

Chewing enrichment items in shelter and laboratory environments: an analysis of their use by domestic dogs (*Canis lupus familiaris*) and their implications for welfare

A discussion of contemporary chew enrichment items and their potential in kennel environments for stress relief and expression of positive and normal behaviours

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In shelter and laboratory kennels, changes to housing design and bedding, and provision of food enrichment items can improve dog behaviours and relieve stress, thus enhancing quality of life and the potential for adoption (Schipper *et al.*, 2008; Protopopova & Gunter, 2017). The welfare implications of chewing items are still uncertain, despite their potential to enhance natural chewing behaviours, enrich animals' lives, and reduce calculus deposition and subsequent dental disease (Brown, 2011). This paper discusses the application of contemporary chewable enrichment items to kennel welfare, with specific reference to animals' freedoms from disease and distress, and to normal behaviours as outlined by the Five Freedom Framework.

Current Australian animal research guidelines fail to address the specific chewing need of canines, and to date, no standard chewing object has been approved as suitable in Australian or European research facilities (NHMRC, 2013). Döring *et al.*, (2016a) observed the interactions of 47 beagles with chewing objects to determine their frequency of use and potential suitability as enrichment items in research kennels. One of the four German research facilities did not provide chewing enrichment items as part of the dogs' husbandry, however, the remaining three allowed dogs to interact with tree branches, dental balls and weekly beef bones respectively. While the branches were scarcely used, dogs averaged 2.7 minutes engaging with dental balls daily, and exhibited great interest in the beef bones (90 minutes per dog). The long-lasting chew activity of beef bones not only encourages arousal and natural chewing behaviours but also has positive implications for overall health by reducing dental calculus and the risk of dental disease (Marx *et al.*, 2016). While dental balls provide similar health benefits (Jeusette *et al.*, 2016), they failed to significantly increase the dogs' activity, unlike in previous food enrichment studies (Schipper *et al.*, 2008). The dogs with no chewing items or toys appeared to show increased evidence of chronic stress, indicated by significantly higher noise levels and coprophagy, although animal age and housing design could be potential confounders. The chewing actions induced by the provision of tree branches, dental balls or beef bones appeared essential in relieving stress and in developing individual stress coping mechanisms.

While the apparent preference for beef bone enrichments has been confirmed in other canids, their applicability to kennels is still disputed (Hovland *et al.*, 2016; Döring *et al.*, 2016a). The potential for bone splintering, obstruction and oral trauma requires close and extended monitoring by staff, who can experience time and financial constraints in shelter and research environments (Döring *et al.*, 2016a; Kiddie *et al.*, 2017). Thus an alternative calf hoof was examined as a chewing enrichment item over three consecutive days by Döring *et al.*, (2016b), in a study of 62 beagle laboratory dogs across three German facilities. Only one of the facilities had previously supplied calf hoof enrichments biweekly with natural branches, while the other facilities provided weekly beef bones or no chewing enrichment. Dogs exhibited strong interest in the calf hooves with average chewing times of 22.8-29.3 minutes recorded within the first hour of provision. This exceeded that found for other chewing objects, and was similar to the time spent interacting with other food toys (Schipper *et al.*, 2008). Dogs that had previous biweekly calf hooves exhibited a higher chewing efficiency and shared the same interest and chewing times as other groups, suggesting that calf hooves remain an effective chew item over long periods of time. No oral trauma or potential for obstruction was observed, and

thus calf hooves appear to be an attractive substitute for raw bones by maintaining the mechanical chewing actions important for oral health and expression of normal behaviours (Brown, 2011).

It is expected that some Australian facilities may have difficulty sourcing regular calf hooves. Thus, a study by Kiddie *et al.*, (2016) could offer a potential solution by assessing the behavioural impacts of readily available and cheap chewing items on 36 sheltered Pitt Bull Terriers. Dogs were individually housed in small wire cages close to other dogs, and would have experienced considerable stress prior to the start of the study due to housing constraints, frequent visual contact with other dogs and vocalisations. Animals were pseudo-randomly provided with one enrichment item: a cardboard partition to block visual contact, cardboard bed or whole brown coconut for chewing. All dogs but one shredded and gnawed on the cardboard beds, suggesting the importance of play and chewing behaviours in stress-inducing environments. The study therefore re-classified coconuts and cardboard beds together as interactive enrichment. Dogs that received these items had significantly reduced instances of yawning, a behaviour indicative of chronic stress. Interactive enrichment also significantly increased the dogs' activity, with reduced times spent lying down and sitting. Activity levels also varied significantly between dogs, suggesting that individual dogs have different coping mechanisms when dealing with stressors, and that not all dogs are afforded the same level of stress relief when engaging with chewing enrichment items. Therefore, dogs should ideally be provided with a range of chewing items based on their preferability, enjoyment, and stress relieving properties for the individual (Hovland *et al.*, 2016). In shelters where this is not possible, Kiddie *et al.*, (2016) makes it clear that any chewable item can significantly improve quality of life by relieving stress and increasing active behaviours. While coconuts might not be applicable or readily available to Australian shelters, tree branches or durable plastics as described by Döring *et al.*, (2016a) and Hovland *et al.*, (2016) are good alternatives.

Chewing enrichment items should be implemented in all Australian shelters and research facilities as they have significant welfare implications by relieving stress and increasing animal activity and the expression of normal behaviours. While raw bones are most preferable, calf hooves are a safer and cheaper alternative that still provide prolonged chewing enrichment, and subsequently are a recommended standard chewing item for kennel environments. Tree branches, cardboard and plastic chewables are not as strongly preferred as hooves, but can significantly improve the quality of life for dogs in shelters with limited finances.

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