

8-1-2010

Seasonal variation in the number of dogs and cats entering four animal shelters in Mississippi and the characteristics [i.e. characteristics] influencing their adoption

Sarah Elizabeth Lefebvre

Follow this and additional works at: <https://scholarsjunction.msstate.edu/td>

Recommended Citation

Lefebvre, Sarah Elizabeth, "Seasonal variation in the number of dogs and cats entering four animal shelters in Mississippi and the characteristics [i.e. characteristics] influencing their adoption" (2010). *Theses and Dissertations*. 3873.
<https://scholarsjunction.msstate.edu/td/3873>

This Graduate Thesis - Open Access is brought to you for free and open access by the Theses and Dissertations at Scholars Junction. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholars Junction. For more information, please contact scholcomm@msstate.libanswers.com.

SEASONAL VARIATION IN THE NUMBER OF DOGS AND CATS
ENTERING FOUR ANIMAL SHELTERS IN MISSISSIPPI
AND THE CHARACTERISTICS INFLUENCING THEIR
ADOPTION

By

Sarah Elizabeth Lefebvre

A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Veterinary Medical Science
in the Department of Clinical Sciences

Mississippi State, Mississippi

August 2010

SEASONAL VARIATION IN THE NUMBER OF DOGS AND CATS
ENTERING FOUR ANIMAL SHELTERS IN MISSISSIPPI
AND THE CHARACTERISTICS INFLUENCING THEIR
ADOPTION

By

Sarah Elizabeth Lefebvre

Approved:

Philip Bushby
Professor
Department of Clinical Science
(Director of Thesis)

Skip Jack
Professor
Department of Pathobiology
and Population Medicine
(Committee Member)

Richard Minnis
Wildlife Biologist/Staff Officer
USDA APHIS WS
(Committee Member)

Andrew Mackin
Associate Professor and Chief
Small Animal Medicine
Department of Clinical Sciences
(Department Graduate Coordinator)

Kent H. Hoblet
Dean of the College of Veterinary Medicine

Name: Sarah Elizabeth Lefebvre

Date of Degree: August 8, 2010

Institution: Mississippi State University

Major Field: Veterinary Medical Science

Major Professor: Dr. Philip Bushby

Title of Study: SEASONAL VARIATION IN THE NUMBER OF DOGS AND CATS
ENTERING FOUR ANIMAL SHELTERS IN MISSISSIPPI AND THE
CHARACTERISITICS INFLUENCING THEIR ADOPTION

Pages in Study: 39

Candidate for Degree of Master of Science

The pet overpopulation problem is a multi-factorial problem that many organizations such as animal shelters attempt to manage. Many studies have focused on the reasons animals are relinquished by their owners but few have also looked at the characteristics that may influence adoption. Identifying which characteristics that influence adoption may help shelters provide more detailed adoption programs based on their dog and cat profile.

Increases in the number of dogs and cats entering animal shelters during the spring and summer months is a perception among shelter staff. Investigating the seasonal trends in the number of animals entering a shelter may help the facility prepare to provide additional space and resources.

The focus of this study was to identify any seasonal variation in the number of dogs and cats entering animal shelters in Mississippi and to determine the characteristics of dogs and cats that influenced their adoption.

DEDICATION

I would like to dedicate this research and my graduate studies to my mother Pamela Hicks, my brother John Lefebvre and my husband Darwin Petras for their love and unlimited support over the last three years.

ACKNOWLEDGEMENTS

The author would like to thank Dr. Phil Bushby, Dr. Skip Jack and Dr. Richard Minnis for their support and patience. Thanks are also given to the Humane Ethics and Animal Welfare fund for providing monetary support.

TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vi
CHAPTER	
I. INTRODUCTION	1
II. LITERATURE REVIEW	3
Shelter	3
Types	3
Infrastructure	4
Economics	5
Seasonal Variation	5
Animal Characteristics	6
Origin	6
Sex and Reproductive Status	8
Health Status	8
Age	9
Breed	9
Coat Color	11
III. METHODOLOGY	12
Materials and Methods	12
Seasonal Variation	13
Characteristics	13
IV. RESULTS	17
Seasonal Variation	17
Characteristics	17
Dogs	19

Cats	25
V. DISCUSSION	28
REFERENCES	33
APPENDIX	
A. PERMISSION LETTER SENT TO ALL PARTICIPATING ANIMAL SHELTERS	36
B. STANDARDIZED FORM USED FOR ALL SHELTER DATA	38

LIST OF TABLES

3.1	Multiple Competing Models in Dogs	15
3.2	Multiple Competing Models in Cats	16
4.1	Number of Dogs per Season Based on Shelter	18
4.2	Number of Cats per Season Based on Shelter	18
4.3	One-Way Analysis of Variance for Seasonal Variation in Dogs and Cats	18
4.4	Breed Categories Used to Classify Cats Admitted to Animal Shelters	18
4.5	Breed Categories Used to Classify Dogs Admitted to Animal Shelters	20
4.6	Characteristics of Dogs and Cats from Shelters	22
4.7	Variable Odds Ratio and Confidence Interval for Dogs and Adoption	23
4.8	Analysis of Maximum Likelihood Estimates for Variables in Dogs	23
4.9	Variable Odds Ratio and Confidence Interval for Cats and Adoption	26
4.10	Analysis of Maximum Likelihood Estimates for Variables in Cats	26

CHAPTER I

INTRODUCTION

Approximately six to eight million cats and dogs enter USA animal shelters each year and of them three to four million healthy cats and dogs are euthanized.⁴ According to a 2007 survey from the American Pet Products Manufacturers Association, 10% of owned dogs and 18% of owned cats were adopted from shelters. Animal shelters are organizations with the sole purpose of caring for unwanted animals. These organizations are responsible in providing adoption programs and euthanizing animals that are not adopted. The Humane Society of the United States (HSUS) estimates that there are 4,000 to 6,000 animal shelters in the United States. However the actual number may be higher since the HSUS estimate does not include sanctuaries, no-kill shelters or small groups that foster animals.¹⁰ Unfortunately many animal shelter are understaffed and underfunded which make caring for these animals difficult.^{10,11,23} In addition, comprehensive data collection and analysis of the dogs and cats entering animal shelters on the national level has been ineffective in providing assistance to the local animal shelter.¹⁸ Data regarding shelter animals on the local level may provide more accurate information that may be more beneficial to shelter staff and funding agencies.

The first objective of this study was to determine whether there are seasonal trends relating to the number of dogs and cats entering animal shelters in Mississippi. It is theorized among those that work at animal shelters that there is a seasonal variation in the number of animals entering their facilities. This theory is based on the observation that more animals enter shelters during the spring and summer months. However, studies investigating this perception are limited and there are none that address shelters in Mississippi.²³ Monitoring seasonal trends in the number of animals (cats and dogs) entering a shelter will allow staff to prepare for fluctuations in the demand of services and better usage of funds to support those demands. Tracking any seasonal trends may also assist shelters in creating more effective adoption programs during certain parts of the year.

The second objective of this study was to determine whether there are certain characteristics that influence adoption. Reasons for animals entering shelters range from owner relinquishment or abandonment of their pet, to stray and seized animals while reasons for euthanasia include lack of shelter space and animal health status, age, and reproductive status.⁷ Many studies have addressed why animals are relinquished to animal shelters but few have looked at the specific characteristics of the animals that get adopted. Determining which animals are more likely to be adopted will help animal shelter staff develop adoption campaigns focusing on those characteristics that influence adoption. In addition, animal shelters can advertise the animals that are more likely to get adopted based on certain characteristics.

CHAPTER II

LITERATURE REVIEW

Shelters

Animal shelters have consistently been responsible for caring for homeless animals and attempting to control the pet population. These shelters typically have limited funding, space and staff to care for the animals that enter each facility annually.

Types

Moulton et al. (1991) describes three types of agencies that care for unwanted animals: animal control, humane agencies and humane agencies with government contracts. Animal control agencies are supported by tax funds and user fees. The function of an animal control agency is to manage stray animals and protect the health and welfare of the community. Humane agencies are privately operated shelters. These agencies are non-profit, tax exempt and funded by donations. The third type of shelter is one that is private, but has a contract with the city or county. The contract allows the shelter to perform the same duties as animal control or allows animal control to bring animals to the shelter.

Typically shelter space and funds are limited resulting in many animals being euthanized.¹⁰ Many humane societies/animal shelters attempt to provide educational

information regarding pet adoption and some require animals to be sterilized prior to adoption.¹⁰

Infrastructure

In a 1999 study²³, Wenstrup and Dowidchuk surveyed 186 shelters regarding shelter capacity, economics, and policies. The surveyed shelters reported a capacity for only 2.6% of the animals entering their facilities in the past year: 19,998 places for the annual 764,879 animals. The average animal remained in a shelter for approximately 9.5 days before exiting through euthanasia, adoption or being returned to their owner. In the same study, shelters cited insufficient space as one of the main reasons for euthanasia.

Shelters and humane societies have developed programs to help off-set the lack of space available for dogs and cats. Lord and Wittum, et al. (2006) compared data from 1996 and 2004 regarding 165 Ohio animal shelters. The buildings had a median age of 20 years in 2004 and only 31% reported having built a new facility or completing a substantial addition since 1996. The results of the study also revealed a decrease in the number of dogs handled and euthanized by the animal care and control agencies over the eight year period. One explanation for the decrease in the number dogs over the eight year period was that there were more foster programs available in 2004 than in 1996. Foster programs typically allow dogs or cats to be kept and cared for by people off-site, thus reducing the number of animals in the shelter.

Economics

In most instances animal shelters are under-funded. Wenstrup and Dowidchuk (1999)²³ surveyed the amount of money spent by 186 shelters. The shelters spent a total of \$132.7 million during the course of one year representing an average cost per animal of \$176 dollars. Nationally the study estimated that between \$1.4 billion and \$2.8 billion were spent on animal control facilities and shelters. In a 2006 Ohio study, the total expenses by animal control agencies were \$57.7 million in 2004 which was a 69% increase over 1996.⁸ In contrast, the total amount of money allocated by the city and county governments was \$25.8 million in 2004.⁸ While this amount had increased from 1996, it is still far less than what is needed to match the total expenses. It is likely that the amount of money spent by these facilities has increased since 2004.

Seasonal Variation

Most animal shelters remain open to admit animals all year. Shelter staff perceives that animal intakes increase during the warmer months of the year, typically spring and summer (Phil Bushby, personal communication). However, the months and length of these seasons likely vary according to shelter location. Breeding cycle of these animals, especially cats, is another explanation for the perceived increase in number during warmer months. Cats are seasonally polyestrous, i.e. have more than one estrus cycle during a specific time of year. One may assume that the number of cats entering a facility may increase during late winter and late spring. Shore and Girrens (2001) found that there were more animals entering an animal control facility and humane society in Wichita, Kansas during the summer months with the largest percentage (10.6%) in July.

These shelters received fewer animals during the winter months with December having the least percentage (6.7%) of animals.²² An increase in the number of stray dogs was cited as a reason for the increased numbers during the summer months. More people tend to be outdoors during that time and are more likely to find, capture and relinquish a stray animal to a shelter.²²

Marston, Bennet, and Coleman (2004) found that most stray dogs were admitted to the shelters during the Australian summer months of December, January and February. This possibly reflects the increased frequency of more stray dogs running-at-large during the summer.

Animal Characteristics

Many studies have investigated the characteristics of dogs and cats as well as the reasons people give when they relinquish their pet. The characteristics studied include age, weight/size, sex and reproductive status, coat color, primary breed, and health status.^{1,2,3,5,7} While many studies have identified reasons for relinquishment of dogs and cats few have identified those characteristics that are likely to lead to adoption.

Origin

In order to decrease the number of unwanted dogs and cats, it is important to understand where the animals originate. Specific reasons for relinquishment that have been studied include behavioral problems (Salman et al.,2000), moving (New et al., 1999), and health and personal issues (Scarlet et al., 1999).¹³ The two most common behavior-related reasons people give when relinquishing the pets are inappropriate

elimination in cats and dog aggression toward people.^{6,15,16,17,19,21} Many of dogs and cats that are relinquished to shelters for behavior problems were initially adopted from shelters.¹ This could imply that people are not given a complete health and behavior profile about an animal prior to adoption.

Prospective owners seem to adopt animals that have background information available such as medical history and reason for relinquishment.¹ This is supported by a study which evaluated a shelter in the midwest that reported that dogs and cats were more likely to be adopted if they were brought to a shelter by a citizen or relinquished by an owner rather than an animal control officer.¹⁵ Lepper et al. (2002) found that stray, ill, or injured dogs were less likely to be adopted than dogs that had been relinquished due to moving or expense of maintaining the animal's health. However the same study showed that stray cats had a greater likelihood of being adopted than did those impounded for other reasons.

Neidhart and Boyd (2002) evaluated the outcomes of companion animal adoptions from PetSmart[®], a 1999 adopt-a-thon and Arizona Humane Societies. Most people were satisfied with the adoption process and a year later four out of five people still had the animal. Animals adopted for a child or grandchild, older animals and animals adopted by people with incomes less than \$35,000 resulted in the lowest retention level.

Another study found that dogs adopted from shelters, acquired for less than \$100 from a breeder or private owner, born in the home or found as stray had an increased risk of relinquishment.¹⁶ In the same study cats acquired at no cost from the previous owner

were at increased risk of relinquishment but cats found as strays had a decrease risk of relinquishment.^{17,20}

Sex and Reproductive Status

Alexander and Shane (1994) found no significance difference in the number of adopted male dogs versus female dogs. Lepper et al. (2002) studied the characteristics of dogs and cats that might influence the probability of adoption. In this study, neutered and spayed dogs were adopted more frequently than intact male and female dogs. Spayed and neutered cats were also adopted over intact male and female cats.¹⁷ Bartlett et al. (2005) showed that dogs and cats that were spayed or neutered had lower euthanasia rates when compared to those that were intact. Clevenger and Kass (2003) compared determinants of adoption or euthanasia of dogs neutered at University of California-Davis Veterinary School to a group of dogs from the general shelter population. The study found that neutered dogs had the best chance for adoption compared to intact dogs. In addition, neutered dogs and cats had less chance of being relinquished by their owners.^{14,16,17,19} The success of established spay and neuter programs may explain why more spayed and neutered dogs and cats are adopted more frequently than those that are not. Problems with owner compliance to spay or neuter their pet are diminished when animals are spayed or neutered prior to leaving a facility.

Health Status

Kass et al. (2001) conducted a survey regarding reasons for relinquishing cats and dogs to shelters between 1995 and 1996. Eighty-two percent of the dogs and cats

relinquished for euthanasia were determined to have been for geriatric problems and/or disease. Lepper et al. (2002) found that dogs and cats that are injured on entry to an animal shelter are less likely to be adopted.

Age

Studies investigating age and adoptability vary. Lepper et al. (2002) found that the possibility of adoption decreases as dogs and cats become older. Typically older dogs and cats are less likely to be adopted than younger dogs and cats.

Alexander and Simon (1994) found that dogs less than 4 months old and kittens were more likely to be adopted than older animals. The same study revealed that dogs and cats returned to the shelter were usually less than four years old. New et al. (2000) found that dogs less than two years of age and cats less than three years of age are more likely to be relinquished to shelters.^{14,16,17} However, in the 2000 study dogs older than two years had less chance of being relinquished but this was not the same for cats.¹⁴ Kass et al. (2001) found that dogs and cats relinquished to shelters for adoptions had a median age of 1.2 and 2.0 years respectively. It is interesting that while puppies and kittens are likely to be adopted many of these will be relinquished by the time they are 3 years old.

Breed

Mixed breed dogs are more likely to be relinquished to shelters and tend to be more frequently spayed and neutered than purebred dogs.^{14,16,17} People may retain dogs that are purebred for the possibility of breeding and selling purebred puppies. In one

study, Labrador Retrievers and German Shepherd Dogs were overrepresented as the most common breeds relinquished.²¹

Lepper et al. (2002) found that lapdogs, defined as nonhunting breeds less than 16 inches tall at the shoulder, Cocker Spaniels, “giant breed” dogs and small terrier-like dogs were preferred for adoption over the reference “large companion breeds”. Guarding and fighting breed dogs were the least likely to be adopted. In the same study, Persian and rare breed cats were preferred when domestic short-haired cats were used as a reference group. Domestic long-haired, domestic medium-haired and Siamese cats had the same likelihood of adoption as the domestic short-haired cat.

Pitbulls, Rottweilers, Chow Chows typically have a higher incidence of euthanasia due to the aggressive nature of these breeds.³ German Shepherd Dogs, Cocker Spaniels, Staffordshire Terriers, Labrador Retrievers, Chihuahuas, Chow Chows and Rottweilers are most likely to be euthanized for behavior reasons.⁵

During recent years many humane societies have adopted policies regarding pitbull type dogs. A 2006 study focusing on animal shelters and control agencies in Ohio from 1996 and 2004 revealed a substantial increase in the number of pitbull type dogs that were euthanized.⁸ Many of these dogs lived in counties with large metropolitan areas.⁸ Small living space could be one explanation for the increase in euthanasia as well as the potential for aggressive incidents by these dogs.

Domestic short hair cats are overrepresented as the most common breed relinquished by their owners.²² Domestic short hair cats are more common than other breeds which could explain their overrepresentation.²²

Coat Color

Lepper et al. (2002) found that dogs with red, merle and tricolor coats were more likely to be adopted and brindle or black coated dogs were least likely to be adopted compared to the reference color black and tan.³ In the same study, cats that were white, color point and gray were more likely to be adopted and brown and black cats were least likely to be adopted relative to tabby color.³

CHAPTER III

METHODOLOGY

Materials and Methods

Initially seven animal shelters in northern Mississippi were selected to participate in this study. These shelters were being visited by Mississippi State University College of Veterinary Medicine's mobile veterinary clinic and already had a relationship with Mississippi State University. Two shelters were omitted because very few records were kept regarding the impounded animals. Each of the remaining five shelters was visited and the objectives of the study were discussed with the manager of each facility. Following visiting with the five shelters, one shelter was omitted due to staff-related problems managing the necessary data for the study. Subsequently, four animal shelters were selected to participate in this study. Written authorization was obtained from each facility acknowledging participation in the study and allowing disclosure of animal records. Also each facility was guaranteed that their information would not be shared with the other participating facilities and that their shelter would not be named in the study. Paper and toner for each copy machine was provided to each facility. Each shelter was assigned a number 1-4. Shelter 4 was excluded in the second objective of the study due to failure to receive the required information in a timely manner.

Each facility had its own system for monitoring animals entering and leaving their building. Shelter 1 used a data base program called Animal Shelter Manager© (R.

Rawson-Tetley) and shelters 3 and 4 used a program called Pet Point™ (Pethealth Software Solutions, Rolling Meadow, IL USA). Animal Shelter Manager and Pet Point™ are free commercially available software programs designed to monitor parameters of shelter animals. Shelter 2 used a database designed by their own staff. All the facilities used cage cards and paper forms with information pertaining to each animal. Animal data was collected from October 1, 2008 to September, 30, 2009. Periodic phone calls were made to each shelter to check on their progress and need for supplies. Mississippi State University's College of Veterinary Medicine mobile veterinary unit visited the four shelters at least twice a month and was responsible for retrieving the data.

Seasonal Variation

All four facilities counted the number of cats and dogs entering their respective buildings daily from October 1, 2008 to September 20, 2009. Months were grouped together based on seasons; winter (December, January, February), spring (March, April, May), summer (June, July, August) and fall (September, October, November).

Characteristics

Shelters 1-3 monitored the following parameters on each dog and cat: shelter animal name/number, species, reason for relinquishment, reproductive status on entry and exit, altered by Mississippi State University College of Veterinary Medicine mobile clinic, age, weight, primary and secondary breed, primary and secondary color and outcome status. The term "reason for relinquishment" was used to describe the origin of the dog or cat and included the following categories: stray, animal control stray, animal

control surrender, relinquished by owner, abandoned, seized, previously adopted and returned by owner, rescued, and other. The term “outcome status” was used to describe the disposition of the animal and included the following categories: euthanized, adopted, euthanasia owner requested, returned to owner, transferred to another shelter, transferred to a rescue agency, died or other. Age categories were defined as less than 6 months, 6 months to 5 years and greater than 5 years. Weight categories for dogs were defined as less than twenty pounds, twenty to forty pounds, forty to sixty pounds and greater than sixty pounds. Weight categories for cats were defined as less than ten pounds and greater than ten pounds. Primary and secondary breed and color were determined by the staff that was responsible for animal intake.

Each facility’s data tracking system and cage cards were utilized and then the data was transferred from each shelter to a standard form with the characteristics being evaluated. This information was placed in a Microsoft® EXCEL® (Microsoft USA). Any animal with incomplete information was excluded from the study.

Prior to statistical analysis some characteristics were combined or categorized to decrease the number of variables. The top five primary colors in cats and the top seven primary colors as dogs were analyzed as separate variables. All other primary colors were placed in the category “other”. Secondary breed was limited to a mixed breed or purebred category.

A distribution analysis was performed on the number of dogs and cats entering each shelter for the following seasons: spring, summer, winter, and fall. Kruskal Wallis was performed on the number of cats due to the possibility of normalcy. Subsequently both dog and cat data were analyzed using one-way analysis of variance (ANOVA).

ANOVA was performed using the SAS procedure GLM (SAS Institute Inc., Cary, NC USA).

Multiple logistic regression was performed to analyze the characteristics of dogs and cats. Quasi-complete separation of data points was detected so forward and stepwise logistic regression was performed on the following variables: sex, spay or neuter, health, size, age, MSU spay or neuter, dominant breed, secondary breed, and primary color.

Multiple competing models were used to best describe the data. (Table 3.1 and 3.2)

Finally convergence criterion was met for all variables. All calculations were performed using the SAS System for Windows, Version 9.2 (SAS Institute Inc., Cary, NC USA); all statistical tests used the 0.05 level of significance.

Table 3.1 Multiple Competing Models in Dogs

Variables	Akiake Information Criteria	Percent Concordance
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Secbreed ^e /Prcolor ^f	4042.80	85.6
Sex/Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Prcolor ^f	4270.88	83.0
Sex/Health/Age/Sz ^b /MSU ^c /Prcolor ^f	4275.96	81.6
Sex/Health/Age/Sz ^b /MSU ^c /Dombreed ^d	4281.04	81.5
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Secbreed ^e	4277.12	84.0

^a Spay or neuter

^b Size

^c Mississippi State University spay or neuter

^d Dominant breed

^e Secondary breed

^f Primary color

Table 3.2 Multiple Competing Models in Cats

Variables	Akaike Information Criteria	Percent Concordance
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Secbreed ^e /Prcolor ^f	1698.48	90.0
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Prcolor ^f	2036.48	90.4
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Dombreed ^d /Secbreed ^e	2030.11	89.4
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Prcolor ^f	2040.11	89.4
Sex/Spynt ^a /Health/Age/Sz ^b /MSU ^c /Secbreed ^e /Prcolor ^f	2017.86	89.6

^a Spay or neuter

^b Size

^c Mississippi State University spay or neuter

^d Dominant breed

^e Secondary breed

^f Primary color

CHAPTER IV

RESULTS

Seasonal Variation

Shelter 1 received 773 animals (226 cats and 547 dogs), shelter 2 received 3,386 animals (1,365 cats and 2,021 dogs), shelter 3 received 4,134 animals (1,363 cats and 2,771 dogs), and shelter 4 received 8,059 animals (3,364 cats and 4,695 dogs) during the study period. (Table 4.1 and 4.2) No significant variation between seasons was found in the number of dogs entering each shelter for each of the four seasons ($p = 0.8694$). (Table 4.3) There was also no significant variation between seasons in the number of cats entering each shelter ($p = 0.2657$). (Table 4.3)

Characteristics

The original data contained a combined total of 5,596 dogs and 2,954 cats from shelters 1-3. The final number of dogs available for adoption was 3,431 and for cats available for adoptions was 1,683 after records were omitted that were missing data and after subtracting those animals that died, escaped or were returned to their owner. The percentage of dog and cats adopted was 28% and 20%, respectively. Fifteen cat breeds were represented in the original data set. These breeds were combined into four categories. (Table 4.4)

Table 4.1 Number of Dogs per Season Based on Shelter

Shelter	Winter	Spring	Summer	Fall
1	152	154	117	124
2	447	627	547	400
3	751	787	785	448
4	1376	1146	1038	1135

Table 4.2 Number of Cats per Season Based on Shelter

Shelter	Winter	Spring	Summer	Fall
1	42	49	59	76
2	191	368	601	205
3	155	300	605	303
4	317	763	1397	887

Table 4.3 One-Way Analysis of Variance for Seasonal Variation in Dogs and Cats

Animal	DF	Sum of Squares	Mean Square	F Value	Pr>F
Dog	3	62800.250	20933.417	0.11	0.9543
Cat	3	489721.68	163240.56	1.23	0.3419

Table 4.4 Breed Categories Used to Classify Cats Admitted to Animal Shelters

Category	No. Impounded	No. Available for Adoption	No. Adopted
Domestic Short-hair	1354	1326	222
Domestic Medium-hair	248	248	100
Domestic Long-hair	57	57	4
Other			
Ragdoll	5	5	1
Siamese	15	15	6
Chartreux	1	1	1
Persian	8	8	1
Russian Blue	7	7	1
Scottish Fold	3	3	3
Burmese	1	1	1
Manx	7	7	1
Maine Coon	5	5	0
Subtotal	1721	1683	341

Seventy-four dog breeds were noted in the original data set. These dogs were then placed in four breed categories. (Table 4.5) The number of animals and the studied variables are summarized. (Table 4.6) Initial analysis indicated that the variables “origin” and “secondary color” were not significant so they were eliminated from further analysis.

Dogs

The variables sex, spay or neuter, health, age, dominant breed; secondary breed and primary color were found to be important characteristics in predicting adoptability in dogs.

Sex was found to be a significant variable ($p = 0.02$) in influencing adoption. There was 1,605 male dogs (47%) and 1,826 female dogs (53%). Male dogs seemed more likely to be adopted than female dogs. The odds ratio (OR) was 1.24, estimate 0.221 and 95% confidence interval (CI) was 1.03 to 1.50. (Table 4.7 and 4.8)

Spaying and neutering were important factors in influencing adoptability ($p \leq 0.0001$). The number of dogs spayed or neutered was 858 (25%) out of the total population of adopted dogs and the data suggests that more dogs are adopted if they are spayed or neutered (OR=0.10, estimate = -2.26, 95% CI = 0.07 to 0.14). The number of dogs spayed or neutered by Mississippi State University College of Veterinary Medicine’s mobile veterinary clinic from the total number of spayed and neutered dogs was 675 (79%).

Table 4.5 Breed Categories Used to Classify Dogs Admitted to Animal Shelters

Category	No. Impounded	No. Available for Adoption	No. Adopted
Giant breed			
Bernese Mountain Dog	6	5	1
Borzoi	1	1	1
Bullmastiff	2	2	1
Great Dane	2	1	0
Great Pyrenees	7	5	4
Newfoundland	2	2	1
Malamute	1	1	1
Mastiff	8	8	4
Rhodesian Ridgeback	7	5	0
Rottweiler	104	100	10
Saint Bernard	5	4	1
Wolfhound	1	1	1
Subtotal	146	135	25
Large breed			
Airedale terrier	2	2	2
Akita	5	5	2
Bloodhound	1	1	0
Boxer	56	52	19
Brittany Spaniel	5	3	0
Bull Terrier	1	1	0
Catahoula	23	22	4
Chesapeake Bay Retriever	2	2	0
Chow Chow	56	39	12
Coonhound	13	13	13
Cur	5	5	0
Dalmatian	4	4	0
Doberman Pinscher	7	6	4
German Shorthaired Pointer	1	1	0
German Shepherd Dog	22	22	7
Golden retriever	55	46	18
Greyhound	3	3	0
Irish Setter	13	13	7
Labrador Retriever	798	706	162
Pointer	24	23	11
Shepherd Mix	215	198	44
Siberian Husky	30	28	20
Springer Spaniel	3	3	2
Staffordshire Terrier(pitbull)	239	230	6
Standard Poodle	3	3	1
Standard Schnauzer	17	7	6
Vizla	2	2	0
Weimaraner	12	4	2
Subtotal	1617	1444	328

Table 4.5 Continued

Category	No. Impounded	No. Available for Adoption	No. Adopted
Medium breed			
Australian Cattle Dog	17	17	6
Australian Shepherd	73	72	13
Basset Hound	24	23	8
Beagle	104	89	35
Border Collie	73	68	21
Bulldog	96	84	14
Cocker Spaniel	66	57	20
Collie	25	24	9
Heeler	47	35	28
Hound	149	133	11
Shar-pei	2	0	0
Shetland Sheepdog	11	11	3
Spitz	6	6	0
Welsh Corgi	10	32	3
Subtotal	703	651	168
Small breed			
Bichon Frise	2	2	0
Boston Terrier	15	14	5
Cairn Terrier	1	1	0
Chihuahua	61	55	22
Chinese Crested	9	8	3
Dachshund	50	48	25
Fiest	34	24	11
Fox Terrier	9	9	4
Jack Russell Terrier	32	30	18
Japanese Chin	1	1	1
Lhasa Apso	3	3	0
Maltese	10	10	8
Miniature Pinscher	16	16	6
Miniature Poodle	7	6	2
Miniature Schnauzer	5	5	3
Norwich Terrier	1	1	0
Papillion	1	1	1
Pekingese	3	3	2
Pomeranian	7	7	5
Pug	8	6	5
Rat Terrier	1	1	1
Schipperke	2	2	0
Scottish Terrier	2	2	0
Shih Tzu	26	25	19
Terrier	216	203	71
Toy Poodle	23	13	12
Wheaton Terrier	3	3	1
Yorkshire Terrier	17	17	1
Subtotals	566	516	226
Mixed breed	694	685	199

Table 4.6 Characteristics of Dogs and Cats from Shelters

Variable	Dogs	Cats
Stray	1789	830
Relinquished by owner	1370	774
Abandoned	158	76
Previously adopted and returned	28	3
Seized	86	0
Male	1605	749
Female	1826	934
Healthy	2483	1136
Unhealthy	948	547
Spay/neutered	858	381
Spayed/neutered by MSU	675	307
Less than 6 months	2026	1136
6 months to 5 years	1326	526
Greater than 5 years	79	21
Less than 20 pounds	1200	-
20 to 40 pounds	1049	-
40 to 60 pounds	1083	-
Greater than 60 pounds	99	-
Less than 10 pounds	-	1575
Greater than 10 pounds	-	108
Adopted	946	341
Euthanized	2361	1289
Transferred	124	12
Died	24	19
Escaped	2	1
Euthanized owner requested	10	6
Returned to owner	259	9
Rescued	-	6

Table 4.7 Variable Odds Ratio and Confidence Interval for Dogs and Adoption

Variable	Odds Ratio	95% Confidence Interval
Sex	1.24	1.03 to 1.50
Spay/neuter	0.10	0.07 to 0.14
Health	0.15	0.11 to 0.21
Size	0.86	0.76 to 0.99
Age	0.64	0.53 to 0.77
Secondary breed	0.64	0.45 to 0.90
MSU spay or neuter	0.75	0.52 to 1.10
Giant breed vs small breed	1.00	0.38 to 2.56
Large breed vs small breed	0.50	0.37 to 0.67
Medium breed vs small breed	0.51	0.36 to 0.67
Mixed breed vs small breed	0.33	0.24 to 0.44
Primary black vs tricolor	0.56	0.30 to 1.04
Primary blonde vs tricolor	0.61	0.27 to 1.40
Primary brindle vs tricolor	0.48	0.19 to 1.25
Primary brown vs tricolor	0.72	0.37 to 1.38
Primary grey vs tricolor	1.26	0.52 to 3.02
Primary other vs tricolor	0.87	0.46 to 1.64
Primary red vs tricolor	0.59	0.28 to 1.22
Primary tan vs tricolor	0.88	0.46 to 1.70

Table 4.8 Analysis of Maximum Likelihood Estimates for Variables in Dogs

Variable	Estimate	Standard Error	Pr>Chisq
Sex	0.22	0.095	0.020
Spay/neuter	-2.26	0.179	<0.0001
Health	-1.85	0.151	<0.0001
Size	-0.14	0.068	0.038
Age	-0.43	0.092	<0.0001
Secondary breed	-0.44	0.175	0.011
Giant breed	0.49	0.369	0.180
Large breed	-0.19	0.116	0.088
Medium breed	-0.17	0.137	0.196
Mixed breed	-0.61	0.136	<0.0001
Primary color black	0.71	31.29	0.981
Primary color blonde	0.79	31.29	0.979
Primary color brindle	0.56	31.29	0.985
Primary color brown	0.95	31.29	0.975
Primary color grey	1.50	31.29	0.961
Primary color red	0.74	31.29	0.980
Primary color tan	1.15	31.29	0.970
Primary color other	1.14	31.29	0.970

There were 2,483 (72%) dogs that were healthy and 948 (28%) were unhealthy on entry to the shelters. The data suggested that healthy dogs were more likely to be adopted (OR = 0.15, estimate = -1.85, 95% CI = 0.11 to 0.21, $p \leq 0.0001$).

Age was an important variable in influencing adoptability ($p \leq 0.0001$). There were 2,026 (59%) dogs that were less than 6 months old, 1,326 (38%) 6 months to 5 years old and 79 (2%) greater than 5 years old. The data suggested that dogs that were less than 6 months old (OR=0.64, estimate = -0.436, 95% CI = 0.53 to 0.77) were more likely to be adopted over dogs of all the other ages.

Size was found to be an important predictor of adoption ($p = 0.03$). The data suggested that dogs that were less than 20 pounds were more likely to be adopted over the other size ranges (OR = 0.86, estimate = -0.141, 95% CI = 0.76 to 0.99).

Dog breeds were placed into four different categories: giant, large, medium, small and mixed breed. Rottweilers made up 40% of the giant breed category adopted; Labrador Retrievers were 49% of the large breed category adopted, Beagles were 21% of the medium breed category adopted, Terriers were 31% of the small breed category adopted and 29% of dogs in the mixed breed category were adopted. Overall breed was significant ($p \leq 0.0001$) in influencing adoptability. The mixed breed category was the only significant category (p value ≤ 0.0001) out of the four categories. Secondary breed was used to identify whether being a purebred or mixed breed dog influenced adoption. It was significant in influencing adoption ($p = 0.01$). The data also suggested that purebred dogs are may be more likely to be adopted over mixed breed dogs (OR = 0.64, estimate = -0.344, 95% CI = 0.45 to 0.90).

Overall primary coat color seemed to influence adoption in dogs ($p \leq$ value 0.0009). However each of the eight major colors was not significantly different.

Cats

The variables spay or neuter, health, age, dominant breed; and primary color were found to be important characteristics in predicting adoptability in cats.

There were 749 male cats (45%) and 934 female cats (55%). Sex was not found to be a significant variable ($p = 0.12$) in influencing adoption. The odds ratio (OR) was 1.31 and the 95% confidence interval (CI) was 0.92 to 1.85. (Table 4.9 and 4.10)

Spaying and neutering were important factors in influencing adoptability ($p \leq 0.0001$). The number of cats spayed or neutered was 381 (23%) out of the total number of adoptable cats. The data suggested that more cats were adopted if they are spayed or neutered (OR=0.06, estimate = -2.80, 95% CI = 0.03 to 0.11). The number of cats spayed or neutered by Mississippi State University College of Veterinary Medicine's mobile veterinary clinic out of the total number of spayed and neutered cats was 307 (80%).

There were 1,136 (68%) healthy cats and 547 (32%) were unhealthy cats on entry to the shelters. The data suggested that the health status of cats influenced their adoption ($p \leq 0.0001$) and healthy cats were more likely to be adopted (OR = 0.05, estimate = -2.97, 95% CI = 0.02 to 0.09).

Table 4.9 Variable Odds Ratio and Confidence Interval for Cats and Adoption

Variable Value	Odds Ratio	95% Confidence Interval
Sex	1.31	0.92 to 1.85
Spay/neuter	0.06	0.03 to 0.11
Health	0.05	0.02 to 0.09
Size	0.86	0.43 to 1.74
Age	0.52	0.36 to 0.75
MSU	0.71	0.38 to 1.31
Sec Breed	<0.001	<0.001 to >999.99
DLH vs other	>999.99	<0.001 to >999.99
DMH vs other	>999.99	<0.001 to >999.99
DSH vs other	>999.99	<0.001 to >999.99
Primary black vs other	0.50	0.33 to 0.77
Primary brown vs other	0.95	0.35 to 2.58
Primary cream vs other	1.03	0.36 to 2.90
Primary grey vs other	0.59	0.37 to 0.94
Primary orange vs other	0.44	0.24 to 0.79

Table 4.10 Analysis of Maximum Likelihood Estimates for Variables in Cats

Variable	Estimate	Standard Error	Pr>Chisq
Sex	0.27	0.176	0.122
Spy/nt	-2.80	0.307	<0.0001
Health	-2.97	0.324	<0.0001
Size	-0.140	0.356	0.693
Age	-0.643	0.186	0.0006
MSU	-0.547	0.291	0.060
Sec breed	-11.68	582.7	0.984
Dom brd DLH	2.81	145.7	0.984
Dom brd DMH	3.43	145.7	0.981
Dom brd DSH	2.14	145.7	0.988
Primary Black	-0.337	0.181	0.063
Primary Brown	0.292	0.418	0.484
Primary Cream	0.367	0.435	0.399
Primary Grey	-0.186	0.201	0.355
Primary Orange	-0.473	0.247	0.055

Age was statistically significant in influencing adoption ($p \leq 0.0006$). There were 1,136 (67%) cats that were less than 6 months old, 526 (32%) 6 months to 5 years old and 21 (1%) greater than 5 years old. The data suggested that cats less than 6 months old (OR=0.52, estimate = -0.71, 95% CI = 0.36 to 0.75) were more likely to be adopted over cats of all the other ages.

There were 1,575 (94%) less than 10 pounds and 108 (6%) greater than 10 pounds. Unlike dogs, size was not found to influence adoption of cats ($p = 0.69$).

Cat breeds were placed into four different categories: domestic short-hair, domestic medium-hair, domestic long-hair and other. The “other” category contained nine breeds of cats that entered the shelters in very low numbers (Ragdoll, Siamese, Chartreux, Persian, Russian Blue, Scottish Fold, Burmese, Manx, and Maine Coon). There was 1,326 (79%) domestic short-hair, 248 (15%) domestic medium-hair cats, and 57 (3%) domestic long-hair cats that were adopted. Fifty-two (3%) of cats in the “other” category were adopted. Overall dominant breed was significant in influencing adoption ($p \leq 0.0001$). However none of the specific breed categories showed statistical significance. Secondary breed was not significant in influencing adoption ($p = 0.98$).

Six major colors were used to analyze coat primary coat color in cats: black, brown, cream, grey, orange, and other. An “other” category was used for all other minor primary colors. Primary coat color significantly influenced adoption ($p=0.01$). There were 606 (36%) black cats, 33 (1%) brown cats, 40 (2%) cream colored cats, 359 (21%) grey cats and 100 (6%) orange cats. There were 440 (34%) cats with colors that placed them in the “other” category. The color most significant in adoption was orange ($p=0.05$).

CHAPTER V

DISCUSSION

The percentage of dogs and cats adopted from shelters in this study was 28% and 20%, respectively based on completed records. However the percentage of adopted cats and dogs would have been lower (20% in dogs and 17% in cats) if calculations were based on the total number of impounded dogs (5,596) and cats (2,954).

The variable sex seemed to influence adoption in dogs but not cats in this study. The data suggested that male dogs were more likely to be adopted than female dogs. This study did not look at sex and reproductive status together as one variable, i.e. intact male dogs. Most studies find that intact male dogs and cats are least likely to be adopted over all others.^{3,7}

Spayed and neutered dogs and cats were significantly associated with adoption over intact dogs and cats. This is the same conclusion found in previous studies investigating this characteristic and adoption. This study also found that Mississippi State University College of Veterinary Medicine's mobile veterinary unit spayed and neutered the majority of dogs and cats at all three shelters.

The health status of dogs and cats seemed to influence adoption. Some shelters are able to treat minor health problems found on dogs and cats on entry to their facilities. This study attempted to gather data on which animals had treatable health problems on entry. This proved difficult since no shelter was consistent on which problems would be treated and so this variable was more narrowly defined to healthy and unhealthy on entry.

Age influenced adoption in both cats and dogs in this study. The data suggested that dogs and cats less than 6 months old may be adopted over the other age categories. Previous studies show that younger dogs and cats tend to be adopted over older ones. This study in contrast to previous studies included litters of cats and dogs which could represent a very large population of young animals. This could bias the number of adoptable dogs and cats in favor of those that are young.

Size in dogs but not cats influenced adoption. Dogs were more likely to be adopted if they were less than 20 pounds in this study. This is interesting since the shelters in this study are located in fairly rural parts of Mississippi. One might expect that larger dogs would be adopted since there is more space available in rural areas as opposed to a major metropolitan area. A cat requires less space than a dog and thus weight may not be an important characteristic in adoption.

This study showed that breed influenced adoption in both dogs and cats. Rottweilers, Labrador Retrievers, Beagles and Terriers represented the most adopted breed in each of the four categories. The mixed breed category contained all the dogs that a primary breed could not be determined by the staff in-taking animals at each respective animal shelter. This category represented 29% of the total population of dogs available for adoption and was the only category that was significant. Previous studies show that

Rottweilers and Labrador Retrievers are overrepresented in shelters. Domestic short-hair cats made up the largest breed adopted which is consistent with other studies.

Coat color in cats significantly influenced adoption. Orange was the only significant color influencing adoption. Orange cats made up only 6% of the total number of available cats for adoption. These results are in contrast to a study by Lepper and Kass (2002) where gray cats were more likely to be adopted over other coat color when the tabby cat was used as a reference. Coat color was important in influencing adoption in dogs. However, in this study none of the categories for coat color were significant. Black dogs made up the greatest percentage (45%) of the total number of dogs available for adoption. Lepper and Kass (2002) found that brindle and black coated dogs were least likely to be adopted and most other colors were only slightly preferred.

The initial analysis of data did not show any significance in the origin of cats and dogs entering these shelters. This is in contrast to most studies which find dogs that were relinquished by their owners and cats that are strays are more likely to be adopted. There may have been too many confounding variables in the origin category. Perhaps limiting the number of variables would have revealed more significant results.

This study did not reveal any seasonal variation in dogs and cats entering shelters throughout the study period. This may be due to a study period of only one year. Most studies that have seen a seasonal variation in seasons evaluated shelters for longer than one year. Also, Mississippi does not have four pronounced seasons like other regions of the United States. Mild temperatures most of the year may influence the number of cats and dogs entering shelters.

The inability of the staff to accurately assess, process and manage information relating to the animals entering and exiting each shelter is the biggest limitation in this study. Shelter 4 received 8,766 animals during the study period but was unable to deliver completed records to be included in the second objective of this study. The staff member responsible for in-taking animals and gathering data at shelter 3 left her position without informing the investigators of this study. Unfortunately the staff member did not discuss the requirements of this study with her replacement and two months of data were incomplete. Shelters 1 and 2 delivered the most complete data. They were also smaller than shelters 3 and 4. It is possible that smaller animal shelters are able to keep better records due to the small volume of animals entering their facilities. Investigating whether the size of an animal shelter is related to accurate data-keeping may be an important question to answer as it may help shelters purchase more appropriate computer software programs.

Another limitation to this study is the great deal of variability in how the staff at each shelter recorded results for several of the variables studied. Determining the true age of a dog may have been difficult especially if the animal was a stray. Weight may have been difficult to determine without an actual scale thus many of the animals may have been placed in the wrong category. The degree of education of a staff member may influence whether an animal's gender is accurately recorded. Record keeping and accurate data is difficult in animal shelters that are understaffed. Also there are no consistent parameters for measuring animals across all animal shelters.

Finally there may be some inherent bias in the staff members regarding which dog or cat may make the best pet. It is conceivable that a potential adopter may be shown

animals that the staff member thinks would be most appropriate as pets versus the animal that the potential adopter really wants.

This study's design could be improved by limiting the number of variables being investigated. Perhaps selecting one animal shelter that utilizes a shelter-specific computer database and studying that shelter over a longer period of time may provide more accurate data and discover trends that could not be found in this study due its time period of one year. If the study funded a staff member at the animal shelter under investigation it may decrease the amount of incomplete data since the staff member would be more committed to the project. It may also relieve some of the financial burden of the shelter.

The results of this study may be helpful in determining which variables influence adoption in the shelters included in this study. However the results may not be the same for every shelter in Mississippi or in the United States. Changes in these variables may occur locally, regionally, or nationally.

In conclusion, people who adopt animals from shelters have different preferences when it comes to age, size, sex, reproductive status, health, breed and color. Shelter policies such as licensing, spaying and neutering may influence adoption and these policies are not the same among shelters. Shelter personnel may make better decisions based on variables influencing adoption and these decisions would improve the care and welfare of the animals. Further investigation into each shelter individually may provide even more information to help them in the future.

REFERENCES

1. Alexander, S. A., and Simon, S. M., "Characteristics of animals adopted from an animal control center whose owners complied with a spaying/neutering program," *J Am Vet Med Assoc* 1994;205(3):472-476.
2. Bartlett, P.C., Bartlett, A., Walshaw, S., Halstead, S., "Rates of Euthanasia and Adoption for Dogs and Cats in Michigan Animal Shelters," *J Appl Anim Welf Sci* 2005;8(2):97-104.
3. Clevenger, J., Kass, P.H., "Determinants of Adoption and Euthanasia of Shelter Dogs Spayed or Neutered in the University of California Veterinary Student Surgery Program Compared to Other Shelter Dogs," *J Vet Med Educ* 2003;30(4):372-378.
4. Humane Society of United States. http://www.hsus.org/pets/issues_affecting_our_pets/pet_overpopulation_and_ownership_statistics/hsus_pet_overpopulation_estimates. Oct. 12, 2006.
5. Kass, P.H., New, J.C., Jr., Scarlett, J.M., Salman, M.D., "Understanding Animal Companion Surplus in the United States: Relinquishment of Nonadoptables to Animal Shelters for Euthanasia," *J Appl Anim Welf Sci* 2001;4(4):237-248.
6. Kogan, L., New, J.C., Jr., Kass, P.H., Scarlett, J.M., "Behavioral Reasons for Relinquishment of Dogs and Cats to 12 Shelters," *J Appl Anim Welf Sci* 2000;3(2):93-106.
7. Lepper, M., Kass, P.H., Hart, L.A., "Prediction of Adoption Versus Euthanasia Among Dogs and Cats in a California Animal Shelter," *J Appl Anim Welf Sci* 2002;5(1):29-42.
8. Lord, L.K., Wittum, T.E., Ferketich A.K., Funk J.A., Rajala-Schultz P., Kauffman R.M.. "Demographic trends for animal care and control agencies in Ohio from 1996 to 2004," *J Am Vet Med Assoc* 2006;229(1):48-54.
9. Marston, L.C., Bennett, P.C., Coleman, G.J., "What Happens to Shelter Dogs? An Analysis of Data for 1 Year From Three Australian Shelters," *J Appl Anim Welf Sci* 2004;7(1):27-47

10. Moulton, C., Wright, P., Rindy, K., "The role of animal shelters in controlling pet overpopulation," *J Am Vet Med Assoc* 1991;198(7):1172-1176.
11. Nassar, R., Fluke, J., "Pet population dynamics and community planning for animal welfare and animal control," *J Am Vet Med Assoc* 1991;198(7):1160-1164.
12. Neidhart, L., Boyd, R., "Companion Animal Adoption Study," *J Appl Anim Welf Sci* 2002;5(3):175-192.
13. New, J.C., Jr., Salman, M.D., Scarlett, J.M., Kass, P.H., Vaughn, J.A., Scherr, S., et al., "Moving: Characteristics of Dogs and Cats and Those Relinquishing Them to 12 U.S. Animal Shelters," *J Appl Anim Welf Sci* 1999;2(2):83-96.
14. New, J.C., Jr., Salman, M.D., King, M., Scarlett, J.M., Kass, P.H., Hutchison, J.M., "Characteristics of Shelter-Relinquished Animals and Their Owners Compared with Animals and Their Owners in U.S. Pet-Owning Households," *J Appl Anim Welf Sci* 2000;3(3):179-201.
15. Notaro, S.J., "Disposition of Shelter Companion Animals From Nonhuman Animal Control Officers, Citizen Finders, and Relinquished by Caregivers," *J Appl Anim Welf Sci* 2004;7(3):181-188.
16. Patronek, G.J., Glickman, L.T., Beck, A.M., McCabe, G.P., Ecker, C., "Risk factors for relinquishment of dogs to an animal shelter," *J Am Vet Med Assoc* 1996;209(3):572-581.
17. Patronek, G.J., Glickman, L.T., Beck, A.M., McCabe, G.P., Ecker, C., "Risk factors for relinquishment of cats to an animal shelter," *J Am Vet Med Assoc* 1996;209(3):582-588.
18. Rowan, A.N., "What we need to learn from epidemiologic surveys pertaining to pet overpopulation," *J Am Vet Med Assoc* 1991;198(7):1233-1236.
19. Salman, M.D., New, J.G., Jr., Scarlett, J.M., Kass, P.H., Ruch-Gallie, R., Hetts, S., "Human and Animal Factors Related to the Relinquishment of Dogs and Cats in 12 Selected Animal Shelters in the United States," *J Appl Anim Welf Sci* 1998;1(3):207-226.
20. Scarlett, J.M., Salman, M.D., New, J.G., Jr., Kass, P.H., "Reasons for Relinquishment of Companion Animals in U.S. Animal Shelters: Selected Health and Person Issues," *J Appl Anim Welf Sci* 1999;2(1):41-57.
21. Shore, E.R., "Returning a Recently Adopted Companion Animal: Adopters' Reasons for and Reactions to the Failed Adoption Experience," *J Appl Anim Welf Sci* 2005;8(3):187-198.

22. Shore, E.R., Girrens, K., "Characteristics of Animals Entering an Animal Control or Humane Society Shelter in a Midwestern City," *J Appl Anim Welf Sci* 2001;4(2): 105-115.
23. Wenstrup, J., Dowidchuk, A., "Pet Overpopulation: Data and Measurement Issues in Shelters," *J Appl Anim Welf Sci* 1999;2(4):303-319.

APPENDIX A
PERMISSION LETTER SENT TO
ALL PARTICIPATING
ANIMAL SHELTERS

Date

Shelter Information

This document is to obtain written authorization to participate in a year long study conducted by Drs. Sarah Lefebvre and Phil Bushby and Mississippi State University. The purpose of the study is to determine if there is seasonal variation in the number of cats and dogs entering (shelter name) through the course of one calendar year. In addition, the study will evaluate the characteristics of dogs and cats that increase their chances of being adopted. (Shelter name) will monitor parameters set forth in the study and release that information to Drs. Sarah Lefebvre and Phil Bushby. The information will be used to meet the goals of the study and published in a master's thesis and/or journal. Data will be published in the aggregate and in no situation will specific data be directly associated with the originating shelter. (Shelter name) will be given a report summarizing the findings at the end of the study.

(Shelter name)

Date

Sarah Lefebvre, D.V.M.

Date

Phil Bushby, D.V.M., M.S., A.C.V.S.

Date

APPENDIX B
STANDARDIZED FORM USED FOR
ALL SHELTER DATA

Mississippi State University – College of Veterinary Medicine

Shelter name: _____ Date _____

Animal Number: _____

Origin

Stray: _____ Relinquished by owner: _____ Abandoned: _____ Seized: _____

Previously adopted and returned: _____ Other: _____

Species

Canine: _____ Feline: _____

Sex/Reproductive Status

Male: _____ Female: _____ Intact: Y N (circle one)

Healthy status on entry

Appears healthy: _____ Appears unhealthy: _____

Age

less than 6 months: _____ 6 mo – 5 yrs: _____ greater than 5 yrs: _____
(puppy/kitten) (adult) (senior)

Size

Dogs: Less than 20 lbs: _____ 20-40 lbs: _____ 40-60 lbs: _____ greater than 60 lbs: _____
(small) (medium) (large) (extra large)

Cats: Less than 10 lbs: _____ greater than 10 lbs: _____
(small) (large)

Breed

Dominant Breed: _____ Other: _____

Color (indicate color)

Dominant Color: _____ Bicolor: _____ Tricolor: _____

Multiple colors: _____ Other: _____

Outcome

Euthanasia: _____ Adopted: _____ Returned to owner: _____

Transferred to another shelter: _____ Died: _____ Rescue: _____

Other: _____