EPIDEMIOLOGICAL STUDY OF OHIO ANIMAL SHELTERS AND
LOST AND FOUND PET POPULATION ISSUES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy
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By

Linda K. Lord, D.V.M., M.S.

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The Ohio State University
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Dissertation Committee: Approved by

Dr. Thomas E. Wittum, Advisor
Dr. Amy K. Ferketich
Dr. Päivi J. Rajala-Schultz
Dr. Julie A. Funk

_____________ Veterinary Preventive Medicine
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Graduate Program
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ABSTRACT

The issues involved in animal sheltering and pet population dynamics continue to be a major focus of epidemiological research. The research described herein addresses trends in animal shelter populations and basic epidemiological questions related to search and identification methods involved in the lost pet reunification process.

The research on trends in animal shelter populations describes trends that have occurred in animal care and control agencies in Ohio between 1996 and 2004. This current research involved using a mail survey instrument to collect information from Ohio animal agencies for the year 2004 and comparing the information to results collected in prior years starting in 1996. There has been a significant decline in canine intake and euthanasia numbers for dogs, however these numbers have increased for cats. Overall for all animals, medical care and veterinary relationships have significantly improved. For county dog warden agencies, the odds of euthanasia declined for dogs handled by an agency with a spay/neuter policy.

The remaining part of this research addresses basic epidemiological questions on how pets that become lost are reunited with their owners. A telephone survey instrument was used to interview owners who had lost a dog or cat in Dayton, Ohio to identify search methods the owners used to try and find their pets, pet identification methods
used, and which methods resulted in reunification. The study showed that a much higher percentage of dogs were reunited with their owners, and that the animal sheltering system primarily resulted in reunification. For cats, the majority reunited with their owners came home on their own and no particular search method seemed to help with reunification. Overall, there were also great differences between pet identification used by owners for dogs and cats. A similar telephone survey was also conducted with people who found pets they perceived to be lost in the same study area. This group believed it was very important to find the owners but most were unable to do so. The findings from this research on lost pets lay the groundwork for further study of improving pet reunification.
Dedicated to my husband, Tim Berens, and my two dogs, Chuck and Sally
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I would also like to thank Dr. Richard Obermanns, executive director of the Kenneth A. Scott Trust, which has funded my PhD program. Dr. Obermanns, not only do I appreciate the financial support of the trust, but also your encouragement and belief in me to help fulfill the trust’s mission.
Finally, I wish to thank my family. Mom and Dad, you have always encouraged me to go for my dreams, no matter how unattainable they may seem to others. I never would have gotten to this point without your wonderful love and support. Most of all, Tim, thank you for tolerating my need to achieve new goals, and your willingness to sacrifice your own time and interests to support me. You truly make me a better person.
VITA

December 16, 1962 ........................................... Born - Oklahoma City, Oklahoma

1985 ............................................................... M.S., Finance and Accountancy,
Miami University

1999 ............................................................... D.V.M., The Ohio State University

1999 ............................................................... M.S., Veterinary Preventive Medicine,
The Ohio State University

2004 – present .................................................. Research Fellow,
The Ohio State University

PUBLICATIONS


**FIELDS OF STUDY**

Major Field: Veterinary Preventive Medicine

Specialization: Veterinary Epidemiology
# TABLE OF CONTENTS

ABSTRACT ........................................................................................................................ ii

DEDICATION ................................................................................................................... iv

ACKNOWLEDGMENTS .................................................................................................. v

VITA ................................................................................................................................... v

LIST OF TABLES ............................................................................................................. xi

CHAPTERS:

1. INTRODUCTION ...................................................................................................... 1

2. USE OF GROUP RANDOMIZED TRIALS IN PET POPULATION RESEARCH 3
   2.1 Introduction ........................................................................................................... 3
   2.2 Use of Group Randomized Trials in Public Health Research ................................. 6
       2.2.1 Introduction to group randomized trials ....................................................... 6
       2.2.2 Potential sources of bias in group randomized trials ................................. 7
       2.2.3 Other methodological issues in group randomized trials ......................... 9
       2.2.4 Statistical issues in group randomized trials ............................................ 10
       2.2.5 Conclusions on group randomized trials ................................................... 10
   2.3 Findings of Recent Pet Population Research .......................................................... 11
       2.3.1 Reasons for relinquishment ....................................................................... 11
       2.3.2 Prepubescent gonadectomy effects ........................................................... 14
       2.3.3 Feral cat trap-neuter-return (TNR) programs .......................................... 15
       2.3.4 Lost and found pets .................................................................................. 16
   2.4 Use of Group Randomized Trials in Companion Animal Population Research 17
   2.5 References ........................................................................................................... 20
6. SEARCH METHODS THAT PEOPLE USE TO FIND OWNERS OF LOST PETS

6.1 Introduction ........................................................................................................ 93
6.2 Materials and Methods ..................................................................................... 94
  6.2.1 Location of study ...................................................................................... 94
  6.2.2 Study population ..................................................................................... 94
  6.2.3 Study design ............................................................................................ 95
  6.2.4 Telephone questionnaire ....................................................................... 95
  6.2.5 Statistical analysis .................................................................................. 97
6.3 Results .............................................................................................................. 97
  6.3.1 Reunification & disposition ..................................................................... 97
  6.3.2 Pet characteristics .................................................................................. 98
  6.3.3 Awareness of search methods ............................................................... 99
  6.3.4 Search methods ..................................................................................... 99
  6.3.5 Miscellaneous questions ..................................................................... 100
6.4 Discussion ....................................................................................................... 100
6.5 Endnotes .......................................................................................................... 105
6.6 References ...................................................................................................... 106

7. CONCLUSIONS ................................................................................................. 115
  7.1 Major Findings of Current Research .......................................................... 115
  7.2 Plans for Future Research .......................................................................... 118

BIBLIOGRAPHY .................................................................................................. 120
LIST OF TABLES

Table 3.1 – 2004 Survey of Ohio Animal Care and Control Agencies. ......................... 44
Table 3.2 - Estimated annual expenses and number of employees during 1996 and 2004 ........................................................................................................................................... 49
Table 3.3 - Estimated total numbers of animals handled by animal care and control agencies in Ohio during 1996 and 2004. ........................................................................ 50
Table 3.4 - Estimated total numbers of animals taken in and euthanatized by animal care and control agencies in Ohio during 1996 and 2004 as a proportion of state human and animal population.............................................. 51
Table 3.5 - Medical services provided by animal care and control agencies in Ohio during 1996 and 2004.................................................................................................................. 52
Table 3.6 - Results of generalized linear mixed effects modeling of factors associated with euthanasia of dogs by county dog warden agencies in Ohio between 1996 and 2004 ........................................................................................................................................... 53
Table 4.1 – Telephone survey to interview owners of lost dogs ...................................... 69
Table 4.2 - Reunification methods that reunited lost dogs with their owners categorized by length of time dog was lost. ............................................................................................................... 73
Table 4.3 - Number of owners using search methods for dogs categorized by length of time to recovery. .............................................................................................................................. 74
Table 4.4 - Results of final multivariate Cox proportional hazards regression model for factors associated with recovery of a lost dog. ............................................................................ 75
Table 5.1 – Telephone survey to interview owners of lost cats........................................ 87
Table 5.2 - Search methods that reunited lost cats with their owners categorized by length of time cat was lost. .................................................................................................................. 91
Table 5.3 - Number of owners using search methods for cats categorized by length of time to recovery ................................................................................................................ 92

Table 6.1 – Found survey to interview people that found lost pets. ............................... 107

Table 6.2 - Reunification methods used to find owners of lost pets categorized by length of time to find owners..................................................................................................... 112

Table 6.3 – Finder disposition of pets for which the owners were not found categorized by species........................................................................................................................ 113

Table 6.4 – Reasons that finders of lost pets did not surrender them to local animal agencies categorized by species............................................................. 114
CHAPTER 1

INTRODUCTION

In September, 2004 I had the good fortune to receive a research fellowship award from the Kenneth A. Scott Charitable Trust to pursue my interests in pet population epidemiology. The fellowship has included a teaching component to educate veterinary students about animal shelter populations and companion animal welfare; an outreach component to oversee the shelter medicine track that is part of the Midwest Veterinary Conference and to work on improving collaboration between the various types of animal shelter groups in the state; and a research component to examine shelter and pet population issues. This PhD program is the culmination of this third component.

My relationship with the Kenneth A. Scott Charitable Trust is not a new one. During my time as a veterinary student, I enrolled in a dual degree Masters program in Veterinary Preventive Medicine. One of my research projects was to collect comprehensive demographic and needs assessment data from Ohio animal shelters and to disseminate this information in the state. This project was funded by the Scott Trust.
After spending several years in private veterinary practice, I knew that I wanted to return to academia to further explore companion animal population problems. I had spent 5 years serving as a Humane Society of Greater Dayton board member and as chair of their veterinary medical advisory committee. My volunteer experiences helped me to gain a much deeper appreciation for the complexities of shelter issues and the paucity of relevant scientific research.

As part of my PhD program, I have continued the Ohio shelter data collection to look for long-term trends among shelters. The statewide survey has been instrumental as a surveillance tool to look at trends in animal numbers, differences for dogs and cats, medical care and other demographics and needs information. The information is useful not only for shelters in Ohio but for states as well as a model for how this type of data can be used to monitor trends and formulate policy.

My remaining research has focused on a topic that has received little attention in companion animal research, the reunification of lost pets with their owners. After having gone through experience of both my dogs running away several years ago, I became interested in learning more about how people look for their pets, what people do who find pets, and which factors about this search process result in successful reunification. My hope is that the research described in this dissertation improves our understanding of lost and found pet issues and serves as a foundation to explore ways to reunite more pets with their owners.
CHAPTER 2

USE OF GROUP RANDOMIZED TRIALS IN PET POPULATION RESEARCH

2.1 Introduction

Unwanted pets are a widely recognized problem in the United States that is associated with considerable animal welfare and public health concerns. The common means by which communities have managed the problem of unwanted pets is with animal shelters. These shelters serve to reunite owners with lost pets, find unclaimed animals new homes, or euthanize unwanted animals. Today, there is a major movement among animal sheltering groups to reduce or eliminate the euthanasia of healthy, adoptable animals in shelters and to identify means to increase adoptions. The major focus for these groups has traditionally been “LES is More”, an acronym standing for Legislation, Education and Sterilization as a means to try and curb overpopulation. These programs promote state and federal legislation to address the control of stray and unwanted pets, education of current and potential pet owners in order to encourage retention of pets in the home, and sterilization to reduce the number of animals entering shelters. It appears that some success in reducing euthanasia in shelters has been achieved through this approach. Annual euthanasia has declined from an estimated 13.5 to 18.6 million dogs
and cats in the 1970s to the most recent national estimates of 4 to 6 million dogs and cats.\textsuperscript{1-4} Thus despite this progress, a large number of unwanted dogs and cats continue to be euthanized in shelters each year, demanding further investment of resources and need for better solutions.

The academic research community has also invested resources in trying to help better understand pet population dynamics. In the 1970s, the major focus of research was on the basics of trying to enumerate the pet-owning population, describe the pet population dynamics in several communities, and estimate national euthanasia figures.\textsuperscript{5-11} National humane groups such as American Humane Association and Humane Society of the United States also invested resources in trying to estimate the number of animal shelters and national euthanasia figures.\textsuperscript{1,12} These early efforts faced many obstacles, primarily the lack of a census for the pet-owning community and the lack of an accurate list for the number of animal shelters in the United States. These problems are still faced by researchers today.

Since the 1990s, the focus of pet overpopulation research has shifted to attempt to better understand reasons for owner relinquishment of pets resulting from the breakdown of the human-animal bond, factors associated with successful adoptions, evaluation of effects of early spay-neuter and the implications of the increasing feral cat population. Much of this research has utilized basic epidemiological study designs including cross-sectional studies, case-control studies, and retrospective cohort studies. This era of research has made a tremendous contribution toward a better understanding of the factors associated with overpopulation and has laid the groundwork for further advancement in this area of research.
Although basic epidemiologic data has been generated and reported, studies of population interventions to reduce pet overpopulation are sparse. Few reports of rigorous scientific evaluation of interventions such as the use of prospective cohort studies, individual randomized trials and group randomized trials have been reported. Just as individual randomized trials are considered the “gold standard” for studies to evaluate interventions at the individual level, group randomized trials (GRT) are considered the “gold standard” for evaluation of interventions delivered at the group level. Group randomized trials have been used extensively in public health research to evaluate interventions that change a population’s behavior vs. just affecting selected individuals. The value of group randomized trials is their effectiveness of population-wide strategies that have the potential to change the social norm for a particular behavior. Although increasing use of prospective cohort studies and individual randomized trials would be of benefit in pet population research, their techniques are well known in the veterinary literature and will not be discussed further in this paper. Despite being used commonly in public health research, group randomized trials have not been utilized in companion animal research and will be the focus in this manuscript.

The goals of this report are to 1) describe how group randomized trials are used to evaluate interventions that promote social and behavioral changes in the human public health field; 2) summarize the findings of recent epidemiological research on pet population issues that may lead to further interventional studies; and 3) lay the framework for how group randomized trials may be used to help advance the evaluation of interventions to reduce pet overpopulation.
2.2 Use of Group Randomized Trials in Public Health Research

2.2.1 Introduction to group randomized trials

A group-randomized trial (GRT) is a study designed to evaluate an intervention that operates at a group level, changes the social or physical environment, or cannot be delivered at the individual level. These studies have been advocated in public health research over the last 30 years to achieve widespread change in health behaviors. Common groups used in these studies include communities, worksites and schools. GRTs are considered the gold standard when the allocation of interventions to groups and not to individuals is necessary.

There are several characteristics which make group randomized trials different from the standard randomized clinical trials used in clinical medicine. The unit of assignment in a GRT is a group instead of an individual and the group adds an extra level of nesting and variability within the study. Groups are also not formed at random but are based on some common characteristic related to social structure, geography or other common characteristic. Also, due to the complexity and size of groups in most GRTs only a small number of groups can be allocated to the intervention and control conditions, and often the size of the groups may be relatively large (hundreds/group). Whereas a single drug or treatment is often evaluated in a clinical trial, interventions in a GRT have traditionally been multi-factorial and involve a variety of educational programs, mass media campaigns, and social marketing tools to try and influence group behavior.

There are numerous examples of group randomized trials in the public health literature. In the 1970s three large community intervention trials, the Stanford Five-City...
Project, Minnesota Heart Health Project, and Pawtucket Heart Health Project, were funded by the National Heart, Lung and Blood Institute that targeted reducing risk factors for coronary heart disease such as high blood pressure, elevated cholesterol, and cigarette smoking.\textsuperscript{15-17} None of these early studies included randomization of the groups, and magnitude and level of significance for reduction of risk factors were mixed in the 3 studies. In 1989, the National Cancer Institute funded the Community Intervention Trial for Smoking Cessation (COMMIT).\textsuperscript{18,19} In this study, 11 matched pairs were randomized to test a 4-year intervention to encourage smokers to achieve cessation. Significant declines in smoking prevalence were seen for light to moderate smokers and had a greater impact on the less educated group. In another study, Communities Mobilizing for Change on Alcohol (CMCA), communities were randomized to evaluate a community-organizing intervention to limit teen access to alcohol.\textsuperscript{20} A decline in arrest and traffic crash indicators was found in the intervention communities as a result. Group randomized trials have also been used in both the workplace and school setting to promote healthy behaviors such as physical activity and improved eating habits, and to discourage risky behaviors such as smoking.

\textbf{2.2.2 Potential sources of bias in group randomized trials}

GRTs are particularly susceptible to several forms of bias that must be controlled for as much as possible.\textsuperscript{13,21} The first type of bias is selection bias, meaning that differences exist between groups before the intervention is carried out and these differences are not evenly distributed between treatment and control groups. In most individual randomized trials this bias is handled through randomization. In GRTs,
however, with the small number of groups it may not be possible to completely eliminate selection bias even with randomization. Selection bias is part of the reason that having as many groups as possible is critical in GRTs.

Group randomized trials occur in the “real” world, and schools, worksites and communities are potentially exposed to other influences than the intervention. If these other influences have an impact on the results of the study, they are referred to as bias due to history. If these influences equally affect both treatment and control groups, they are less of a concern than those that only affect groups in one arm of the study. For example, if the intervention involves a smoking cessation program, and some of the control communities decide to implement their own smoking cessation campaign during the study, differential history bias has occurred. As much as possible it is important for researchers to be aware of these influences and try to limit them whenever possible.

Another type of bias that is of particular concern in GRTs is maturation bias, also known as secular trends. This has been a concern in some of the more recent community trials such as the coronary heart disease trials and COMMIT discussed above. This type of bias occurs when the natural development or long-term trends of a behavior affect the results of the study, and can be non-differential or differential. For example, in the COMMIT study it was believed that the secular trend of a decline in smoking among the control groups masked part of the intervention effect found in the intervention groups. Baumann et. al. showed with further regression analysis that the intervention effect in the COMMIT study increased as the control community change in smoking prevalence decreased. Although secular trends can’t be prevented, study design techniques can be implemented to help evaluate and control for their effects.
The other major type of bias that is of particular concern in GRTs is that of contamination. This occurs when the program that is implemented in the intervention groups leaks or crosses over into the control groups. For example, this can occur when community leaders in one or more of the intervention groups share intervention information with their counterparts in control groups and programs suddenly appear in the control groups. Researchers must take particular care in monitoring the control groups for contamination and making sure that participants in the intervention groups understand the need to keep program information in their own groups.

2.2.3 Other methodological issues in group randomized trials

Since the early group randomized trials in the 1970s, several advances have been made in the design of these studies, particularly in community based trials.\textsuperscript{23,24} One of the areas that researchers have tried to address is community involvement. In early intervention trials, the intervention itself was completely chosen by the researchers with no input from the community. Over time, community participation has become an integral part of community GRTs and most studies include a community advisory board at a minimum. Most community based trials also include some type of process evaluation to understand how the components of the intervention are delivered and to make sure they are received by individuals. Finally, more emphasis has been put on maintenance of intervention programs, particularly if they are successful. Groups participating in a study are concerned with what happens to the intervention once the study ends.
Researchers, groups and funding organizations need to consider what is required to maintain a successful intervention program at some level in order to both monitor long-term trends beyond the initial study and to help ensure community buy-in of the program.

2.2.4 Statistical issues in group randomized trials

There are several issues that must be accounted for in GRTs that are not of issue in individual randomized trials. First, members of groups have something in common, and this level of correlation (called the intraclass correlation coefficient or ICC) must be taken into account. The ICC is almost always positive in group randomized trials and leads to an increase in the variance of the group means. This ICC lowers the power of a study and if not accounted for in the analysis, will inflate the type I error rate. Second, because the unit of assignment is the group and not the individual, testing for intervention effects depend on the degrees of freedom based on the number of groups. Because the number of groups is small, the power of these tests for intervention effects is further reduced and if the incorrect degrees of freedom are used, the type I error rate will also be inflated. This can be particularly problematic in detecting statistically significant intervention effects in group randomized trials. It has also been shown that by modeling time explicitly in the analysis and adjusting for individual level regression covariates, the operative ICC in group-randomized trials can be reduced.

2.2.5 Conclusions on group randomized trials

Even with this brief overview, it is readily apparent that group randomized trials are associated with design, analysis and implementation challenges. They are time-consuming, costly and require the involvement of many research and group
constituencies. However, they remain the most popular and appropriate method that we currently have to evaluate interventions at the group level and are in continued use in the health behavior and promotion area of public health research. They are appealing to researchers because they provide a scientific way to evaluate population-wide interventions to change the social norm for a particular behavior. And as we will demonstrate below, there are several areas of research on pet population problems that lend themselves to the use of group randomized trials.

2.3 Findings of Recent Pet Population Research

Pet population research has evolved in the last twenty years to try and address specific issues of concern. With the continued emphasis on legislation, education and sterilization (LES), much of the research has focused on impact of early-spay neuter programs, why individuals choose to relinquish their pets and more recently with the dynamics of the lost pet population. Much of this research has identified potential factors that can be modified through interventions at a community level in order to bring about change in the pet owning community.

2.3.1 Reasons for relinquishment

Both cross-sectional and case-control study designs have been used to characterize factors related to relinquishment of a pet to an animal shelter. In a cross-sectional study conducted in Ohio,28 the three most common reasons reported for relinquishing a dog were dog’s behavior (30%), too much time, work or money needed to care for dog (21%), and moving (19%).
For cats the three most common reasons were moving (29%), owner illness/allergies (15%), and cat’s behavior (14%). Three-fourths of dogs and two-thirds of cats were younger than 2 years of age when relinquished.

Two landmark studies used a case-control study design to examine both animal and human factors associated with relinquishment of dogs and cats to an animal shelter in Indiana. The researchers found multiple risk factors that could be potentially modified through educational and outreach interventions. Relinquishment for dogs increased with lack of veterinary care, inappropriate care expectations by owners, lack of participation in an obedience class after acquisition, inappropriate elimination, and owning a sexually intact dog. Relinquishment was also associated with household incomes of less than $40,000 and households that had children. Relinquishment for cats increased when an owner had a specific role identified for the cat in the family, cat had access to the outdoors, cat was intact, owner never read about feline behavior, inappropriate elimination, and cat was more work than expected. Younger dogs and cats between 6 months and 3 years of age were also more likely to be relinquished.

In 1993 the National Council on Pet Population Study and Policy (NCPPSP) was formed in part to collect data regarding the extent of pet surplus and the factors contributing to pet relinquishment to shelters. Two large scale surveys were done in order to compare owner and animal characteristics for pets relinquished to shelters compared to those not relinquished. The Regional Shelter Relinquishment Survey was conducted in 12 shelters in 4 regions of the country in order to characterize the dogs and cats relinquished, their owners and reasons for relinquishment. The National Shelter Survey was conducted using a subset of a random sample of 80,000 U.S. households and
was used as the comparison group for the regional shelter survey. In the regional shelter survey, moving was the most frequent reason for dogs and the third most frequent reason for cats reported as reason for relinquishment. When relinquishment reasons were combined into similar categories, behavior was listed as a reason for relinquishment for 40% of dogs and 28% of cats. When the group of animals relinquished was compared with the group from the household survey, relinquished dogs and cats had higher odds for behavior problems than those that were not relinquished including behaviors such as inappropriate elimination and destructive behavior. Pets relinquished also had a higher odds of being intact and younger.

It is evident from these multiple studies that several common factors are associated with owner relinquishment of a pet to an animal shelter. Although some such as age of pet and owner moving may not be modifiable, others such as animal behaviors, intact status of animal, owner expectations of the pet, and use of veterinary care may be modifiable and targeted interventions to change these behaviors can be evaluated through more rigorous controlled trials, particularly GRTs. Although traditional individual randomized trials can be used to evaluate the effects of a behavioral intervention, if any of the potential interventions are implemented at the group level than a GRT is required. An example might be providing free puppy training classes or behavioral counseling in targeted communities and then measuring the relinquishment rate for those communities compared to other placebo communities. This design would require a GRT. A small reduction at the population level for any of these modifiable behaviors could result in large declines in the number of animals relinquished to shelters each year.
2.3.2 Prepubescent gonadectomy effects

As part of the animal sheltering community’s efforts to try and curb pet overpopulation, the concept of prepubescent (early-age) gonadectomy became increasingly popular in the last 30 years. The standard among humane groups is now to spay and neuter all animals prior to adoption, including puppies and kittens. By performing prepubescent gonadectomy, humane groups have been able to prevent any unwanted litters coming from animals adopted from their facilities.

When prepubescent gonadectomy was first discussed and implemented as an intervention, it was criticized as potentially dangerous. As a result, several cohort studies have been performed to look at the effects of early spay/neuter on pet health and behavior. In two retrospective cohort studies of dogs and cats altered in 2 shelters in Texas, no serious long-term problems with health or behavior were found for cats or dogs altered at traditional age (>= 24 weeks) or prepubescent age (< 24 weeks) during a median follow-up period of 37 and 48 months respectively.\textsuperscript{37,38} In the two largest retrospective cohort studies on early-age gonadectomy conducted on animals adopted from a New York shelter\textsuperscript{39,40}, the researchers also found no serious medical or behavioral conditions associated with gonadectomy before 5.5 months of age for cats. For dogs, however, the researchers found that urinary incontinence was higher among female dogs gonadectomized before 3 months of age, suggesting it may be best to wait until after 3 months of age to perform ovariohysterectomies in dogs.

The overall conclusion from these and other studies on the effects of early spay/neuter suggest that it is safe and can be performed both in a shelter environment and recommended by veterinarians to prevent accidental litters. The implementation of early
spay/neuter programs in community programs may be worth evaluating to measure the impact they have on populations and owner acceptance of the procedure. Similar to relinquishment studies, if early spay/neuter programs are offered as the intervention at the community level, a GRT design will be required instead of the more traditional individual randomized trial.

2.3.3 Feral cat trap-neuter-return (TNR) programs

Another issue of importance that warrants further scientific evaluation is the use of trap-neuter-return (TNR) programs to control the feral cat population. The problem of free-roaming cats has been well documented, and is one of the largest challenges facing the humane movement in the 21st century.\(^{41-43}\) TNR programs are largely promoted to help address this growing problem but few rigorous studies have been done to evaluate their effectiveness. One descriptive study showed a decline in the percentage of impounded cats euthanized and an increase in the percentage of impounded cats adopted after a TNR program was implemented in a community.\(^{44}\) The authors recognized, however, that this effect could not be contributed directly to the TNR program vs. other program changes implemented during the same time in the community. Two studies conducted on university campuses showed a decline in the number of cats and kittens caught when a comprehensive TNR and adoption program was implemented.\(^{45,46}\) These latter two studies demonstrate that in smaller, controlled environments with active caregivers, TNR can be an effective means to control and even reduce feral cat populations. In a more recent study that has used mathematical population modeling, TNR was not shown to reduce the per capita growth, and any population effects were
minimal for two large county TNR programs. In another study that employed matrix population models, it was shown that annual neutering of greater than 75% of the fertile cat population would be needed to control the population, which may be unrealistic for many larger scale TNR programs. These recent modeling studies point out the need for further investigation to try and access community impact of TNR programs both in prediction of cat numbers, size of TNR program needed for success in a given size community, and the impact on numbers of cats entering shelters in communities utilizing TNR.

2.3.4 Lost and found pets

An area of research that has been neglected until recently is understanding the search methods utilized by people who either lose or find a pet. Three epidemiological studies were conducted in Dayton, Ohio to describe the lost and found search process. Two initial studies used a single cohort of lost dogs and cats respectively that were identified by owner reports of losing a pet to local animal agencies or placement of a lost pet advertisement in the local newspaper. These studies showed that only 48% of dogs and 14% of cats were wearing any type of identification or had a microchip. Further, the studies showed that for dogs utilization of the animal sheltering system through calling and/or visiting an animal agency, the pet wearing a dog license tag, and the hanging of neighborhood signs all increased the probability of reunification, whereas for cats two-thirds returned home on their own and no particular search methods seemed effective in reunification. In the study on lost dogs, although only 14% of owners placed advertisements in the newspaper, 23% of the ads were successful in reunification. In the
study on people who found pets they perceived to be lost, only 46% of dog owners and 3% of cat owners were found. Search methods that were most successful in reunification of the found pet with the owner were information provided on owners by the animal agencies, people placing found pet advertisements to search for owners and neighborhood signs. These findings provide insight into the lost and found pet search process and point out many areas where interventions through education on search methods and identification could be evaluated with more sophisticated study designs. If these interventions were offered in communities or other sites such as veterinary clinics, then the GRT design could be used.

2.4 Use of Group Randomized Trials in Companion Animal Population Research

In traditional research on diseases, research progresses from epidemiological studies that identify potential factors involved with a disease process to generating testable hypotheses for specific treatments that will hopefully alter the course of a disease. When dealing with chronic diseases such as heart disease, researchers may test particular treatments involving new drugs, or in human research, they may test interventions to change health behaviors associated with the disease such as smoking, physical activity and dietary habits. Often these health behavior interventions are administered at a group level and require the use of group randomized trials for evaluation.

Different from many animal diseases where the focus of research has been on clinical diagnosis and treatment, the factors associated with overpopulation require a different type of evaluation approach. As the summary of the recent epidemiological
literature has shown, many of these risk factors are social and behavioral in nature and can not be treated with traditional medical and surgical interventions. They require interventions at a larger level such as communities in order to evolve societal change. Thus, in order to advance our research, we should consider those examples from the field of public health and the use of group randomized trials to evaluate potential interventions. Funding agencies have invested considerable resources in programs to reduce overpopulation, but in most cases scientific evaluation of the impact of these programs is not conducted. Because much of the funding is implemented through community groups such as humane societies, funding agencies want to know what impact their money is having at the community level. Our evidence to evaluate these programs has largely been anecdotal and we can better serve funding groups, communities, owners and most importantly pets by attempting to show which interventions truly make a difference.

Many of the findings discussed above on pet population research can be further investigated through the use of group randomized trials. For example, we know that in a population of dogs that were lost, only 8% had a microchip and only 1.5% of the dogs reunited were done so by a microchip. Given the emphasis placed on microchips as a recovery method for lost dogs by the humane community, particularly with the recent difficulties in reunification during the response to hurricane Katrina, evaluation of methods to increase the prevalence of microchips is warranted. A community based group randomized trial could be used to evaluate promotional programs in communities (intervention group) compared to control communities by using pre and post intervention surveys of residents to evaluate if microchip promotion increases the prevalence at the community level. Microchip and identification campaigns could also be used in a similar
approach to assess the shelter return to owner rate in those communities where programs are implemented. Because these microchip and identification campaigns would be offered at the community level and not to particular individuals, a group randomized trial would be required. Group intervention strategies could be used to evaluate in communities the reduction in strays where low-cost or mobile spay/neuter clinics were implemented; the impact of community pet education programs on pet retention levels; the implementation of school pet obedience programs on retention of pets in homes with children, to name just a few.

These types of interventional studies are not without challenges. They require a change in our approach and a redirection of research dollars. These types of studies will be expensive and time-consuming and will require pilot studies to evaluate whether an intervention is worth pursuing in a larger study and to estimate intraclass correlation coefficients so that larger studies can be properly powered. Traditional epidemiologists will have to involve researchers with expertise in the field of health behavior and promotion and be willing to devote resources to establishing community involvement. This approach appears daunting and may require more resources than traditional funding agencies are have been willing to provide. As a society, however, the continued euthanasia of millions of pets in animal shelters in the United States each year is morally unacceptable and as researchers, we have a responsibility to advance our knowledge to impact the problem to the greatest extent possible. We ask that the research community and funding agencies consider the need for better evaluation of interventions and explore the use of group randomized trials as a method to do so.
2.5 References


49. Lord LK, Wittum TE, Ferketich AK, et al. Search and identification methods that owners use to find a lost dog. *J Am Vet Med Assoc.* Accepted for publication.


CHAPTER 3

DEMOGRAPHIC TRENDS FOR ANIMAL CARE AND CONTROL AGENCIES IN OHIO FROM 1996 TO 2004

3.1 Introduction

In the past quarter century, great efforts have been made to address the pet overpopulation problem in the United States. Previous authors\textsuperscript{1-3} have estimated that between 13.5 and 18.6 million dogs and cats were euthanatized at animal shelters in the United States each year during the 1970s, but a more recent estimate currently places the annual figure as being between 4 and 6 million.\textsuperscript{4} Statistics have been reported in certain states that have also shown a decline in euthanasia of animals at shelters. In particular, in states where publicly funded spay/neuter programs have been in existence, animal statistics from shelters have been collected for more than a decade. In New Jersey, animal intake at shelters decreased by 29\% and the euthanasia rate decreased by 10\% between 1984 and 1999, despite an 8\% increase in the state population.\textsuperscript{5} In New Hampshire, the mean annual euthanasia rate at animal shelters decreased by 77\% after a state-funded spay-neuter assistance program was implemented.\textsuperscript{5}
Because of a lack of information on animal care and control agencies, a comprehensive survey of animal care and control agencies in Ohio was performed to collect baseline statistics on the number of animals handled by these agencies during 1996 and to characterize agency policies, procedures, and needs. Less-detailed versions of the survey were performed to obtain information for 1997 through 2000. The purpose of the present study was to repeat the comprehensive survey to obtain information for 2004. The primary objective of the present survey was to examine trends among animal care and control agencies in Ohio since 1996 in regard to numbers of animals handled, medical care provided, expenses, numbers of employees, and policies of the agencies. The secondary objectives were to analyze trends in euthanasia rates and animal intake per capita for dogs and to identify factors associated with those trends. Factors that were considered in particular included whether the agency had a spay-neuter policy and whether the agency routinely used veterinary services.

3.2 Materials and Methods

For the present and previous studies, 3 types of organizations were included in the definition of animal care and control agencies: county dog warden agencies, municipal animal control agencies, and humane societies. Animal control in Ohio differs from that in most states, in that state law mandates each county have an agency with an appointed chief dog warden (the state law does not refer to cats). Although primarily responsible for control of stray dogs and enforcement of laws regarding stray dogs, wardens may also choose to handle owner-released dogs as well as other species. Municipal animal control agencies are usually located in cities that are part of a larger
metropolitan area. These agencies are responsible for animal control in their own municipality and usually deal with numerous species, including wildlife. Humane societies consist of private nonprofit organizations that usually were established to assist unwanted animals, typically by providing housing, adoption, and community education. Often in Ohio, the county humane officer in charge of cruelty investigations works for the local humane society. Some humane societies have contracts with local government agencies to perform animal control functions. In the present study, when the county agency to which the appointed dog warden was assigned (ie, the county dog warden agency) and a humane society acted as a single organization, we considered them to be a combined organization.

To allow results of the present survey to be compared with results of a similar previous survey, breed rescue groups were not included. Such groups are often transient in nature and difficult to identify. In addition, breed rescue groups typically focus on a single breed of dog and do not provide general animal services to the public, such as housing or education.

For the present survey, a comprehensive survey similar to the initial 1996 survey was used. The survey was reviewed by members of the Ohio Dog Wardens Association, the Ohio Federated Humane Societies, and a municipal officer. A common final survey instrument was used for all types of agencies. (Table 3.1) A database of all animal care and control agencies in Ohio was compiled from the internal list used for previous surveys, various Internet sources, and the Humane Society of the United States regional mailing lists. Phone calls were made prior to the survey to validate the existence of and proper addresses for agencies included in the study.
A standardized survey method was used. A letter of introduction explaining the purpose of the survey was sent to all agencies in February 2005. The survey itself was mailed in April 2005, and a postcard reminder was sent to agencies that had not responded by 3 weeks after the initial mailing. A final packet, similar to the initial one, was sent to those agencies that had not responded within 3 weeks after the initial postcard reminder was mailed. Representatives of The Ohio State University, the Ohio Dog Wardens Association, and the Ohio Federated Humane Societies placed telephone calls to the remaining nonrespondents between June and August 2005 to remind them to complete the survey. Survey responses were accepted through September 2005.

The survey included questions regarding general information about each agency; expenses and revenues; numbers of staff members and volunteers; number of animals handled during 2004 (by intake and disposition category as well as by species); adoption fees; adoption policies; methods for euthanasia and disposal of carcasses; medical care provided, including vaccination protocols, spay-neuter policy, and associations with veterinarians; information about agency needs and the most important community animal welfare issue. For the needs assessment, agencies were asked to rank various areas on a scale from 1 (not important) to 5 (very important) and to indicate their 3 most pressing needs, drawn from the previous list or their own self-identified needs.

The survey method used for the present survey was the same as that used in a previous survey, which had requested information for 1996. For 1997 through 2000, similar methods were used to survey animal care and control agencies in Ohio, but a more limited questionnaire was used.
3.2.1 Statistical analysis - Median and range were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. Standard software was used. Some agencies reported the number of animals by species but were unable to report the number of animals by intake category. For these agencies, numbers of animals in each intake category were extrapolated on the basis of mean percentages reported by agencies able to classify animals on the basis of intake categories. Animals received from other agencies and animals transferred to other agencies were not included in analyses to ensure that such animals were not counted twice.

For total expenses, animal intake, and animal disposition, estimates for the state as a whole were calculated. For total expenses, median expenses by agency type were calculated. To estimate total expenses for the state as a whole, the median value by agency type was assigned to each nonrespondent agency and each respondent agency that did not provide information on expenses, and these values were added to total expenses for respondents that provided information on expenses. For animal intake and animal disposition, median numbers of animals were calculated for respondents grouped by agency type (ie, municipal agencies and humane societies). Median numbers were also calculated for each category on the basis of the known percentage of animals in each category. Categories for animal intake included strays, owner surrendered, and cruelty-neglect-other; categories for animal disposition included adopted, reclaimed by owner, euthanatized, and other-died-lost. To estimate animal intake and disposition values for the state as a whole, the median value was assigned to each nonrespondent agency and each respondent agency that did not provide information on animal numbers. These
values were then added to total numbers for respondent agencies that provided information on animal numbers. Although all dog wardens who were sent a survey responded, 3 dog wardens were not able to report animal numbers. Because these dog wardens reported animal numbers in 2000, values reported for 2000 were used as estimates for animal intake and disposition. Number of animals taken in by all agencies in the state and number of animals euthanatized were calculated as a proportion of the human population and as a proportion of the animal population in the state. For these calculations, state and county human population estimates were obtained from the US Census Bureau,\textsuperscript{8} and animal population estimates were obtained from the AVMA.\textsuperscript{9,10}

To analyze responses to the 3 most pressing needs, a weighted-mean score was calculated by assigning the need ranked first a value of 3 points, the need ranked second a value of 2 points, and the need ranked third a value of 1 point.

For the county dog warden agencies, adequate data were collected during the 6 years that surveys were performed to allow for longitudinal data analysis to examine trends in dog intake and euthanasia rates. For this analysis, a combined county dog warden agency-human society that acted as a single organization was treated as a county dog warden agency. County dog warden agencies that transferred all dogs to another agency were not included in this analysis. Covariates that were included in the analysis included total yearly expenses, total numbers of full-time and part-time employees, use of veterinary services (yes vs no), and presence of a spay-neuter policy (yes vs no).
Total numbers of employees were calculated for each year by adding the total numbers of full-time and part-time employees, with part-time employees each assigned a weight of 0.5 full-time employee. All yearly expenses were adjusted for inflation to be equivalent to 2004 dollars.  

To model the odds that a dog would be euthanatized by a county dog warden agency, a generalized linear mixed effects model with a logit link function was used. The response variable was modeled as a proportion for each dog warden agency by means of events per trials syntax (ie, number of dogs euthanatized per number of dogs handled). A random intercept was included in the model for each dog warden agency to allow for agency-specific effects. The model assumed conditional independence, meaning that all observations for a given dog warden agency were assumed to be independent, given the random intercept. Model building was done by means of a forward selection process. A variable for year was forced into the model because of the hypothesized change in rate over time. Each potential covariate was then tested for entry into the base model. At each stage, the covariate with the lowest Wald $P$ value was added to the previous model. This process was continued until the addition of no additional covariate significantly improved the model at an $\alpha$ value of 0.05, as determined by the Wald test. Once all main effects were determined, relevant quadratic and interaction terms were examined, with entry again determined on the basis of an $\alpha$ value of 0.05, as determined by the Wald test. Diagnostic testing was performed to test the assumption of linearity in the logit for continuous variables. A histogram was used to evaluate normality of the random intercepts, and a predicted versus residual value plot was used to examine equality of the variances.
To model the number of dogs handled by county dog warden agencies, a linear mixed effects model was used. To account for differences in sizes of the counties served, intake rates were standardized by dividing the number of dogs taken in by the population served, with population served determined on the basis of state and county human population estimates obtained from the US Census Bureau. The outcome, expressed as dogs per person served, was found to be approximately normally distributed when log transformed. Therefore, the natural logarithm of the intake rate was modeled as a continuous variable. A random intercept was included in the model to allow for agency-specific effects. The model building was carried out as described for analysis of the odds of euthanasia. With the use of a random intercept, an exchangeable correlation structure was assumed for the residuals. Diagnostic testing was performed to examine normality of the random intercepts and equality of the variances as described.

3.3 Results

Surveys were mailed to 223 animal care and control agencies, of which 165 (74%) responded. All 88 (100%) county dog warden agencies responded, along with 23 of 33 (70%) municipal animal control agencies, and 65 of 113 (58%) humane societies (11 county dog warden agencies and humane societies provided combined responses for the survey; each was counted separately for calculation of response rates by agency, but responses were included only once for all other analyses).

3.3.1 Expenses, numbers of employees and volunteers - Median values for annual expenses and number of full-time employees during 2004 were calculated by type of animal care and control agency (Table 3.2). Estimated total expenses for all animal care
and control agencies in Ohio during 2004 were $57.7 million, which was a 69% increase compared with estimated total expenses during 1996, after adjustment for inflation ($34.2 million). Estimated total amount of money allocated by county and city governments in Ohio for use by animal care and control agencies during 2004 was $25.8 million, which was a 39% increase compared with estimated total amount allocated during 1996, after adjustment for inflation ($18.6 million). In estimating total expenses for all animal care and control agencies in Ohio during 2004, extrapolations were used for 89 (40%) of the agencies.

Overall, 32 (20%) of the 164 animal care and control agencies that responded reported that they did not have any full-time employees during 2004, and 22 (13%) reported that they did not have any full- or part-time employees. Seventy-eight (49%) of 158 agencies indicated that they spent money on employee training during 2004. Eighty-three (51%) of 164 agencies employed volunteers during 2004, compared with 70 of 175 (40%) agencies that employed volunteers during 1996.

Median age of buildings used by animal care and control agencies during 2004 was 20 years (range, 0.25 to 150 years). Thirty-six (31%) of 115 agencies reporting having built a new facility or completed a substantial addition since 1996.

3.3.2 Number of animals handled - Of the 165 agencies that responded, 153 (93%) were able to provide information on the number of animals handled during 2004 (Table 3.3). Information on disposition was available for 3,897 fewer animals than the number of animals taken in during 2004; this difference was assumed to represent animals still residing at the agencies at the end of the year. Agencies did not classify 29,514 (9%) animals in regard to intake categories, and these animals were assigned to
intake categories on the basis of mean percentages of animals in each category. In estimating total numbers of animals handled during 2004, extrapolations were used for 63 (28%) agencies. Total numbers of animals taken in and euthanatized were calculated as a proportion of the human and animal population in the state (Table 3.4).

3.3.3 Adoption fees and policy - Of the 165 agencies that responded, 131 (79%) provided adoption services, compared with 82% that did during 1996. The remaining agencies transferred animals to other agencies that were responsible for adoption. Adoption fees for a dog or puppy ranged from $5 to $150 (median, $55), and adoption fees for a cat or kitten ranged from $0 to $80 (median, $55). By contrast, median adoption fees during 1996, after adjustment for inflation, were $25 for a dog or puppy and $41 for a cat or kitten. Of the 121 agencies that listed the adoption services they provided, 82 (68%) included the cost of spaying or neutering in the adoption fees, compared with 46% of agencies that did during 1996. Only 16 agencies (13%) did not include any services in their adoption fees, compared with 21% that did not include any services in their adoption fees in 1996.

3.3.4 Methods of euthanasia and carcass disposal - Of the 155 agencies that provided information on methods used to euthanatize animals during 2004, 108 (70%) used pentobarbital sodium, 34 (22%) used carbon monoxide, and 29 (19%) transferred animals to another agency or veterinarian for euthanasia (some agencies used > 1 method).
Of the 155 agencies that provided information on methods of carcass disposal, 30 (19\%) used incineration, 93 (60\%) used a landfill, 19 (12\%) used common burial, and 13 (8\%) used other methods (eg, transferred the carcass to another agency). Except for the use of rendering, which was no longer legal in Ohio in 2004, these percentages were similar to percentages reported for 1996.

3.3.5 Medical care - Of the 101 agencies that had a spay-neuter policy (Table 3.5), 42 (42\%) indicated that all animals were spayed or neutered before they were discharged from the facility, 30 (30\%) indicated that animals were spayed or neutered before or after adoption, 41 (41\%) provided a certificate that could be redeemed with local veterinarians for spaying or neutering of the animal, and 5 (5\%) used another policy (agencies could select > 1 policy).

3.3.6 Other policies - Of the 165 agencies that responded, 37 (22\%) indicated that they did not house animals during 2004. These agencies used foster homes or transferred all animals to other agencies. Overall, 77 (49\%) of 156 agencies had a foster program, and 23 (35\%) of the 65 humane societies had a trap-neuter-return program for feral cats. Only 1 animal control agency reported having a trap-neuter-return program for feral cats. Of 156 agencies that responding, 93 (60\%) indicated that they scanned animals for a microchip when they received the animals, and 13 (8\%) reported that they implanted microchips in animals that were adopted. By contrast, in 1996, 48\% of agencies scanned animals for a microchip, and 4\% implanted microchips in animals that were adopted.

3.3.7 Pit bull-type dogs - Of the 144 agencies that reported they had a policy related to the handling of pit bull-type dogs, 23 (16\%) indicated that they do not accept such dogs, 87 (60\%) indicated that they accepted such dogs but do not allow them to be
adopted, and 34 (24%) indicated that they accepted such dogs and put them up for adoption. In total, 68 agencies reported handling 8,834 pit bull-type dogs during 2004, compared with 2,141 pit bull-type dogs handled by 101 agencies during 1996.

Of the 8,834 pit bull-type dog handled during 2004, 1,425 (16%) were reclaimed by their original owner or adopted by a new owner and 7,409 (84%) were euthanatized. This represented 9% of the dogs euthanatized during 2004.

3.3.8 Needs assessment and welfare issues - The top 5 needs reported by responding agencies, as determined on the basis of weighted-mean scores, were capital-facility improvement, increased funding, additional paid staff, veterinary services, and improved legislation. Similarly, during 1996, the top 5 needs were capital-facility improvement, increased funding, improved legislation, improved education, and veterinary services. Of the 134 agencies that provided information on the most important animal welfare issue in their community, 40 (30%) listed feral and stray cats, 21 (16%) listed overpopulation (not species specific), 18 (13%) listed cruelty and neglect, 18 (13%) listed abandoned and stray dogs, 13 (10%) listed lack of spay/neuter services and 24 (18%) listed other miscellaneous issues.

3.3.9 Dog intake and euthanasia rates - Between 1996 and 2004, mean dog intake rate for county dog warden agencies decreased from 23.1 to 17.2 dogs per 1000 individuals served. Linear mixed effects modelling indicated that year was the only variable significantly associated with intake rate, with intake rate during 1998, 1999, 2000, and 2004 significantly lower than intake rate during 1996.
Similarly, between 1996 and 2004, mean dog euthanasia rate for county dog warden agencies decreased from 68% to 48%. Linear mixed effects modelling indicated that year, spay-neuter policy, and county population were significantly associated with the dog euthanasia rate (Table 3.6). Examination of the odds ratios indicated that a dog handled by a county dog warden agency during 2004 was half as likely to be euthanatized as a dog handled during 1996 (P < 0.001). In addition, a dog handled by a county dog warden agency without a spay-neuter policy was 1.36 times as likely to be euthanatized as a dog handled by an agency with such a policy (P = 0.022), and the odds that a dog handled by a county dog warden agency would be euthanatized increased as county population increased (P = 0.046). Yearly expenses, total number of employees, and use of veterinary services were not found to be significantly associated with euthanasia rate. No significant higher order or interaction terms were found.

3.4 Discussion

When combined with results of our previous study, results of the present study reveal that animal care and control agencies in Ohio saw a large reduction in the annual number of dogs handled between 1996 and 2004. Specifically, total intake of dogs decreased by 16.6%, which represented a decrease from 19.14 to 15.59 dogs per 1,000 people. In addition, not only were fewer dogs taken in by animal care and control agencies during 2004, but far fewer were euthanatized. The number of dogs euthanatized decreased by 39.0%, which represented a decrease from 11.50 to 6.85 per 1,000 people.
Our analyses of data for county dog warden agencies indicated that there was an association between having a spay-neuter policy and a lower euthanasia rate. This suggests that county dog wardens may be taking responsibility to improve the disposition of dogs that they handle. In particular, it is possible that county dog warden agencies that have implemented spay-neuter policies have greater motivation to have dogs adopted into new homes. We found that there was a substantial increase in the proportion of county dog warden agencies that provided medical care, such as vaccination and intestinal deworming, to the animals they handled, and it seems likely that providing these services resulted in a healthier dogs and improved the public perception of dogs available for adoption from county dog warden agencies, which may have contributed to the decrease in euthanasia rate. Importantly, although having a spay-neuter policy was associated with a decrease in euthanasia rate, this should not be taken as proof of a cause-and-effect relationship. Rather, it is possible that having a spay-neuter policy is an indicator of other management practices that may reduce the euthanasia rate.

We did not observe a similar association between having a spay-neuter policy and a decrease in dog intake rates for county dog warden agencies. Although county dog warden agencies handled most dogs in the state, the present study did not take into account the effects of other spay-neuter programs, such as those offered by humane societies and other groups. We also believe there is a lag effect before the effects of a spay-neuter program can be measured in a community. Thus, the increase in the proportion of animal care and control agencies with a spay-neuter policy between 1996 and 2004 would not necessarily have been reflected in dog intake numbers.
Other factors that we did not measure may also have been responsible, in part, for the decrease in dog euthanasia and intake rates. Foster care programs that have been developed by various animal care and control agencies provide an outlet for treatment of animals with medical or behavioral problems and may provide for temporary housing of excess animals during busy periods. This may have led to higher adoption rates and a subsequent decrease in the euthanasia rate. Similarly, rescue groups have flourished in the past decade in Ohio, and an increasing number of dogs may be initially taken in by one of these groups instead of the traditional animal care and control agencies. Rescue groups traditionally only handle animals they believe are adoptable and only euthanatize dogs under extreme circumstances. Because of the difficulty in surveying these groups, we do not have an accurate picture of the number of dogs that are filtered through these groups either directly from owners or as strays and the subsequent impact on intake and disposition rates for traditional animal care and control agencies. An additional factor that may have had a large impact on the intake rate is the potential change in owner attitudes toward their pets since 1996, when the survey was first conducted. With increasing attention on both the human-animal bond and the overpopulation problem, pet owners may have become more responsible, with the result that fewer dogs were taken in by animal care and control agencies.

Unfortunately, results of the present study suggest that the disposition of cats handled by animal care and control agencies in Ohio has not improved since 1996. Total number of cats taken in by these agencies increased by 19.7%, representing an increase from 10.27 to 11.26 cats per 1,000 people. The number of cats euthanatized increased by 13.9%, which represented an increase from 7.23 to 8.04 cats per 1,000 people. The
growing cat problem in Ohio was recognized by animal care and control agencies, as
30% listed feral and stray cats as the most important animal welfare problem in their
communities.

Cats have become the most commonly owned pet in the United States, with an
estimated 72.5 million cats owned in the United States in 2004. In addition, there is an
unknown number of feral cats in the country. With the growing popularity of cats as pets
has come an increase in the magnitude and complexity of problems associated with the
management of unwanted cats, engendering substantial debate as to the most appropriate
solutions. Only 1 state, Rhode Island, requires cats to be licensed and to wear
identification; in all other states, cat control is left to the local authorities. Many states,
such as California, have mandatory spay-neuter policies for animals that leave shelter
facilities, and the AVMA supports state and local ordinances mandating spaying or
neutering of such animals, licensing of cats, and keeping cats indoors. Many animal
welfare groups and veterinarians support the use of trap-neuter-return programs for feral
cats, and 23 (35%) of 65 humane societies in the present study reported that they have
instituted such programs. However, the effectiveness of various cat control laws and trap-
neuter-return programs is not clear, and additional research is needed to measure their
impact.

The present study revealed a substantial increase in the number of pit bull-type
dogs euthanatized in Ohio since 1996. Approximately three-fourths of the 7,409 pit bull-
type dogs that were euthanatized by animal care and control agencies during 2004 were
located in counties with large metropolitan areas. In Ohio, any dog of a breed commonly
known as a pit bull is automatically considered as vicious, and there is a growing debate
nationally about the best way to deal with dangerous dogs. Although the effectiveness of
breed-specific bans is not clear, an estimated 200 municipalities nationwide have enacted
some type of breed-specific ban, despite opposition from various national groups,
including the AVMA and Humane Society of the United States.\textsuperscript{18-20}

Despite the increases in the proportion of animal care and control agencies that
provide medical care to the animals they handle and the proportion that have an
association with a veterinarian, animal care and control agencies still identified veterinary
services as one of their top 5 most important needs during 2004. Veterinarians play a
critical role in helping these agencies care for the animals under their control, and shelter
medicine has become an important field.

As with any study that focuses on a particular geographic area, care should be
taken in extrapolating results of the present study to the situation in other states. We do
believe, however, that our methods for examining trends over time are useful to other
states attempting to characterize their animal care and control agencies. We also believe
that the broad trends we saw in regard to proportion of agencies providing medical care,
proportion of agencies that have an association with a veterinarian, and dog intake and
euthanasia rates are likely to be reflected in other areas of the country. Given the critical
role that veterinarians play in animal welfare and overpopulation, it is important for
veterinarians to be aware of these broad trends.
3.5 Endnotes

a. Stata Version 9.1, StataCorp, College Station, Tex.
b. PROC GLIMMIX, SAS Version 9.1 for Windows, SAS Institute, Cary, NC.
c. PROC MIXED, SAS Version 9.1 for Windows, SAS Institute, Cary, NC.
3.6 References


2004 Survey of Ohio Animal Care & Control Agencies

Please provide information regarding the year January 1, 2004 - December 31, 2004

Please respond to all questions as completely as possible. If a question does not apply to your agency, please mark ‘N/A’.

General Agency Information:

Name of Agency: ____________________________________________________________

Contact Person: __________________________  Title: _____________________________________

Mailing Address: ____________________________________________________________

(Street)    (City)    (Zip)

Telephone number: (____) _______________     Fax Number: (____) _________________

Email address: _________________________  Website address: ____________________________

Please check the choice below that best describes your agency:

[  ] We are a government agency (municipal or county animal control)
[  ] We are a 501(c)3 tax-exempt agency
[  ] We are a combined agency (humane society and animal control)
[  ] Other (please describe):________________________________________________

Shelter/Building Information:

Does your agency have a facility for housing animals? [   ] yes  [   ] no  If no, please skip to the next section

Hours open to the public (please list days/times):

________________________________________________________________________

What is your maximum shelter capacity? _______ dogs  _______ cats

How old is your building? ________ years  What is the total square footage? __________ square feet

Operations and Staffing Information:

**Law enforcement agencies please include only budget & staff involved in animal care and control activities**

Please list:  Total Expenditures for 2004: ______________  Total Revenues for 2004: ______________

Please list the number of paid employees : ________ Full Time     ________ Part Time

Table 3.1 – 2004 Survey of Ohio Animal Care and Control Agencies.
Table 3.1 (continued)

Please list the average number of weekly volunteers: __________
Please estimate the total number of volunteer hours for 2004: ___________
Please list the number of employed certified euthanasia technicians: _____ Full Time _____ Part Time
Do you employ any certified veterinary technicians? [ ] yes [ ] no
How much did you spend on employee education/training programs in 2004? $___________
Did any of your employees or volunteers attend the Midwest Veterinary Conference in 2004? [ ] yes [ ] no

2004 Animal Statistics & Information:

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<td>______</td>
</tr>
<tr>
<td>Transfer to Other Agency</td>
<td>___________</td>
<td>___________</td>
<td>_______</td>
<td>______</td>
</tr>
<tr>
<td>Died/Lost in Care</td>
<td>___________</td>
<td>___________</td>
<td>_______</td>
<td>______</td>
</tr>
<tr>
<td><strong>Total Disposition</strong></td>
<td>___________</td>
<td>___________</td>
<td>_______</td>
<td>______</td>
</tr>
</tbody>
</table>

How many of the euthanasias listed above were requested by the owner? _______ dogs _______ cats
If you received/transferred animals from/to other agencies, please list the agencies __________________
____________________________________________________________________________________

What is your policy for pit bull/pit bull mixes? [ ] do not accept [ ] accept/do not adopt [ ] accept & adopt
If you accept pit bull/pit bull mixes, please give: # handled _____ # adopted _____ # redeemed _____
Do you track puppies/kittens separately from dogs/cats? [ ] yes [ ] no
How do you track animal statistics? [ ] by computer [ ] manually [ ] both
If you track using a computer, what is the name of the computer program? ________________________

Table 3.1 continued next page
Table 3.1 (continued)

Which statements best characterize the policy of your agency regarding animal intake (check all that apply):

[ ] We routinely accept all animals
[ ] We routinely accept only dogs
[ ] We routinely accept only cats
[ ] We routinely accept only animals that we deem to be “adoptable”
[ ] We accept animals until we are “full,” after which we turn animals away
[ ] We routinely accept only owner-relinquished animals
[ ] None of the above. Explain: _____________________________________________________

What are your adoption fees?  Dog ________ Puppy _______ Cat ________ Kitten _________

What services do your adoption fees include? (ex. spay/neuter cost, vaccines, microchip, etc.) __________
______________________________________________________________________________________

Do you sell dog licenses?  [ ] yes  [ ] no If yes, what is your fee? $______

Do you have a foster program?  [ ] yes  [ ] no

Do you have a feral cat trap/neuter/return (TNR) program?  [ ] yes  [ ] no

If yes, how many cats were spayed/neutered in 2004? _______

Does your agency have an official role in emergency and disaster planning in your area?  [ ] yes  [ ] no

What method of euthanasia is utilized by your agency (check all that apply):

[ ] Sodium pentobarbital injection  [ ] Carbon monoxide  [ ] Other _______  [ ] None

What method of disposal is utilized by your agency (check all that apply):

[ ] Incineration  [ ] Landfill  [ ] Common Burial  [ ] Other _______________________

Does your agency routinely scan stray animals for microchip ID?  [ ] yes  [ ] no

Does your agency implant adopted animals with microchip IDs?  [ ] yes  [ ] no

**Medical Care Information:** (If you immediately transfer animals and do not provide medical care, please write “NA” here and skip this section _______________)

Does your agency use the services of a veterinarian?  [ ] yes  [ ] no

If yes, what type of relationship do you have with your veterinarian(s) (check all that apply)

[ ] full-time employee  [ ] part-time employee  [ ] independent contractor  [ ] volunteer

Do you have a spay/neuter program for animals for adoption?  [ ] yes  [ ] no

If yes, please pick the most appropriate description of your program:

[ ] All adopted animals are spayed/neutered before leaving facility
[ ] Some adopted animals are spayed/neutered before leaving facility
[ ] We use a spay/neuter certificate with local veterinarians
[ ] Animals are brought back to agency after adoption to be spayed/neutered
[ ] Other _________________________
Table 3.1 (continued)

Do you test dogs for heartworm disease? [ ] yes [ ] no [ ] Do not handle dogs
Do you test cats for: FeLV? [ ] yes [ ] no FIV? [ ] yes [ ] no [ ] Do not handle cats
Do you vaccinate dogs for distemper/parvo (DHPP)? [ ] yes [ ] no [ ] Do not handle dogs
Do you vaccinate dogs for bordetella (kennel cough)? [ ] yes [ ] no [ ] Do not handle dogs
Do you vaccinate cats for distemper/upper respiratory (FVRCP)? [ ] yes [ ] no [ ] Do not handle cats
Do you routinely give medication for intestinal worms? [ ] yes [ ] no

Law Enforcement & Regulations Information: (If your agency is not involved in law enforcement, please mark “NA” here and skip this section __________)

Humane Agent Section (For agencies that investigate cruelty & neglect)
How many humane agents are at your agency: _______ Full time _______ Part time
How many of your humane agents have completed the state mandated humane agent training program? ___
For 2004, please list the number of:
- cruelty/neglect complaints received _____ criminal charges filed _____ guilty verdicts won _____

Law Enforcement & Regulations Information (continued):
Animal Control Section (for agencies that enforce state dog laws and/or municipal ordinances)
How many enforcement officers are at your agency: _______ Full time _______ Part time
How many of your enforcement officers are NACA certified? ________
For 2004, please list the number of citations/legal notices issued for:
- ______ stray/at large ______ Unlicensed _______ Vicious/Dangerous ______ Other
If your agency handles stray dogs, what is the average fee an owner pays your agency to reclaim a stray, unlicensed dog held for 3 days? $__________

Table 3.1 continued next page
Table 3.1 (continued)

**Other Information:**
Please indicate the importance of the following needs for your organization:  
*(Please circle the rank for each need using a scale of 1-5; 1 = not important  5 = very important)*

<table>
<thead>
<tr>
<th>Need</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital/Facility Improvements (Building, Fencing, Cages, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Paid Staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel Relations (Team Building)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board Development &amp; Recruitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Legislation for Animal Laws</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer Training &amp; Recruitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community/Public Relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fund Raising</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary Community Relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers (hardware, software, training, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Office/Medical Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please list the three most important needs of your organization in order of importance:

1) ____________________________________________________________
2) ____________________________________________________________
3) ____________________________________________________________

What is the most serious animal welfare problem in your community? _______________________
_______________________________________________________________________________

Next year would you like to receive/return the survey by email? [ ] yes [ ] no

Please return your completed survey in the enclosed envelope by May 20th. If you have any questions, please contact Linda Lord at (614) 247-8145, (614) 292-1206 or lord.19@osu.edu. Thank you for your participation!
<table>
<thead>
<tr>
<th>Agency type</th>
<th>No. of agencies responding</th>
<th>Expenses ($)</th>
<th>No. of full-time employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>County dog warden agency</td>
<td>66</td>
<td>77</td>
<td>106,000</td>
</tr>
<tr>
<td>Humane Society</td>
<td>67</td>
<td>65</td>
<td>90,000</td>
</tr>
<tr>
<td>Municipal animal control agency</td>
<td>47</td>
<td>23</td>
<td>41,000</td>
</tr>
</tbody>
</table>

Table 3.2 - Estimated annual expenses and number of employees during 1996 and 2004 for animal care and control agencies in Ohio.

Values represent median (range). Values for 1996 have been reported previously, but were now adjusted for inflation to be equivalent to 2004 dollars,
Table 3.3 - Estimated total numbers of animals handled by animal care and control agencies in Ohio during 1996 and 2004.

Values are given as number of animals (%).
### Table 3.4 - Estimated total numbers of animals taken in and euthanatized by animal care and control agencies in Ohio during 1996 and 2004 as a proportion of state human and animal population.

<table>
<thead>
<tr>
<th>Variable</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animal Intake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per 1,000 People</td>
<td>19.14</td>
<td>15.59</td>
<td>10.27</td>
<td>11.26</td>
<td>29.41</td>
<td>26.84</td>
</tr>
<tr>
<td>As percentage of animals in Ohio</td>
<td>9.50</td>
<td>7.17</td>
<td>4.44</td>
<td>4.55</td>
<td>6.80</td>
<td>5.78</td>
</tr>
<tr>
<td><strong>Animals euthanatized</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per 1,000 People</td>
<td>11.50</td>
<td>6.85</td>
<td>7.23</td>
<td>8.04</td>
<td>18.73</td>
<td>14.89</td>
</tr>
<tr>
<td>As percentage of animals in Ohio</td>
<td>5.71</td>
<td>3.15</td>
<td>3.13</td>
<td>3.25</td>
<td>4.33</td>
<td>3.21</td>
</tr>
<tr>
<td>Medical service</td>
<td>County dog warden agency</td>
<td>Humane society</td>
<td>Municipal animal control agency</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spay-neuter policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>17/56 (30)</td>
<td>60/65 (92)</td>
<td>10/34 (29)</td>
<td>87/155 (56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>32/67 (48)</td>
<td>63/64 (98)</td>
<td>6/12 (50)</td>
<td>101/143 (71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associated with veterinarian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>12/65 (18)</td>
<td>49/66 (74)</td>
<td>8/47 (17)</td>
<td>69/178 (39)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>41/68 (60)</td>
<td>64/64 (100)</td>
<td>10/12 (83)</td>
<td>115/144 (80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccinated animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>11/56 (20)</td>
<td>48/61 (61)</td>
<td>5/33 (15)</td>
<td>64/150 (43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>30/66 (45)</td>
<td>62/63 (98)</td>
<td>6/11 (55)</td>
<td>98/140 (70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested dogs for heartworm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1/56 (2)</td>
<td>30/61 (49)</td>
<td>2/33 (6)</td>
<td>33/150 (22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>6/66 (9)</td>
<td>47/59 (80)</td>
<td>3/11 (27)</td>
<td>56/136 (41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dewormed animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>7/56 (13)</td>
<td>57/63 (90)</td>
<td>5/33 (15)</td>
<td>69/152 (45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>22/66 (33)</td>
<td>62/64 (97)</td>
<td>6/11 (55)</td>
<td>90/141 (64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested cats for FeLV infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>1/8 (13)</td>
<td>50/60 (83)</td>
<td>4/10 (40)</td>
<td>55/78 (71)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.5 - Medical services provided by animal care and control agencies in Ohio during 1996 and 2004.

Values are given as number of agencies that provided that service/number of agencies that responded (%). ND = Not determined.
<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>Reference</td>
<td>NA</td>
</tr>
<tr>
<td>1997</td>
<td>0.89 (0.80–1.00)</td>
<td>0.048</td>
</tr>
<tr>
<td>1998</td>
<td>0.88 (0.79–0.99)</td>
<td>0.027</td>
</tr>
<tr>
<td>1999</td>
<td>0.89 (0.80–1.00)</td>
<td>0.043</td>
</tr>
<tr>
<td>2000</td>
<td>0.87 (0.77–0.97)</td>
<td>0.013</td>
</tr>
<tr>
<td>2004</td>
<td>0.50 (0.41–0.62)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Spay-neuter policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Reference</td>
<td>NA</td>
</tr>
<tr>
<td>No</td>
<td>1.36 (1.05–1.77)</td>
<td>0.022</td>
</tr>
<tr>
<td>County population</td>
<td>1.01 (1.00–1.02)</td>
<td>0.046</td>
</tr>
</tbody>
</table>

Table 3.6 - Results of generalized linear mixed effects modeling of factors associated with euthanasia of dogs by county dog warden agencies in Ohio between 1996 and 2004.

OR = Odds ratio. CI = Confidence interval. NA = Not applicable.
CHAPTER 4

SEARCH AND IDENTIFICATION METHODS THAT OWNERS USE TO FIND A LOST DOG

4.1 Introduction

Dogs and cats are enormously popular as companion animals in the United States. In 2002, it was estimated that 36% of American households owned dogs and 32% of American households owned cats.\(^1\) Not only are dogs and cats popular, but their owners consider them part of the family. In the 2004 American Animal Hospital Association Pet Survey, 50% of respondents would choose a dog or cat as their sole companion if stranded on a desert island and 56% said they are very likely to risk their lives to save their pets.\(^2\)

A pet that strays from its home can be at serious risk, and may suffer from starvation, injury or death. Also, given the strength of the human-animal bond and the emotional attachment that owners may have for their pets, having a pet stray from home can be very traumatic and distressing for the owner. Thus, veterinarians may provide benefit to both their patients and clients by counseling pet owners on methods to prevent lost pets, and effective means to ensure their rapid recovery if they do become lost.
Traditionally, owners have identified pets with tags on collars, placed advertisements in newspapers, or searched local animal shelters to recover lost pets. Newer technology has led to the use of implanted microchip identification and Internet websites devoted to finding and returning lost pets to owners. However, the effectiveness of the various methods for recovering a lost pet has not been reported. The objectives of this study were to characterize the process by which owners search for lost dogs, and to identify the factors that improved the time to recovery of a lost dog.

4.2 Materials and Methods

4.2.1 Location of study - The study was conducted in Montgomery County, Ohio in 2005. The county has approximately 550,000 residents, of which 160,000 reside in the city of Dayton. The county has one major newspaper, the Dayton Daily News. In Ohio, each county has a primary dog warden who is responsible for handling stray dogs, and dogs are required to wear a county dog license. The license has a number by which the county dog warden can identify the owner of the dog. In Ohio, the dog warden is required to hold all unlicensed strays for 3 days and licensed strays for 14 days. There are three major animal care and control agencies supporting the county: one dog warden agency that handles all stray dogs for the county as well as stray cats for some city municipalities; and two non-profit humane societies that handle cats and owner surrendered dogs, but also receive reports on lost dogs. The agencies handled approximately 7,400 dogs in 2005. The return to owner rate at the county dog warden facility was 19%. In addition, all three agencies scan incoming dogs for microchips and implant adopted dogs with microchips.
4.2.2 Study population - The study population consisted of a cohort of dogs that were identified as missing by owners through either placement of an advertisement in the lost & found classified section of the Dayton Daily News or contact with one of the county’s three animal agencies to look for their lost dog between June 1, 2005 and September 30, 2005. The primary phone number given by the owner was used as the unique identifier to avoid including a lost dog that was reported missing in multiple sources more than once in the study.

4.2.3 Sampling frame - Each animal agency kept a log of the owner’s phone number and date of contact by the owner. Additional information such as date dog was lost, area of town the dog was lost and signalment information such as dog gender, breed and age was optionally provided by the owner. Information in the newspaper advertisements varied but typically included the owner’s phone number, breed of dog, date lost, area of town and whether or not a reward was offered.

Advertisements in the newspaper were collected daily during each month of the study. Logs from the animal agencies were collected at the end of each month. A separate sampling frame was created for each of the four months in the study for June, 2005 through September, 2005.

4.2.4 Sample selection - At the end of each month, a random numbers table was used to select a simple random sample of 35% of the lost dogs for the study. The percentage of dogs to include in the study was based on sample size calculations determined from the pilot study described below.
4.2.5 Study design - cross sectional study was conducted using a telephone survey instrument. A standardized survey method was used. Owners were contacted no sooner than 30 days after the date the dog was lost. If the date the dog was lost was unavailable, they were contacted no sooner than 30 days after the date of contact by the owner with the animal agency or the starting date of the newspaper advertisement. This time frame was chosen in order to give ample time for dog recovery without excessive risk of recall bias. Owners were contacted up to 10 times before they were considered a non-response. Owners with disconnected phone numbers were only treated as a non-response if the phone number was generated from a call to an animal agency instead of a written log. Owners were also considered ineligible if they reported they visited one of the shelters for a different reason than looking for a lost dog (e.g. looking for a dog to adopt or visiting a dog held for bite quarantine).

4.2.6 Pilot study - A pilot study was conducted for dogs that were lost in May, 2005. The pilot study was performed to estimate the percentage of dogs that were recovered by their owners. This proportion was used for sample size calculations. The pilot study was also used to test the reliability of the questionnaire. Owners of 23 of the 192 lost dogs in May were interviewed. Of the dogs lost, 74% were reunited with their owners. This percentage was used for the sample size calculation. Each question was tested for reliability using either the Kappa statistic or the Spearman reliability statistic. The validity of the some of the information was measured during the pilot study by comparing answers to signalment questions with the information reported to the animal agencies. In all cases, the information was the same.
4.2.7 Telephone questionnaire - Owners were asked a series of questions related to reunification, characteristics of their dog, identification methods used for their dog, methods used to search for their dog and other miscellaneous information. (Table 4.1) Reunification characteristics included: how dog was reunited with owner (dog returned home on its own, personal identification tag, dog license tag, rabies tag, microchip, neighborhood signs, newspaper advertisement, call/visit to agency, and other); and distance dog traveled from home (returned home on own; less than 1 mile, 1 to 5 miles, more than 5 miles). Dog characteristics included gender, purebred (yes or no); age of dog (1 year or less, between 1 and 5 years, 5 years or greater); length of time owned (1 year or less, between 1 and 5 years, 5 years or greater); spay/neuter status (yes or no); and number of times dog had been lost in the past (never, 1 to 5 times, more than 5 times). Identification methods included yes/no questions for personal identification tag, dog license tag, rabies tag, and microchip. Search methods included: placed lost advertisement in newspaper (yes or no with starting/ending date of advertisement); read newspaper looking for found advertisement (yes or no); call animal agency (yes or no with date of first call); visit animal agency (yes or no with number of visits and starting/ending date of visits); number of agencies contacted; placed signs in neighborhood (yes or no); searched Internet lost pet sites (yes or no) and used other search method (yes or no). Miscellaneous questions included: did the owner believe the dog was stolen (yes or no); and offered reward for dog (yes or no). All data were tracked using a standard database package. The survey was given exempt approval status by the Ohio State University Institutional Review Board.
4.2.8 Statistical analysis - Medians and ranges were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. For each of the recovery methods a success rate was calculated as the number of dogs recovered by the method divided by either the number of owners who used the search method or the number of dogs with the corresponding identification. Success rates were not calculated for dogs that returned home on their own or for the general category of other.

One of the major outcomes of interest for the study was time to recovery of a lost dog. Since this was a time to event outcome, right censoring was measured using a categorical variable for recovery of dog (1 if yes; 0 if no). Because of the time to event component of the study, survival analysis was used\textsuperscript{8} to model the data with standard statistical software.\textsuperscript{9} Univariate Cox proportional hazards regression model analyses were performed to screen variables for multivariate analysis. Variables with values of P \textless= 0.25 in the univariate analyses were included in the multivariate analysis. Variables were removed from the full multivariate model based on the Likelihood Ratio Test to select variables for the final multivariate model. Biologically meaningful interactions between the main effect variables in the model were tested for inclusion in a similar manner.

Before the model building process, the proportional hazards assumption was tested on each variable based on Schoenfeld residuals and graphical techniques to test that the log hazard ratio function is constant over time.\textsuperscript{9} For variables that did not satisfy the assumption, the interaction between the variable and the log of time was included in the model. After the model building process, the assumption of proportional hazards was
also tested for each variable in the final model. Variables that included a date component were treated as time varying covariates. For all statistical tests, an alpha level of 0.05 was used for significance.

4.3 Results

During the study period, 823 dogs were identified as lost and 294 owners of these dogs were randomly selected for the study. Of those, 263 owners were determined to be eligible for the study, and 187 (71%) agreed to complete a telephone interview.

4.3.1 Reunification - Of the 187 dogs that were lost, 132 (71%) were recovered in a median of 2 days (range 0.5 to 21 days). The recovery methods categorized by the length of time the dog was lost are summarized. (Table 4.2) For 124 dogs that were recovered, owners could report how far from home the dogs were found: Ten (8%) returned home on their own; 88 (71%) were found less than a mile from home; 17 (14%) were found between 1 and 5 miles from home; and 9 (7%) were found more than 5 miles from home.

4.3.2 Dog characteristics - Of the 187 dogs that were lost, 116 (62%) were male and 71 (38%) were female. Owners reported 117 (63%) were purebred and 70 (37%) were mixed breeds. Overall 87 (53%) of the dogs were spayed/neutered and 100 (47%) were intact with comparable percentages for males and females. Dogs were grouped into the following age categories: 47 (25%) were one year of age or less; 75 (40%) were between 1 and 5 years of age; and 65 (35%) were 5 years and older. Length of time of ownership was grouped into the following categories: 62 (33%) were owned 1 year or less; 67 (36%) were owned between 1 and 5 years; and 58 (31%) were owned 5 years or
more. Owners reported that 101 (54%) of the dogs had never been lost previously; 53 (28%) had been lost 1 to 5 times previously; and 33 (18%) had been lost more than 5 times previously.

4.3.3 Identification and search methods - Owners were asked about various methods of identification that were present on their dogs at the time they were lost. Thirty-six (19%) of dogs were wearing a personal identification tag; 75 (41%) were wearing a dog license tag; 37 (20%) were wearing a rabies tag; and 15 (8%) had a microchip. Overall 81 (43%) of dogs were wearing one or more of the three types of tags and 89 (48%) had some form of identification. Seventy (53%) of the dogs that were recovered had some form of identification compared to only 19 (35%) of the dogs that were not recovered. The search methods used by owners categorized by the time lost are summarized. (Table 4.3) For the major methods, the success rates were: 32% for dog license tag; 31% for personal identification tag; 28% for call/visit to animal agency; 27% for posting neighborhood signs; 23% for newspaper advertisement; and 13% for microchip.

Owners waited a median of 1 day (range 0 to 14 days; mean 1.8 days; SD 2.1 days) prior to contacting an animal agency. Owners who recovered their dogs waited a median of 1 day (mean 1.3 days; SD 1.8 days) compared to owners who did not recover their dogs waited a median of 2 days (mean 2.7 days; SD 2.6 days). The median time between visits to an agency was 3 days (range 0.5 to 47 days; mean 9.0 days; SD 11.9 days) with the median time for owners who found their dog being 2 days (mean 2.7 days; SD 2.6 days) and for owners who did not find their dog being 17.5 days (mean 21.7 days; SD 13.1 days).
4.3.4 Other characteristics - Thirty-nine (21%) of owners offered a reward for the return of their dog. Eighteen (10%) of owners believed their dog was stolen. There were no significant differences between the search methods used by owners who believed their dogs were stolen compared to those that did not.

4.3.5 Factors associated with reunification - Median survival (recovery) time for the 187 dogs in the study was 4 days (95% CI 3 to 6 days) with right censoring of 55 of the dogs. Only neighborhood signs violated the proportional hazards assumption, and an interaction with the logarithm of time was included in the model. The search methods placed advertisement in newspaper, called animal agency, and visited animal agency were treated as time varying covariates since dates were tracked for when owners used the methods. Results for the final multivariable analysis are given. (Table 4.4) The model shows that owners had a higher likelihood of recovery when they called or visited an animal agency, and when they posted neighborhood signs. Neighborhood signs did not become effective (hazard ratio > 1.0) until 7 or more days after the dog was lost. Dogs that were wearing a dog license tag also had a higher likelihood of recovery. Recovery was lower for dogs that the owner believed were stolen.

4.4 Discussion

Our findings suggest that the majority of people that make some effort to recover their lost dog are able to do so. Furthermore, approximately one-half of owners recovered their dogs by calling or visiting an animal agency or through a dog license tag, and all of these factors are associated with higher recovery likelihoods in our model. Owners who found their dogs also visited an animal agency sooner and more frequently
than owners who did not find their dogs. All of these findings support the concept that
the animal control system is an important component in lost dog recovery when utilized
by owners.

Even though this was a population of dogs that owners considered important
enough to try and find, only 48% had some form of identification at the time they were
lost. Despite the legal requirement that dogs are licensed in Ohio, only 40% of dogs were
wearing a dog license tag and less than one fourth of dogs were wearing a personal
identification tag. In Montgomery County, an estimated 54% of dogs are licensed in the
county. It was difficult to measure concurrently the significance of a personal
identification tag since 89% of dogs with this identification also had a dog license. We
believe that both of these identification methods are critical in lost pet recovery and
contribute to faster recovery. In our study, the search and identification methods with
the highest success rates were these two types of tags.

The prevalence of dogs with microchips in our study was 8% which is consistent
with national estimates. The success rate for microchips was the lowest of the common
search methods at only 13%. One of the largest microchip manufacturers, Schering
Plough, estimates that of the 3.4 million pets with their microchips, 8% have been
recovered by the microchip at some point in their lives. With the increasing attention
on pet reunification from Hurricane Katrina we expect the prevalence of microchips to
increase. However, we do not believe that microchips should be viewed as a replacement
for a personal identification tag or dog license tag for identification. Of the 15 dogs that
had a microchip in our study, only 7 (47%) were wearing some type of tag for
identification. It is our belief that people that find a lost dog can locate the owner faster
and easier through the use of a tag as compared to a microchip. Microchips, however, are important as a permanent method of identification and work as a backup for dogs that lose their collars and tags.

Owners who placed signs in the neighborhood had a higher likelihood of recovering their dogs than those that did not in our final model. This increased likelihood occurred after dogs were lost more than 7 days. This is most likely due to the fact that the longer dogs were lost, the more owners started to hang signs. For dogs that were lost less than 5 days, only 30% of owners placed signs compared to 53% of owners who did not find their dogs within 5 days. For dogs that were recovered after 5 days, almost one-fourth were recovered with signs. Given that only 21% of dogs that were recovered were found more than 1 mile from home, owners will most likely gain the most success with signs when they concentrate their placement close to home.

Although placing an advertisement in the newspaper was not a significant factor for increasing the recovery of lost dogs in our model, we feel that this is an important method that is under-utilized. Only 14% of all owners and 24% of owners who did not find their dog within 5 days advertised in the newspaper. Despite the fact that only 5% of dogs were recovered through the newspaper, the success rate for the owners who used it was 23%. Owners also did not tend to read the newspaper to see if someone had placed a found advertisement matching the description of their dog. Only 35% of all owners and 65% of owners who did not find their dogs within 5 days read the newspaper. We believe that by improving the awareness of the lost & found section in the classifieds the number of owners utilizing the newspaper may increase. It may be, however, that the cost of placing an advertisement is a significant barrier for many owners.
The use of the Internet was infrequent in our sample population. Only 12% of all owners and 21% of owners who did not find their dogs within 5 days searched any lost and found pet sites on the Internet. There are multiple national lost and found Internet sites to try and assist owners in locating their pets. However, based on our study, it appears that most pet owners are not aware of these sites or do not have access to them. Anecdotally during our interview process multiple people reported they either did not own a computer or did not have access to the Internet. In the United States, an estimated 69% of the population are recent Internet users,\(^\text{12}\) making it more likely that awareness of Internet lost and found pet sites is more of a barrier than Internet access.

Owners who believed their dogs were stolen recovered them at a 70% lower likelihood than dog owners who did not have this belief. We originally hypothesized that owners who believed their dogs were stolen would not search as diligently as owners who did not share this belief. We did not find this to be true, as there were no differences in how these owners searched for their dogs. Although it is impossible to know if these dogs were truly stolen, the belief was associated with a lower likelihood of recovery.

There are several limitations associated with this study. We chose to include only owners who made some initial attempt to find their lost dog based on easily identifiable methods. Without performing a random digit dial telephone survey, we were unable to interview owners who had lost a dog that did not utilize the newspaper or the shelter in their search efforts. We believe that further research is warranted to try and interview these owners to understand what search methods they use, if any.
As with any study that focuses on a particular geographic area, care should be taken in extrapolating results of the present study to the situation in other areas. Finally since data were only collected for 4 months of the year, it is possible that seasonal differences exist both for search and recovery methods.

To the best of our knowledge, our study is the first to show that the vast majority of owners who make an effort to recover their lost dogs are able to do so. Furthermore, our study illustrates that there is a need for education of owners on the various search methods and the importance of identification. One-half of the dogs in our study were never lost before, indicating that owners are most likely inexperienced in how to search for them, and likely have never given consideration to the ramifications of losing a pet. In addition, given that only one-half had some form of identification, an opportunity exists for increasing awareness of the importance of identification. Both animal agencies and veterinarians can play a role in this opportunity to educate dog owners on the importance of identification tags, licensing and microchips. Agencies can educate dog adopters about these issues and help to emphasize the importance of having a search plan in case their dog is lost. Veterinarians can provide the same type of education on identification and search methods not only for new dog owners but also for clients that have the misfortune of losing their dogs. By better preparing the animal through identification and educating the owner on various search methods, the percentage of lost dogs recovered should be improved.
4.5 Endnotes

a. Personal communication with Dayton animal agencies.


c. Stata Version 9.1, StataCorp, College Station, TX.
4.6 References


Telephone Survey – Lost Dogs – STUDY VERSION

Cover Page / Call Record / Introduction

Pet Name/Species: ____________________________ Date Pet Lost: ________________
Phone Number: ____________________________ Source of Number: ________________________
Description: ________________________________

Introduction

Hi. My name is Linda Lord. I’m a veterinarian from The Ohio State University in Columbus. We are conducting a research project to learn more about lost pets.

I saw your ad in the Dayton Daily News lost & found section or
I’m working with the Animal Resource Center on Webster St (or HSGD or SICSA) and got your name from their lost & found log.

Do you have a few moments to answer some questions about your lost pet?

Call Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Result Codes:

I Complete Interview
R Refusal / Breakoff (how, why)
CB Call Back (when – time to call back)
NC Non Contact (No Answer or Answering Machine)
O Other (answer phone but can’t complete survey)
WN Wrong Number (no lost pet)
DISC Disconnect

Table 4.1 – Telephone survey to interview owners of lost dogs. (continued next page)
Table 4.1 (continued)

**Time Interview Began**

1. When did you lose your pet?
   
   **DATE**
   
   **OR ESTIMATE (HOW LONG AGO):**

2. How did you lose your pet?

3a. Did you find your pet?
   
   **YES** .............................................................................. **1**
   
   **NO** .................................................................................. **0**

3b. (IF “YES”):
   
   When did you find your pet?
   
   **DATE**
   
   **OR HOW MANY DAYS AFTER MISSING**

3c. (IF “YES”):
   
   How did you find your pet?

   (CODES FOR 3c ANSWER):
   
   CAME HOME ON OWN .......................................................... **0**
   
   ID TAG .................................................................................. **1**
   
   DOG LICENSE ........................................................................ **2**
   
   RABIES TAG ........................................................................... **3**
   
   MICROCHIP ............................................................................. **4**
   
   TATTOO .................................................................................... **5**
   
   NEIGHBORHOOD SIGNS ....................................................... **6**
   
   NEWSPAPER AD ..................................................................... **7**
   
   CALL/VISIT TO SHELTER .................................................... **8**
   
   OTHER ................................................................................... **9**

3d. (IF "YES" and PET DID NOT RETURN HOME ON ITS OWN):

   How far from home was your pet found? Please choose from one of the following:
   
   FOUND AT HOME .................................................................. **0**
   
   LESS THAN A MILE FROM HOME ........................................ **1**
   
   BETWEEN 1 AND 5 MILES FROM HOME ................................ **2**
   
   GREATER THAN 5 MILES FROM HOME ................................. **3**
   
   DON'T KNOW ......................................................................... **8**

4. Was this the first time your pet became lost?

   **YES** .............................................................................. **1**
   
   **NO** .................................................................................. **0**

Table 4.1 continued next page
Table 4.1 (continued)

4a. (IF “NO”):
How many times has your pet been lost in the past? Would you say:

<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS THAN 5 TIMES</td>
<td>1</td>
</tr>
<tr>
<td>5 OR MORE TIMES</td>
<td>2</td>
</tr>
<tr>
<td>DON’T KNOW</td>
<td>8</td>
</tr>
</tbody>
</table>

The following series of questions concern what methods of identified you used for your pet. Please respond to each choice with a yes or no answer.

5a. Was your pet wearing an identification tag with your contact information?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

5b. Was your pet wearing a dog license?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

5c. Was your pet wearing a rabies tag?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

5d. Does your pet have a microchip?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

5e. Does your pet have a tattoo?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The following is a series of yes/no questions concerning how you searched for your lost pet. Please respond to each choice with a yes or no answer. Did you:

6a. Place an ad in Lost & Found Section of the Newspaper?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

6b. Read the Lost & Found Section of the Newspaper?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

6c. Search for your pet on the Web/Internet?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

6d. Call one or more local animal care agencies to let them know your pet was missing?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4.1 continued next page
Table 4.1 (continued)

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6e. Visit one or more local animal care agencies to look for your lost pet?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES ..............................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO ...............................................................................................................</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF “YES” Which agencies? ........................................................................</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF “YES”, How many visits did you make? _____________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6f. IF CALLED OR VISITED AGENCY:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many days after your pet was missing did you first call or visit an agency? _________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6g. Place signs in your neighborhood or at local stores?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES ..............................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO ...............................................................................................................</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6h. Utilize another method to find your pet (describe):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES ..............................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO ...............................................................................................................</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF YES, (Describe): ____________________________________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Did you offer a reward for your pet?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES ..............................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO ...............................................................................................................</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF “YES”, what was the amount? _____________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. What breed is your pet? (describe) ................................................</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Is your pet male or female?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALE ...........................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEMALE ......................................................................................................</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Is your pet spayed or neutered?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES ..............................................................................................................</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO ...............................................................................................................</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. What is the age of your pet? (years) _______________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. How long have you owned your pet? (years) ___________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. We are trying to map lost pets to see if there are certain areas of town with higher numbers of lost pets. Would you be willing to provide your address and/or zip code? It will be confidential and only used for mapping for this project.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADDRESS _____________________________________________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time Interview Ended: ________________________________
<table>
<thead>
<tr>
<th>Reunification Method</th>
<th>Lost 1 day or less</th>
<th>Lost Between 1 and 5 Days</th>
<th>Lost More Than 5 Days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Came home on own</td>
<td>5 (8.8)</td>
<td>2 (4.9)</td>
<td>3 (8.8)</td>
<td>10 (7.6)</td>
</tr>
<tr>
<td>Identification tag</td>
<td>7 (12.3)</td>
<td>3 (7.3)</td>
<td>1 (3.0)</td>
<td>11 (8.3)</td>
</tr>
<tr>
<td>Dog license tag</td>
<td>15 (26.3)</td>
<td>6 (14.7)</td>
<td>3 (8.8)</td>
<td>24 (18.2)</td>
</tr>
<tr>
<td>Microchip</td>
<td>1 (1.8)</td>
<td>1 (2.4)</td>
<td>0 (0)</td>
<td>2 (1.5)</td>
</tr>
<tr>
<td>Neighborhood signs</td>
<td>6 (10.5)</td>
<td>6 (14.7)</td>
<td>8 (23.5)</td>
<td>20 (15.2)</td>
</tr>
<tr>
<td>Newspaper ad</td>
<td>0 (0)</td>
<td>1 (2.4)</td>
<td>5 (14.7)</td>
<td>6 (4.5)</td>
</tr>
<tr>
<td>Call/visit animal agency</td>
<td>17 (29.8)</td>
<td>21 (51.2)</td>
<td>8 (23.5)</td>
<td>46 (34.9)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (10.5)</td>
<td>1 (2.4)</td>
<td>6 (17.7)</td>
<td>13 (9.8)</td>
</tr>
<tr>
<td>Total</td>
<td>57 (100)</td>
<td>41 (100)</td>
<td>34 (100)</td>
<td>132 (100)</td>
</tr>
</tbody>
</table>

Table 4.2 - Reunification methods that reunited lost dogs with their owners categorized by length of time dog was lost.

Values are given as number of dogs (%).
<table>
<thead>
<tr>
<th>Search Method</th>
<th>Recovered 5 days or less</th>
<th>% owners used method</th>
<th>Recovered more than 5 days or not recovered</th>
<th>% owners used method</th>
<th>Total</th>
<th>% dogs method used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertised in newspaper</td>
<td>6</td>
<td>5.7</td>
<td>20</td>
<td>24.7</td>
<td>26</td>
<td>13.9</td>
</tr>
<tr>
<td>Read newspaper</td>
<td>12</td>
<td>11.3</td>
<td>53</td>
<td>65.4</td>
<td>65</td>
<td>34.8</td>
</tr>
<tr>
<td>Searched internet</td>
<td>5</td>
<td>4.7</td>
<td>17</td>
<td>21.0</td>
<td>22</td>
<td>11.8</td>
</tr>
<tr>
<td>Called agency</td>
<td>67</td>
<td>63.2</td>
<td>76</td>
<td>93.8</td>
<td>143</td>
<td>76.5</td>
</tr>
<tr>
<td>Visited agency</td>
<td>67</td>
<td>63.2</td>
<td>72</td>
<td>88.9</td>
<td>139</td>
<td>74.3</td>
</tr>
<tr>
<td>Posted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neighborhood signs</td>
<td>32</td>
<td>30.2</td>
<td>43</td>
<td>53.1</td>
<td>75</td>
<td>40.1</td>
</tr>
<tr>
<td>Other method (*)</td>
<td>16</td>
<td>15.1</td>
<td>16</td>
<td>19.8</td>
<td>32</td>
<td>17.1</td>
</tr>
</tbody>
</table>

Table 4.3 - Number of owners using search methods for dogs categorized by length of time to recovery.

(*) Other method included contacting veterinarians, calling the police, sending email to neighbors.
Table 4.4 - Results of final multivariate Cox proportional hazards regression model for factors associated with recovery of a lost dog.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit animal agency (*)</td>
<td>1.8 (1.12-2.74)</td>
<td>0.014</td>
</tr>
<tr>
<td>Call animal agency (*)</td>
<td>2.1 (1.34-3.36)</td>
<td>0.001</td>
</tr>
<tr>
<td>Dog license tag</td>
<td>1.6 (1.14-2.30)</td>
<td>0.007</td>
</tr>
<tr>
<td>Belief pet stolen</td>
<td>0.3 (0.15-0.76)</td>
<td>0.009</td>
</tr>
<tr>
<td>Neighborhood signs and interaction with ln(time) (**)</td>
<td></td>
<td>0.012</td>
</tr>
</tbody>
</table>

(* ) Time varying covariate
( ** ) Effect of posting neighborhood sign for recovery of lost dog.

<table>
<thead>
<tr>
<th>Day</th>
<th>Hazard Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>5</td>
<td>0.84</td>
</tr>
<tr>
<td>7</td>
<td>1.00</td>
</tr>
<tr>
<td>15</td>
<td>1.48</td>
</tr>
</tbody>
</table>
CHAPTER 5

SEARCH AND IDENTIFICATION METHODS THAT OWNERS USE TO FIND LOST CAT

5.1 Introduction

Cats have surpassed dogs as the most popular pet in the United States with an estimated 32% of American households owning 72 million cats.\textsuperscript{1} This increase in the popularity of the cat may be due to the fact that cats are easy to care for, can be kept in smaller living quarters due to their size and for the most part are willing to be held and petted by humans. Cats are also considered to be fairly independent, which makes them compatible with the active and transient lifestyle of many Americans. With this increasing popularity, the human-animal bond has also strengthened between owners and their cats.
Even more so than dogs, cats that become stray are at risk for injury and predation, and the event of a cat becoming lost may be particularly stressful to the owner. Methods of recovering lost pets such as identification with a tag or microchip, placing an advertisement in the newspaper, posting neighborhood signs and utilizing the animal sheltering system have not been measured for their effectiveness of recovering lost cats. The objectives of this study were to characterize the process by which owners search for lost cats and the methods used in their recovery.

5.2 Materials and Methods

5.2.1 Location of study - The study was conducted in Montgomery County, Ohio in 2005. The county has approximately 550,000 residents, of which 160,000 reside in the city of Dayton. The county has one major newspaper, the Dayton Daily News. In Ohio, there are no state cat control laws, and municipalities may establish their own laws to regulate cats. In Montgomery County, five of the local municipalities contract with the county dog warden agency to handle their stray cats. Minimum holding periods required by most of the municipalities are 3 days. The two non-profit humane societies in the county also handle both stray and owner surrendered cats. The three agencies handled approximately 6,500 cats in 2005. In addition, all three agencies scan incoming cats for microchips and implant adopted cats with microchips.

5.2.2 Study population, sampling frame & study design - The study population, sampling frame and selection, and study design have been described elsewhere. The study population consisted of a cohort of cats that were identified as missing by owners through either placement of an advertisement in the lost & found classified section of the
Dayton Daily News or contact with one of the three animal agencies described above to look for their lost cat between June 1, 2005 and September 30, 2005. A separate sampling frame was created for each of the four months in the study for June, 2005 through September, 2005. At the end of each month, a random numbers table was used to select a simple random sample of 66% of the lost cats for the study. A cross sectional study was conducted using a telephone survey instrument. A standardized survey method was used.5

5.2.3 Pilot study - The pilot study was described elsewhere.4 The pilot study was conducted for cats that were lost in May, 2005. The pilot study was performed to estimate the percentage of cats that were recovered by their owners, which was needed for sample size calculation.6 The pilot study was also used to test the reliability of the questionnaire. Owners of 10 of 49 lost cats in May were interviewed. Of the cats lost, 67% were reunited with their owners.

5.2.4 Telephone questionnaire - The questionnaire has been described elsewhere.4 Owners were asked a series of questions related to reunification, characteristics of their cat, identification methods used for their cat, methods used to search for their cat and other miscellaneous information. (Table 5.1) Cat owners were also asked whether or not their cat was an indoor-only cat. All data were tracked using a standard database package.b The survey was given exempt approval status by the Ohio State University Institutional Review Board.

5.2.5 Statistical analysis - Medians and ranges were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. Comparisons were made between dichotomous variables using a Chi
squared test and continuous variables using a Student’s t-test. Standard statistical software was used. For each of the recovery methods a success rate was calculated as the number of cats recovered by the method divided by either the number of owners who used the search method or the number of cats with the corresponding identification. Success rates were not calculated for cats that returned home on their own or for the general category of other. For all statistical tests, an alpha level of 0.05 was used for significance.

5.3 Results

During the study period, 264 cats were identified as lost and 177 owners of these cats were randomly selected for the study. Of those, 161 owners were determined to be eligible for the study, and 138 (86%) agreed to complete a telephone interview.

5.3.1 Reunification - Of the 138 cats that were lost, 73 (53%) were recovered in a median of 5 days (range 0.5 to 81 days). The recovery methods categorized by the length of time the cat was lost are summarized. (Table 5.2) For 25 of the 73 cats that were recovered, owners could report how far from home the cats were found: 48 (65.8%) returned home on their own; 21 (28.8%) were found less than a mile from home; 2 (2.7%) were found between 1 and 5 miles from home; and 2 (2.7%) were found more than 5 miles from home.

5.3.2 Cat Characteristics - Of the 138 cats that were lost, 80 (58%) were male and 58 (42%) were female. Only 9 (7%) of the cats in the study were purebred. Overall 122 (88%) of the cats were spayed/neutered and 16 (12%) were intact with comparable percentages for males and females. Only 25% of the intact cats were reunited with their
owners compared with 57% of the altered cats ($X^2 = 5.65; P = 0.02$). Of the 138 cats, 56 (41%) were housed strictly indoors and normally not allowed outside. Cats were grouped into the following age categories: 18 (13%) were one year of age or less; 52 (38%) were between 1 and 5 years of age; and 68 (49%) were 5 years and older. Length of time of ownership was grouped into the following categories: 27 (20%) were owned 1 year or less; 54 (39%) were owned between 1 and 5 years; and 57 (41%) were owned 5 years or more. Owners reported that 107 (78%) of the cats had never been lost previously; 24 (17%) had been lost 1 to 5 times previously; and 7 (5%) had been lost more than 5 times previously.

5.3.3 Identification and Search Methods - Owners were asked about various methods of identification that were present on their cats at the time they were lost. Fourteen (10%) of cats were wearing a personal identification tag; 8 (6%) were wearing a rabies tag; and 10 (7%) had a microchip. Overall 19 (14%) of cats were wearing one of the two types of tags and 26 (19%) had some form of identification. Sixteen (22%) of the cats that were recovered had some form of identification compared to 10 (15%) of the cats that were not recovered ($X^2 = 0.96; P = 0.33$). The search methods used by owners categorized by the time lost are summarized. (Table 5.3) There was no difference in the mean number of days lost between cats that returned home on their own vs. cats recovered by a search method ($t = 1.86; P = 0.07$). Searching the neighborhood by walking the neighborhood or talking to neighbors was not listed because all owners reported using this method. For the major methods, the success rates were: 12% for posting neighborhood signs; 8% for newspaper advertisement; 5% for cat wearing a tag; 4% for call/visit to animal agency; and 4% for owner searching neighborhood.
Owners waited a median of 3 days (range 0 to 21 days; mean 3.9 days; SD 3.8 days) prior to contacting an animal agency. The median time owners waited between visits to an agency was 8 days (range 0.5 to 57 days; mean 16.1 days; SD 15.1 days).

5.3.4 Other Characteristics - Twenty-six (19%) of owners offered a reward for the return of their cat. Nine (7%) of owners believed their cat was stolen. There were no significant differences between the search methods used by owners or percentage of cats recovered for owners who believed their cats were stolen compared to those that did not.

5.4 Discussion

Our findings suggest that it is difficult for owners to recover their lost cat and that traditional methods are somewhat ineffective. Different to what was found for dogs,\textsuperscript{4} utilizing the animal control system was only responsible for the recovery of 7% of cats, and the success rate for contacting an animal agency was only 4%. This may in part be due to the fact that no animal control laws exist at the county level in Ohio and that no identification is required for cats. There is tremendous debate as to whether cat licensing or mandatory identification is effective in reducing the cat overpopulation problem and whether or not owners would comply with the law for cats. Currently in Montgomery County, where our study was conducted, the return to owner rate for the three animal agencies is only 1.5% for cats.\textsuperscript{a} In areas with comprehensive ordinances such as San Mateo County, California, where identification and licensing of cats is required, this rate has increased from 3% prior to the enactment of these ordinances to 4.5% for cats.\textsuperscript{7} In Honolulu, where cats are required to be identified but not licensed, the return to owner rate from the Hawaiian Humane Society is 5.2% for cats.\textsuperscript{8,9} This is still well below dog
return to owner rates which in Ohio are 16%. It is also likely that the animal shelters play such a small role in owners finding their lost cats because of how little they are utilized. Different to what was found for dogs, cat owners waited a median of 3 days to make contact with an animal shelter and only visited an animal shelters on average every 8 days to look for their lost cat. With non-mandatory holding periods of 3 days and infrequent owner visitation, it is very possible that at least some of the cats in our study that were not recovered were humanely euthanized at one of the animal agencies. More frequent and earlier contact with the animal shelters by owners could further increase the overall recovery rate.

Results of this study support the commonly held belief that cats that are missing typically return home on their own. In this study, we found that 35% of all lost cats and 66% of recovered cats returned home on their own. It is still commonly accepted that owners allow their cats to spend time outdoors. In our study, 59% of owners actively allowed their cats to spend part of their time outdoors. In addition, only 14% of the cats in our study were wearing a tag. It is our belief that many people who see a stray, healthy cat in their yard or neighborhood believe the cat may be owned and may be hesitant to catch the cat or actively look for the owner. Cats also tend to be more elusive than dogs and it is often difficult to capture a stray cat, even if the cat is not feral. It is possible that if more cats were wearing an identification tag, people who see a stray cat would be more likely to try and assist the cat. Tags would also help to distinguish owned cats from cats that are unowned and/or feral. In addition, it is difficult to distinguish cats because many look alike and a tag helps in identifying a particular cat. Although we did not directly ask the question in our study, many people who were asked about identification reported they
did not keep a tag on their cat because they believed their cat could be injured from wearing a collar or that their cat did not tolerate wearing a collar. If owners are unwilling to have their cats wear a collar and tag, microchips may become increasingly more important in cat identification. Unfortunately, however, they are only helpful if a cat is taken to a shelter or veterinarian’s office to be scanned for a microchip. Further research is needed to better understand how the public perceives the importance of trying to assist healthy, stray cats and how visible identification might affect this process.

Different to what was found for dogs, cats that owners were trying to recover were more likely to be altered, were older and were less likely to have run away in the past. This suggests that the cat for which owners are willing to search using traditional methods such as contacting an animal agency or placing an advertisement in the newspaper are well cared for, mature cats. Despite the high spay/neuter rate, we did find a significantly higher likelihood of recovery for altered vs. intact cats. Although the numbers are small, these unrecovered intact cats may be further adding to the overpopulation problem, particularly if they become free-roaming in the community.

The search method with the highest success rate for cats was posting neighborhood signs. Although the success rate was only 12% compared to 27% for dogs, this could potentially be increased by including pictures on the signs. With only 7% of the cats that were lost being purebred, it is more difficult to identify a cat by a description than with a picture.
A description of a black cat on a sign gives no real distinguishing features, whereas a picture may trigger someone who has seen the cat to take action and contact the owner. We did not specifically ask if owners included pictures on their signs. More research is needed to investigate if the type of signage affects the success of this method.

Similar to our study for dogs, we believe our study illustrates the importance of educating owners about providing identification for their cats. We also believe that our study points to the need to continue to encourage owners to keep their cats indoors. There are many national campaigns by groups such as Humane Society of the United States and the American Bird Conservancy to promote housing cats indoors. Veterinarians can play a key role in educating owners on the health and safety reasons for keeping cats indoors and to the importance of identification. Given that 40% of the cats lost in the study were never allowed outdoors, it is important to educate owners of indoor-only cats on the importance of identification and the potential risk of the cats escaping and becoming lost. Veterinarians can also provide information on search methods. It appears from our study, however, that traditional search methods such as advertising in the newspaper are not as effective for cats as they are for dogs. Further research is needed to better understand the reunification process for cats.
5.5 Endnotes

a. Personal communication with Dayton animal agencies.


c. Stata Version 9.1, StataCorp, College Station, TX.
5.6 References


Hi. My name is Linda Lord. I’m a veterinarian from The Ohio State University in Columbus. We are conducting a research project to learn more about lost pets.

I saw your ad in the Dayton Daily News lost & found section or I’m working with the Animal Resource Center on Webster St (or HSGD or SICSA) and got your name from their lost & found log.

Do you have a few moments to answer some questions about your lost pet?

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Result Codes:
- I: Complete Interview
- R: Refusal / Breakoff (how, why)
- CB: Call Back (when – time to call back)
- NC: Non Contact (No Answer or Answering Machine)
- O: Other (answer phone but can’t complete survey)
- WN: Wrong Number (no lost pet)
- DISC: Disconnect

Table 5.1 – Telephone survey to interview owners of lost cats. continued next page
Table 5.1 (continued)

*Time Interview Began ____________________________

1. When did you lose your pet?
   DATE ____________________________
   OR ESTIMATE (HOW LONG AGO): ____________________________

2. How did you lose your pet?
   __________________________________________
   __________________________________________

3a. Did you find your pet?
   YES ................................................................. 1
   NO ................................................................. 0

3b. (IF “YES”):  
   When did you find your pet?
   DATE ____________________________
   OR HOW MANY DAYS AFTER MISSING ____________________________

3c. (IF “YES”):  
   How did you find your pet?
   __________________________________________
   __________________________________________
   (CODES FOR 3c ANSWER) :
   CAME HOME ON OWN ........................................ 0
   ID TAG ............................................................... 1
   RABIES TAG ....................................................... 3
   MICROCHIP ........................................................ 4
   TATTOO .............................................................. 5
   NEIGHBORHOOD SIGNS ....................................... 6
   NEWSPAPER AD .................................................... 7
   CALL/VISIT TO SHELTER ...................................... 8
   OTHER .................................................................. 9

3d. (IF "YES" and PET DID NOT RETURN HOME ON ITS OWN):
   How far from home was your pet found? Please choose from one of the following:
   FOUND AT HOME .................................................. 0
   LESS THAN A MILE FROM HOME ............................. 1
   BETWEEN 1 AND 5 MILES FROM HOME .................... 2
   GREATER THAN 5 MILES FROM HOME ...................... 3
   DON'T KNOW ........................................................... 8

4. Was this the first time your pet became lost?
   YES .................................................................... 1
   NO ..................................................................... 0

Table 5.1 continued next page
Table 5.1 (continued)

4a. (IF “NO”): How many times has your pet been lost in the past? Would you say:
   LESS THAN 5 TIMES ................................................. 1
   5 OR MORE TIMES .................................................. 2
   DON’T KNOW .......................................................... 8

The following series of questions concern what methods of identified you used for your pet. Please respond to each choice with a yes or no answer.

5a. Was your pet wearing an identification tag with your contact information?
   YES ................................................................. 1
   NO ................................................................. 0

5b. Was your pet wearing a rabies tag?
   YES ................................................................. 1
   NO ................................................................. 0

5c. Does your pet have a microchip?
   YES ................................................................. 1
   NO ................................................................. 0

5d. Does your pet have a tattoo?
   YES ................................................................. 1
   NO ................................................................. 0

The following is a series of yes/no questions concerning how you searched for your lost pet. Please respond to each choice with a yes or no answer. Did you:

6a. Place an ad in Lost & Found Section of the Newspaper?
   YES ................................................................. 1
   NO ................................................................. 0

6b. Read the Lost & Found Section of the Newspaper?
   YES ................................................................. 1
   NO ................................................................. 0

6c. Search for your pet on the Web/Internet?
   YES ................................................................. 1
   NO ................................................................. 0
   IF YES, NAME OF SITE: ________________________________

6d. Call one or more local animal care agencies to let them know your pet was missing?
   YES ................................................................. 1
   NO ................................................................. 0
   IF “YES” WHICH AGENCIES? ________________________________

6e. Visit one or more local animal care agencies to look for your lost pet?
   YES ................................................................. 1
   NO ................................................................. 0
   IF “YES” Which agencies? ________________________________
   IF “YES”, How many visits did you make? ____________________
Table 5.1 (continued)

6f. IF CALLED OR VISITED AGENCY:
   How many days after your pet was missing did you first call or visit an agency? ________

6g. Place signs in your neighborhood or at local stores?
   YES ................................................................. 1
   NO ................................................................. 0

6h. Utilize another method to find your pet (describe):
   YES ................................................................. 1
   NO ................................................................. 0
   IF YES, (Describe):

7. Did you offer a reward for your pet?
   YES ................................................................. 1
   NO ................................................................. 0
   IF “YES”, what was the amount? ____________

8. What breed is your pet? (describe) ________________________________

9. Is your pet male or female?
   MALE ............................................................. 1
   FEMALE ......................................................... 2

10. Is your pet spayed or neutered?
    YES ............................................................. 1
     NO ............................................................. 0

11. What is the age of your pet? (years) ______________________________

12. How long have you owned your pet? (years) ________________________

13. Does your cat normally stay inside at all times?
    YES ............................................................. 1
     NO ............................................................. 0

14. We are trying to map lost pets to see if there are certain areas of town with higher numbers of lost pets. Would you be willing to provide your address and/or zip code? It will be confidential and only used for mapping for this project.

   ADDRESS ____________________________________________

   Time Interview Ended: ____________________________
<table>
<thead>
<tr>
<th>Reunification Method</th>
<th>Lost 3 days or less</th>
<th>Lost Between 3 and 7 Days</th>
<th>Lost More Than 7 Days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Came home on own</td>
<td>16 (59.3)</td>
<td>21 (77.8)</td>
<td>11 (57.9)</td>
<td>48 (65.8)</td>
</tr>
<tr>
<td>Rabies tag</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (5.3)</td>
<td>1 (1.4)</td>
</tr>
<tr>
<td>Neighborhood signs</td>
<td>3 (11.1)</td>
<td>3 (11.1)</td>
<td>2 (10.5)</td>
<td>8 (11.0)</td>
</tr>
<tr>
<td>Newspaper ad</td>
<td>0 (0)</td>
<td>1 (3.7)</td>
<td>1 (5.3)</td>
<td>2 (2.7)</td>
</tr>
<tr>
<td>Call/visit animal agency</td>
<td>4 (14.8)</td>
<td>1 (3.7)</td>
<td>0 (0)</td>
<td>5 (6.8)</td>
</tr>
<tr>
<td>Found in neighborhood (*)</td>
<td>2 (7.4)</td>
<td>1 (3.7)</td>
<td>2 (10.5)</td>
<td>5 (6.8)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (7.4)</td>
<td>0 (0)</td>
<td>2 (10.5)</td>
<td>4 (5.5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27 (100)</strong></td>
<td><strong>27 (100)</strong></td>
<td><strong>19 (100)</strong></td>
<td><strong>73 (100)</strong></td>
</tr>
</tbody>
</table>

Table 5.2 - Search methods that reunited lost cats with their owners categorized by length of time cat was lost.

(*) Found in neighborhood included finding the cat in the woods, in a drain, in a neighbor’s attic, and by driving in the neighborhood.

Values are given as number of cats (%).
<table>
<thead>
<tr>
<th>Search Method</th>
<th>Recovered 7 days or less</th>
<th>% owners used method</th>
<th>Recover more than 7 days or not recovered</th>
<th>% owners used method</th>
<th>Total</th>
<th>% owners used method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertised in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>newspaper</td>
<td>5</td>
<td>9.3</td>
<td>20</td>
<td>23.8</td>
<td>25</td>
<td>18.1</td>
</tr>
<tr>
<td>Read newspaper</td>
<td>16</td>
<td>29.6</td>
<td>43</td>
<td>51.2</td>
<td>59</td>
<td>42.8</td>
</tr>
<tr>
<td>Searched internet</td>
<td>1</td>
<td>1.9</td>
<td>15</td>
<td>17.9</td>
<td>16</td>
<td>11.6</td>
</tr>
<tr>
<td>Called agency</td>
<td>47</td>
<td>87.0</td>
<td>75</td>
<td>89.3</td>
<td>122</td>
<td>88.4</td>
</tr>
<tr>
<td>Visited agency</td>
<td>43</td>
<td>79.6</td>
<td>75</td>
<td>89.3</td>
<td>118</td>
<td>85.5</td>
</tr>
<tr>
<td>Posted neighborhood</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>signs</td>
<td>25</td>
<td>46.3</td>
<td>40</td>
<td>47.6</td>
<td>65</td>
<td>47.1</td>
</tr>
<tr>
<td>Other method</td>
<td>3</td>
<td>5.6</td>
<td>10</td>
<td>11.9</td>
<td>13</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Table 5.3 - Number of owners using search methods for cats categorized by length of time to recovery

(*) Other method included contacting veterinarians, calling the police, sending email to neighbors.
CHAPTER 6

SEARCH METHODS THAT PEOPLE USE TO FIND OWNERS OF LOST PETS

6.1 Introduction

The human-animal bond is well recognized in the United States, with over 50% of households owning a companion animal.¹ For many people, the human-animal bond includes reaching out to help animals who they do not own but that are in need. The risk of injury, starvation and abuse prompt many individuals to attempt to rescue a pet that is perceived to be lost. Although most communities have the availability of one or more animal agencies to house these lost pets, many people who find a pet in need may choose to try and find the owner themselves.

Individuals that find an animal they perceive to be lost have a variety of options available to search for the owner. Beyond using the animal sheltering system, they can utilize the newspaper, hang signs and/or walk in the neighborhood, search lost and found web sites on the Internet, and contact veterinarians for assistance. Veterinarians can assist these individuals in locating owners by providing information on search methods, scanning the animals for microchips and providing owner information if a rabies tag is
present. However, the process by which these individuals look for owners of lost pets and their awareness of search methods that are typically available in a community has not been described. The objectives of this study were to characterize the process by which individuals search for owners of lost pets, and to potentially identify factors that may aid in reunification of these lost pets with their owners.

6.2 Materials and Methods

6.2.1 Location of study - The study was conducted in Montgomery County, Ohio in 2006. The county has approximately 550,000 residents, of which 160,000 reside in the city of Dayton. The county has one major newspaper, the Dayton Daily News that allows individuals who find a lost pet to run an advertisement for free for 10 days. There are three major animal care and control agencies supporting the county: one dog warden agency that handles all stray dogs for the county as well as stray cats for some city municipalities; and two non-profit humane societies that handle cats and owner surrendered dogs, but also receive reports on lost dogs. These types of agencies in Ohio have been previously described.

6.2.2 Study population - The study population consisted of a cohort of individuals (called finders) that found a pet they perceived to be lost and attempted to find the owner through either placement of an advertisement in the lost & found classified section of the Dayton Daily News or contact with one of the county’s three animal agencies between March 1, 2006 and June 30, 2006. The primary phone number given by the finder was used as the unique identifier to avoid including a found pet that was reported missing in multiple sources more than once in the study.
Each animal agency kept a log of the finder’s phone number and date of contact. Additional information such as date pet was found, area of town the pet was found and signalment information such as pet gender and breed was optionally provided by the finder. Information in the newspaper advertisements varied but typically included the finder’s phone number, breed of pet, date found, and area of town. Advertisements in the newspaper were collected daily during each month of the study. Logs from the animal agencies were collected at the end of each month. All found pets that appeared in the newspaper or were reported as found to one of the animal agencies were eligible to be included in the study.

6.2.3 Study design - A cross sectional study was conducted using a telephone survey instrument. A standardized survey method was used. Finders were contacted no sooner than 30 days after the date the pet was found. If the date the pet was found was unavailable, they were contacted no sooner than 30 days after the date of contact by the finder with the animal agency or the starting date of the newspaper advertisement. This time frame was chosen in order to give ample time for pet recovery without excessive risk of recall bias. Finders were contacted up to 10 times before they were considered a non-response. Finders were considered ineligible if they reported never having found a pet.

6.2.4 Telephone questionnaire - Finders were asked a series of questions related to reunification and pet disposition, characteristics of the pet, awareness of potential search methods, search methods they used to find the owner, and other miscellaneous information. (Table 6.1) Reunification and disposition characteristics included: how pet was originally found (in the street/traffic, in own yard, in neighborhood, at worksite, at
park, and other); how pet was reunited with owner (information from one of animal agencies, finder ad in newspaper, owner ad in newspaper, finder signs in neighborhood, owner signs in neighborhood, finder walking in own neighborhood, pet tag, and other); distance pet traveled from home (less than 1 mile, 1 to 5 miles, more than 5 miles); number of days until owner found; and disposition of pet if owner not found (gave to animal agency, kept pet myself, gave to another individual, gave to rescue group, and other). Pet characteristics included gender; purebred (yes or no); spay/neuter status (yes, no, don’t know); pet wearing collar (yes or no) and did collar have any tags (yes or no); and appearance of pet (appeared well-cared for – yes or no). Awareness of search method questions included whether the finder was aware of lost and found section in the newspaper (yes or no); aware that found pet advertisements in the newspaper can be placed for free (yes or no); aware of lost and found pet sites on the Internet (yes or no); and knowledge of microchips (yes or no). Search methods included: placed found advertisement in newspaper (yes or no); read newspaper looking for owner’s lost advertisement (yes or no); called animal agency (yes or no); surrendered animal to agency (yes or no) and if no reason for not surrendering (afraid pet would be euthanatized, preferred to find owner myself, animal agency wouldn’t accept pet, preferred to find new home for pet myself, did not have pet long enough to relinquish to animal agency, and other); placed signs in neighborhood (yes or no); searched Internet lost pet sites (yes or no); contacted veterinary offices (yes or no); have pet scanned for a microchip (yes or no) used other search method (yes or no); and number of days actively searched for owner. Miscellaneous questions included: importance of finding the owner (extremely important, somewhat important, and not very important); does finder own any
pets (yes or no); and has finder found any pets in the past (yes or no). All data were tracked using a standard database package. The survey instrument and methodology was approved by the Ohio State University Institutional Review Board prior to administration.

6.2.5 Statistical analysis - Medians and ranges were calculated for responses that consisted of continuous data, and proportions were calculated for responses that consisted of categorical data. Comparisons were made between categorical variables using the Chi squared test. A Fisher’s exact test was used for categorical variables when the expected value of a given cell in the comparison was less than 5. Standard statistical software was used. For each of the reunification methods, a success rate was calculated as the number of owners found by the search method divided by the number of finders who used the search method. Success rates were not calculated for the general category of other. For all statistical tests, an alpha level of 0.05 was used for significance.

6.3 Results

During the study period, 213 people that found a pet they perceived as lost were identified. Of those, 188 were determined to be eligible for the study, and 156 (83%) agreed to complete a telephone interview.

6.3.1 Reunification & disposition - Of the 156 people in the study, 127 (81%) found dogs and 29 (19%) found cats. Pets in the study were found at the following locations: 28 (18%) were on a street/in traffic; 65 (42%) were in the finder’s yard; 45 (29%) were in the finder’s neighborhood; 11 (7%) were at a worksite; 5 (3%) were at a park; and 2 (1%) were at other locations.
Overall 59 (38%) of the pets were reunited with their owners in a median of 2 days (range 0.5 to 45 days). Only 1 (3%) cat owner was found compared to 58 (46%) of dog owners (P < 0.001). The methods used to find owners categorized by the length of time to find the owner are summarized. (Table 6.2) For 59 pets that were reunited with their owner, the finder could report how far from home the pets were found: thirty-nine (66%) were found less than a mile from owner’s home; 10 (17%) were found between 1 and 5 miles from owner’s home; 5 (8%) were found more than 5 miles from owner’s home; and for 5 (8%) the distance was unknown. For pets that were not reunited with their owners, their disposition by species is summarized. (Table 6.3)

6.3.2 Pet characteristics - Of the 156 pets that were found, 80 (51%) were male and 76 (49%) were female. Finders reported that of the 129 dogs, 76 (60%) were purebred and 51 (40%) were mixed breeds. Finders reported that overall 35 (22%) of pets were spayed/neutered, 78 (50%) were intact, and 43 (28%) were unknown. Of the 43 that were unknown, 65% were females. Only 5 (17%) of cats were wearing collars at the time they were found compared with 57 (45%) of dogs (P = 0.006). Only 6 (11%) of the dogs and none of the cats that were wearing collars had any tags on the collar. Finders were asked their perception if they felt that the pets were well cared for by the owners. Eighty-one percent (126) reported the pets were well cared for and 19% (30) reported the pets seemed to receive less than adequate care. Only 3% (2) of the 59 pets that were reunited with the owners were not considered well cared for compared with 29% (28) of the 97 pets that were not reunited (P < 0.001).
6.3.3 Awareness of search methods - The finders were asked about their awareness and knowledge of certain search and identification methods. Almost all (94%) of the finders were aware there was a lost and found section in the local newspaper, however, only 97 (62%) were aware that a lost and found advertisement could be run at no charge. Only 61 (39%) were aware of any lost and found pet sites on the Internet. The vast majority (94%) were aware that microchips are used for identification of pets.

6.3.4 Search methods - Finders actively searched a median of 7 days (range 0.5 to 45 days) for owners. All 156 participants mentioned that they walked in their own neighborhood to try and locate the owner of the pet. Seventy (45%) of the finders ran an advertisement in the newspaper and 106 (68%) read the newspaper to look for a lost ad by the owner. Only 1 of the 59 finders that were not aware that found advertisements could be placed in the newspaper at no charge actually paid to have an advertisement run (P < 0.001). Only 34 (22%) of all finders searched for owners on lost and found Internet sites, and 34 (56%) of those that were aware of these sites actually utilized them. Ninety-four percent (147) of the finders were aware of the use of microchips to identify pets, and 50% (73) of those that were aware actually had the pet scanned to check for a microchip. Of those 73 finders that had the pets scanned to check for a microchip, 46 (63%) used a veterinarian and 27 (37%) used an animal agency to have the pet scanned.

Almost all (94%) of the finders called one or more of the animal agencies to report they had found a lost pet but only 13 (8%) initially surrendered the pets to the agencies. An additional 5 people kept the pets during their search for the owners and surrendered when they were unsuccessful in locating the owner. Reasons for not surrendering the pet to one of agencies are summarized by species. (Table 6.4) Fifty-
three (34%) of finders placed signs in their neighborhood to search for the owner and 62 (40%) contacted a veterinarian for help in locating the owner. Thirty (19%) used another search method to look for the owner such as contacting the police, contacting a groomer or sending email to neighbors.

For the major methods used to locate owners, the success rates were: 20% for placing a newspaper advertisement; 10% for calling an animal agency; 9% for posting neighborhood signs; and 7% for walking the neighborhood. All of the 6 dogs that had some type of tag were reunited with their owners.

6.3.5 Miscellaneous questions - Of the 156 participants, 87% (129) considered it extremely important to find the owners, 15% (24) considered it somewhat important and 2% (3) considered it not very important. There was a positive association between the importance of finding the owner and the perception that the pet was well cared for (P = 0.026) and with finding the owner (P = 0.003). The vast majority (89%) of the finders owned pets and 115 (74%) had found other pets in the past.

6.4 Discussion

Our findings suggest that in our study community, there is a population of people that are willing to help reunite lost pets with their owners, but are not willing to surrender the pets to the animal sheltering system. This group of people is familiar with pets (89% owning pets themselves), has experience with assisting lost pets (74% have found pets in the past), and 87% consider it to be extremely important to find the owners. Almost one-half of this group ultimately kept the lost pet themselves.
No differences were found in the search methods used by people that kept the pets themselves vs. those that utilized other disposition methods. This most likely indicates that a desire to keep the animal did not influence the search methods used by the finders.

Despite the group’s willingness and experience in locating owners, only 58 (46%) dogs and 1 (3%) cat were reunited with their owners. This is lower than lost recovery rates in prior studies in the same study area that showed that 71% of dogs and 53% of cats were found by owners actively looking for them.\(^7,^8\) These recovery rates for owners searching for lost pets are at least partly higher because they include pets found at an animal shelter or pets that returned home on their own. These types of recoveries would not involve an individual described in our current study being part of the recovery process. It is also possible the reunification rates in this study are lower because they represent a population of pets for which the owners may not be actively searching. However, 81% of the pets found were considered to be well cared for by finders, indicating that the pets were owned and given some level of care.

Both dogs and cats in this study had a much lower rate of identification through a tag than reported in the prior studies on lost pets. This may be in part, because pets that were wearing a tag with owner information, may have been reunited without the finder contacting one of the animal agencies or placing an advertisement in the newspaper. Thus, they would not have been included in our study design. In those prior studies, 43% of dogs were wearing some type of tag and 8% had a microchip, and dogs wearing a dog license had a 60% faster time to recovery than those that did not have a tag.\(^7\) In our current study, only 6 dogs that were found had any type of tag and none that were scanned had a microchip, but all 6 with a tag were reunited with their owners through the
use of the tag. In the prior study on lost cats,\textsuperscript{8} only 14% were wearing any type of tag and none of the cats in the current study were wearing any type of tag. These findings further emphasize the difficulty in locating owners of pets without identification, and the importance of visible pet identification in the reunification process. Animal shelters have a prime opportunity to educate pet owners about identification at the time of adoption and through community education programs. Veterinarians can educate clients about pet identification through front lobby displays, informational handouts and personal education by staff at annual visits.

The most successful method used by the study individuals to find owners was placing an advertisement in the newspaper. Twenty four percent of owners were found through an advertisement run by the finder of a lost pet and 20% of advertisements run by the finders were successful in locating the owners. However, only 62% of people that found a lost pet were aware they could run an advertisement for free and only 1 person that was not aware of the no-charge policy still initiated running an ad. The newspaper provides a widely distributed, easy accessible method for finders and owners to communicate about lost pets and is available in both print and on the Internet. Many other newspapers in major cities have a similar policy of running an advertisement for free for 3 to 10 days for people that have found a lost pet.\textsuperscript{c} Given the potential success for using the newspaper as a way to reunite pets and lost owners, it is important to educate people who find pets that they can potentially run an advertisement for free in their community, and to educate all pet owners about the importance of utilizing the newspaper as a resource to find their lost pets.
In our study, the largest percentage of owners was found when the finders called one of the animal agencies. In our study community, the agencies make an attempt to manually compare their lost and found logs to see if there is a potential match between a lost pet and a found animal. In our study, 15 of the 59 (25%) pet owners were found through this method. This illustrates the importance of shelters trying to match information and being willing to share it with individuals on the phone. It also demonstrates the potential need for development of software programs that can automate the matching process. For communities with multiple shelters, the development of one central hotline resource that can maximize the success for matching lost and found reports may prove to be most effective. Further research is needed in this area to determine the best approach for different types of communities.

In our study, only 8% of the individuals that found a lost pet were willing to initially surrender them to an animal agency. The primary reason (57%) was fear the animal would be euthanatized. The euthanasia rate in the study area for 2005 was 12 animals per 1,000 people which is slightly below the average of 14.4 per 1,000 people reported for the Midwest. Thus, this attitude may be common in other communities with similar or higher euthanasia rates and these types of individuals may only be willing to utilize the animal sheltering system through a phone call. Although the concern for euthanasia is understandable, it poses a problem for those individuals who have lost a pet and are attempting to find them by visiting an agency.
The importance of educating this group of people on various search methods and the role that shelters can play in reunification is paramount in order for owners to be able to find their pets. It is also important for shelters to continue to try and improve public perception and to work with the public on better systems for pet reunification.

There are several limitations associated with this study. First it only includes people that find a pet and contact a shelter by phone or place an advertisement in the newspaper. It does not include individuals that do not use these primary methods which may introduce some bias into the study. As with any study that focuses on a particular geographic area, care should be taken in extrapolating results of the present study to the situation in other areas. Since data were only collected for 4 months of the year, it is possible that seasonal differences exist both for search and recovery methods. Finally, we were not able to perform any type of multivariable analysis for the association of factors with reunification, primarily due to the relatively small sample size. Future studies with larger numbers to better identify associations while controlling for confounding are warranted.

Our study shows that people who find lost pets are only able to reunite a little more than one-third of the pets with their owners. An opportunity exists for both shelters and veterinarians to educate these people on various search methods and the importance of finders providing the owners with every possible means to recover their pet. Further research is needed to better understand the role of both community and pet owner education in improving pet reunification rates.
6.5 Endnotes


b. Stata Version 9.1, StataCorp, College Station, TX.

c. Confirmed by telephone calls to newspaper classified departments in Columbus, Cleveland, Cincinnati, Toledo, Akron and Youngstown by primary author.
6.6 References


Telephone Survey – Found Pets

Cover Page / Call Record / Introduction

Species __________________________ Date Pet Found __________________________
Phone Number __________________________ Source of Number __________________________
Description __________________________

Introduction

Hi. My name is Linda Lord. I’m a veterinarian from The Ohio State University in Columbus. We are conducting a research project to learn more about lost and found pets.

I saw your ad in the Dayton Daily News lost & found section or I’m working with the Animal Resource Center on Webster St (or HSGD or SICSA) and got your name from their lost & found log.

Do you have a few moments to answer some questions about your lost pet?

Call Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Result Codes:
I Complete Interview
R Refusal / Breakoff (how, why)
CB Call Back (when – time to call back)
NC Non Contact (No Answer or Answering Machine)
O Other (answer phone but can’t complete survey)
WN Wrong Number (no lost pet)
DISC Disconnect

Table 6.1 – Found survey to interview people that found lost pets. continued next page
<table>
<thead>
<tr>
<th>Time Interview Began</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. How did you find the pet?</td>
</tr>
<tr>
<td></td>
<td>- RUNNING IN TRAFFIC/ON STREET</td>
</tr>
<tr>
<td></td>
<td>- IN MY YARD</td>
</tr>
<tr>
<td></td>
<td>- RUNNING NEIGHBORHOOD</td>
</tr>
<tr>
<td></td>
<td>- FOUND AT WORKSITE</td>
</tr>
<tr>
<td></td>
<td>- FOUND AT PARK</td>
</tr>
<tr>
<td></td>
<td>- OTHER (Describe)</td>
</tr>
<tr>
<td></td>
<td>2a. Did you find the owner?</td>
</tr>
<tr>
<td></td>
<td>- YES</td>
</tr>
<tr>
<td></td>
<td>- NO</td>
</tr>
<tr>
<td></td>
<td>2b. (IF “YES”):</td>
</tr>
<tr>
<td></td>
<td>How many days before you found the owner? # DAYS</td>
</tr>
<tr>
<td></td>
<td>2c. (IF “YES”):</td>
</tr>
<tr>
<td></td>
<td>How far from home had the pet traveled?</td>
</tr>
<tr>
<td></td>
<td>- FOUND AT HOME</td>
</tr>
<tr>
<td></td>
<td>- LESS THAN A MILE FROM HOME</td>
</tr>
<tr>
<td></td>
<td>- BETWEEN 1 AND 5 MILES FROM HOME</td>
</tr>
<tr>
<td></td>
<td>- GREATER THAN 5 MILES FROM HOME</td>
</tr>
<tr>
<td></td>
<td>- DON’T KNOW</td>
</tr>
<tr>
<td></td>
<td>2d. (IF “YES”):</td>
</tr>
<tr>
<td></td>
<td>How did you find the owner?</td>
</tr>
<tr>
<td></td>
<td>- INFO FROM AGENCY</td>
</tr>
<tr>
<td></td>
<td>- WHICH AGENCY</td>
</tr>
<tr>
<td></td>
<td>- MY AD IN NEWSPAPER</td>
</tr>
<tr>
<td></td>
<td>- OWNER AD IN NEWSPAPER</td>
</tr>
<tr>
<td></td>
<td>- MY SIGNS IN NEIGHBORHOOD</td>
</tr>
<tr>
<td></td>
<td>- OWNER SIGNS IN NEIGHBORHOOD</td>
</tr>
<tr>
<td></td>
<td>- WALKING NEIGHBORHOOD</td>
</tr>
<tr>
<td></td>
<td>- FROM TAG</td>
</tr>
<tr>
<td></td>
<td>- OTHER (Describe)</td>
</tr>
<tr>
<td></td>
<td>3d. (IF “NO”):</td>
</tr>
<tr>
<td></td>
<td>What did you do with the pet?</td>
</tr>
<tr>
<td></td>
<td>- GAVE TO AGENCY</td>
</tr>
<tr>
<td></td>
<td>- WHICH AGENCY</td>
</tr>
<tr>
<td></td>
<td>- KEPT MYSELF</td>
</tr>
<tr>
<td></td>
<td>- GAVE TO FRIEND</td>
</tr>
<tr>
<td></td>
<td>- GAVE TO RESCUE GROUP</td>
</tr>
<tr>
<td></td>
<td>- OTHER (Describe)</td>
</tr>
</tbody>
</table>

Table 6.1 continued next page
Table 6.1 (continued)

The following series of questions are designed to determine what methods you utilized to find the owner. Please respond to each choice with a yes or no answer.

Did you:

4. Place an ad in Lost & Found Section of Newspaper?
   YES ................................................................. 1
   NO ................................................................. 0

4b. Read the Lost & Found Section of the Newspaper?
   YES ................................................................. 1
   NO ................................................................. 0

4c. (IF “NO”), Did you know you there was a lost & found section in the paper for pets?
   YES ................................................................. 1
   NO ................................................................. 0

4d. (IF “NO”), Did you know you could run an ad for free?
   YES ................................................................. 1
   NO ................................................................. 0

5. Search the internet for lost pets?
   YES ................................................................. 1
   NO ................................................................. 0
   IF YES, NAME OF SITE: ________________________________

5a. (IF “NO”), Did you know there are web sites for lost and found pets?
   YES ................................................................. 1
   NO ................................................................. 0

6. Call one or more local animal care agencies?
   YES ................................................................. 1
   NO ................................................................. 0
   IF YES, WHICH ONE(S) ________________________________
   IF NO, WHY? __________________________________

7. Take the animal to an animal care agency initially?
   If YES, which one? ________________________________

7a. (IF “NO”), What was the reason you did not take the pet to an agency?
   AFRAID PET WOULD BE EUTHANIZED ......................... 1
   PREFERRED TO FIND OWNER MYSELF ......................... 2
   AGENCY WOULDN’T ACCEPT ..................................... 3
   IF UNABLE TO FIND OWNER, WANTED TO FIND NEW HOME MYSELF 4
   DIDN’T HAVE LONG ENOUGH TO TAKE IN .................... 5
   OTHER (Describe) .................................................. 6

Table 6.1 continued next page
Table 6.1 (continued)

8. Place signs in your neighborhood?
   YES ............................................................... 1
   NO ............................................................... 0

9. Contact a veterinarian?
   YES ............................................................... 1
   NO ............................................................... 0

10. Utilize another method to find the owner (describe):
    YES ............................................................... 1
    NO ............................................................... 0
    IF YES, (Describe):

11. How long did you actively search for the owner? ____________ days

12. Did you have the pet scanned for a microchip at a shelter or veterinarian’s office?
    YES, VET ............................................................... 1
    YES, SHELTER ...................................................... 2
    NO ............................................................... 0

12a. (IF “NO”) Do you know what a microchip is?
    YES ............................................................... 1
    NO ............................................................... 0

The following is a series of questions about the pet that you found.

13. What breed is the pet? (describe) ________________________________

14. Is the pet male or female?
    MALE ............................................................... 1
    FEMALE ........................................................... 0
    DON’T KNOW .................................................... 8

15. Is the pet spayed or neutered?
    YES ............................................................... 1
    NO ............................................................... 0
    DON’T KNOW .................................................... 8

16. Was the animal wearing any type of collar?
    YES ............................................................... 1
    NO ............................................................... 0

17. Does the pet appear to have been well cared for by the owner?
    YES ............................................................... 1
    NO ............................................................... 0
    IF NO, WHY? ....................................................

Table 6.1 continued next page
Table 6.1 (continued)

18. Do you own any pets?
   YES .................................................................................. 1
   NO .................................................................................. 0
   IF YES, WHICH ONES? ........................................................

19. How important was it to you to find the owner of this pet?
   EXTREMELY IMPORTANT .................................................. 1
   SOMewhat IMPORTANT ...................................................... 2
   NOT VERY IMPORTANT ..................................................... 3

20. Have you found other pets in the past?
   YES .................................................................................. 1
   NO .................................................................................. 0

Time Interview Ended: ________________________________
<table>
<thead>
<tr>
<th>Reunification Method</th>
<th>Found owner 1 day or less</th>
<th>Found owner between 1 and 5 days</th>
<th>Found owner more than 5 days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information from agency</td>
<td>4 (15.4)</td>
<td>8 (38.1)</td>
<td>3 (25.0)</td>
<td>15 (25.4)</td>
</tr>
<tr>
<td>Finder ad in newspaper</td>
<td>4 (15.4)</td>
<td>2 (9.5)</td>
<td>8 (66.7)</td>
<td>14 (23.7)</td>
</tr>
<tr>
<td>Finder signs in neighborhood</td>
<td>1 (3.8)</td>
<td>4 (19.1)</td>
<td>0 (0)</td>
<td>5 (8.5)</td>
</tr>
<tr>
<td>Owner signs in neighborhood</td>
<td>1 (3.8)</td>
<td>2 (9.5)</td>
<td>1 (8.3)</td>
<td>4 (6.8)</td>
</tr>
<tr>
<td>Finder walking in neighborhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet tag</td>
<td>6 (23.1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>6 (10.2)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (7.7)</td>
<td>2 (9.5)</td>
<td>0 (0)</td>
<td>4 (6.8)</td>
</tr>
<tr>
<td>Total</td>
<td>26 (100)</td>
<td>21 (100)</td>
<td>12 (100)</td>
<td>59 (100)</td>
</tr>
</tbody>
</table>

Table 6.2 - Reunification methods used to find owners of lost pets categorized by length of time to find owners.

Values are given as number of owners (%).
Table 6.3 – Finder disposition of pets for which the owners were not found categorized by species.

Values are given as number of finders (%).
<table>
<thead>
<tr>
<th>Reason</th>
<th>Dogs</th>
<th>Cats</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afraid agency would euthanize pet</td>
<td>63 (54.8)</td>
<td>18 (64.3)</td>
<td>81 (56.6)</td>
</tr>
<tr>
<td>Wanted to find owner myself</td>
<td>20 (17.4)</td>
<td>2 (7.1)</td>
<td>22 (15.4)</td>
</tr>
<tr>
<td>Agency wouldn't accept</td>
<td>1 (0.9)</td>
<td>3 (10.7)</td>
<td>4 (2.8)</td>
</tr>
<tr>
<td>Wanted to find pet new home</td>
<td>9 (7.8)</td>
<td>3 (10.7)</td>
<td>12 (8.4)</td>
</tr>
<tr>
<td>Had pet too short of time</td>
<td>20 (17.4)</td>
<td>0 (0)</td>
<td>20 (14.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.7)</td>
<td>2 (7.1)</td>
<td>4 (2.8)</td>
</tr>
<tr>
<td>Total</td>
<td>115 (100.0)</td>
<td>28 (100.0)</td>
<td>143 (100.0)</td>
</tr>
</tbody>
</table>

Table 6.4 – Reasons that finders of lost pets did not surrender them to local animal agencies categorized by species.

Values are given as number of finders (%).
CHAPTER 7

CONCLUSIONS

7.1 Major Findings of Current Research

- In 2004 the estimated number of animals handled by Ohio animal care and control agencies was 315,519, which represented a decrease of 7% compared to 1996.

- The number of dogs handled in 2004 decreased 17%, but the number of cats handled increased 20%.

- Between 1996 and 2004, the number of dogs euthanatized decreased 39%, but the number of cats euthanatized increased 14%.

- The proportion of agencies with a spay-neuter policy increased from 56% to 71%, and the proportion that maintained an association with a veterinarian increased from 39% to 80%.
• For dogs handled by county dog warden agencies, the odds of euthanasia were 36% higher if the agency did not have a spay-neuter policy.

• Owners were reunited with their dogs 71% of the time in a median of 2 days (range 0.5 to 21 days).

• Dogs were recovered by their owners most frequently through a call/visit to an animal agency (35%), a dog license tag (18%), and posting of neighborhood signs (15%).

• Overall, 48% of dogs had some type of identification at the time they were lost (identification tag, dog license tag, rabies tag or microchip), with 43% wearing some type of tag and 8% having a microchip.

• Our Cox proportional hazards regression model showed that owners had a higher likelihood of recovery when they called an animal agency (HR = 2.1; 95% CI=1.34-3.36), visited an animal agency (HR=1.8; 95% CI=1.12-2.74), and posted neighborhood signs. Neighborhood signs did not become effective (hazard ratio > 1.0) until 7 or more days after the dog was lost. Dogs that were wearing a dog license tag also had a higher recovery (HR=1.6; 95% CI=1.14-2.30). Owners were less likely to recover their dogs if they believed their dogs were stolen (HR=0.3; 95% CI=0.15-0.76).
• Owners were reunited with their cats 53% of the time in a median of 5 days (range 0.5 to 81 days).

• Cats were primarily recovered by returning home on their own (66%), posting of neighborhood signs (11%), owner walking neighborhood (7%) and call/visit to animal agency (7%).

• Only 26 (19%) of all cats had some type of identification at the time they were lost (identification tag, rabies tag, or microchip), with 14% wearing some type of tag and 7% having a microchip.

• Owners allowed 59% of the cats to spend at least some time outdoors.

• Overall, 88% of the cats were spayed/neutered, and only 25% of the intact cats were recovered compared to 57% of the altered cats (P=0.02).

• Only 38% of individuals who found a pet they perceived to be lost were able to find the owners. Median time to reunification was 2 days (range 0.5 to 45 days). Only 3% of cat owners were found compared to 46% of dog owners (P<0.001).

• Individuals found pet owners were found by information provided by an animal agency (25%), newspaper advertisement (24%), walking the neighborhood (19%), signs in the neighborhood (15%), pet tag (10%) and other methods (7%).
• Most people (87%) considered it very important to find the owner of the lost pet, yet only 8% initially surrendered the found pet to an animal agency. The primary reason people did not surrender the pets was fear of euthanasia (57%).

• Only 62% of the people were aware they could run a found pet ad in the newspaper at no charge, and only 1 person that was unaware of the no-charge policy still placed an ad.

7.2 Plans for Future Research

• To continue the Ohio shelter study described in Chapter 3 in order to provide long-term trend analysis for sheltering groups. Consider the addition of breed-rescue groups to the survey.

• To provide both qualitative and quantitative survey research of residents in Ohio to evaluate attitudes towards free roaming and feral cats. The research will focus specifically on attitudes towards cat protection and control, whether or not cats should be allowed to roam free, consideration of cats as a community welfare problem, and willingness to spend public dollars on cat issues. The research will examine regional and demographic differences.
• To implement a group-randomized trial to evaluate the effect of an identification promotional campaign on the prevalence of both identification tags and microchips in intervention vs. control communities. This research will also evaluate if return to owner rates from the shelters is higher for intervention communities.

• To implement a similar group-randomized trial but in a workplace setting of veterinary clinics. Again the primary outcome will be prevalence for types of identification compared between the intervention and control clinics.
BIBLIOGRAPHY


121


