Promoting the Welfare of Kenneled Dogs: Environmental Considerations

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Introduction

Protecting the welfare of dogs in kennels requires consideration of their unique sensory and thermoregulatory capabilities. Because dogs and humans perceive environments very differently, it is important to ensure that dogs' housing environments are tailored to meet their needs, rather than the needs of their caretakers.

Noise

In 2007, the National Institute for Occupational Safety and Health released a report indicating that the sound levels in kennels could cause hearing loss in kennel workers. Because dogs are more sensitive to sounds than are humans (Lipman and Grassi, 1942), excessive noise levels within kennels also pose a serious health and welfare concern for dogs. Consistently noisy kennels are common (Coppola et al., 2006), can be aversive to dogs, and can lead to over-stimulation and hearing loss (Scheifele et al., 2012). Sales et al. (1997) found that kenneled dogs were exposed, on average, to noise levels as high as 120 dB during the day. Similar results were found by Scheifele et al. (2012), who recorded daily kennel noise levels ranging from 100–108 dBA. This exceeds the Occupational Safety and Health Assessment levels of safe hearing for humans (90 dBA for 8 hours/day; 95 dBA for 4 hours/day; 100 dBA for 2 hours/day).

Continuous, excessive noise may also cause distress in dogs, just as it does in laboratory animals that "…begin to exhibit symptoms correlated with elevated stress when ambient sound pressure levels approach 85 dB for extended periods of time" (Anthony et al., 1959; Morgan and Tromborg, 2007). Unfortunately, the dogs themselves cause most of the noise in kennels. The challenge, therefore, is to reduce noise caused by the resident dogs. One way to do that is to incorporate materials such as sound-reducing panels into kennel design and installation. Such creative interventions can reduce the levels of noise that dogs experience and provide a healthier environment.

Caretakers should consider why dogs bark excessively and should develop a plan to address these issues. Several studies have focused on identifying behavioral modification strategies that can alleviate dogs' barking intensity and frequency—and, thus, excessive noise. These include exposing dogs to dog-appeasing pheromones (Tod et al., 2005) and pheromones from other animals such as pigs (McGlone et al., 2014); playing music in the kennel (Wells et al., 2002); having the dog wear a citronella collar (Wells, 2001); providing the dog with conspecific social interactions (Mertens and Unshelm, 1996); and dog laughter playbacks (Simonet et al., 2005).

One of the most effective strategies for ensuring a quiet and calm kennel may be consistent, positive human-animal interaction. For example, in addition to communicating with each other, dogs may be attempting to solicit human attention. Research has identified that humans are able to categorize bark recordings based upon the context in which they were originally recorded (Pongrácz et al., 2005; Pongrácz et al., 2006). This suggests that barking may be a form of interspecies communication with humans. Yin and Richardson

(2006) found that 48.7% of respondents to a survey reported "indoor barking as an attention-seeking behavior." For dogs that bark excessively to elicit increased human-animal interactions, incorporating play, walks, or petting into their daily care routine may reduce this behavior. Training also may help facilitate a quiet environment. Through feeding toys, puzzles, and reinforced periods of quiet behavior, dogs may learn that quiet behavior, rather than barking, earns them rewards.

Odors

Dogs have an extremely acute sense of smell; thus, the odors (or lack of odors) in the kennel can potentially influence their well-being. Routine husbandry procedures, such as cleaning, can greatly impact the dog's olfactory environment and cause disruptions that might be overlooked by caretakers. For example, while it is well known that certain cleaning agents may cause nasal irritation or contain scents that dogs find aversive, even daily cage cleaning may be stressful for animals that mark their territories (Hediger, 1964). The constant disruption of their odor fields may make them feel frustrated or insecure. Providing safe, appropriate items (such as bedding that dogs will not ingest or destroy) that retain familiar odors in a cleaned kennel may help ensure both kennel cleanliness and dog security.

While permitting dogs to maintain familiar odor fields may enhance their sense of security in a kennel, careful introduction of novel scents may also help relax and decrease stress in dogs. Graham (2005) found that some odors, such as lavender and chamomile, caused dogs to be more relaxed. Dogs with this odor enrichment spent more time resting and less time barking than did dogs without odor interventions. To avoid causing inadvertent irritation to dogs, it is important to ensure that any odor preparations introduced to the kennel environment are safe for dogs and approved by veterinarians.

Ventilation and Airflow

Providing good air quality within the kennel is critical for ensuring dog welfare. Air quality measurements or assessments should be taken within the dog's kennel and at the dog's level. Measuring what humans breathe in alleyways and at human height does not yield useful, animal-relevant information. The Occupational Safety and Health Administration recommends that human exposure to ammonia concentration in air should be limited to no more than 25 ppm for no longer than 8 hours (Eller and Cassinelli, 1994). Studies investigating the impact of ammonia on dogs showed that continuous exposure to ammonia for several weeks can cause eye and nasal irritation (Grant, 1974). Therefore, ensuring adequate ventilation at the dog level is important to dog health and welfare.

Temperature and Humidity

Ambient temperatures that are too hot or too cold for dogs to be comfortable can be stressful, potentially altering behavior and physiological function. For most dogs, the thermoneutral zone (the range of ambient temperature in which the animal is able to maintain normal body temperature without a change in metabolic rate) is 20°C (68°F) to 30˚C (86°F) (NRC, 2006). This range can vary depending on a dog's age, size, and breed. For example, for huskies, the lower critical temperature is 0°C (32°F) while the upper limit has been noted as 30˚C (86°F). However, the upper limit is currently debated for this breed (NRC, 2006) and should be further investigated. Thus, caretakers must be prepared to make adjustments accordingly and carefully monitor dogs for indications of thermal discomfort, which can include panting with tongue extended, constant shifts in lying area and position, excessive drinking, shivering, or huddling with a pen-mate.

The recommended dry-bulb room temperature (the temperature of air measured by a thermometer freely exposed to the air but shielded from radiation and moisture) for kenneled dogs is 18°C (64.4°F) to 29°C (84.2°F) (NRC, 2011). The ambient temperature in the facility or in the sheltered part of the outdoor facility must not fall below 10°C (50°F) (USDA, 2013), and auxiliary ventilation must be provided when the ambient temperature is 29.5°C (85°F) or higher (USDA, 2013). When temperatures fall below 10°C (50°F),

bedding or other measures to conserve body heat must be provided (USDA, 2013). Further, the ambient temperature for indoor, sheltered, and mobile or traveling housing facilities should not drop below 7.2°C (44.9°F) or rise above 29.5°C (85°F) for more than four consecutive hours when animals are present (USDA, 2013). As the kennel is the dog's home environment, it is important to measure ambient temperature at the dog level, rather than at caretaker level, to ensure a comfortable temperature for the dog.

In addition to temperature, relative humidity can impact a dog's ability to thermoregulate. Very little research has been conducted to identify optimal relative humidity in dogs. However, most mammals should be housed at humidity levels between 30% and 70% (NRC, 2011). The USDA indicates that dogs in areas with relative humidity levels of more than 70% are at increased risk of heat stress (USDA, 2013). Therefore, monitoring both the temperature and the relative humidity of kennel dog enclosures is an important component of best practices.

Lighting

Light can affect an animal's physiology, morphology, and behavior—and light stress can come in the form of inappropriate photoperiod, intensity, or light spectrum (NRC, 2011). Dogs surpass humans in their ability to function in dim light, in their field of view, in their ability to differentiate shades of gray, and in their ability to detect motion (Miller and Murphy, 1995).

Ensuring that the kennel is adequately lit is, therefore, important in dog husbandry. Kennel managers should focus not just on light intensity, duration, and type, but also on placement. Providing a bright light source near a resting or bedding area may disrupt a dog's ability to comfortably rest or may cause the dog not to use the provided resources as intended. Light that mimics natural photoperiods is important for maintaining a regular estrous cycle in bitches and for maintaining good semen quality. Sperm concentration, sperm output, frequency of estrus, and pregnancy rates exhibit seasonal variation (Chawla and Reece, 2002; Forsberg et al., 1989; Taha et al.,1981; Totton et al., 2010), and photoperiod can influence rectal and vaginal temperatures in dogs (Giannetto et al., 2014).

Conclusion

Best practices for kenneled dog care include monitoring the environment to ensure that the dog's physiological as well as behavioral needs are met. Optimizing the kennel environment depends on finding a balance between maintaining a safe, sanitary environment and one that appropriately accommodates the dog's sensory capabilities, thermal comfort, and security needs. Ultimately, decisions about the kennel environment must focus on dog welfare, rather than human comfort. Understanding the biology of the dog is, therefore, critical to facilitating best practices for dog care and well-being.

References

Anthony, A., Ackerman, E., Lloyd, J.A., 1959. Noise stress in laboratory rodents. I. Behavioral and endocrine response of mice, rats, and guinea pigs. *The Journal of the Acoustical Society of America* 31, 1430-1437.

Chawla, S. K., Reece, J. F. 2002. Timing of oestrus and reproductive behaviour in Indian street dogs. *The Veterinary Record*, 150: 450-451.

Coppola, C.L., Enns, R.M., Grandin, T., 2006. Noise in the animal shelter environment: building design and the effects of daily noise exposure. J*ournal of Applied Animal Welfare Science* 9, 1-7.

Eller, P.M., Cassinelli, M.E., 1994. *NIOSH Manual of Analytical Methods*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Physical Sciences and Engineering.

Fanger, P.O., 1970. *Thermal Comfort—Analysis and Applications in Environmental Engineering*. Copenhagen: Danish Technical Press. Copenhagen, Denmark.

Forsberg, M., Fougner, J.A., Hofmo, P.O., Madej, M. and Einarsson, E.J. 1989. Photoperiodic regulation of reproduction in the male silver fox *(Vulpes vulpes). Journal of Reproduction and Fertility* 87:115-123.

Giannetto, C., Piccione, G., Giudice, E., 2009. Daytime profile of the intraocular pressure and tear production in normal dog. *Veterinary Ophthalmology* 12, 302-305.

Giannetto, C., Fazio, F., Panzera, M., Alberghina, D., Piccione, G., 2014. Comparison of rectal and vaginal temperature daily rhythm in dogs (*Canis familiaris*) under different photoperiod. *Biological Rhythm Research* 1, 113-115.

Graham, L., Wells, D.L., Hepper, P.G., 2005. The influence of olfactory stimulation on the behaviour of

dogs housed in a rescue shelter. *Applied Animal Behaviour Science* 91, 143-153.

Grant, W.M., 1974. T*oxicology of the eye: drugs, chemicals, plants, venoms*. Charles C. Thomas, Springfield, Ill.

Hediger, H., 1964. *Wild Animals in Captivity.* Dover Publications.

Lipman, E., Grassi, J., 1942. Comparative auditory sensitivity of man and dog. *The American Journal of Psychology* 55, 84-89.

McGlone, J.J., Thompson, W., Guay, K.A., 2014. Case Study: The pig pheromone androstenone, acting as an interomone, stops dogs from barking. *The Professional Animal Scientist* 30, 105-108.

Mertens, P.A., Unshelm, J., 1996. Effects of group and individual housing on the behavior of kennelled dogs in animal shelters. *Anthrozoos* 9, 40-51.

Miller, P.E., Murphy, C.J., 1995. Vision in dogs. *Journal of the American Veterinary Medical Association* 207, 1623-1634.

Morgan, K.N., Tromborg, C.T., 2007. Sources of stress in captivity. *Applied Animal Behaviour Science* 102, 262-302.

National Research Council, 2011. *Guide for the Care and Use of Laboratory Animals: Eighth Edition.* National Academies Press, Washington, D.C.

National Research Council, 2006. *Nutrient Requirements of Dogs and Cats.* National Academies Press, Washington, D.C.

Pongrácz, P., Molnár, C., Miklósi, A., Csányi, V., 2005. Human Listeners Are Able to Classify Dog (Canis familiaris) Barks Recorded in Different Situations. *Journal of Comparative Psychology* 119, 136.

Pongrácz, P., Molnár, C., Miklósi, Á., 2006. Acoustic parameters of dog barks carry emotional information for humans. *Applied Animal Behaviour Science* 100, 228-240.

Sales, G., Hubrecht, R., Peyvandi, A., Milligan, S., Shield, B., 1997. Noise in dog kennelling: is barking a welfare problem for dogs? *Applied Animal Behaviour Science* 52, 321-329.

Scheifele, P., Martin, D., Clark, J. G., Kemper, D., Wells, J. 2012. Effect of kennel noise on hearing in dogs. *American Journal of Veterinary Research*, 73(4), 482-489.

Simonet, P., Versteeg, D., Storie, D., 2005. Dog Laughter: recorded playback reduces stress related aggression in shelter dogs, *Proceedings of the Seventh International Conference on Environmental Enrichment*, Wildlife Conservation Society. New York, NY, pp. 170-176.

Taha, M., Noakes, D., Allen, W.E., 1981. The effect of season of the year on the characteristics and composition of dog semen. *Journal of Small Animal Practice* 22, 177-184.

Tod, E., Brander, D., Waran, N., 2005. Efficacy of dog appeasing pheromone in reducing stress and fear related behaviour in shelter dogs. *Applied Animal Behaviour Science* 93, 295-308.

Totton, S.C., Wandeler, A.I., Gartley, C.J., Kachhawaha, S., Suman, M., Ribble, C.S., Rosatte, R.C., McEwen, S.A. 2010. Assessing reproductive patterns and disorders in free-ranging dogs in Jodhpur, India, to optimaize a population control program. *Theriogenology* 74:1115-1120.

USDA, 2013. Animal Welfare Act. Animal and Plant Health Inspection Service, Title 7, Chapter 54.

Wells, D., Graham, L., Hepper, P., 2002. The influence of auditory stimulation on the behaviour of dogs housed in a rescue shelter. *Animal Welfare* 11, 385-393.

Wells, D.L., 2001. The effectiveness of a citronella spray collar in reducing certain forms of barking in dogs. *Applied Animal Behaviour Science* 73, 299-309.

Yin, S., Richardson, S., 2006. Excessive Barking: When and Why it Occurs, AVSAB Annual Conference, Honolulu, HI.

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