

at the rural shelter. There were no significant differences observed in the ratio of dogs relinquished for aggression between the shelters.

Data relating to the reasons dogs were euthanased was not available from the suburban shelter, so the findings from the other two shelters are presented. Approximately one third (35%) of dogs euthanased by these organisations were euthanased for health reasons. A significantly greater proportion ($N=4,846$, $c_2=31.37$, $df=6$, $p < .0001$) of dogs were euthanased at the rural shelter for aggression (27.4% compared with 23.7% at the city shelter) and temperament issues (22.66% compared with 19.8% at the city shelter). In comparison, more dogs were euthanased at the city for behaviour (9.8% compared with 7.7% at the rural shelter) and breed specific issues i.e. whether the dog is a PBT (5.9% compared with 3.28% at the rural fringe).

Overall 7.26% (320 dogs) were returned to the shelters post-adoption. At the suburban shelter, canine behavior problems and owner-related factors comprised 60% of the reasons for return ($N=320$, $c_2=28.66$, $df=12$, $p = .004$), while problems with existing pets and escaping were cited less frequently than at the other two shelters. Dogs returned to the suburban shelter were significantly more likely to be resold compared with the other shelters (70% versus 55% at the rural shelter and 24% in the city) ($N=320$, $c_2=31.81$, $df=4$, $p < .0001$). Approximately 59% of dogs returned to the city shelter were euthanased.

Discussion:

The proportion of desexed dogs admitted varies directly with the distance from the city centre, 60% at the rural fringe shelter (compared with the 74% at the suburban shelter and 83% at the city). The size of dog admitted to each shelter increases with distance of that shelter from the city centre, with small dogs being admitted more frequently to the city, medium size dogs to the suburban and larger dogs to the rural fringe shelter. Perhaps this is due to socio-economic factors or owners selecting appropriately sized dogs for the size of their properties. However, the catchment area of the city shelter actually covers 15 widely divergent municipalities (including rural and suburban areas), so factors other than the geographic location of the shelter are likely to be involved such as socio-economic or cultural factors of the catchment areas.

Six Melbourne councils provided registration data and identified that 85% of registered dogs are desexed, in contrast with only 22% of desexed shelter dogs tracked in this study. This provides a strong indication that current desexing and compliance messages are not reaching the owners of stray dogs.

Seasonal trends were observed in admissions at the suburban and city shelters, with a greater than average number of dogs admitted during December-February. This could be the result of increased escaping during thunderstorms and New Year fireworks, but the more stable pattern seen at the rural fringe shelter does not tend to support this explanation. Similarly, increased straying and shelter admissions in summer could result from people being more active outdoors and inadvertently leaving gates open, again we would expect to see the same trend at the rural shelter. Perhaps, the more stable admission pattern at the rural shelter rather reflects the demands of animal husbandry or horticulture in the country, with a concomitant reduction in the ability of the rural community to take regular holidays. Further research would clarify these discrepancies.

The relationship of relinquishment reason with location may enable strategic educational interventions to be formulated by councils and animal welfare agencies aimed at preventing behaviour problems becoming sufficiently severe to warrant relinquishment. For example, suburban owners could be targeted with techniques to combat hyperactivity and boisterousness, whilst city dwellers could be educated in techniques to quieten barking dogs or reduce destructiveness.

Shelter admission, itself can negatively impact upon dog behaviour, the effects can last a lifetime and result from even a short period of confinement (Senay, 1966), as little as two weeks kennel confinement (without enrichment) is enough to alter some dog's behaviour (Coppinger & Zucotti, 1999). Environmental factors can have significant negative effects upon canine welfare (Hubrecht, 1996; Sales, Hubrecht, Peyvandi, Milligan, & Shield, 1997), resulting in extensive physiological (Beerda et al., 1999; Hennessy, Voith, Buttrania, Miller, & Lindetic, 2001; Beerda et al., 1999; Tuber, Sanders, Hennessy, & Miller, 1996) and behavioral changes (Beerda, Schilder, van Hooff, De Vries, & Mol, 1999; Beerda, Schilder, van Hooff, De Vries, & Mol, 1998; Senay, 1966), particularly increased excitability, aggression and the development of stereotypes (Dean, 1999; Bayne, 2003). Other stressors include high noise levels (over 120db has been reported) (Sales et al., 1997), exposure to novelty, isolation from previous attachments, disruption of routines, prolonged confinement and reduced interaction between peers and humans. Understanding this then, it is vital to ensure that regulated 'holding' periods are minimized whilst still enabling the majority of owners to reclaim their dogs. The clear majority of reclamations in this study occurred within four days of admission. Whilst reducing this period to four days would substantially reduce the negative impact of a shelter stay, it might result in more dogs being euthanased. However, the imposition of an escalating reclaim fee structure based on the number of days that the dog is housed at the shelter, might be a way of encouraging the rapid reclamation of dogs.

Australians shelter statistics differ from those available from the USA. Australians relinquished a fewer dogs (with very few for euthanasia), return dogs post-adoption far less frequently (7.2% versus 22%) and experience different behavioural problems with their dogs. Escaping does not appear to be a problem for American owners and hyperactivity / boisterousness is reported to a much lower degree.

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Linda Marston

Linda is currently completing her PhD in Psychology through the Animal Welfare Science Centre located at Monash University. Her particular research interests are animal welfare and human-companion animal interactions. She has extensive experience with dog training and is investigating factors that affect the success of dog adoptions from animal welfare shelters. The first part of the project involved establishing good baseline data concerning the types of dogs admitted to shelters and the range of outcomes experienced. She is now focusing on identifying those factors that determine how the dog bonds to its new owner. She is also looking at methods for reducing the negative effects of shelter admission on the dogs. This involves modifying the shelter environment slightly using environmental enrichment, examining the effect of providing in-house training to reduce behaviour problems, reviewing the assessment protocol used by shelter staff, investigating and researching the effects of follow-up obedience classes for persons who adopt dogs from the shelter. Her work will provide important information about shelter dogs that can be used to improve the number of dogs rehomed and the success rate of adoptions. The information about how dogs form bonds with their new owner is likely to have relevance for all new dog owners.