



Breed differences in everyday behaviour of dogs



Helena Eken Asp, Willem Freddy Fikse, Katja Nilsson, Erling Strandberg*

Swedish University of Agricultural Sciences, Department of Animal Breeding and Genetics, Box 7023, SE-750 07 Uppsala, Sweden

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ABSTRACT

The domestication of the dog and the ensuing breed creation has resulted in a plethora of dog breeds that differ not only in morphology but also in terms of behaviour. In addition, a majority of the dogs today are no longer utilized for their working ability, but are mainly kept as companion animals. The main aim of this study was to estimate breed differences in everyday behaviour traits, as well as to study the phenotypic correlations between these traits. Dog owners described their dogs' everyday behaviour in a questionnaire. The responses to the questions were combined into 18 behavioural subscale scores (BSS). After editing, the material included dog owner responses for 3591 dogs from 20 different breeds. The breeds represent both working and non-working breeds.

We can conclude that breed (and grouping into working vs non-working breeds), age and sex had significant effects on many everyday behaviour traits. The working breeds were about 10% more trainable, showed 30% more interest in playing with humans and were 10–60% less fearful. Furthermore, our results showed that fearful dogs were more aggressive, whereas more social dogs were less fearful and less aggressive. We also found that dogs that were more eager to play with humans were also easier to train.

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1. Introduction

Today, most dogs are not used for the original purpose of the breed; instead, they are companion dogs (Kobelt et al., 2003; Bennett et al., 2007; King et al., 2012). The majority of dogs today are considered family members, living in our homes and participating in everyday activities. Many companion dogs are on a daily basis exposed to situations that can cause stressful and fearful reactions, for example, being left home alone (Norling and Keeling, 2010; PAW, 2013), heavy traffic, sudden noises and strange objects (Sherman and Mills, 2008). In a survey study by King et al. (2009) participants were asked to describe their ideal companion dog, results showed that the dog should be safe with children, friendly towards people, calm and well behaved. Several studies have shown that the most common reason for relinquishing a dog to a shelter is that the dog is not behaving according to their owners' expectations – common behaviour problems are hyperactivity, noisiness and fearfulness (Wells and Hepper, 2000; Weng et al., 2006; Khoshnegah et al., 2011). Thus, everyday behaviour is very important for both the wellbeing of the dog and their owners.

The ability to herd, hunt or guard have been important selection criteria in dog breeding, perhaps for hundreds or even thousands of years (King et al., 2012), and today there is a great variation in behaviour between breeds. Several previous studies have shown that behavioural differences can be identified between breeds (Serpell and Hsu, 2005; Notari and Goodwin, 2007; Duffy et al., 2008; Hsu and Sun, 2010). For example, Duffy et al. (2008) found breed differences for aggressive and fearful behaviour by using a survey to dog owners. However, Svartberg (2006) could not find any significant differences between the breed groups that were defined based on the original purpose of the breeds; results from a standardized behaviour assessment were used in his study.

A majority of the tests previously used in behaviour studies have a main purpose to find suitable working dogs, e.g., police dogs, guide dog or other types of working dogs – whether the results from those tests are applicable for non-working dogs is less studied (Jones and Gosling, 2005). Svartberg (2006) studied the differences between working and non-working dogs and found that breeds with more show merits tend to be more fearful and less playful, compared with breeds that also have other types of merits. A greater knowledge regarding the similarities and differences in behaviour between working and non-working dog breeds could be important for potential dog owners in their choice of breed. Such knowledge could also be important for researchers when planning a study and interpreting the results.

Many of the previous studies regarding behaviour in dogs are based on behaviour assessments or behaviour tests (Jones and

* Corresponding author. Tel.: +46 18 67 19 52; fax: +46 18671201.

E-mail addresses: helena.eken@slu.se (H. Eken Asp), freddy.fikse@slu.se (W.F. Fikse), katja.nilsson@slu.se (K. Nilsson), erling.strandberg@slu.se (E. Strandberg).

Gosling, 2005), recording the dogs' reaction to different stimuli. Everyday behaviour has often been assessed through a questionnaire to the dog owner or to dog experts, e.g., judges, veterinarians or dog-trainers (Jones and Gosling, 2005). In their review, Jones and Gosling (2005) found that experts have been used to assess the general behaviour of a breed or sex. Bias in expert ratings of dog breeds can occur due to media and cultural background (Notari and Goodwin, 2007). More recent studies often ask dog owners to describe individual dogs (Jones and Gosling, 2005). Bias from the subjective description of a dog owner is limited by using a large number of independent responses (Jones and Gosling, 2005).

The aim of this study was to estimate the effect of breed and the grouping into working/non-working breed on everyday behaviour in a sample of the Swedish dog population. We also analyze how various everyday behaviours are related to each other.

2. Materials and methods

2.1. Choice of breeds

Purebred dogs from 20 breeds registered at the Swedish Kennel Club (SKC) were included in the study (Table 1). The breeds were selected based on the information from SKC, breed clubs and the number of new registrations (at SKC) per year. One criterion when selecting breeds was to include both working and non-working breeds. Working breeds were defined as breeds where the SKC has assigned the responsibility for the breeding work to the Swedish Working Dog Association. Dogs from these breeds are required to participate in the Swedish Dog Mentality Assessment (DMA) before they are used for breeding. The results from the DMA are made official through the SKC webpage and are thereby available for breeders. In addition, the working breeds are required to have both working and show merits before receiving a champion title (either in working or in show). The distribution between working and non-working breeds in the sample was 11 vs 9 breeds. All working breeds had an origin from herding or guarding dogs. Dogs born in the years 2000–2011 were included in the study. Dogs that were no longer alive were also included in the analyses.

2.2. Questionnaire

Information regarding everyday behaviour was assessed through an online questionnaire which was open for all dog owners from September 2012 to October 2013. A link to the questionnaire was posted on the SKC website. There were also advertisements on the websites of the selected breed clubs. E-mails were sent to 18 822 dog owners of the selected breeds and age groups. The e-mail addresses were received from the SKC. The only identification required to answer the questionnaire was the registration number of the dog, which was later matched to the SKC registrations.

The questionnaire was a combination of the Canine Behaviour Assessment and Research Questionnaire (C-BARQ), developed and validated by Hsu and Serpell (2003) and questions regarding playfulness and sociability, previously used in a study by Svartberg (2005). The C-BARQ questionnaire consisted of 118 questions and the questions regarding playfulness and sociability consisted of 15 questions. For all these 133 questions, the respondent used a five-grade scale to describe the dogs' typical behaviour in the recent past when exposed to certain stimuli. There were two scales used in the questionnaire: one indicated the severity of the behaviour (how much of the behaviour the dog showed) on a scale of 0 (no sign of the behaviour) to 4 (severe form of the behaviour) and the other indicated how often the dog showed the behaviour (the scale was never to always). Some questions were added to collect more information about the respondent, the identity of the dog and some

specific behaviour. In total the online questionnaire contained 152 questions. The date when the questionnaire was answered was generated by the online system. The questions regarding the dogs' behaviour could be condensed into 18 behaviour subscale scores (BSS) (Table 2) according to the previous literature (Hsu and Serpell, 2003; Svartberg, 2005; Duffy et al., 2008; Duffy and Serpell, 2012). The BSS is the average value of the included items. A BSS value was calculated for the dog when there was information for more than 2/3 of the included items.

2.3. Data editing and description

Information about all SKC registered dogs for the 20 breeds was retrieved from SKC. The records from SKC contained the unique SKC registration number of the dog as well as information regarding breed, age and sex of the dog.

The dataset included a total of 5841 questionnaire records, before editing. To identify dogs of the selected breeds the registration number given in the online questionnaire was matched with the unique SKC registration number from the SKC information. The records that could not be matched to the SKC information, because the dog was not one of the selected breeds or there was no identity information, were excluded (1860 records). Questionnaire records were also removed for the following reasons: duplicate entries (146) and dogs born before 2000 or after 2011 (254). In total there were 3591 records available for further analysis (Table 1).

The dogs were nearly evenly distributed over sexes: 46% males on average across all breeds (Table 1). The median age of the dogs was 4.7 years. The dogs were divided into seven age categories (1–2, 3, 4, 5, 6–7, 8–9 and 10–14 years) to avoid small age classes. The age groups 1–2 and 3 years each had 15% of the dogs, age groups 4 and 5 each had 12%, 19% of the dogs were 6–7 years old, 14% of the dogs were 8–9 years old and 13% were older than 10 years old.

2.4. Statistical analysis

Cronbach's alpha was calculated for each of the behaviour subscale scores (BSS) based on the Pearson correlations between the items included in the specific BSS by using the correlation procedure in SAS (SAS, 2011). Analysis of factors affecting the behaviour subscale scores was performed using ordinary least squares as implemented in the general linear model procedure in SAS (SAS, 2011). The model used to describe the data was:

$$y = \mu + \text{group} + \text{breed}(\text{group}) + \text{age} + \text{sex} + \text{age} * \text{breed}(\text{group}) \\ + \text{sex} * \text{breed}(\text{group}) + e$$

where y is the individual BSS value, μ is the overall mean, group is the fixed effect of breed classification (working or non-working, Table 1), $\text{breed}(\text{group})$ is the fixed effect of breed nested within group , sex is the fixed effect of the sex and age is the fixed effect of the age (seven age classes: 1–2, 3, 4, 5, 6–7, 8–9 and 10–14 years) of the dog, $\text{age} * \text{breed}(\text{group})$ is the interaction between age and breed nested within group , $\text{sex} * \text{breed}(\text{group})$ is the interaction between sex and breed nested within group and e is the individual random error, assumed to be $N(0, \sigma_e^2)$. Sex was divided into two classes, male or female. Age was calculated by subtracting the birthdate of the dog from the date when the questionnaire was answered, and then divided into seven classes.

The breeds were grouped in a hierarchical cluster analysis using hclust complete linkage method in the R-package (RCoreTeam, 2013). Clustering was based on the LS means for each breed ($\text{group} + \text{breed}(\text{group})$) for all the 18 BSS. The correlation procedure in SAS (SAS, 2011) was used to estimate the phenotypic correlations between BSS.

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