

A Proposal to Establish the Maddie's Laboratory for the Benefit of Shelter Animals

Ronald D. Schultz, Professor and Chair, Department of Pathobiological Sciences

School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI 53706

schultzr@svm.vetmed.wisc.edu

Recurring and widespread sporadic outbreaks of infectious disease are major concerns in all shelters. The most common canine infectious diseases seen in these outbreaks are distemper (CDV), parvoviral diarrhea (CPV-2), and respiratory disease complex (caused by multiple viruses, bacteria, and environmental factors). The most common feline infectious disease outbreaks seen in shelters are feline panleukopenia (FPV) and feline respiratory disease complex (FRDC), caused primarily by feline herpes virus type 1 (FHV-1) and feline calicivirus (FCV) in association with various bacteria and environmental factors. Although many additional canine and feline infectious diseases exist, they generally occur more sporadically in a shelter animal population.

In most shelters, outbreaks or continuing occurrences of these diseases are often diagnosed clinically and with the aid of various diagnostic tests that are available in kit form, and/or through diagnostic laboratories. However, once shelters have a diagnosis, they frequently lack guidance to manage the outbreak in a manner that will result in the fewest number of deaths from disease and/or euthanasia. Shelter personnel, such as veterinary technicians, veterinarians, and managers, need information on which animals are susceptible to the disease and which are protected from the viruses causing the outbreak. Furthermore, information is not always available on how to prevent future outbreaks of the same disease, thus multiple recurrences can be frequent over the course of a year.

The services to be provided by the Maddie's Laboratory are designed to provide the most accurate information on managing disease outbreaks in shelters. More importantly, the laboratory will attempt to find methods and programs that will reduce or eliminate future similar outbreaks in that specific shelter as well as in shelters with similar disease outbreaks.

As outlined in the "First Year Goals for the Maddie's Laboratory", 25 shelters (including at least half that adhere to the Asilomar Accords) with "unexpected outbreaks of one of the infectious diseases listed above will be provided help controlling their canine outbreak caused by CPV-2 or CDV, or feline outbreak caused by FPV." Based on the information generated by testing samples in the Maddie's Laboratory, a plan will be developed to control or prevent similar outbreaks of the specific disease in other shelters.

Also, during the first year of the study, shelters will be selected in which serologic studies will be performed to examine levels of antibody to CDV, CPV-2 and/or FPV. These studies will be done in shelters with outbreaks of diseases caused by one of the above viruses to determine the number of

animals entering the shelter at the time of the outbreak that are susceptible to the virus causing the outbreak. It will then be determined which percentage of animals are protected from disease, with those vaccinated immediately (following their current protocol) upon entry to the shelter compared to animals vaccinated 24 to 48 hours before entry to the shelter. This will be accomplished by vaccinating and holding approximately 66% of the animals for 24 or 48 hours in a building or area that is separated from the building (room) with the outbreak. Approximately 33% of the animals will be vaccinated and immediately placed in the building (room) with diseased animals, as would be done currently in those shelters.

Development of active vaccinal immunity to CDV, CPV-2, and FPV is critical to providing protection. The first 48 hours after vaccination can make a significant difference in the animal being protected or not protected from severe clinical disease. During most current outbreaks, the immune status of animals entering the shelter is unknown. With the testing done by Maddie's Laboratory, the immune status will be determined and only immune animals will be allowed to enter without vaccination whereas the others will be vaccinated and immediately placed or held for one or two days to give the vaccines time to provide protection. We will also determine whether one commercial vaccine is more effective than another in terms of the time it takes for immunity to develop.

Another question that has never been answered that will be answered by Maddie's Laboratory is whether it is more likely an animal vaccinated at entry to the shelter (e.g. first 12 hours) will develop a protective immune response sooner than an animal that is vaccinated after being in the shelter for 48 to 72 hours. Although it would be intuitive that vaccination as early as possible would lead to the greatest protection, the immune system may be significantly compromised by severe stress during the first 12 to 24 hours after admission to the shelter, thus the vaccine may fail to provide a protective response, whereas at 24 to 48 hours after admission, the response to vaccines may be protective.

These are questions we plan to answer during the first and second years of study (see goals for the first and second years). It may not be readily apparent to the casual observer that hours or a few days can make a difference with regard to vaccinal immunity, but they can for a variety of reasons. Most vaccines generally do not provide immunity within hours, but there are two: CDV vaccine, and intranasal "kennel cough" vaccine provide immunity in less than 24 hours. Other vaccines take at least 3 to 5 days to provide immunity (e.g. CPV-2, FPV) and yet others take weeks (FCV, FHV-1, CIV) in immunologically naïve (antibody negative) animals. The proposed outbreak studies are included in the goals for the first year, but they will continue to be goals for the 2nd and 3rd years.

Based on the results we find with regard to "optimal time for vaccination", we will institute various programs at specific shelters to determine if timing of the vaccination does make a difference in the development of immunity and prevention or control of an outbreak with a given pathogen (e.g. CDV vs. CPV-2) or species (FPV outbreak in the cat vs. CPV-2 outbreak in the dog). Although the canine and feline parvoviruses are almost identical, the host species are very different with regard to the immunity that develops and the effect of stress on development of protective immunity. Of special interest is the difference between canine and feline combination vaccines in their effect on the host immune system. Feline combination vaccines (FPV, FCV, FHV-1) when administered, do not cause immunosuppression, whereas the canine combination vaccines (CDV, CPV-2, CAV-2 with or without CPiV) cause significant immunosuppression starting 72 hours post vaccination and continuing for 7 to 9

days when administered to immunologically naïve (antibody negative) dogs. We have found that the percentage of immunologically naïve dogs entering some shelters is as high as 50%! Vaccine induced immunosuppression is of minimal consequence to the pet dog in a relatively pathogen-free environment (e.g. the owner's home.) However, in a pathogen filled shelter environment, immunosuppression may significantly increase susceptibility to disease outbreaks like CRDC or enhance the severity of disease for 3 to 10 days after canine vaccination! It will be possible using the techniques and testing available in the Maddie's Laboratory to answer important questions regarding timing of vaccination and which combination of vaccines to use to provide the best protection at the earliest possible time without compromising the immune system.

The Maddie's Laboratory at the outset will have access to all the techniques, equipment, and tests currently available in the Schultz laboratory, making it possible to perform all the proposed studies. This is a significant advantage because the time and efforts of the specialist and scientist will be devoted to performing the proposed studies rather than developing test procedures. Whenever possible, "in-office or field tests" available and used in the shelters will be performed simultaneously with tests performed in Maddie's Laboratory to compare and ensure that the "in-office tests" give similar information to the gold standard laboratory tests! When the "in-office tests" do not correlate with laboratory tests, an attempt will be made to determine how or if those tests should continue to be used to help control certain shelter disease outbreaks. For some tests, we have already demonstrated the "in-office" tests are very valuable in controlling an outbreak and determining which animals are or are not at risk for developing a specific disease like FPV or CDV. Rapid antibody tests for FPV and CDV are very useful in predicting the outcome of the disease in specific cats and dogs respectively and to determine if the animals are immune, and thus can be sent to foster homes or adopted. In contrast, those that are infected and those that are not immune may need to remain in the infected environment to prevent further spread of disease. We have already found that certain of the "in office" tests are unable to provide reliable information for those animals incubating the infection. In this case, laboratory tests are required to make decisions on which animals are immune and which are susceptible.

The information generated through the Maddie's Laboratory on diagnosis and control of disease outbreaks will be provided in the quarterly newsletter, available online to any shelter. Also the medical expertise of the laboratory will be available to shelter veterinarians, animal technicians, and other shelter personnel throughout the US to help manage infectious disease problems through prevention, diagnosis, and treatment if and when appropriate.

Shelters seeking assistance from Maddie's Diagnostic Laboratory will receive these services free-of-charge. In return, participating shelters in the first year of the project will be asked to submit their Calendar Year 2011 annual shelter statistics using the attached reporting form based on the Asilomar Accords. Maddie's fund is available to answer questions about the reporting form and to help you meet this requirement (510-337-8975 or grants@maddiesfund.org). Shelter participating in Year 2 will need to provide Calendar Year 2012 annual shelter statistics, for year 3 participants, Calendar Year 2013 annual shelter statistics.

During the first year of a 3 year program, the following projects will be initiated. Some will be accomplished during the first year, whereas others will be initiated and continued for the 3 years of the program.

Goals for the First Year of Maddie's Laboratory

1. A Maddie's Laboratory Newsletter that provides information on use and interpretation of various laboratory tests and describes certain diseases or disease complexes will be initiated. For the first year, we will plan to publish the Newsletter online for any shelter that wants access to it. The Newsletter will also include information about the services the laboratory can provide. It will be published quarterly.
2. Ten shelters, including at least half that adhere to the Asilomar Accords, will be selected for which serologic studies will be performed for CDV and CPV-2 in dogs and FPV in cats. The shelters will be requested to obtain 5 to 10 canine and 5 to 10 feline samples daily on entry to the shelter for one to two weeks with the aim of obtaining a minimum of 100 samples. Based on the percentage of animals that are sero-positive for these viruses, we will be able to determine the risk factor for these diseases. Follow-up blood samples will be collected from dogs and cats on day of adoption to determine the serologic profile at the time animals leave these shelters. Vaccination programs in the shelters will be known and will differ (eg shelters where all animals are vaccinated on entry [24 hours] vs. those where the time of vaccination varies from 1 to 7 days).
3. Studies will be performed to demonstrate how many days/weeks after vaccination dogs and cats will be positive for vaccine viruses on PCR tests (dogs for CDV and CPV-2, and cats for FPV, FCV and FHV-1). Dogs and cats that are antibody positive to these viruses at vaccination will be compared to dogs and cats that are antibody negative at time of vaccination.
4. Two or three shelters with canine respiratory disease complex (CRDC) will be identified and nasal swabs, feces, and blood will be obtained to attempt to determine the viruses, bacteria, mycoplasma, and intestinal parasites present in the shelter animals' samples. Immune response (antibody) will be measured to the organisms isolated. Serum samples from these shelters will be tested for canine influenza virus (CIV) antibody to determine the role this virus is playing in their CRDC.
5. Up to 25 shelters with unexpected outbreaks of infectious disease will be provided help in controlling their outbreak, which will most likely be CPV-2, FPV, or CDV. Serologic testing and PCR will be used to control the outbreak by identifying the animals that need to be removed from the shelter to isolate them from the infected animals and to determine those that are immune and can remain in the shelter or be safely adopted.
6. Blood samples from dogs and cats giving birth to pups and kittens in 5 shelters will be collected and tested for CDV and CPV-2 in dogs and FPV in cats. Based on the antibody titer, the pups and kittens will be vaccinated on a date determined via a nomograph to be the earliest the pups or kittens can be actively immunized. Samples collected 7 to 10 days after vaccination will be tested for antibody.

7. A study currently in progress is designed to determine if the recombinant canarypox vectored CDV vaccine, when used in pups, will provide better immunity than the MLV CDV vaccines by immunizing at an earlier age in the presence of maternally derived antibody (MDA).

Goals for the Second Year of Maddie's Laboratory

1. Continue to publish the Maddie's Laboratory Newsletter on a quarterly basis
2. The results of serologic testing performed in the 10 or more shelters during the first year as well as disease outcome in those shelters will be analyzed. Recommendations for model vaccination programs will be made, based on these results, in an attempt to tailor the vaccination program to meet the needs of specific types and sizes of shelters, and at the same time keep program costs as reasonable as possible.
3. Results of first year testing to determine how long after vaccination PCR tests, as well as other highly sensitive diagnostic tests, remain positive, will be made available so that diagnostic testing will not be confused by vaccination as is currently the case. Many shelters are currently spending significant amounts of money for diagnostic tests like PCR without knowing how to interpret the results in recently vaccinated animals. The information generated from our "vaccination studies" will be extremely valuable in knowing when a positive result from a vaccinated animal is likely to be virulent virus and not vaccine virus, thus a truly positive animal.
4. A study will be initiated based on our serologic studies during the first year to determine if a given combination of vaccines will be more effective in controlling the severity of CRDC in shelters with a continuing history of CRDC. In a 2003 Shelter Study of CRDC, we found no difference among the different vaccines used that were available at the time in reduction of clinical disease. New vaccines and different combinations of vaccines are now available and we anticipate more vaccines in the near future. A study similar to the 2003 study will be performed using the old and new vaccines, with the hope of finding the best combination of products to reduce the severity of CRDC.
5. At least 10 long stay shelters (half of which adhere to Asilomar Accords) will be selected in which 50% of the dogs (at least 500) will receive parenteral CIV vaccine and an intranasal product with Bordetella, CPiV, and CAV-2 and 50% (at least 500) will not receive the CIV nor the intranasal CAV-2 portion of the combination vaccine so that enough dogs are vaccinated and included in the study to determine if the additional vaccines (CIV and CAV-2) reduced the severity of CRDC.
6. The results of a study using recombinant (r) CDV vaccine to vaccinate puppies will be initiated in shelters having CDV outbreaks. This will be done to further demonstrate that recombinant CDV vaccine is more effective and safer to use in very young puppies than any of the MLV products currently being used.
7. A study will be initiated to determine if reactivation of FHV-1 is more prevalent in shelters with severe FRDC than shelters with mild FRDC. FHV-1 reactivation will be determined from samples tested by PCR as well as by serologic testing. Significant increases in antibody titers after entry to the shelter occurs in cats that recrudesce the FHV-1. The serologic results will also demonstrate the degree of stress the cats are under, since it takes severe stress to release enough cortisol to reactivate the latent FHV-1.

Goals for the Third Year of Maddie's Laboratory

1. Continue to publish the Maddie's Laboratory Newsletter on a quarterly basis.
2. Results from previous and ongoing serologic studies with pre and post vaccination samples will be used to establish and/or refine recommendations for optimal times to vaccinate. Also, information on what combination of vaccines is most effective in providing rapid protective immunity will be made available to help ensure as many shelters as possible are using the most effective vaccines and vaccination programs for both cats and dogs.
3. Results of studies in selected long stay shelters where injectable CIV vaccines and intranasal CAV-2 vaccines were routinely administered will be analyzed to determine if vaccination with those additional vaccines provided any measurable benefit in the control of CRDC (Kennel Cough). Currently, few or no shelters use CIV vaccine, and very few use the intranasal CAV-2.
4. We will continue and complete the study started in year 2 to determine if the recombinant CDV vaccine provides an advantage in immunizing pups in shelters with high numbers of canine distemper cases. We will initiate a study to compare rCDV with measles virus (MV) vaccine to immunize puppies with MDA.
5. The study on the role of recrudescence of FHV-1 in FRDC will be completed and recommendations made regarding procedures to reduce recrudescence of FHV-1 in cats entering a shelter (eg treatment with lysine will be compared to no treatment).
6. A complete Maddie's Guide on Management of Canine and Feline Diseases will be written based on results from our studies as well as published studies and made available online to all shelters.

We believe the proposed studies will provide critical information on methods to best prevent, manage, control and possibly treat important canine and feline infectious diseases that currently cause high morbidity and, in some outbreaks, even high mortality. More importantly, certain of these studies will optimize procedures to prevent future outbreaks, thus reducing suffering and mortality caused by these important pathogens of cats and dogs.



The Pet Rescue Foundation

Animal Statistics Table

	NAME OF ORGANIZATION:	Dog	Cat	Total
	DATE OF REPORT: (MONTH/YEAR - MONTH/YEAR)			
A	BEGINNING SHELTER COUNT (date)			0
	INTAKE (Live Dogs & Cats Only)			
	<i>From the Public</i>			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
B	Subtotal Intake from the Public	0	0	0
	<i>Incoming Transfers from Organizations within Target Community (specify orgs)</i>			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
C	Subtotal Intake from Incoming Transfers from Orgs within Target Community	0	0	0
	<i>Incoming Transfers from Organizations outside Target Community (specify orgs)</i>			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
D	Subtotal Intake from Incoming Transfers from Orgs outside Target Community	0	0	0
	<i>From Owners/Guardians Requesting Euthanasia</i>			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
E	Subtotal Intake from Owners/Guardians Requesting Euthanasia	0	0	0
F	Total Intake [B + C + D + E]	0	0	0
G	Owner/Guardian Requested Euthanasia (Unhealthy & Untreatable Only)			0
H	ADJUSTED TOTAL INTAKE [F minus G]	0	0	0
	ADOPTIONS (only dogs and cats adopted by the public)			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
I	TOTAL ADOPTIONS	0	0	0

	OUTGOING TRANSFERS to Organizations within Target Community (specify orgs)			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
J	TOTAL OUTGOING TRANSFERS to Orgs within Target Community	0	0	0
	OUTGOING TRANSFERS to Organizations outside Target Community (specify orgs)			
	Healthy			0
	Treatable – Rehabilitatable			0
	Treatable – Manageable			0
	Unhealthy & Untreatable			0
K	TOTAL OUTGOING TRANSFERS to Orgs outside Target Community	0	0	0
L	RETURN TO OWNER/GUARDIAN			0
	DOGS & CATS EUTHANIZED			
M	Healthy (Includes Owner/Guardian Requested Euthanasia)			0
N	Treatable – Rehabilitatable (Includes Owner/Guardian Requested Euthanasia)			0
O	Treatable – Manageable (Includes Owner/Guardian Requested Euthanasia)			0
P	Unhealthy & Untreatable (Includes Owner/Guardian Requested Euthanasia)			0
Q	Total Euthanasia [M + N + O + P]	0	0	0
R	Owner/Guardian Requested Euthanasia (Unhealthy & Untreatable Only)			0
S	ADJUSTED TOTAL EUTHANASIA [Q minus R]	0	0	0
T	SUBTOTAL OUTCOMES [I + J + K + L + S] Excludes Owner/Guardian Requested Euthanasia (Unhealthy & Untreatable Only)	0	0	0
U	DIED OR LOST IN SHELTER/CARE			0
V	TOTAL OUTCOMES [T + U] Excludes Owner/Guardian Requested Euthanasia (Unhealthy & Untreatable Only)	0	0	0
W	ENDING SHELTER COUNT (date)			0

In a perfect world, the Ending Count is equal to the Beginning Count (A) plus Total Intake (F) minus all Outcomes (R+V). -----> 0 0 0

If your reported Ending Count does not match these numbers, please go back through your data and be sure you didn't miss something (i.e., animals in foster, adoptions, transfers, etc.). If all animals have been accounted for and the reported Ending Count is different, please indicate in the comment section.

COMMENTS:

I agree that in completing this form, we have used the Maddie's Fund definitions of “Healthy,” “Treatable - Manageable,” “Treatable - Rehabilitatable,” and “Unhealthy & Untreatable” as set forth in the attached document titled, “Maddie’s Fund® Categorizations/Definitions of Shelter Animals.”

Signature: _____ **Date:** _____



The Pet Rescue Foundation

Health & Behavior Categories for Shelter Animals

The following definitions are taken from the Asilomar Accords. For more information on the Accords, please visit the [Asilomar Accords](#) page on our website. For more information on how to apply these definitions, please click on [A Guide to the Asilomar Definitions](#).

Healthy: The term "healthy" means and includes all dogs and cats eight weeks of age or older that, at or subsequent to the time the animal is taken into possession, have manifested no sign of a behavioral or temperamental characteristic that could pose a health or safety risk or otherwise make the animal unsuitable for placement as a pet, and have manifested no sign of disease, injury, or congenital or hereditary condition that adversely affects the health of the animal or that is likely to adversely affect the animal's health in the future.

Treatable: The term "treatable" means and includes all dogs and cats who are "rehabilitatable" and all dogs and cats who are "manageable."

Rehabilitatable: The term "rehabilitatable" means and includes all dogs and cats who are not "healthy," but who are likely to become "healthy," if given medical, foster, behavioral, or other care equivalent to the care typically provided to pets by reasonable and caring pet owners/guardians in the community. (Treatable-rehabilitatable conditions are generally considered to be curable.)

Manageable: The term "manageable" means and includes all dogs and cats who are not "healthy" and who are not likely to become "healthy," regardless of the care provided; but who would likely maintain a satisfactory quality of life, if given medical, foster, behavioral, or other care, including long-term care, equivalent to the care typically provided to pets by reasonable and caring pet owners/guardians in the community; provided, however, that the term "manageable" does not include any dog or cat who is determined to pose a significant risk to human health or safety or to the health or safety of other animals. (Treatable-manageable conditions are generally considered to be chronic.)

Unhealthy & Untreatable: The term "Unhealthy & Untreatable" means and includes dogs and cats who, at or subsequent to the time they are taken into possession,

1. have a behavioral or temperamental characteristic that poses a health or safety risk or otherwise makes the animal unsuitable for placement as a pet, and are not likely to become "healthy" or "treatable" even if provided the care typically provided to pets by reasonable and caring pet owners/guardians in the community; or
2. are suffering from a disease, injury, or congenital or hereditary condition that adversely affects the animal's health or is likely to adversely affect the animal's health in the future, and are not likely to become "healthy" or "treatable" even if provided the care typically provided to pets by reasonable and caring pet owners/guardians in the community; or
3. are under the age of eight weeks and are not likely to become "healthy" or "treatable," even if provided the care typically provided to pets by reasonable and caring pet owners/guardians in the community.