

What Happens to Shelter Dogs? An Analysis of Data for 1 Year From Three Australian Shelters

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Annually, welfare shelters admit many dogs, including those whose caregivers surrender them or dogs who are strays. This article analyzes admission data from 3 metropolitan Australian shelters. The study collected data for a 1-year period and analyzed them to identify the characteristics of the typical shelter dog; patterns of relinquishment, sales, reclamation and euthanasia; and duration of stay and reasons underlying euthanasia, relinquishment, and postadoptive return. The study tracked more than 20,000 admissions during this period. To facilitate reclamation, the local Code of Practice requires a mandatory holding period for stray dogs; assessment for suitability for rehoming then occurs. Dogs failing the assessment are euthanized. Surrendered dogs can be assessed immediately. The Code of Practice also recommends that unsold dogs be euthanized 28 days postassessment. Typically, shelter dogs in Melbourne are strays, sexually entire, adult, small, and—usually—male. The majority of admissions are reclaimed or sold. Most reclamations occur within 4 days, and postadoptive return rates are low. That current desexing messages do not appear to have reached the owners of stray dogs to the same extent as they have other dog owners is a major finding, suggesting that a targeted education campaign may be required.

Dogs are integral to contemporary society, providing companionship, security, and nurturing experiences for many, particularly the vulnerable and isolated in our community (Albert & Bulcroft, 1987, 1998). Despite the generally positive

relationship between dogs and humans, many dogs are admitted annually to animal shelters as relinquishments or strays.

Although such shelters are committed to animal welfare, financial and resource constraints mean there is little guarantee of a positive outcome unless the legal owners reclaim their dogs. Researchers in the United States have reported that about 38% of total admissions and 48% of relinquished dogs are euthanized, with owners specifically requesting euthanasia in 17.2% of relinquishments (Patronek, Glickman, & Moyer, 1995). Moulton, Wright, and Rindy (1991) reported that 64% of relinquished dogs were euthanized (averaged over 4 years). Patronek et al. (1995) also reported that 18.8% of rehomed dogs were returned, and half of these were subsequently euthanized.

When these statistics were discussed with shelter managers from Victoria, Australia, it was claimed that local return rates were substantially lower. In fact, one shelter estimated its return rate at 3%. If true, understanding why this occurs may identify strategies suitable for employment elsewhere. Local statistics were not available to clarify this question, however, leading us to undertake the study reported in this article.

Melbourne is the capital of Victoria, a major state of Australia, with a population of 3.16 million (Australian Bureau of Statistics, 2001). Dog ownership is ubiquitous, with an estimated 920,000 dogs living in the state (BIS Shrapnel Global Marketing Intelligence & Forecasting, 1999) and 18 animal shelters situated within Melbourne (C. Pawsey, personal communication, January 20, 2003). Dogs enter shelters via two primary routes: either relinquished by owners no longer able or willing to care for them or presented as strays by members of the public or by duly appointed animal management officers. A small proportion of dogs are seized following dog attacks. These "aggressive" dogs form a separate category. They usually face long-term detainment awaiting legal resolution. Humane acquisitions comprise a further small proportion of admissions and occur when cruelty or neglect is involved.

The immediate fate of a dog depends on how the dog is admitted. On admission, dogs are checked routinely for council registration tags or microchips. In the case of strays, this information is used to inform owners that their dogs are available for reclamation from the shelter. Strays are held for a mandatory holding period, during which time shelters can legally provide only basic husbandry and necessary veterinary interventions while they attempt to reunite dog and owner. In Victoria, this period is 8 days (Department of Natural Resources and Environment, 1998). After completion of the holding period, the dog becomes the property of the shelter and is assessed for sale using a behavioral and veterinary protocol. Typically, relinquished dogs are assessed immediately. Based on the assessment, dogs are euthanized or made available for sale.

Dogs are assessed for signs of physical illness, breed characteristics, and behavioral or temperament problems. Dogs showing signs of poor health are euthanized,

as are those assessed as aggressive or fearful, although the validity and reliability of such assessments are not established. Breed issues also can render a dog unsuitable for sale. In Victoria, shelters cannot rehome dogs identified as being pit bull terriers. Dogs who have passed assessment are made available for rehoming. This still does not ensure their future, however, as the Code of Practice in Victoria requires euthanasia for dogs who pass assessment but who are not sold within 28 days (Department of Natural Resources and Environment, 1998). This means that many healthy dogs, otherwise suitable for rehoming, are euthanized simply because there is lack of buyer interest. Statistics from the United States indicate that shelter euthanasia accounts for one third of all canine deaths and has been a leading cause of canine death for the past three decades (Olson, Moulton, Nett, & Salmon, 1991).

The factors determining why companion dogs become strays are unknown, although some may reflect a casualness of owner attitude and others may reflect genuine containment problems. Even in the case of relinquishment, where owners are available for comment, shelter staffs often lack the time or skills to probe for details, and intake documents allow only limited recording of the reasons for relinquishment. Consequently, existing research probably underestimates the complexity of the relinquisher's situation. One U.S. study, based on 38 interviews of relinquishers, reported that the most common reasons for relinquishment are canine behavior problems, followed by medical and accommodation reasons (DiGiacomo, Arluke, & Patronek, 1998). Another study, based on 3,676 cases, identified the three most prevalent reasons for relinquishment as accommodation or moving, financial pressures, and lack of time (Salman et al., 1998). Behavioral problems cited frequently as reasons for relinquishment include hyperactivity, inappropriate chewing, elimination, and vocalization (Miller, Staats, Partlo, & Rada, 1996; Salman et al., 1998), although some researchers believe that behavioral problems are substantially underreported (Coren, 1999; Miller et al., 1996). Notably, aggression is rarely given as a reason for relinquishment, perhaps because relinquishers perceive that this will reduce their pets' chances of rehoming (DiGiacomo et al., 1998).

Other factors associated with risk of relinquishment include unintentional pet acquisition (DiGiacomo et al., 1998), lifestyle changes (Houpt, Honig, & Reisner, 1996), and age of the dog at acquisition (Miller et al., 1996; Patronek, Glickman, Beck, McCabe, & Ecker, 1996), with the greatest risk of relinquishment occurring with dogs acquired aged 1 to 2 years.

Patronek et al. (1996) also found that shelter dogs were likely to be sexually intact. Over the last 15 years, community education and incentive programs in both Australia and the United States have focused on reduced-cost desexing, reduced registration fees for desexed animals, and the automatic desexing of all shelter stock (Olson et al., 1991). Although these measures have significantly reduced the number of dogs admitted to U.S. shelters by 40% from 1985 to 1994 (Luke, 1996),

they also have resulted in fewer puppies being presented; the typical shelter dog now is more than 2 years of age (DiGiacomo et al., 1998; Patronek et al., 1996). This means that dogs currently available for adoption are those also at greater risk of subsequent relinquishment.

The aim in this study was to collect descriptive data concerning the characteristics of shelter dogs; patterns of admission, sale, reclamation, and euthanasia; duration of stay; and the reasons for relinquishment, euthanasia, and postadoptive return in three Melbourne shelters.

MATERIALS AND METHOD

Archival data relating to a full year of canine admissions were gathered from three animal welfare shelters located in metropolitan Melbourne. Resource constraints prohibited the sampling of all 18 metropolitan shelters. However, those included in this study are known to process a significant number of the total shelter admissions in the city. Therefore, it was believed they would provide substantial baseline data for further research in the city. All dogs presented for admission were accepted by the shelters sampled.

Data for the same 12-month period were not available from all three shelters, so data were gathered from June 2001 to May 2002 for two of the shelters and from November 2001 to October 2002 for the third. All participating shelters also provide pound facilities for multiple municipalities (one for 15, one for 5, and one for 3 municipalities).

Most data were obtained from paper records that provided the major details of admission: date and type of admission (stray or relinquishment), outcome, and date of outcome. However, these records sometimes were incomplete regarding reasons for relinquishment, return, or euthanasia. Nonetheless, the fate of each dog admitted was tracked as fully as possible and microchip data were recorded when available. As all rehomed shelter dogs are microchipped, this enabled readmissions of the same dog to be identified. Information relating to the age, size, gender, and desexed status of the dog also was collected.

Although information regarding breed was available, this study concentrated on physical size of the adult dog (small = < 10 kg; medium = 10 to 25 kg; large = > 25 kg). This decision was made when it became apparent that documentation for the same dog, even within a shelter, varied widely in the assessment of breed characteristics but that there was little variation in perceived size. Age estimations also varied substantially, so age categories were limited to pup (6 months and less) and adult and were estimated by dentition or based on owner information when available. All data were analyzed using SPSS Windows version 11.5, with alpha level set at .05.

RESULTS

Characteristics of Dogs Admitted

Collation of the data resulted in 20,729 recorded admissions. Table 1 presents descriptive data for these admissions. As can be seen from Table 1, the vast majority of admissions were stray and adult dogs. Pups formed about one tenth of total admissions, with proportionately more of them relinquished by owners compared to adult dogs (27.5% of pups compared to 13.6% of adults), $\chi^2(2, N = 20,729) = 287.3, p < .0001$. Small dogs were admitted more frequently than either large or medium dogs. Significant differences existed in the gender composition of the overall sample compared with national figures (57.15% male, 42.85% female, compared to 50:50 nationally), $\chi^2(1, N = 20,729) = 423.53, p < .0001$. Nearly half of all admitted dogs were reclaimed, with approximately one

TABLE 1
Breakdown of Admission Data for 1 Year From the Three Shelters

<i>Category</i>	<i>% Admissions</i>
Admission type	
Stray	83.80
Relinquished	15.07
Other	1.14
Age	
Adult dogs	89.75
Pup (< 6 months)	10.24
Size	
Small dogs	41.91
Medium-sized dogs	28.90
Large dogs	29.10
Gender	
Female	42.85
Male	57.15
Sexual status	
Sexually entire dogs	77.19
Desexed dogs	22.81
Outcomes	
Reclaimed	46.20
Euthanized	31.50
Sold	21.30
Other	1.00
Legal orders	
Dogs held under legal order	1.00

Note. $N = 20,729$.

third euthanized and one fifth sold. Focusing on the admission data first, Table 2 presents descriptive data for gender and desexed status.

As can be seen from Table 2, significantly more sexually entire animals (77.2%) were presented to the shelters than would be predicted from national statistics, where only 39% of dogs are identified as being entire, $\chi^2(1, N = 20,729) = 129.36, p < .0001$ (McHarg, Baldock, Headey, & Robinson, 1995). Male dogs were significantly more likely to be entire than females, $\chi^2(1, N = 20,729) = 32.51, p < .0001$; strays were more likely to be entire than relinquished dogs, $\chi^2(1, N = 20,729) = 692.11, p < .0001$.

Two temporal patterns emerged from the admission data. First, the number of strays admitted to the shelters remained relatively constant throughout the week, although members of the public presented significantly more strays on weekends and animal management officers more on weekdays, $\chi^2(36, N = 17,616) = 583.28, p < .0001$. Figure 1 presents these data. Second, were admissions spread evenly throughout the year, 8.33% of admissions would occur each month. Contrary to

TABLE 2
Neuter Status by Admission Type and Gender

Category	% Entire	% Desexed
Overall admissions	77.19	22.81
Admission type		
Stray	80.41	19.59
Relinquished	58.95	41.05
Gender		
Female	75.27	24.73
Male	78.63	21.37

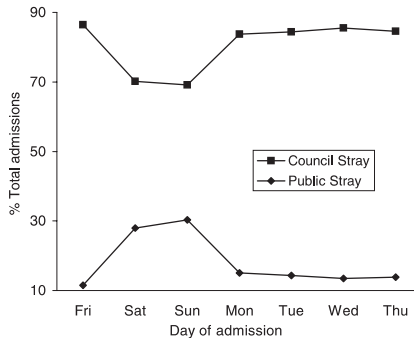


FIGURE 1 Comparison of stray admissions by day of admission.

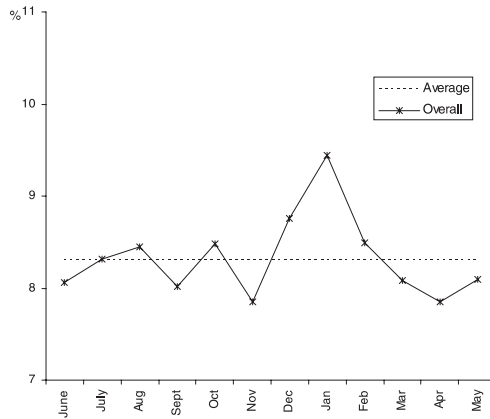


FIGURE 2 Percentage of admissions by month of admission. This figure has compiled data by month of admission regardless of year to reveal annual patterns.

this, more dogs than expected were admitted in December, January, and February (see Figure 2).

Outcomes

As presented in Figure 1, nearly half of all shelter dog admissions were reclaimed, 31.5% were euthanized, and 21.3% were rehomed. This level of euthanasia was significantly less, $\chi^2(1, N = 20,729) = 366.58, p < .0001$, than the lowest rate reported in other studies—38% (Patronek et al., 1995). Table 3 presents descriptive data for the shelter admission outcomes.

As can be seen from Table 3, desexed dogs (male and female) were significantly more likely to be sold or reclaimed than were entire dogs, who were more likely to be euthanized, $\chi^2(3, N = 20,729) = 273.39, p < .0001$. Male dogs (entire and desexed) were more likely to be euthanized than females (in fact nearly 60% of euthanized dogs were male), whereas females were more likely to be reclaimed or sold, $\chi^2(3, N = 20,729) = 25.87, p < .0001$.

Length of Time Spent in Shelter

The average time spent in a shelter was 5.68 days, although almost half of all dogs admitted to a shelter spent 2 or fewer days there. See Figure 3 for the length of time dogs spent in shelters, broken down by outcome.

There were no significant differences observed in reclamation time across sex, size, or desexed status of dogs. Three quarters of all reclaimed dogs were claimed within 2 days, and 89.5% of reclaimed dogs were reclaimed within 4 days ($M =$

TABLE 3
Outcomes by Admission Type, Desexed Status, and Gender

Category	Outcome			
	Euthanized %	Reclaimed %	Sold %	Other %
Stray admissions	28.01	53.63	17.38	0.98
Relinquishments and seizures	51.56	3.95	43.14	1.35
Male dogs	32.69	45.97	20.24	1.09
Bitches	30.01	46.44	22.59	0.96
Desexed animals	22.80	48.93	27.47	0.80
Entire animals	34.13	45.36	19.41	1.10

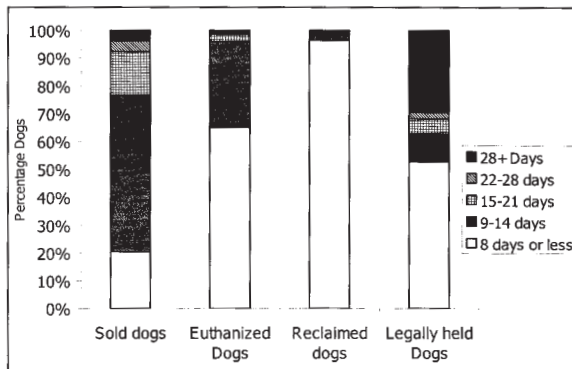


FIGURE 3 Length of stay in shelter by outcome.

2.21 days). Generally, the time taken for dogs to be reclaimed was independent of the day of admission, with more than 90% of all reclamations taking place within 4 days. Friday admissions were the exception, when only 85% of dogs were claimed within 4 days. If admitted on a Friday—compared with any other day of the week, $\chi^2(24, N = 9,568) = 139.80, p < .0001$ —almost twice as many dogs (6.3%) were reclaimed in 8 or more days. Dogs reclaimed after 8 days primarily were (a) dogs who had been held for legal reasons—their cases had been resolved allowing the return of the dog to them—or (b) dogs who had been taken into care temporarily during a personal crisis—human welfare cases such as a battered wife moving into a refuge temporarily or an eviction.

For owners to reclaim dogs they had previously relinquished took significantly longer than did reclaiming a stray, $\chi^2(4, N = 9,567) = 19.25, p < .001$. However, 78.7% of unsuccessful relinquishments were reclaimed within 4 days.

Almost all strays who were sold (rather than being reclaimed or euthanized) found homes in the first week they were made available for sale (68.4%). One third

of relinquished dogs were sold in the first week postadmission and a further third in the next 4 days, $\chi^2(5, N = 4,389) = 349.71, p < .0001$. Larger dogs typically took longer to rehome than smaller ones, $\chi^2(8, N = 4,389) = 39.04, p < .0001$. Legally held dogs formed the vast majority of dogs held for more than 28 days, and about one-third of these dogs were held for more than 28 days. One dog was retained for 156 days before a ruling was handed down.

The majority (65%) of euthanasias occurred at 8 days or before. Most of those occurring in the 9- to 14-day time frame were due to delayed assessments and took place on the 9th or 10th day. Primarily, dogs euthanized between 15 and 28 days (approximately 3.3%) were displaying adverse reactions to the shelter environment—the onset of stereotypic behavior or dog aggression, which caused the animal to be reassessed.

Reasons for Relinquishment

Legal owners relinquished only 15.1% of this sample (3,123 dogs). Where possible, the reasons for relinquishment were recorded. Tables 4 and 5 present these reasons.

As can be seen from Table 4, one third of relinquishing owners did not give a reason for the relinquishment. A variety of reasons for relinquishment were recorded for the remainder. Of the relinquished dogs, 6.47% were puppies, the result of unwanted pregnancies or leftovers from litters who could not be sold or rehomed by the breeder. Almost 8% of relinquished dogs were relinquished for owner-requested euthanasia, contrasting significantly with the 17.2% (Patronek et al., 1995) observed in U.S. research, $\chi^2(1, N = 3,123) = 191.91, p < .0001$. Almost one third of the reasons given could be characterized as owner-related factors. In order of frequency, the

TABLE 4
Reasons Given for Relinquishment

<i>Reason</i>	<i>% of Total Relinquishments</i>
Reason not recorded	34.26
Owner factor	31.92
Dog behavior	10.82
Relinquished for euthanasia	7.85
Unwanted pup	6.47
Aggression	3.20
Issues with other pet	2.43
Unchangeable dog factors	2.05
Unsuccessful relinquishment	0.80
Other	0.19

Note. $N = 3,123$.

TABLE 5
Breakdown of Major Reasons for Relinquishment

<i>Reasons</i>	<i>%</i>
Owner related ^a	
Accommodation and moving	40.42
Too much work/effort/time	17.65
Owner health	13.44
Personal reasons	6.92
Financial	4.71
Owner commitment	3.61
Irresponsible owner	3.31
Poor decision/unrealistic	2.91
Another person's dog	2.61
Welfare issues	1.71
Traveling	1.20
Partner does not want dog	0.90
Unwanted gift	0.50
Unintentional adopter	0.30
Behavioral ^b	
Escapes	24.26
Too boisterous/hyperactive	20.41
Barking	10.36
Predatory behavior	8.58
Destructive	7.40
Uncontrollable	6.80
Digs	5.33
Mouthing/nipping	2.96
Separation issues	2.96
Not housetrained	2.96
Too demanding	1.48
Jumping up	1.18
Too strong, won't walk well	1.48
Dog used to being inside dog	1.18
Other (includes chasing cars, pulling washing off line, scared of storms, etc.)	2.07

^a*n* = 997. ^b*n* = 338.

most common were owner moving; dog requiring too much effort, work, or time; and owner experiencing health issues. As in the United States, moving was the single most common reason given for relinquishments (New et al., 1999; Salman et al., 1998). Other reasons were cited far less frequently.

Behavioral reasons were given for approximately 11% of relinquished dogs. The three most commonly reported behavioral problems were the dog's escaping, boisterousness or hyperactivity, and barking. Other behavioral reasons for relinquishment were cited far less frequently. Of the approximately 100 dogs relin-

quished for aggression (3.2% of all relinquished dogs in this sample), more than half actually had bitten a human, and 20% had displayed severe dog aggression. The rest were relinquished for nonspecific aggression or untrustworthiness. Other dog-related factors were relatively infrequent and included canine health issues, size, death (body disposal), and farm dogs unable to adjust to life in a city. Table 6 presents data relating to the gender and desexed status of relinquished dogs.

As can be seen in Table 6, sexually intact animals were relinquished significantly more often for aggression, owner-related factors, unchangeable dog factors, and euthanasia. Indeed, such dogs formed a large proportion of the 51.56% of relinquishments who subsequently were euthanized. By contrast, desexed dogs were relinquished more frequently for behavior problems and issues with existing pets, $\chi^2(9, N = 3,123) = 158.99, p < .0001$. Surprisingly, a large number of relinquished dogs later were reclaimed.

Reasons for Euthanasia

As full veterinary information was not available from one shelter, data relating to euthanasia were obtained from the other two. Table 7 relates to all animals euthanized—at request of the owner or by decision of the shelter—at these two shelters during this period.

As is evident from Tables 7 and 8, several reasons were given for performing euthanasia, the most common being health, aggression, temperament, and behavior issues. Old age was cited as the reason for euthanasia in more than a third of health-related cases, followed by skin problems, luxating patellas, poor physical condition, stereotypies, separation-related behaviors, severe otitis, and injury.

TABLE 6
Reasons for Relinquishment by Gender and Desexed Status

<i>Relinquishment Reason</i>	<i>Gender (%)</i>		<i>Desexed Status (%)</i>	
	<i>Female</i>	<i>Male</i>	<i>Entire</i>	<i>Desexed</i>
Aggression	38.00	62.00	59.00	41.00
Dog behavior	44.08	55.92	41.72	58.28
Unchangeable dog factors	34.38	65.63	65.63	34.38
Owner factors	45.44	54.56	60.18	39.82
Other	33.33	66.67	50.00	50.00
Issues with other pet	46.05	53.95	35.53	64.47
Relinquished for euthanasia	45.31	54.69	68.16	31.84
Reason not recorded	45.14	54.86	56.26	43.74
Unwanted pup	53.96	46.04	91.09	8.91
Unsuccessful relinquishment	28.00	72.00	64.00	36.00
Total relinquishments	45.12	54.88	58.95	41.05

TABLE 7
Overall Reasons for Euthanasia

<i>Reason</i>	<i>% of Total</i>
Canine health issues	34.54
Aggression	24.14
Temperament	20.14
Behavior	9.57
Breed PBT	5.53
Unknown	3.90
Other	2.17

Note. $N = 4,846$. PBT = 268.

TABLE 8
Breakdown of Reasons for Euthanasia

<i>Reason</i>	<i>% of Euthanasia</i>
Behavior problems ^a	
Hyperactive	34.48
Escapes	16.38
Won't walk on lead easily	14.87
Barking	12.07
Mouthy	7.54
Uncontrollable	5.17
Destructive	2.80
Jumps up	2.16
Difficult to catch	1.72
Too strong	1.94
Lunges	0.22
Can't examine mouth	0.65
Health ^b	
Old age	34.29
Skin problems	19.41
Luxating patellas	10.39
Poor physical condition	4.96
Stereotypy or anxiety	4.90
Severe/chronic otitis	4.48
Injured	4.24
Blindness or eye damage	2.63
Severe hip dysplasia	1.91
Cancer	1.43
Too young to survive	1.37
Other	9.98

(continued)

TABLE 8 (Continued)

<i>Reason</i>	<i>% of Euthanasia</i>
<i>Aggression^c</i>	
Dog aggressive	37.95
Failed assessment	36.32
Aggressive to humans	11.45
Dog has bitten	8.97
Predatory aggression	1.71
Rushed attack	1.62
Fear biter	1.11
Growling	0.68
Dangerous dog	0.17
<i>Temperament^d</i>	
Untrustworthy	42.52
Timid	33.40
Temperament	15.37
Hyperexcitable	2.15
Unsocialized	1.64
Head shy	1.33
Anxious	1.13
Other	2.46

^a*n* = 464. ^b*n* = 1,674. ^c*n* = 1,170. ^d*n* = 976.

More than a third of dogs euthanized for aggression displayed dog aggression, a third displayed aggression during assessment, and about a fifth displayed aggression toward people. Two fifths of the dogs euthanized for temperament issues were assessed as untrustworthy and a third as timid. Hyperactivity was the most common behavioral reason for euthanasia, followed by escaping, inability to walk easily on a lead, excessive barking, and mouthing. Other reasons for euthanasia included owner-requested euthanasia, legal rulings, and lack of buyer interest after 28 days (this affected 37 rehomeable dogs in this sample—less than 0.2% of the total admissions).

Although male dogs formed 57.1% of the total sample and 60% of the total euthanasias, they formed a greater proportion of those euthanized for aggression (62.7%) and behavior problems (63.4%) than did females, $\chi^2(6, N = 4,846) = 25.18, p < .0001$. Males were underrepresented in euthanasias for breed, health, and other reasons. The majority of dogs euthanized for all reasons were entire, $\chi^2(6, N = 4,846) = 26.10, p < .0001$. In fact, entire dogs formed 83.5% of all euthanasias but only 77.2% of the overall sample, $\chi^2(3, N = 20,729) = 273.39, p < .0001$. Overall analysis of the reasons desexed dogs were euthanized revealed that 41% of these euthanasias were for other reasons, primarily at the owner's request or for expiration of the mandated maximum 28-day sale period, $\chi^2(6, N = 6,539) = 264.67, p < .0001$, followed by health and temperament issues.

Desexed dogs were significantly more likely to be sold or reclaimed than entire dogs, who were more likely to be euthanized, $\chi^2(3, N = 20,729) = 273.39, p < .0001$. Just over half (51%) of the relinquished dogs were euthanized in this sample, which is significantly less than the 63.7% averaged over 4 years reported by Moulton et al. (1991), $\chi^2(1, N = 3,123) = 214.34, p < .0001$, but significantly greater than the 48% reported by Patronek et al. (1995), $\chi^2(1, N = 3,123) = 14.68, p < .0001$. Of the 3,123 relinquished dogs in this sample, 245 were relinquished specifically for owner-requested euthanasia (7.8% of relinquishments and just over 1% of total admissions).

Reasons for Postadoptive Return

Of the 4,405 dogs adopted, 7.22% (318 dogs) were returned. A quarter of these dogs (26.4%) were returned for (a) owner-related factors such as a move from the house or inappropriate selection; (b) 22.3% for dog-related factors such as size and health; (c) 22% for behavior problems; and (d) 12.9% because of problems with an existing pet. Approximately 40% of returned dogs were euthanized and the balance were resold. Dogs who were returned for unchangeable dog-related issues (size, health) were twice as likely to be euthanized, and those returned for escaping and psychological reasons (separation-related behaviors and stereotypes) were one-and-a-half times more likely to be euthanized than dogs returned for other reasons. Dogs returned for owner-related factors, behavior problems, and issues with existing pets were more likely to be resold, $\chi^2(12, N = 318) = 116.96, p < .0001$. More than 70% of dogs returned for problems with existing pets were returned within 1 week of adoption; 68% of those returned for owner-related factors and 65% of those returned for behavior problems were returned within 1 month.

DISCUSSION

The aim in this study was to collect descriptive data concerning dogs admitted to three Melbourne shelters over a period of 1 year. Particular areas of interest were the characteristics of the dogs, patterns of admission, sale, reclamation, and euthanasia; duration of stay, and the reasons for relinquishment: euthanasia and postadoptive return. The main findings of note are discussed in more detail in the following sections.

General Admission Data

The majority (84%) of all canine admissions in this study were strays. Although this approximates the findings of the National Council for Pet Population Study and Policy (NCPSP, 1997) that reported a 27% surrender rate, 30% of admis-

sions reported in this survey are not classified as either stray or surrender (NCPSP, 1997). The findings from this study contrast with one U.S. report, which identified 52.2% of shelter admissions to one shelter as strays and 44.2% as owner relinquishments. This shelter also functioned as a pound similar to those studied here (Patronek et al., 1995). Given that Melbourne has universal leash laws, except at a small number of posted off-leash areas, and that urban animal control issues rank high in local government priorities, a higher general level of straying animals seems unlikely. This finding is difficult to explain, but perhaps relinquishment and shelters are perceived somewhat differently in the two countries. Certainly, it is generally accepted that, in Australia, shelters are seen as a solution of last resort. A cross-cultural investigation of these perceptions would clarify this.

More than half the strays in this study (54.9%) were reclaimed by their owners, corresponding closely with the 53.8% reported by Patronek et al. (1995) and in substantial contrast to the 15.8% reported by NCPSP (1997). The typical stray dog in our sample was adult and, usually, male—again corresponding to the Patronek et al. (1995) study. Additionally, shelter admissions in this sample tended to be entire—and small. Unfortunately, comparison of demographic factors between the studies, such as socioeconomic status, was not possible because the shelters sampled in this study function as pounds for multiple municipalities comprised of diverse population groups.

Several findings from the general admission data are of particular note. First, sexually intact dogs were markedly overrepresented in our sample, despite apparent public acceptance of desexing for pet dogs. National figures indicate that 61% of Australian dogs were desexed in 1995 (McHarg et al., 1995). Centralized state-based statistics currently are not available by gender and desexed status, but six municipalities were able to provide such information. This indicated that approximately 85% of registered dogs are desexed. Both these figures contrast significantly with the 22% of desexed shelter dogs tracked in this study and provide a strong indication that current desexing messages are not reaching the owners of stray dogs.

A survey of the reasons Australian owners do not desex their dogs (Australian Bureau of Statistics, 1995) showed that 27% regard the animals as breeding stock, 18% claim that the animals are too old, 15.5% cite personal ethical reservations about desexing, and 14.5% cite cost as their primary reason for not desexing their animals. Identifying which, if any, of these reasons relate to the owners of stray dogs would facilitate targeting this group in future desexing campaigns. Modification of centralized databases allowing analysis by gender and desexed status would assist greatly in evaluating the effectiveness of such strategies.

A second finding pertains to the annual pattern of admissions. More dogs than average were admitted in Australia's traditional summer holiday months (December, January, and February). This possibly reflects the increased frequency of

straying associated with thunderstorm activity (and New Year fireworks) at this time of year, or perhaps with children leaving gates and doors open during school holidays. Sales also were reduced during summer, perhaps indicating a reluctance to acquire a new pet during the vacation season.

Only 31.5% of total shelter admissions in this sample were euthanized, in contrast with the 38% reported in the United States (Patronek et al., 1995). This difference can be attributed largely to the proportion of dogs relinquished specifically for euthanasia, 7.8% of relinquished dogs in this study versus 17.2% in the Patronek et al. (1995) study. The results of this study again contrast with NCPPSP's (1997) report that 56.4% of shelter dogs are euthanized.

Outcomes

Many of the dogs in our sample were reclaimed or rehomed within a short period. Others were euthanized for health, temperament, or behavioral issues. It is difficult to envisage how these numbers might be reduced unless community attitudes change toward dog acquisition, training, and continuing responsibilities as the animal's guardian. Of more immediate concern is the number of healthy, rehomeable dogs euthanized simply because the mandated 28-day sale period had expired. Although not large in number, it is still a sad statistic. Our community clearly continues to produce more pet dogs than are required, which justifies additional initiatives promoting desexing and prepurchase education. Considering that the majority of shelter admissions were stray dogs and that the outcomes for unclaimed strays were grim, it must be a priority to reduce the number of strays in our community. This would enable the redirection of limited community resources into proactive, educational, and rehabilitative efforts and reduce the number of healthy dogs euthanized.

It has been well established that environmental factors (Hubrecht, 1996; Sales, Hubrecht, Peyvandi, Milligan, & Shield, 1997) can have significant negative effects on canine welfare, resulting in extensive physiological (Hennessy, Voith, Buttrania, Miller, & Lindetic, 2001; Tuber, Sanders, Hennessy, & Miller, 1996) and behavioral changes (Beerda, Schilder, Bernadina, et al., 1999; Beerda, Schilder, van Hooff, de Vries, & Mol, 1998, 1999; Senay, 1966) such as increased excitability, aggression, and the development of stereotypies (Bashaw, Tarou, Mali, & Maple, 2001; Ridley & Baker, 1982; von Borell & Hurnik, 1991). Understanding this, it is vital to ensure that holding periods for strays are minimized while still enabling the majority of owners to reclaim their dogs. The clear majority of reclamations in this study occurred within 4 days of admission. Although reducing this period to 4 days would reduce substantially the negative impact of a shelter stay, it also could result in more dogs being euthanized. However, encouraging early reclamation of dogs by imposing an escalating fee scale based on num-

ber of days retained could provide an incentive to reduce the length of the average shelter stay. Modifying shelter procedures to reduce the negative impact of such shelter stays would enhance the quality of life for these animals.

Reasons for Relinquishment

Unfortunately, in one third of all relinquishments the reasons for relinquishment were either not given or not recorded. It is uncertain whether this systematically may have affected the observed reasons for relinquishment, as would be the case if behavioral or aggression reasons for relinquishment were not disclosed. However, among the relatively small proportion of relinquished dogs in our sample, the most frequent reasons given for relinquishment were owner-related issues such as accommodation or moving, lack of time, and owner health. The next most frequently given reasons were nonaggressive behavior problems: escaping, hyperactivity, and barking. With regard to reasons for relinquishment, this study more closely parallels the findings of Salman et al. (1998) than those of DiGiacomo et al. (1998). Escaping and hyperactivity were reported more frequently in this study than in Salman et al. (2000), perhaps indicating that these behaviors are more problematic in the Melbourne community.

In this study, escaping was the most prevalent behavioral reason for initial relinquishment and was responsible for 8.5% of returned dogs. Suburban dogs in Melbourne spend most of their time in backyards rather than confined in the house (Kobelt, Hemsworth, Barnett, & Coleman, 2003). This may be the reason why other studies do not observe escaping as a problem. Animal management officers could be proactive in this area by providing advice on containment for owners of dogs who repeatedly stray. In addition, there is scope to refine current shelter assessment procedures that presently do not target escaping behaviors.

Male dogs were relinquished more frequently than female dogs in all categories other than unwanted puppies. When aggression was the reason for relinquishment, it was typically very serious in nature, with a large number of dogs already having bitten or signaled serious intent.

Hyperactivity was the next most common behavioral factor cited. However, it is unclear whether this was a reflection of actual canine behavior or a mismatch of owner expectations with normal activity levels. Only further research will clarify this.

Reasons for Euthanasia

One third of all euthanasias (34.5%) conducted in this study were performed for canine health reasons, 24.1% for aggression, and 9.6% for other behavior issues.

Health issues were assessed by veterinarians, who evaluated the effect of such issues on an animal's quality of life as well as the future financial liability for a new owner in caring for an animal with such conditions. In-shelter rehabilitative training has the potential to affect up to one tenth of current euthanasias. Entire, small, and male dogs were more likely to be euthanized than were female, desexed, or larger dogs. Given the reality of shelter economics, this is not wholly surprising: Dogs who are desexed on admission require less veterinary care to prepare them for sale. Entire dogs also present with more health and temperament issues than do desexed ones, meaning they are less likely to pass assessment. It is notable that entire males were more likely to be euthanized for aggression and behavior problems than were desexed males, supporting the premise that desexing males reduces aggression.

Kass, New, Scarlett, and Salman (2001) recently reported in a U.S.-based study, "shelters are providing an alternative to veterinary clinics for the purpose of euthanasia for humane reasons" (p. 247). By contrast, it is generally accepted in Australia that euthanasia is best performed by one's normal veterinarian, someone familiar to the animal. These perceptions probably are reflected by the finding that only 7.8% of relinquishments were made specifically for euthanasia in this sample (just over 1% of total admissions). This is in marked contrast to 17.2% of relinquishments and 7.7% of total admissions relinquished specifically for owner-requested euthanasia reported by Patronek et al. (1995).

Reasons for Postadoptive Returns

Only 7.2% of rehomed dogs were subsequently returned. This figure is significantly lower than the 18.8% reported previously in the United States (Patronek et al., 1995) and supports the claims of Australian shelter managers. This finding may result from cultural differences affecting dog owners in the two countries, being either a reflection of demographic differences that this study has not identified or a function of the assessment protocols used. Certainly, an increased understanding of postadoptive returns will enable refinement of the assessment and matching processes and possibly lead to increased retention.

Postadoptive returns occurred primarily because of owner-related factors (moving or poor selection), dog-related factors (size and health), and behavior problems. Others were returned because of problems with an existing pet. This contrasts somewhat with findings from a recent telephone survey that sampled adopters at various intervals postadoption. The survey identified the most common reasons adopters gave for not retaining their dogs 1 year postadoption: (a) the dog did not get on with other pets or children and (b) there were behavioral issues (Neidhart & Boyd, 2002). Possibly, those adopters who had moved could not be contacted, and this would have affected the results obtained.

The majority (60%) of returned dogs were rehomed; the balance were euthanized. Dogs returned for dog-related factors, escaping, and psychological reasons were more likely to be euthanized than were those returned for owner-related factors, behavior, and problems with existing pets. These animals were more likely to be resold. Returns that occurred shortly after adoption revolved around issues with an existing pet, owner-related factors, and behavior problems. This indicates that interventions aimed at improving the integration of a new pet with an existing one, targeting the selection process, and providing in-shelter rehabilitation all may be effective avenues for further research.

Using microchip numbers to track dogs meant that more returns were identified (including postadoptive relinquishments and adopted dogs subsequently admitted as strays) than were noted on the admission documentation. This was surprising, as it meant owners were foregoing a substantial refund when returning their dogs. A few rehomed dogs also turned up at a different shelter from the one at which they had been purchased. These findings may indicate a reluctance to be identified with failed adoptions. As microchip numbers are not always recorded on shelter documentation and the majority of Melbourne shelters were not included in this study, it is likely that shelter returns are still somewhat underreported. A productive venue for future research might involve designing a tracking program for shelter dogs, in cooperation with the microchip registration databases. This probably is the only way to ensure complete accuracy in establishing return figures.

REFERENCES

- Albert, A., & Bulcroft, K. (1987). Pets and urban life. *Anthrozoös*, 1, 9–23.
- Albert, A., & Bulcroft, K. (1998). Pets, families and the life course. *Journal of Marriage and the Family*, 50, 543–552.
- Australian Bureau of Statistics. (1995). *Australian social trends 1995: Culture and leisure—Special feature: Household pets*. Canberra, Australia: Author.
- Australian Bureau of Statistics. (2001). *Census of population and housing*. Canberra, Australia: Author.
- Bashaw, M. J., Tarou, L. R., Mali, T. S., & Maple, T. L. (2001). A survey of variables related to stereotypy in captive giraffe and okapi. *Applied Animal Behaviour Science*, 73, 235–247.
- Beerda, B., Schilder, M. B., Bernadina, W., van Hooff, J. A., de Vries, H. W., & Mol, J. A. (1999). Chronic stress in dogs subjected to social and spatial restriction: II. Hormonal and immunological responses. *Physiology and Behavior*, 66, 243–254.
- Beerda, B., Schilder, M. B. H., van Hooff, J. A., de Vries, H. W., & Mol, J. A. (1998). Behavioral, saliva cortisol and heart rate responses to different types of stimuli in dogs. *Applied Animal Behaviour Science*, 58, 365–381.
- Beerda, B., Schilder, M. B., van Hooff, J. A., de Vries, H. W., & Mol, J. A. (1999). Chronic stress in dogs subjected to social and spatial restriction: I. Behavioral responses. *Physiology and Behavior*, 66, 233–242.
- BIS Shrapnel Global Marketing Intelligence and Forecasting. (1999). *Contribution of the pet care industry to the Australian economy* (3rd ed.). Melbourne, Australia: Petcare Information and Advisory Service.

- Coren, S. (1999). Psychology applies to animal training. In A. M. Stec & D. A. Bernstein (Eds.), *Psychology: Fields of application* (pp. 199–217). Boston: Houghton Mifflin.
- Department of Natural Resources and Environment. (1998). *Code of practice for the management of dogs and cats in shelters and pounds*. Victoria, Australia: Author. Retrieved May 12, 2003, from [http://www.nre.vic.gov.au/web/root/domain/cm_da/nrecinf.nsf/c119e3f042f5596aca256bca001f8bd5/f4c11058b54e9a3aca256c16002203cf/\\$FILE/AG1009.pdf](http://www.nre.vic.gov.au/web/root/domain/cm_da/nrecinf.nsf/c119e3f042f5596aca256bca001f8bd5/f4c11058b54e9a3aca256c16002203cf/$FILE/AG1009.pdf)
- DiGiacomo, N., Arluke, A., & Patronek, G. J. (1998). Surrendering pets to shelters: The relinquisher's perspective. *Anthrozoös, 11*, 41–51.
- Hennessy, M. B., Voith, V. L., Buttrania, J., Miller, D. D., & Lindetic, F. (2001). Behavior and cortisol levels of dogs in a public animal shelter, and an exploration of the ability of these measures to predict problem behavior after adoption. *Applied Animal Behaviour Science, 73*, 217–233.
- Haupt, K. A., Honig, S. U., & Reisner, I. R. (1996). Breaking the human–companion animal bond. *Journal of the American Veterinary Association, 208*, 1653–1659.
- Hubrecht, R. C. (1996). The welfare of dogs in human care. In J. A. Serpell (Ed.), *The domestic dog: Its evolution, behavior and interactions with people* (pp. 179–198). Cambridge, England: Cambridge University Press.
- Kass, P. H., New, J. C. J., Scarlett, J. M., & Salman, M. D. (2001). Understanding animal companion surplus in the United States: Relinquishment of non-adoptables to animal shelters for euthanasia. *Journal of Applied Animal Welfare Science, 4*, 237–248.
- Kobelt, A. J., Hemsworth, P. H., Barnett, J. L., & Coleman, G. J. (2003). A survey of dog ownership in suburban Australia—Conditions and behaviour problems. *Applied Animal Behaviour Science, 82*, 137–148.
- Luke, C. (1996). Animal shelter issues. *Journal of the American Veterinary Association, 208*, 524–527.
- McHarg, M., Baldock, C., Headey, B., & Robinson, A. (1995). *National people and pets survey*. Victoria, Australia: Urban Animal Management Coalition. Retrieved May 12, 2003, from www.petnet.com.au/People_and_Pets/52UAMR.HTML
- Miller, D. D., Staats, S. R., Partlo, C., & Rada, K. (1996). Factors associated with the decision to surrender a pet to an animal shelter. *Journal of the American Veterinary Association, 209*, 738–742.
- Moulton, C., Wright, P., & Rindy, K. (1991). The role of animal shelters in controlling pet overpopulation. *Journal of the American Veterinary Association, 198*, 1172–1176.
- National Council for Pet Population Study and Policy. (1997). *The shelter statistics survey, 1994–97*. Retrieved August 1, 2003, from <http://www.petpopulation.org/statsurvey.html>
- Neidhart, L., & Boyd, R. (2002). Companion animal adoption study. *Journal of Applied Animal Welfare Science, 5*, 175–192.
- New, J. C. J., Salman, M. D., Scarlett, J. M., Kass, P. H., Vaughn, J. A., Scherr, S., et al. (1999). Moving: Characteristics of those relinquishing companion animals to U.S. animal shelters. *Journal of Applied Animal Welfare Science, 2*, 83–96.
- Olson, P., Moulton, C., Nett, T., & Salmon, M. (1991). Pet overpopulation: A challenge for companion animal veterinarians in the 1990s. *Journal of the American Veterinary Association, 198*, 1152.
- Patronek, G. J., Glickman, L. T., Beck, A. M., McCabe, G. P., & Ecker, C. (1996). Risk factors for relinquishment of dogs to an animal shelter. *Journal of the American Veterinary Association, 209*, 572–581.
- Patronek, G. J., Glickman, L. T., & Moyer, M. R. (1995). Population dynamics and the risk of euthanasia for dogs in an animal shelter. *Anthrozoös, 8*, 31–43.
- Ridley, R. M., & Baker, H. F. (1982). Stereotypy in monkeys and humans. *Psychological Medicine, 12*, 61–72.
- Sales, G., Hubrecht, R. C., Peyvandi, A., Milligan, S., & Shield, B. (1997). Noise in dog kenneling: Is barking a welfare problem for dogs? *Applied Animal Behaviour Science, 52*, 321–329.

- Salman, M. D., Hutchinson, J., Ruch-Gaillie, R., Kogan, L., New, J. C. J., Kass, P. H., et al. (2000). Behavioral reasons for relinquishment of dogs and cats to 12 shelters. *Journal of Applied Animal Welfare Science*, 3, 93–106.
- Salman, M. D., New, J. G., Scarlett, J. M., Kass, P. H., Ruch-Gaillie, R., & Hetts, S. (1998). Human and animal factors related to the relinquishment of dogs and cats in 12 selected animal shelters in the United States. *Journal of Applied Animal Welfare Science*, 1, 207–226.
- Senay, E. C. (1966). Toward an animal model of depression: A study of separation behavior in dogs. *Journal of Psychiatric Research*, 4, 65–71.
- Tuber, D. S., Sanders, S., Hennessy, M. B., & Miller, J. A. (1996). Behavioral and glucocorticoid responses of adult domestic dogs (*Canis familiaris*) to companionship and social separation. *Journal of Comparative Psychology*, 110, 103–108.
- von Borell, E., & Hurnik, J. F. (1991). Stereotypic behavior, adrenocortical function, and open field behavior of individually confined gestating sows. *Physiology and Behavior*, 49, 709–713.