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Pilot study to design a behavioural test to detect separation related problems in dogs

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Introduction

A significant number of dogs are referred to the behavioural therapist or veterinarian for their behaviour that occurs at the times that they are separated from or denied access to their owner. These behaviours are called *separation related problems*. Mostly, they are represented by excessive vocalisation, house soiling and/or destructiveness. Separation related problems seems to have different causes, e.g. boredom, inappropriate house breaking, traumatic experiences, reaction to arousing stimuli and separation anxiety (Schwartz, 2003; Bowen and Heath, 2005). For many years separation related problems was synonymous for 'separation anxiety', until the latter was clearly defined as a problem behaviour motivated by anxiety that occurs exclusively in the owner's absence (Appleby and Pluymakers, 2004). This means that separation related problems are not always linked to anxiety. The diagnosis and subsequent treatment of separation related problems may be improved by tools that discriminate different causes.

The objective of the pilot study presented is to develop a behavioural test to detect separation related problems and other behaviours related to these problems in dogs. The ultimate goal of the project is to diagnose separation anxiety in dogs by the use of a simple behavioural test.

Materials and methods

Forty-five dogs were divided in two groups on the basis of their behaviour as reported by the owners: Problem Group (SG), including 20 dogs (11 males and 9 females) that showed separation related behaviours, and Control Group (CG), including 25 dogs (7 males and 18 females) that did not show any separation related behaviour. These animals were submitted to a behavioural test that included 3 different phases (T_1–T_3) and was performed in a test room furnished like a living room: T_1, the dog spent 4 minutes with its owner; T_2, the dog was left alone in the test room during 18 minutes; T_3, the behaviour of the dog was observed during 35 seconds after the owner returned to the test room. Data on locomotion (e.g. *walking, standing, sitting, lying, jumping*), orientation (e.g. *door, owner, couch, window, other objects*), vocalisation (e.g. *barking, whining and peeping, howling*), tail position (*high, neutral or low*), time spent in the sectors of the test room (*sofa, door, window, TV, carpet*) and other behaviours (e.g. *destruction, play, exploration, panting, urinating, shacking, paw lifting, sneeze, mouth behaviour*) were collected using The Observer software (Noldus Technology, Wageningen, The Netherlands). Changes of locomotive state were also studied.

The data were analysed with Restricted Maximum Likelihood (REML) by use of a Linear Mixed Model (LMM) in the computer program GENSTAT (VSN International, UK). Effects of group (SG or CG), phase (T_1, T_2 and T_3), gender and interactions among these fixed components were tested per behavioural parameters. Dogs were assimilated as random component to account for multiple measurement per individual.

Table 1: Behaviours that showed a statistical significant difference between SG and CG.

Behaviour	Definition
Jumping	Dogs pushes up on hind legs whereby its body goes up, front legs get off the floor and could touch the door, the window or the owner.
Other objects	Eyes are fixed on other objects than door, owner, couch or window.
Barking	Mouths open fast and loud sound comes out.
Peeping	Short high vocalisations, mouth mostly closed.
Whining	Several consecutive peeps, loud noise.
High tail	The main tail axis, described as a straight line going from the base to the point of the tail, describes with the dorsal line of the body a positive angle.
Neutral tail	The main tail axis describes with the dorsal line of the body a negative angle between 0 and 90 degrees.
Low tail	The main tail axis describes with the dorsal line of the body a negative angle greater than 90 degrees, with the tail between the posterior legs.

Results

Behaviours that where shown by less than 21 dogs (*howling, destruction, play, urinating, sneeze*) were not analysed statistically. *Low tail position* occurred minimally and was added to *neutral tail position*. In comparison with dogs in CG, those in SG showed more ($P < 0.05$) orientation to *other objects* during T_1; more *barking, whining and peeping* and changes of locomotive states in T_2; and more *whining and peeping, high* tail position (or less *neutral and low* tail position) and, limited to female dogs, more *jumping* during T_3.

Discussion

Dogs which manifested separation related problems in the home situation showed more visual explorative behaviours in presence of the owner during testing. More changes in locomotive states and vocalisation were exhibited when the SG dogs were left alone, and more greetings behaviours when reunited with their owners, compared to control dogs. These behaviours could be considered as indicators of a higher degree of arousal or anxiety. Differences in anxiety behaviour between SG and CG dogs could be interpreted as a variation in secure-insecure attached dimension of dogs toward the owner (Topal *et al.*, 1998). Further studies are required to assess which behavioural signs are specific for dogs affected by separation anxiety.

Keywords: Behavioural Test, Dog, Separation Anxiety, Separation Related Problems.

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POSTER

Use of a synthetic analogue of a dog appeasing pheromone in sheltered dogs after adoption

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Introduction

Adaptation to the new socio-environment might actually be a very hard step for sheltered dogs. The aim of this study was to investigate the use of a synthetic analogue of a dog appeasing pheromone (DAP® Ceva Santé Animale) in dogs rehomed from a rescue shelter. The study was performed according to a prospective open label experimental design, comparing the evolution according to time of the experimental group of dogs treated with DAP®.

Materials and Methods

The dogs were divided in two groups (puppies: 2–6 months; adults: 6 months–7 years). Exclusion criteria were abnormal behaviours and severe emotional disturbances,[1] primary organ failure and presence in the shelter for less than 2 months for adults. Validated behavioural tests were performed for preliminary overall assessment.[2,3]

At adoption V_0 a DAP® diffuser was given to the owners, who were briefed verbally but no behavioural consultations were given throughout the study time. At V_1 (28 ± 3 days) and V_2 (56 ± 3 days) the owners were interviewed in control visit in the shelter; between V_0 and V_1 the questionnaire was filled up by the investiga-

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PILOT STUDY TO IDENTIFY RISK FACTORS FOR COPROPHAGIC BEHAVIOUR IN DOGS

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INTRODUCTION

According to several training centres of guide dogs and social dogs in the Netherlands their trainee dogs seem to be prone to develop coprophagic behaviour. Trainee dogs are even expelled from the training programme, especially if a dog shows coprophagia together with other forms of unwanted behaviour. Also working guide dogs and social dogs are no longer suitable for use if they show this problem behaviour and have to be replaced by another trained dog. So these rejections of dogs because of coprophagic behaviour can be considered as economic "losses" to training centres for guide and social dogs.

Consumption of faeces or coprophagia is widespread among animals. In dogs we distinguish two main types: dogs eating dog stool (intraspecific coprophagia) or dogs eating stool of other animals like cats, rabbits, ungulates and humans (interspecific coprophagia). Furthermore in the dogs eating dog stool two types can be distinguished: dogs that ingest their own faeces (autocoprophagia) and dogs that ingest faeces of other dogs (allocoprophagia). Whereas it is natural behaviour that adult bitches consume the faeces of their puppies, all other forms of coprophagia might be considered abnormal (Landsberg e.a., 2003). Although authors like Landsberg et al (2003) and Askew (2003) report that this behaviour is very common especially in pups and young dogs, the prevalence of coprophagia in the dog population is not known.

In the literature several factors have been hypothesised to cause coprophagia. In the first place physical causes like deficiencies or nutritional problems. These problems can arise either from the dog's physical state or from the dog's diet. Reed and Harrington (1981) reported that Beagles started to show coprophagia after deprivation of thiamine (vitamin B-1). However this might be ruled out as cause in our well fed Western pet dogs. Also coprophagia can be one of the clinical signs for exocrine pancreatic insufficiency (together with mild to marked weight loss, diarrhoea, fatty stool – light in colour and flatulence), and treatment will be aimed at replacing digestive enzymes (commercial products such as Pancrezyme ® or Viokase-V®). Furthermore it is suggested that gender, hunger, stress and/or boredom, and social learning (Askew, 2003; Serpell, 2002; Beerda e.a., 1999) might be causes of coprophagia. But, as

far as we know, not one single published research is focused on the risk factors of coprophagia in dogs.
However, as long as we are not able to properly assess the cause of the stool eating behaviour, the therapy is likely to be unsuccessful. In order to understand the possible motivations underlying this problem behaviour we started a pilot study. The goal of this study was to estimate the prevalence of coprophagia and quantify risk factors, which might contribute to the development of coprophagic behaviour.

MATERIALS AND METHODS

In this study 517 dogs, considered by their owner to have a behavioural problem and therefore sought therapeutic help, were investigated for their coprophagic behaviour. Only 2 owners reported coprophagia to be the problem.
Information about the dog's behaviour was noted on a standardized client's fact sheet, from which five groups of risk factors were selected:

- Physical and behavioural characteristics of the dog: age (until one year vs one year and older), breed (retrievers vs all other dogs), gender (female vs male)
- Satiation and hunger: castration (yes vs no), style of eating (greedy vs normal to slow), weight (normal or overweight vs underweight), meals per day (two or more vs one)
- Stress: chasing (shadows and/or own tail vs no or other), pica (yes vs no) and amount of different owners a dog had (one vs two or more)
- Under stimulation (boredom): walks per day (one vs two or more), play (yes vs no) and training (yes vs no)
- Amount of dogs raised by the owner (one vs two or more) and mother with nest until 7 weeks (no and unknown vs yes)

Preliminary statistical analysis was performed using logistic regression in which a group of dogs with coprophagia and a group of dogs without this behaviour were compared with respect to presence of hypothesized risk factors. The strength of the association between a factor and coprophagia is calculated through an Odds Ratio (OR), which is an approximation of the Relative Risk. An OR greater than 1 indicates a positive statistical association between factor and behaviour, identifying the factor as a risk factor. An OR less than 1 indicates a negative statistical association: in that case the factor may be seen as having a preventive effect for the behaviour. An OR of 1 suggests that there is no association at all. The OR is significantly greater or less than 1 if the value 1 is not included in the confidence interval. The further the deviation is from 1, the stronger the association between factor and disease. Thus, the OR can be interpreted as the excess of risk of showing the behaviour due to exposure to a certain factor.
In this paper only outcomes of univariable analysis of dogs eating dog faeces are presented. Analysis of dogs eating all kind of faeces is in progress. To correct for confounding and/or interaction, a multivariable analysis needs to be done.

RESULTS

Almost half of the 517 problem dogs (= 231), representing different breeds and age classes, show intra- and/or interspecific coprophagia. Of these coprophagic dogs 59 (25.5 %) showed intraspecific coprophagia. More than half of these dogs (55.9 %) eat only faeces from other dogs, whereas 37.3 % only eat their own faeces. Four dogs consume their own faeces as well as faeces from other dogs (table 1).

Table 1: Distribution of the type of dog faeces eaten

Types of dog faeces	N	%
Only own faeces	22	37.3
Only other dog's faeces	33	55.9
Both	4	6.8
Total	59	100

The risk factor gender was analysed for different types of faeces eaten (table 2). Female dogs (50.9 %) showed more often ($P < 0.05$) coprophagic behaviour of all types of faeces than males (40.5%). Also females (38.5%) eat more often ($P < 0.05$) stool from other animals than males (29.8%). However, analysis of dogs which only eat dog faeces shows no gender difference (N.S.; 12.4% versus 10.7%).

Table 2: The prevalence (Prev) and Odds ratio's (OR) of the risk factor gender for three types of faeces eating

Type of faeces eaten	**Risk factor**	n	%	Prev	OR	95% CI	P wald
All types	Female	218	42.2	50.9	1.53	1.07-2.17	**0.0186**
	Male	299	57.8	40.5	Ref		
Only dog faeces	Female	218	42.2	12.4	1.18	0.68-2.03	0.5526
	Male	299	57.8	10.7	Ref		
Only other animal faeces	Female	218	42.2	38.5	1.48	1.02-2.14	**0.0374**
	Male	299	57.8	29.8	Ref		

The univariable analysis for the other 14 risk factors was focused on dogs eating dog

faeces. This analysis revealed 6 of these 14 factors to be significant (table 3). Castrated dogs (14.9 %) eat more often ($P < 0.05$) dog faeces than not castrated dogs (9 %). Dogs with a greedy style of eating (17.7 %) show more often ($P < 0.05$) intraspecific coprophagia than dog with a normal or slow style of eating (8.6 %). Also retriever breeds (18.3 %) show this behaviour more frequently ($P = 0.05$) than other breeds (10.3 %). Dogs that chase shadows and/or their own tail (18.5 %) also eat more frequently ($P = 0.01$) dog faeces than non chasing dogs (9.5 %). Furthermore dogs with mothers absent from the nest (14.9 %) eat more often ($P < 0.05$) dog stool than dogs that had their mother with the nest (9 %). Finally dogs being with their first owner also show more often ($P < 0.05$) dog faeces eating behaviour than dogs being with their second or later owner (7 %).

Table 3: The prevalence (Prev) and Odds ratio's (OR) of the other significant risk factors for eating dog faeces

Risk factor		n	%	Prev	OR	95% CI	P wald
Castration	Yes	195	37.8	14.9	1.76	1.02 -3.05	**0.0437**
	No	321	62.2	9.0	Ref		
Style of eating	Greedy	158	30.6	17.7	2.28	1.32 -3.95	**0.0033**
	Normal to Slow	359	69.4	8.6	Ref		
Breed (retriever)	Yes	71	13.7	18.3	1.95	0.99 -3.83	**0.0525**
	No	446	86.3	10.3	Ref		
Chasing	Shadow + tail	108	20.9	18.5	2.16	1.20 -3.88	**0.0103**
	No + other	409	79.1	9.5	Ref		
Mother with nest	No + unknown	47	14.2	25.5	2.62	1.24 -5.54	**0.0118**
	Yes	285	85.5	11.6	Ref		
Different owners	1	359	69.6	13.4	2.05	1.03 -4.06	**0.0399**
	2 or more	157	30.4	7	Ref		

CONCLUSION AND DISCUSSION

In this research population about half of the problem dogs show one or more types of coprophagic behaviour. About one out of ten dogs eat dog faeces. Wells and Hepper (2000) found a prevalence of 12.9 % coprophagia reported as a problem by owners

of dogs within 4 weeks of purchase from an animal rescue shelter. Unfortunately this percentage is not comparable with our findings, because it was not clear what types of coprophagia was asked for, since only 'eats faeces' was listed in the questionnaire.
The clear difference between the percentages of dogs eating their own faeces and dogs eating other dogs faeces, while only 6.8 % eat both types of dog faeces, suggest different causes for intraspecific coprophagia. Due to lack of data it was not possible to differentiate between the different types of intraspecific coprophagia (own faeces of other dog's faeces) and to assess the risk factors for each type.
Female dogs show significantly more often coprophagia than males. This is in concordance with the findings of Askew (2003). Why females show this behaviour more often is unknown.
The other significant risk factors indicate different type of causes for coprophagia of which hunger (castration and greedy style of eating) and stress (chasing shadows and/or own tail) are the most obvious one.
In order to study prevalence and risk factors for coprophagia more in depth we designed an internet survey (in Dutch) for dog owners (www.dierenwetenschap.com). So not only prevalence can be determined, but also do we hope to gather enough data to quantify the risk factors for the different types of coprophagic behaviour. Also other risk factors like age at the onset of the problem, source of purchase of the dog and type of dog food need to be investigated. Understanding the causes and risk factors is the first step in a better understanding of development of coprophagia. With that we might be more able to help dog owners to prevent, control or solve this unwanted behaviour.

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KEYWORDS

dog; problem behaviour; coprophagia; prevalence; risk factors.

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THE EFFECTIVENESS OF DOG PERSONALITY TESTS FOR IDENTIFYING DOGS PRONE TO POOR WELFARE IN RESCUE SHELTERS.

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A large degree of individual variation exists in terms of how dogs respond physiologically and behaviourally to confinement in rescue shelters (Stephen & Ledger, 2005; 2006). This study was undertaken to determine the degree to which dogs' personality characteristics correspond with these response to confinement. Subsequently, the relationship between a dog's personality and its emotional response to kennelling is inferred.

Ninety-four dogs were relinquished by their owners to Battersea Dogs' Home (Old Windsor, UK). On their second day in kennels, each dog was subjected to 7 behaviour tests, during which, dogs were rated on five personality dimensions: playfulness, excitability, anxiousness, fearfulness and exploration. A mean personality score for each dimension was calculated for each dog based on how it behaved across all seven tests. These mean personality scores were found to be reliable (Cronbach alpha range 0.65 to 0.85, N=94). Comparisons between personality scores derived from the behaviour tests and personality ratings provided by the dogs' owners revealed correlations that support the validity of the personality scores (Spearman rho range 0.32 to 0.52, N=40). The behaviour displayed by dogs in their kennels was monitored daily for 14 days following admittance using a checksheet for direct behavioural observations of the dogs by staff (see Stephen & Ledger, 2005) and video footage taken in the absence of people for 20 minutes on days 2, 5 and 10.. Urinary cortisol: creatinine (CCR) levels were sampled on days 2, 5, 10 and 17 at approximately 0800 hours when dogs were removed from their indoor kennels where they had been confined overnight and walked on lead in a grass paddock until they urinated (see Stephen & Ledger, 2006).

Dogs with the most playful, explorative and excitable personalities displayed more

BEHAVIOURAL TEST FOR THE DIAGNOSIS OF SEPARATION RELATED PROBLEMS IN DOGS

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Separation related problems are common in dogs and the syndrome is often referred to as separation anxiety (SA). SA may be defined as problem behaviour motivated by anxiety and occurring exclusively in the absence of the owner. The diagnosis for SA is usually based on owner reports and lacks the use of objective criteria. The goal of the present experiment was to validate a behavioural test for a standardized and objective diagnosis of SA. In total 63 dogs were selected based on the behavioural history according to the owner and their age (< 7 years). Owners of 39 problem dogs and 24 control dogs filled out the C-BARQ questionnaire (developed and validated by Hsu & Serpell, JAVMA 2003) on the behaviour of their dog and participated in a behaviour test. The test consisted of three intervals (I: dog + owner, 3 minutes; II: dog alone, 20 min; III: dog + owner, 3 min). Preliminary results of a principal component analysis (PCA) indicate that the major components were related to "walking aimless" (28.14% of variance, walking, etc.), "restlessness" (19.37% of variance, jumping, walking, etc.) and "greeting behaviour" (14.7% of variance, greet jumping, mouth licking, etc.) of interval 1, 2 and 3 respectively. In interval II problem dogs scored significantly higher on the "restlessness" component and on howling and urinating. More time was spend on destruction in problem than in control bitches. No such difference was found for male dogs. Barking, whining, howling, urinating and destructing in interval II of the test were correlated positively with the owners opinion (answers C-BARQ questionnaire) on how often these behaviours occurred when the dog was left at home (Spearman's rho 0.2-0.6; $P<0.05$). We conclude that this behavioural test could be a useful tool to obtain a standardized and objective diagnosis for separation related problems in dogs.

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VOCAL EXPRESSIONS OF DENSITY, GROUP SIZE AND WELFARE IN LAYING HENS

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Vocalizations in laying hens may be indicative of hunger, motivation to lay an egg or to dust bath. Can vocalizations also be indicative of high density, large group size or welfare per se, without any additional motivation? The effects of stocking density and group size on vocalisation and interactive behaviour of laying hens were measured. Subsamples of 40 Lohman Brown laying hens were tested in 25 crossed combinations of group size (2, 4, 6, 8, and 10 birds) and density (1, 3.2, 10, 17.8 and 31.6 hens/m^2) during tests of 15 minutes. Using behavioural sampling, all vocalisations and overt interactive behaviour were measured. Using multiple regression and non-linear statistical catastrophe models the complex relations between vocalizations, overt behaviour, density and group size are analyzed. There were strong significant relations between vocal and overt behaviour and stocking density and group size. An increase in group size led to less vocalizations (a.o. Gakel-calls) per hen ($P<0.004$), while an increase in density led to more vocalizations (a.o. Gakel-calls) per hen ($P<0.001$). Analysis using statistical catastrophe models shows that in most cases the explained variance increased significantly using a so-called cusp model (example: R^2 cusp = 0.56 vs. R^2 linear = 0.24). This indicated that part of the data show linear relations and part show non-linear relations between vocalizations and density and group size. The findings concerning Gakel-calls suggest a negative relation with welfare aspects in the test, while for other vocalisations a positive relation is found (a.o. contact grunts). An explanation for the findings could be that an increase in group size increases social support, while an increase in density increases social stress. Furthermore, a non-linear cusp catastrophe model offers a better description of the effects of group size and density of vocalisations and overt behavioural interactions than a linear model.

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