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## Prediction of Adoption Versus Euthanasia Among Dogs and Cats in a California Animal Shelter

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The purpose of this retrospective cohort study was to investigate determinants of adoption of cats and dogs from a large municipal animal shelter. The subjects were 4,813 cats and 3,301 dogs impounded by the Sacramento County Department of Animal Care and Regulation and offered for adoption September 9, 1994 to May 26, 1995. The study constructed models predicting the conditional probability of adoption using logistic regression and a final multiple logistic regression model from variables found to be important predictors of adoption. Age, sex, coat color, and reason for relinquishment were major determinants of adoption in cats. Age, sex, coat color, reason for relinquishment, breed, purebred status, and injury status were major determinants of adoption in dogs. Shelter personnel could utilize this information to increase the adoption of frequently overlooked animals. Alternatively, shelters could use this to focus their resources on animals with characteristics the public prefers.

Millions of dogs and cats (Carter, 1987; Rowan, 1992) are annually impounded in the United States in animal shelters. The majority of these companion animals are never adopted or reclaimed by their owners and instead must be humanely destroyed. This wholesale euthanasia of unwanted dogs and cats has been recognized by our society as both tragic and wasteful. Euthanasia is probably the most conspicuous and unpalatable manifestation of what has been called the “pet overpopulation problem.”

The number of dogs and cats annually euthanized in the United States has been estimated as between 5 million and 17 million nonhuman animals (Carter, 1987;

Rowan, 1992). Other authors have estimated that between one tenth and one fourth of the companion animal population is destroyed each year, making euthanasia the leading cause of death in companion animals (Nassar, Mosier, & Williams, 1984). The same authors have estimated that the cost of this form of animal control in monetary terms alone annually exceeds 500 million dollars.

Animals entering shelters usually meet one of three fates: They are reclaimed, adopted, or euthanized. If the number adopted or reclaimed were increased, fewer pets would require euthanasia. For this reason, we studied characteristics of pets, including age, sex, breed, coat color, size and length of hair, which, we hypothesized, might influence the probability that an animal would be adopted. Conversely, traits that cause a pet to be less desirable may increase that pet's risk of euthanasia. By quantifying preferences of adopters, our goal was to predict the likelihood of adoption relative to euthanasia for a particular animal as a function of these preferences and to use this information to devise strategies to increase adoption rates.

## METHODS

The subjects of this retrospective cohort study were the dogs and cats impounded by the Sacramento County Department of Animal Care and Regulation and offered for adoption between September 9, 1994 and May 26, 1995. This approximate 9-month period was selected because computerization of shelter records began on the earlier date and the analytic portion of this study began on the later date.

The animal shelter administered by the Sacramento County Department of Animal Care and Regulation is the largest of three animal shelters serving Sacramento County, California. Sacramento County had a population of 1,070,500 at the 1990 census (Department of Finance, State of California, 2001). The county is demographically, sociologically, and geographically diverse, with a population comprised of 69.3% White, 9% African American, 8.8% Asian American, and 11.7% Hispanic.

The original data on which this study is based contained a total of 17,420 records. The Sacramento County Department of Animal Care and Regulation impounds a wide variety of species including bats, birds, rattlesnakes, and cattle as well as dogs and cats. From the total number of records, 3,301 records of cats and 4,813 records of dogs actually offered for adoption were selected for analysis.

As a result of shelter policies, certain categories of dogs and cats were never offered for adoption: These were not included in the analysis. For example, when owners relinquished pets with a request for euthanasia, that animal was never offered for adoption. Others never offered for adoption included unweaned neonates, animals under quarantine for rabies, animals redeemed by their owners within 3 days, and

those redeemed after agency holds (while an owner is jailed or hospitalized). The official policy of this animal shelter is that dogs of pit bull breeding and feral animals will not be offered for adoption. However, exceptions to this policy were frequent. Animals who died soon after arrival or escaped were likewise not at risk of adoption. The only animals evaluated in this study were those actually known to be offered for adoption. The numbers of animals included in this study, and those falling into the other categories, are summarized in Figure 1.

Each individual animal record was identified by a unique number and accompanied by descriptive information. This information included dog breed (19 levels), cat breed (6 levels), coat color, age category (4 levels), sex (4 levels), dog hair length (3 levels), and dog and cat status. *Age category* was divided into 4 levels (less than 1 year, 1 to 2 years, 3 to 5 years, more than 5 years). Inclusion in these age categories was based on information provided by the relinquishing owner when available but often was simply an educated guess by shelter employees.

*Status* of dogs and cats was a term coined by the animal shelter to indicate the reasons for impoundment. Some status categories, such as "behavior," "expense,"

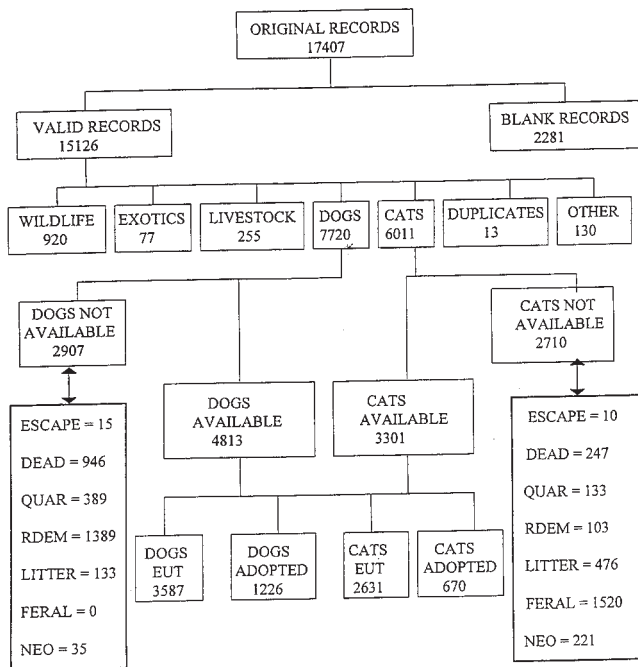


FIGURE 1 Animals impounded by the Sacramento County Department of Animal Control and Regulation between September 9, 1994 and May 26, 1995.

“moving,” “landlord,” “don’t want,” “neonate,” or “old and sick” were contributed by owners when relinquishing an animal. Other status categories were based on the circumstances under which animal control personnel picked up the animal, such as “stray,” “agency hold,” and “feral.”

Eighty-four breeds of dogs were represented in the original data set after initial editing. Each of these breeds was combined with its crossbreeds and then placed into one of 18 different categories. An exception was made for the shepherd mixes, who were categorized with the large companion breeds, while the purebred German shepherd dogs were included with the guarding breeds. If single breeds and their crosses contained several hundred individuals, they were made categories of their own. Breed categories were based on usage of breeds as commonly perceived by the public. This resulted in similar animals being grouped together to determine the type of dog people prefer to adopt. Examples of preferences for dogs in a given use category would be the adoption of one of the miscellaneous sporting breeds by an avid hunter or the assumption by a potential adopter that a medium sized companion breed would be a better dog for a child than a guarding breed or a tiny lapdog. The dog breeds and categories used in this analysis are summarized in Table 1.

Several new variables were constructed from the shelter’s original information. For example, a “purebred dog” column differentiated purebred from crossbred animals, information that was lost when the breeds were grouped. The variables—size and length of hair—were included for dogs based on information obtained from published canine breed standards (Davis, 1970). Length of hair was recorded as short, medium, or long. Dogs who were not purebred were assigned the characteristic size and length of coat of the reported predominant parent.

Variables that had only two possible entries (yes and no) were “license or tag,” “collar,” “name,” “injured,” “adopted,” and “purebred dog.” “Name” and “license” were used to determine the effect of past ownership on adoption. This information also was available to the public on the cage cards of animals offered for adoption. Records lacking an identifying number or lacking data for most variables were deleted from the working table. Litters, where one identification number represented more than one animal, also were eliminated from the analysis.

Models predicting the conditional probability of adoption or euthanasia were constructed using logistic regression. A final multiple logistic regression model was constructed first from variables found in univariate analysis to be important predictors of adoption and whose regression coefficients subsequently, after controlling for other variables, had associated  $p$  values less than .05 for at least one level of the variable. However, breed (regardless of species) was forced into each model. Nested models also were compared for improvement of fit by likelihood ratio tests, with a  $p$  value less than .05 considered statistically significant. Results are presented as odds ratios (OR) and 95% confidence intervals (95% CI).

TABLE 1  
Breed Categories Used to Classify Dogs Admitted to Animal Shelters

<i>Category</i>	<i>No. Impounded</i>	<i>No. Available for Adoption</i>	<i>No. Adopted</i>
Companions—large <sup>a</sup>			
Afghan hound	2	1	1
Bernese mountain dog	2	2	2
Shepherd mix	1,101	755	182
Rhodesian ridgeback	21	14	1
Standard poodle	133	76	20
Subtotal	1,259	848	206
Pointers			
German wirehaired pointer	5	4	1
German shorthaired pointer	67	53	21
Vizla	11	5	1
Subtotal	83	62	23
Ratters			
Miniature schnauzer	36	24	2
Cairn terrier	3	2	1
Finnish spitz	31	21	7
Fox terrier	3	1	1
Jack Russell terrier	6	1	1
Basenji	3	2	0
Schipperke	9	2	0
Scottish terrier	7	3	0
Toy fox terrier	1	1	0
Dachshund	98	63	27
Subtotal	197	120	39
Sled dogs			
Alaskan malamute	37	18	2
Eskimo	17	9	4
Samoyed	41	26	5
Siberian husky	151	100	35
Subtotal	246	153	46
Fighting breeds			
Bull terrier	8	2	1
Chow chow	458	286	38
English bulldog	9	6	3
Shar-pei	141	91	5
Subtotal	616	385	47
Hounds			
Basset hound	53	35	14
Beagle	59	32	9
Norwegian elkhound	9	5	3
Walker hound	14	10	4
Catahoula hog dog	2	2	0
Miscellaneous hounds	71	54	11
Subtotal	208	138	41

*(continued)*

TABLE 1 (Continued)

<i>Category</i>	<i>No. Impounded</i>	<i>No. Available for Adoption</i>	<i>No. Adopted</i>
Guarding breeds			
Airedale terrier	13	9	4
Akita	58	30	4
Doberman pinscher	133	76	18
German shepherd	210	97	24
Subtotal	414	212	50
Herding breeds			
Belgian sheepdog	10	5	2
Border collie	137	97	38
Collie	57	36	9
Old English sheepdog	18	10	2
Shetland sheepdog	85	47	11
Welsh corgi	23	14	2
Subtotal	330	209	64
Companions—giant <sup>b</sup>			
Borzoi	3	2	1
Bullmastiff	2	1	0
Irish Wolfhound	3	1	1
Newfoundland	10	4	1
Briard	3	3	1
Great Dane	46	30	9
Mastiff	12	8	1
Saint Bernard	12	7	5
Subtotal	91	56	19
Labrador retrievers	1,181	776	190
Lap dogs			
Lhasa apso	96	59	25
Miniature pinscher	10	5	5
Pekingese	27	15	5
Pug	20	12	6
Shih tzu	45	27	11
Yorkshire terrier	27	7	2
Maltese	19	9	4
Miniature dachshund	3	1	1
Toy poodle	10	7	2
Miniature poodle	5	4	0
Pomeranian	37	18	7
Chihuahua	130	83	36
Bichon frise	1	1	0
Papillon	2	1	1
Subtotal	432	249	105
Cocker spaniel	454	299	96

(continued)

TABLE 1 (Continued)

<i>Category</i>	<i>No. Impounded</i>	<i>No. Available for Adoption</i>	<i>No. Adopted</i>
Australian herding breeds			
Kelpie	1	1	0
Australian shepherd	256	176	54
Australian heeler	90	54	16
Subtotal	347	231	70
Companions—medium <sup>c</sup>			
Boxer	70	48	16
Dalmatian	61	36	10
Greyhound	6	3	1
Keeshond	32	16	3
Subtotal	169	103	30
Miscellaneous sporting breeds			
Weimaraner	13	5	1
Brittany spaniel	50	27	7
Chesapeake Bay retriever	19	11	1
Golden retriever	112	44	23
Gordon setter	6	4	1
Irish setter	5	1	1
Springer spaniel	103	69	21
Miscellaneous setters	4	3	0
Subtotal	312	164	55
Miscellaneous terriers	360	241	77
Rottweilers	480	264	64
Staffordshire terrier (pit bull)	541	306	7

<sup>a</sup>23 to 27 inches. <sup>b</sup>Greater than 27 inches. <sup>c</sup>17 to 22 inches.

## RESULTS

Originally, 7,720 dogs and 6,011 cats were impounded at this shelter; 62% of the dogs and 55% of the cats were made available or offered for adoption. Therefore, the cohort of adoptable animals under study comprised 4,813 dogs and 3,301 cats. Among these, 26% of the dogs and 20% of the cats were adopted. The number of animals in various categories processed at this shelter during the study period has been summarized in Figure 1.

Table 1 lists the number of dogs who were impounded, offered for adoption, and adopted. Breeds impounded in large numbers included the Shepherd mixes, Chow Chows, Labrador Retrievers, Staffordshire Terriers, Rottweilers, and Cocker Spaniels. Reasons for relinquishment were not recorded, so breeds more commonly surrendered to shelters may have been correspondingly more popular among residents of the county or may have been relinquished because of



breed-specific problems. The percentage adopted ranged from 2% for the Staffordshire terriers to 41% for the lap dogs, with adoption rates for many of the other breeds approximately 30% of those actually offered for adoption. Available animals who were not adopted were euthanized at the shelter.

Statistical models were constructed to determine what characteristics of dogs and cats in this cohort increased their likelihood of being adopted. Factors investigated in dogs were age, sex, coat color, reason for impoundment, breed, purebred standing, presence of an injury, presence or absence of a license, having a collar, hair length, having a name, and size. The final multiple logistic regression results for dogs are summarized in Table 2. Among cats, the factors evaluated were age, sex, coat color, reason for impoundment, breed, presence of an injury, having a collar, hair length, and having a name. The final multiple logistic regression results for cats are summarized in Table 3.

## Dogs

When looking at age in dogs, puppies less than a year old were used as a reference group. The likelihood of adoption in dogs decreased with increasing age. The odds ratio (OR) was 0.45 for 1 to 2 year old dogs, 0.33 for 3 to 5 year olds, and 0.019 for dogs older than 5 years. The respective 95% CI were 0.35 to 0.53, 0.26 to 0.42, and 0.0092 to 0.038 for these age groups.

Examining sex and adoption preferences in dogs showed that intact male dogs (OR = 0.87, 95% CI = 0.72 to 1.04) were less likely to be adopted than the reference group of intact females. Altered males and spayed females were more likely to be adopted than intact female dogs (OR = 1.87, 95% CI = 1.16 to 3.01 and OR = 1.76, 95% CI = 1.29 to 2.41, respectively) as well as intact male dogs (OR = 2.16, 95% CI 1.25 to 3.71 and OR = 2.03, 95% CI = 1.08 to 3.82), respectively.

Coat color in dogs influenced adoption choices. Brindle (OR = 0.41, 95% CI = 0.21 to 0.80) and black (OR = 0.74, 95% CI = 0.52 to 1.04) dogs had the least likelihood of being adopted compared to the reference coat color of black and tan. Most of the other 10 coat colors, such as red, merle, and tricolor were preferred only slightly over black and tan.

Data collected at this shelter included the reason for impoundment for each dog. "Stray" was used as a reference group because 67% of the dogs in the group available for adoption were impounded as strays. Dogs relinquished because of expense (OR = 1.86, 95% CI = 0.74 to 4.67), agency holds (OR = 1.56, 95% CI = 0.52 to 4.68), or a family move (OR = 1.49, 95% CI = 0.81 to 2.73) were adopted more readily than strays. On the other hand, dogs who were relinquished by their owners because of behavior problems (OR = 0.057, 95% CI = 0.018 to 0.18), those who were relinquished because they were old and sick (OR = 0.17, 95% CI = 0.060 to 0.49), or injured (OR = 0.62, 95% CI = 0.22 to 1.79) were less readily adopted.

TABLE 2  
Conditional Logistic Regression Analysis of the Relationship Between Adoption of Dogs  
From an Animal Shelter and Various Characteristics of Those Dogs

<i>Variable Value</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>Global p</i>	<i>p</i>
Age of dog				< .001
< 1 year	1.00			
1 to 2 years	0.43	0.35 to 0.53	< .001	
3 to 5 years	0.33	0.26 to 0.42	< .001	
> 5 years	0.019	0.0092 to 0.038	< .001	
Sex of dog				< .001
Female	1.00			
Male	0.87	0.72 to 1.04	.13	
Neutered male	1.87	1.16 to 3.01	.01	
Spayed female	1.76	1.29 to 2.41	< .001	
Dog coat color				.013
Black and tan	1.00			
Black	0.74	0.52 to 1.04	.083	
Black and white	1.04	0.74 to 1.44	.84	
Brindle	0.41	0.21 to 0.80	.009	
Brown	1.06	0.77 to 1.44	.73	
Gray	1.17	0.48 to 2.85	.72	
Merle	1.23	0.65 to 2.32	.52	
Red	1.66	1.02 to 2.70	.040	
Solid with white	1.08	0.76 to 1.53	.66	
Tricolor	1.29	0.89 to 1.87	.17	
White	0.95	0.53 to 1.68	.85	
Dog status				< .001
Stray	1.00			
Agency hold	1.56	0.52 to 4.68	.43	
Behavior problems	0.057	0.018 to 0.18	< .001	
Do not want	0.84	0.65 to 1.08	.18	
Expense	1.86	0.74 to 4.67	.19	
Injured	0.62	0.22 to 1.79	.38	
Landlord	0.86	0.44 to 1.70	.67	
Moving	1.49	0.81 to 2.73	.20	
Old and sick	0.17	0.060 to 0.49	< .001	
Dog breed				< .001
Large companions	1.00			
Australian herding	1.05	0.67 to 1.65	.84	
Cocker spaniels	1.80	1.19 to 2.73	.005	
Fighting breeds	0.37	0.24 to 0.57	< .001	
Giant companions	2.71	1.20 to 6.12	.017	
Guarding breeds	0.76	0.47 to 1.23	.26	
Herding breeds	1.24	0.79 to 1.95	.35	
Hounds	1.27	0.73 to 2.23	.40	
Labrador Rretrievers	0.93	0.68 to 1.28	.68	

(continued)

TABLE 2 (Continued)

<i>Variable Value</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>Global p</i>	<i>p</i>
Lap dogs	3.86	2.45 to 6.08	< .001	
Medium companions	1.15	0.62 to 2.12	.66	
Miscellaneous sporting breeds	1.70	1.02 to 2.83	.041	
Pointers	1.20	0.54 to 2.64	.66	
Ratters	2.10	1.17 to 3.76	.013	
Rottweilers	0.93	0.61 to 1.41	.73	
Sled dogs	0.91	0.54 to 1.53	.71	
Staffordshire terriers	0.070	0.027 to 0.18	< .001	
Miscellaneous terriers	1.74	1.15 to 2.65	.009	
Purebred dogs				< .001
Versus crossbreeds	1.43	1.16 to 1.76	< .001	
Injured dogs				< .001
Versus uninjured	0.22	0.11 to 0.44	< .001	

*Note.* Odds ratios for all variables are adjusted for the presence of the other variables in the model. Global *p* values test the null hypothesis that the odds ratios for all levels of a single variable are simultaneously equal to 1.00. Status = reason for impoundment.

TABLE 3  
Conditional Logistic Regression Analysis of the Relationship Between Adoption of Cats  
From an Animal Shelter and Various Characteristics

<i>Variable Value</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>Global p</i>	<i>p</i>
Age of cat				< .001
< 1 year	1.00			
1 to 2 years	0.27	0.20 to 0.37	< .001	
3 to 5 years	0.22	0.14 to 0.34	< .001	
> 5 years	0.054	0.016 to 0.18	< .001	
Sex of cat				< .001
Female	1.00			
Male	1.17	0.86 to 1.60	< .001	
Neutered male	6.68	4.26 to 10.46	< .001	
Spayed female	4.28	2.26 to 8.12	.31	
Cat coat color			.17	
Tabby	1.00			
Black	0.59	0.38 to 0.92	.02	
Black and White	0.78	0.48 to 1.20	.23	
Brown	0.56	0.25 to 1.30	.56	
Color point	1.26	0.67 to 2.38	.48	
Gray	1.25	0.66 to 2.36	.50	
Solid with white	0.93	0.53 to 1.64	.81	

(continued)

TABLE 3 (Continued)

<i>Variable Value</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>Global p</i>	<i>p</i>
Tabby with blue	0.99	0.59 to 1.66	.97	
Tabby with red	0.75	0.47 to 1.18	.21	
Tortoise shell	0.87	0.54 to 1.39	.56	
White	1.61	0.72 to 3.59	.24	
Cat status			.005	
Stray	1.00			
Behavior problems	0.25	0.086 to 0.71	.01	
Don't want	0.84	0.58 to 1.20	.33	
Expense	0.59	0.19 to 1.85	.36	
Feral	2.01	0.48 to 8.49	.34	
Injured	0.47	0.027 to 7.78	.60	
Landlord	0.54	0.17 to 1.65	.28	
Moving	0.71	0.29 to 1.75	.46	
Neonate	0.35	0.12 to 1.05	.06	
Old and sick	0.36	0.49 to 0.27	< .001	
Cat breeds			.58	
Domestic short hair	1.00			
Domestic long hair	0.85	0.58 to 1.24	.40	
Domestic medium hair	1.12	0.78 to 1.62	.53	
Persian	1.86	0.71 to 4.88	.21	
Rare breeds	1.75	0.54 to 5.74	.35	
Siamese	1.08	0.33 to 3.53	.91	

*Note.* Odds ratios for all variables are adjusted for the presence of the other variables in the model. Global *p* values test the null hypothesis that the odds ratios for all levels of a single variable are simultaneously equal to 1.00. Status = reason for impoundment.

Breed or use category of dogs was found to be important to adopters. The "lapdogs," defined as nonhunting breeds less than 16" tall at the shoulder, and cocker spaniels were preferred for adoption over the reference "large companion breeds" (OR = 3.86, 95% CI = 2.86 to 6.98; and OR = 2.01, 95% CI = 1.33 to 3.02, respectively). The "giant companion breeds" (OR = 2.71, 95% CI = 1.20 to 6.12) and the small terrier-like dogs, grouped here as "ratters" (OR = 2.10, 95% CI = 1.17 to 3.76), also were more likely than the reference group to be adopted. On the other hand, the "guarding breeds" (OR = 0.76, 95% CI = 0.47 to 1.23) were less likely to be adopted, and the "fighting breeds" (OR = 0.37, 95% CI = 0.24 to 0.57) and Staffordshire Terriers (OR = 0.070, 95% CI = 0.027 to 0.18) were much less likely to be adopted than the large companion breeds. The remaining categories, such as the "miscellaneous sporting breeds" and "herding breeds," "sled dogs," and Rottweilers were close to the reference group in their appeal to potential adopters.

The multiple logistic regression model also showed that purebred dogs were more likely to be adopted than crossbred dogs (OR = 1.43, 95% CI of 1.16 to 1.76). Injured dogs were not likely to be adopted, with an odds ratio of 0.22 and a 95% CI of 0.11 to 0.44.

## Cats

Age in cats influenced adoption choices, as it did in dogs. The likelihood of adoption progressively decreased with increasing age of cat. Compared to the reference group of cats less than 1 year of age, it was observed that cats between 1 and 2 years old had an odds ratio of 0.27, with a 95% CI of 0.20 to 0.37. Cats 3 to 5 years old had an odds ratio of 0.22 with a 95% CI of 0.14 to 0.34, and cats older than 5 years had an odds ratio of only 0.054, with a 95% CI = 0.016 to 0.18.

The sex of a cat was important to potential adopters. Most impounded cats were intact females, and this was used as the reference group. Intact males (OR = 1.17, 95% CI = 0.86 to 1.60) were found to be adopted slightly more readily than sexually intact females. Sexually altered cats were preferred over intact animals in general. For example, spayed females (OR = 4.28, 95% CI = 2.26 to 8.12) and neutered males (OR = 6.68, 95% CI = 4.26 to 10.46) were adopted much more readily than intact females as well as intact males (OR = 3.66 and OR = 5.71, respectively).

The effect of coat color (relative to tabby color) in cats at the time of adoption was compared. White (OR = 1.61, 95% CI = 0.72 to 3.59), color point (OR = 1.26, 95% CI = 0.67 to 2.38), and gray (OR = 1.25, 95% CI = 0.66 to 2.36) cats were more likely to be adopted. Cats less likely to be adopted (relative to tabby color) were brown (OR = 0.56, 95% CI = 0.25 to 1.30) or black (OR = 0.59, 95% CI = 0.38 to 0.92).

In 60% of cats, the reason for impoundment was stray status and was the reference category for reasons for impoundment. In contrast to dogs, stray cats had a greater likelihood of being adopted than did those impounded for other reasons. For example, cats relinquished by their owners because of expense (OR = 0.59, 95% CI = 0.19 to 1.85), landlord problems (OR = 0.54, 95% CI = 0.17 to 1.65), or moving (OR = 0.71, 95% CI = 0.29 to 1.75) were less likely overall to be adopted than were strays. Cats impounded because they were injured (OR = 0.47, 95% CI = 0.028 to 7.78), because they had behavior problems (OR = 0.25, 95% CI = 0.086 to 0.71), or because they were old and sick (OR = 0.036, 95% CI = 0.0049 to 0.27) were not very likely to be adopted.

People seeking to adopt a cat had mild preferences for certain breeds. When domestic short hair was used as a reference group, a preference for Persians (OR = 1.86, 95% CI = 0.71 to 4.88) and the rare breeds (OR = 1.75, 95% CI = 0.54 to 5.74) was observed over domestic short-haired cats. Domestic long-hair cats (OR = 0.85, 95% CI = 0.58 to 1.24), domestic medium-hair cats (OR = 1.12, 95% CI =

0.78 to 1.62), and Siamese cats (OR = 1.08, 95% CI = 0.33 to 0.53) had approximately the same likelihood of adoption as the domestic short-hair reference cats.

## DISCUSSION

As mentioned earlier, 26% of dogs and 20% of cats available for adoption were, in fact, adopted. However, the percentages adopted were much lower when calculations were based on the total number of impounded dogs and cats. For example, only 11% of the all the cats and 16% of all the dogs impounded were adopted. Therefore, determining availability for adoption is important, and this depends on animal shelter policies. The legal mandate of a shelter and its public or private designation determine these policies and procedures, which have received little attention in the literature. Some of the most influential policies are quarantine rules, neutering and vaccination requirements, temperament evaluations, new owner screening, local regulations concerning "problem breeds" legally required holding times, required holding times for local agencies (such as when a pet owner is jailed), health of the animal and availability of veterinary care, space available for animals, and penalties and fees assessed. In addition, policies governing the source, species, numbers, and types of animals impounded vary from facility to facility. Employees often circumvent established shelter policies in unusual or hardship situations (although this is difficult to quantify).

Wells and Hepper (1992) found that relinquished dogs in general were more readily adopted than were those who had previously been stray. Here, however, it was found that the reasons for relinquishment of dogs can be important to an adopter if this information is made available. An animal who entered the shelter when the owner was hospitalized or who was classed as an agency hold had a better chance of being adopted than one who was relinquished for behavioral problems. This is consistent with the relatively longer "time-to-adoption" found by Barnes (1995) for dogs with known behavior problems. This did not apply to cats, however, as stray animals were preferred.

Breed preferences in Sacramento County were similar to those observed by adopters of dogs from an animal shelter in Northern Ireland (5; Wells & Hepper, 1992). In descending order, the breed preferences they observed were Spaniel, Labrador Retriever, Collie, Rottweiler, Staffordshire Terrier, and Jack Russell Terrier.

Wells and Hepper (1992) also ranked preferences for coat color in dogs in descending order. Dogs who were adopted most frequently were black and white, followed by yellow, then solid black, gold, and lastly black and tan. The Sacramento County study agreed in that black and tan was not preferred, but otherwise the preferences from two shelters on two different continents had little in common.

Neither study demonstrated that coat color was an overwhelmingly important influence on adoption preferences.

Some of the breeds who were impounded in Sacramento County in large numbers, including the Staffordshire terriers and fighting and guarding breeds such as Chow Chows and Rottweilers, were not adopted in large numbers. This may be an example of a need to counsel people who buy puppies owners concerning their expectations regarding pets of certain breeds.

This study covered approximately a 9-month period of time, omitting the summer months. So long as the reasons and preferences that drive people to adopt pets do not change in these months, our findings should be able to be generalized to throughout the year. It also is important to recognize that adoption preferences can be affected by shelter adoption policies, so our findings may not hold for shelters whose adoption policies are substantially different from the shelter in this study.

In conclusion, people who adopt pets from animal shelters do have demonstrable preferences for animals of certain ages, sexes, breeds, coat colors, and histories. Shelter personnel could use such information perhaps to increase the adoption of frequently overlooked animals. For example, they might discuss with people the advantages of adopting a mature dog rather than a puppy or convince an adopter to invest in nursing a sick or injured animal back to health. Alternatively, shelters could use this kind of information to focus their resources on the types of animals the public prefers. More important, this study has offered an opportunity to verify quantitatively some of the impressions of animal shelter personnel concerning adoption preferences.

## REFERENCES

- Barnes, D. D. (1995). *Retrospective cohort study of factors affecting time to adoption of dogs in a humane society*. Unpublished master's thesis, University of California, Davis.
- Carter, C. N. (1987). Pet population control: Another decade without solutions? *Journal of the American Veterinary Medical Association*, 197, 192–195.
- Davis, H. P. (1970). *The new dog encyclopedia*. Harrisburg, PA: Stackpole.
- Nassar, R., Mosier, J. E., & Williams, L. W. (1984). Study of the feline and canine populations in the greater Las Vegas area. *American Journal of Veterinary Research*, 45, 282–287.
- Rowan, A. (1992). Shelters and pet overpopulation: A statistical black hole. *Anthrozoös*, 5, 140–143.
- Wells, D., & Hepper, P. G. (1992). Behaviour of kennelled dogs. *Animal Welfare*, 1, 171–186.