

Topic Summary

Stress behaviours of kennelled dogs (*Canis lupus familiaris*) and using olfactory stimulation and enrichment to reduce these stress behaviours

Multiple different behaviours are studied here as canines have numerous ways they may display stress. Behaviours more often associated with acute stress include paw-lifting and body shaking (Beerda et al., 1997), yawning, and snout-licking (Beerda et al., 2000), however these behaviours can also be observed in chronically stressed dogs in addition to elevated locomotor activity, nosing, and displacement behaviours (Beerda et al., 2000). In environments where dogs are kennelled for longer periods, the presence of chronic stress is assumed due to factors like confinement of space, excessive noise, and lack of human and conspecific interaction. Physiological parameters measured that are associated with major stress response systems, and thus may be involved with triggering behaviours, include cortisol concentrations, heart rate variability rates and adrenaline, noradrenaline, and creatinine concentrations (Beerda et al., 2000; Part et al., 2014; Amaya et al., 2020b). Upon introduction to a stressful environment, cortisol to creatinine ratios have been found to increase, however the validity of this parameter is questioned as more recent studies have suggested increases in cortisol levels can simply be due to exposure to novel environments (Beerda et al., 2000; Part et al., 2014). Furthermore, physiological parameters are difficult to assign as being causal for particular behaviours as there are often multiple additional factors involved in the production of a behaviour including genetic predispositions, neurotransmitter activity, and environmental context.

Because kennelling is required for rehoming and rehabilitation of dogs, environmental enrichment is a strategy that can be used to mitigate this stress of dogs in these temporary environments. Wells, D (2004) reviewed various enrichment methods and how they may increase the welfare of caged dogs, and she found that conspecific or human interaction, and auditory, olfactory, and toy enrichment can all reduce stress-indicating behaviours, at least partially,

Olfactory enrichment is specifically a good target for domestic canines given that their olfactory acuity is higher than that of their other sensory systems. Essential oils (EOs) have been diffused (Amaya et al., 2020a; Amaya et al., 2020b; Graham et al., 2005; Haverbeke et al., 2019), applied to cloths (Binks et al., 2018), and placed on toys (Murtagh et al., 2020), in efforts to decrease stress-related behaviours and associated physiological parameters. These changes in behaviour are typically analyzed through video recordings by comparing the frequencies and durations of behaviours before and after exposure to enrichment. Both instantaneous and continuous scan-sampling are used.

The effects of lavender and chamomile scents have been consistent with the findings of previous studies done on different animals in that they have reduced excessive vocalizations and locomotory activities, and increased time spent resting (Graham et al., 2005). Although, when lavender oil was applied to knotted rope toys, it increased exploratory behaviour, similarly to the effects caused by rabbit pelt scent (Murtagh et al., 2020). Lavender scent has also been associated with an increase in parasympathetic activity (Rietman et al., 2004), which is likely related to reduction in stress-indicating behaviours in dogs.

Other scents presented, including ginger, vanilla, valerian, and coconut have all been found to decrease vocalization frequency and locomotory activity in kennelled canines, suggesting they have stress-reducing effects (Binks et al., 2018). When a blend of EOs was used, a transition from higher, more alert, posture to a lower posture was observed over time spent at the shelter, suggesting a decrease in

stress or habituation to the shelter environment (Haverbeke et al., 2019). Peppermint and rosemary, however, have been shown to increase alertness and vocalization frequency (Graham et al., 2005).

Although both diffusions of and applications of EOs to cloths have had positive effects on the stress behaviours of kennelled canines, so has the addition of EOs to toys. When EOs were applied to toys, it increased interest in the toys presented, including the unscented ones (Murtagh et al., 2020). While multiple methods have been observed to reduce stress of dogs via olfactory enrichment, I believe the most positive effects will come from using a variety of different scents and methods, as novelty itself is a means of distracting dogs from the particular stressors present. In the future, research should focus primarily on the combined effects of EOs used with different types of toys, as this topic is scarce in the current literature.

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