

Response of Stress Levels in Domestic
Canines to Calming Pheromone

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Abstract:

The effect of Appeasing Pheromones on domestic canine stress was observed. Appeasing Pheromones are secreted by female dogs to their offspring. Dog Appeasing Pheromone (DAP) is produced to induce a calm state in domestic canines. The effect of this pheromone was determined by comparing two observation periods with dogs being exposed to DAP between observations. This study showed no significant difference in stress levels due to pheromone treatment. Stress levels did decrease, but this was observed in both treatment and control groups.

Introduction:

Chemical communication is very strong in the animal world. Most chemical communication is done through the use of pheromones. Pheromones are a group of biologically active substances that are secreted to the outside by an animal and received by a second animal. These substances resemble hormones but they do not come from endocrine glands and are secreted outside the body. Pheromones are active in minute quantities and over long distances. These chemicals can affect the growth, health, and behavior of individuals (Birch 1974).

Appeasing pheromones are secreted by female mammals during the first days after giving birth. They play an important role in the attachment of young with the mother. Appeasing pheromones are similar in chemical make-up among all mammals. The main compounds involved are fatty acids, making them fairly simple molecules. This similar chemical composition might explain why bonds can form between humans and their domestic pets (Beata 2001).

The relatively simple chemical composition of the appeasing pheromones makes them easy to synthesize. Recently pheromone treatment of animal behavior has become available on the commercial market. Dog Appeasing Pheromone (DAP) is used to help reduce stress and anxiety in dogs. Many animal shelters have begun to use DAP to reduce stress in dogs that stay at the shelter. Results of studies using DAP treatments are not available although studies touting the effects have been posted on the web (Farnam Co. 2005) This study presents results of a controlled experiment using a BACI (before-

after-control-impact) design to test the efficacy of DAP in reducing stress in dogs in an animal shelter.

Methods:

Subjects:

An arrangement with Beltrami Humane Society of Bemidji, Minnesota, was made for use of their canines in this study. Observation of 20 random dogs took place in their building. Ten dogs were randomly selected to receive DAP treatment; ten were selected as controls receiving no treatment.

Treatment:

The pheromone tested in this study was Dog Appeasing Pheromone (DAP). It is available commercially through Farnam Co. as a treatment for canines showing anxiety. A 60-ml bottle was purchased to test the effectiveness of this pheromone.

Each dog was tested initially in identical ways. The dog was selected, leashed, and brought into the staff room. Observation of ten different stress behaviors took place while seated, and lasted for five minutes (Scott 2003). The observer didn't interact with the animals during the observation. Stress behaviors were recorded from 1 (none) to 4 (most extreme response) on a data sheet (Appendix 1). The dog was then brought back to its original kennel. The ten treatment dogs had DAP sprayed in their kennel before returning. After 20 minutes the second round of observations took place in the same manner.

Data were analyzed using a BACI (before-after-control-impact) statistical design (Green 1979) with SPSS and Excel programs. For each symptom the interaction term of a two-factor analysis of variance was used as the test statistic to determine the

effectiveness of DAP in reducing stress behaviors at a pre-established alpha of 0.1. The main effects were treatment (control with no exposure to DAP and treatment with DAP) and time (before and after treatment).

Results:

P-values of interaction terms on two-factor AVOVA (Table 1) indicated that the pheromone treatment overall appeared to not have a significant effect (Figure 2). There was not a noticeable difference in an overall drop in stress level between the untreated and treated groups. The main effect was observed in both treatment groups between the before and after stress levels (Figure 1). This drop in stress was observed in both treatment groups to a similar degree. There were significant p-values found between the before and after measurements for some symptoms (Table 2). Shivering ($p = 0.08$), Panting ($p = 0.057$) and whining ($p = 0.093$) showed a distinct change in stress level, apparently an effect of time.

The data shows a lower overall stress level in the treatment group with the average being 1.54 versus the untreated average at 1.72. However, the treated group also had a lower stress score before treatment began. Both treatment groups show a decline in all stress levels between the two observations. This shows that due to the second observation being 20 minutes later, and a repetition of what happened the first time, the dog was more comfortable with the procedure and therefore both treatment groups showed a decrease in stress levels between the first and second observation.

Discussion

The lack of significant interaction terms, but significant effects of time, indicate that DAP was ineffective. Reduced stress responses through time can be attributed to the fact that the dog was more familiar with the observer and environment during the second observation.

This pheromone is commercially available and advertised to prevent fear and stress related behavior (Farnam Co.). Even though the findings did not show a significant effect overall, some of the symptoms did show a slightly higher drop, although statistically insignificant, than that of the untreated group. It could be that the stress symptoms that it affects are different than those tested for. Also this experiment created a stressful situation that might have elicited more of a fear response from some dogs instead of more of a boredom stress response that the pheromone might treat better.

Small sample size resulted in relatively low statistical power. Using a larger sample may have resulted in small, but significant effects. However, with the low number of animal turn-over in the shelter, a larger sample size was not possible. Also, the time that the dogs were exposed might have been too short. Although within the parameters of the suggested time, a longer time exposure might have led to more of a difference between the stress levels. A similar study by Sheppard and Mills (2003), they showed a decrease in frequency of stress symptoms with a constant administration of DAP through a diffuser.

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Appendix I

Stress Symptoms

NAME:

	Before	After
<p>Crouching/Slinking posture</p> <ol style="list-style-type: none"> 1) none 2) Slight lowering of head 3) lowered head, shoulders, tail between legs 4) crouching near floor, head flat 		
<p>Yawning</p> <ol style="list-style-type: none"> 1) none 2) 0-2 times during observation 3) 2-5 times during observation 4) 5 + times (make record of times if extreme) 		
<p>Panting</p> <ol style="list-style-type: none"> 1) none 2) 0-1 minute of total panting (little/ no time) 3) 1-3 minutes of panting (half of the time) 4) 3-5 minutes of panting (most of the time) 		
<p>Shivering/trembling</p> <ol style="list-style-type: none"> 1) none 2) Slight trembling 3) shivering/trembling most of the time 4) very visible tremors/shaking most of time 		
<p>Shaking (like that to shake off water)</p> <ol style="list-style-type: none"> 1) none 2) once 3) twice 4) 3+ times (record number) 		
<p>Whining/excessive vocalizing</p> <ol style="list-style-type: none"> 1) none 2) light whining/few barks 3) whining/multiple barks 4) multiple-constant whining or barking 		
<p>Coughing/sneezing</p> <ol style="list-style-type: none"> 1) none 2) 1-2 cough/sneezing 3) 2-5 cough/sneezing 4) 5+ cough/sneezing 		

<p style="text-align: center;">Pacing</p> <p>1) none 2) slight pacing 3) pacing about half the observation time 4) almost constant pacing</p>		
<p style="text-align: center;">Scratching/licking</p> <p>1) none 2) 1-2 scratch 3) 2-5 / scratch 4) 5+ scratching</p>		
<p style="text-align: center;">Licking lips</p> <p>1) none 2) 1-2 licks 3) 2-5 licks 4)5+ licks (record number or if it is constant)</p>		
<p style="text-align: center;">Other symptoms (circle)</p> <ul style="list-style-type: none"> • excessive shedding • Dilated pupils • Avoidance/hiding (rate 1-4) • Paw marks left from sweaty paws 		
<p style="text-align: center;">Calming signals (record # of times)</p> <ul style="list-style-type: none"> • Yawning • Turning head and looking away calmly 		

Table 1: Stress Level Means by Symptom

Symptom	Untreated		Treated		Untreated		Treated	
	Mean Before	Mean After	Mean Before	Mean After	Mean (Before-After)	Mean (Before-After)		
Posture	2.44	2.22	2.00	1.40	0.22			0.60
Yawn	1.00	1.00	1.10	1.00	0.00			0.10
Pant	2.22	1.78	3.50	2.80	0.44			0.70
Shiver	2.00	1.56	1.50	1.10	0.44			0.40
Shake	1.00	1.00	1.00	1.00	0.00			0.00
Whine	1.44	1.22	2.00	1.40	0.22			0.60
Cough	1.00	1.00	1.00	1.00	0.00			0.00
Pace	3.44	3.11	3.50	3.10	0.33			0.40
Scratch	1.11	1.11	1.10	1.00	0.00			0.10
Licking	3.33	3.22	2.10	1.60	0.11			0.50
Average	1.90	1.72	1.88	1.54	0.18			0.34
Standard Deviations								
Posture SD	1.01	0.97	0.47	0.52				
Yawn SD	0.00	0.00	0.32	0.00				
Pant SD	1.09	0.83	0.85	0.78				
Shiver SD	1.00	0.73	0.71	0.32				
Shake SD	0.00	0.00	0.00	0.00				
Whine SD	0.73	0.44	0.94	0.70				
Cough SD	0.00	0.00	0.00	0.00				
Pace SD	0.73	1.27	0.85	0.88				
Scratch SD	0.33	0.33	0.31	0.00				
Licking SD	1.11	1.10	5.70	5.20				

Table 2: Statistical Analysis

Symptom	P-value Group and Time	P-value Group	P-value Time	Power of test
Posture	0.45	0.02	0.11	0.11
Yawn	0.35	0.35	0.35	0.01
Pant	0.66	0.00	0.60	0.55
Shiver	0.93	0.05	0.08	0.06
Shake	n/a	n/a	n/a	0.00
Whine	0.43	0.13	0.09	0.60
Cough	n/a	n/a	n/a	0.00
Pace	0.91	0.94	0.24	0.34
Scratch	0.59	0.51	0.59	0.15
Licking	0.49	0.00	0.28	0.04

Chart 1: Stress Level by Symptom

Stress Level by Symptom

