoder forbudt i 2001, dog med undtagelse af anvendelse i foder til hunde og katte. På den ene side kan dette (trods undtagelse med hensyn til anvendelse til hunde- og kattefoder) have afholdt nogle producenter fra at anvende kød- og benmel, som så er blevet erstattet af fyldstoffer - for eksempel i form af kulhydratkilder - eller vegetabilsk protein. Faldende efterspørgsel betyder faldende priser, hvorfor andre producenter kan være blevet fristet til netop at anvende kød- og benmel i hundefoder på bekostning af andre animalske produkter. Om sådanne ændringer har haft betydning for risikoen for udvikling af ledproblemer hos hunde vides imidlertid ikke, men årsagerne til udvikling af ledproblemer bør undersøges nærmere.

Udover stigningen i andelen af hunde aflivet på grund af problemer med muskler eller led blev der fundet markante stigninger i andelen af hunde aflivet på grund af neoplasier. Derimod fandtes et fald i andelen af hunde aflivet med diagnosen alderdomssvækkelse.

Hunde dør ikke bare, fordi de har nået en bestemt alder. Men risikoen for en række lidelser - herunder blandt andet problemer med hjertet (og dermed ofte også lungerne), nyre og lever, bevægeapparatet samt syn og hørelse - stiger med alderen. Hvis hunden har stærkt nedsat funktionsevne på grund af en række lidelser, uden at den enkelte lidelse i sig selv er afgørende, og hunden har nået en vis alder, vil diagnosen derfor naturligt ofte være alderdomssvækkelse. Faldet i andelen af hunde, som blev aflivet på grund af alder, i forhold til undersøgelsen fra 1999, kan formentlig forklares ved, at der for flere af hundene er angivet de konkrete lidelser frem for blot diagnosen alderdomssvækkelse.

5.2.2. Problemer med hundens adfærd

Den svenske undersøgelse (6), som er nævnt ovenfor, var baseret på hunde, som var livsforsikret, og dødsårsagen blev kun registreret i de tilfælde, årsagen udløste erstatning. Da aflivning på grund af andre forhold end trauma og medicinske eller fysiske lidelser – herunder bl.a. adfærdsproblemer – ikke udløste erstatning, blev dødsårsagen ikke specificeret, hvis hundens død skyldtes disse forhold. Derfor var det ikke muligt at sige, hvor stor en andel af hundene, der blev aflivet på grund af adfærdsproblemer.

I en skotsk undersøgelse fra 1982 (32), var adfærdsproblemer årsag til 13,2 % af samtlige aflivninger af hunde i vinterperioden, mens de i sommerperioden var årsag til 17,7 % af alle aflivninger. Blandt de hunde som blev aflivet på grund af adfærdsproblemer, var aggression årsagen til aflivning i 41,4 % af tilfældene.

I en canadisk undersøgelse fra 1997 (14) var adfærdsproblemer årsag til 13,2 % af alle aflivninger af hunde i en række prærieprovinser. I 68 % af disse tilfælde blev hunden aflivet på grund af aggression.

Den første danske undersøgelse af årsager til aflivning af hunde er ligeledes fra 1997 (24). I denne undersøgelse var adfærdsproblemer årsag til 15,6 % af alle aflivninger. Som i den ovennævnte canadiske undersøgelse var forholdet mellem hanhunde og tæver, som blev aflivet på grund af adfærdsproblemer, ca. 2:1. Undersøgelsen var dog kun baseret på 199 aflivninger af hunde i 6 udvalgte sjællandske dyreklinikker.

Af senere undersøgelser foreligger en australsk fra 2001 (25) og en finsk fra 2003 (27). Den australske undersøgelse var kun baseret på 90 aflivninger. Problemer med hundens adfærd var involveret i 13 % af aflivningerne. Den finske undersøgelse omfattede 307 hunde, og de hyppigste årsager til aflivning var alder (18 %), neoplasier (16 %), muskel- og skelletale lidelser (14 %) samt adfærdsproblemer (11 %). Halvdelen af hundene aflivet på grund af adfærdsproblemer blev aflivet på grund af aggression og hele 24 % på grund af separationsproblemer.

I nærværende undersøgelse og Jørgen Mikkelsens undersøgelse fra 1999 (26) var problemer med hundens adfærd årsag eller medvirkende årsag til henholdsvis 22,0 % og 23,8 % af aflivningerne. I begge undersøgelser var aggressionsproblemer årsag eller medvirkende årsag til aflivningen for omkring 2/3 af de hunde, hvor adfærdsproblemer blev angivet som aflivningsårsag. Det er måske ikke så underligt, at andelen af hunde aflivet på grund af aggressionsproblemer ikke har ændret sig nævneværdigt.

Hvis en hund optræder aggressivt og kan finde på at snappe eller bide, er den en reel fare for sine omgivelser, og hvis ikke hundens adfærd skyldes sygdom eller fysiske problemer, og adfærden tilsyneladende forekommer uprovokeret eller uforudsigeligt, så er problemet både risikabelt og vanskeligt at behandle. Det vil ikke være muligt at sige, om behandlingen har virket, før hunden har snappet eller bidt igen. Aggression rettet mod børn er naturligt et særligt alvorligt problem, dels fordi bidskader hos børn forårsaget af hunde ofte ses i ansigtet, dels fordi det er svært at forklare specielt mindre børn, hvordan de skal opføre sig over for hunde.

I nærværende undersøgelse oplyste en stor del af ejerne af hunde, som blev aflivet på grund af aggression, at den bed eller snappede uprovokeret eller uforudsigeligt eller uden forudgående truende adfærd. Dette stemmer overens med en amerikansk undersøgelse (29), som viste, at netop uforudsigelighed øger risikoen for, at hunden bliver aflivet, hvis den udviser dominansbetinget aggression. Hvis familien føler sig utryg ved en hund, som kan finde på at optræde aggressivt, vil det bare forværre problemet. Man kan ikke bebrejde en ejer af en sådan hund, at han eller hun vælger at lade hunden aflive.

Hunde vil normalt udvise truende adfærd, før de snapper eller bider, eller på anden måde vise, at de ikke ønsker, at man kommer nærmere, eller at de er utrygge ved situationen. Når ejeren opfattede hundens aggressive adfærd som uprovokeret, uforudsigelig eller forekommende uden forudgående varsel, kan det selvfølgelig skyldes, at hunden rent faktisk opførte sig sådan – for eksempel, hvis hunden følte smerte ved berøring eller pludseligt følte sig stærkt presset. Men det kan også skyldes, at ejeren ikke var i stand til at aflæse de signaler, som hunden udsendte, før den optrådte aggressivt - eller at ejeren ikke var opmærksom på, hvad som udløste hundens aggression.

Mange problemer med aggression kunne formentlig undgås, hvis hundeejere vidste mere om hundes adfærd, herunder deres signalsprog. Selvom der er et utal af bøger om hunde på markedet, er der stadig kun relativt få, som beskæftiger sig systematisk med dette emne på en måde, som almindelige hundeejere kan få glæde af. Desuden er det et godt spørgsmål, hvor mange hundeejere, som man kan nå på denne måde.

I forhold til undersøgelsen fra 1999 sås i nærværende undersøgelse en stigning på 67 % i andelen af hunde, hvor frygtsomhed eller angst var årsag eller medvirkende årsag til aflivningen. Mere end halvdelen af disse hunde var bange for mennesker.

En af årsagerne til frygtsomhed over for mennesker er mangelfuld socialisering til mennesker. Der kan både være tale om for lidt kontakt med forskellige mennesker hos opdrætteren og om for lidt omgang med fremmede mennesker inden for det første år, efter hunden er kommet ud i sin nye familie, således at den indledende socialisering ikke er blevet tilstrækkeligt fulgt op.

En af årsagerne til angst over for lyde eller andre ting kan være, at hvalpen ikke har fået tilstrækkelig erfaring med forskellige stimuli i sin tidlige opvækst, eller at den ikke er blevet vænnet til situationer, som den kunne risikere at møde senere i livet (miljøtræning).

Det er svært at sige, hvad der er årsagen til stigningen i andelen af hunde aflivet på grund af frygtsomhed eller angst.

Når det gælder frygtsomhed over for mennesker, er der flere muligheder. Den stigende interesse for at anskaffe sig hund, har uden tvivl skabt en større efterspørgsel end kunne dækkes af dansk producerede hvalpe, hvilket har presset prisen på en hvalp i vejret, specielt inden for visse racer. Det kan have ansporet nogle opdrættere til at producere flere hvalpe end de har tid til at sørge for bliver socialiseret tilstrækkeligt. Desuden findes der eksempler på, at personer, uden tilstrækkelig erfaring med hunde, er begyndt at opdrætte hvalpe i håb om stor fortjeneste. Endvidere er der personer, som handler med importerede hvalpe, som kan være utilstrækkelig socialiseret hos opdrætteren, samtidigt med at de i forbindelse med selve importen har levet en omskiftelig tilværelse i en meget følsom periode i deres liv, med den risiko for traumatiske oplevelser dette indebærer. Endelig kan stigningen i andelen af hunde, hvor frygtsomhed angives som årsag eller medvirkende årsag til aflivning skyldes, at dyrlæger i stigende grad er blevet opmærksomme på, at aggression meget ofte skyldes frygtsomhed (Jørgen Mikkelsen, pers. com.).

De fleste hunderacer blev oprindeligt fremavlet til at fungere som brugshunde, men i dag bliver langt de fleste hunde anskaffet for blot at skulle fungere som familiehunde – selvom nogle bliver trænet på forskellig måde eller anvendt til konkurrenceformål. Den mindre efterspørgsel efter hunde med specifikke brugsegenskaber har betydet, at mange racer er blevet splittet op i linier, hvor der i avlsarbejdet fortsat lægges vægt på de racespecifikke brugsegenskaber, og linier, hvor der mere lægges vægt på hundenes fremtoning, herunder deres succes ved hundeudstillinger. Dette har ifølge en svensk undersøgelse (34) haft nogle interessante konsekvenser, idet avlsudvælgelse med henblik på hundeudstillinger synes at føre til hunde, som oftere udviser social og ikke-social angst samt er mindre nysgerrige og legesyge – men også mindre aggressive. En del af forklaringen på stigningen i andelen af hunde, som bliver aflivet på grund af frygtsomhed eller angst, kan derfor tænkes at være, at showlinierne udgør en større og større andel af de forskellige racer – specielt de racer, som pludseligt er blevet populære.

Det er imidlertid værd at bemærke, at stigningen i andelen af hunde, hvor frygtsomhed eller angst er årsag eller medvirkende årsag til aflivningen, hovedsagelig sås blandt de alleryngste hunde. Det tyder på, at der siden undersøgelsen fra 1999 er kommet flere hunde, der er blevet utilstrækkelig socialiseret som hvalpe. Dette kan måske også forklare stigningen i andelen af hunde, som blev aflivet på grund af andre adfærdsproblemer end aggression, frygtsomhed/angst og separations-problemer blandt hundene i aldersgruppen 1 – 2 år. Hvis hunden ikke kan falde til i familien, kan det komme til udtryk på mange måder i hundens adfærd – f.eks. at den er hyperaktiv, optræder for voldsomt eller opfattes som ukontrollabel.

I nærværende undersøgelse sås et fald i andelen af hunde aflivet på grund af separationsproblemer (problemer med at være alene hjemme) i forhold til undersøgelsen fra 1999. Årsagen kan være, at den øgede fokus på adfærd og adfærdsproblemer hos hunde har medført, at hundeejere samt dyrlæger og andre, som beskæftiger sig med adfærdsbehandling, er blevet opmærksomme på, at der i de fleste tilfælde kan gøres noget ved problemerne.

Tidligere delte man ofte hunde, som har problemer med at være alene hjemme, i hunde, der udviser destruktiv adfærd, og hunde, som hyler. En undersøgelse fra 1999 (23) af, hvad hunde med separationsproblemer rent faktisk foretager, når de er alene hjemme, viste imidlertid, at det ikke er muligt at foretage en sådan opdeling, idet selvom nogle hunde fortrinsvis udviser destruktiv adfærd, og nogle fortrinsvis hyler, så vil de fleste hunde både udvise destruktiv adfærd, hyle og gø – blot i forskellige grader. Af de 20 hunde, som indgik i undersøgelsen, udviste 18 destruktiv adfærd, mens 17 gøede og 14 hylede. Af de 18 hunde, der udviste destruktiv adfærd, gøede 15, mens 12 hylede, og kun 3 hverken gøede eller hylede. Den traditionelle opdeling i destruktive hunde og 'hylere' afspejlede derfor formentligt, hvad ejerne opfattede som problemet.

I nærværende undersøgelse var destruktiv adfærd et problem for 73,3 % af ejerne af de hunde, som blev aflivet på grund af separationsproblemer, mens hylen var et problem for 33,3 % og gøen for 23,3 %. Dette indikerer, at destruktiv adfærd hyppigere fører til aflivning af hunden end andre former af separationsadfærd.

5.2.3. Andre problemer end sygdom eller adfærd

Set i forhold til resultaterne fra undersøgelsen i 1999 er sket et markant fald i andelen af hunde aflivet på grund af andre problemer end sygdom og adfærd. Det er en almindelig udbredt opfattelse, at hundeejere ofte vælger at skaffe sig af med deres hund af bekvemmelighedsgrunde. Nærværende undersøgelse giver imidlertid ikke grundlag for at antage, at dette er tilfældet.

5.2.4. Geografiske forskelle med hensyn til aflivningsårsager

Det er bemærkelsesværdigt, at den næstlaveste andel af hunde aflivet på grund af aggression fandtes i København, Frederiksberg og omegn. Den laveste andel fandtes på Bornholm. Alt andet lige skulle man forvente, at hunde i tæt befolkede områder oftere møder fremmede mennesker og andre hunde og dermed hyppigere kommer i en situation, som kan fremprovokere aggressiv adfærd, der kan føre til, at ejeren vælger at få hunden aflivet.

En mulig forklaring på den lave andel af hunde aflivet på grund af aggressionsproblemer i Københavnsområdet kan være, at hundene her som hvalpe hyppigere møder fremmede mennesker og andre hunde, og derved vænnes til at omgås disse. De bliver med andre ord bedre socialiseret.

En anden årsag kan være, at der er forskel på racefordelingen af hunde i forskellige dele af landet, således at der i Københavnsområdet måske generelt er færre hunde tilhørende racer, som relativt hyppigt aflives på grund af aggression. Her tænkes ikke kun på racer, som er specielt aggressive, men også på racer, som for eksempel i kraft af hundenes størrelse forventes at kunne gøre særlig stor skade, når de optræder aggressivt. En aggressiv *Rottweiler* vil naturligvis opfattes som en større trussel end en aggressiv *Pekingeser*, selvom de udviser samme adfærd.

Endelig kan der være landsdelsforskelle med hensyn til ejerens holdning til den hund, som han eller hun har anskaffet sig, samt dermed ejerens tolerance over for den adfærd, som hunden udviser. For eksempel er det nærliggende at forestille sig, at hundeejere i Københavnsområdet samt i og omkring de større byer i højere grad opfatter hunden som et fuldgyldigt familiemedlem end hundeejere i den øvrige del af landet. Omvendt kan man forestille sig, at hundeejere på landet har en mere brugsorienteret holdning til hunden. I den forbindelse er det værd at bemærke, at udprægede jagthunderacer som for eksempel *Ru- og Korthåret hønsehund* samt *Kleiner mynsterlænder* optræder med særlig stor hyppighed i den vestlige del af landet og med lav hyppighed på Sjælland.

Den laveste andel af hunde aflivet på grund af frygtsomhed eller angst fandtes i Københavnsområdet. Dette kan måske også forklares ved, at hundene her tidligt møder mange fremmede mennesker og andre hunde. Dog kan forskelle i racefordelingen og ejernes holdning til hunden mellem landsdelene også spille ind her.

I Sønderjylland og tilstødende områder var både andelen af hunde aflivet på grund af aggression og andelen af hunde aflivet på grund af frygtsomhed eller angst særlig høj. Men sammenhængen mellem andelen af hunde aflivet på grund af aggression og andelen aflivet på grund af frygtsomhed eller angst var ikke entydig. I Nordjylland sås således den tredjelaveste andel af hunde aflivet på grund af aggression, men den næsthøjeste andel aflivet på grund af frygtsomhed eller angst.

Som man måske kunne forvente, var andelen af hunde aflivet på grund af separationsproblemer særlig stor i Københavnsområdet. Her bor mennesker tæt, og hvis problemet er, at hunden gør eller hyler, kan det give ejeren problemer i forhold til hans eller hendes naboer. En anden faktor, som måske kan spille ind, er, at risikoen for udvikling af separationsproblemer er påvirket af, hvor meget hunden bliver stimuleret og aktiveret (18). Sammenhængen er dog ikke sådan, at jo mere, des bedre. Måden, hvorpå hunden bliver stimuleret og aktiveret, kan være afgørende. Men de fleste racehunde er fremavlet til at udføre bestemte opgaver, og nogle har et særligt stort aktivitetsbehov – f.eks. slædehunde som *Siberian husky* og nogle hyrdehunde som *Border collie*. Hvis en hund bliver understimuleret i forhold til de opgaver, som den er skabt til at udføre, kan det øge risikoen for udvikling af adfærdsproblemer – for eksempel i form af separationsproblemer eller frygtsomhed eller angst.

I byområder går hunde oftest i snor, og det kan være svært for en fortravlet familie at afse tid nok til at sørge for, at hunden bliver tilstrækkeligt stimuleret. Omvendt er det ikke ualmindeligt, at hunde på landet får lov at løbe frit rundt og følge med i familiens aktiviteter.

På Bornholm var andelen af hunde aflivet på grund af separationsproblemer påfaldende lav. Måske kan en del af variationen mellem landsdelene forklares ved, at der er forskel på, hvor udbredt kendskabet er til, at separationsproblemer i de fleste tilfælde kan bedres eller helt afhjælpes.

På baggrund af de fundne forskelle mellem landsdelene med hensyn til aflivningsårsager, kunne det være interessant at undersøge 1) folks bevægegrunde til at anskaffe sig hund, 2) hvilke forventninger forskellige hundeejere har til hunden og dens plads i familien, samt 3) hvilke overvejelser som de gjorde sig, da de valgte en hund af lige netop den race.

5.3. Betydningen af hundens race

5.3.1. Blandingshunde

Generelt kan racehunde forvente at leve længere end hunde af blandingsrace. En del af forklaringen kan være, at en relativt stor andel af blandingshundene aflives i en tidlig alder på grund af adfærdsproblemer, især aggressiv adfærd. Dette betyder dog ikke nødvendigvis, at hunde af blandingsrace oftere optræder aggressivt end racehunde set under ét.

Hundeejere kan have forskellige forventninger til deres hund, alt efter om de vælger en blandingshund eller en racehund. Hvis man køber en blandingshund, kan det ofte være, fordi man blot ønsker en sød og rar familiehund. Hvis det så viser sig, at hunden optræder på en måde, som ejeren ikke forventer, skal der måske mindre til, før han eller hun vælger at gå til dyrlægen for at få hunden aflivet. Omvendt hvis man køber en bestemt racehund, vil det ofte være, fordi man lægger vægt på visse adfærds- eller udseendemæssige karakteristika hos den pågældende race. Der kan derfor være en tendens til, at ejeren udviser større tolerance over for hunden, som måske oven i købet har været meget dyr. Det er i den forbindelse interessant, at andelen af hunde aflivet på andre forhold end sygdom eller adfærd lå relativt højt hos hunde af blandingsrace set i forhold til de fleste racehunde.

Med hensyn til aflivning på grund medicinske eller fysiske lidelser synes hunde af blandingsrace at have mindre risiko for at blive aflivet på grund af hjerte- og lungelidelser, centralnervøse lidelser samt lever- og nyrelidelser.

5.3.2. Racehunde

Nogle racer var repræsenteret ved et lille antal hunde, hvorfor de beregnede andele af hundene, som blev aflivet af en given årsag, var meget påvirkelige af tilfældigheder, idet nogle få individer fra eller til kunne få relativt stor betydning. Derfor skal man være forsigtig med at generalisere ud fra de fundne resultater for disse racer, idet de reelle værdier på landsplan kan afvige betydeligt fra de, som blev fundet i nærværende undersøgelse.

Der var meget store raceforskelle på, hvor stor en andel af de aflivede hunde som blev aflivet på grund af aggression - lige fra ingen hunde hos *Flat coated retriever* til 45 % af hundene hos *Sankt bernhardshund*. En meget høj andel aflivet på grund af aggression sås desuden hos racerne *Chow chow*, *Samojedhund* og *Rottweiler*. Selvom racerne *Sankt bernhardshund*, *Chow chow* og *Samojedhund* kun var repræsenteret ved henholdsvis 20, 17 og 18 individer, var andelen af hunde aflivet på grund af aggression inden for disse racer så stor, at den tilsyneladende høje risiko for aflivning af denne årsag med stor sandsynlighed ikke skyldes tilfældigheder.

Hunde tilhørende større racer må forventes at være i særlig stor risiko for at blive aflivet, hvis de optræder aggressivt, da de vil kunne forvolde større skade, hvis de bider. Men der var også mindre racer, hvor andelen af hunde aflivet på grund af aggression var særlig høj – f.eks. *Cocker spaniel* og *Dansk/svensk gårdhund*, som bliver stadigt mere populær. Hos begge disse racer var andelen af hunde aflivet på grund af aggression højere end hos *Schæferhund*. Også hos gruppen af *Pinschere*, hvortil *Dansk/svensk gårdhund* normalt henregnes, var andelen af hunde aflivet på grund af aggression høj. Gruppen indeholdt dog ikke kun relativt små hunde, men også racen *Dobermann*.

Der var ligeledes stor forskel mellem de enkelte racer på andelen af hunde aflivet på grund af en række forskellige medicinske og fysiske lidelser. Specielt er det bemærkelsesværdigt, at hele 46 % af de aflivede *Schnauzere* (alle racer) blev aflivet på grund af neoplasier. I en svensk undersøgelse fra 1997 (7) blev 37 % af alle *Riesenschnauzere* aflivet på grund af tumorer.

Det er desuden bemærkelsesværdigt, at 31 % af alle *Cavalier king charles spaniels* og 18 % af hundene tilhørende racen *Pomeranian* blev aflivet på grund af hjerte-/lungelidelser. Racen *Cavalier king charles spaniel* var dog kun repræsenteret ved 16 individer. Men at en stor andel af hundene tilhørende denne race aflives på grund af hjerteproblemer, bekræftes af en svensk undersøgelse fra 2005 (6), hvor hjerteproblemer var dødsårsagen for hele 52 % af hundene (tabel 5.1). Anerkendelsen af hjerteproblemerne inden for racen har medført, at *Dansk Kennel Klub* ikke registrerer hvalpe, medmindre begge forældre er hjerteundersøgt af en af DKKs godkendte dyrlæger og fundet "godkendt til avl" på en attest fra KVL (nu *Det Biovidenskabelige Fakultet, Københavns Universitet*), samt at *Dansk Racehunde Club* har pålagt opdrættere tilknyttet organisationen at få deres testet deres hunde for hjertefejl (16).

Det skal dog bemærkes, at den svenske undersøgelse kun inkluderede forsikrede hunde, hvor dødsårsagen var kendt og registreret, da den udløste erstatning til ejeren – dvs. hunde døde som følge af trauma samt medicinske og fysiske lidelser, men ikke andre forhold som for eksempel adfærdsproblemer. Det betyder alt andet lige, at de beregnede værdier må forventes at ligge højere end i nærværende undersøgelse. På den anden side inkluderede nærværende undersøgelse kun hunde døde på grund af trauma i det omfang, at de var i live ved ankomsten til dyrlægen og efterfølgende aflivet, hvilket trækker i den modsatte retning.

Tilsyneladende havde danske *Cavalier king charles spaniels* særlig stor risiko for at udvikle centralnervøse lidelser, men denne tendens kunne ikke genfindes i den svenske undersøgelse. Den høje andel af hunde aflivet på grund centralnervøse lidelser i nærværende undersøgelse kan skyldes tilfældigheder på grund af, at racen som nævnt ovenfor kun var repræsenteret ved få individer. En af de centralnervøse lidelser, som ses hos *Cavalier king charles spaniel*, er partiel epilepsi (5), der kan komme til udtryk ved, at hunden under et anfald opfører sig som om, at den snappede efter fluer.

Hele 29 % af hundene tilhørende racen *Newfoundland* blev aflivet på grund af problemer med muskler eller led. I den ovennævnte svenske undersøgelse var andelen af denne race, som blev aflivet på grund af lidelser i bevægeapparatet 24 % (tabel 5.1). I den svenske undersøgelse var andelen af hunde døde/aflivet på grund af hjertelidelser på 21 % mod kun 9 % i nærværende undersøgelse.

Andelen af hunde aflivet på grund af lidelser i bevægeapparatet var desuden høj hos racerne *Schæferhund* og *Labrador retriever* – både blandt de danske og blandt de svenske hunde. Trods metodeforskelle mellem den svenske og nærværende undersøgelse er det bemærkelsesværdigt, at hos *Labrador retriever* var andelen af hunde aflivet på grund af lidelser i bevægeapparatet næsten dobbelt så høj i den svenske undersøgelse sammenlignet med nærværende undersøgelse (29 % vs. 15 %). Hos *Schæferhund* var forskellen noget mindre (27 % vs. 18 %), men stadig markant. Det er desuden bemærkelsesværdigt, at i den svenske undersøgelse var andelen af hunde tilhørende racen *Labrador retriever* aflivet på grund af lidelser i bevægeapparatet næsten dobbelt så høj (29 %) som hos *Golden retriever* (15 %). I nærværende undersøgelse var forskellen mellem de to racer langt mindre, idet andelen af hundene tilhørende racerne *Labrador retriever* og *Golden retriever*, som blev aflivet på grund af problemer med muskler eller led, var henholdsvis 15 % og 13 %.

Neurologiske lidelser var dødsårsag for 9 % af de svenske hunde tilhørende racen *Golden retriever*, men kun 2 % af hundene tilhørende denne race blev aflivet på grund af centralnervøse lidelser i nærværende undersøgelse.

Centralnervøse lidelser var aflivningsårsag for 7 % af *Gravhundene* i nærværende undersøgelse, mens neurologiske lidelser kun var dødsårsag for 2 % af de svenske *Gravhunde*. Derimod var disse lidelser dødsårsag for 7 % af de svenske *Pudler* mod kun for 3 % af *Pudlerne* i nærværende undersøgelse. Det er bemærkelsesværdigt, at andelen af *Pudler* aflivet på grund af neoplasier i nærværende undersøgelse var dobbelt så høj (20 %) som andelen af svenske *Pudler*, hvor tumorer blev angivet som dødsårsag (10 %). Desuden var andelen af danske *Pudler* aflivet på grund af hjerte/lunge lidelser (9 %) dobbelt så stor som andelen af svenske *Pudler*, hvor hjertelidelser blev angivet som dødsårsag.

Af de svenske hunde tilhørende racen *Sankt bernhardshund* døde 19 % som følge af tumorer, 14 % som følge af lidelser i bevægeapparatet, 18 % som følge af hjertelidelser og 10 % som følge af neurologiske lidelser. I nærværende undersøgelse blev ingen *Sankt bernhardshunde* aflivet på grund af de tre sidstnævnte lidelser. Det kan i høj grad skyldes tilfældigheder, idet racen kun var repræsenteret ved relativt få individer. Men det skal også tages i betragtning, at en stor del af hundene tilhørende denne race blev aflivet i en ung alder på grund af aggression. Derfor var der ikke mange hunde, som nåede en alder, hvor risikoen for en række medicinske og fysiske lidelser var særlig stor. Den svenske undersøgelse omfattede et meget stort antal hunde. Derfor var racen repræsenteret inden for alle kategorier af dødsårsager. Det kunne være interessant at undersøge, om danske *Sankt bernhardshunde* hyppigere optræder aggressivt end svenske.

Tabel 5.1. Sammenligning af andelen af hunde (%) døde/aflivet på grund af 4 forskellige årsager hos 10 forskellige racer samt hunde af blandingsrace i Sverige (SE) (6) og Danmark (DK)

Race	Tumor		Bevægeapp.		Hjerte		Neuro	
	SE	DK	SE	DK	SE	DK	SE	DK
C. king charles sp.	5	6	3	6	52	31	3	13
Schæferhund	16	12	27	18	3	1	4	5
Gravhund[1]	8	10	16	12	10	9	2	7
Labrador retriever	21	18	29	15	3	4	5	3
Springer spaniel	21	17	6	11	5	6	9	8
Golden retriever	30	15	15	13	4	5	9	2
Pudel[2]	10	20	7	5	3	9	7	3
Sankt bernhardsh.	19	15	14	0	18	0	10	0
Newfoundland	14	14	24	29	21	9	2	0
Boxer	37	23	10	4	7	10	11	6
Blandinger	19	14	6	11	3	4	8	2

1) De svenske gravhunde inkluderede ikke miniatureudgaver
2) De danske pudler omfattede alle racer - de svenske kun miniature/toy pudler

Hele 37 % af de svenske *Boxere* blev aflivet på grund af tumorer. I nærværende undersøgelse var andelen noget lavere, men alligevel relativ høj (23 %). Blandt de svenske *Boxere* var lidelser i bevægeapparatet og neurologiske lidelser dødsårsag for henholdsvis 10 % og 11 % af hundene. I nærværende undersøgelse blev kun 4 % aflivet på grund af problemer med muskler eller led og kun

6 % på grund af centralnervøse lidelser, men racen *Boxer* var kun repræsenteret ved 48 individer, hvorfor disse lave værdier skal tages med forbehold.

Der er tilsyneladende markante forskelle mellem danske og svenske hunde af blandingsrace med hensyn til hyppigheden af forskellige døds-/aflivningsårsager. I nærværende undersøgelse blev 11 % af blandingshundene aflivet på grund af problemer med muskler eller led, mens dette kun var tilfældet for 6 % i den svenske undersøgelse. Til gengæld var neurologiske lidelser dødsårsag for hele 8 % af de svenske blandingshunde, mens dette kun var tilfældet for 2 % af de danske. Hovedårsagen til disse forskelle er formentlig, at der er store forskelle mellem racefordelingen i Danmark og Sverige - og dermed også den relative hyppighed, hvormed de enkelte racer indgår i blandingshunde.

På trods af ovennævnte forskelle mellem den svenske undersøgelse og nærværende undersøgelse i måden, hvorpå andelen af hunde døde på grund af en given årsag er beregnet, tyder resultaterne på, dels at der er store raceforskelle på hyppigheden af forskellige aflivningsårsager, dels at der er forskelle på det avlsmateriale, som anvendes i Danmark og Sverige.

Hos nogle racer var andelen af hunde aflivet på grund af en given lidelse som nævnt ovenfor særlig høj, hvilket opdrættere bør være opmærksomme på. Der er generelt ikke grundlag for at antage, at det afhænger af hundens race, om ejeren vælger at lade hunden aflive, hvis den lider af en bestemt sygdom.

Generelt kunne racer med en kropsvægt under 10 kg forvente at leve længere end racer, som vejede 10 kg eller derover. Men andelen af hunde inden for de enkelte racer, der blev aflivet på grund af adfærdsproblemer, havde dramatisk indflydelse på, hvor længe hunde af en given race kunne forventes at leve. Således måtte mindre end 30 % af hundene tilhørende racerne *Sankt bernhardshund*, *Rottweiler*, *Chow chow* og *Pinchere* forventes at nå en højere alder end 10 år, hvilket i stor udstrækning skyldtes, at en meget stor del af hundene tilhørende disse racer som nævnt ovenfor blev aflivet på grund af aggression, hvilket typisk skete i en ung alder.

Der var tilsyneladende forskel mellem danske og svenske hunde med hensyn til, hvor længe de kunne forventes at leve. I Sverige kunne 89 % af hundene (alle racer) forventes at blive mindst 5 år og 68 % mindst 10 år gamle (1). I nærværende undersøgelse var andelen af racehunde, som kunne forventes at overleve til 5-års alderen og til 10-års alderen, henholdsvis 81 % og 54 %.

Der var også store forskelle mellem de danske og de svenske hunde, når sås på den beregnede dødelighed hos enkelte racer. Mens 82 % af de svenske *Schæferhunde* kunne forventes at blive mindst 5 år og 52 % kunne forventes at blive mindst 10 år gamle, var dette kun tilfældet for henholdsvis 74 % og 42 % af de danske.

I Sverige kunne 93 % af hundene tilhørende racen *Labrador retriever* og 94 % af hundene tilhørende racen *Golden retriever* forventes at blive mindst 5 år, mens henholdsvis 78 % og 81 % kunne forventes at blive mindst 10 år gamle. I nærværende undersøgelse kunne 85 % af hundene tilhørende racen *Labrador retriever* og 89 % af hundene tilhørende racen *Golden retriever* forventes at nå 5-års alderen, mens henholdsvis 67 % og 71 % kunne forventes at nå 10-års alderen. Både i Danmark og Sverige kunne *Golden retrievere* forventes at leve lidt længere end *Labrador retrievere*.

Af de svenske gravhunde kunne 91 % forventes at blive mindst 5 år og 75 % at blive mindst 10 år gamle. I nærværende undersøgelse kunne 88 % af gravhundene forventes at nå 5-års alderen, mens 62 % kunne forventes at nå 10-års alderen. Det er bemærkelsesværdigt, at der med hensyn til hundenes overlevelse til 5-års alderen kun er 3 procentpoints forskel mellem de danske og de svenske gravhunde, mens der med hensyn til deres overlevelse til 10-års alderen er hele 13 procentpoints forskel.

Når de beregnede værdier for den forventede overlevelse generelt lå højere i den svenske undersøgelse sammenlignet med nærværende undersøgelse, kan det skyldes, at der er anvendt forskellige beregningsmetoder. I den svenske undersøgelse blev hundene fulgt fra registrering i forsikringsselskabet til deres død - dvs. at det var muligt at tage højde for, hvor mange hunde som på et givent tidspunkt var i risiko for død/aflivning. I nærværende undersøgelse var beregningerne derimod baseret på aldersfordelingen blandt de aflivede hunde. Hvis den forventede overlevelse beregnet på grundlag af aldersfordelingen skal give et retvisende billede af, hvor længe hundene kan forvente at leve, skal dødeligheden i populationen og populationens størrelse være uændret over tid.

5.3.3. Kamphunde

Der har i de senere år været megen snak om kamphunde, d.v.s. racer med en kamphundebaggrund. Nogle mennesker mener, at disse racer bør forbydes, da de opfattes som farligere for deres omgivelser end andre hunderacer. Det er imidlertid svært helt klart at sige, hvilke racer der bør betragtes som kamphunde. Et af problemerne er, at mange hunderacer har været anvendt til mange forskellige formål gennem tiden, heraf nogle til at kæmpe med andre hunde eller andre dyr. De større og tungere racer har desuden været anvendt i krig eller til beskyttelse af ejendom. For nogle racers vedkommende ligger disse former for anvendelse mange år tilbage i tiden. Det betyder, at avlerne kan have forsøgt at avle sig væk fra de egenskaber, som oprindeligt gjorde racen velegnet som kamphund. Så spørgsmålet er, hvor tæt på nyere tid skal racen have været anvendt til kamp, og hvor udbredt skal denne anvendelse have været, før racen kan betegnes som en kamphund.

I forbindelse med avl er "frem og tilbage" dog ikke nødvendigvis lige langt. Hvis en uheldig egenskab er blevet udbredt inden for en bestemt race, kan det – afhængigt af, hvordan egenskaben er genetisk styret – være svært helt at eliminere denne egenskab igen. Selv hvis langt den største del af hundene synes velfungerende, kan der være risiko for, at de uheldige egenskaber dukker op hos nogle individer.

I forbindelse med racer, som pludseligt er blevet så populære, at efterspørgslen ikke kan dækkes af dansk opdrættede hvalpe (for eksempel *Amerikansk staffordshire terrier*), er der desuden det problem, at der importeres mange hvalpe. Køberne af disse hvalpe kan som nævnt ovenfor ikke altid være sikre på hundenes genetiske baggrund, samt om hvalpene er blevet håndteret og socialiseret korrekt hos opdrætteren.

Andelen af kamphunde registreret i *Dansk Hunderegister* har været konstant stigende siden registrets start i 1993. Men hovedparten af stigningen har været koncentreret om nogle få racer herunder *Amerikansk staffordshire terrier* og *American bulldog*. I de senere år er også *Staffordshire bull terrier* kommet til. Den årlige tilgang af *Bull terrier* har ligget nogenlunde konstant, mens tilgangen af *Engelsk bulldog* har svinget lidt. Når ses på de øvrige kamphunderacer er der i perioden 1993 – 2005 kun sket en fordobling i andelen af samtlige hunde, som årligt registreres.

Man kan således ikke sige, at der har været en stærkt stigende interesse for kamphunderacer (eller andre muskuløse racer) generelt. Hvis man ser på de registrerede hundes vægt i forhold til kvadratet på deres højde (Body Mass Index), viser det sig også, at dette har ligget nogenlunde konstant gennem årene. Der var dog en lille stigning i BMI fra 2002 til 2003, men denne stigning var betydeligt mindre end variationen mellem de foregående år.

Det skal dog bemærkes, at netop *Amerikansk staffordshire terrier* er blandt de hunderacer, hvor der importeres mange hvalpe til Danmark. Blandt hunde tilhørende denne race må det derfor forventes, at der er relativt mange, som ikke er registreret i *Dansk Hunderegister*. Derfor kan der være betydeligt flere hunde af denne race, end der er registreret.

Andelen af kamphunde i nærværende undersøgelse var kun lidt større, end man skulle forvente ud fra deres andel af hundene i *Dansk Hunderegister*. Til gengæld blev en meget stor del af kamphundene aflivet på grund af aggression. Det skal dog bemærkes, at en uforholdsmæssig stor del af de registrerede hunde, på grund af den stærkt stigende interesse for bestemte kamphunderacer, er relativt unge. Disse unge hunde har endnu ikke nået en alder, hvor risikoen for, at de pådrager sig en række aldersbetingede lidelser er særlig stor. Af denne årsag (og på grund af den stigende interesse) må andelen af hunde med kamphundebaggrund af de hunde, som aflives, forventes at stige betydeligt i de kommende år - samtidigt med, at aldersfordelingen ændrer sig ved, at de aflivede hunde bliver ældre, samt at andelen, som aflives på grund af aggression, falder.

5.4. Betydningen af køn og sexuel status

Tæver kan regne med at leve ca. 1 år længere end hanhunde, hvilket skyldes en markant forskel mellem kønnene med hensyn til den relative hyppighed af de forskellige aflivningsårsager. Af størst betydning er, at hanhunde udgør omkring 2/3 af de hunde, som aflives på grund af adfærdsproblemer.

Sammenlignet med undersøgelsen fra 1999 sås i nærværende undersøgelse en stigning på 56 % i andelen af kastrerede hanhunde og en stigning på 99 % i andelen af steriliserede tæver. En undersøgelse fra 2001 (21) viste, at for 61,4 % af hanhunde var adfærdsproblemer årsag eller medvirkende årsag til kastrationen, mens adfærdsproblemer kun var årsag eller medvirkende årsag til sterilisationen af tæver i 17,1 % af tilfældene.

Det er interessant, at sammenlignet med intakte hanhunde blev en større andel af de kastrerede hanhunde aflivet både på grund af aggressiv adfærd og på grund af frygtsomhed eller angst. En del af forklaringen på den større andel aflivet på grund af aggression kan være, at nogle hunde forud for aflivningen var blevet kastreret, netop fordi de havde optrådt aggressivt, dog uden det havde hjulpet. Men denne forklaring kan ikke anvendes i forbindelse med hunde, som blev aflivet på grund af frygtsomhed eller angst – med mindre denne adfærd optrådte associeret med aggression.

I en amerikansk undersøgelse (17) fandt man, at kastration havde en gunstig effekt på følgende adfærdsformer hos hanhunde: strejfen, aggression over for andre hanhunde, urinmarkering i hjemmet samt bestigning af andre hunde eller mennesker. Men der er først for nylig (2006) offentliggjort en undersøgelse af effekten af neutralisering på hundens samlede adfærd (11). Undersøgelsen konkluderede, at selvom nogle få adfærdsformer (for eksempel energiniveauet og urinmarkering) blev reduceret ved neutralisering, var neutralisering for de fleste adfærdsformers

vedkommende associeret med værre adfærd, hvilket strider mod den gængse opfattelse. For eksempel var både steriliserede tæver og kastrerede hanhunde mere aggressive over mennesker og andre hunde samt mere frygtsomme og følsomme over for håndtering. Der var dog store raceforskelle på effekten af neutralisering.

At neutralisering kan øge risikoen for adfærdsproblemer støttes af ovennævnte dansk undersøgelse fra 2001 (21), som viste, at aggression rettet mod personer uden for familien hyppigere optræder hos kastrerede hanhunde end hos intakte – også når hunde kastreret på grund af adfærdsproblemer ikke medregnes. Desuden viste undersøgelsen, at i forhold til intakte tæver så optræder tæver steriliseret efter 2-års alderen hyppigere aggressivt over for børn.

Det er derfor betænkeligt, hvis vi i Danmark er på vej mod at neutralisere hunde nærmest rutinemæssigt, da vi risikerer at skabe flere problemer for hundene (og deres omgivelser) end vi løser. Der kan være gode grunde (af medicinsk eller adfærdsmæssig art) til at vælge at lade hunden neutralisere, men fordele og ulemper bør vejes mod hinanden i hvert enkelt tilfælde. Det er ikke tilladt i Danmark at foretage kirurgiske indgreb på hunde af kosmetiske årsager (20) – dog må 5 hunderacer halekuperes (3). Det er derfor inkonsekvent, at det er tilladt uden videre at lade hunden neutralisere – på trods af, at dette har langt større konsekvenser for hunden.

6. Konklusion

Trods en stigende interesse for adfærd og adfærdsproblemer hos hunde, har andelen af hunde, som aflives pga. adfærdsproblemer, ikke ændret sig markant siden Jørgen Mikkelsens undersøgelse fra 1999. Men generelt er hundene ældre, før de bliver aflivet pga. adfærdsproblemer. Desuden bliver en større andel af hundene aflivet pga. frygtsomhed eller angst, mens en mindre andel bliver aflivet på grund af separationsproblemer (problemer med at være alene hjemme) samt andre forhold end sygdom eller adfærd.

Andelen af hunde, som er forsøgt behandlet forud for aflivning pga. adfærdsproblemer, har heller ikke ændret sig markant, men andelen af hunde, som er forsøgt behandlet på andre måder end medikamentel behandling, neutralisering og lydighedstræning, er steget markant – dvs. at en større andel af de behandlede hunde formentlig modtager adfærdsterapi og en større andel af deres ejere adfærdsrådgivning.

Hunde, som optræder aggressivt, er tilsyneladende et konstant problem. Således har antallet af bidskader, som fører til skadestuekontakt, samt antallet af hunde, der bliver aflivet på grund af adfærdsproblemer, ligget på nogenlunde samme niveau i de senere år.

Det kan være vanskeligt at gøre noget ved aggressiv adfærd, hvis adfærden ikke skyldes medicinske eller fysiske lidelser, og den forekommer uforudsigeligt eller uprovokeret. Hvis andelen af hunde, som aflives på grund af aggression, skal nedbringes, må tilvejebringes større indsigt i de grundlæggende årsager til, at hunde kan optræde aggressivt.

Stigningen i andelen af hunde, hvor frygtsomhed eller angst var årsag eller medvirkende årsag til aflivningen, bør give anledning til bekymring. Hvis hundene ikke bliver tilstrækkeligt socialiseret som hvalpe, er det hundene og deres familie, som kommer til at betale prisen – hundene ofte med

deres liv. Dette bør opdrættere være meget opmærksomme på, så de ikke producerer flere hvalpe, end de har tid til at sørge for bliver tilstrækkeligt socialiseret.

At en stor andel af de danske hunde stadig bliver aflivet pga. problemer med deres adfærd, betyder at der fortsat er behov for stor forebyggende indsats, så deres ejere undgår, at problemerne opstår.

Hvis antallet af aflivninger skal nedbringes, bør hundeejere informeres om:
- Hvad de kan forvente, inden de anskaffer sig hunden
- Hvorledes de undgår at få problemer med hunden
- Hvilken adfærd hos hunden, som de skal være opmærksom på, så de undgår, at den udvikler sig til et problem
- Vigtigheden af at søge hjælp, så snart problemerne opstår
- Hvor de kan søge hjælp

Der er tilsyneladende store forskelle mellem landsdelene med hensyn til årsagerne til aflivning. Hvis antallet af hunde, der aflives på grund af adfærdsproblemer, skal nedbringes, må indsatsen således målrettes. Derfor bør følgende forhold undersøges nærmere:
- Folks bevægegrunde for at anskaffe sig hund
- Hvilke forventninger forskellige hundeejere har til hunden og dens plads i familien
- Hvilke overvejelser ejerne gjorde sig, da de valgte en hund af lige netop den race
- Hvorledes det er muligt at nå forskellige målgrupper

Blandt de aflivede hunde var andelen af hunde, som udelukkende blev aflivet på grund af andre årsager end sygdom eller aggression, meget lav. Derfor var genplacering som alternativ til aflivning kun relevant for relativt få hunde.

I forbindelse med hunde aflivet på grund af medicinske eller fysiske lidelser må den meget markante stigning i andelen af hunde, som bliver aflivet på grund af problemer med muskler eller led, give anledning til bekymring. De grundlæggende årsager til denne stigning bør undersøges nærmere.

Der er tilsyneladende meget store raceforskelle med hensyn til den relative hyppighed af aflivning på grund af en række medicinske og fysiske lidelser. Inden for visse racer synes risikoen for aflivning på grund af bestemte lidelser at være særlig stor. Dette er noget, som opdrættere af disse racer og hvalpekøbere bør være opmærksomme på.

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Informationsskema

Appendix 1

Ejers postnr.: _____ **Dato for aflivning:** _____

Race: ☐ Racehund ☐ Bland. Angiv race(r): _____

Køn: ☐ Han ☐ Tæve ☐ Intakt ☐ Neutraliseret

Alder: _____ år _____ mdr ☐ <40 cm ☐ 40-60 cm ☐ >60 cm (Skulderhøjde) ☐ <10 kg ☐ 10-30 kg ☐ >30 kg (Vægt)

Årsager eller medvirkende årsager til aflivningen af hunden

☐ Medicinsk/fysisk lidelse (A) ☐ Aggression (B1) ☐ Frygtsomhed/angst (B2) ☐ Separationsproblemer (B3) (Problemer med at være alene hjemme)

☐ Anden adfærd (B4) ☐ Andre forhold end sygdom eller adfærd (C) ☐ Behandling forsøgt - adf.prbl. (D)

A. Hvis medicinsk/fysisk lidelse er årsag eller medvirkende årsag til aflivningen

☐ Hjerte/lunge ☐ Genital lidelse ☐ Problemer m. led i ☐ Ben ☐ Hofter ☐ Ryg ☐ Hals

☐ Lever/nyre lidelse ☐ Endocrin lidelse ☐ Problemer m. muskler ☐ Anden lidelse

☐ Mave/tarm lidelse ☐ Neoplasier ☐ Læsioner/kvæstelse

☐ Centralnervøs lidelse ☐ Hudlidelse ☐ Alderdomssvækkelse

Hvis anden lidelse, angiv hvilken: _____

B1. Hvis aggression er årsag eller medvirkende årsag til aflivningen

Type af aggressiv adfærd: ☐ Viser tænder ☐ Knurrer ☐ Snapper ☐ Bider

☐ Aggressiv over for mennesker: ☐ Fremmede mennesker ☐ Personer i familien

☐ Mænd/mand ☐ Kvinder/kvinde ☐ Børn/barn

☐ Andre hunde: ☐ Fremmede hunde ☐ Hunde i familien

☐ Hanhunde ☐ Tæver ☐ Bestemte hunde ☐ Alle hunde

Forekomst/hyppighed af aggressionen: ☐ En enkelt gang ☐ Få gange ☐ Af og til ☐ Ofte

☐ Forekommer uprovokeret ☐ Forekommer uforudsigeligt

☐ Advarer ikke før bid/snappen ☐ Ses i særlige situationer

Hvis ses i særlige situationer, angiv hvilke: _____

B2. Hvis frygtsomhed el. angst er årsag eller medvirkende årsag til aflivningen

☐ Frygtsomhed over for mennesker: ☐ Fremmede mennesker ☐ Personer i familien

☐ Mænd/mand ☐ Kvinder/kvinde ☐ Børn/barn

☐ Frygtsomhed overfor andre hunde ☐ Hanhunde ☐ Tæver ☐ Bestemte hunde ☐ Alle hunde

☐ Angst for lyde ☐ Fyrværkeri ☐ Tordenvejr ☐ Skud ☐ Andet

☐ Angst for andre ting

☐ Generelt frygtsom/bange

Hvis angst for andre ting, angiv hvilke: _____

B3. Hvis separationsproblemer er årsag eller medvirkende årsag til aflivningen

☐ Hunden gør ☐ Hyler ☐ Ødelægger ting ☐ Er urenlig ☐ Anden adfærd

B4. Hvis anden adfærd er årsag eller medvirkende årsag til aflivningen

☐ Hunden er for aktiv ☐ Er ulydig ☐ Ødelægger ting ☐ Larmer (naboklager) ☐ Skader sig selv (F.eks. flank sucking)

☐ Kan ikke lide børn ☐ Er urenlig ☐ Optræder for voldsomt ☐ Hypersexualitet ☐ Anden adfærd

☐ Gør for meget ☐ Kan ikke med andre hunde i husstanden

☐ Bider/snapper ☐ Meget opmærksomhedskrævende

Hvis anden adfærd, angiv hvilken: _____

C. Hvis anden årsag eller medvirkende årsag til aflivningen end sygdom eller adfærd

☐ Årsag ikke oplyst ☐ Må ikke have hund i beboelsen ☐ Hunden svarer ikke til ejers forventninger

☐ Skilsmisse ☐ Allergi i husstanden ☐ Økonomiske årsager ☐ Anden årsag

☐ Familien skal flytte ☐ Sygdom i husstanden

☐ Ejer skiftet arbejde ☐ Ejeren død

☐ Ny baby i husstand ☐ Manglende tid til hunden

Hvis anden årsag, angiv hvilken: _____

D. Hvis behandling er forsøgt forud for aflivning pga. adfærdsproblemer

☐ Neutralisering ☐ Lydighedstræn. ☐ Adfærdsrådgivning

☐ Medikamentel beh. ☐ Adfærdsterapi ☐ Anden behandling

Hvis anden behandling, angiv hvilken: _____

Sendes til Jørgen Damkjer Lund, Institut for Produktionsdyr og Heste, Københavns Universitet, Grønnegårdsvej 8, 1870 Frederiksberg C

Mundkurvs betydning for en hunds adfærd

På vores sidste møde onsdag den 6. maj, blev der udtrykt ønske om at få en viden om, hvilken betydning det har for en hund at bære mundkurv. Nedenstående redegørelse har dels baggrund i en videnskabelig artikel og dels i min personlige vurdering ud fra viden om hundes adfærd.
Den eneste videnskabelige artikel jeg umiddelbart kan finde om mundkurvens betydning for en hunds adfærd er nedenstående artikel. Mundkurven beskrevet i undersøgelsen har til formål at forhindre hunden i at gø. Den er derfor udformet lidt anderledes end den lukkede mundkurv som "farlige" hunde påbydes at bære. Da begge kurve sidder rundt om hundens snude samt giver den et tryk over snude og rundt om nakken, vil jeg forvente, at de adfærdsmæssige observationer, der er gjort i artiklen, tilnærmelsesvis kan overføres på en lukket mundkurv.

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"An-antibarking muzzle for dogs and its short-term effektct om behaviour and salvia cortisol concentrations"
Cronin, Hemsworth, Barnett, Jongman, Newman and McCauley, appl. Animal Behavior Science 83 (2003) 215-226.

Undersøgelsen i artiklen består af to dele: Mundkurvens effekt på testhundenes adfærd og Mundkurvens effekt på testhundenes cortisol niveau.

Mundkurvens effekt på adfærd:
I forhold til kontrolgruppen udviser de hunde, der påføres mundkurv en anden adfærd. De ligger ned en større del af tiden, de bevæger sig mindre og de udviser "underlegen adfærd": holder hoved og hale nede samt lægger ører tilbage. Efter fjernelse af mundkurven ses en øget aktivitet hos hundene, der bar mundkurv i forhold til kontrol gruppen.
I artiklen gives følgende forklaring: Adfærden kan skyldes hundens reaktion på en fremmed stimulus. Det kan også være en reaktion betinget af hundes sociale adfærd. Hunde kan lægge munden om en anden hunds snude og trykke let for at udvise kraftig dominerende/ truende adfærd. En hund, der bærer mundkurv, kan muligvis derfor opfatte mundkurvens tryk over snuden på samme måde og derfor udvise "underlegen" adfærd, for at få "truslen" til at stoppe. Det øgedes aktivitetsniveau kan være en kompensation for den manglende aktivitet i testperioden og et forsøg på at etablere den sociale status igen.

Mundkurvens effekt på hunden cortisol niveau:
Måling af cortisol bruges ofte adfærdsmæssigt til at vurdere et dyrs stress tilstand. Cortisol niveauet er uændret hos gruppen, der bærer mundkurv i forhold til kontrolgruppen. I artiklen tages dette som et udtryk for, at mundkurven ikke påvirker hundene så meget, at det øger deres stress-niveau.

Min vurdering ud fra viden om hundes adfærd

Lugtesans:
Hunden har en utrolig god lugtesans (den bedste blandt domesticerede arter) og de kan lugte substrater, der er opløst ned til en hundrede del i forhold til, hvad mennesker kan lugte ("Clinical behavioral Medicin for Small Animal", Overall 1997). Hundene bruger deres lugtesans til at få oplysninger fra artsfælder ("Clinical behavioral Medicin for Small Animal", Overall1997). Dette er primært lugte fra urin og fæces, men det kan også være lugten fra talgkirtler i trædepuder og ører, samt fra analkirtler. Hvis hunde levede vildt ville de desuden bruge deres lugtesans til at opspore et bytte. Hunden får således en stor del af information om omverden via lugtesansen. Hvis man iagttager en hund i det fri vil man se den snuse til omgivelserne en stor del af tiden. Dette forgår med snuden helt tæt til og ofte i berøring med det, den lugter til, hvad enten det er en anden hund, jorden, et menneskes fremstrakte hånd og lignende.
Min vurdering af mundkurvens betydning: Da en lukket mundkurv forhindrer en hund i at få snuden i nærkontakt med det, den vil lugte til, har jeg svært ved at forestille mig andet end, at det vil nedsættes hundens evne til at modtage stimuli via lugtesansen. I hvor høj grad evnen bliver nedsat, ved jeg dog ikke.

Pheromoner:
Pheromoner er lugtløse signalstoffer som opfattes af hjernen uden om hjernens bevidste del. Lige over ganen har pattedyr det vomeronasale organ, som opfatter disse signalstoffer og sørger for transporten til hjernen. Dette organ er meget rudimentært hos mennesker, men meget veludviklet hos hunde. Når man ser hanhunde stå og slikke på græsset, hvor f.eks. tæver har urineret, er det ikke for at slikke på det, men fordi tungen bringer pheromonerne til det vomeronasale organ.
Min vurdering af mundkurvens betydning: Mundkurven vil fuldstændig forhindre en hund i at udføre denne naturlige adfærd.

Kommunikation med andre hunde:
Udover deres kropssprog bruger hunde deres mimik herunder også deres mund til at kommunikere med andre hunde. For eksempel vil kortvarig slikken om munden være et udtryk for usikkerhed/venlighed og ikke-truende adfærd og sammen med andre elementer i kropsproget være med til at undgå at en konfliktsituation opstår. Et andet eksempel er formen på hundens mundvige: korte mundvige vil signalere truende adfærd, mens "lange" tilbagetrukne mundvige vil signalere en mere "underlegen"/usikker/venlig adfærd
Min vurdering af mundkurvens betydning: Andre hunde vil have svært ved at se ovenstående signaler hos en hund, der bærer mundkurv. Jeg har derfor svært ved at tro andet, end at en mundkurv vil nedsætte hundens evne til at kommunikere med andre hunde. Derved nedsættes dens evne til at undgå konfliktsituationer også.

Konklussion
Ud fra ovenstående er det min vurdering, at en mundkurv vil have en grad af negativ effekt på hundens livskvalitet i form af nedsat aktivitet, højere grad af "underlegen" adfærd (i hvert fald på kort sigt), nedsat evne til at modtage stimuli (lugte, pheromoner) og nedsat evne til at kommunikere med andre hunde. Denne gene er dog tilsyneladende ikke så stor, at hundens fysiologiske stress-niveau øges.

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Breed differences in canine aggression

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Abstract

Canine aggression poses serious public health and animal welfare concerns. Most of what is understood about breed differences in aggression comes from reports based on bite statistics, behavior clinic caseloads, and experts' opinions. Information on breed-specific aggressiveness derived from such sources may be misleading due to biases attributable to a disproportionate risk of injury associated with larger and/or more physically powerful breeds and the existence of breed stereotypes. The present study surveyed the owners of more than 30 breeds of dogs using the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), a validated and reliable instrument for assessing dogs' typical and recent responses to a variety of common stimuli and situations. Two independent data samples (a random sample of breed club members and an online sample) yielded significant differences among breeds in aggression directed toward strangers, owners and dogs (Kruskal–Wallis tests, $P < 0.0001$).

Eight breeds common to both datasets (Dachshund, English Springer Spaniel, Golden Retriever, Labrador Retriever, Poodle, Rottweiler, Shetland Sheepdog and Siberian Husky) ranked similarly, $r_s = 0.723$, $P < 0.05$; $r_s = 0.929$, $P < 0.001$; $r_s = 0.592$, $P = 0.123$, for aggression directed toward strangers, dogs and owners, respectively. Some breeds scored higher than average for aggression directed toward both humans and dogs (e.g., Chihuahuas and Dachshunds) while other breeds scored high only for specific targets (e.g., dog-directed aggression among Akitas and Pit Bull Terriers). In general, aggression was most severe when directed toward other dogs followed by unfamiliar people and household members. Breeds with the greatest percentage of dogs exhibiting serious aggression (bites or bite attempts) toward humans included Dachshunds, Chihuahuas and Jack Russell Terriers (toward strangers and owners); Australian Cattle Dogs (toward strangers); and American Cocker Spaniels and Beagles (toward owners). More than 20% of Akitas, Jack Russell Terriers and Pit Bull Terriers were reported as displaying serious aggression toward unfamiliar dogs. Golden Retrievers, Labradors Retrievers, Bernese Mountain Dogs, Brittany Spaniels, Greyhounds and Whippets were the least aggressive toward both humans and dogs. Among English Springer Spaniels,

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conformation-bred dogs were more aggressive to humans and dogs than field-bred dogs (stranger aggression: Mann–Whitney U test, $z = 3.880$, $P < 0.0001$; owner aggression: $z = 2.110$, $P < 0.05$; dog-directed aggression: $z = 1.93$, $P = 0.054$), suggesting a genetic influence on the behavior. The opposite pattern was observed for owner-directed aggression among Labrador Retrievers, ($z = 2.18$, $P < 0.05$) indicating that higher levels of aggression are not attributable to breeding for show per se.

Keywords: Aggression; Dog; Breed; Agonistic behavior

1. Introduction

Canine aggression presents serious public health, economic and animal welfare concerns. Recent reports estimate that hospital emergency rooms treat over 300,000 dog bite injuries per year in the USA, nearly half of which involve children under the age of 15 years. Approximately 2–4% of all dog bite cases require hospitalization (Weiss et al., 1998; Centers for Disease Control and Prevention, 2003).

In a study of 12 different animal shelters across the USA, 40% of relinquishing owners cited behavioral problems as one of the reasons for surrendering a dog. When behavior was the only reported reason for relinquishment, aggression was the most frequently cited problem (40% of dogs) (Salman et al., 1998).

Four primary approaches have been used to investigate breed-related variation in aggressive behavior: analyses of dog bite statistics (e.g., Gershman et al., 1994; Lockwood, 1995; Guy et al., 2001b; Reisner et al., 2005), behavior clinic/consultant caseloads (e.g., Beaver, 1983; Borchelt, 1983; Blackshaw, 1991; Bamberger and Houpt, 2006), the opinions of dog experts (veterinarians and trainers; e.g., Hart and Hart, 1985; Bradshaw and Goodwin, 1998; Takeuchi and Mori, 2006; Notari and Goodwin, 2007) and the results of behavioral testing (e.g., Svartberg, 2006). Each method has its drawbacks.

Dog bite statistics are potentially misleading for several reasons: (a) most dog bites go unreported unless medical attention is sought (which may be more likely with larger breeds that have the ability to inflict more serious injury); (b) the total number of dogs of a given breed in the local community is seldom known, so the degree to which that breed is over-represented among reported dog bites is usually undetermined (Lockwood, 1995; however see Gershman et al., 1994; Guy et al., 2001b; Reisner et al., 2005); and (c) in many cases the breed of dog involved cannot be verified (Wright, 1991).

Breed-specific data on aggression derived from behavior clinic/consultant caseloads are also likely to be unrepresentative. Because of the greater risk of injury posed by larger, more powerful dogs, owners of these dogs are more likely to seek professional help in dealing with canine aggression. In addition, dog owners dealing with aggression directed toward themselves or members of their family are more likely to seek professional help compared to pet owners whose dogs are aggressive toward unfamiliar people or animals (Bamberger and Houpt, 2006).

Hart and Hart (1985) pioneered the use of animal 'experts' (e.g., veterinarians and obedience judges) as sources of information on the prevalence of various desirable and undesirable behaviors among popular dog breeds. Their methods, which involve asking experts to rank breeds on a series of traits, have also been applied to studies of breed differences in countries other than the USA, e.g., the UK (Bradshaw and Goodwin, 1998), Italy (Notari and Goodwin, 2007), and Japan (Takeuchi and Mori, 2006), and have provided evidence of agreement regarding

levels of aggression in some breeds. Unfortunately, with surveys of this type, it is difficult to ascertain whether agreement among experts about the aggressiveness of a particular breed, either within or between countries, reflects true consistencies in breed behavior or simply shared stereotypes.

In contrast to opinions based upon breed generalizations, assessments directed at individual dogs may be less susceptible to bias related to breed stereotypes (Notari and Goodwin, 2007). Such assessments include behavioral tests and dog owner surveys. Behavioral testing for aggression involves exposing dogs to one or more startling or potentially threatening stimuli and noting any signs of aggressive responses. A recent Swedish study using behavioral test scores of over 13,000 dogs representing 31 breeds found significant differences across breeds and among breed lines derived from different breeding stocks (e.g., show dogs, hunting, working or herding) (Svartberg, 2006). However, the accuracy with which behavioral tests reflect a dogs' typical behavior has been called into question (van den Berg et al., 2003). The tests used in the Swedish study have been extensively evaluated for reliability and validity and, although most traits measured by the test met validity criteria, aggressiveness was poorly associated with owner assessments (Svartberg, 2005). Several studies aimed at validating aggression tests using pet dog populations report some validity with respect to owner accounts (van der Borg et al., 1991; Planta and De Meester, 2007); however, there is often a large proportion (>20%) of cases in which dogs passed aggression tests despite having a history of biting (Netto and Planta, 1997; Kroll et al., 2004). A recent study has demonstrated that temperament testing of shelter dogs often fails to detect some forms of aggression (e.g., territorial, predatory and intra-specific) that are difficult to simulate in a test situation (Christensen et al., 2007).

Often used as means of validating behavioral tests, questionnaire surveys of dog owners typically provide more detailed information regarding a dog's tendency to display different classes of aggression because owners have the opportunity to observe the animal in a variety of situations over an extended period of time. However, dog owner reports have a greater potential for subjective bias compared to more objective behavioral observations (Hsu and Serpell, 2003).

The goal of the present study was to investigate breed differences in the prevalence and severity of different forms of aggressive behavior in dogs using a research design that avoids some of the problems described above. We utilized a survey method, the Canine Behavioral Assessment and Research Questionnaire (C-BARQ©), that has been demonstrated to meet validity and reliability criteria (Hsu and Serpell, 2003). The findings are compared with those of previous studies of breed differences in aggression that have used other sources of data.

2. Methods

2.1. Data collection and survey methods

Behavioral data on aggression were collected from dog owners using the C-BARQ. Details of this survey, its validation and its internal reliability, have been described elsewhere (Hsu and Serpell, 2003; Serpell and Hsu, 2005). Briefly, the C-BARQ is a standardized questionnaire designed to assess the prevalence and severity of behavior problems in dogs. It consists of 101 items that ask owners to indicate how their dogs have responded, "in the recent past" to a variety of common events and stimuli using a series of 0–4 rating scales (where 0 = none and 4 = serious). Originally, 68 of these items were condensed by factor analysis into 11 distinct subscales (Hsu and Serpell, 2003). Two new subscales, 'dog rivalry' and 'energy level', were added subsequently and were thus not included in the Breed club survey (described below). An example of a typical questionnaire aggression item and preamble can be viewed in Supplementary data.

For the purposes of analysis, subscale scores are calculated as the average of the scores for the questionnaire items comprising each factor. In the present paper, we focus on four subscales related to aggression. The aggression subscales address aggressive responses of dogs to different targets: unfamiliar people (stranger-directed aggression, SDA), familiar people (owner-directed aggression, ODA), unfamiliar dogs (dog-directed aggression, DDA), and familiar dogs living in the same household (dog rivalry, DR). Because fearful responses are often associated with the expression of aggressive behavior in dogs (Lindsay, 2001, pp. 171–172), we included two additional subscales that address fearful responses directed toward unfamiliar people (stranger-directed fear) and unfamiliar dogs (dog-directed fear) for some analyses.

Calculation of Cronbach's alpha coefficients (Cronbach, 1951) for the individual aggression subscales obtained coefficients greater than 0.80, indicating a high level of internal reliability for these scales (Nunnally, 1978, p. 245; Carmines and Zeller, 1979, p. 51). Similarly, independent (i.e. without conferring) C-BARQ ratings of a sample of 75 dogs by pairs of owners (e.g., spouses or partners) have also confirmed that the aggression subscales have good inter-rater reliability characteristics. Average weighted Kappa coefficients ranged from 0.4 to 0.6 ($P < 0.0001$), which is considered to be a moderate to substantial degree of inter-rater agreement (Landis and Koch, 1977). The average weighted percent agreement between pairs of raters exceeded 90% for all aggression subscales. Intraclass correlation coefficients (ICC) (Bartko, 1966; Shrout and Fleiss, 1979) of the calculated subscales also indicate a moderate to high degree of inter-rater reliability (SDA ICC = 0.84; ODA ICC = 0.91; DDA ICC = 0.69; DR ICC = 0.60). Using a sample of 200 clinical referral cases, the construct validity of these subscales was established by confirming their effectiveness at discriminating between dogs independently diagnosed as either displaying or not displaying corresponding behavior problems (Hsu and Serpell, 2003).

2.2. *Participants*

2.2.1. *Breed club sample*

Study participants consisted of members of 11 American Kennel Club (AKC) recognized national breed clubs (see Serpell and Hsu, 2005 for details). C-BARQ questionnaires were distributed to breed club members by ordinary mail together with an explanatory letter, and a pre-paid return envelope. In an effort to 'randomize' the samples, recipients from most of the clubs were selected from either the first or last 300 members listed alphabetically in each club's membership directory. The Labrador Retriever Club elected to distribute the C-BARQ to its own members, and sent questionnaires to the first 488 members listed alphabetically in its directory. The English Springer Spaniel Field Trial Association also chose to distribute the C-BARQ: all 187 members with field (working)-bred Spaniels were sent questionnaires, and the Trinity College (Dublin, Ireland) online random number generator (http://random.org/) was used as the basis for sampling 300 out of a total of 367 members with conformation (show)-bred Spaniels. In addition to the C-BARQ assessments, information was also collected on each dog's age, sex and neuter status. For the Labrador and English Springer Spaniel breeds, owners were also asked to state whether the dog was field or conformation (show)-bred, if known.

To ensure statistical independence, each respondent was asked to assess only one dog, preferably one that was well known, that was at least 1 year old at the time of assessment in order to reduce maturational effects (Serpell and Jagoe, 1995).

2.2.2. *Online sample*

Beginning in April 2006, free access to an online version of the C-BARQ (http://www.vet.upenn.edu/cbarq) became available to pet owners. The online survey was advertised via an article in the newsmagazine of the Veterinary Hospital of the University of Pennsylvania, USA (http://www.vet.upenn.edu/bellwether/v64/article10.shtml) and by notices sent to Philadelphia-area veterinary clinics and the top 20 USA breed clubs based on AKC registrations. Availability of the survey then spread via word of mouth. This sample of dog owners is therefore self-selected which we note as a potential source of bias. Breed designations are based entirely upon owner assertions.

Owners were permitted to complete questionnaires for as many dogs as they wished. However, for data analysis we used a random number generator (available as part of the statistics software, SPSS 15.0, SPSS, Inc.) to randomly select only one dog per owner to ensure statistical independence. Only breeds for which at least 45 dogs were surveyed were included in analyses.

2.3. Analyses

Data were analysed using SPSS 15.0 for Windows (SPSS, Inc.). Due to non-normality of the data that could not be corrected with transformation, non-parametric tests were used to analyse differences in C-BARQ subscale scores. Mann–Whitney U and Kruskal–Wallis tests were used for between-group comparisons of continuous variables (age and aggression subscale scores). Chi-square tests of independence were used for analyses of sex ratios and frequency of neutered/spayed dogs. To distinguish dogs that tended to engage in aggressive displays (e.g., barking, growling, etc.) from those that actually bit or attempted to bite, the proportion of dogs in each breed that scored at least one "4" ("snaps, bites or attempts to bite") on items pertaining to each of the aggression subscales was calculated. Because inter-dog aggression within a household can only occur if there is more than one dog, 'dog rivalry' cases that had missing values for all four questions that comprise this subscale were excluded. Spearman rank order correlation coefficients were used to assess associations between breed means for C-BARQ subscale scores and percentages reported as biting.

Correlations among the subscales were determined using Spearman rank order correlation coefficients. Partial correlations were used to assess the relationship between ODA and DR while controlling for DDA and SDA. To assess breed differences in aggressiveness relative to fearfulness, we subtracted the population mean from the mean of each breed for stranger- and dog-directed aggression and fear.

To assess how breeds common to both the online and breed club datasets compared to one another, Spearman rank order correlation coefficients were used to compare mean subscale scores.

3. Results

3.1. Descriptive statistics

3.1.1. Breed club sample

A total sample of 1553 complete C-BARQs were returned (average return rate 49%). Twenty-four cases were removed due to missing data regarding the dog's sex (three cases) or age (21 cases). Despite our instructions, a small number of dogs were less than 1 year old ($n = 27$). Dogs that were less than 6 months old (five cases) or greater than 17 years old (three cases) were excluded from the data to eliminate possible effects of extreme immaturity and senility, respectively. Table 1 summarizes the primary descriptive characteristics of the sample. Breeds did not differ significantly from one another with respect to sex ratio but there were significant breed differences in the ratio of intact to neutered dogs ($\chi^2 = 60.81$, d.f. = 10, $P < 0.0001$). Overall, there were more intact dogs compared to neutered dogs among most breeds. Breeds also differed from one another in age (Kruskal–Wallis $H = 63.83$, d.f. = 10, $P < 0.0001$).

3.1.2. Online sample

A total of 8260 complete C-BARQs were available as of December 3, 2007. Of those, 1257 dogs whose breed status was reported as 'mixed/unknown' were removed from the data. Removing breeds with fewer than 45 dogs (2051 dogs representing 143 breeds) left 4952 dogs. Random selection of one dog for each owner provided 3791 C-BARQs that were included in analyses, representing 33 different breeds (Table 2). There were significant breed differences for sex ratio ($\chi^2 = 48.97$, d.f. = 32, $P < 0.05$) and in the ratio of intact to neutered dogs ($\chi^2 = 251.84$,

Table 1
Descriptive statistics of the breed club sample of dogs used in the study

Breed	*n*	Female (%)	Neutered (%)	Age in years (mean ± S.D.)
Basset Hound	151	52.98	50.99	5.65 ± 3.10
Dachshund	120	47.50	44.17	6.58 ± 3.46
English Springer Spaniel	247	51.01	27.94	5.06 ± 2.42
Golden Retriever	179	46.37	49.72	5.29 ± 2.83
Labrador Retriever	277	53.43	25.63	5.68 ± 2.83
Poodle[a]	69	60.89	34.78	6.87 ± 3.43
Rottweiler	92	50.00	41.30	6.00 ± 2.94
Shetland Sheepdog	112	47.32	49.11	7.48 ± 3.79
Siberian Husky	92	42.39	42.39	7.31 ± 4.08
West Highland White Terrier	92	60.87	44.57	6.66 ± 3.64
Yorkshire Terrier	90	60.00	44.44	6.12 ± 3.02
All breeds	1521	51.55	39.18	5.99 ± 3.20

[a] Includes standard, miniature, and toy varieties.

d.f. = 32, $P < 0.0001$). In contrast to the breed club survey, the proportion of neutered dogs was greater than intact dogs for all breeds. As in the breed club survey, breeds differed from one another in age (Kruskal–Wallis $H = 139.99$, d.f. = 32, $P < 0.0001$). Ages ranged from 6 months to 17 years.

The breed club and online samples differed from each other in three main respects. The ratio of intact to spayed/neutered dogs was significantly higher in the breed club sample ($\chi^2 = 567.66$, d.f. = 1, $P < 0.0001$), and the ratio of males to females was somewhat lower ($\chi^2 = 5.56$, d.f. = 1, $P < 0.025$). The dogs in the breed club sample were also, on average, older than the dogs in the online sample (Mann–Whitney *U* test: $z = 18.42$, $P < 0.0001$; Tables 1 and 2).

3.2. Breed differences in aggression

3.2.1. Breed club sample

As shown in Fig. 1A–C, significant differences were observed across the 11 breeds for scores on each of the C-BARQ aggression subscales, excluding dog rivalry which was not included in the breed club survey (Kruskal–Wallis $H = 232.06$, d.f. = 10, $P < 0.0001$; $H = 85.35$, d.f. = 10, $P < 0.0001$; $H = 52.23$, d.f. = 10, $P < 0.0001$ for SDA, ODA and DDA, respectively). A large effect size (Cohen, 1988, pp. 20–26) between subscale scores for the most and least aggressive breeds was observed for SDA (Cohen's $d = 1.55$; Dachshund vs. Siberian Husky, Fig. 1A) while medium to large effect sizes were found for DDA ($d = 0.647$; Dachshund vs. Shetland Sheepdog, Fig. 1C) and ODA ($d = 0.572$; Basset Hound vs. Labrador Retriever, Fig. 1B). To investigate the breed-specific prevalence of bites or bite attempts, as distinct from aggressive displays, we also calculated the percentage of dogs of each breed that scored at least one "4" ("snaps, bites or attempts to bite") among the questionnaire items pertaining to each subscale (Table 3). Breed average C-BARQ aggression scores were significantly positively correlated with the proportion of animals biting or attempting to bite in each breed (SDA: $r_s = 0.835$, $n = 11$, $P < 0.001$; ODA: $r_s = 0.639$, $n = 11$, $P < 0.05$; DDA: $r_s = 0.697$, $n = 11$, $P < 0.025$).

Significant positive correlations were found between subscale scores for aggression and fear directed toward both strangers ($r_s = 0.357$, $n = 1275$, $P < 0.0001$) and unfamiliar dogs

Table 2
Descriptive statistics of the online sample of dogs used in the study

Breed	*n*	Female (%)	Neutered (%)	Age in years (mean ± S.D.)
Airedale Terrier	66	51.5	75.8	4.39 ± 2.88
Akita	99	42.4	63.6	4.44 ± 2.98
Australian Cattle Dog	136	47.1	86.8	4.22 ± 3.35
Australian Shepherd	177	50.3	76.8	4.23 ± 2.95
Beagle	63	44.4	85.7	5.06 ± 3.65
Bernese Mountain Dog	67	46.3	76.1	3.87 ± 2.37
Bichon Frise	65	50.8	90.8	4.32 ± 3.14
Border Collie	163	49.7	79.1	4.41 ± 3.06
Boxer	70	47.1	82.9	4.13 ± 2.87
Brittany Spaniel	66	42.4	86.4	4.54 ± 3.34
Chihuahua	56	50.0	82.1	4.27 ± 3.28
Cocker Spaniel (American)	107	44.9	81.3	4.23 ± 3.30
Collie	132	48.5	51.5	4.72 ± 3.19
Dachshund	68	41.2	80.9	4.33 ± 3.55
Doberman Pinscher	144	59.0	56.9	4.51 ± 2.97
English Springer Spaniel	57	31.6	73.7	4.57 ± 3.64
German Shepherd	292	53.1	71.9	4.03 ± 3.10
Golden Retriever	181	48.6	81.2	4.56 ± 3.18
Great Dane	53	54.7	75.5	3.87 ± 2.92
Greyhound	62	54.8	100	5.48 ± 3.13
Havanese	73	49.3	63.0	3.05 ± 2.40
Jack Russell Terrier	78	39.7	76.9	5.33 ± 3.72
Labrador Retriever	349	50.4	79.9	4.31 ± 3.16
Mastiff (English)	126	31.7	52.4	2.27 ± 1.70
Pit Bull[a]	132	49.2	88.6	3.98 ± 3.20
Poodle[b]	169	42.6	75.7	4.71 ± 3.42
Portuguese Water Dog	75	61.3	68.0	4.41 ± 2.76
Rhodesian Ridgeback	69	46.4	52.2	4.56 ± 3.67
Rottweiler	210	47.1	55.2	3.74 ± 2.56
Shetland Sheepdog	57	50.9	82.5	5.42 ± 3.19
Siberian Husky	54	40.7	72.2	4.40 ± 3.33
Soft Coated Wheaten Terrier	216	48.1	78.2	5.12 ± 3.30
Whippet	59	49.2	71.2	4.93 ± 3.54
All breeds	3791	47.4	75.0	4.33 ± 3.15

[a] Includes American Pit Bull Terriers, American Staffordshire Terriers and Staffordshire Bull Terriers.
[b] Includes standard, miniature, and toy varieties.

($r_s = 0.311$, $n = 1356$, $P < 0.0001$), although breeds differed in their patterns of aggression relative to fear directed at strangers and dogs (Fig. 2A and B). Some breeds (e.g., Dachshund) showed high levels of both behaviors (Fig. 2A and B), some tended to be more aggressive than fearful, particularly in relation to unfamiliar dogs (e.g., West Highland White Terriers and Rottweilers, Fig. 2B), while none were markedly more fearful than aggressive.

3.2.2. *Online sample*

Significant differences were observed across the 33 breeds for subscale scores for each of the aggression subscales (Kruskal–Wallis $H = 383.21$, d.f. = 32, $P < 0.0001$; $H = 132.76$, d.f. = 32, $P < 0.0001$; $H = 306.93$, d.f. = 32, $P < 0.0001$; $H = 173.52$, d.f. = 32, $P < 0.0001$ for SDA,

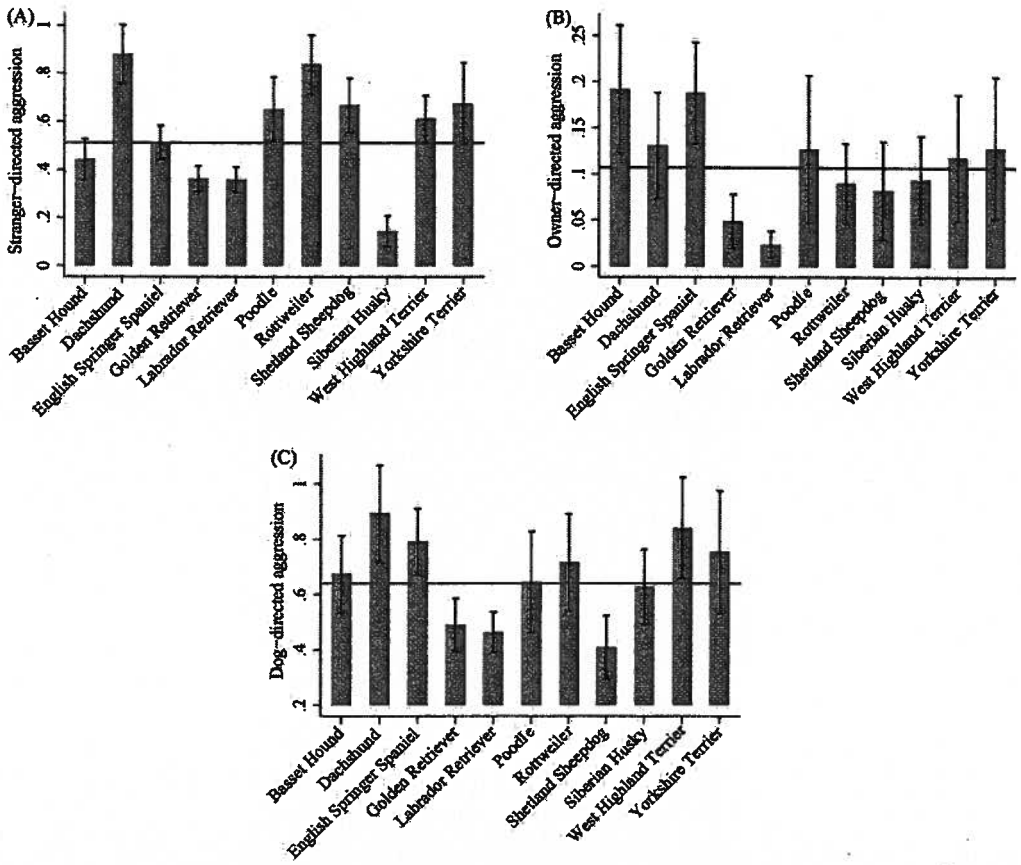

Fig. 1. Mean scores (±95% confidence intervals) for (A) stranger-, (B) owner- and (C) dog-directed aggression for each of the 11 dog breeds from the breed club survey. Horizontal bars indicate the population means.

ODA, DDA and DR, respectively; Fig. 3A–D). Large effect sizes between subscale scores for the least and most aggressive breeds were observed for SDA (Cohen's $d = 1.80$; Dachshund vs. Siberian Husky, Fig. 3A), DDA ($d = 1.16$; Akita vs. Greyhound, Fig. 3C) and DR ($d = 0.98$; Chihuahua vs. Brittany Spaniel, Fig. 3D); a medium effect size was found for ODA ($d = 0.60$; Dachshund vs. Rhodesian Ridgeback, Fig. 3B). The breed-specific prevalence of bites or bite attempts was examined as previously described (Table 4). As with the breed club sample, breed average C-BARQ aggression scores were significantly positively correlated with the tendency to bite (SDA: $r_s = 0.709$, $n = 33$, $P < 0.0001$; ODA: $r_s = 0.482$, $n = 33$, $P < 0.005$; DDA: $r_s = 0.921$, $n = 33$, $P < 0.0001$; DR: $r_s = 0.685$, $n = 33$, $P < 0.0001$).

Significant correlations were found between subscale scores for aggression and fear directed toward strangers ($r_s = 0.409$, $n = 3216$, $P < 0.0001$) and dogs ($r_s = 0.316$, $n = 3003$, $P < 0.0001$), and breeds differed in their patterns of aggression relative to fear directed at strangers and dogs (Fig. 4A and B). Again, some breeds (e.g., Dachshund and Chihuahua) displayed exceptionally high levels of aggression and fear (Fig. 4A and B), some were more aggressive than fearful, particularly with respect to other dogs (e.g., Akita, Jack Russell Terrier and Pit Pull, Fig. 4B) and only a minority was more fearful than aggressive (e.g., Greyhound and Shetland Sheepdog,

Table 3
Number of dogs of each breed from the breed club survey that received the maximum score of 4 for aggression (snaps, bites, or attempts to bite) for at least one question pertaining to each subscale

		"Snaps, bites, or attempts to bite"		
	n	Stranger aggr.	Owner aggr.	Dog aggr.
Basset Hound	151	1 (0.66)	4 (2.65)	3 (1.99)
Dachshund	120	8 (6.67)	1 (0.83)	5 (4.17)
English Springer Spaniel	247	3 (1.21)	6 (2.43)	11 (4.45)
Golden Retriever	179	0 (0)	0 (0)	1 (0.56)
Labrador Retriever	277	2 (0.72)	0 (0)	2 (0.72)
Poodle	69	3 (4.35)	0 (0)	0 (0)
Rottweiler	92	5 (5.43)	1 (1.09)	1 (1.09)
Shetland Sheepdog	112	3 (2.68)	1 (0.89)	1 (0.89)
Siberian Husky	92	0 (0)	0 (0)	1 (1.09)
West Highland WhiteTerrier	92	0 (0)	0 (0)	1 (1.09)
Yorkshire Terrier	90	7 (7.78)	1 (1.11)	5 (5.56)
Average	138	3 (2.68)	1 (0.82)	3 (1.96)

Within-breed percentage is given in parentheses.

Fig. 4A and B). A significant correlation was also found between subscale scores for ODA and DR ($r_s = 0.385$, $n = 2448$, $P < 0.0001$) that remained significant when controlling for SDA and DDA ($r_s = 0.326$, $n = 2446$, $P < 0.0001$).

3.2.3. Comparisons between samples

Limiting the analysis to the eight breeds common to both samples, small but significant differences were found between subscale scores for the breed club sample ($n = 1186$) and the online sample ($n = 1045$) for SDA (Cohen's $d = 0.05$; Mann–Whitney U test, $z = 4.86$, $P < 0.0001$), ODA ($d = 0.03$; $z = 2.85$, $P < 0.025$) and DDA ($d = 0.14$; $z = 2.35$, $P < 0.025$), with dogs from the breed club sample scoring somewhat higher for SDA and lower for the other

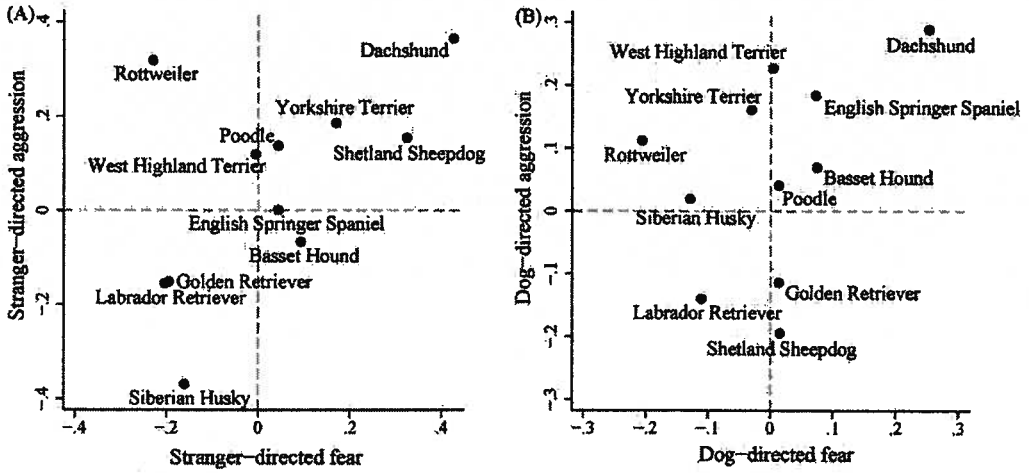

Fig. 2. (A) Stranger- and (B) dog-directed aggression plotted against stranger- and dog-directed fear for the 11 dog breeds from the breed club survey. Data points are breed averages relative to the mean scores for all breeds combined.

two forms of aggression compared to dogs from the online sample. Only the difference for SDA remained significant when the analysis was limited to intact dogs ($d = 0.21$; $z = 4.00$, $P < 0.0001$; online sample $n = 981$, breed club sample $n = 917$).

Significant correlations were observed between the two datasets when the breed averages for SDA and DDA were compared ($r_s = 0.723$, $n = 8$, $P < 0.05$; $r_s = 0.927$, $n = 8$, $P < 0.001$, respectively). The correlation for ODA approached but did not reach significance ($r_s = 0.592$, $n = 8$, $P = 0.123$) (Table 5).

3.3. Conformation vs. field stock

Among English Springer Spaniels in the breed club sample, conformation-bred dogs scored significantly worse for SDA (Mann–Whitney U test, $z = 3.820$, $P < 0.0001$), ODA ($z = 2.012$, $P < 0.05$) and DDA ($z = 1.839$, $P = 0.066$) compared with field-bred dogs (Fig. 5A). Labrador Retrievers showed the opposite pattern for ODA ($z = 2.18$, $P < 0.05$) with conformation-bred dogs scoring lower than field stock. The remaining two aggression subscales revealed no significant differences among Labrador Retrievers (Fig. 5B).

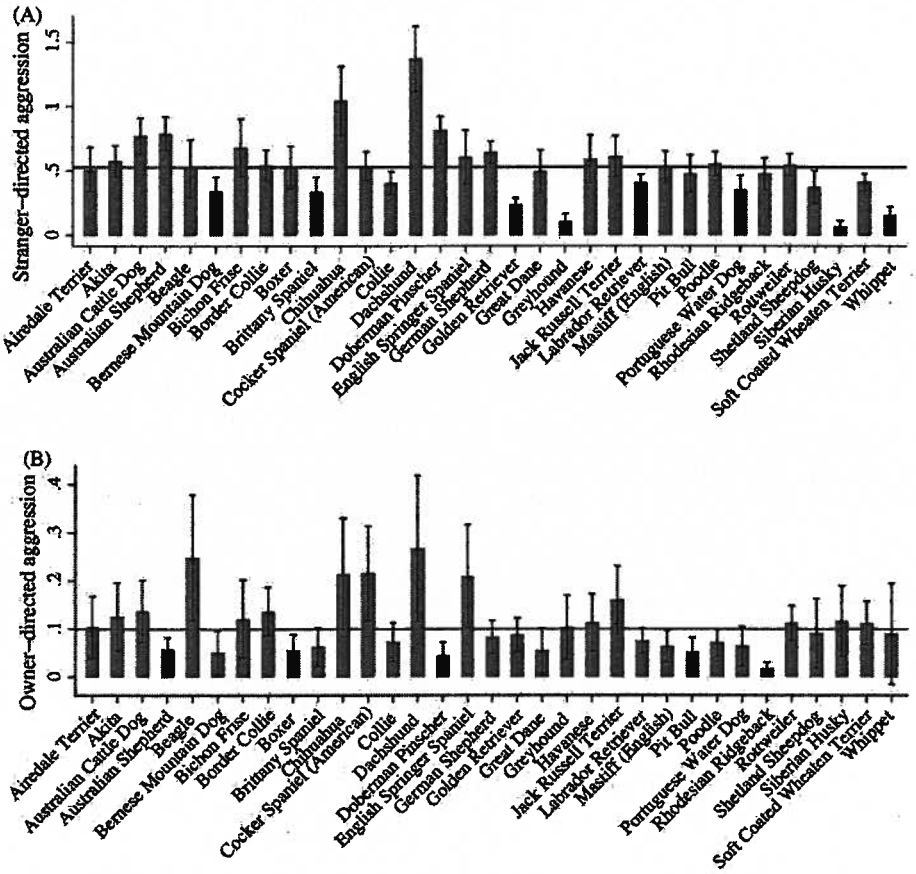

Fig. 3. Mean scores (±95% confidence intervals) for (A) stranger-, (B) owner- and (C) dog-directed aggression and (D) dog rivalry for each of the 33 breeds of dog from the online survey. Horizontal bars indicate the population means.

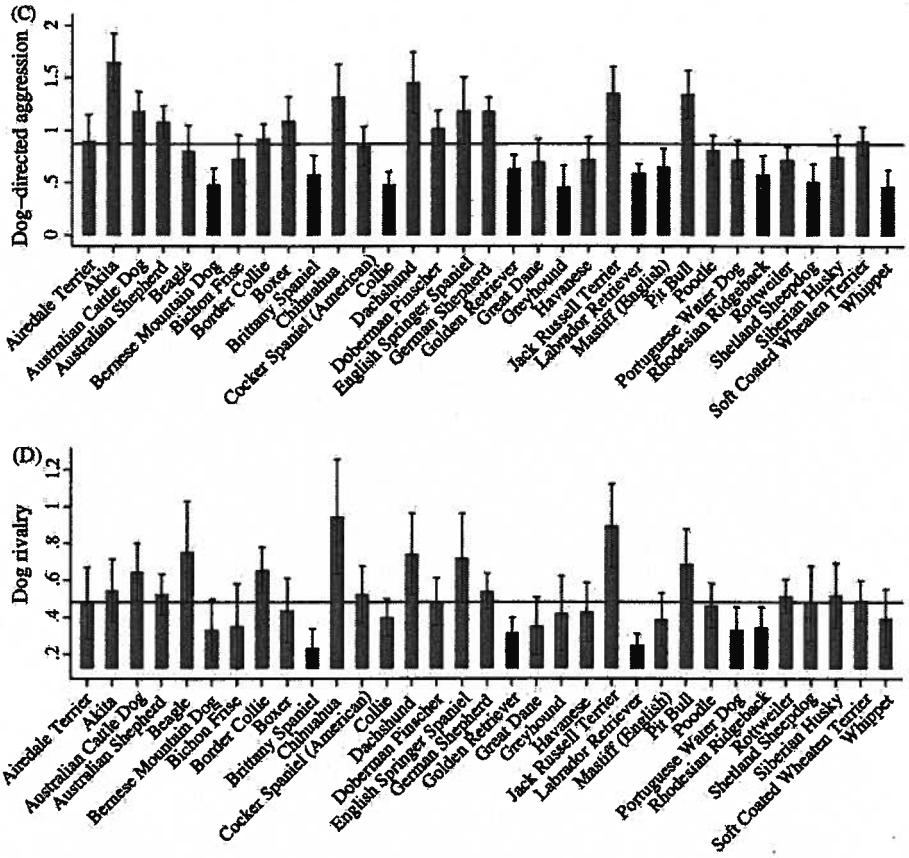

Fig. 3. (*Continued*).

4. Discussion

4.1. Breed differences in aggression

These findings demonstrate considerable variation among breeds in the prevalence and severity of aggression directed at different targets (strangers, owners, or other dogs). Although small differences were observed between the breed club and online samples, breeds were remarkably consistent relative to one another. To our knowledge, this is the first study to report replicated findings of breed differences in aggression using the same measure in two independent samples. Average subscale scores for each breed were significantly correlated with the proportion showing serious aggression (e.g., biting, snapping), indicating that the C-BARQ subscale scores provided a reasonably accurate reflection of the relative risks of biting. The findings also suggest that, for the purpose of obtaining information on the prevalence of behavior problems in the pet dog population, internet data collection methods provided results comparable to those obtained by more traditional paper-and-pencil surveys (Gosling et al., 2004).

The present findings should be interpreted with caution. The substantial within-breed variation in C-BARQ scores observed in this study suggests that it is inappropriate to make

Table 4
Number of dogs of each breed from the online sample that received the maximum score of 4 for aggression (snaps, bites, or attempts to bite) for at least one question pertaining to each subscale

		"Snaps, bites or attempts to bite"				
	n	Stranger aggr.	Owner aggr.	Dog aggr.	Dog rivalry	N (DR)[a]
Airedale Terrier	66	3 (4.5)	1 (1.5)	6 (9.1)	2 (3.6)	56
Akita	99	3 (3)	1 (1)	29 (29.3)	5 (7.1)	70
Australian Cattle Dog	136	13 (9.6)	2 (1.5)	28 (20.6)	5 (4.9)	103
Australian Shepherd	177	11 (6.2)	1 (0.6)	26 (14.7)	10 (6.5)	155
Beagle	63	5 (7.9)	5 (7.9)	6 (9.5)	4 (8)	50
Bernese Mountain Dog	67	1 (1.5)	2 (3)	3 (4.5)	1 (1.6)	61
Bichon Frise	65	3 (4.6)	1 (1.5)	3 (4.6)	2 (4.2)	48
Border Collie	163	13 (8)	3 (1.8)	22 (13.5)	7 (5.1)	137
Boxer	70	4 (5.7)	0 (0)	11 (15.7)	3 (5.3)	57
Brittany Spaniel	66	0 (0)	1 (1.5)	3 (4.5)	1 (2)	50
Chihuahua	56	9 (16.1)	3 (5.4)	10 (17.9)	2 (4.8)	42
Cocker Spaniel (American)	107	5 (4.7)	6 (5.6)	8 (7.5)	4 (5.2)	77
Collie	132	2 (1.5)	3 (2.3)	9 (6.8)	2 (1.6)	122
Dachshund	68	14 (20.6)	4 (5.9)	12 (17.6)	5 (8.8)	57
Doberman Pinscher	144	8 (5.6)	2 (1.4)	16 (11.1)	4 (3.4)	119
English Springer Spaniel	57	2 (3.5)	2 (3.5)	10 (17.5)	4 (9.5)	42
German Shepherd	292	13 (4.5)	6 (2.1)	48 (16.4)	13 (5.8)	225
Golden Retriever	181	2 (1.1)	1 (0.6)	13 (7.2)	3 (2)	150
Great Dane	53	3 (5.7)	1 (1.9)	5 (9.4)	2 (4.9)	41
Greyhound	62	1 (1.6)	0 (0)	1 (1.6)	0 (0)	45
Havanese	73	2 (2.7)	0 (0)	3 (4.1)	1 (1.8)	56
Jack Russell Terrier	78	6 (7.7)	3 (3.8)	17 (21.8)	7 (11.1)	63
Labrador Retriever	349	8 (2.3)	6 (1.7)	15 (4.3)	6 (2.2)	272
Mastiff (English)	126	3 (2.4)	1 (0.8)	8 (6.3)	5 (4.7)	106
Pit Bull	132	9 (6.8)	3 (2.3)	29 (22)	11 (11.5)	96
Poodle	169	2 (1.2)	0 (0)	13 (7.7)	2 (1.4)	139
Portuguese Water Dog	75	2 (2.7)	0 (0)	5 (6.7)	2 (3.3)	61
Rhodesian Ridgeback	69	1 (1.4)	0 (0)	4 (5.8)	1 (1.7)	59
Rottweiler	210	10 (4.8)	2 (1)	16 (7.6)	2 (1.1)	176
Shetland Sheepdog	57	2 (3.5)	2 (3.5)	2 (3.5)	2 (3.8)	52
Siberian Husky	54	0 (0)	1 (1.9)	3 (5.6)	1 (2.1)	48
Soft Coated Wheaten Terrier	216	9 (4.2)	4 (1.9)	35 (16.2)	9 (5.2)	172
Whippet	59	0 (0)	1 (1.7)	2 (3.4)	1 (1.9)	54
Average	115	5 (4.7)	2 (2)	13 (10.7)	4 (4.4)	93

Within-breed percentage is given in parentheses.
[a] Because "dog rivalry" is applicable only in households with more than one dog, the within-breed percentage is based on a smaller sample size "N (DR)" that eliminates cases in which all questions related to "dog rivalry" were left blank.

predictions about a given dog's propensity for aggressive behavior based solely on its breed. Furthermore, questionnaire reports inevitably involve a degree of subjectivity, and it is possible that respondents' answers were influenced by both popular breed stereotypes and/or perceptions of which answers would be deemed socially acceptable. The various C-BARQ items are designed to reduce systematic biases of this kind by focusing on the dog's recent responses to specific stimuli and situations. However, in practice, it is impossible to eliminate such biases entirely using survey methods (Nederhof, 1985). In addition, both the breed club and online samples will

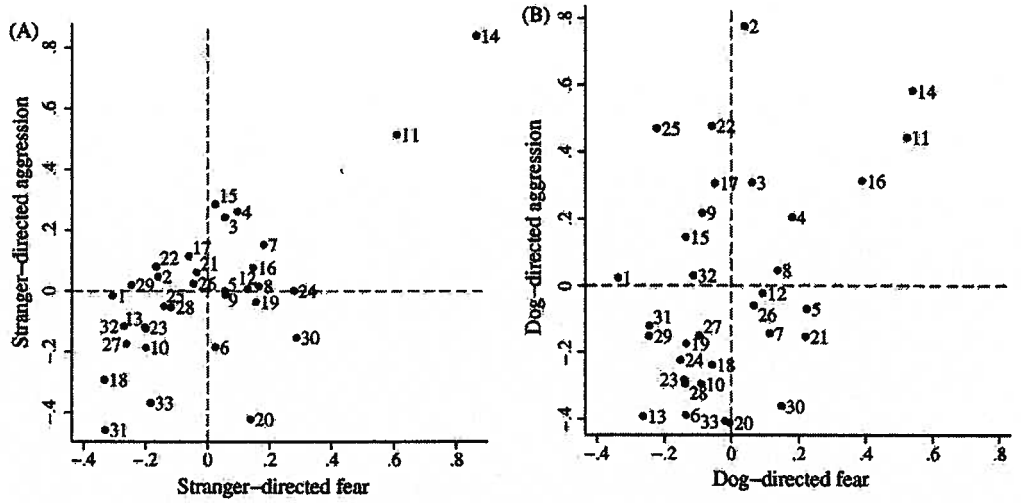

Fig. 4. (A) Stranger- and (B) dog-directed aggression plotted against stranger- and dog-directed fear for the 33 breeds from the online survey. Data points are breed averages relative to the mean scores for all breeds combined. ((1) Airedale Terrier, (2) Akita, (3) Australian Cattle Dog, (4) Australian Shepherd, (5) Beagle, (6) Bernese Mountain Dog, (7) Bichon Frise, (8) Border Collie, (9) Boxer, (10) Brittany Spaniel, (11) Chihuahua, (12) Cocker Spaniel (American), (13) Collie, (14) Dachshund, (15) Doberman Pinscher, (16) English Springer Spaniel, (17) German Shepherd, (18) Golden Retriever, (19) Great Dane, (20) Greyhound, (21) Havanese, (22) Jack Russell Terrier, (23) Labrador Retriever, (24) Mastiff (English), (25) Pit Bull, (26) Poodle, (27) Portuguese Water Dog, (28) Rhodesian Ridgeback, (29) Rottweiler, (30) Shetland Sheepdog, (31) Siberian Husky, (32) Soft Coated Wheaten Terrier, and (33) Whippet).

have been subject to self-selection biases that may have influenced the current findings. On the other hand, and in spite of these potential limitations, most of our findings were reasonably consistent with previous reports of breed differences in aggression (Borchelt, 1983; Hart and Hart, 1985; Wright and Nesselrote, 1987; Bradshaw and Goodwin, 1998; Svartberg, 2006; Takeuchi and Mori, 2006).

Although some breeds appeared to be aggressive in most contexts (e.g., Dachshunds, Chihuahuas and Jack Russell Terriers), others were more specific. Aggression in Akitas, Siberian Huskies, and Pit Bull Terriers, for instance, was primarily directed toward unfamiliar dogs. These findings suggest that aggression in dogs may be relatively target specific, and that independent

Table 5
Mean scores of aggression for dog breeds common to the breed club and online surveys

Breed	Stranger-directed		Owner-directed		Dog-directed	
	Online	Breed club	Online	Breed club	Online	Breed club
Dachshund	1.37 (1)	0.88 (1)	0.27 (1)	0.13 (2)	1.46 (1)	0.89 (1)
English Springer Spaniel	0.60 (2)	0.51 (5)	0.21 (2)	0.19 (1)	1.19 (2)	0.79 (2)
Golden Retriever	0.23 (7)	0.36 (7)	0.09 (6)	0.05 (7)	0.63 (6)	0.49 (6)
Labrador Retriever	0.41 (5)	0.36 (6)	0.07 (8)	0.02 (8)	0.59 (7)	0.46 (7)
Poodle	0.55 (3)	0.65 (4)	0.07 (7)	0.13 (3)	0.81 (3)	0.64 (4)
Rottweiler	0.55 (4)	0.84 (2)	0.11 (4)	0.09 (5)	0.72 (5)	0.72 (3)
Shetland Sheepdog	0.37 (6)	0.67 (3)	0.09 (5)	0.08 (6)	0.51 (8)	0.41 (8)
Siberian Husky	0.07 (8)	0.14 (8)	0.12 (3)	0.09 (4)	0.75 (4)	0.63 (5)

Rankings are in parentheses.

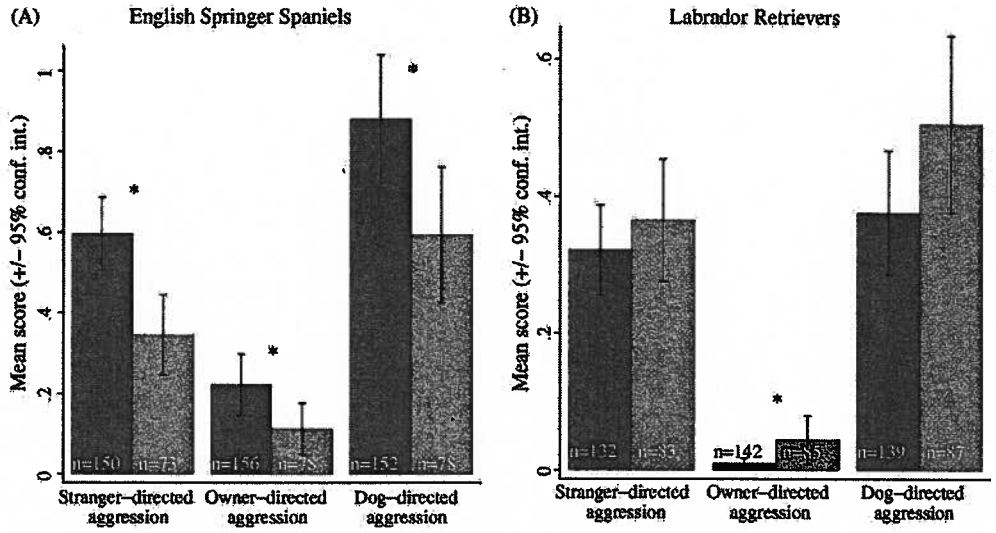

Fig. 5. Mean scores (±95% confidence intervals) of stranger-, owner- and dog-directed aggression of (A) English Springer Spaniels and (B) Labrador Retrievers comparing dogs bred for conformation (dark gray) vs. field stock (light gray). $^{*}P < 0.05$.

mechanisms may mediate the expression of different forms of aggression. Recent heritability analyses of aggression in a population of Dutch Golden Retrievers found a weak correlation between estimated breeding values for C-BARQ ratings of stranger- and dog-directed aggression, suggesting that these traits are partially related but genetically distinct (Liinamo et al., 2007).

4.1.1. Stranger-directed aggression (SDA)

There are few published reports describing breed variation in the degree of aggression directed toward strangers that do not rely on bite statistics. The most extensive and often cited report is a USA-based survey of veterinarians and obedience judges in which respondents were asked to rank several popular breeds based on various behavioral traits (Hart and Hart, 1988; see also Bradshaw and Goodwin, 1998; Takeuchi and Mori, 2006; Notari and Goodwin, 2007). The respondents' rankings for each behavior were then transformed into deciles, each containing five or six breeds, with higher deciles indicating more aggressive behavior. Two behavioral traits, 'watchdog barking' (barking to alert owners to an intruder) and 'territorial defense' (attacking an intruder) would be most relevant to our factor of stranger-directed aggression. Several of the breeds in our study found to be rated highest for stranger-directed aggression (Dachshunds, Chihuahuas, Doberman Pinschers, Rottweilers, Yorkshire Terriers and Poodles) scored in the eighth decile or higher for 'watchdog barking' and/or 'territorial defense' in Hart and Hart (1988) survey.

Breeds scoring low (below the median) for SDA in our study include Basset Hounds, Golden Retrievers, Labrador Retrievers, Siberian Huskies, Bernese Mountain Dogs, Brittany Spaniels, Whippets and Greyhounds. Four of these breeds (Basset Hounds, Golden Retrievers, Brittany Spaniels, and Labrador Retrievers) were ranked at or below the fourth decile for both 'watchdog behavior' and 'territorial defense' in Hart and Hart (1988) survey. Siberian Huskies ranked in the second decile for 'watchdog behavior' but in the sixth decile

for 'territorial defense' while English Springer Spaniels showed the opposite pattern (Hart and Hart, 1988). Bernese Mountain Dogs, Greyhounds and Whippets were not included in the Hart and Hart (1988) study.

The relatively average C-BARQ scores for stranger-directed aggression found among Pit Bull Terriers (Fig. 3A) were inconsistent with their universal reputation as a 'dangerous breed' and their reported involvement in dog bite-related fatalities (Sacks et al., 1996). In our survey, nearly 7% of Pit Bull owners indicated that their dogs had bitten or attempted to bite an unfamiliar person in the recent past, somewhat higher than the overall average (4.7%), while 22% reported bites directed at other dogs. This pattern is consistent with the view that this breed has been selectively bred for aggression toward other dogs rather than humans (Lockwood, 1995). It should be emphasized, however, that while the prevalence of human-directed bites or bite attempts among Pit Bull Terriers may be only slightly above average, the severity of their attacks is probably affected by other traits (e.g., the size and strength of the breed, its reputed failure to give warning signs, and its reported tenacity when attacking) that may also have been selected for in the development of this "fighting" breed. In contrast, although more than 20% of Dachshund owners in our study reported bites or attempts to bite against humans, the relatively small size of this and other highly aggressive breeds (e.g., Chihuahuas) substantially reduces the risks of serious injury.

4.1.2. Owner-directed aggression (ODA)

In general, scores for ODA were very low and most owners reported no signs of aggression towards themselves or other members of the household in any context. More than half of cases involving severe aggression (bites or attempts to bite) were associated with a household member taking food or other valued objects away from the dog. The low prevalence of ODA in all breeds makes sense from an evolutionary perspective, since this type of aggression, in contrast to that directed at strangers and other dogs, has probably never been encouraged by human owners, and is likely to have been actively selected against.

Breeds that stood out as being rated relatively high (above the median) for aggression toward household members in our study included the Basset Hound, Beagle, Chihuahua, American Cocker Spaniel, Dachshund, English Springer Spaniel and Jack Russell Terrier (Figs. 1B and 3B); all breeds in the small to medium size range. Presumably, aggression among larger more powerful breeds would be more difficult to tolerate or manage. The higher levels of ODA among English Springer Spaniels in both samples concur with recent published reports of problems with dominance-type aggression in this breed (Borchelt, 1983; Reisner et al., 1994; Guy et al., 2001a; Reisner et al., 2005). In their survey of clients sampled from a general veterinary caseload in Canada, Guy et al. (2001a) reported that English Springer Spaniels were the breed most often cited to have bitten members of the household (26.8% of owners reported biting). In general, percentages of dogs reported as having bitten household members by Guy et al. (2001a) were substantially greater than those reported here (average rate of all breeds combined 13.2% vs. $\leq$2%, respectively), a discrepancy that may be partly attributable to the present study's focus on aggression only in the recent past.

Aggression directed towards people living in the household is often interpreted as a result of conflicts related to social dominance (for review, see Lindsay, 2001, pp. 229–272). In support of this, we found a highly significant correlation between owner-directed aggression and rivalry among dogs living in the same home. This correlation was independent of aggression toward unfamiliar people or dogs, suggesting that some canine aggression is specific to those individuals with whom the dog is familiar and is consistent with the view that aggression towards owners is

sometimes related to social dominance, especially with respect to food or object possession/ resource guarding.

4.1.3. Dog-directed aggression (DDA)

In general, we found higher levels of aggression directed toward unfamiliar dogs compared to unfamiliar people (parts A and C in Figs. 1 and 3); however, this pattern was highly breed-specific. Dachshunds, for example, showed similar levels of aggression to both dogs and humans (parts A and C in Figs. 1 and 3) while Akitas, Jack Russell Terriers and Pit Bull Terriers showed substantially greater aggression toward dogs (Fig. 3A and C).

Our study found significant differences across breeds in displays of aggression toward unfamiliar dogs and several breeds stood out as being particularly aggressive: Akita, Boxer, Australian Cattle Dog, German Shepherd, Pit Bull, Chihuahua, Dachshund, English Springer Spaniel, Jack Russell Terrier and West Highland White Terrier (Figs. 1C and 3C). Six of these breeds (Akita, Boxer, Chihuahua, Dachshund, German Shepherd, and West Highland White Terrier) were ranked at the sixth decile or higher for 'aggression toward other dogs' in Hart and Hart (1988) report. English Springer Spaniels ranked in the second decile, and Australian Cattle Dogs, Pit Bull Terriers and Jack Russell Terriers were not included in the Hart and Hart (1988) survey.

A detailed analysis of a German population of dogs revealed that, among other breeds, Pit Bull Terriers, German Shepherds, Great Danes and Rottweilers were often the aggressors in inter-dog conflicts, while Boxers, Cocker Spaniels (presumably English), Dachshunds, Doberman Pinschers, Poodles, Yorkshire Terriers and West Highland White Terriers were more often the victims (Roll and Unshelm, 1997). In our study, most of the breeds that Roll and Unshelm (1997) cited as being aggressors tended to score higher for aggression than fear relative to the population average (Figs. 2B and 4B).

4.2. Aggression and fear

The present findings point to an interesting balance of aggressive and fearful motivations underlying the expression of aggressive behavior in the various breeds. While aggression is often associated with fear in animals (Wingfield et al., 2006, pp. 179–182), this relationship appears to be stronger in some dog breeds than others. For example, Rottweilers were below average for fear of strangers but above average for stranger-directed aggression (Fig. 2A). Doberman Pinschers, Jack Russell Terriers, West Highland White Terriers, Australian Cattle Dogs and German Shepherds were also more aggressive than fearful towards strangers (Fig. 4A). In contrast, Dachshunds, Chihuahuas and Yorkshire Terriers were well above average for both aggression and fear (Figs. 2A and 4A), while Shetland Sheepdogs and Greyhounds tend to be more fearful than aggressive (Figs. 2A and 4A). These results make intuitive sense given that the more aggressive than fearful breeds in our study have historically held working roles that require some degree of assertiveness (protection, herding and hunting) (American Kennel Club, 1992). By expressing this balance between defensive (fear-mediated) and offensive aggression to widely different degrees, dog breeds may represent a useful model for studying the underlying causation of aggressive behavior.

4.3. Conformation vs. field stock

Our results indicate that owner-directed aggression is more pronounced in conformation-bred English Springer Spaniels compared to field stock dogs, replicating findings in the literature

(Reisner et al., 2005). In contrast, field-bred Labrador Retrievers obtained significantly higher ODA scores than conformation-bred dogs. The fact that these two breeds showed opposite patterns confirms Reisner et al.'s (2005) finding that the higher aggression in show-bred English Springer Spaniels is attributable to a popular sire effect rather than breeding for show per se. A Swedish study of 31 different breeds found that, in general, breeding for show was associated with lower levels of aggression, curiosity and playfulness, and with higher levels of fearfulness (Svartberg, 2006). In contrast, selection for use in field trials was correlated with higher levels of playfulness and aggression (Svartberg, 2006). Taken together, these findings suggest that canine aggression has some genetic basis, and that aggressiveness may be selected for either intentionally or inadvertently by different breeding practices.

While the results of the present study demonstrate striking and consistent variation in aggression among dog breeds, they shed little light on the underlying sources of this variation in behavior. Demographic and environmental risk factors for the development of canine aggression need to be investigated across a variety of breeds so that both generalized and breed-specific influences can be identified. More empirical data regarding the effects of hormones and neuter status among the various breeds are also needed. Genetic and environmental factors are likely to interact to mediate the expression of aggressive behavior during development. Genetic markers associated with aggressiveness in particular contexts are likely to be identified in the near future due to the recent sequencing of the dog genome (Lindblad-Toh et al., 2005). Using valid and reliable measures of canine behavioral phenotypes, such as the C-BARQ, behavioral genetic studies will further our understanding of how aggressive traits are inherited and mediated by experiential and environmental factors.

5. Conclusions

We found large and consistent differences among dog breeds in the prevalence and severity of aggression directed at different targets (familiar and unfamiliar humans and dogs), and the degree to which aggression was associated with fear. Reported levels of aggression in some cases are concerning, with rates of bites or bite attempts "in the recent past" rising as high as 20% toward strangers and 30% toward unfamiliar dogs in some breeds. In general, the highest rates of human-directed aggression were found in smaller breeds whose aggression is presumably easier to tolerate. Differences between lines of distinct breeding stock indicate that the propensity toward aggressive behavior is at least partially rooted in genetics, although substantial within-breed variation suggests that other factors (developmental, environmental) play a major part in determining whether aggressive behavior is expressed in the phenotype. The study also demonstrates the value of the internet for collecting population-level behavioral data on dogs. In the future, the use of standardized measures of canine behavioral phenotypes, such as the C-BARQ, by owners and breeders may help to illuminate the causes and reduce the prevalence of aggression in pet dogs.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.applanim.2008.04.006.

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Demographic and aggressive characteristics of dogs in a general veterinary caseload

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Abstract

A retrospective cross-sectional survey of dog-owning veterinary clients was undertaken in 1996 in the three Canadian provinces of New Brunswick, Nova Scotia, and Prince Edward Island, to generate a population of dogs for future use in a more detailed survey on canine behaviour. The questionnaire was designed to detect which dogs had or had not bitten a person living in the same household, and included both demographic and behaviour questions. Twenty veterinary clinics were enlisted to administer the questionnaire to their clientele. Data was collected on 3226 dogs, a response rate of 81.4%. Dogs were predominantly purebred (60.1%) and neutered (71.6%). The Labrador Retriever was the most commonly reported of 110 breeds. There were slightly more female than male dogs, and significantly more female dogs were neutered ($P < 0.001$). Questions elicited information about three forms of aggression: growling, possessive aggression, and biting. The reported frequencies of aggression problems were significantly associated with age, gender, neuter status, and breed. Biting behaviour was reported for 15.6% of all dogs. The highest frequency of biting was reported for dogs less than 1 year of age. Relative to intact female dogs of at least 1 year of age, the odds ratio for having bitten a member of the household was highest for neutered male dogs (OR: 3.23; 95% CI: 1.83–5.71), followed by neutered female dogs (OR: 2.13; 95% CI: 1.21–3.75). Similar trends were seen for growling and possessive aggression. Our results indicate that excellent response rates can be achieved in behavioural research by utilising general veterinary practices and their clientele, that canine aggression in a household setting is a frequent

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problem, and that the relationship between neutering and behaviour warrants further investigation.

Keywords: Dog; Aggression; Dog bites; Sex; Neutering; Breed

1. Introduction

Biting behaviour by dogs has received considerable attention in the media and has been an ongoing area of concern in veterinary and human medicine (Parrish et al., 1959; Blackshaw, 1991; Wright, 1991; Sosin et al., 1992; Sacks et al., 1996; Hunthausen, 1997). Veterinary behaviourists report that aggression is the leading reason for referral, and the most common form of aggression by dogs in their caseload is due to the diagnostic category of "dominance" (Voith, 1981; Wright and Nesselrote, 1987; Landsberg, 1991). By definition, this type of aggression is directed toward persons known to the dog, especially members of the immediate household. Fear, inadequate socialisation, pain, and learning can also result in aggression towards people, as can territorial and maternal behaviour (Borchelt, 1983; Landsberg, 1991). It is not uncommon for owners to be injured by their own dog while playing with it or when trying to interrupt a dog fight (CHIRPP, 1996).

With an estimated population of 45–50 million dogs in the US (Patronek and Rowan, 1995) there are approximately 400,000 reported dog bites to people annually in that country. That is equivalent to slightly less than one reported dog bite per 100 dogs each year, a figure which is widely held to be a significant underestimation of the problem (Beck and Jones, 1985; Elliot et al., 1985; CHIRPP, 1996; Sacks et al., 1996). The report of a dog bite to police, animal control, or public health officials is usually associated with the victim requiring attention in a hospital emergency room, which is not the most common scenario (Beck and Jones, 1985). Many bite injuries either receive no medical attention, or are treated by the family physician and are therefore not included in hospital statistics (CHIRPP, 1996). Dog owners are known to be the most frequent victims of their own dog (Kizer, 1979; Wright, 1990), yet owners are unlikely to formally report a personal injury by their dog to any authority. It is also difficult to determine which breeds or types of dogs may be most responsible for bites to people due to the lack of detailed information about the size and composition of the general dog population. Not all dogs are licensed or registered (Wright, 1990). Unless biting by a particular breed is measured with regard to its representation in the population, no comment can be made about the relative likelihood of that breed to bite in comparison with any other.

Published reports of behaviour cases seen in a referral setting can be expected to reflect a selected caseload (Fletcher et al., 1988, p. 59). Individuals who seek out specialised services when they have a problem with their dog may not be representative of most owners or most dogs (Beaver, 1994). In addition, many behaviour articles are in case report or case series format (without controls), or reflect survey data which has been collected from voluntary participants. No conclusions can be drawn about the cause of a problem without a control group (Dohoo and Waltner-Toews, 1985); and voluntary surveys are of limited value as they may preferentially attract owners who have already experienced a behaviour

problem with their pet, are in less of a hurry to leave the clinic, or have some personal need to share information (Dillman, 1978, p. 53).

This survey was designed as the first phase of a larger project to identify characteristics, risk factors, and predictors of aggressive behaviour by dogs toward people living in the same household. To accomplish these objectives, a study population of owned dogs was developed which was not limited to licensed dogs, registered dogs, or dogs with a history of aggression.

2. Materials and methods

2.1. Subjects

Twenty veterinary clinics were recruited to participate in the survey. These clinics were selected on a convenience basis such that they were distributed among the Canadian provinces of New Brunswick, Nova Scotia, and Prince Edward Island. In early 1996, a veterinarian who was either an owner or a partner in each practice was contacted by phone or mail to introduce the project and to request their participation. All of the first 20 veterinarians contacted agreed to participate. On a provincial basis, there were nine clinics enrolled from both New Brunswick and Nova Scotia, and two were enrolled from Prince Edward Island. This constituted approximately 15% of the clinics in these provinces in 1996 according to lists provided by the provincial veterinary associations. Practice types were 75% exclusively small animal, and 25% mixed.

Each veterinarian was asked to estimate the number of canine patients their practice would see in a 1-month period in the late spring or summer of 1996. Each clinic was provided with a number of questionnaires equal to 90% of their projected estimate. From the outset, clinics were made aware that the questionnaire was to be offered to all clientele arriving at their practice with a dog, with the following exceptions: (1) people bringing in litters of puppies for vaccination; (2) people bringing in dogs for euthanasia; (3) people who were obviously upset or crying. The process, in other words, was to be as non-voluntary for the dog owners as possible while still allowing the clinic staff to show compassion in difficult situations. Since the questionnaire was to be offered by the reception staff in each clinic, and not usually the veterinarian, provision was made for surveys that could not be offered or completed due to the reception area being too busy. One form was to be set aside with the "completed" pile for every dog owner arriving at the clinic, regardless of whether the form had been filled out. If any owners refused to participate in the survey, this uncompleted form was also placed in the "completed" box. This would permit an estimation of the number of individuals who were unavoidably missed by the process. Staff were reminded to be sensitive to the fact that some of their clients might be functionally illiterate, and that if someone was hesitant or gave an excuse such as they had "forgotten their glasses", then it was permissible to read the questions aloud and complete the form for the client. It was our belief that these guidelines would minimise any important bias in the composition of survey respondents. No restrictions were placed on the number of questionnaires completed by a client if they owned more than one dog, and had presented more than one dog to the practice during the study. Only one

questionnaire was completed per dog, regardless of the number of times the dog visited the practice during the course of the study.

2.2. Questionnaire design

The questionnaire was a single page format, and each form was coded with a unique number. The top quarter of the page displayed the official logo of the Atlantic Veterinary College, and a brief paragraph describing both the purpose of the project and encouraging the owner's participation. This paragraph deliberately did not mention aggression as the area of research, but only made a general statement about our interest in the relationship between dogs and people. Respondents were also advised that all personal information would be kept confidential.

The second part of the questionnaire, made up of six questions, was dedicated to the collection of the name and phone number of the owner, the dog's name, and general information on the dog such as its age, sex, neuter status, breed, and weight. The final question in this section asked how long the owner had owned the dog.

The third section contained six closed end questions on the behaviour of the dog, with "yes" or "no" as the only possible response choices. Although we were specifically interested in aggressive behaviour by the dog, three questions on housetraining, command training, and the owner's perception of the dog as a member of the family were included to make the questionnaire read as a more general assessment of behaviour. The remaining three questions in this section were intended to detect a range of aggressive behaviours by the dogs toward people living in the same household. The questions were presented as follows. (1) Has your dog ever growled at any member of your household, even if you thought he/she was just playing (yes or no)? (2) Does your dog ever growl or snap at anyone when they try to take away food, toys, or other objects (yes or no)? (3) Has your dog ever bitten any member of your household, even if you think it may have happened by accident while playing (yes or no)? Specific situations where the dog might have shown aggression were purposely described in the questions to jog the respondents' memories, and to minimise any bias secondary to the respondents having different criteria for aggression than our own.

The final section of the questionnaire asked for written permission to review the dog's medical records if we required more complete information, and was followed by a line for both the signature of the owner and the date. Twenty copies of the draft questionnaire were pre-tested at one of the participating clinics. To determine the ability of the questionnaire to collect accurate information, respondents in the pre-test were re-interviewed either in person or by telephone within the same week. Minor adjustments in design and wording were made following the pre-test to produce the format described above.

2.3. Survey implementation

A total of 5095 questionnaires were prepared for distribution to the 20 clinics. The number provided to each clinic varied from a low of 54 to a high of 700, in direct proportion to their estimated monthly canine caseload. Questionnaire distribution began in April 1996, and all questionnaires were returned by July 1996. Each clinic was visited by the

principal investigator to provide the necessary materials, and to speak directly to as many members of the reception staff as possible about the purpose of the project and its implementation. Each clinic was provided with a professionally mounted sign to help introduce the project to hospital clientele. Weekly follow-up calls were made to assess the speed of questionnaire distribution and to determine whether clinics were encountering any difficulties. Receptionists reported no particular difficulties in administering the survey, and that the response of the public was generally quite positive. Many confessed that they did not have time to offer the questionnaire when the reception area was busy, but they were reassured that this was not a problem as long as one form was put aside for each dog seen by the practice.

2.4. Data management

All questionnaires were coded and entered into Quattro Pro 6.0 (Corel Corporation Limited, Ottawa, Ont., Canada) by one individual. Whenever a dog's breed was missing, it was coded as of "mixed or unspecified breed". Purebred dogs were classified into 110 different breeds, including additional categories for "Poodles of unspecified size or type" and for "Huskies". All Cocker Spaniels (American and English) were classified as one group, as were all Springer Spaniels (English and Welsh), as few owners made these distinctions when recording breed. Based on Canadian Kennel Club registration statistics for the years 1992–1994 (1995), it can be estimated that approximately 90% of the Cocker Spaniels were "American" and 98% of Springer Spaniels were "English". Where the different size types of breeds such as "miniature" or "standard" were not given by the owner, the dogs were classified according to weight, if given, and the breed standard. This situation occurred infrequently, and only applied to animals of the Poodle, Schnauzer, and Dachshund breeds.

Statistical analysis was accomplished with Intercooled STATA 5.0 software (Stata Corporation, College Station, TX, USA). The association between gender and neuter status was tested using contingency table Chi-square analysis (Glantz, 1992, pp. 110–154). In order to identify potential risk factors for biting behaviour, two comparison groups were selected from the population. The members of the first group were dogs of at least 1 year of age which were reported to have bitten a member of the household. The second group was composed of non-aggressive dogs of at least 1 year of age for which the owner had recorded a negative response to all three questions on aggression (growling, possessive, and biting behaviour). Potential risk factors for specific behaviours were measured by odds ratios with 95% confidence intervals. Multiple logistic regression techniques were used to determine the relationship between various aspects of behaviour and reproductive status. As intact female dogs had the lowest reported levels of all forms of aggression, they were selected as the baseline population for comparison.

3. Results

3.1. Questionnaire completion rates

A total of 3962 questionnaires were utilised in this survey, of which 3226 (81.4%) were completed. Completion rates for the 20 clinics ranged from a low of 64.0% to a high of

94.0%, with a mean of 83.1%. The largest and busiest practice also had the lowest completion rate, but no consistent relationship between clinic size and completion rate was found.

3.2. Demographic characteristics of the dog population

The responses to each survey question are summarised in Table 1. Fig. 1 illustrates the age distribution of dogs presented to the clinics, demonstrating that 18.5% (561) of the dogs were less than 1 year of age. The group of dogs over 10 years of age comprised 11.2% (340) of the population. The age distributions of male and female dogs were remarkably similar (Fig. 2). Significantly more female dogs were neutered (78.3%) than male dogs (64.1%) ($P < 0.001$). Fig. 3 illustrates the percentage of neutered and intact dogs in each year class.

Including "mixed" as a breed classification, only 17 categories contained at least 35 dogs, although there were a total of 110 breeds reported (Table 2). The largest grouping was for dogs of mixed or unspecified breed (39.9%, 1287). Labrador Retrievers (6.2%, 200), Golden Retrievers (5.7%, 183), German Shepherds (5.2%, 166), and Shetland Sheepdogs

Table 1
Summary of the responses to questionnaires completed by the owners of 3226 canine patients presented to 20 veterinary practices in maritime Canada in May–July 1996[a]

Variable	Response (%)	Results (*n*)
Sex	96.8	Female: 51.8% (1618)
Breed[b]	100	Purebred: 60.1% (1939)
Neutered	92.7	Neutered: 71.6% (2147)
Weight	66.0	Median: 21.3 kg (2108); range: 0.23–90.8 kg
Age	93.8	Median: 4 years (3027); range: 1.2 months to 18 years
Duration of ownership	99.2	<1 month: 3.8% (123); 1–11 months: 18.9% (605); ≥1 year: 77.3% (2473)
Is your dog completely housetrained?	99.9	Yes: 87.8% (2831)
Have you trained your dog to do any tricks such as "sit"?	99.6	Yes: 87.3% (2804)
Has your dog ever growled at any member of your household, even if you thought he/she was just playing?	99.6	Yes: 41.0% (1317)
Does your dog ever growl or snap at anyone when they try to take away food, toys, or other objects?	99.7	Yes: 20.6% (663)
Has your dog ever bitten any member of your household, even if you think it may have happened by accident while playing?	99.8	Yes: 15.6% (503)
Do you consider your dog to be a member of your family?	99.9	Yes: 99.3% (3202)

[a] Maritime Canada is composed of the provinces of New Brunswick, Nova Scotia, and Prince Edward Island.
[b] Any non-responses to the question on breed were classified as being of "mixed or unspecified breed".

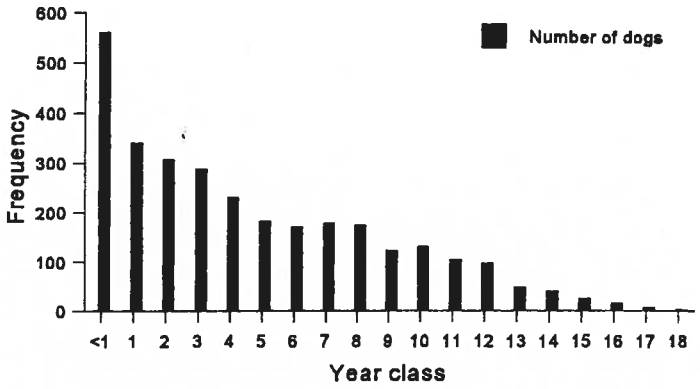

Fig. 1. The age distribution of dogs in a survey of canine patients seen by 20 veterinary practices in maritime Canada ($n = 3027$).

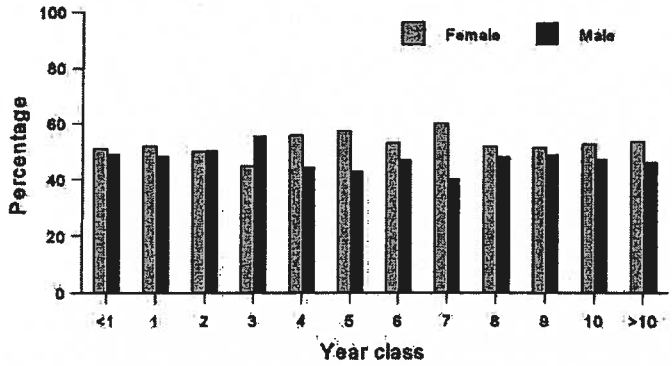

Fig. 2. The percentage of male and female dogs in each year class of the population. Each bar pair totals to 100% ($n = 3124$).

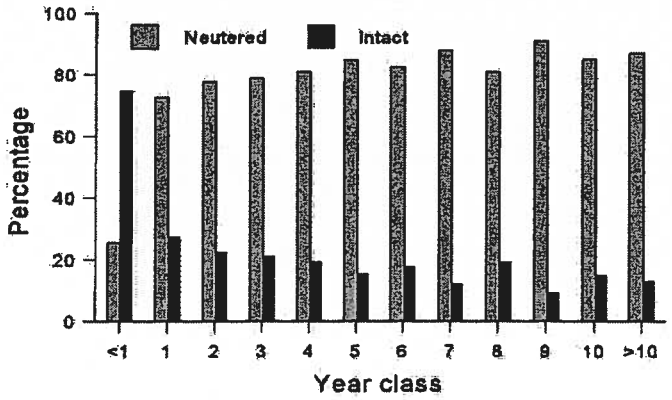

Fig. 3. The percentage of neutered and intact dogs in each year class of the population. Each bar pair totals to 100% ($n = 2999$).

Table 2
Characteristics of dog breeds for which 35 or more individuals were reported

Breed	*n*	Female (%)	Neutered (%)	Owned for ≥1 year (%)	Bitten[a] (%)	
					≥1 year of age	<1 year of age (*n*)[b]
Mixed or unspecified breed	1287	53.0	86.4	75.7	14.6	25.7 (237)
Labrador Retriever	200	54.1	82.1	71.0	9.3	36.7 (49)
Golden Retriever	183	47.2	79.6	78.7	7.9	25.8 (31)
German Shepherd	166	48.4	64.9	72.1	9.7	31.3 (32)
Shetland Sheepdog	142	46.4	78.0	84.5	6.3	15.4 (13)
Cocker Spaniel	76	51.4	85.5	84.2	7.5	33.3 (9)
Springer Spaniel[c]	65	60.9	78.6	81.5	26.8	55.6 (9)
Toy Poodle	57	63.2	83.0	86.8	10.0	0 (6)
Rottweiler	55	52.8	63.9	60.0	16.7	15.8 (19)
Shih Tzu	54	40.7	90.0	74.1	22.0	15.4 (13)
Beagle	50	43.8	53.7	80.0	4.7	28.6 (7)
Miniature Poodle	43	58.1	87.5	97.6	9.5	0 (1)
Lhasa Apso	41	45.0	78.8	80.0	33.3	0 (1)
Yorkshire Terrier	38	48.6	85.3	94.6	13.5	0 (1)
Siberian Husky	36	61.8	76.2	55.6	9.1	7.1 (14)
Doberman Pinscher	35	54.3	83.3	68.6	15.4	11.1 (9)
Miniature Schnauzer	35	31.4	77.4	88.2	6.3	0 (3)
Total (all purebred dogs)	1939	51.0	77.3	78.3	13.2	23.8 (323)
Total (all dogs in study)	3226	52.8	80.8	77.3	13.7	24.6 (560)

[a] Percentage of dogs within each age group (≥1 year or <1 year) and within each breed which were reported to have bitten a member of the household.
[b] *n* equals the number of dogs in each breed group which are less than 1 year of age.
[c] Breed most frequently reported to have bitten when all age groups are combined.

(4.4%, 142) were the most popular breeds recorded, and were at least twice as popular as any other breed. Of the 17 most popular breeds listed by owners, the Miniature Poodle had the highest percentage of dogs owned for more than 1 year at 97.6%, and the Siberian Husky had the lowest percentage at 55.6%.

3.3. Household aggression

The results indicated that as the potential seriousness of the aggression increased (from growling to snapping to biting), the reported frequency of the behaviour decreased (Table 1). In other words, more dogs growl than bite, although 180 owners responded positively to all three questions on aggression. The highest reported frequency of biting (24.6%) occurred in dogs less than 1 year of age (Fig. 4).

There were no significant associations between reproductive status and aggression in dogs less than 1 year of age. The association between gender, neuter status, and reports of growling or possessive aggression (growling or snapping over resources) in dogs ≥1 year of age is shown in Table 3. Intact males, neutered females, and neutered males were tested against the lowest level of aggression which was reported in the intact female dogs. In dogs

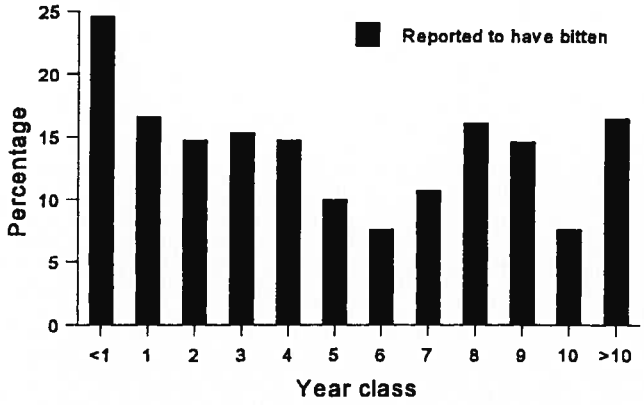

Fig. 4. The percentage of dogs in each year class which were reported to have bitten a member of the household. There were 138 reports of biting in dogs less than 1 year of age, and 80 reports of biting in dogs greater than 10 years of age ($n = 3226$).

Table 3
A comparison of the odds ratios (OR) and 95% confidence intervals (95% CI) for a reported history of growling or possessive aggression in dogs of at least 1 year of age[a]

Reproductive status	Growling ($n = 2359$)		Possessive ($n = 2362$)	
	OR	95% CI	OR	95% CI
Intact male	2.05	1.38–3.03	0.98	0.62–1.55
Neutered female	2.15	1.53–3.02	1.17	0.80–1.71
Neutered male	2.49	1.76–3.51	1.41	0.96–2.07

[a] Results are based on a comparison with intact female dogs.

of at least 1 year of age, gender and reproductive status were significantly associated with aggression. In a comparison with intact female dogs, the odds ratios for a report of growling behaviour were significantly increased for intact male dogs and neutered dogs of both sexes.

Comparing biting dogs to the group of dogs which had no reported aggression revealed a similar positive association with neutering (Table 4). Overall, the odds ratio for a

Table 4
Odds ratios (OR) and 95% confidence intervals (95% CI) for dogs with a history of biting a household member as compared to dogs with no history of growling, possessive aggression, or biting directed toward a household member ($n = 1523$)[a]

Reproductive status	Biting	
	OR	95% CI
Intact male	2.04	1.07–3.88
Neutered female	2.13	1.21–3.75
Neutered male	3.23	1.83–5.71

[a] Calculations are based on dogs of at least 1 year of age in a comparison with intact female dogs.

neutered dog having bitten relative to an intact dog was 1.57 (95% CI: 1.12–2.19). The odds ratio for biting by a neutered male dog relative to an intact male dog was 1.59 (95% CI: 1.06–2.38), and for a neutered female dog relative to an intact female dog was 2.04 (95% CI: 1.07–3.88). Intact male dogs were twice as likely to have bitten as intact female dogs. Biting was reported at a similar level for intact male and neutered female dogs. Neutered male dogs were the most likely to be reported as having bitten, with the odds of a report of bite in a neutered male dog being more than three times higher than that for an intact female dog. The inclusion of age in this analysis does not alter the significance or trend of the results. The effect of body weight may be significant, although one-third of owners failed to report this information. When weight is included in the model, increasing body size is associated with a reduced odds of biting (OR: 0.98; 95% CI: 0.97–0.99), while the risk associated with gender and neutering remain essentially unchanged.

4. Discussion

4.1. Owner compliance and considerations for bias

The population of dogs compiled by this survey is a subset of the real population of dogs in this region. It represents those dogs belonging to owners with at least some desire to use veterinary services and having access to those services. Of concern in this research is the possibility that aggressive dogs might not be presented to the veterinarian as frequently as non-aggressive dogs, or may be lost from the general veterinary caseload through relinquishment to shelters, abandonment, or euthanasia. The mature dogs in our study undoubtedly represent a somewhat "cleaned-up" population of animals for a variety of reasons. Even so, the number of people reporting that their dog had bitten was substantial at 15.6%, and we believe that our results have produced a reasonable estimation of the composition of the general veterinary caseload, if not the general dog population.

4.2. Demographic characteristics of the study population

The relatively large number of dogs less than 1 year of age encountered in our survey reflects the higher visitation rate to the veterinarian for dogs in this age group. Routine vaccination and neutering protocols predispose young dogs to more frequent presentation to veterinarians. Many dogs are also relinquished to humane societies in the first 1 or 2 years of ownership (Miller et al., 1996; Patronek et al., 1996), so that some dogs seen by the clinics as puppies may not return to the practice in subsequent years.

Our results are very close to the model by Patronek and Glickman (1994), which estimates that 79% of all pet female dogs in the US are spayed. There is likely to be a great deal of regional variation in these statistics. For example, Wright and Nesselrote (1987) found that only 30% of all canine patients were neutered in the caseload of three referring practices in Georgia.

Mixed breed dogs or those of unspecified breeding made up 39.9% of the population. Patronek and Rowan (1995) have estimated that the proportion of mixed breed dogs is 45% of all dogs in homes in the US, although they admit that there is disagreement over what should be classified as a purebred dog. Previous work has indicated that the purchase price of a dog (which is typically higher for a dog of specific breeding) is positively correlated with its retention by the owner, which may in turn be associated with the use of veterinary services (Patronek et al., 1996). In other words, our results may demonstrate an under-representation of mixed breed dogs in the veterinary caseload in comparison with their proportion in the general dog population. In addition, some mixed breed dogs may have been mis-classified as purebred because the owner believed their dog looked like a certain breed, and no attempt was made to ascertain whether a reported "purebred" dog was actually registered. It is worth noting, however, that the four most frequently reported breeds in this survey are also the same four most frequently registered with the Canadian Kennel Club (1995).

4.3. Associations between neutering, gender, and aggression

The results indicate that a clinically important association between neutering and aggression may exist in certain populations of dogs. Because the study design was cross-sectional, and because we did not inquire about the owners' reasons for neutering, it is impossible to determine at this point whether the association we have detected between neutering and aggression is causal.

There is little research into the effect of neutering in pet dogs that do not have a pre-existing behavioural problem. Neilson et al. (1997) examined 57 mature male dogs having at least one of several targeted problems and recorded behaviour changes after castration as reported by the owner. The authors determined that although there was a significant reduction in aggression toward family members, the effect was limited to approximately one-third of dogs who had presented with this problem. From both practical and ethical perspectives, it is virtually impossible to blind an owner to the castration of their dog, and the authors admit that it may be difficult to distinguish the placebo effect from the biological effects of castration. O'Farrell and Peachey (1990) published the results of a prospective study of behavioural changes in 300 female dogs, half of which were spayed. Their conclusion was that spaying has no behavioural benefit in female dogs other than the prevention of oestrus, and that in young female dogs already showing some signs of dominance aggression, spaying appeared to be associated with an increase in aggressive behaviour. Wright and Nesselrote (1987) also detected an association between spaying and aggression in their caseload. Neutered female dogs were presented for aggression at a disproportionately high rate (86%) relative to their frequency in the local referring population (37%). In a cross-sectional study of English Cocker Spaniels, Podberscek and Serpell (1996) detected a significant positive association between neutering and aggression, although the association largely disappeared when dogs neutered specifically because they had been aggressive were removed from the analysis. Even taking the reasons for neutering into account, however, the authors determined that neutered female English Cocker Spaniels were significantly more likely to display aggression toward children in the household when compared to intact female cocker spaniels. In a

laboratory setting, Salmeri et al. (1991) examined the skeletal, physical, and behavioural effects of gonadectomy in immature dogs. They found that neutered dogs scored as significantly more active and excitable than their intact litter mates during the 15 months of observation. There was no measurable effect of gonadectomy in relation to aggression toward the handlers, but the impact of increased excitability in the development of aggressive behaviour when a dog is raised in a household rather than a laboratory setting is unknown. These results, in combination with our own, suggest that the relationship between neutering and non-reproductive behaviour are deserving of a more thorough examination.

4.4. Associations between aggression and breed

The manner in which data was collected for this survey allows us to make certain statements about the propensity of different breeds of dogs to be reported as aggressive towards family members. By surveying owners of all dogs presented to veterinarians, not just those with behaviour problems, we have defined the basic structure of the population with regard to breed. Without more information, however, we cannot say *why* certain breeds are reported to be more aggressive than others.

Whether or not a dog was purebred did not significantly affect the reported frequency of biting although there were definite differences between recognised breeds. Results for Labrador and Golden Retrievers support their reputation as relatively non-aggressive adult dogs. The German Shepherd, which is often identified by the public as a dangerous breed, had a reported bite frequency which was essentially equivalent to that of the Golden Retriever. It is possible that German Shepherds have attained their reputation by being involved in more cases of extra-household aggression (Gershman et al., 1994; Reick, 1997). Although we are unable to comment on the severity of the bite incidents, our survey indicated that owners of Springer Spaniels in maritime Canada are reporting the highest frequency of biting behaviour by their dogs, both as puppies and in adulthood. Springer Spaniels have previously been reported by both Landsberg (1991) and Reisner et al. (1994) as having relatively frequent problems with aggression towards their owners when compared to other breeds.

5. Conclusions

The results have demonstrated that it is possible to administer a multi-centric survey on the subject of dog behaviour and achieve an excellent level of compliance from both veterinary clinic staff and their clients. Owners were apparently willing to reveal the presence of undesirable behaviours in their dogs, given the frequency with which aggression was reported by the respondents. Relative to intact female dogs, neutered male dogs of at least 1 year of age were at the highest risk for having previously shown biting behaviour, followed by neutered female dogs, and intact males. In North America, elective neutering of young dogs is commonly recommended for reasons related to health, behaviour, and population control, but our results indicate that the behavioural outcomes of these surgical procedures are worthy of further investigation.

Acknowledgements

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APPLIED ANIMAL BEHAVIOUR SCIENCE

Behavioural testing for aggression in the domestic dog

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Abstract

Aggressive behaviour in dogs is an increasing problem in The Netherlands. In an attempt to find a solution to this problem the Dutch Ministry of Agriculture, Conservation and Fisheries has financially supported a study aimed at developing an aggression test for dogs. The primary goal is to use the test as an instrument for excluding very aggressive individuals of certain breeds from breeding. On the basis of two pilot studies a test has been developed with 43 sub-tests in which a variety of stimuli are presented relating to contexts that are known to elicit aggression in dogs. In the final test, 112 dogs, 75 of which were potentially aggressive breeds (PAB) and a group of 37 "control dogs", were tested. Questionnaires were used to collect information about the aggressive history of the dog. The results show clear differences in the aggression-eliciting properties of the sub-tests. Dogs with and without biting history differ significantly in their biting/attack behaviour during the test (Mann–Whitney U-test, $P = 0.02$). This difference is also found for only the PAB-dogs (MWU-test, $P = 0.007$). For reliability of analysis, 37 dogs were re-tested. The comparison between test and re-test shows a significant correlation for total attack (SPCC = 0.78) and biting/attack (SPCC = 0.68). So that the test can be implemented in practice, two "Models for Unacceptable Aggression (MUAs)" are discussed. To validate the results of the test and the application of the MUAs the results are compared with the biting history of the dogs. The results of an MUA based exclusively on the biting/attack behaviour shows a significant relation with the biting history for all dogs and for the PAB-dogs. On the basis of these results we consider the test to be a useful instrument for the assessment of aggressive tendencies in dogs, provided the test is performed by trained researchers or trained judges and test assistants. © 1997 Elsevier Science B.V.

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1. Introduction

Unfortunately biting incidents with dogs are a problem in various countries, not only in The Netherlands (Hanna and Selby, 1981; Morton, 1973; Beck et al., 1975; Sacks et al., 1989). In The Netherlands in recent years, aggression in dogs has become a considerable problem. Results of a study by Mulder (1991) indicate that annually 50 000 people have to be treated in hospital for bite wounds caused by dogs.

A number of very severe incidents caused primarily by Pit Bull Terriers prompted the Ministry of Agriculture, Conservation and Fisheries to set up an Advisory Committee concerning Aggression in Dogs. The committee made several recommendations, one of which was to develop a behavioural test for aggression in dogs. We were asked to develop and validate such a test. The primary goal of the test at the moment is to select highly aggressive individuals in three "potentially aggressive breeds" indicated by the Ministry: the fila Brasileiro, the dogo Argentino and the American Staffordshire Terrier. To prevent dogs of these breeds from being used as substitutes for pit bulls, breeding has to be controlled. Measures are being prepared which will prevent the breeding of dogs that have failed an aggression test. Selection in the breeding program is a means of decreasing aggressive behaviour.

Aggressive behaviour is part of the normal behaviour of dogs. However, the level of aggression in individuals may be so high that it is unacceptable to the direct environment or to society in general. As in all types of behaviour, both genetic and environmental factors play a role. Important for the goal of this study is the fact that aggression has a genetic component. Selection for guard and police dog functions has resulted in breeds with a lower threshold for aggressive behaviour (Beaver, 1981). Other authors report that biting incidents are more frequent in certain breeds (e.g. van Gorp et al., 1990). Males are more often involved in biting incidents than are females (e.g. Beck et al., 1975; Borchelt, 1983; Wright, 1991). Clearly there is a genetic basis for aggressive behaviours with an originally biological function. In this connection, authors mention various classes of aggression (e.g., Borchelt, 1983; Houpt, 1983; Polsky, 1984).

The contexts in which aggressive behaviour is observed are the basis for the development of sub-tests for aggression. The literature provides some information about behavioural testing of aggression in dogs (Seiferle and Leonhardt, 1984). The information on tests available in the literature, experiences with tests used by dog clubs and our own research (van der Borg et al., 1991 and unpublished internal reports, 1989, 1990, 1992) were used to develop sub-tests. Additional sub-tests were developed, with a variety of stimuli, presented in contexts in which aggressive problem behaviour is likely to occur (van der Wijk and Klasen, 1981; Wright, 1985; Winkler, 1977; Moss and Wright, 1987; Sacks et al., 1989; van Gorp et al., 1990; Podberscek and Blackshaw, 1990). Non-threatening sub-tests were added so that the test would be more acceptable to the owner.

The purpose of our study is to develop a behavioural test that has been scientifically validated and that can be used in dog clubs by laypersons as an instrument for instituting selective breeding. The test should not only be applicable to the breeds indicated by the Ministry, it should also have more general applicability so that it can be used to test levels of aggressiveness in dogs that are a danger to society.

In this paper we describe the set of sub-tests we finally used. Furthermore we investigate the reliability and the validity of the test as a whole.

2. Materials and methods

Over 80 sub-tests were designed in two pilot studies. In these two pilot studies 171 dogs were tested with two different test configurations. On the basis of the results we made a final selection of sub-tests and some new sub-tests were developed. The final test is described in this paper.

2.1. Subjects

All dogs ($n = 112$: 59 males and 53 females) in the final test were owned by private persons. Among the dogs were 75 dogs belonging to the three potentially aggressive breeds (PAB: 18 fila Brasileiros; 26 dogo Argentinos; 31 American Staffordshire Terriers). Of these dogs, 60% had bitten before they participated in the test (referred to hereafter as dogs with "biting history"). 37 dogs (78% with biting history) of different breeds and some mongrels were used as "controls" (CG). Some of these dogs (23 "aggressive controls") belonged to breeds that had some aggressive characteristics in the breed properties (e.g. Rottweiler, Dobermann Pinscher). A second control group of 9 dogs consisted of "non-aggressive breeds" (e.g. Labrador Retriever, Golden Retriever, German Pointer). A group of 37 dogs was re-tested to establish the reliability of the test.

Before the test we made use of an extensive questionnaire to gather information about dog and owner (details will be reported elsewhere) and in particular about the aggressive history of the dog.

2.2. The test areas

The studies were performed in the facilities for dog research at Utrecht University. The sub-tests in the final test were done mainly indoors (Fig. 1). From the pilot studies, we concluded that it was easier to control the stimulus situation and build up a certain tension during a test when it was done indoors.

Dogs could move around freely in area a during some of the sub-tests. Test persons were never allowed in that area when the dogs were moving freely. During most sub-tests the dogs were constrained in area b or c (see Fig. 1). The leash(es) could be attached to a very strong hook on the wall in the middle of area b or area c. An extra rope was added to secure very heavy and strong dogs. On the floor of both areas, a line was painted for security reasons. The test-person was given direct information about how close he or she could safely come to the dog. Next to area b, there were two chairs for the owner, the one closer to the dog being slightly more than an arm's length from the dog so that the owner could not pet the dog. The second chair, placed at an extra arm's length from the dog, was used for safety reasons when the owner was interacting with a stimulus dog. The owner was asked to bring along the basket/bed in which the dog normally lay/slept. This was placed in the centre of area b against the wall. This

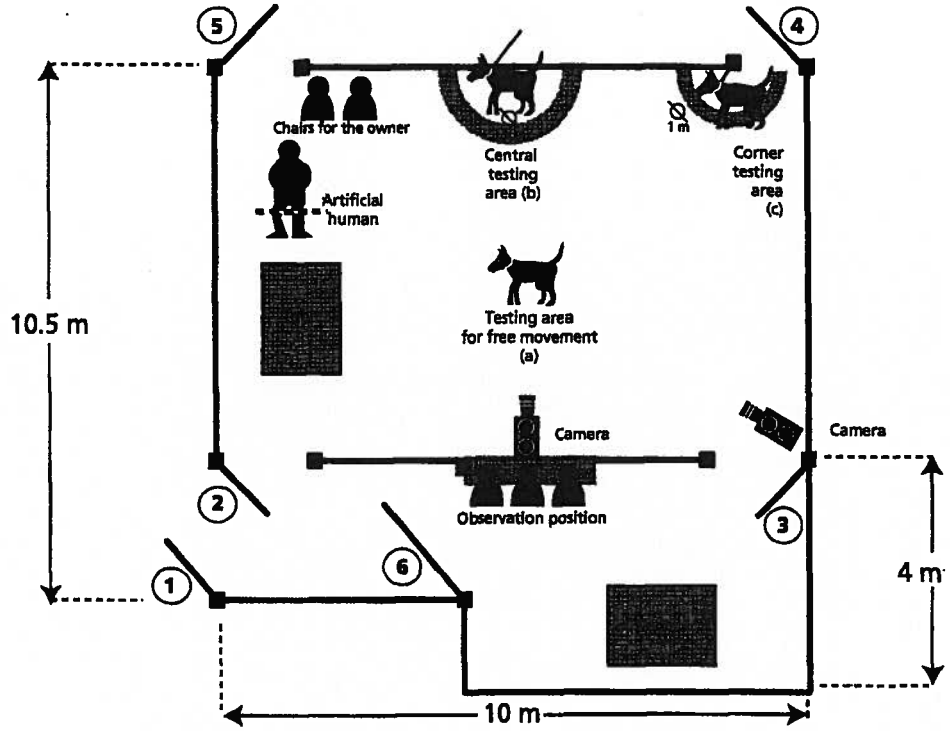

Fig. 1. Schematic view of the test-room: 1–5 are doors; see text for further explanation.

gave the dog a chance to retreat and could perhaps play a role in territorial defence. A few sub-tests were done out of doors for practical reasons. The outdoor testing facilities were adjacent to the test-room. Dogs were given a leather collar and a leather leash before testing: big dogs got two of both for security reasons.

The sub-tests simulated situations in which aggression may occur. Some non-threatening sub-tests were performed in the first part of the test in order to "acclimatise" the owner and the dog.

2.3. Description of the sub-tests

References between brackets in the description of the sub-tests refer to the literature in which the sub-test or a variation of the sub-test or the aggressive context involved is mentioned. The codes indicating the positions of the dog in the test-room refer to Fig. 1.

2.3.1. Sub-tests 1–6;

1) Two test-persons approach the dog-owner's car containing the dog and one of these persons stares at the dog; one of the test-persons knocks on the car window and rattles the door (van der Borg et al., 1991).

2) The owner walks the dog up and down on the leash outdoors, for a distance of 20 m.

3) The owner gives the command "sit"; the owner keeps the dog in a sitting position for 20 s, if necessary with the assistance of means such as the leash (O'Farrell, 1986; Voith, 1982).

4) The owner gives the command "down"; the owner keeps the dog in this position for 20 s, if necessary with the assistance of means such as the leash (O'Farrell, 1986; Voith, 1982).

5) Confrontation with three free-running barking stimulus (not dominant) bitches behind a fence (length 20 m); the owner walks with the dog on the leash once along the fence and back again at a distance of 1 m from the fence.

6) Confrontation of the dog (in the absence of the owner) with a barking dominant male stimulus dog behind a fence in the absence of the owner; the test dog is 1 m from the fence tied with a 1.5 m leash to a grapple in the ground.

After this sub-test the dog is transferred to the adjacent test room (Fig. 1, using doors 1 and 2), where all the other sub-tests are carried out. Door 6 can be closed to conceal observers and test-persons. Test-persons enter the test room using doors 2 and 3 and stimulus dogs enter by door 2.

2.3.2. Sub-tests 7–9: dog moves freely in area a; performed in presence of owner

7) The owner gives the command "come".

8) The owner plays with his/her dog for 1 min using a familiar toy.

9) The owner plays tug-of-war with his/her dog for 1 min using an unfamiliar toy (specially chosen for its suitability for use in a game of tug-of-war) (O'Farrell, 1986; van der Wijk and Klasen, 1981).

2.3.3. Sub-tests 10–19: dog in area b; performed in presence of owner

For sub-tests 10–12 and 16–19 the owner is sitting in the chair next to the dog (Fig. 1).

10) A test-person shines a small electric torch into the eyes of the dog and looks into its eyes (dog in area b; the owner holds the dog's head): this is a test to check whether the dog has been given sedatives.

11) A test-person plays tug-of-war with the dog using the same toy as in test 9 (Beck et al., 1975; van der Wijk and Klasen, 1981).

12) A test-person pets the dog using an artificial hand; the artificial hand is a very natural-looking model of a hand that is made of a strong/tough type of plastic material; the artificial hand can be operated by a stick attached to the artificial hand; the stick is covered with a sleeve to hide the hand of the test-person operating the artificial hand (O'Farrell, 1986; Mugford and Gupta, 1984; van der Wijk and Klasen, 1981).

13) The owner stares at the dog.

14) The owner holds the dog's muzzle with two hands.

15) The owner pushes the dog over on its back and tries to hold it in this position with one hand or two hands placed on the dog's breast.

16) The owner squeezes the skin on one of the dog's groins rather tightly.

17) Using the artificial hand, a test-person pulls away the dog's feeding bowl filled with the dog's favourite food type or a commercial brand of dry dog food (van der Borg et al., 1991).
18) Using the artificial hand, the owner pulls away the dog's feeding bowl filled with commercial brand of dry dog food.
19) A test-person walks towards the owner and shakes hands vigorously with him/her and speaks loudly in a mildly threatening way (Beck et al., 1975).

2.3.4. Sub-tests 20–28: dog in area b; performed in the absence of the owner.

20) A test-person uses a rattle at the edge of area b in front of the dog.
21) A test-person suddenly opens an umbrella with an automatic opening device at the edge of area b in front of the dog.
22) A test-person drags in a big (diameter 0.50 m) plastic bag filled with foam chips which makes a peculiar noise as it is dragged along the edge of area b in front of the dog.
23) A test-person dressed as a strange-looking woman, walking with a stick, approaches the dog, tries to pet the dog using the artificial hand and speaks in a strange high piercing voice (Winkler, 1977).
24) A life-sized doll (little girl) 65 cm tall, standing on a board mounted on small wheels, is pulled at walking speed towards the dog by a test-person who is out of the dog's sight (Blackshaw, 1988; Wright, 1985; van der Borg et al., 1991).
25) A test-person holds the doll and tries to touch the dog with the doll's hand (if the dog does not retreat).
26) A test-person stares at the dog (Mugford and Gupta, 1984; Winkler, 1977).
27) A test-person claps his/her hands loudly in front of the dog.
28) A test-person threatens the dog by yelling and shouting and making hitting and kicking movements in the direction of the dog just out of reach of the dog (Wright, 1985).

2.3.5. Sub-tests 29–43: performed in the presence of the owner.

29) A model of a human male (1.90 m; normally dressed, wearing a hat; the model can rotate at knee level) lying on its back in stretched position is pulled up to a standing position the moment the owner with the dog on the leash comes through the door (Fig. 1, dog and owner leave the test room by door 4 and enter by door 5) directly in front of the model.

For sub-tests 30–34 the dog is in area c, with the owner standing next to the dog and holding the leash:

30) Three persons approach the dog slowly step by step and surround the dog; the owner is standing next to the dog.
31) In the same situation as in sub-test 30, three persons approach and surround the dog very rapidly.
32) The dog is threatened by a test-person with a broom; the test-person yells and screams banging the broom on the floor in front of the dog just inside area c; if the dog bites the broom the test continues.
33) A test-person threatens the owner by yelling and shouting at him/her and that

test-person pushes the owner with the artificial hand (Beck et al., 1975; Seiferle and Leonhardt, 1984).

34) Dog and owner are cornered by two persons with three barking dogs on the leash; one of the dogs is a dominant male, two dogs are submissive males; the dogs are stimulated to bark; the stimulus dogs are allowed to come within 0.50 m of area c.

For sub-tests 35–43, the dog is in area b with the owner sitting in the chair next to the dog; in sub-tests 36 and 40, to prevent accidents, the owner is in the chair that is further away.

35) A test-person with an unknown dominant male dog on the leash approaches the dog, stopping at a distance of 0.50 m from the edge of area b (Goddard and Beilharz, 1985).

36) A test-person walks with the dominant male dog towards the owner and the owner is asked to pet the stimulus dog and not to pay any attention to his/her dog (Goddard and Beilharz, 1985).

37) The dog is given his feeding bowl by his owner in area b at a distance of 0.50 m from the dominant male dog (Goddard and Beilharz, 1985).

38) The owner gives his dog's feeding bowl to the dominant male dog at a distance of 0.50m from the edge of area b (Goddard and Beilharz, 1985).

Sub-tests 39–42: these sub-tests are the same as tests 35–38, but they are performed with an unknown moderately dominant female stimulus dog; if the test dog is a male dog sub-tests 39–42 are performed before sub-tests 35–38.

43) The owner puts the dog in a lying position in his own basket/bed in area b; a test-person approaches the dog in area b and pets the dog using the artificial hand.

2.4. Test procedures

Most sub-tests lasted 20 s, but could be extended by 10 s if a further increase in aggression-intensity was likely to occur. The duration of the tug-of-war sub-tests (8, 9, 11 and 12) was 1 min. The pauses between the sub-tests lasted as long as it took to prepare the next sub-test. Sub-tests with humans as stimuli were performed by three different persons. No more than two subsequent sub-tests were performed by the same test-person. For the sub-tests with dogs as stimuli four male and four female dogs were used.

When dogs, especially fearful ones, simply cannot cope with the test, the testing should be terminated by the supervisor of the testing. Of course the owner too can terminate the test at any time. This should be made clear to the owner at the beginning of the test.

2.5. Scoring method

Because the plan was that dog clubs would use the test in the near future, a scaling system was developed to score the most important aspects of the aggressive behaviour in a simple way. A 5-point Gutmann-scale (DeVellis, 1991) was used for this purpose. The following levels were distinguished.

1. No aggression observed.
2. Growling and/ or barking.

3. Baring the teeth, with or without growling and/or barking.
4. Snapping (bite movement from a distance), with or without growling and/or barking and/or showing the teeth; with uncompleted approach (stopping at some distance from stimulus) or without any approach.
5. Biting and or attacking with bite intention (approaching at high speed and coming as close as possible to the victim with bite attempts; actual biting may be impossible because of the sub-test safety design), with or without growling and/or barking and/or showing the teeth.

With this method only the highest level of aggression observed during the sub-test was scored. If for example a dog first growled and thereafter attacked, the dog was scored at level 5. In displays of aggression at levels 2–5 additional aspects of agonistic behaviour such as body posture or pilo-erection may be visible. This information is scored separately. In this paper, we present mainly the data of the scaling system. Protocols were made on paper to test whether the scoring system was suitable for practical use. Video recordings were made by the use of a close-up camera and an overview camera. Protocols were checked later on by video analysis.

2.6. Statistics

Statistical tests were two-tailed unless stated otherwise. Results for the Mann Whitney U-test are indicated as MWU. The validations are analysed by means of Kruskal–Wallis one-way analysis of variance by ranks (one tailed, indicated as KW–MC (multiple comparison between treatments, comparison versus control; Siegel and Castellan, Jr., 1988, pp. 213–214). Results for the chi-squared analysis (with continuity correction when appropriate) are indicated as Chi. Spearman rank-order correlation coefficient results are indicated as SPCC.

3. Results

3.1. The detection of aggression

In reaction to the tests, 67% of the dogs demonstrate at least one act of biting/attack behaviour (level 5). In 12.5% of the dogs, snapping (level 4) is the highest aggression level observed. In 6.3%, the highest intensity is "baring the teeth" (level 3) and for 11.6%, grunting/barking (level 2). Only 3 dogs (2.7%) show no aggression at all.

The sub-tests differ clearly in their aggression-eliciting properties. Fig. 2 shows the results for snapping (level 4) and biting/attack behaviour (level 5).

A few of the sub-tests (e.g., sub-tests 2–4 and 7) were performed mainly for "acclimatization" purposes, as stated earlier. Nevertheless in some dogs, threatening behaviour was observed in these sub-tests. Only in sub-test 7, was no aggression at all observed. The results in Fig. 2 indicate that most sub-tests were capable of eliciting attack behaviour (levels 4 + 5). On the basis of the results of the pilot studies the sub-tests were presented approximately in the order of their expected aggression-elicit-

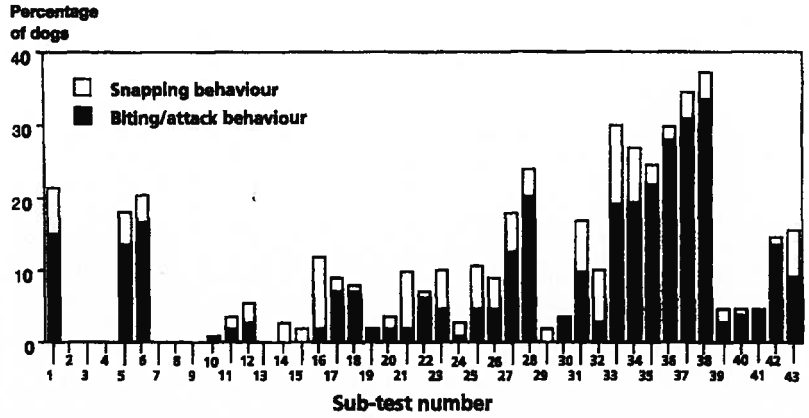

Fig. 2. The biting/attack behaviour (black bars) and the snapping behaviour (white bars) observed in the 43 sub-tests. The numbers refer to the sub-tests described in the text.

ing properties. For practical reasons, several rather strongly aggression-eliciting sub-tests (1, 5 and 6) were done early in the sub-test sequence.

It should be noted that sub-tests 39–42 involve a confrontation with an unknown female dog. The results of these sub-tests are presented in Fig. 2 after the sub-tests involving the unknown male stimulus dog. In reality, if the tested dog was male, these sub-tests (39–42) were performed before the sub-tests with the unknown male dog. The order in which the two groups of sub-tests were conducted (35–38 and 39–42) depended on the gender of the tested dog. This explains the lower level of aggressive behaviour in these sub-tests. Sub-test 1 shows a high level of aggression. This sub-test was performed first, because it ought to be done by people totally unknown to the dog.

3.2. Validation of the test

One way in which the test is validated is by comparing the aggressive behaviour observed in the test with the biting behaviour mentioned by the owners in the questionnaire ("biting history"). The most important goal of the test is to detect the tendency to perform the ultimate aggressive behaviour, biting. Therefore this behaviour was used to categorise the dogs.

On the basis of the answers to the 112 questionnaires, three categories of dogs were distinguished: the non-biters ($n = 38$) and two groups of biters ($n = 74$). The category of biters can then be subdivided into dog-biters ($n = 51$) and man-biters ($n = 23$). The owners of the non-biters did not report any bite incidents. The owners of the dog-biters reported that their dog had bitten a dog at least once but never a person. The owners of the man-biters reported that their dog had bitten a person at least once and some dogs had also bitten a dog. Fig. 3 shows the mean frequencies of biting/attack, snapping and the sum of biting/attack and snapping for "non-biters", "dog-biters" and "man-biters" all according to owner's opinion.

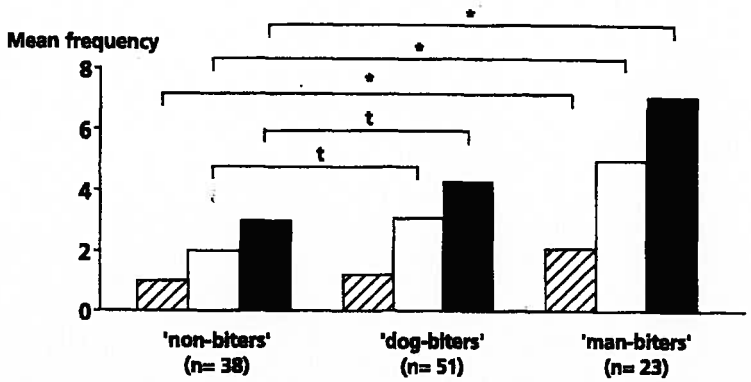

Fig. 3. Comparison of the mean frequencies of snapping behaviour (dashed bars), biting/attack behaviour (white bars) and total attack (the sum of biting/attack and snapping; black bars) in the test between dogs with and without biting history (owner's opinion); * = $P < 0.05$ and $t = P < 0.10$.

We expect that in the test, the aggression scores are higher for "dog-biters" and "man-biters" than for "non-biters". There are significant differences (KW–MC, $P < 0.05$) between non-biters and man-biters in snapping behaviour (level 4), biting/attack behaviour (level 5) and total attack (levels 4 + 5). Between non-biters and dog-biters there is a trend (KW–MC, $P < 0.10$) for differences in biting/attack behaviour and total attack. Separate analyses for the PAB-dogs show significant differences (KW–MC, $P < 0.05$) between non-biters and man-biters in snapping behaviour, biting/attack behaviour and total attack. Between non-biters and dog-biters, there is a significant difference (KW–MC, $P < 0.05$) for biting/attack behaviour and a trend (KW–MC, $P < 0.10$) for differences in total attack. For the CG-dogs, the differences between biters and non-biters are not significant. The PAB-dogs contribute most strongly to the differences found between biters and non-biters.

The aggression of "dog-biters" (owner's opinion) in the sub-tests with dogs as stimuli is compared with the aggression of non-biters. Dog-biters show significantly more attack behaviour in dog sub-tests ($n = 11$) than do non-biters (MWU, $P = 0.05$). The aggression of man-biters (owner's opinion) in the sub-tests with humans as stimuli is compared with the aggression of non-biters. In human sub-tests, ($n = 30$; In this comparison we did not take into account sub-tests 24 and 29, because the measured attack behaviour could not be performed against a human being) the man-biters show a significantly higher level of attack behaviour than do non-biters (MWU, $P = 0.003$). These results indicate that the test is a valid instrument for measuring a dog's tendency to attack humans and dogs.

3.3. The reliability of the test

To measure the reliability of the behavioural test, 37 dogs of owners who were willing to cooperate were re-tested approximately six months after the first test. The results of the test and the re-test are compared.

First, we measured the reliability, i.e. the consistency of the whole behavioural test. The total attack behaviour (levels 4 + 5) during test and re-test was highly correlated; therefore the test is considered to be reliable (SPCC = 0.77, $P < 0.0001$). For snapping (level 4) and for biting/attack (level 5) these correlations are SPCC = 0.52, $P < 0.0017$ and SPCC = 0.65, $P < 0.0001$ respectively. The latter results indicate that biting/attack behaviour is a more reliable predictor of a biting history than snapping behaviour.

The reliability can also be measured by calculating the absolute difference between the averages of the individual biting/attack frequencies obtained in the test and re-test.

For example, a dog shows biting/attack behaviour three times during the test and five times during the re-test. The average of the biting/attack behaviour is four. The absolute difference from the average is therefore one. The differences calculated for each dog by this method are shown in Fig. 4, divided into five classes expressed as percentages. The majority of the dogs (81.1%) fall into the small difference classes (two acts or less). Most differences were observed in sub-tests with dogs as stimuli.

3.4. The predictability of the various sub-tests

The predictability of a sub-test depends on the number of correct predictions that aggressive behaviour will again occur during the re-test and the number of correct predictions that aggressive behaviour will not occur. The predictability can be calculated by dividing the number of correct predictions by the number of dogs multiplied by 100. The number of biting/attack and snapping behaviours that occurred during the first test and during the re-test is compared. In Table 1, this is expressed as the percentage of agreement for attack behaviour between test and re-test.

The predictability of the 43 sub-tests has also been measured in a second way, by calculating the kappa coefficient (Martin and Bateson, 1986). This coefficient corrects for similarities based on coincidence. To calculate the kappa coefficients and their significance values (Bishop et al., 1975) we used the MATMAN program (de Vries et al., 1993).

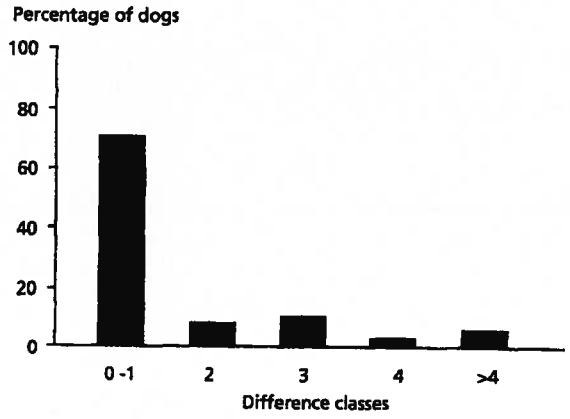

Fig. 4. The percentage of dogs in each class of difference between the average biting/attack behaviour and the biting/attack behaviour in test and re-test; for further explanation see text.

Table 1
Predictability per sub-test for biting/attack and snapping (levels 4+5), expressed as percentage of agreement for the sub-tests and the kappa coefficient and its significance ([a] = $P < 0.05$ and [b] = $P < 0.001$)

Sub-test number	% Agreement	Kappa coefficient	Sub-test number	% Agreement	Kappa coefficient
1	81.3	0.46 [b]	23	88.9	0.28
2	100	0	24	97.2	0
3	100	0	25	88.9	− 0.05
4	97.1	0	26	94.4	0.72 [b]
5	91.9	0.72 [b]	27	77.8	0.42 [a]
6	78.4	0.54 [b]	28	88.6	0.60 [b]
7	100	0	29	100	0
8	100	0	30	94.6	0
9	100	0	31	91.9	0.62 [b]
10	100	0	32	94.4	0.47
11	94.6	0	33	74.3	0.25
12	97.3	0	34	75.0	0 52 [b]
13	100	0	35	75.0	0.53 [b]
14	94.6	0.47	36	85.3	0 68 [b]
15	97.2	0	37	68.6	0.37 [a]
16	88.6	0.53 [b]	38	76.5	0.53 [b]
17	89.2	− 0.04	39	97.2	0.79 [b]
18	94.4	− 0.03	40	94.6	0.47
19	94.6	− 0.03	41	91.7	0.37
20	86.5	0.23	42	86.1	0.37
21	89.2	0.28	43	97.2	0.66 [a]
22	94.4	0.47	–	–	–

The numbers of the sub-tests refer to the descriptions given in the text.

Table 1 demonstrates that most sub-tests show a high percentage of agreement. In the majority of cases where a kappa coefficient could be determined there is a significant resemblance between test and re-test. Some sub-tests show 100% agreement and a kappa coefficient of 0. If one column or row in the matrix is zero then the kappa coefficient is undefined. This is the case for the following sub-tests: sub-tests 2, 3, 7, 8, 9, 10, 13, 15, 24, 29 and 30. Some sub-tests where there is no basis for a kappa coefficient calculation (sub-tests 2, 3, 7, 8, 9, 10 and 29) were not primarily meant to elicit severe aggression but were meant for acclimatization purposes.

Those sub-tests in which stimulus dogs were used (sub-tests 5 and 6 and sub-tests 34–42) have a lower predictability than most other sub-tests. (MWU: $P < 0.05$). A possible reason for this is that the reactions of the stimulus dogs changed during the study. Because we prevented the stimulus dogs from being "defeated" by the tested dogs, the male stimulus dog (sub-tests 35–38) and the three dogs on the leash (sub-test 34) became conditioned and acted more aggressively as the study continued. The stimulus bitch, in contrast, (sub-tests 39–42) behaved less aggressively. A number of dogs reacted more aggressively towards her and some less aggressively. The kappa coefficient is nonetheless significant for those sub-tests in which the stimulus male dog was used and for the first sub-test (39) in which the stimulus bitch was used. Most of the

dogs that were re-tested reacted more aggressively too. This effect influences the outcome of the reliability.

3.5. The implementation of the behavioural test

The dogs were put through a severe test. It is, therefore, not surprising, taking into account the composition of the test population, that 97% of all dogs showed some form of aggression during the test and 67% showed biting/attack at least once during the test. If the test is to be used as a tool for identifying dogs that are excessively aggressive and therefore not acceptable for breeding, the mere fact that biting/attack behaviour is observed during the test is an insufficient reason for the exclusion of such dogs from breeding. Therefore, we need to develop criteria by which it can be decided precisely at what level of aggression dogs should be declared to have failed the test and should therefore be excluded from breeding.

To develop criteria to exclude dogs from breeding we need to take into consideration: 1) aggression is a natural behaviour; and 2) in view of the severity of the test, a degree of aggression is expected and is acceptable. Two "Models" of Unacceptable Aggression (MUAs) are discussed in this paper as examples of ways in which criteria can be developed. The first model is based on all aggression observed during the test (AA-MUA) and the second model is based exclusively on the biting/attack behaviour (level 5) observed (BI-MUA).

3.6. Method

In the AA-MUA, penalty points are assigned for the different levels of aggression (levels 2–5): biting/attack (level 5), 10 points; snapping (level 4), 8 points; baring teeth (level 3), 6 points; and barking/growling (level 2), 1 point. In the BI-MUA, penalty points are assigned for biting/attack only: (level 5), 10 points.

The following criteria, based on the results of the analysis of the relation among the five levels of aggression, were used for "failing" the test:

AA-MUA: 1) a biting/attack score that is higher than 50 points; or 2) a total biting/attack and snapping score higher than 60 points (at least 20 points of these 60 points must be for biting/attack behaviour); or 3) a total aggression score higher than 70 points (the biting/attack score must be at least 20 points and if the biting/attack score is 20 the snapping score must be at least 16; the sum of the two must be at least 36).

BI-MUA: a biting/attack score higher than 50 points.

One method of establishing the validity of the outcome of the test is to compare the classification of the dog as biter or non-biter by the owner with the results of the test; we can do this by means of contingency table analysis. Various validity measures can be used (Mausner and Bahn, 1974; Vecchio, 1966; van der Borg et al., 1991). Measures such as the sensitivity and the specificity are dependent on the prevalence of the problem: in this case on the number of biters involved in the test. If the prevalence is high, as is the case in the test population in this study, even a specific test will give a relatively large number of false negatives because of the many biters being tested. Another reason for differences between the biting history and the test results is the

"tolerant" passing level, as is used in these models, related to the purpose of the test. This creates a high percentage of false positives. In the context of this study, the two measures considered to be of the greatest importance for evaluating the test are the following.

1) Specificity of the test (formula: $d/(b+d) \times 100\%$; see Table 2); this measure gives an indication of the test's ability to correctly identify the biters.

2) Predictive value of the "positive" test (formula: $a/(a+b) \times 100\%$; Table 2); this measure gives an indication of the likelihood that a dog with a "positive" test is a biter (Other measures are: predictive value of the negative test ($d/(c+d)$); false positive ($b/(a+b)$); false negative ($c/(c+d)$); sensitivity ($a/(a+c)$.).

3.7. Results

To validate our methods of testing and assigning penalty points, the resul s of the models are compared with the biting history of the dogs. Table 2 shows the results for the PAB for the two models. The results of contingency table analyses and various validity measures are given.

A contingency table analysis shows that when the AA-MUA model is used the relation between failing and passing the test and the biting history for the PAB is nearly significant (Chi, $P = 0.059$). For the CG this relation is not significant (Chi, $P = 0.23$). The difference is caused by the relatively high number of dogs that have a biting history in the CG but do not show a high level of aggression in the test. For the PAB the predictive value of the positive test is 78.3% and for the CG 80.0%. The percentage of false negatives for the CG (77.8%) is considerably higher than for the PAB (51.9%). The predictive value of the negative test is higher for the PAB (48.1%) than for the CG (22.2%).

Because of the results for the CG, the relation between failing and passing the test and the biting history is not significant in the analysis for all dogs together (Chi, $P = 0.11$). For all dogs, there is a tendency (Chi, $P = 0.07$) that dogs that have a biting history relating to humans (43.5%) fail the test more often than dogs that have a biting history relating to dogs (31.4%).

Table 2
Comparison of the biting history for PAB-dogs, as reported by the owners with the test results for AA-MUA and BI-MUA

Test results	AA-MUA		BI-MUA	
	'Biters'	'Non-biters'	'Biters'	'Non-biters'
Fail the test	18 (a)	5 (b)	15 (a)	2 (b)
Pass the test	27 (c)	25 (d)	30 (c)	28 (d)
'Predictive value of the positive test ($a/a+d$)'	78.3%		88.2%	
'Specificity ($d/b+d$)'	83.3%		93.3%	
Contingency table analysis, Chi	$P = 0.059$		$P = 0.008$	

If the AA-MUA is applied to all dogs, then the majority of the dogs (26) fail the test because they have a biting/attack score higher than 50 points. Five dogs fail the test because of a too high biting/attack and snapping score. So aggression levels 5 and 4 are the basis for failure in 93.9% of all the dogs that did not pass the test. Only two dogs fail the test because the total aggression score is more than 70 points.

Because of the chosen "tolerant" criterion for failing the test the percentage of dogs with a biting history (66.1%) is considerably higher than the percentage of dogs that fail the test (29.5%). Of the latter 78.8% have a biting history (predictive value of the positive test). 21.2% of the dogs are false positive. A consequence of the "tolerant" passing level in the model is that the percentage of false positives for all dogs is high (60.8%).

The most obvious harmful behaviour is biting/attack (level 5). Therefore a model (BI-MUA) based only on this behaviour is analysed as well. The results in Table 2 show that for the PAB alone the relation between the test results and the biting history is significant (Chi, $P = 0.008$). For the CG alone, the relation is not significant.

When the BI-MUA is applied to all dogs, 26 dogs fail the test (23.2%). The relation between the test results and the biting history is significant (Chi, $P = 0.04$). For the PAB, this model yields a predictive value of the positive test of 88.2%, 11.8% are false positive and the specificity is 93.3%. For the CG, the results are: the predictive value of the positive test is 77.8%, 22.2% of the dogs are false positive and the specificity is 75.0%. The percentage of false negatives (78.6%) for the CG is considerably higher than for the PAB (60.5%).

For all dogs, the predictive value of the positive test is 84.6%. The model yields 15.4% false positives and a specificity of 89.5%. The results indicate a high agreement between the results of the model and the biting history.

4. Conclusions

The test described does have strong aggression-eliciting properties. In response to the test, 97% of the dogs show aggression and 67% of the dogs show biting/attack behaviour on one or more occasions. With one exception, all sub-tests, even those that were meant primarily for acclimatization purposes, elicited aggression. As the test continues, the sub-tests elicit increasing amounts of aggression (there is a significant correlation (SPCC = 0.51, $P = 0.001$) between the sub-test number and the number of dogs that show attack behaviour (Fig. 2). This is due partly to the increasingly threatening character of the sub-tests involved. Results indicate that during the test, the aggression motivation of the dogs is increased.

Comparison of the biting behaviour reported by the owner and the biting/attack during the test is used as a way of validating the test. Dogs with and without a biting history differ significantly in the biting/attack behaviour observed in the test. With regard to the biting history, we furthermore established that the stimuli that are bitten/attacked more often in the test, namely dogs or humans, are significantly related to the history of the dog as "dog-biter" or "man-biter". From these results we conclude that the variety of stimulus situations and contexts created in the test can be regarded as

representative of the situations in which biting occurs in society. We conclude that the test is a valid instrument for testing aggressive tendencies in dogs.

The reliability of the test is established by the re-testing of 37 dogs. The results show a significant correlation between biting/attack behaviour in the test and in the re-test. Furthermore, most of the sub-tests that are meant to be threatening reveal a high percentage of agreement and a significant kappa-coefficient.

In view of the severity of the test, a degree of aggression is expected and is regarded as acceptable. So that the test can be used in dog clubs for the purpose of excluding highly aggressive dogs from breeding, selection criteria (MUAs) have been developed. To validate the test and the judging methods (MUAs) together, the outcome is compared with the biting history of the dog. Only for the model based on biting/attack behaviour (BI-MUA), is the relation between outcome of test and model and the biting history significant for all dogs together. Analysis of the PAB and CG separately shows that for the PAB also the outcome of the AA-MUA is significantly related to the biting history. For the BI-MUA, the relation is nearly significant. For the CG the relation between the models and the biting history is not significant. It is concluded that when used in combination with the judging method (MUA), the test described is a valid instrument for selecting highly aggressive dogs.

5. Discussion

5.1. The test design

The 43 sub-tests that were used in this study are of a simple nature and incorporate a high number of potentially aggression-eliciting contexts. Early in the sub-test sequence some sub-tests, involving the owner and test persons behaving in a friendly way, serve primarily to acclimatize the owner. They contribute primarily to the acceptability of the test but influence also the aggressive motivation. To be effective, a considerable number of sub-tests need to be carried out because the test has to represent a variety of situations and contexts. Comparison of the results of two pilot-studies shows that a test with over eighty sub-tests elicits more aggression than a test with only 32 sub-tests. If only a small number of sub-tests are performed, there is less chance of detecting aggression, especially in those dogs that are characterised by a slow increase in aggression motivation. It is therefore not advisable to reduce the number of sub-tests. An additional reason for incorporating many sub-tests is that this factor makes it more difficult for dog owners to train their dogs to pass the test. The number of sub-tests described in this paper can be seen as a reasonable compromise between a maximum and a minimum number of sub-tests. The entire test should not take longer than about three quarters of an hour.

To enhance the likelihood of an increase in aggressive motivation the time between the sub-tests should be kept as short as possible. By stimulating the aggressive motivation in this way one can restrict the number of sub-tests. Furthermore, the results of a pilot-study indicate that sub-tests in the indoor situation elicit significantly more aggressive behaviour than in the outdoor situation. This is mainly because the dog

cannot easily avoid confrontation with the stimulus. In the areas b and c (Fig. 1) the dog is more or less "cornered". If the test is used in dog clubs, a suitable test site and suitable test materials need to be available. Sundgren (1993) found a significant difference between judges' test results in more than 50% of the behaviours the judges measured. Therefore judges should be thoroughly trained in how to conduct this behavioural test and in how to evaluate and judge the behaviour. Test persons should receive training too, so that they all conduct the behavioural test in the same way. If the method varies, the reliability of the test decreases.

The results obtained by Lore and Eisenberg (1986) and our results indicate that some of the dogs react more aggressively towards men. Podberscek and Blackshaw (1990) found that men are bitten more often than women. It is, therefore, advisable to have both a male and a female test-person in the team. A test-person who behaves dominantly should also be part of the team. It might be advisable to have a few more test persons than we had (3), because the work is both mentally and physically demanding. The owner should receive careful instructions about how to behave, particularly before engaging in the threatening sub-tests (sub-tests 13–16 and 18). The supervisor should also keep a close watch on the owner for safety reasons. Stimulus dogs should be selected carefully and if the stimulus dogs become too aggressive as a result of conditioning, other stimulus dogs should be substituted. They should be rather dominant (sub-tests 35–42) but not too aggressive. The stimulus dogs should not show tendencies for redirection-aggression towards the owner in those sub-tests that create opportunities for this type of aggression (sub-tests 36 and 40).

It is obvious that presenting stimuli to dogs will result in learning of some kind. One problem that cannot be completely avoided is that the test itself could increase "learned" aggression (Hart, 1976). The tested dogs received few "aggressive winning experiences" because we prevented as far as possible the stimulus dogs and the test persons from being "defeated" by the tested dogs. Because of the design of the test (the tested dogs receive aggression and their (counter) attacks are not successful) the consequence of learning experience may also result in not displaying aggression in particular contexts in the future.

5.2. Reliability and validity of the test

To establish the reliability of the behavioural test, 37 dogs were re-tested. Re-testing constitutes a problem, because the second time a dog is tested the situation and the sub-tests are familiar to the dog and the owner. This may influence the outcome. Nevertheless, biting/attack behaviour and snapping behaviour in test and re-test are significantly correlated.

Some dogs showed considerable differences in their aggressive behaviour in the test and in the re-test. These differences are caused mainly by differences in the responses in the sub-tests in which dogs were used as stimuli. A possible reason for this is the increased aggression shown by the male stimulus dog during the re-test owing to the repeatedly winning the conflict during the study.

It is difficult to validate a test of this type. The test population for the final test configuration contained a high percentage of dogs with a biting history (66.1%).

Furthermore, some of the non-biters were aggressive, problem dogs, but had not bitten yet. The high percentage of biters in the CG was chosen deliberately because the goal of the test was not to differentiate between non-aggressive and aggressive dogs, but to differentiate between different types of aggressive dogs.

The method selected for validation of the test is to establish a relation between the biting/attack behaviour in the test and the prior biting behaviour as reported by the owner. The disadvantages of this method are obvious. The quality of the information provided by the owner cannot easily be established. Measures of validity are strongly influenced by the characteristics of the test population and in this case by the criteria chosen for passing the test. One cannot expect that a validation carried out in this way will ever be 100% correct. On the one hand, some of the dogs will be characterised incorrectly because of limitations in the test itself; for instance, the test provides only a limited number of aggression-eliciting contexts. On the other hand, however, there may be a variety of reasons for an "incorrect" characterization of the dog as a biter or a non-biter on the part of the owner.

In reporting aggressive behaviour as a problem behaviour, each owner will have his or her own personal interpretation of what constitutes "aggressive problem behaviour" (Campbell, 1975; Voith, 1983; Houpt, 1983; Mugford, 1984; Hart and Hart, 1985b). Owners with a higher threshold for aggression may interpret biting as "a playful gnaw". Furthermore, there will always be dog owners who handle their dog in such a way that they easily elicit aggression, even if they have a "non-aggressive dog". On the other hand, very capable and responsible dog owners are often able to prevent biting incidents, even in highly aggressive dogs, by keeping their dog away from possible aggression-eliciting situations. A possible reason why, especially in the PAB, some of the dogs without a biting history show biting/attack behaviour is that the owners of these big dogs took very strong precautions to prevent the dogs from biting. As a consequence these owners did not report biting in specific stimulus situations. According to the owner's opinion, a dog belonging to such an owner may be indicated as a "non-biter", whereas in fact the dog may be extremely aggressive. These complications strongly influence the outcome of the validation. Nevertheless, a significant relation between biting history and test result is found.

For the implementation of the test two MUAs are developed to provide possible criteria for failing and passing the test. In these models a "tolerant" level for passing the test is chosen mainly for two reasons. The first reason is that the acceptability of the test by dog owners and dog clubs is facilitated by the fact that only 11.8% of the PAB are false positive when the BI-MUA is applied. The 93.3% specificity for the PAB using this model indicates that almost all dogs without a biting history pass the test. The second reason for choosing a "tolerant" passing level is to increase the likelihood that the dogs that fail the test do so primarily because of their genetic basis for aggression. This is necessary in view of the urgent goal of the test.

The test that has been developed is designed primarily as a tool for selecting individuals that should not be used for breeding because of their uninhibited aggression. A breeding program is a means of decreasing aggressive behaviour. In relation to this, of course, only the genetically determined characteristics are important. Genetic components are involved in the various aspects of aggressiveness (e.g. Polsky, 1984) measured

in the test. Breed differences in relation to aggressiveness have also been reported by a number of authors including Scott and Fuller (1965) and Hart and Hart (1985a). In adult dogs (the test is designed for adult dogs only), the readiness to perform aggressive behaviour is influenced by genetic and environmental factors and the interactions between these factors (e.g. Lockwood and Rindy, 1987). The test has to ensure that genetic aspects play an important role in the aggressiveness of the dogs that fail the test. There is only one way to do this: failing the test must be based on a high intensity and frequency of aggression demonstrated over a wide range of contexts. The criteria for failure chosen in the models presented in this study satisfy these conditions as far as possible.

The answers in the questionnaires completed by the owners and their comments indicate that in some dogs of the CG, the aggressive problem behaviour is caused mainly by environmental factors ("learned" aggression; Hart, 1976). However, in contrast to the situation described by Hart, the aggression was often directed towards the owner and members of the owner's family (the questionnaire results indicate dominance problems, partly solved by therapy). In this type of dog we do not observe a high level of aggression over the wide range of contexts of the sub-tests. This result supports the conclusion that significant differences in aggression that are based primarily on prior environmental factors relating to the owner do not lead to a higher failure rate in the test. Together with significant differences in the number of dogs belonging to the PAB and the CG that fail the test (BI-MUA: KW–MC, $P = 0.007$) this result indicates that failing the test is strongly based on genetic differences in tendencies for aggression.

We conclude that the test can be a suitable instrument for use in a breeding program if the authorities are seeking methods for controlling aggressive tendencies in dogs belonging to certain breeds. If the test is to be used as an instrument for implementing legal measures, then the BI-MUA is the better model. In this model the relation between the outcome and the biting history is significant. Furthermore, the validity measures, namely the predictive value of the positive test and the specificity, are highest if this model is used. The low level of false positives facilitates the acceptability of the test by dog-owners and dog-clubs. However, if safety is regarded as the most important factor, the AA-MUA is a better model. When this model is used, dogs that show a low threshold for biting/attack behaviour and other forms of aggression also fail the test. The results indicate that these dogs are potentially dangerous in a variety of situations. The relation between threatening behaviour and biting/attack behaviour needs to be further analysed for a better understanding of the predictability of the different types of threatening behaviour.

However, the use of a test-method alone can never provide absolute proof of its success. A follow-up study is necessary to establish whether breeding selection based on behavioural tests will result in a decrease in aggression in a population. The results suggest, however, that if the test were to be used in combination with parent–offspring research it would be a powerful tool for controlling aggression in a population.

We think that the test can also be a very useful tool for vets, therapists and breeders seeking to control aggression in dogs. The test seems also applicable to individual dogs that have caused injuries to other dogs and to humans and could be useful if an expert opinion is required about appropriate measures that could be taken. Possibly the test can

also be a tool for the control of "idiopathic aggression" (Hart, 1976) which unfortunately is often seen these days in popular breeds as a result of indiscriminate breeding (Beaver, 1980).

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An anti-barking muzzle for dogs and its short-term effects on behaviour and saliva cortisol concentrations

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Abstract

A commercial anti-barking muzzle for dogs was tested during winter on Australian Kelpies at a commercial breeding kennel, to examine the effects of the device on dog behaviour and welfare. The trial involved 16 dogs (paired on sex and age); one dog per pair was allocated at random to the Muzzle Treatment (MT) and the other to the Control Treatment (CT) (not muzzled). The dogs were penned individually with pairs housed in adjacent pens. Muzzle Treatment dogs wore the anti-barking device for about 43 h. Muzzles were removed for about 30 min on day 2 of the treatment period while dogs were fed. The behavioural responses of dogs were recorded over 4 days, from before application of muzzles (pre-treatment) to 2 days after removal of the muzzles (post-treatment period). Saliva samples were collected at 2, 21 and 24 h post-muzzling to measure saliva cortisol concentrations.

The initial response of dogs to wearing muzzles was to display submissive behaviour: tail held between the hind legs or down for the first few minutes only and head and tail down for the majority of time while wearing the muzzles, especially in the absence of humans. Activity level (2.3 versus 15.7% of observations), barking (0.1 versus 7.8%) and standing posture (8.3 versus 29.5%) by dogs were significantly reduced ($P < 0.05$) while wearing the muzzles compared to non-muzzled controls. Even in response to stimulation from humans, dogs barked significantly less when muzzled compared to non-muzzled controls (0.5 versus 23.4% of observations, $P < 0.01$). However, based on saliva cortisol concentrations there was no evidence of a physiological stress response to wearing the muzzles. After removal of the muzzles after 43 h of treatment, the dogs in the Muzzle compared to Control

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Treatment tended to stand more ($P < 0.06$) during observation sessions over the next 2 days (48.3 versus 32.5% of observations). It was concluded that although dogs responded to wearing the muzzle by modifying their behaviour, including the display of submissive behaviour, and vocalisation, there was no indication that the dogs showed a stress response when wearing the muzzle. Further evaluation of anti-barking muzzles for dogs is recommended to test the ability of dogs to drink and pant while wearing the device during hot weather, to ensure they can effectively thermoregulate.

Keywords: Dog; Behaviour; Stress; Welfare; Muzzle; Barking; Vocalisation

1. Introduction

Sixty-six percent of the 6 million Australian households have at least one pet and 40% of these pets are dogs. However, dogs in the general community can cause embarrassment and inconvenience to their owners. Excessive barking by dogs, for example, is a considerable social problem (Kobelt et al., 2003) often with extreme solutions, such as surgical "debarking" or euthanasia. "Anti-barking" muzzles may offer a solution to this problem. The device used in this trial was a commercial anti-barking muzzle which was made of elastic and cloth and designed to allow the dog to feed and drink while wearing it. The device was designed to impose pressure on the jaws of a barking dog and thereby tire the jaw muscles and inhibit barking. Two experiments were conducted to evaluate the welfare implications of the device's effects on the dog.

There are a number of ways in which the device could be used. However, it is most likely that at least initially such a device, if effective in reducing barking, would be valuable to dog owners who have animals that incessantly bark when family members are absent or during the evening. In such situations the device may be applied during the period in which the barking is expected, for example, during the day when the owner(s) is absent or during the evening when people are sleeping. The present experiments did not examine the effectiveness of the device as a training aid, but examined the most pressing issue: examining its effectiveness when the muzzle is worn for long periods, i.e. for those situations in which barking is expected. In such situations, it is important that the welfare of the dog is not seriously compromised. Thus, in the following experiments the device was tested when worn over about 2 days by dogs, some of which had a history of uncontrollable barking, in situations in which barking was stimulated. While this use was atypical, it was chosen on the basis that if problems were not to arise in this scenario, they would be unlikely to arise if the device was to be used for shorter periods.

There has been disagreement over what is important for the welfare of animals and this has led to attempts to study and conceptualise animal welfare in more scientific ways (Duncan and Fraser, 1997). The most recognised approach within scientific circles in assessing risks to the welfare of animals involves studying whether the animal's biological systems are functioning in a normal or satisfactory manner. This approach, which is often called the "functioning-based" approach (Duncan and Fraser, 1997) or the "homeostasis" approach (Barnett et al., 2001), is underpinned by the definition that "the welfare of an individual is its state as regards its attempts to cope with its environment" (Broom, 1986). While there

are some limitations to this approach, this approach has the most scientific credibility and has been used by many scientists to assess welfare (Hemsworth and Coleman, 1998).

There are examples in the literature of examining short-term challenges to animals using this approach. Lay et al. (1992) studied the behavioural and physiological responses of cattle to two branding procedures to assess the relative aversiveness of the procedures. Hemsworth et al. (1996) utilised behavioural and physiological responses together with growth performance to assess the welfare implications of a husbandry procedure regularly imposed (daily injections) on pigs. Ogburn et al. (1998) measured behaviour and some physiological responses including cortisol concentrations, heart rate and blood pressure in dogs to compare the effects of neck and head collars. In the present experiments we examined the risks to welfare of dogs of wearing the an anti-barking muzzle, utilising the functioning-based or homeostasis approach, in which behaviours indicative of maladaption and an element of the stress response were measured.

2. Materials and methods

Two experiments were conducted at a commercial dog breeding kennel, about 100 km west of Melbourne in central Victoria, involving a total of 16 Australian Kelpies. All dogs except one (in the Muzzle treatment (MT)) had been trained and displayed at dog shows. The experiments were each conducted in two time replicates (weeks) with eight dogs per replicate. Due to difficulties in assaying the saliva samples from experiment 1, this aspect of the experiment was repeated. The repeated experiment (experiment 2) involved the same 16 dogs.

2.1. Housing

During the two experiments the dogs were individually housed in a row of adjacent pens measuring 1.5 m × 4.0 m. Pens consisted of two compartments: a 1 m long indoor compartment at the rear of the pen and a 3 m long outdoor run. The indoor compartment was solid brick construction with concrete floor and was separated from the outdoor run by a partial brick wall to the height of the roof and a solid door. Access to the indoor run was available over-night between about 18:00 h and 08:00 h. The solid roof extended 1 m into the outdoor run, while the other 2 m was covered with shade cloth. The front and side fences of the outdoor run were made from 40 mm × 40 mm mesh galvanised wire panels. A wire mesh gate was situated in the front fence of the pen and the floor of the pens sloped towards the front. Each pen contained two dog beds made of fabric on metal frames (indoor and outdoor) and a water bowl. Dogs were fed each morning between 08:00 and 08:45 h when the pens were also cleaned. Dogs were allowed to leave their pen during cleaning when they had unrestricted access to a large forest area in front of the dog kennels. However, only one dog at a time was allowed out of the pens.

2.2. Treatments

Dogs were selected from available adult subjects prior to experiment 1. The dogs were paired on same sex and similar age basis (mean age 45 months, range 4–92 months) and

moved to a pen on day 1, following allocation to pens within pairs at random. Thus, the pairs of dogs were housed in adjacent pens with one dog per pair allotted to the Muzzle and the other to the Control Treatment (CT). Two of the eight subjects in the Muzzle and five of the eight in the Control Treatment had been surgically "debarked" (D) more than a year prior to the experiments, because of noise issues. This procedure removes all or part of the vocal chords and had been performed to reduce the loudness of barking. As described by Houpt and Wolski (1982), dogs are not rendered silent by this procedure, but the strength and pitch of their voices are lowered. The same dogs were used in experiment 2, but dogs in the Muzzle Treatment in experiment 1 were used as Control Treatment subjects in experiment 2 and vice versa. There were two treatments:

Muzzle treatment: at about 12:00 h on day 4, an experimenter entered the dog's pen and fitted the appropriate-sized "Husher" anti-barking muzzle to the dog. The muzzle consisted of black elastic material which encircled the dog's snout, edged with webbing which limited expansion of the elastic. Two pieces of webbing extended from the muzzle to form a neck strap, which could be pulled tight and locked at the back of the dog's head, making it difficult for the dog to dislodge the muzzle. Muzzles were removed for about 30 min at feed time (about 08:00 h) on day 5 and were removed but not replaced at feed time on day 6 in experiment 1. In addition, the muzzles were briefly removed to facilitate collection of saliva samples for cortisol assay at 2, 21 and 24 h after the initial muzzling and were replaced within 2 min. This protocol was repeated for experiment 2, although in experiment 2 muzzles were not replaced on the dogs following the third saliva sample, i.e. 24 h post-muzzling, since we were not collecting behaviour data. Thus in experiment 1, Muzzle Treatment dogs wore the anti-barking muzzle for about 42.5 h, while in experiment 2, dogs wore the muzzle for 24 h.

Control treatment: at about 12:00 h on day 4, and at the same time as for the paired-dog in the Muzzle Treatment, an experimenter entered the pen and handled the dog in a manner similar to the Muzzle Treatment, but without fitting the dog with a muzzle. Control Treatment dogs were also handled in a similar manner and at the same times as the Muzzle Treatment dogs for feeding and collection of saliva samples.

All dogs were examined each day by the owner during the feeding and cleaning routine, for injuries, such as lacerations on the head.

2.2.1. Behaviour observations—Experiment 1

Direct behaviour observations were conducted on the eight dogs per replicate from days 4–7, with observation sessions commencing at 09:00, 10:00, 12:00 and 13:00 h. About 2 min prior to commencing an observation session, the observers (four on days 4 and 5 and two on days 6 and 7) sat in a chair positioned about 2 m from the front of the pens, opposite a pair of focal dogs (i.e. one from the Muzzle and the other from the Control Treatment). Each observation session was sub-divided into four 10.5 min behaviour recording periods, which commenced with a 30 s "barking response to human stimulation" test, in which a human walked along the front of the pens, from one end to the other then back, to "stimulate" the dogs to bark. The observers recorded whether either of their two dogs barked

during the 30 s stimulation. At the conclusion of the 30 s stimulation, the observers then commenced recording the behaviour of the dogs, one subject at a time for 30 s, alternating between dogs in each successive 30 s period for the next 10 min. The dog observed first in each period was alternated so that in each observation session, each dog was observed first twice out of the four periods. At the end of the first, second and third behaviour recording period per session, the human stimulus again walked back and forth along the front of the pens, to stimulate the dogs. In an attempt to provide variation in the stimulus, the human stimulus moved/behaved/vocalised in a different manner each time, or incorporated a different object of potential interest to the dogs, such as a ball, bucket, stick, etc. Observers rotated places between observation sessions and the human stimulus was different in each session on any day. The exception to this protocol was the initial period when the Muzzle and Control Treatments were applied. In this period (i.e. the 12:00 h observation period on day 4) the stimulus human did not walk in front of the dogs because the imposition of the treatments was, by necessity, staggered by a minute or so between pairs of dogs.

In each 30 s behaviour observation period, the observer recorded the predominant (defined as occurring during at least half of the time) posture of the dog (stand, sit or lie), whether the dog was predominantly active (moving about in its pen) or inactive, and whether the dog barked, drank water, pawed at its head/muzzle or rubbed its head/muzzle against a surface or object in the pen. In addition, four video cameras were mounted in the kennels to provide a continuous record of the behaviour of all eight dogs per replicate. The cameras were connected to time-lapse video recorders.

2.2.2. Cortisol measurements—Experiment 2

Saliva samples were collected from the 16 dogs at 2, 21 and 24 h after the application of the muzzles. Experiment 2 was conducted using the same protocol as experiment 1, with the exceptions that (1) dog behaviour was not recorded and two instead of four human observers sat opposite the pens to simulate behaviour recording and (2) the experiment was completed on day 5, 24 h after the application of the treatment.

To collect the saliva sample, two experimenters entered the dog's pen. One person held the dog while the other removed the muzzle (in the Muzzle Treatment). The flow of saliva was stimulated by allowing the dog to chew a plug of cotton wool impregnated with crystallised citric acid (5% solution). Saliva was collected in balls of cotton wool, which were then sealed in cling film, transferred to a screw-top vial and placed on ice. The samples were then transported to the laboratory and the saliva was extracted from the cotton wool using a centrifuge and stored at about −20 °C until assayed. After thawing, saliva samples were centrifuged at 12 000 rpm in a microcentrifuge to precipitate any particulate matter. A 250 μl aliquot was extracted with 2.5 ml of dichloromethane on an orbital shaker for 15 min. A 2.0 ml aliquot of the organic phase was removed and allowed to dry down overnight. The dried extract was resuspended by vortex mixing following the addition of 200 μl of 0.1 M tris-buffered saline, pH 7.4, containing 0.1% bovine gamma globulin. This was split into two 100 μl aliquots and analysed by a commercial RIA kit for cortisol (Orion Diagnostica, Turku, Finland) according to the protocol for salivary samples. The within- and between-assay coefficients of variation for cortisol concentrations of 3.4 and 13.3 nmol/l were 11 and 7% (within-) and 17 and 10% (between-), respectively.

2.3. Statistical analysis

The behaviour data were collated into three time periods categorised according to treatment situations: (1) pre-treatment, (2) treatment and (3) post-treatment. The pre-treatment period included the data recorded in the observation sessions that commenced at 09:00 h and 10:00 h on day 4. The treatment period was comprised of the 12:00 h and 13:00 h sessions on day 4, together with the 09:00, 10:00, 12:00 and 13:00 h sessions on day 5. The post-treatment period consisted of all observation sessions on days 6 and 7. Differences in the vocalisation, behaviour and posture of dogs between the Muzzle and Control treatments were analysed within time periods using the Kruskall–Wallis one-way analysis of variance with the χ^2 approximation to provide information on the level of significance (GenStat, 2000). The occurrence of barking by "debarked" and "intact" (I) dogs was also compared within time periods using the Kruskall–Wallis one-way analysis of variance and the χ^2 approximation. A post-hoc comparison of the interaction between the treatments and surgical "debark" status of dogs was not possible due to an unbalanced data set. Values reported are raw mean percentages. Cortisol data were analysed using analysis of variance blocked on replicate and pairs of dogs.

3. Results

3.1. Initial reactions of dogs to wearing the muzzle from the video records

Muzzling resulted in four of the eight Muzzle Treatment dogs almost immediately lowering their tail between the legs, although their tails were only held in this position for less than 30 s. The predominant tail position for all eight muzzled dogs over the first 15 min of wearing the muzzle was "down" compared to "raised". In addition, there were very few instances of tail wagging over the 15 min. Initially, the dogs' ears tended to be "back" but within 1 min of being muzzled, ears reverted to the usual, upright position. Scans of the entire time-lapse video record indicated that dogs while standing, also generally tended to keep their heads and tails lowered while muzzled, i.e. over the entire 43 h period, particularly in the absence of humans.

During the first 30 s of being muzzled, seven of the eight dogs pawed at the muzzle and six dogs rubbed their head against a surface, such as the floor or mesh walls of the pen. The video record also showed that during the first 15 min of being muzzled, on average dogs performed about five bouts of pawing at the muzzle and four bouts of rubbing their head. These behaviours were not apparent 24 h later. All Muzzle Treatment dogs displayed bouts of inactivity, either standing, sitting or lying on the sternum stretched out.

3.2. Barking by dogs

3.2.1. Barking response to the stimulus human

Table 1 shows the proportion of tests that dogs in the two treatments barked at the stimulus human, before application, during wearing and following removal of, the anti-barking muzzle. While there was no difference between the treatments in the occurrence of dogs barking

Table 1
Mean proportion of observations in which dogs in the Muzzle and Control Treatments vocalised, occupied different postures and were active during the experiment

Variate	Time period								
	Pre-treatment			Treatment			Post-treatment		
	Muzzle	Control	*P*-value	Muzzle	Control	*P*-value	Muzzle	Control	*P*-value
Bark response	29.7	51.6	0.266	0.5**	23.4	0.002	38.3	26.6	0.957
Free barking	8.0	14.1	0.633	0.1**	7.8	0.003	7.6	6.2	0.635
Stand	76.3	47.5	0.140	8.3*	29.5	0.024	48.3	32.5	0.059
Sit	4.7	22.0	0.710	7.7	14.8	0.241	10.7	14.1	0.115
Lie	17.5	30.0	0.711	84.0*	55.7	0.027	40.9	53.7	0.141
Move	33.3	28.6	0.401	2.3**	15.7	0.005	25.6	12.0	0.172

Values shown are raw mean percentages. Data were analysed using the Kruskall–Wallis one-way ANOVA and the χ^2 approximation. Within time periods, the asterisk indicates significant difference between the treatments.

at the stimulus human in the pre-treatment period ($P > 0.05$), Muzzle compared to Control Treatment dogs barked significantly less ($P = 0.002$) when wearing the anti-barking muzzle in response to the stimulus human during the treatment period. In the post-treatment period after removal of the muzzles, there was no difference in the incidence of barking in response to human stimulation (Table 1).

3.2.2. *Barking during non-stimulation periods*

There was no difference ($P > 0.05$) due to treatment in the pre-treatment period in the incidence of "free" barking by dogs during the observation periods (Table 1), as distinct from the 30 s of human stimulation at the start of each observation period. However, Muzzle Treatment dogs barked significantly less ($P = 0.003$) than Control Treatment dogs during the treatment period (Table 1). In the post-treatment period there was no effect ($P > 0.05$) of treatment.

3.3. *Postures and activity level of dogs*

3.3.1. *Standing posture*

While the Muzzle Treatment tended ($P = 0.14$) to spend more time standing than the Control Treatment during observations in the pre-treatment period, the difference was not significant (Table 1). However, dogs spent less ($P = 0.024$) time standing during the treatment period in the Muzzle than Control Treatment (Table 1). Following the permanent removal of muzzles from dogs in the Muzzle Treatment, there was a trend for the Muzzle Treatment to stand more compared to the Control Treatment ($P = 0.059$).

3.3.2. *Lying posture*

Lying was the most common posture recorded for dogs in the experiment. There was no difference due to treatment in time spent lying in the pre-treatment period ($P > 0.05$), but there were effects after the dogs were muzzled. In the treatment period, the Muzzle compared to Control Treatment, respectively, spent 84 and 55% of observation time lying

($P = 0.027$). Following the removal of the muzzles in the post-treatment period, there was a weak ($P = 0.014$) effect of treatment on time spent lying (Table 1).

3.3.3. Sitting posture

Sitting was the least common posture measured. There were no effects of treatment on the occurrence of sitting posture in any of the three treatment periods (Table 1).

3.3.4. Activity

The level of activity of dogs was measured by the proportion of 30 s periods in which the dog spent at least 15 s 'moving about' the pen. While there was no effect of treatment on activity level in the pre-treatment period ($P > 0.05$), the application of the muzzle resulted in a significant reduction in activity compared to the Control Treatment dogs ($P = 0.005$; Table 1). In the post-treatment period, Muzzle Treatment dogs were more active than Control Treatment dogs, but the difference was not significant ($P > 0.05$; Table 1).

3.4. Lacerations

The owner of the dogs performed inspections of the dogs during and after the muzzles were worn by the dogs and found no evidence of lacerations. During observations and on the video record, while we noted that dogs pawed at the muzzle or rubbed the head/muzzle against objects, these behaviours did not apparently result in physical damage to the dogs.

3.5. Cortisol concentrations

There were no effects of treatment on free cortisol concentrations of dogs at either 2, 21 or 24 h after the application of the anti-barking muzzles. The pooled mean (±S.D.) concentrations for dogs in the two treatments over the three sample periods were 2.79 (±0.93), 2.34 (±0.80) and 2.22 (±0.55) nmol/l, respectively. The mean treatment concentrations at 2 h post-application of the muzzling/sham-handling were 2.66 (±1.11) and 2.92 (±0.76) nmol/l, respectively, for the Muzzle and Control Treatments, and at 24 h post-application were 2.14 (±0.40) and 2.30 (±0.69) nmol/l, respectively.

3.6. Barking amongst "debarked" and non-debarked dogs

Surgically "debarked" dogs differed from dogs with "intact" vocal chords in the occurrence of barking recorded in the pre-treatment and treatment periods. In response to human stimulation in the pre-treatment period, the "debarked" dogs barked more than the "intact" dogs (64.3 versus 22.2% of observations, respectively, $P = 0.029$) and there was a tendency ($P = 0.069$) for more "free" barking during observation periods (19.6 versus 4.3%, respectively). Similarly, during the treatment period "debarked" dogs vocalised more in response to human stimulation (24.2 versus 2.4%; $P = 0.031$) and performed more "free" barking (7.2 versus 1.4%; $P = 0.047$) than "intact" dogs. However, there were no differences in these parameters in the post-treatment period. Table 2 shows the mean data for barking by "debarked" and "intact" dogs in the different treatments, over the three time periods.

Table 2
The occurrence of barking by "debarked" (D) and "intact" (I) dogs in the Muzzle (MT) and Control Treatments (CT) during the pre-treatment, treatment and post-treatment periods

Class	*N* dogs	Vocalisation type					
		Bark in response to human stimulation			"Free" barking		
		Pre-treatment[a]	Treatment[a]	Post-treatment[a]	Pre-treatment[a]	Treatment[a]	Post-treatment[a]
D in MT	2	75.0	0.0	75.0	18.1	0.2	7.2
I in MT	6	14.6	0.7	26.0	4.6	0.1	7.7
D in CT	5	60.0	33.9	38.8	20.3	10.0	7.8
I in CT	3	37.5	5.8	6.3	3.8	4.0	3.5

Values shown are mean percentage of observations.
[a] Time period.

The data indicate that on average, there was a relative increase in barking in response to human stimulation by Muzzle compared to Control Treatment dogs between the pre- and post-treatment periods.

4. Discussion

The anti-barking device significantly reduced the occurrence of barking by dogs. While the changes to activity level and standing posture recorded for dogs wearing the muzzle were relatively large compared to the pre-treatment period and the Control Treatment, there were no apparent adverse effects of wearing the muzzle, for example, on self-damaging behaviours, lacerations or saliva cortisol response.

The measurements on saliva cortisol taken during these experiments provide no evidence of a substantial activation of the hypothalamic–pituitary–adrenal axis. If the muzzle caused a serious challenge to the animal, a significant cortisol increase would be expected. The primary saliva samples were collected 2 h post-muzzling. While it is possible the dogs experienced an acute stress response to muzzling or sham-handling, the elevation in cortisol concentrations was not present after 2 h. The lack of treatment differences cannot be explained in terms of human contact confounding treatment effects. Saliva samples were generally taken within 2 min of entering the dogs' pens and this interval is likely to be insufficient for plasma cortisol concentrations to have been affected by the handling associated with collection (Broom and Johnson, 1993). Since the dogs had one more week of regular exposure to the observers prior to experiment 2 in which samples were collected, the novelty of the presence of observers is unlikely to have masked treatment effects.

There was no evidence of behavioural responses to the treatment that were indicative of sustained avoidance, such as vigorous or unusual movements that may occur when an animal is confronted with a serious challenge. Most dogs attempted to remove the muzzle by pawing or rubbing, which could be considered natural responses of dogs to disengage themselves from the muzzle, however, this response was only observed within the first 15 min of the muzzle being applied. There was no evidence of injury around the snout/muzzle area and, based on the behavioural observations, no such effect was expected.

Following initial attempts to remove the muzzle, the activity of the dogs as measured by the occurrence of standing posture and ambulation, was significantly reduced while wearing the muzzle. This reduction in activity may be due to several reasons. The application of the device may cause subordination through forcing the mouth closed, inhibiting the display of the teeth which are the dog's "weapons", or inhibiting movement (Schenkel, 1967). Indeed the initial behavioural response of most dogs upon muzzling included holding the tail between the legs or down and inactivity. Schenkel (1967) and Ogburn et al. (1998) describe these as submissive behaviours, although it is also possible that dogs were reacting to the novelty of wearing a muzzle. Schenkel (1967) also described dominant behaviour in the situation of a superior dog seizes the inferior's muzzle while uttering a growl. The anti-barking muzzle may be interpreted by the wearer as being mouthed by a dominant.

Mild but repeated stimulation to the muzzle region of the dog may also cause inactivity, however, such stimulation if causing disturbance or irritation is generally associated with excessive rubbing (Broom and Johnson, 1993). The novelty of the restraint of the mouth may also cause inactivity. However, while novelty will cause an initial orienting response (McFarland, 1981) which may involve inactivity, if habituation does not occur, on-going activation of the hypothalamic–pituitary–adrenal axis, with increased release of cortisol, in response to the stimulus would be expected (Hemsworth and Coleman, 1998).

The apparent "rebound" in standing posture, activity and vocalisation post-treatment, as suggested in Tables 1 and 2, is an interesting phenomenon. While it may be interpreted as evidence of a serious suppression in motivation, the rebound may reflect an increase in normal (ambulatory) activity after a period of exposure to a novel stimulus and associated inactivity. The increase in activity following removal of the muzzle may be due to lack of exercise while muzzled, with dogs potentially compensating for a lower than normal level of exercise in their activity budget while muzzled. In rats, Mueller et al. (1999) found that wheel-running increased after 3 h deprivation and was proportional to the amount of running normally occurring during the deprivation period. Thus, the increase in activity of the Muzzle treatment dogs following removal of the muzzles may be explained as compensating for their recent lack of exercise, although a longer period of observation post-treatment may be required to provide conclusive evidence. The increased activity may also be associated with dogs attempting to regain their social status if the muzzle acted to cause subordination. It should also be recognised that while some authors have suggested that heightened activity after a period of deprivation may result from an increase in motivation during deprivation and hence may be considered as potentially indicative of suffering (Metz and Wierenga, 1984), the basis and indeed the welfare implications of such rebound effects are far from clear. McFarland (1989) has suggested that animals may habituate to the presence of a stimulus and not notice its subsequent removal or absence. But on later presentations of the stimulus, they may show an exaggerated behavioural response because of renewed novelty. Thus, it is difficult to speculate on the welfare implications of the rebound effect. If the muzzle was causing a serious challenge for the animal, some substantial and prolonged behavioural and physiological responses would be expected. While reduced activity was apparent, there was no evidence of major biological responses.

Not unexpectedly, the surgically "debarked" dogs vocalised more than the non-debarked dogs. The noises made by these dogs could be described as hoarse barks. Thus while "debarking", which had occurred more than 12 months prior to these experiments for 7 of

the dogs, did not stop the dogs vocalising, we do not know whether "debarking" alters their motivation to bark.

5. Conclusion

While dogs showed a reduction in activity including barking when wearing the anti-barking device, there were no significant changes in behaviours that were indicative of a painful or aversive stimulus, such as sustained, vigorous attempts to remove the stimulus. Furthermore, there were no significant changes in saliva cortisol concentrations. However, the environmental conditions under which the experiments were conducted were limited. One obvious area of potential concern and need for further research is any welfare risk during periods of hot and/or humid weather.

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Owner-companion dog interactions: Relationships between demographic variables, potentially problematic behaviours, training engagement and shared activities

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Abstract

Many companion dogs occupy a privileged position in our society, living closely with human caretakers who go to great lengths to provide for their needs and desires. Others fare less well, being abandoned or killed, many because they are believed to exhibit behaviour problems. The aim in this study was to investigate the frequency of potentially problematic behaviours experienced by a convenience sample of companion dog owners and to establish if the presence of these behaviours was associated with demographic variables, involvement in dog training activities and participation in other dog-human interactions. Potentially problematic behaviours were reported to occur by the 413 adult participants only infrequently, but fell into five factors; disobedience, unfriendliness/aggression, nervousness, anxiety/destructiveness and excitability. Each of these factors was associated with a number of owner and dog characteristics. Engagement in training activities was predictive of lower scores being obtained for many of the behaviours, as well as increased involvement in shared activities. Some of the behaviours, particularly the perceived friendliness of the dog, were also predictive of involvement in shared activities. This confirms that strategies designed to increase participation in dog training

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activities and promote canine sociability may have significant benefits for both companion dog owners and their dogs.

Keywords: Canine; Dog behaviour; Dog training; Human–animal interaction; Human–animal bonding

1. Introduction

The domestic dog (*Canis familiaris*) is regarded as a highly trainable species (Prestrude and O'Shea, 1996). Despite this, thousands of dogs are surrendered to animal shelters annually because of perceived behaviour problems (Patronek et al., 1996; New et al., 2000; Marston et al., 2004). This is a significant animal welfare issue. In addition, misbehaving dogs cause road accidents, community disputes, property damage and injury (Ashby, 1996; Sacks et al., 1996). Establishing the prevalence of perceived dog behaviour problems in the community is an important issue, which has previously been addressed in several different contexts (Adams and Clark, 1989; Beaver, 1994; Guy et al., 2001; Hiby et al., 2004; Wells and Hepper, 2000). A recent study in Australia by Kobelt et al. (2003), for example, found that overexcitement and jumping up on people were common behaviours among dogs, as were rushing at people or other dogs and excessive barking. Kobelt et al. (2003) also found that specific 'problem behaviours' were associated with general disobedience, owner experience and the amount of time spent by the owner with his or her dog, and that dogs who attended obedience training were more likely to obey their owner's commands. This is consistent with previous reports that participation in obedience training is associated with a significantly reduced prevalence of canine behaviour problems (Clark and Boyer, 1993; Jagoe and Serpell, 1996) and an increased probability of a positive outcome following adoption of a dog from a welfare shelter (Patronek et al., 1996; Marston and Bennett, 2003).

Perhaps surprisingly, then, it was reported in 1999 that only 24% of dog owners attend formal obedience training classes (Coren, 1999). It is not known whether this apparent lack of interest in formal dog training occurs because many owners have dogs that do not, or are at least not perceived to, demonstrate problematic behaviours, or whether owners who do experience behavioural difficulties feel unwilling or unable to learn how to address these behaviours. Perhaps many owners simply train their dogs at home, accessing training knowledge via books, videos or informal conversations with friends and family members.

There were four aims in this study. The first was to ascertain the perceived frequency of potentially problematic canine behaviours in a large convenience sample of companion dog owners. The second was to see if these varied with relevant demographic variables. Third, we investigated whether participants engaged in several dog training activities and, if so, whether this engagement was associated with or predicted the presence of potentially problematic behaviours. Fourth, we examined whether dog owners participated in a number of shared activities with their dog and whether this was associated with or predicted by the presence of potentially problematic behaviours and/or engagement in training activities.

2. Method

2.1. Participants

Participants were recruited via two techniques. First, 150 paper copies of the questionnaire, including reply paid envelopes, were distributed to pet shops and veterinary clinics in the city of Melbourne, Australia. A total of 46 questionnaires were returned. Second, the survey was posted on the internet for a period of 7 months and was publicised at local pet shops and veterinary surgeries and in the media. Three hundred and sixty seven participants submitted questionnaires via this method, resulting in a total sample size of 413.

The mean age of participants was 35.8 years (S.D. = 12.3, range = 18–76 years). The majority of respondents (85%) were female. Participants were drawn from all Australian states although the majority came from Victoria (40%). Just over 10% (10.4%) of the sample lived in a country other than Australia. Over half of the participants resided alone or in a two person household (59%) and just over one fifth (22.3%) lived with one or more children. All participants reported owning at least one dog. Many reported owning a second dog (44.1%) and 36.5% reported owning a cat. The majority had owned a dog previously (83.1%), although the range of experience varied considerably ($M = 22.4$, S.D. = 13.7, range = 1–60 years). The most common reason for dog acquisition in the sample was companionship (85.2%). Other common reasons for acquisition were because the dog needed a home (4.6%), for protection (2.7%) and for showing (2.2%).

Half of the sample had acquired their dog through a breeder (50.1%). Most others were acquired through an animal shelter (14.3%), pet shop (11.4%), from a friend or relative (10.7%) or as a stray (9.2%). A small proportion (2.4%) had been bred by their current owner. Most participants reported that they were the main person responsible for their dog's care (63%). Another 32.7% shared this responsibility with at least one other person. Only 3.4% reported that a person other than themselves was primarily responsible for the dog.

The mean age of dogs in the sample was 5.1 years (S.D. = 3.7), however this statistic was influenced by several very old dogs (range = 3 months–19 years). One quarter of the sample was under 2 years of age, another quarter was between the ages of 2 and 4 years and another quarter was under 8 years, with the remaining quarter being spread between 9 and 19 years. Most dogs in the sample had been acquired as puppies, with the mean age at acquisition being 7 months (S.D. = 14). Although the range was from 0 (owner bred) to 13 years, three quarters of the sample had been acquired by their owner before four months of age. There were slightly more female dogs (53.3%) than male dogs (46.2%) in the sample. As is customary in Australia, the majority of dogs were de-sexed (78%) rather than sexually entire (21.5%). Within the total sample, 9.2% were entire females, 12.4% were entire males, 44.3% were desexed females and 34.1% were desexed males.

Just under half of all dogs in the sample were reported to be of medium size (48.6%), 31.2% were classified as small and 20.2% were described as large. Just over one third of the sample (33.9%) reported that their dog was mixed breed (crossbred). Although we recorded the breed type for purebred dogs we did not ascertain whether or not these dogs were registered with an appropriate breed society and it was not possible to determine

whether the dogs were really purebred or just believed to be so by their owner. Rather than analysing dogs by breeds or breed groups, therefore, we simply grouped the dogs for analysis according to whether their owner believed them to be purebred or crossbred.

2.2. Measures

A preliminary questionnaire was constructed based on available literature. This was evaluated by two focus groups consisting of convenience samples of six adult dog owners. It was then piloted on another convenience sample of 15 adult dog owners and refined according to the feedback obtained. The final questionnaire was divided into four sections. The first section, Section A, collected demographic information about the participant and the type of dog that they owned. Section B contained the nine item interaction subscale from the Monash dog owners relationship scale (MDORS, Dwyer et al., in press), which assesses the frequency with which the respondent engages in typical shared activities (listed in Table 1) with their dog. The respondent indicates whether they engage in each of

Table 1
Descriptive statistics pertaining to the extent to which adult companion dog owners who completed a survey about their dog's behaviour reported engaging in various shared activities with their dog and the extent to which they reported engaging in various dog training activities

	Valid cases	Mean score	S.D.	Min	Max	Percentiles		
						25	50	75
Shared activities items[a]								
Kiss	410	2.79	1.66	0	4	1	4	4
Hug	411	3.78	0.70	0	4	4	4	4
Take in car	412	2.30	1.14	0	4	1	3	3
Groom	408	2.01	1.02	0	4	1	2	3
Buy gifts	411	1.26	0.83	0	4	1	1	2
Give treats	412	3.25	0.97	0	4	3	4	4
Play games	412	3.62	0.73	0	4	3	4	4
Take visiting	411	1.61	1.19	0	4	1	2	3
Sit with	412	3.72	0.85	0	4	4	3	4
Training engagement items[b]								
Read Books	411	3.14	1.97	0	6	2	3	5
Discuss with friends/family	410	3.61	1.89	0	6	3	4	5
Attend training	411	2.33	2.43	0	6	0	1	5
'Shared activities' composite scale[c]	398	24.30	5.31	7	35	21	25	28
'Training engagement' composite scale[d]	410	9.06	5.23	0	18	5	9	13

[a] Survey respondents rated how often they engaged in each 'shared activity' on a five-point scale (0: never, 1: monthly, 2: weekly, 3: every few days and 4: daily).

[b] Survey respondents rated how often they engaged in each 'training activity' on a seven-point scale (0: never, 3: sometimes, 6: always).

[c] Raw scores from the 'shared activities' variables were summed for each respondent to produce a composite scale with possible range of 0–36.

[d] Raw scores from the 'training engagement' variables were summed for each respondent to produce a composite scale with possible range of 0–18.

the activities never, monthly, weekly, every few days or daily. Section C contained three items designed to assess the level of involvement in dog training by the respondent. Each item (listed in Table 1) was rated on a seven-point scale. The end points of the scale were labelled 'never' and 'always' and the midpoint was labelled 'sometimes', but intermediate points were left undefined. Section D included 24 statements (listed in Table 2) about the dog's perceived behaviour. Each was answered on a seven-point scale, labelled the same as the items in Section C.

2.3. Data analysis

All data were entered into SPSS for Windows (Version 12). Reverse scoring was conducted for some items in Section D so that high scores on each variable were indicative of the presence of potentially problematic behaviours. For items probing behaviours normally deemed to be undesirable (see Table 2), such as 'My dog digs holes inappropriately,' a response of 'never' on the seven-point scale received a score of 0 and a response of 'always' received a score of 6. In contrast, for items probing behaviours normally deemed to be desirable, such as 'My dog is friendly towards other dogs,' a response of 'never' received a score of 6 and a response of 'always' received a score of 0. In order to reduce the number of variables in the statistical analyses the nine items from the MDORS were summed to produce a single 'shared activities' score (see Dwyer et al., in press). Principal components analysis, followed by varimax rotation using Kaiser normalisation, was carried out separately on the data from Sections C and D. For each analysis, the initial solution was subjected to a visual inspection of the eigenvalues, the scree plot, the amount of variance explained by the solution and the ease of interpretation of the factors contained therein. Several additional analyses were then conducted, varying the number of factors extracted and other statistical parameters, until the most satisfactory solution in terms of interpretability was identified. For Section C a single factor was found to underlie the pattern of data obtained. The items in this section were therefore summed into an aggregate value representing 'training engagement'. For Section D several factors emerged, as described below. The items in these factors were summed for each participant to generate subscale scores. Summing the items instead of using the factor scores was felt to be appropriate in this context as we hope to administer the scales to additional samples in the future and would like to draw direct comparisons amongst the various studies conducted.

Pearson's correlation coefficients were used to ascertain if scores on the behaviour subscales were associated with each other, continuous demographic variables, shared activities or training engagement. Each of the behavioural subscales was also explored using independent groups *t*-tests or one way analyses of variance followed by Tukey's post hoc tests to see if there were group differences across the categorical demographic variables. Multiple regression techniques were employed to ascertain whether the behavioural variables could be statistically predicted by the demographic variables and/or training engagement, and whether the shared activities variable could be predicted by the behavioural variables, training engagement or demographic variables. Stepwise regression procedures were used after outliers were removed using the criterion suggested by Tabachnick and Fidell (1996). Throughout all analyses, pair-wise deletion was used to accommodate instances of missing values.

3. Results

Descriptive statistics for items measuring shared activities and training engagement are presented in Table 1. Most respondents reported engaging in several activities with their dog on a regular basis, with mean scores for the shared activities items ranging between 1.26 (How often do you buy gifts for your dog?) and 3.78 (How often do you hug your dog?). The composite scale derived from the nine items had good reliability, with Chronbach's alpha being 0.73. The mean score (possible range 0 = 36) was 24.3 (S.D. = 5.3) and no participant scored below 7. One quarter of the sample scored above 28, indicating that many activities were engaged in on a daily basis by many participants in this study.

The spread of scores on the training engagement variables (Table 1) was wide. This was particularly evident in relation to attending formal obedience training classes, where the distribution was clearly bimodal. Many people (40.6%) reported having never attended training, while many others (20.3%) reported that they did so 'always'. The other two variables were more evenly distributed. The three items loaded strongly (>0.75) on a single factor, which accounted for 69.48% of the variance. The items were therefore summed to calculate a 'training engagement' composite scale, high scores on which denote a high level of engagement with multiple training activities. This scale had good reliability, with Chronbach's alpha being 0.76. Scores on the scale were bimodal, reflecting the bimodal distribution on one of the variables. While some respondents (8.7%) achieved the highest score possible, reporting that they engaged in several training related activities on an 'always' basis, an equivalent number (7%) reported never engaging in any training related activities.

The 24 items assessing the degree to which owners perceived their dog to exhibit specific behaviours were explored using principal components analyses. As shown in Table 2, a five factor solution was selected as being the most appropriate of those tested. This solution explained just over 45% of the variance and included 23 of the 24 items in this section of the questionnaire.

Using the results of the principal components analysis, five behavioural subscales were created by summing the scores from the relevant items. These subscales were named 'disobedient', 'unfriendly/aggressive', 'nervous', 'anxious/destructive' and 'excitable'. While the first three subscales demonstrated adequate reliability, Chronbach's alpha (Table 2) was extremely low for the two remaining scales. All subsequent analyses involving these two subscales should therefore be interpreted with caution.

Also shown in Table 2 are the descriptive statistics for each behavioural subscale. Because the item 'My dog barks excessively' did not load on any of the five factors identified, it is presented separately. It is evident from this table that the frequency of the potentially problematic behaviours examined in this study was extremely low. No dog obtained any score approaching the maximum score possible and the percentile scores generally suggest that the dogs in the sample were rarely considered to exhibit the behaviours in question.

Each of the behavioural subscales was correlated with appropriate demographic variables, the results being presented in Table 3. Mean subscale scores obtained by different demographic groups were also compared, the results being presented in Table 4.

Table 2
Factor loadings and descriptive statistics for the behavioural subscales derived from a principal components analysis of survey items probing the frequency with which companion dog owners report specific, potentially problematic, behaviours in their dogs

Item[a]	Factor					
	Disobedient	Unfriendly/ aggressive	Nervous	Anxious/ destructive	Excitable	Barks excessively
My dog does what he/she is told[b]	0.805					
My dog will stay when asked[b]	0.787					
My dog has good manners[b]	0.729					
My dog will sit on command[b]	0.672					
My dog will come when called[b]	0.629					
My dog soils in the house	0.415					
My dog is friendly to strangers[b]		0.731				
My dog is friendly to other dogs[b]		0.642				
My dog is aggressive to people he/she knows		0.638				
My dog is aggressive to strangers		0.584				
My dog is aggressive to other dogs		0.560				
My dog is friendly to people he/she knows[b]		0.519				
My dog is nervous			0.791			
My dog startles easily			0.743			
My dog is timid in new situations			0.672			
My dog is confident in unfamiliar places[b]			0.554			
My dog digs holes inappropriately				0.731		
My dog chews things he/she shouldn't				0.566		
My dog is relaxed most of the time[b]				0.431		
My dog doesn't mind being left alone[b]				0.371		
My dog pulls on the leash when walking					0.616	
My dog jumps up on people					0.544	
My dog shows inappropriate sexual behaviours					0.475	
My dog barks excessively						
% Variance explained	16.87	9.77	7.81	5.89	5.09	
Chronbach α	0.79	0.68	0.68	0.37	0.29	
Descriptive statistics for the derived subscales and 'barks excessively' item[c]						
Valid cases	407	401	406	411	410	411

Table 2 (*Continued*)

Item[a]	Factor					
	Disobedient	Unfriendly/ aggressive	Nervous	Anxious/ destructive	Excitable	Barks excessively
% Obtaining score of 0	6.3	13.7	12.1	4.6	10.5	48.9
Max score obtained (max score possible)	26 (36)	22 (36)	14 (24)	17 (24)	8 (18)	3 (6)
Mean score	8.11	6.55	5.78	5.66	3.31	0.97
Standard deviation	5.59	4.95	3.73	3.35	2.17	1.18
Percentiles						
25	4	3	2	3	1	0
50	7	6	6	5	3	1
75	12	10	9	8	5	1

[a] Survey respondents were asked to rate how often they perceived their dog to exhibit 24 potentially problematic behaviours on a seven-point scale (0: never, 3: sometimes, 6: always).

[b] Items that were reverse scored during data entry.

[c] High scores on each behavioural subscale are indicative of a greater perceived incidence of potentially problematic behaviours.

Table 3
Correlations between behavioural subscale scores[a] derived from dog owners' survey ratings of perceived potentially problematic behaviours in their companion dogs and self reported demographic details about the owners and their dogs

	Disobedient	Unfriendly/ aggressive	Nervous	Anxious/ destructive	Excitable	Barks excessively
Participant age	−0.069	0.031	−0.027	−0.169**	−0.029	−0.105*
	407	401	406	411	410	411
Family size	0.129**	0.103*	0.088	0.060	−0.024	0.096
	407	401	406	411	410	411
Experience with dogs	−0.176**	−0.055	−0.106*	−0.137**	−0.099*	−0.095
	407	398	403	408	407	408
Current age of dog	−0.076	0.200**	0.033	−0.224**	−0.081	0.035
	400	396	399	404	403	404
Age of dog when acquired	0.000	0.027	0.055	−0.009	−0.059	0.008
	403	397	402	407	406	407

[a] Higher scores on all subscales are indicative of a greater perceived incidence of potentially problematic behaviours.
* Significant at $\alpha = 0.05$.
** Significant at $\alpha = 0.01$.

There were few significant results and many of those that were significant reflected only small differences between group means and weak correlations, statistically significant partially due to the large sample size. Scores on the 'disobedient' scale, which measured the degree to which a dog fails to sit, stay, or come when called, soils in the house and is generally considered to lack good manners and be disobedient, were positively associated with the family size of the respondent and negatively associated with the respondent's experience with dogs. Males reported that their dogs were more 'disobedient' than did females [$t(405) = 2.45$, $p = 0.03$] and participants not primarily responsible for the dog believed it to show more of the behaviours in question than did participants who were solely responsible or shared responsibility with another person [$F(2, 400) = 8.48$, $p < 0.001$]. Dogs believed by their owners to be crossbred were more 'disobedient' than dogs considered to be purebred [$t(400) = 2.37$, $p = 0.018$] and there was a significant difference across the size of the dog [$F(2, 373) = 8.78$, $p < 0.001$]. Tukey's post hoc tests revealed that the mean score obtained by small dogs on the subscale was significantly higher than the mean score obtained by medium or large dogs.

The subscale of 'unfriendly/aggressive' measured the extent to which the dogs in the sample were perceived to be generally unfriendly and aggressive towards strange and familiar people and towards other dogs. Very few dogs in our sample scored highly on this subscale, but the scores obtained were positively correlated with the size of the participant's family ($p = 0.04$) and the current age of the dog ($p < 0.001$). Respondents who did not consider themselves to be the primary carer for the dog reported higher levels of 'unfriendliness/aggression' than did both other participant groups [$F(2, 394) = 6.50$, $p = 0.002$]. The source of the dog also led to significant differences on this variable [$F(6, 390) = 4.10$, $p = 0.001$], with post hoc tests showing that dogs purchased from pet shops or shelters were considered by their owners to be more 'unfriendly/aggressive' than were dogs purchased from breeders.

Table 4
Mean scores and standard deviations on the behavioural subscales[a] derived from dog owners' survey ratings of perceived, potentially problematic, behaviours in their companion dogs across relevant demographic groups

	Disobedient	Unfriendly/aggressive	Nervous	Anxious/destructive	Excitable	Barks excessively
Participant gender						
Male	9.73* (6.46)	7.27 (4.95)	6.08 (3.63)	5.94 (3.97)	3.02 (1.86)	0.94 (1.19)
Female	*7.83* (5.39)	6.41 (4.95)	5.73 (3.75)	5.61 (3.24)	3.37 (2.22)	0.98 (1.18)
Responsibility for dog's care						
Respondent	*7.84* (5.55)	*6.37* (4.80)	*5.60* (3.68)	5.61 (3.45)	3.31 (2.09)	0.98 (1.17)
Shared	*8.09* (5.34)	*6.52* (5.14)	6.01 (3.83)	5.69 (3.10)	3.32 (2.30)	0.90 (1.18)
Another person	14.07** (6.47)	11.38** (4.11)	8.31* (2.36)	7.00 (3.94)	3.50 (2.59)	1.71 (1.27)
Dog sex						
Female	8.14 (5.67)	6.43 (4.87)	6.11 (3.58)	5.87 (3.20)	3.17 (2.00)	0.95 (1.18)
Male	8.12 (5.54)	6.74 (5.07)	5.45 (3.88)	5.48 (3.50)	3.51 (2.33)	1.00 (1.19)
Dog reproductive status						
Entire	8.67 (6.03)	6.14 (4.53)	*4.91* (3.72)	6.40* (3.63)	3.62 (2.26)	0.93 (1.20)
Desexed	7.98 (5.48)	6.69 (5.07)	6.05* (3.69)	*5.49* (3.24)	3.25 (2.14)	0.99 (1.18)
Dog type						
Crossbred	9.01* (5.75)	7.09 (5.08)	6.67** (3.39)	6.06 (3.37)	3.73** (2.11)	1.16* (1.25)
Purebred	*7.63* (5.47)	*6.27* (4.85)	*5.32* (3.83)	5.48 (3.34)	*3.14* (2.17)	*0.88* (1.13)
Dog size						
Small	9.87 ** (6.24)	6.62 (5.29)	5.78 (3.67)	5.70 (3.25)	3.16* (2.05)	1.05 (1.19)
Medium	*7.32* (5.22)	6.48 (4.78)	5.86 (3.84)	5.69 (3.36)	3.59* (2.30)	0.97 (1.17)
Large	*7.22* (5.04)	6.78 (4.82)	5.33 (3.67)	5.07 (3.33)	*2.91* (2.03)	0.79 (1.08)
Source of dog						
Pet shop	9.15 (5.80)	8.70** (5.07)	7.50* (3.73)	5.91 (3.49)	3.81* (2.15)	1.09 (1.18)
Breeder	7.96 (5.71)	*5.61* (4.59)	5.49 (3.77)	5.83 (3.47)	3.28* (2.13)	0.90 (1.14)
Animal shelter	7.98 (5.03)	7.83** (5.23)	6.18 (3.49)	6.15 (3.19)	3.58* (2.25)	1.15 (1.28)
Friend/family	9.16 (6.34)	7.57 (5.32)	5.02 (3.38)	5.07 (3.19)	3.64* (2.36)	1.14 (1.34)
Self bred	6.30 (8.21)	8.20 (5.29)	*4.80* (3.85)	3.40 (2.88)	*2.00* (2.54)	0.80 (.92)
Stray	7.37 (3.73)	5.84 (4.82)	5.58 (3.67)	5.24 (3.07)	2.47* (1.70)	0.97 (1.17)

[a] Higher scores on all behavioural subscales are indicative of a greater perceived incidence of potentially problematic behaviours.

* Significantly higher than italicized group at α=0.05 on the basis of independent group t test (variables with two levels) or one way analyses of variance followed by Tukey's post hoc tests (variables with more than two levels).

** Significantly higher than italicized group at α=0.01 on the basis of independent group t test (variables with two levels) or one way analyses of variance followed by Tukey's post hoc tests (variables with more than two levels).

The third subscale 'nervous' measured whether dogs in the sample were considered by their owners to be lacking in confidence in unfamiliar places and nervous, prone to startling easily and timid in new situations. Scores on this subscale were negatively associated with the participants' experience with dogs ($p = 0.03$) and there was a significant group difference for the variable 'perceived responsibility' [$F(2, 399) = 3.54, p = 0.03$]. Post hoc tests revealed that participants who were solely responsible for their dog's care cited fewer 'nervous' problems than people who were not responsible for the dog. Desexed animals also scored more highly on this subscale than did entire animals [$t(402) = 2.56, p = 0.01$] and crossbred dogs were reported to be more 'nervous' than were purebred dogs [$t(399) = 3.5, p = 0.001$]. The source of the dog was significant [$F(6, 395) = 2.82, p = 0.01$], with post hoc tests showing that dogs purchased from pet shops were considered to be significantly more 'nervous' than dogs bred by the present owner.

Consistent with its poor statistical reliability, the fourth subscale, 'anxious/destructive', appeared to be more complex than the preceding subscales. Two of the items probe whether the dog appears anxious or intolerant of isolation and the remaining two items assess whether the dog chews or digs destructively. While any results obtained using this scale should be treated with caution, the fact that these four items load on the same factor is consistent with the view that dogs who chew and dig often tend to do so because of anxiety or frustration. It is of interest, therefore, that, while the mean score on this subscale was very low (Table 2), only 4.6% of the sample obtained a score of zero. This indicates that most dogs are believed to dig or chew inappropriately, mind being left alone or appear anxious at least some of the time. There was a small positive association between scores on the 'anxious/destructive' subscale and the participants' age ($p = 0.001$), and a small negative association between the subscale and the participants' experience with dogs ($p = 0.006$). The current age of the dog was also negatively correlated with this variable ($p < 0.001$), and sexually intact dogs obtained a higher mean score than desexed dogs [$t(407) = 2.29, p = 0.02$].

The fifth subscale, 'excitable' contained three items relating to the dogs' tendency to act out in an excitable manner; jumping up on people, pulling on the lead and/or engaging in inappropriate sexual behaviour. The reliability of this subscale was too poor to allow definitive conclusions about its association with demographic groups to be drawn, but it is instructive that dogs in our sample generally obtained very low scores on this subscale (Table 2), with just over 10% obtaining a score of zero on all three items. Scores on the 'excitable' subscale were weakly but significantly negatively correlated with the respondent's experience with dogs ($p = 0.046$). Crossbred dogs were reported to be more 'excitable' than purebred dogs [$t(403) = 2.63, p = 0.009$] and there was a significant effect for dog size [$F(2, 375) = 3.18, p = 0.04$], with post hoc tests showing that medium and small dogs were more 'excitable' than large dogs. There was also an effect for source of dog [$F(6, 399) = 2.33, p = 0.03$], with dogs bred by their present owner considered to be less 'excitable' than other dogs in the study.

The final variable explored was 'barks excessively'. As is apparent from Table 2, the dogs in our sample were not generally considered by their owners to bark excessively. Scores on this single variable clustered tightly around the mean of 0.97 and no dog obtained a score higher than 3 (barks excessively sometimes) on the seven-point (0–6) scale. Almost half of the sample (48.9) obtained a score of 0 (never barks excessively). Barking

excessively was negatively correlated with participant age ($p = 0.03$) and crossbred dogs were perceived to bark excessively more frequently than were purebred dogs [$t(404) = 2.33$, $p = 0.02$].

To determine whether the behavioural variables were associated with training engagement and shared activities a correlation matrix was generated (Table 5). This revealed that many of the behavioural variables were significantly positively intercorrelated, although the correlations were generally modest. The strongest correlation (negative) was between 'training engagement' and scores on the 'disobedient' subscale. Other strong correlations (positive) were between 'shared activities' and 'training engagement', the 'unfriendly/aggressive' subscale and the 'nervous' subscale, and the 'disobedient' subscale and the 'anxious/destructive' subscale. 'Excessive barking' was also moderately correlated with the 'disobedient' subscale. Both 'training engagement' and 'shared activities' were significantly negatively correlated with four of the behavioural variables: 'disobedient', 'unfriendly/aggressive', 'nervous' and 'barks excessively'.

To determine which variables best predicted the presence of potentially problematic behaviours in dogs, a series of stepwise multiple regression analyses (Table 6) were conducted with the behavioural variables entered as criterion variables. Variables entered as predictors were training engagement, participant gender, age, family size and experience with dogs, dog sex, reproductive status, type, size and age. These were chosen on the basis of the earlier results showing them to be significantly associated with at least some of the variables of interest, and also on the basis of theoretical interest. For example, we were interested to see if dog sex or reproductive status were predictive of any of the behavioural variables, even though few group differences were evident in earlier analyses.

Four variables accounted for 17.3% of the variance in predicting 'disobedient' behaviours ($F(4, 370) = 19.29$, $p < 0.001$). The strongest significant predictor was 'training engagement', with the size and current age of the dog and the participants' experience with dogs also contributing significantly to scores on this subscale. For the 'unfriendly/aggressive' subscale, just two variables predicted 7% of the variance ($F(2, 368) = 13.79$, $p < 0.001$), 'training engagement' again being the strongest significant predictor, followed by the current age of the dog. Two variables also significantly accounted for 5% of the variance in predicting scores on the 'nervous' subscale ($F(2, 371) = 10.54$, $p < 0.001$), 'training engagement' again being the strongest significant predictor followed by whether the dog was considered to be purebred or crossbred. A significant amount of variance (6%) on the 'anxious/destructive' subscale was also predicted by two variables ($F(2, 372) = 12.83$, $p < 0.001$) but, on this subscale, the current age of the dog was a stronger predictor than 'training engagement'. On the 'excitable' subscale two dog-related variables accounted for 3% of the variance ($F(2, 372) = 5.21$, $p = 0.006$), with the type of dog (purebred versus crossbred) being the strongest significant predictor followed by whether the dog was desexed or not. Finally, the 'barks excessively' variable was significantly predicted by just one variable ($F(1, 373) = 7.86$, $p = 0.005$); 'training engagement'.

The final analysis conducted was a stepwise multiple regression analysis, with which we investigated whether scores on the 'shared activities' subscale were predicted by any of the demographic or behavioural variables (Table 7). Variables entered as potential predictors into the analysis were 'training engagement', participant gender, age, family size and

Table 5
Correlations between behavioural subscales, training engagement subscale and shared activities subscale, derived from dog owners' survey ratings[a]

	Disobedient	Unfriendly/ aggressive	Nervous	Anxious/ destructive	Excitable	Barks excessively	Training engagement	Shared activities
Disobedient	1	0.185**	0.208**	0.265**	0.080	0.234**	−0.345**	−0.150**
		0.000	0.000	0.000	0.107	0.000	0.000	0.003
	413	396	400	405	404	405	404	393
Unfriendly/aggressive		1	0.296**	0.088	0.045	.211**	−.201**	−0.253**
			0.000	0.079	0.365	0.000	0.000	0.000
		401	395	399	398	399	398	386
Nervous			1	0.207**	0.110*	0.176**	−0.184**	−0.200**
				0.000	0.027	0.000	0.000	0.000
			406	404	403	405	403	392
Anxious/destructive				1	0.123*	0.170**	−0.085	−0.010
					0.013	0.001	0.086	0.844
				411	408	409	408	396
Excitable					1	0.028	−0.014	0.024
						0.571	0.773	0.638
					410	408	407	395
Barks excessively						1	−0.144**	−0.178**
							0.004	0.000
						411	408	397
Training engagement							1	0.338**
								0.000
							410	395
Shared activities								1
								398

[a] Higher scores are indicative of a greater incidence of perceived potentially problematic behaviours, training engagement and shared activities respectively.
* Significant at $\alpha = 0.05$.
** Significant at $\alpha = 0.01$.

Table 6
Stepwise multiple regression analyses of behavioural subscales derived from dog owners' survey ratings of perceived, potentially problematic, behaviours in their companion dogs

	Standardized coefficients		
	Beta	*t*	Significance[a]
Disobedient subscale			
Constant	–	15.41	0.000
Training engagement	−0.34	−6.94	0.000
Size of dog	−0.16	−3.28	0.001
Age of dog	−0.12	−2.45	0.015
Experience with dogs	−0.11	−2.18	0.030
Unfriendly/aggressive subscale			
Constant	–	10.57	0.000
Training engagement	−0.18	−3.44	0.001
Age of dog	0.174	3.41	0.001
Nervous subscale			
Constant	–	12.13	0.000
Training engagement	−0.16	−3.06	0.002
Type of dog	−0.14	−2.80	0.005
Anxious/destructive subscale			
Constant	–	17.11	0.000
Age of dog	−0.24	−4.77	0.000
Training engagement	−0.12	−2.39	0.017
Excitable subscale			
Constant	–	9.72	0.000
Type of dog	0.16	−2.92	0.004
Reproductive status	0.08	−1.99	0.047
Barks excessively variable			
Constant	–	10.49	0.000
Training engagement	−0.14	−2.80	0.005

[a] Only variables that were significant predictors are shown.

Table 7
Stepwise multiple regression analysis of shared activities scale derived from companion dog owners' survey ratings

	Standardized coefficients		
	Beta	*t*	Significance[a]
Shared activities			
(Constant)	–	14.32	0.000
Training engagement	0.26	5.26	0.000
Unfriendly/aggressive	−0.12	−2.56	0.011
Age of participant	−0.18	−3.77	0.000
Number of people in household	−0.15	−3.15	0.002
Barks excessively	−0.13	−2.65	0.009
Gender of participant	0.12	2.54	0.012
Age of dog	−0.11	−2.25	0.025
Size of dog	−0.09	−2.12	0.035

[a] Only variables that were significant predictors are shown.

experience with dogs, dog sex, reproductive status, type, size and age, 'disobedience', 'unfriendly/aggressive', 'nervous', 'anxious/destructive', 'excitable' and 'barks excessively'.

Eight variables combined to account for 24.6% of the variance in predicting scores on the 'shared activities' scale ($F(8, 362) = 14.79$, $p < 0.001$). The strongest significant predictor was 'training engagement', followed by the perceived 'unfriendliness/aggressiveness' of the dog, the age of the participant, the number of people in the household, whether the dog was believed to bark excessively, the gender of the participant and the age and size of the dog. Scores on the remaining behavioural subscales ('disobedience', 'nervous', 'anxious/destructive' and 'excitable') were not significant predictors of 'shared activities' and nor were the participants' experience with dogs or the dogs' sex, reproductive status or type (crossbred versus purebred).

4. Discussion

The first aim in this study was to ascertain the perceived frequency of canine behaviours, believed to be potentially problematic for dog owners, in a relatively large convenience sample of companion dog owners. It was found that the behavioural variables included in the study fell into five factors, with only one variable, 'barks excessively', being excluded from the optimal factor solution. These factors were named 'disobedient', 'unfriendly/aggressive', 'nervous', 'anxious/destructive' and 'excitable'. While three of the factors demonstrated good reliability all results concerning the final two should be interpreted with caution. Mean scores on each of the subscales, derived by summing the items in each factor, and on the remaining single variable (barks excessively) were uniformly low, falling in the bottom half of the possible range and often within the bottom third. Given that the lowest point on each item was labelled 'never' and the midpoint labelled 'sometimes' this indicates that the respondents to our survey experienced few of the potentially problematic behaviours that we explored.

While it is difficult to draw valid conclusions without a comparison group, it is highly likely that our results are at least partially a function of the convenience sample employed. Presumably, only those people who are relatively engaged with their dog would voluntarily complete a questionnaire about their dog's behaviour, and such people might be expected to have reasonably well behaved dogs. Consistent with this explanation, three quarters of the sample obtained a relatively high score on the 'shared activities' subscale that we extracted from the MDORS (Dwyer et al., in press). Normative data for the MDORS is not yet available but the scores indicate that members of our sample kissed, hugged and groomed their dogs regularly, that they took their dogs visiting and riding in the car, that they bought them gifts and treats, played games with them and spent time simply sitting with them. Many dogs in the community probably do not enjoy such 'privileges' on a regular basis so it will be important in future to extend this study by targeting less committed owners. Nonetheless, our results are important in suggesting that the vast majority of dog owners, who are sufficiently engaged with their dogs to respond to an anonymous questionnaire, only infrequently experience potentially problematic behaviours. This is encouraging and consistent with

information that dog ownership remains extremely popular and rewarding despite increasing urbanisation.

The second aim in this study was to examine scores on the behavioural measures in relation to the demographic information collected about the participant and their dog. A number of significant findings emerged although most differences between group means were small and correlations between variables were generally weak to moderate. Not surprisingly, the amount of experience a participant reported having with dogs was an important factor in influencing dog behaviour, with experience and undesirable behaviours being weakly or moderately negatively correlated for four of the six behavioural variables. This supports findings reported by Kobelt et al. (2003) and Jagoe and Serpell (1996). Participant gender was significant only for general 'disobedience' and participant age was of little consequence, except in relation to 'anxiety/ destructiveness' and 'excessive barking'. Older participants reported that their dogs were more likely to dig holes or chew things inappropriately, and/or to appear anxious and mind being left alone. They also reported that their dogs were less likely to bark excessively. It is possible that the relationship between participant age and dog behaviour is influenced by a moderator variable. For example, since dog size was associated with scores on some of the behavioural subscales in our study, a tendency for older people to own smaller dogs and to keep them inside the house may account for their reporting more anxiety/destructiveness and less excessive barking.

Family size was significantly correlated with two of the behavioural subscales, with dogs from larger families being rated as more 'disobedient' and more 'unfriendly/ aggressive' than dogs from smaller households. This may reflect a diffusion of responsibility for the dog's training in larger households, increased tolerance of undesirable behaviour or simply a lack of time on the part of the adults in the family to address problematic behaviours in their pet dogs. Interestingly, when the respondent considered a person other than themselves to be primarily responsible for the dog they were describing, they scored it more highly on all of the behavioural subscales; the differences between groups being significant on three of the six variables. Very few respondents in our study (3.4%) did not feel at least partially responsible for the dog they described and perhaps these people chose to participate simply so that they could criticize the behaviour of a particular dog. Alternatively, perhaps the vast majority of our participants, who did feel responsible for the dog they described, tended to view its behaviour more favourably than was really warranted. It has previously been reported that there is an association between pet behaviour and owner attachment levels (Serpell, 1996). The relationship between perceived behaviour, actual behaviour and owner characteristics is an interesting one that deserves further investigation.

Dog related factors were perhaps less consistently associated with specific behaviours than might be expected given previous findings (Guy et al., 2001; Wells and Hepper, 2000), although this was also found in Kobelt et al's. (2003) study. There were no significant differences due to the sex of the dog and the dogs' reproductive status was associated with significant differences on only two of the six behavioural measures, 'anxiety/ destructiveness' and 'nervousness'. While desexed dogs were considered to be more nervous or timid than sexually intact dogs, they were also rated as less anxious and engaged in fewer destructive behaviours. Dogs believed to be crossbred fared more poorly on all

scales than did those believed to be purebred; being significantly more 'disobedient', 'nervous', 'excitable' and 'barking excessively' more often. This is unlikely to be a function of genetic differences between purebred and crossbred dogs, but may reflect differences in the level of commitment to dog training between owner groups. Participants were not asked to disclose the purchase price for their dog in this study, but the owners of purebred dogs typically pay more for their dogs and may be more committed to their care and training.

Smaller dogs were considered to be more 'disobedient' than large dogs and both small and medium dogs were more 'excitable' than large dogs. Kobelt et al. (2003) reported that larger dogs were more likely to attend formal obedience training than small dogs, perhaps because behavioural problems are considered to be more serious in larger dogs, but they did not report behavioural differences across dog size. Perhaps surprisingly, while the current age of the dog was positively associated with 'unfriendliness/aggressiveness' and negatively associated with 'anxious/destructive' behaviours, the age of acquisition of the dog was not correlated with any behavioural outcomes. This challenges a common misconception amongst members of the public that dogs will be more obedient and 'fit into' the family better if purchased as puppies, although it should be noted that the source of the dog was associated with differences on three of the behavioural subscales. This effect was somewhat inconsistent, however dogs purchased from pet shops generally scored more highly on the behavioural subscales than did dogs obtained from other sources. We were not able to ascertain if 'pet shop' dogs do actually exhibit more potentially problematic behaviours than do dogs from other sources. Perhaps 'pet shop' dogs are less adequately socialised as puppies than are other dogs, perhaps their parents are selected less carefully or perhaps the experience of being in a pet shop has lasting effects. Of course it might also be the case that people who buy puppies from pet shops, like those who buy crossbred rather than purebred dogs, may devote less time to training than do other owners, or such people may simply report more potentially problematic behaviours than do others, independently of the dog's actual behaviour. These possibilities clearly warrant further research as, if dogs purchased from pet shops do consistently display more potentially problematic behaviours, this issue should be addressed.

The third aim in the study was to investigate whether the participants engaged in one or more dog training activities and, if so, whether this engagement was associated with dog behaviours. Scores on the 'training engagement' scale varied widely. While the sample was reasonably normally distributed across two of the variables comprising the scale, reading books about dog training and discussing training with friends and family, the distribution for attending dog training was bimodal, with many participants having never attended formal training activities and many others being engaged with formal training on a regular basis. A previous report that only 24% of dog owners ever attend dog training classes (Coren, 1999) may have quite substantially underestimated dog owners' engagement with training, as other sources of information are clearly important. However, it is also possible that engagement in training has increased since the time of the previous publication or that our sample included a disproportionate number of dedicated dog trainers. In this respect it is interesting that, even in our sample of presumably highly committed dog owners, sufficiently interested in their dog to respond to our survey, there were still many persons who did not ever attend formal obedience training. This is an important finding given the

established links between participation in obedience training and a reduced prevalence of canine behaviour problems (Clark and Boyer, 1993; Jagoe and Serpell, 1996) and also the documented outcomes for many dogs that exhibit behavioural problems (Patronek et al., 1996; New et al., 2000; Marston et al., 2004). Work is currently underway in our laboratory to investigate peoples' attitudes towards dog training and also their satisfaction with the range of training services available.

As expected based on previous studies (Clark and Boyer, 1993; Jagoe and Serpell, 1996; Kobelt et al., 2003) 'training engagement' was moderately negatively associated with most of the behavioural subscales and made a significant contribution to predicting scores on these subscales. Dog owners who engaged in dog training activities reported that their dogs were less 'disobedient' and more friendly/less aggressive towards strange and familiar people and other dogs. These dogs were also reported to be less nervous and less likely to bark excessively. The methodology used in this study did not permit us to investigate a causal relationship between training engagement and dog behaviours. It seems likely that training engagement promotes 'better' behaviour in dogs, and common sense dictates that those with problem dogs should be more likely, rather than less likely, than other owners to engage in training activities. However, it is possible that owners of dogs who are 'naturally' well behaved are more likely to engage in training activities, perhaps because these activities are more enjoyable when shared with a well behaved dog. Perhaps people who intend to engage in training are also more careful in their selection of dogs to begin with. We were also unable to ascertain whether an owner's engagement with training actually led to dogs exhibiting fewer of the behaviours in question, or if it simply meant that the owner perceived fewer of these behaviours than did other dog owners. It is possible that there is no difference in the behaviour of the dogs concerned, but that owners who have invested time and money in training are simply more likely to rate their dogs as being better behaved, either because they expect this to be the case or because they have more knowledge of 'normal' dog behaviours.

Training engagement was, perhaps surprisingly, not negatively associated with scores on the 'anxious/destructive' subscale or with 'excitable' behaviours such as jumping up on people, pulling on the leash and engaging in inappropriate sexual conduct. Perhaps these issues are not adequately covered by the sources of training information available, or perhaps they are largely determined by the genetic makeup of the dog or its environment and are not particularly amenable to training. Alternatively, since both of these subscales had poor statistical reliability it is possible that the findings are misleading and they clearly require independent confirmation before being accepted. We did not ask participants to describe the type of training they engaged in, although previous studies (Hiby et al., 2004) suggest that this may have a substantial impact on dog behaviour. This issue is currently being investigated in our laboratory and will be reported at a subsequent date. The important thing to note at present is that participation in training activities is associated with a significantly reduced prevalence of canine behaviours that are potentially problematic for dog owners.

The fourth and final aim in this study was to ascertain whether members of the sample participated in shared activities with their dog and whether their level of involvement was predicted by the demographic information collected, 'training engagement', or the presence of behavioural problems. As expected, most participants in our self-selected sample did engage in many shared activities with their dogs, most of whom were acquired specifically as companions. The extent to which owners engaged in activities with their

dogs was moderately associated with 'training engagement'. It was also negatively associated with the dog being considered to be 'unfriendly/aggressive', 'nervous', 'disobedient' or to 'bark excessively'. The strongest predictor of 'shared activities' was 'training engagement', with a number of demographic variables (age, gender and family size of the participant and age and size of the dog) also having a significant effect. The only behavioural variables to make a significant contribution to predicting the 'shared activities' scale were the perceived 'unfriendliness/aggressiveness' of the dog and the extent to which it was considered to bark excessively.

It would be expected that demographic variables would significantly predict the number of activities an owner engages in with their companion dog. What has been demonstrated in this study, however, is that the owner's perception of their dog's behaviour is associated with the extent to which the dog is included in its owner's activities, and that this, in turn, is significantly influenced by the owner's engagement in training activities. Serpell (1996) previously reported an association between dog behaviour and owner attachment, but it is interesting to consider whether this relationship may be mediated by involvement in shared activities. Of course, a major limitation in this study is that we were not able to ascertain causal relationships between the variables. While it is likely that some people with poorly behaved, unfriendly/aggressive dogs are unable to engage in shared activities because of their dog's behavioural problems, it is equally likely that some dogs develop poor manners and become unfriendly or aggressive because they have limited opportunities to share activities with their owner. It would be interesting to explore this issue prospectively, perhaps by following puppies and their owners from the time of acquisition.

5. Conclusions

Three main conclusions emerged from this study. First, the vast majority of companion dogs owned by people willing to voluntarily complete a survey about dog behaviours are considered by those responsible for their care to rarely display behaviours identified in the literature as being potentially problematic for dog owners. Second, engagement in a range of training activities, but not only attending formal training classes, is predictive of a lower frequency of reported behavioural problems. Third, the extent to which owners engage in training activities and the extent to which their dogs are perceived to be unfriendly or aggressive, are predictive of engagement in a range of shared activities. This suggests that interventions which aim to increase involvement in dog training and improve dog sociability may have significant implications for companion animal owners through reducing behavioural problems. Such interventions may also have significant implications for companion dogs, whose welfare is likely to be considerably improved if they are sufficiently well mannered and sociable to engage in shared activities with their owners.

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Measurement of Bite Force in Dogs: A Pilot Study

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Summary: A force transducer was developed to measure bite force in dogs. A total of 101 readings was obtained from 22 pet dogs ranging in size from 7 to 55 kg. Bite forces ranged from 13 to 1394 Newtons with a mean for all dogs of 256 Newtons and a median of 163 Newtons. Most measurements fell within the low end of the range, with 55% of the biting episodes less than 200 Newtons and 77% less than 400 Newtons. J Vet Dent 12(2): 49-52, 1995.

Introduction

Knowledge of the forces exerted on a dog's jaw by everyday chewing activities and during maximal exertion of bite force could lead to a better understanding of the forces that must be overcome by fracture fixation devices and dental restorative materials, as well as the effect of factors such as facial morphology and malocclusion on jaw function. Very little information about the bite force of domestic animals has been reported in the literature. Forces reported in two veterinary dentistry texts[1,2] are widely divergent, ranging from 2.1-5.5 Newtons/mm^2 to 49-343 Newtons/mm^2; the authors did not indicate how these values were obtained. Other studies generally have used animals to model force transduction in humans or to develop new measurement methodologies, and therefore, investigators have not been concerned with the actual forces generated. Two reports describe the bite forces obtained in their dogs [3,4]. A maximum total force of 550 Newtons was generated during one study in which a transducer was placed between the jaws of seven anesthetized Labrador retrievers whose muscles of mastication were stimulated electrically[3]. A second study involved the implantation of a force transducer onto the mandible of three mixed breed dogs [4,5]. Forces recorded from the transducer reached a maximum of 150 Newtons when the dogs were chewing bones, and 70 Newtons when chewing dry dog food[4].

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The objectives of this study were to develop a non-invasive method to measure bite force in dogs, and to record bite forces in a variety of dogs.

Materials and Methods

Transducer Construction and Calibration

A transducer was constructed from a 42 cm long 2.5 cm diameter hollow steel rod. Transverse cuts were made through ¾ of the circumference of the rod 3 cm and 18 cm from the distal end. A longitudinal strip equal to ¼ of the circumference was removed between the two transverse cuts. Four foil resistance 35 ohm strain gauges arranged in a two arm active, temperature-compensated, Wheatstone Bridge configuration were glued to the inner surface of this portion of the rod (Fig. 1). Wiring from the gauges ran through the handle.

A strip of steel that partially filled the opening in the distal area was secured over the strain gauges to stiffen the apparatus so that it could withstand the large bite forces that were anticipated, but would allow some deformation. This area was covered first with a rubber tubing to protect the dog's teeth, and then with a beef flavored rawhide chew for taste appeal (Fig. 2).

Deformation of the rawhide-covered portion of the rod generated a voltage change across the strain gauges that was transmitted through the handle to a Digital Peak Indicator apparatus (228-D GSE, Inc., Farmington Hills, Michigan), which converted the voltage changes to force. For any given series of bites, the highest force generated was displayed. By switching to another channel, a series of five measurements could be made rapidly.

The transducer was calibrated and tested for linearity by applying compressive forces of known magnitudes up to 2000 Newtons in an electrohydraulic

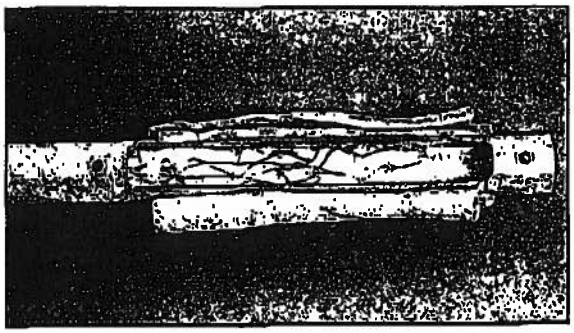

Figure 1. Photograph of strain gauges arranged on inner surface of bite force transducer

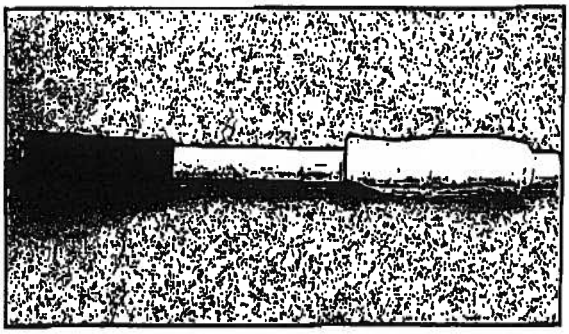

Figure. 2. Photograph of bite force transducer with rawhide covering

testing machine (810, MTS Systems Corporation, Minneapolis, Minnesota). One Newton is defined as the unbalanced force which produces an acceleration of 1 m/sec² in a mass of 1 kg.

Measurement Methods

Dogs owned by members of the veterinary community of the University of Illinois and members of a local dog obedience class were selected based on willingness of owners to allow their dogs to participate, and willingness of dogs to chew on the transducer rod. Twenty-two dogs were identified who fitted these criteria.

Each dog was offered the rawhide-covered transducer rod. Some dogs spontaneously grasped the transducer rod, and started chewing. Most were encouraged to grasp the rod by stimulating tug-of-war play behavior. One dog was Schützen-trained and grasped the rod on command. Bite force measurements were recorded from each dog.

Mean bite force measurements were determined for each individual dog and for the entire group. Data were divided into subsets according to (1) the weight of the dog, and (2) chewing enthusiasm (subjective + to +++ scale), and mean bite force measurements calculated for each category.

Results

One hundred and one bite force measurements were recorded from 22 dogs (Table 1). The dogs ranged in body weight from 7 kg to 55 kg. Five measurements were recorded from each of ten dogs. Two to four measurements were recorded from each of nine dogs who lost interest before five measurements were made. Six to nine measurements were recorded from each of three especially eager participants.

Bite forces ranged from 13 to 1394 Newtons with a mean for all dogs of 256 Newtons and a median of 163 Newtons. Most the measurements fell within the low end of the range: 55% were less than 200 Newtons, 77% were less than 400 Newtons. (Fig. 3). The mean bite forces for individual dogs ranged from 20 to 937 Newtons, with 65% of the means less than 200 Newtons and 91% less than 400 Newtons (Fig. 4).

There was a slight trend toward increasing bite force with increased body weight, which was more

Table 1. Bite Forces

Dog	Breed	Body Weight Range (kgs)	Chewing Enthusiasm	Bite Force (Newtons) Individual Measurements	Mean
1	Golden Retriever	23-34	+	94, 51, 105	83
2	Border Collie	11-23	+	163, 88, 88	113
3	Golden Retriever	23-34	++	68, 248, 108, 63	122
4	Rottweiler	>34	+++	476, 295, 732, 581, 626, 724, 661, 749, 754	622
5	Setter X	>34	+++	140, 173, 227, 318, 418, 313, 286	271
6	Shetland Sheepdog	<11	+	58, 57	58
7	Shetland Sheepdog	<11	+	68, 89	79
8	Golden Retriever	23-34	+	26, 38, 76, 47, 67	55
9	Golden Retriever	23-34	+	25, 46, 32, 55	40
10	Rottweiler	>34	+	241, 120, 283, 92	184
11	Doberman Pinscher	23-34	++	46, 160, 139, 252, 147	148
12	Labrador Retriever	23-34	++	169, 181, 137, 253, 296	206
13	Lab X Dane	11-23	++	67, 83, 133, 19, 30	66
14	Dalmatian	11-23	+	76, 74, 98, 65, 27	68
15	Chow X	11-23	+++	419, 234, 231, 298, 238	348
16	Golden Retriever X	11-23	+++	466, 305, 195, 123, 179	254
17	Labrador Retriever	11-23	+++	270, 372, 411, 647, 133	367
18	West Highland Terrier	<11	+	30, 16, 13	20
19	Belgian Tervuren	23-34	++	195, 112, 111, 251, 115	137
20	Belgian Tervuren	23-34	+++	310, 368, 378, 279, 250, 614	367
21	Labrador Retriever	>34	++	329, 85, 137, 313	197
22	Rottweiler	>34	+++	586, 644, 1394, 945, 1116	937

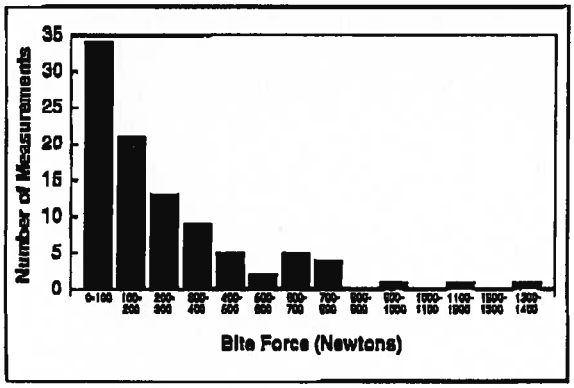

Figure. 3. Distribution of forces generated by individual biting episodes

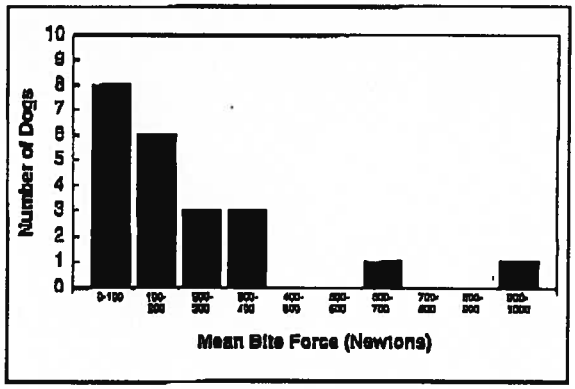

Figure 4. Distribution of the mean bite forces generated by each dog

Weight Range (kgs)	Mean Bite Force (Newtons)	Range of Bite Forces (Newtons)
<11	52	20-79
11-23	168	66-340
23-34	180	40-367
>34	442	184-937

Table 2. Body Weight Catagories of Dogs and Associated Mean and Range of Bite Forces

Chewing Enthusiasm	Mean Bite Force (Newtons)	Range Of Bite Forces (Newtons)
+	78	20-184
++	146	66-206
+++	451	254-937

Table 3. Chewing Enthusiasm of Dogs and Associated Mean and Range of Bite Forces

pronounced at the ends of the spectrum (Table 2). A stronger correlation was found between subjectively assessed eagerness to chew and bite force (Table 3).

Discussion

Possible reasons for the wide variation in bite forces include experimental design, and physical and behavioral characteristics of the dogs. Experimental design was challenging. Experimental methods previously used in dogs, electrical stimulation of the masticatory muscles of an anesthetized dog or surgical implantation of a transducer onto the mandible, raised ethical and practical issues. Both are invasive. Electrical stimulation may not be representative of the clinical situation because it measures forces mediated solely through the biomechanics of the jaw without accounting for the effect of sensory feedback from the periodontal mechanoreceptors[6-10]. A force transducer implanted on the mandible measures only that percentage of the total force that is actually transmitted to the transducer, which is often substantially less than the total force[5].

Methods used to measure bite force in humans are not easily applied to other species because an animal cannot be instructed to hold a transducer in a particular location in its mouth, or bite down with a specified amount of force. It was difficult to get the transducer positioned in the same location in each dog's mouth. Although most dogs held the transducer just caudal to the canine teeth, others chewed with their molars. Studies in humans have demonstrated that bite force may be 2-3 times as great as the transducer is moved from a premolar to a molar location[11,12,13]. Transducer position for each individual biting episode was not determined in this study.

We found it difficult to create a transducer rod that dogs wanted to chew: some dogs refused to chew at all and others chewed with varying amounts of enthusiasm. Chewing enthusiasm appeared to correlate strongly with the level of force generated (Table 3).

Training and prior experiences affect bite force in humans[8,14-16]; higher bite forces are found in persons who chew hard frozen food[17,18], habitually grind or clench their teeth[15], or have exercised their jaws [14]. Personality, breeding, and training may play a role in animals also. Dogs commonly are bred for particular traits. Sixty percent of the dogs in this study were hunting or herding dogs who are bred and trained to have "soft" mouths. For example, the four Golden Retrievers in this study had a mean bite force of only 75 Newtons.

In monkeys, where relative size differences are greater than among humans, a proportional relationship between bite force and body weight has been demonstrated[12]. Although dogs also have a wide range of body size and muscle mass, only a mild correlation appeared to exist between weight and bite strength except at the very ends of the spectrum (Table 2). Facial shape and masticatory muscle mass were not assessed in this study, but, based on human studies, these may also be significant influences.

Conclusions

A wide variety of bite forces were generated by a population of dogs during play behavior. In most instances, the forces generated were probably significantly less than the maximum force which that animal could produce. The variation observed may have been due to the interaction of several factors. In this study, behavioral factors appeared more strongly correlated with differences in bite force than physical factors. However, larger, more controlled studies would be necessary to prove this.

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BOOK REVIEW

Handbook of Veterinary Anesthesia (Muir, Hubbell, Skarda, Bednarski)

The Handbook of Veterinary Anesthesia is a wonderful digest that generously fulfills its stated goal of providing a ready reference on clinical veterinary anesthesia for students, practitioners, animal health technicians, and researchers. The book itself is small and can be conveniently tucked away in a large pocket, or placed in a treatment room area where it can be quickly accessed without taking up too much prized space. Though small, the bright red cover makes it unlikely that the book would blend into clutter and be lost. The book's compact size is deceptive because contained within its 510 pages is the most densely packed compilation of information one could imagine. All information is logically arranged and easy to locate either through the chapter headings or the index. The text is tightly organized in outline form and contains comprehensive lists and charts, covering just about every species and anesthetic scenario. Sometimes the outline style drones on seemingly forever, making it possible to lose track of the original subject, but each page has a heading to remind the reader of the main subject at hand. There are excellent medical illustrations that orient the reader very effectively. Some procedures are even illustrated from more than one viewing angle, helping the reader acquire a three dimensional sense effortlessly. The authors do not endorse any particular product or protocol, but they do report on advantages and disadvantages of various drugs, combinations, and equipment, and allow the reader to draw his/her own conclusion. Whenever appropriate, the authors warn the reader of pitfalls and contraindications. I found myself pondering just what unfortunate experience prompted some warnings and hoping that I will be spared some hapless adventure now that I have been so forewarned. Some of the information presented is very interesting and somewhat unusual, such as the acupuncture site for resuscitation, or how to intubate a rabbit, or which antibiotics can prolong or potentiate some anesthetic drugs. There is also an entire chapter on pain management, which is very poignant for veterinary dentists in light of the recent proclamations by AAHA and others mandating pain control for dental procedures. The adventurous and inquiring reader will be disappointed to find that there are almost no references provided, not even a bibliography or suggested reading list. There is such a vast amount of information presented, quite possibly a reference list would double the page numbers of the book. For the most part, the reader must trust that the information is reliable, and it probably is, giving the reputations of the authors. Occasionally, some of the information is suspect. For example, I would never have described methoxyflurane as "fruity", halothane as "sweet", or isoflurane as "pleasant." However, all things considered, I have great respect and gratitude for the amount of work the authors have done for us in creating this excellent, thorough, and practical book. I think in the future when a call goes out for the "the little read book", we won't be consulting Chairman Mao, but the Muir, Hubbell, Skarda, and Bednarski.

Suzy Aller

(Handbook of Veterinary Anesthesia, Second Edition, 510 pages, illustrated. Published by C.V. Mosby, St. Louis, 1995, price $44.95)