Paper 211-2013

Analyzing the Safewalk® Program with SAS®: Saving Shelter Dogs One Walk at a Time

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ABSTRACT

The MSPCA (Massachusetts Society for Prevention of Cruelty to Animals) in Boston initiated the Safewalk® Program in January 2009. This program was designed to enrich the experience of shelter dogs by providing training to volunteers and staff that allow dogs of varied backgrounds and temperaments to be exercised safely, as well as promoting behaviors encouraging adoption on the adoption floor. Intuitively the program was felt to increase adoption rates, particularly in "hard to adopt" dogs, but proving the benefits of the program was a challenge, especially given the greatly increased numbers of homeless dogs during the Safewalk Program time period. The MSPCA has recorded statistics on all animals in their care compiled with Chameleon© software. Records for all dogs for 30 months prior to the initiation of Safewalk and 30 months after were selected from the Chameleon data base. This data extract was analyzed using multiple SAS procedures in SAS/STAT. This paper will demonstrate how SAS analysis, output and statistical graphs allowed us to assess the effects of the Safewalk Program and which populations it most affected.

INTRODUCTION

Shelter dogs everywhere are typically cared for by both staff and volunteers. At the MSPCA, prior to 2009, any member of the public who was over the age of 16 and who attended one Orientation could walk any dog that was available for adoption. Staff walked the dogs in Dog Receiving (dogs that had not been evaluated), and staff invited the more experienced volunteers to also walk dogs in Dog Receiving. There was no systematized method of training volunteers to walk unruly, strong, or extremely fearful dogs. Dogs were walked twice a day, occasionally more if volunteers were abundant. Many, many “near-misses” were observed, along with unwanted events: dog fights, escapes, humans being bitten, at worst, and inconsistent handling and lack of training dogs at best. (In 1992, comedian George Carlin had a monologue wherein he talked about what the FAA called it when two airplanes flew too close to one another. It was called a “near miss.” Carlin’s reaction? “It’s a near-hit.”)

In an effort to match dogs with challenging behaviors with the right volunteers, a system was implemented at the MSPCA that was used in other shelters, whereby dogs were color-coded as to their difficulty of handling, separating dogs into staff-only and other. In Dog Receiving, where dogs that had not been evaluated were kept, the new color system was not a success. Volunteers continued to walk whichever dogs they wanted to, ignoring the rules about staff-only dogs, and staff was upset when they had to go back to walking many of the dogs in Dog Receiving due to color-codings that reflected potential risky-behaving dogs. Acrimony between staff and volunteers was rife, with volunteers expressing that the staff didn’t really know the dogs and didn’t care, and staff saying that volunteers took unnecessary risks, didn’t follow directions, and didn’t appreciate the staffs’ decisions, especially as regards euthanasia. A separate issue was that though the MSPCA does not have a time limitation for dogs on the Adoption Floor, longer length of stay was correlated with a higher rate of euthanasia, due to factors such as lack of enrichment and training. How long can a 1-year-old pit bull live in a kennel 23 hours a day before its behavior deteriorates to the point it is not a good adoption candidate? Fans of dogs resident in the shelter worried and deepened their resolve to help them overcome the possible outcome for a dog living in an institution for too long: euthanasia for behavioral issues that makes dogs no longer safe to re-home.

CHOPPER: THE DOG THAT STARTED IT ALL

On August 20, 2007, a tallish one-year-old male black and white pit bull named “Chopper” was surrendered to the MSPCA because the owner was moving and could not take him to their new apartment. Chopper settled in nicely to the Shelter routine: two walks, two meals, and a look-see by the public every afternoon. He was adopted on September 18, 2007, by a middle-aged retired Marine who had a big, fenced-in back yard and who was quite experienced with owning a big dog in the past, a German Shepherd. He and Chopper hit it off, and Chopper went home. On November 5th, a mere 48 days later, Chopper was returned, for “being destructive outdoors.”

There was a story. Left to his own devices in the yard, Chopper amused himself by attempting to remove the wooden steps from the back of the house. Then, in an act that most certainly got him the heave-ho, he began to dismantle the wife's van when it was also parked in the yard.

Back in the Shelter, 48 days older and more of an untrained adolescent, Chopper was older, bigger and wilder. His exuberance caused him to jump on people, getting up close and personal. He was strong on the leash, and could be mouthy with people. However, he was quite responsive to training, and would do anything for a treat. He was always very social with people, if by social you mean he was expert at the big terrier launch vertically or horizontally, followed by licking and mouthing you to get and keep your attention. Walking and training Chopper was not for the inexperienced volunteer, but he had fans amongst the staff and volunteers.

As a part of the new system implemented at the MSPCA, Chopper was then assigned a few particular volunteer walkers, who were shown how to walk him, train him, and to use the head halter that helped control some of his wilder behavior. Chopper got more walks per day that were more controlled, and he got more training than dogs on the Adoption Floor usually got. The days ticked on, however, as he languished. Not everyone is looking for a big terrier with puppy behaviors who needs training. Something more was needed.

SAFEWALK: THE PROGRAM

Using the "ADDIE" Model of Instructional Design (Analyze, Design, Development, Implementation, and Evaluation), Ms. Bright developed the "Safewalk" program as a school project. By optimistically and repeatedly assuring a good outcome, Terri was able to garner the support of then Manager Meagan Rock to offer the training to all volunteers, and to make it mandatory for all volunteers and staff. There was some understandable grousing by volunteers, but only one long-time volunteer ultimately quit, refusing to take the training. Safewalk began officially on January 1, 2009, after all staff and all volunteers received the new training.

Interestingly, Safewalk is a program about the behavior of humans around shelter dogs. Volunteers at the MSPCA must be able to work independently, without being supervised closely by staff after training. The behaviors that volunteers were exhibiting were analyzed, as well as those behaviors desired from volunteers. After analysis, the curricular design followed a flowchart of required entry-level behaviors that were broken down into the following domains:

- Intellectual: the ability to read/hear instructions, follow them, and textually reproduce them on written tests administered throughout the program;
- Attitudinal: the ability to cite the organization's mission and staff responsibilities and to support it through their actions;
- Verbal: the ability to verbalize the above, along with descriptions of animal behavior;
- Psychomotor: the ability to safely open a kennel, leash up a dog, and take it for a walk.

These domains were also used in the development of all the behaviors that go with being a volunteer. Each skill volunteers should be able to perform was coded into a domain, and this "map" was used to design instruction. Safewalk did stay with a color-coded system, for people and for dogs (people wear an identifying nametag with a ribbon, dogs are identified as a certain color on a whiteboard or on their kennel door with a large colored dot.

Dogs' "Colors:"

- Green: usually small dogs, easy to handle;
- Yellow: bigger dogs, strong, but no particular behavior or training issues;
- Purple: dogs with behavior issues that are targeted for improvement, i.e. strong pullers, mouthy pups of all ages, fearful dogs;
- Red: staff only dogs, i.e. those being evaluated for health and/or behavioral issues

All volunteers attend a general orientation. To progress to a different color, additional training sessions are required as well as a set number of hours of volunteering and "shadowing" senior volunteers. When volunteering, a name badge is worn with a color-coded ribbon as below:

People "Colors:"

- Blue = "Keeper:" Keepers work the Adoption Floor, observing dog behavior, helping to train dogs in their kennels, advocating for the dogs in the presence of a sometimes-challenging public, and referring potential adopters to staff. The Keeper position is unique, as it serves other functions: the volunteers we want to encourage most to continue are those who are most interested in watching and learning about dog behavior; and prior to Safewalk, the Adoption Floor was unattended by staff, and the dogs were at risk of

having the public enter their cages, tease them, randomly take them out, etc. Having Keepers work the Floor when we are open gives the staff an eye on the scene that was formerly missing.

- Green= "Level 1 Walkers:" Level 1 Walkers can walk dogs that are labeled "green."
- Yellow= "Level 2 Walkers:" Level 1 Walkers can walk dogs that are labeled "yellow."
- Purple = "Level 3 Walkers:" Level 1 Walkers can walk dogs that are labeled "purple" on the Adoption Floor and "yellow" in Dog Receiving.

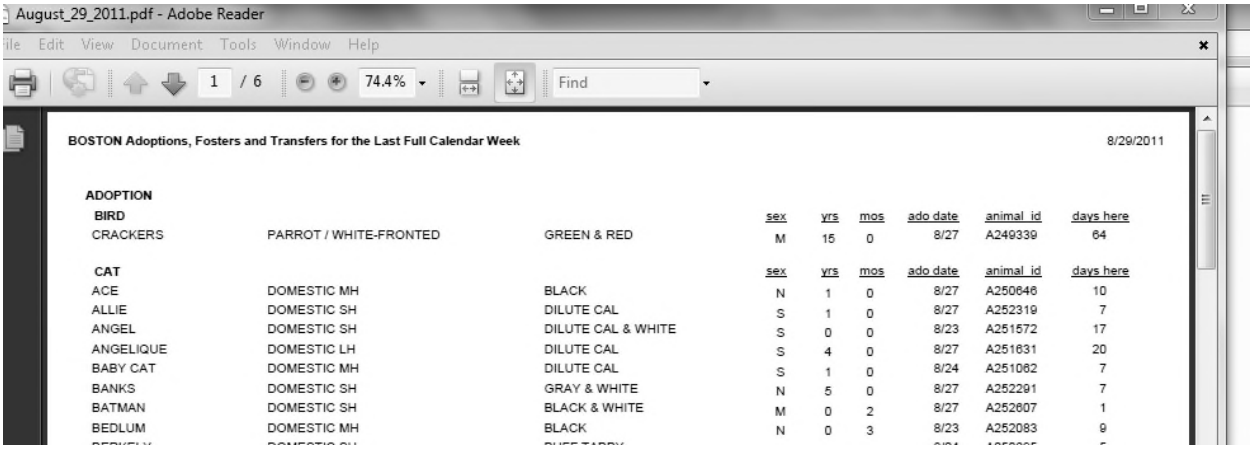
There is a talented cadre of Level 3 volunteers who attend additional training classes that are targeted for our Shelter dogs, including "Pit Bull" class, where the big terriers on the Adoption Floor come into the Education Room for Obedience training once a week, as well as for focused training on any dog's particular needs. These volunteers have learned also to train our dogs to run on a treadmill and to pull a dog-powered scooter donated by a Level 3 volunteer. Another volunteer gives a monthly clicker-training class to any volunteers who are interested. Keen volunteers also take dogs to MSPCA Obedience classes when there is a space in our regular classes, and one of the instructors says that dogs from the Shelter who were required to attend training used to be the worst-behaved dogs in the class, and now are the best, as the dogs are experienced with "school" and have had the training there. We have volunteers who are students, doctors, dentists, pharmacists, lawyers, editors, writers and authors. Volunteers are all ages, and exhibit real excitement as they move through the ranks of colors.

The "culture" of Safewalk is embedded into the trainings, and volunteers are instructed that though there is a hierarchy, this is a horizontal sort of hierarchy, and all volunteers should help each other and be respectful of staff. Instructional Design is an "open-loop" curriculum, meaning that the input of the learner is used to improve the training, and we are always open to volunteers' suggestions as to how we can improve Safewalk.

Through the past few years, we discussed many times how we could measure the effects of Safewalk. The most pronounced observable difference was the enrichment and training that was now available to our pit bulls, the population that suffers most from being cooped up in a kennel for long periods. It was clear there were dogs whose behavior was improved by training, and who went successfully to new homes. In fact, around the time Safewalk started, our pit bull population increased dramatically, as another local Shelter became "limited" admission, taking in fewer pit bulls. We hypothesized that our dogs could now withstand being homeless here longer, and could be adopted…because Safewalk was a success. How could we prove it? We decided to find out, for real, if the observed results were due to Safewalk.

METHODS

The first commandment for all SAS programmers is / should be "Know Thy Data." The initial data source for this project was a report constructed using Crystal Reports® on data from the Chameleon® system. The MSPCA collects data on every animal that enters its care using this system. Below is a sample of reports that are generated on a weekly basis.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BOSTON Adoptions, Fosters and Transfers for the Last Full Calendar Week 8/29/2011

ADOPTION

			sex	yrs	mos	ado date	animal_id	days here
BIRD								
CRACKERS	PARROT / WHITE-FRONTED	GREEN & RED	M	15	0	8/27	A249339	64
CAT			sex	yrs	mos	ado date	animal_id	days here
ACE	DOMESTIC MH	BLACK	N	1	0	8/27	A250646	10
ALLIE	DOMESTIC SH	DILUTE CAL	S	1	0	8/27	A252319	7
ANGEL	DOMESTIC SH	DILUTE CAL & WHITE	S	0	0	8/23	A251572	17
ANGELIQUE	DOMESTIC LH	DILUTE CAL	S	4	0	8/27	A251631	20
BABY CAT	DOMESTIC MH	DILUTE CAL	S	1	0	8/24	A251062	7
BANKS	DOMESTIC SH	GRAY & WHITE	N	5	0	8/27	A252291	7
BATMAN	DOMESTIC SH	BLACK & WHITE	M	0	2	8/27	A252607	1
BEDLUM	DOMESTIC MH	BLACK	N	0	3	8/23	A252083	9

From these reports we were able to determine some of the fields available for analysis in the system. Among these were animal type, animal name, primary breed, primary color, sex, age in years and months, adoption date (outcome date), animal id, and days here (los.) Behind the scenes we assumed variables indicating date of birth and outcome type.

When we first requested data, we received a report, in Excel format, which simply listed outcomes and numbers, and summary numbers and mean length of stay by breed 30 months prior to Safewalk and 30 months post Safewalk. The numbers of pit bull type dogs both before and post Safewalk in the shelter were staggering compared to all other breeds. Labrador retrievers were a very distant second in terms of numbers of dogs arriving in the shelter.

Primary Breed	Number of Dogs Pre-Safewalk	Mean LOS for Dogs Pre-Safewalk	Number of Dogs Post-Safewalk	Mean LOS for Dogs Post-Safewalk	Number of Dogs in Study Period	Mean LOS for Dogs during Study Period
PITTIE	243	19.83	570	16.9	813	17.78
LABRADOR RETR	141	15.45	127	13.57	268	14.56
CHIHUAHUA SH	81	14.33	155	10.58	236	11.87
GERM SHEPHERD	104	18.86	77	15.44	181	17.4
BEAGLE	73	18.75	91	10.89	164	14.39
COCKER SPAN	60	19.17	44	10.89	104	15.66
SHIH TZU	33	13.06	59	9.36	92	10.68
PUG	27	8.37	47	8.62	74	8.53
BOXER	32	14.03	34	14.74	66	14.39
POODLE MIN	27	9.81	36	9.53	63	9.65

We went back to the Chameleon data base for more information – what happened to the animals? Why was the length of stay **lower** for pit bull type dogs post Safewalk? None of this made sense in the context of our observations. This time, we became greedy and asked for a simple data dump of fields we knew to be available from other reports generated for the MSPCA rather than asking for reports. The fields we requested included disposition, gender, age, dominant color, etc. These data could be used to figure out our puzzle, and for further univariate and multivariate analyses.

Getting to know you, getting to know all about you…

Step 1 was to perform standard checks on the data. These included PROC CONTENTS, PROC PRINT (OBS=), PROC MEANS and PROC FREQ (frequencies and crosstabulations.) We also performed duplicate checks – as it happens, some dogs (like Chopper) who arrived at the MSPCA shelter more than once. There was a beagle pre-Safewalk who appeared six times!

Some of these checks resulted in going back to retrieve more data items (for example, whether the dog was ever made available for adoption.) Once we had gotten all the variables we needed, familiarized ourselves with the data, and done some simple coding to identify outcome dates as pre or post Safewalk and recoded primary breed into pit bull type dogs and not, we delved into the analysis.

Before we filtered our data for dogs that had been made available for adoption, we took a quick look at dispositions by pit bull type dogs versus other breeds pre and post Safewalk. The results were extremely discouraging, when you considered percentages rather than raw numbers. Post Safewalk, 12% more pit bull type dogs were being euthanized, and 11% fewer were getting adopted than pre Safewalk. Notably, higher euthanasia rates and lower adoption rates ALSO existed for non-pit bull type dogs post Safewalk. Could the program really be working?

	Prior to Safewalk		***Post Safewalk***	
Statistic	***Pit Bull Type Dog***	***Other Breed***	***Pit Bull Type Dog***	***Other Breed***
Intake	*251*	*1,199*	*570*	*1495*
Adopted	*100 (40%)*	*703 (59%)*	*170 (29%)*	*798 (53%)*
Euthanized	*75 (30%)*	*145 (12%)*	*244 (42%)*	*260 (17%)*
Length of Stay	*19.9* days*	*15.0 days*	*16.9 days*	*12.0 days*

**includes Chopper*

Intuitively we felt that Safewalk had to be helping dogs, yet the numbers showed otherwise.

This is where knowing your data comes in, and knowing the environment in which your data exists. Breed-specific legislation against pit bull type dogs already existed in the Boston area at the time Safewalk was developed, so that was not the answer to the puzzle. We noted above that at the same time Safewalk began, the MSPCA Boston became the only "open" shelter in Boston, meaning that the MSPCA received a greater proportion of dogs other shelters deemed "unadoptable." This helped explain the large increase in the number of pit bull type dogs post Safewalk.

Another aspect is that dogs spend time in Dog Receiving when they first come into the shelter. Their medical needs are assessed, as well as their temperament. Stray dogs are put on a "stray hold" – there is a wait in the hopes that owners will reclaim their dogs before they are re-homed. In a fair amount of cases dogs are surrendered to the shelter through the adjacent hospital because the owners cannot afford the vet care for their dogs – and these dogs have significant medical challenges. In other cases owners may surrender their dogs requesting euthanasia for either medical or behavioral reasons. One gentleman has driven up from Florida with multiple coonhounds living out in the Everglades because he trusts the MSPCA to get his dogs adopted. Many dogs in Dog Receiving do not benefit from the Safewalk program as volunteers may only have contact with dogs that have been evaluated, are medically stable and are safe to rehome. Some dogs remain in Dog Receiving for a long time: for example, a mother who was brought in in medical distress while delivering puppies remained in Dog Receiving for more than six weeks. The length of stay variable was greatly impacted by the amount of time dogs were in Dog Receiving.

Looking at the outcome variable also informed our sample selection. A number of dogs are transferred to other shelters depending on where the dog was found (if stray) or if they had originally come from another shelter. Other dogs go to breed specific rescues (for example, Great Danes would find a long term stay in the MSPCA's smaller runs difficult.) Some dogs go into a medical foster home. Still other dogs are reclaimed by their owners or returned to their owners. None of these dogs would have the opportunity to benefit from the Safewalk program, and their shorter length of stays would influence the length of stay variable.

Thus, our sample was reduced to dogs that were placed on the adoption floor, available to be rehomed, with dispositions of either adoption or euthanasia.

	Prior to Safewalk		***Post Safewalk***	
Statistic	***Pit Bull Type Dog***	***Other Breed***	***Pit Bull Type Dog***	***Other Breed***
Intake	*110*	*484*	*178*	*679*
Adopted	*85 (77%)*	*476 (98%)*	*157 (88%)*	*666 (98%)*
Euthanized	*25 (23%)*	*8 (2%)*	*21 (12%)*	*13 (2%)*
Length of Stay	*30.7* days*	*18.5 days*	*31.5 days*	*15.5 days*

**includes Chopper*

Once our sample had been finalized, our analytic work began in earnest. We used BASE SAS and SAS/STAT to do the analyses, as well as ODS Statistical graphs and SAS/GRAPH.

RESULTS

We chose to compare two items for which we had very dependable data that would test our hypothesis that pit bulls were staying longer and getting adopted more often. We looked at the length of stay for dogs that had been made available for adoption, and adoption rates for those dogs. We looked at these two variables for the two and half years before and after the Safewalk start date of 1/1/09. What we found was significant, for dogs and scientifically.

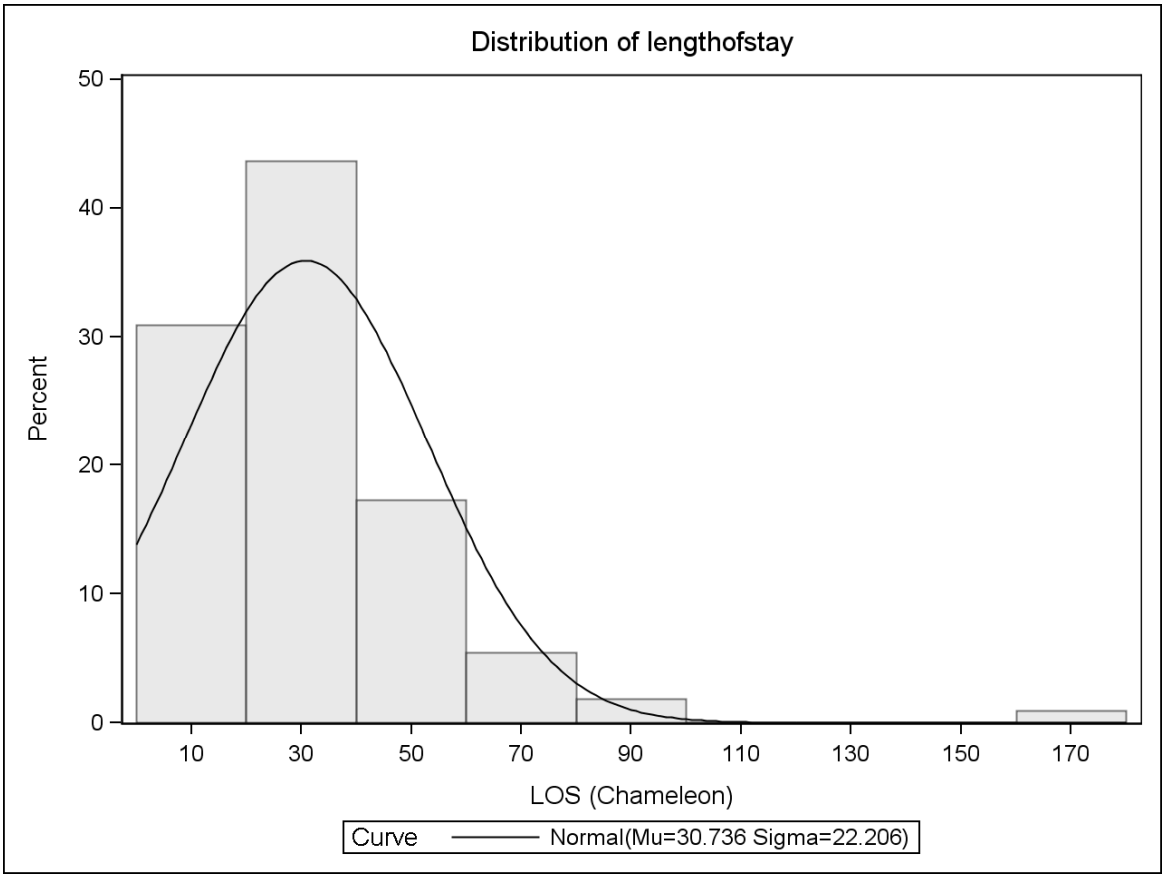
We ran PROC UNIVARIATE with ODS GRAPHICS histograms, which identified outliers in length of stay in both the pre and post Safewalk time periods. Generally these were dogs with significant medical and/or behavioral issues, and one was our friend Chopper. When we saw an outlier who had been at the shelter prior to Safewalk for 172 days. Terri said "That's got to be Chopper". And it was.

These graphics also showed distinct changes in the normal curve of the histograms between the two time periods. In the interest of saving e-trees, only the histograms for pit bull type dogs length of stay pre and post Safewalk are shown here. The univariates informed our choices of further analyses.

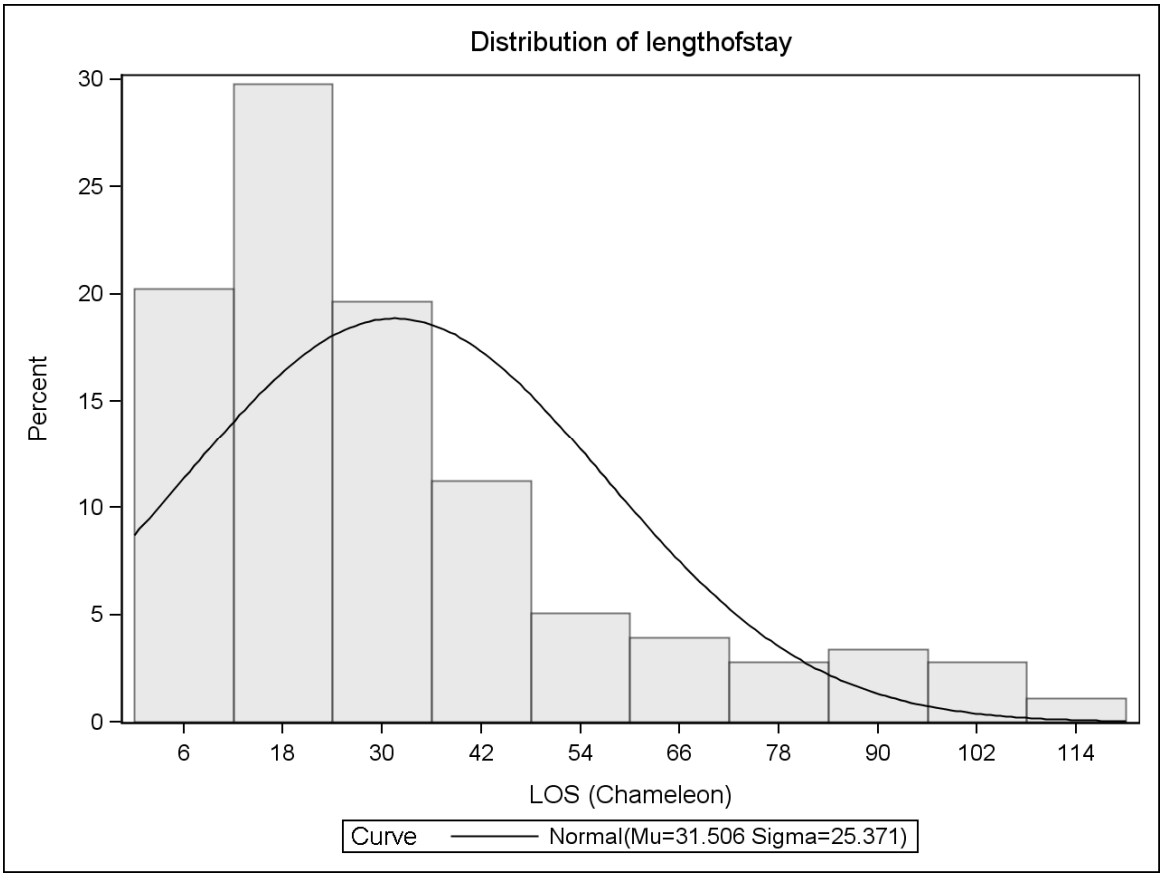
Including Chopper and Other Outliers – All Dogs Eligible for Adoption

Statistic	*Prior to Safewalk*	*Post Safewalk*	*Total*	*Comments*
Number of dogs in study (all breeds)	*594*	*857*	*1,451*	*xx% increase*
Average Length of Stay (all breeds)	*20.8 days*	*18.8 days*	*19.6 days*	*2 day decrease*
Number of pit bull type dogs in study	*110*	*178*	*288*	*Xx% increase*
Average Length of Stay (pit bull type dogs)	*30.7 days*	*31.5 days*	*31.2 days*	*.8 day increase*
Percentage of dogs adopted (all breeds)	*94.4%*	*96.0%*	*95.4%*	*1.6% increase*
Percentage of dogs adopted (pit bull type dogs)	*77.3%*	*88.2%*	*84.0%*	*10.9% increase*

Pre-Safewalk – Length of Stay for Pit Bull Type Dogs
(notice Chopper over on the right)



Post-Safewalk – Length of Stay for Pit Bull Type Dogs

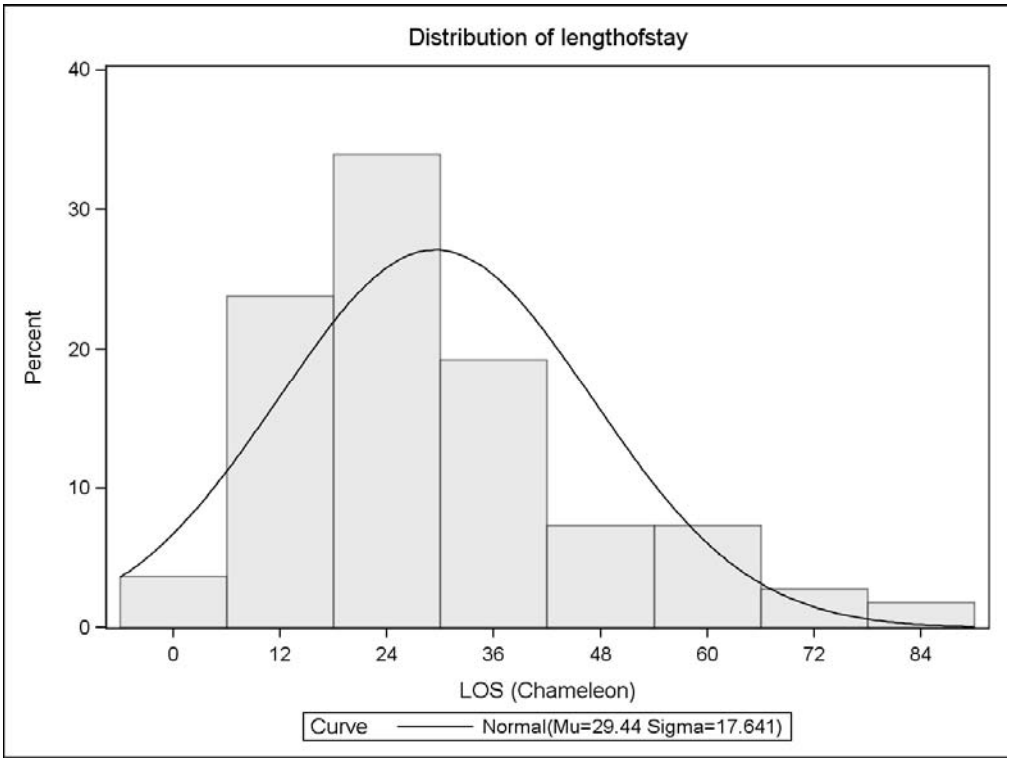


When we first ran the numbers, we discovered an outlier, who had been at the shelter prior to Safewalk for 172 days. Terri said "That's got to be Chopper". And it was. We reran our analyses excluding Chopper and other dogs with very long stays in the shelter (over 110 days). There were more of these dogs post-Safewalk, and they were primarily pit bull type dogs with medical and/or behavioral issues. Each one of these dogs has a name and a face – and now they have forever homes.

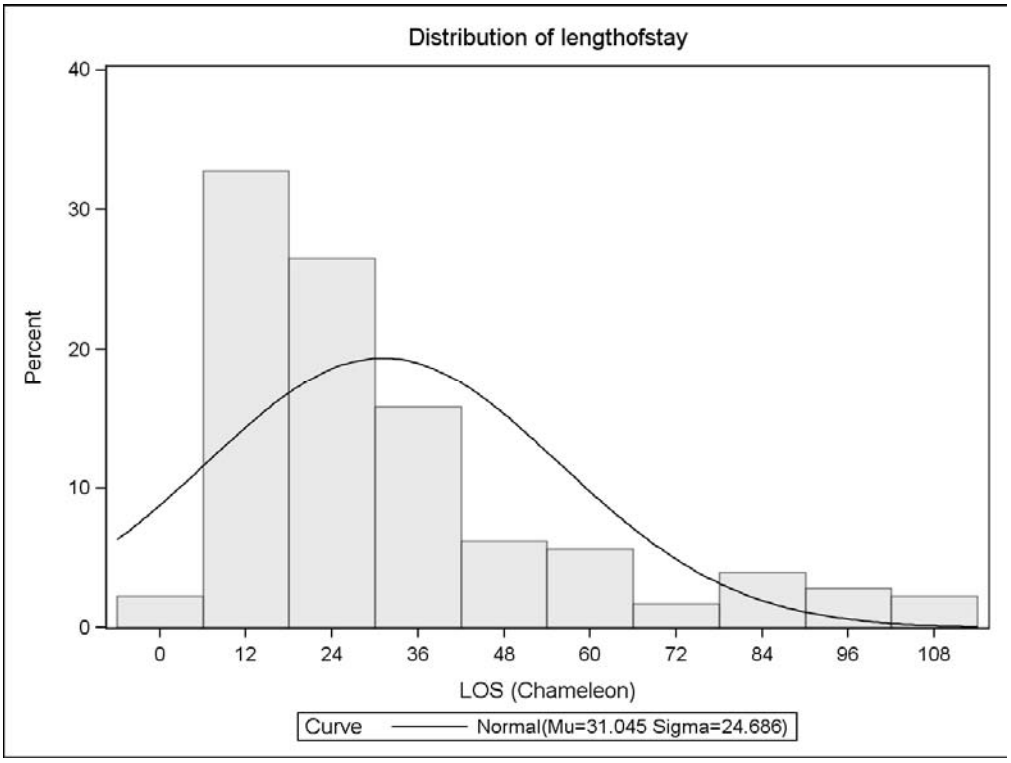
Excluding Chopper and Other Outliers (LOS GT 110 days) – All Dogs Eligible for Adoption

Statistic	*Prior to Safewalk*	*Post Safewalk*	*Total*	*Comments*
Number of dogs in study (all breeds)	*590*	*855*	*1,445*	*Increase*
Average Length of Stay (all breeds)	*20.8 days*	*18.8 days*	*19.6 days*	*Decrease*
Number of pit bull type dogs in study	*109*	*177*	*286*	*Increase*
Average Length of Stay (pit bull type dogs)	*29.4 days*	*31.0 days*	*30.4 days*	*Longer stay*
Percentage of dogs adopted (all breeds)	*94.4%*	*96.0%*	*95.4%*	*1.6% increase ChiSqP 0.1509*
Percentage of dogs adopted (pit bull type dogs)	*77.1%*	*88.1%*	*83.9%*	*11.1% increase ChiSqP 0.0133*

Pre-Safewalk – Length of Stay for Pit Bull Type Dogs
(No Chopper!)

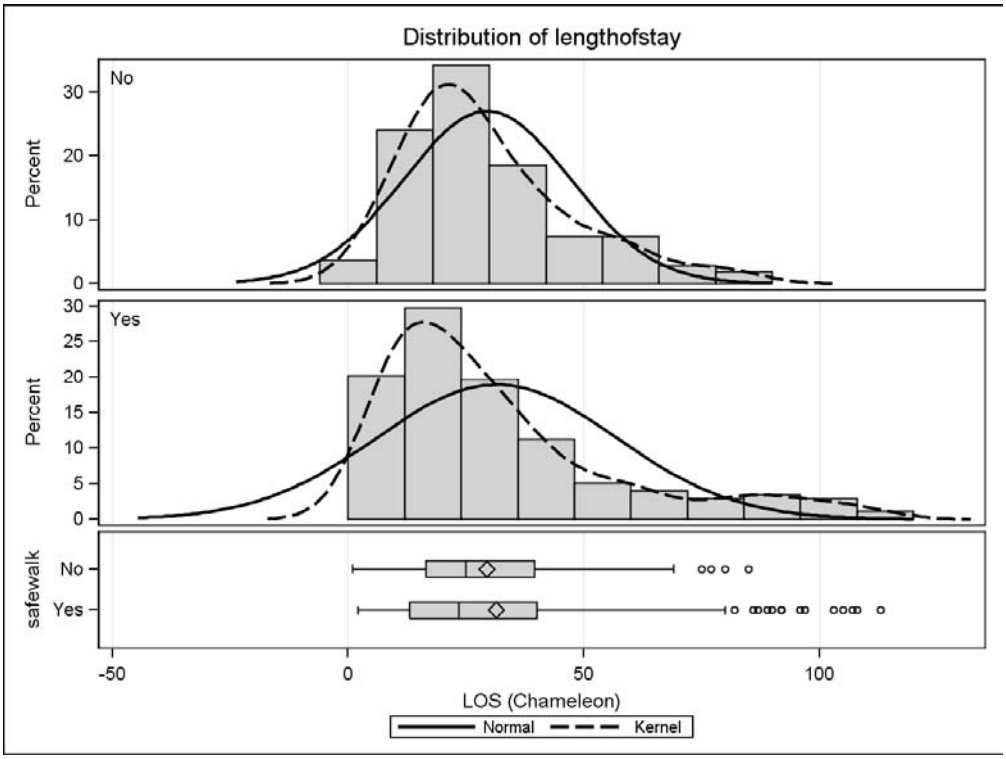


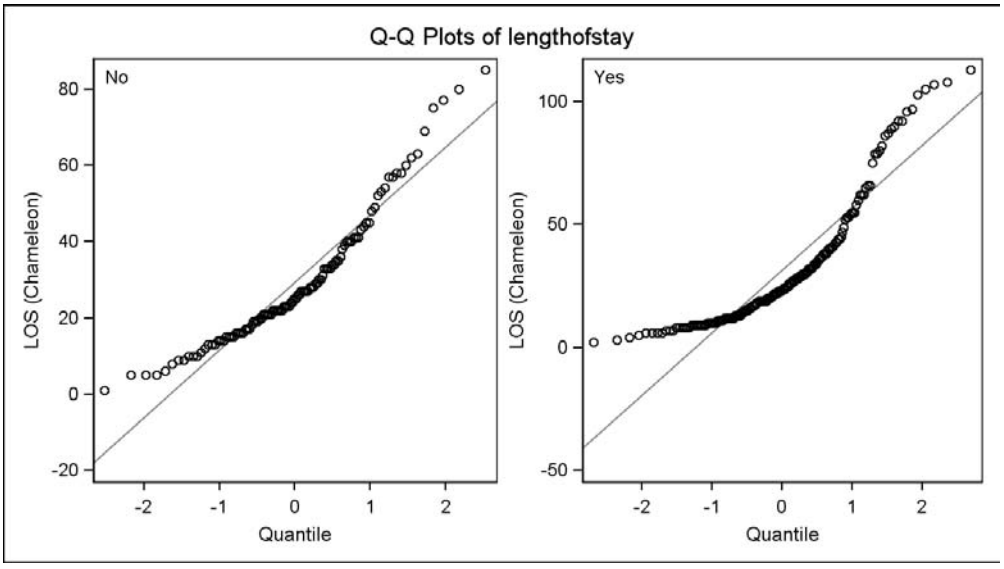
Post-Safewalk – Length of Stay for Pit Bull Type Dogs



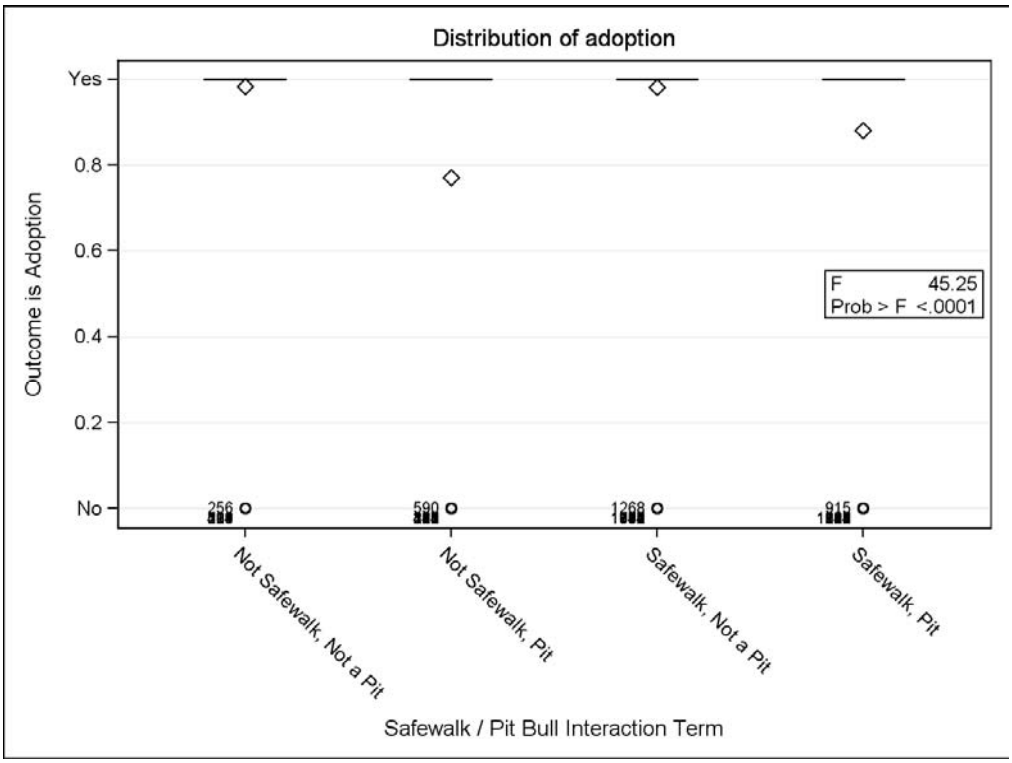
We had the compelling results we were looking for, but needed to prove significance. We ran further analyses on the data, including PROC MULTTEST with a Bonferroni p-value adjustment, PROC TTEST for pair-wise comparisons, and PROC ANOVA to compare an interaction term between binaries for pit bull type dogs and pre/post Safewalk. From these procedures, we were able to obtain significance statistics for our comparisons.

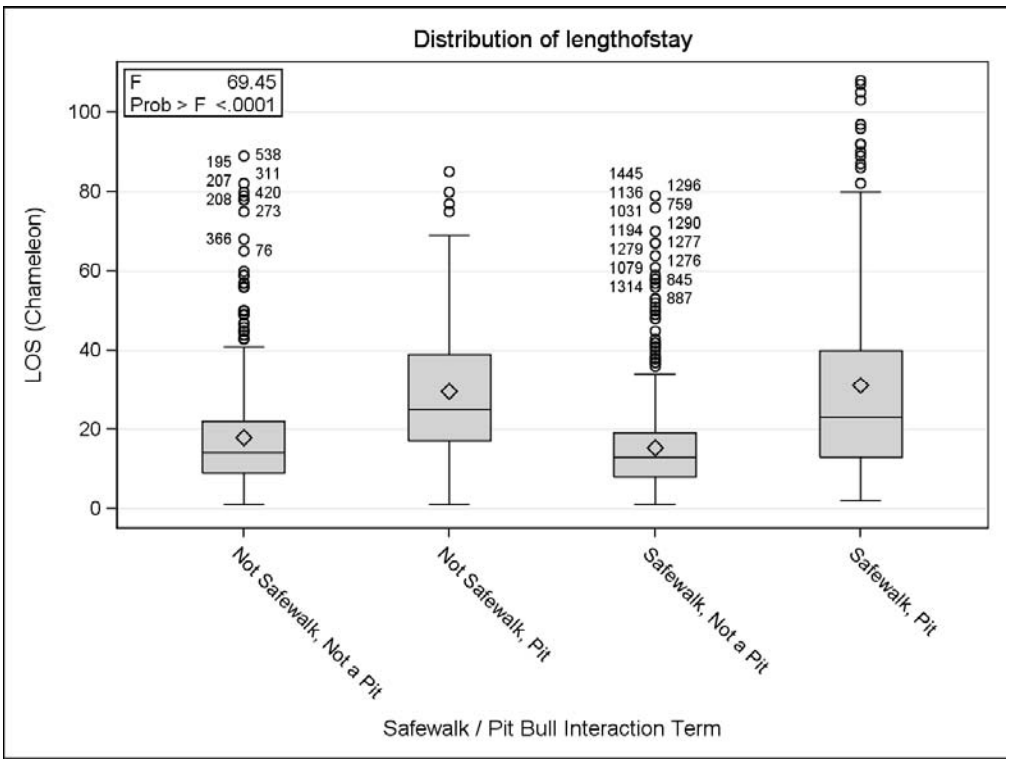
PROC TTEST graphic output – Pitbull





PROC ANOVA graphic output





WHAT'S NEXT FOR THE SAFEWALK ANALYSIS?

We plan to do more in depth multivariate analysis on the existing data base to help us refine the Safewalk program to best serve both dogs and humans. PROC REG will be used to model length of stay, and PROC LOGISTIC will be used to model the adoption outcome. We also plan survival analyses. In addition, a secondary source of data, a "dog log" detailing each walk a volunteer takes a dog on, will be explored. These logs are filled out for each dog while they are on the adoption floor and contain information on who walked the dog, time of day, frequency and description of problem behaviors, comments on the walk experience, bathroom notes, and medical notes. The logs are reviewed by the behaviorist and her team to try and tailor the Safewalk program to each dog's particular needs. In conjunction with the "hard" data, this more subjective data source will provide valuable information on the Safewalk program.

CONCLUSION

What these numbers tell us is this: we do a good job at finding dogs new homes. However, as an "open admission" Shelter, we take in lots of pit bulls, and these big terriers need lots of training an enrichment to flourish and to withstand the institutional lifestyle. With consistent training for humans, pit bulls can withstand being homeless for longer periods, and get adopted at higher rates. SAS® analysis helped us visualize our data, and prove our hypotheses. The statistical significance for the tests we ran was .0001, showing that absent Safewalk, these changes would very likely not have occurred.

We were successful with Chopper, and he went to a new home on 4/24/08. He is considered to be to be the "case study dog" of Safewalk. Last we knew, he was living the high life in Chicago.

Thanks to SAS®, we were able to prove that the system that saved Chopper is helping pit bull type dogs survive and get adopted in a shelter environment.

REFERENCES AND RECOMMENDED READING

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CONTACT INFORMATION

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Code samples are available upon request.