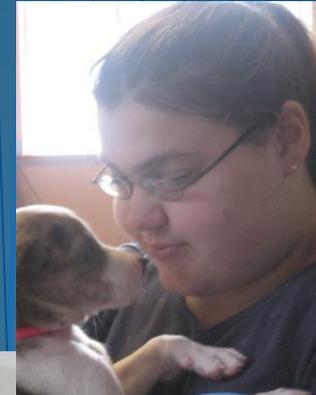


# Prevention of zoonotic disease transmission in animal shelters

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Center for Companion Animal Health  
University of California, Davis

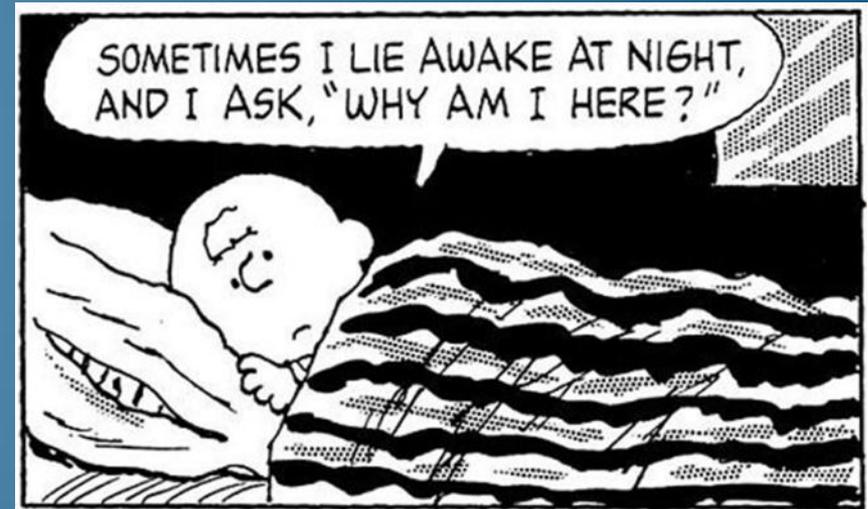
[www.sheltermedicine.com](http://www.sheltermedicine.com)

[www.facebook.com/sheltermedicine](https://www.facebook.com/sheltermedicine)



# Why are we here?

- Learn how to protect most people, most of the time, from zoonotic diseases of shelter pets
  - Emphasis on dogs and cats but general principles apply to all
- Become aware of resources for more information
- NOT: learn how to diagnose and treat every one of the countless zoonotic conditions that can occur in shelter animals



...And a voice answers, "To feed the dog".

# Case study

- Open admission shelter
- 15,000 annual intake
- Built in 1997
- 6 vets on staff
- 94 cat cages in banks



# Calm before the storm

- Self service cattery
- Cats moved from cage to cage for cleaning
- Sick cats treated with antibiotics in isolation and adoption
  - 70-80% either on, or had been on, antibiotics for URI
- In *retrospect*, increase noted in diarrhea and vomiting



# Every director's nightmare

- Several human cases of *Salmonella typhimurium* identified by local health department
- Resistant to ampicillin, chloramphenicol, streptomycin, sulfonamides, tetracyclines, trimethoprim
- Patient interviews reveal common factor: recent contact with a shelter cat



# Spread of the outbreak

- Index case was volunteer whose job was to socialize cats from hoarding case
- Some cases from subclinical and/or casual contact
- Most human cases after adoption or foster
- 49 human cases, 10 hospitalized, no deaths
  - Estimated 39 cases for every 1 diagnosed



*Disease transmission in action*

# Shelter impact

- Press release, CDC involvement
- 500 adopters contacted
- Many sick cats, mostly from foster or adoption
  - Antibiotics for URI was risk factor
- Extensive environmental contamination



# Intervention

- Shut down for 3 weeks
- Cages reduced to 66 (36% reduction)
- Stay in same cage with assigned carrier
- Sick cats immediately removed (foster or euthanized)
- Supervised cattery – mandatory gloves



# Results

	Cats handled	Cats adopted	Cats redeemed	Cats euthanized
Pre-outbreak	3308	1871 (56%)	108 (3%)	1329 (40%)
Post-outbreak	3291	1965 (60%)	103 (3%)	1223 (37%)

# Moral of the story?

- Avoid crowding
- House animals in a way that avoids movement in and out of cage or from cage to cage for cleaning
- Avoid indiscriminate antibiotic use
- House sick animals away from public
- Supervise visitors
- Keep good records on animals and adopters
- Keep communication channels open and reach out in case of disaster

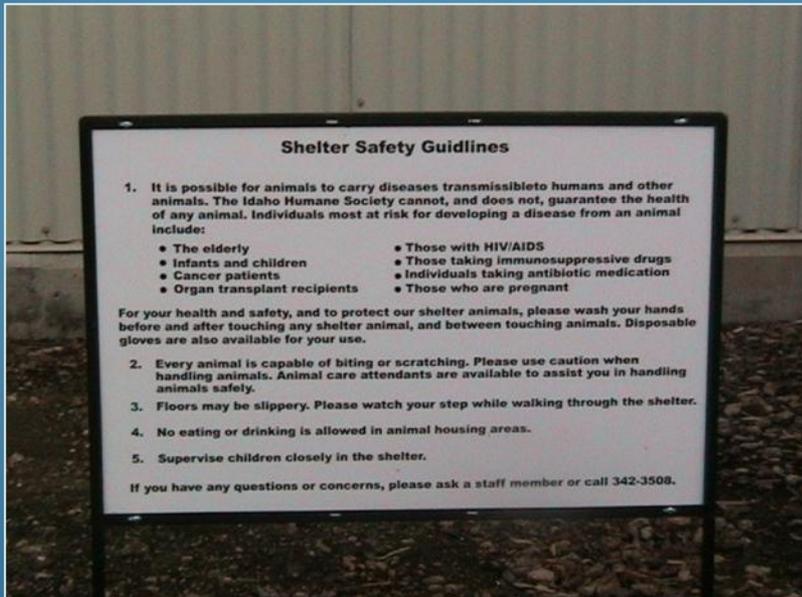
Practices that are good to decrease zoonotic disease risk are often good for shelter animal health and overall shelter success.



Another moral of  
the story...



# You can lead a horse to water, but...

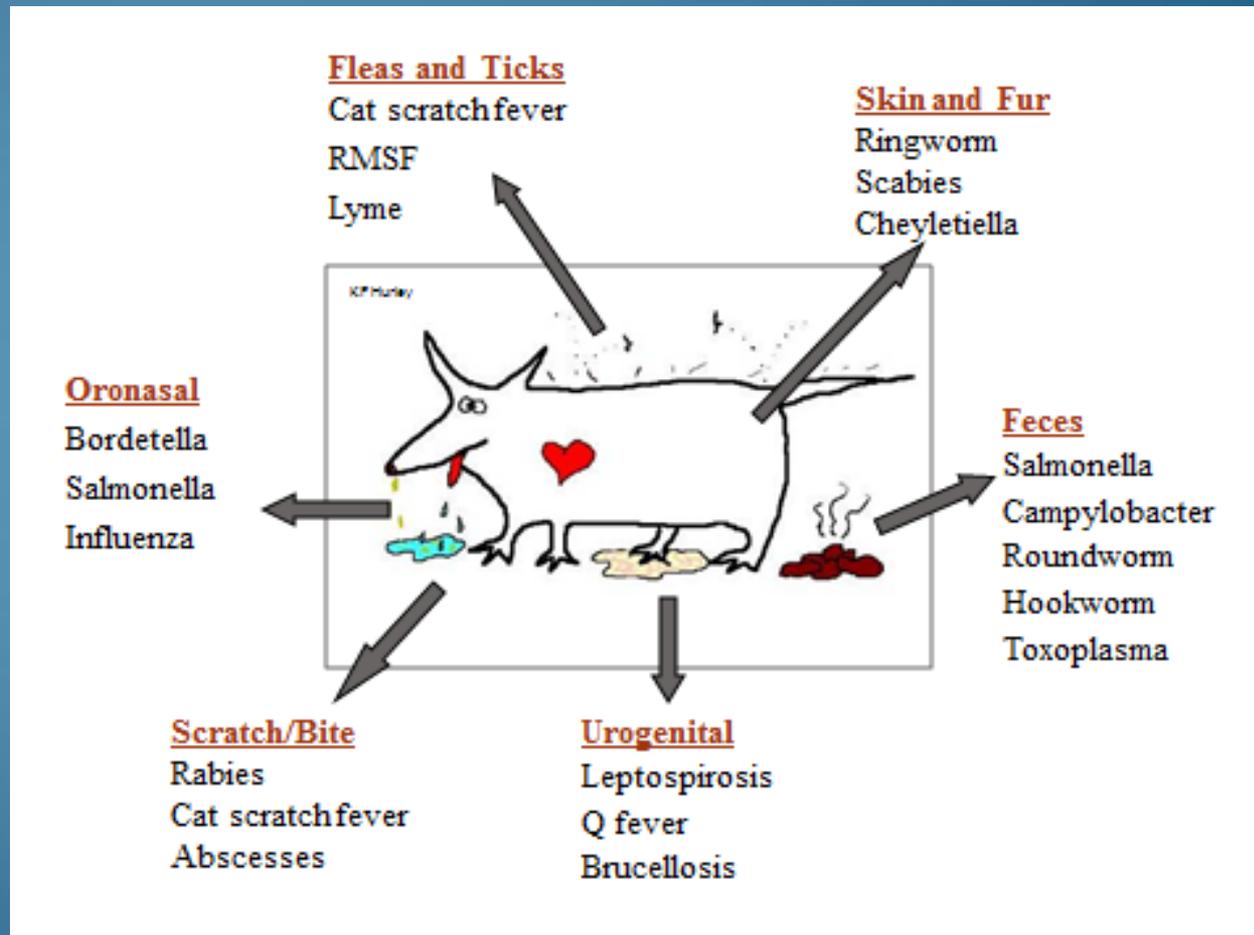


...you can't always make him drink





# So, what diseases do we worry about and where do they come from?



# Risky business!

Human exposure in the shelter

**Yikes!!!**

Stray/poorly cared for animals:  
Predation  
Parasitization  
Lack of vaccination  
Community exposure

Human  
Visi

Human re-entry to community  
Pets of exposed  
Contacts of exposed

Animal transport:  
Shelter to shelter Across ecological and socioeconomic zones

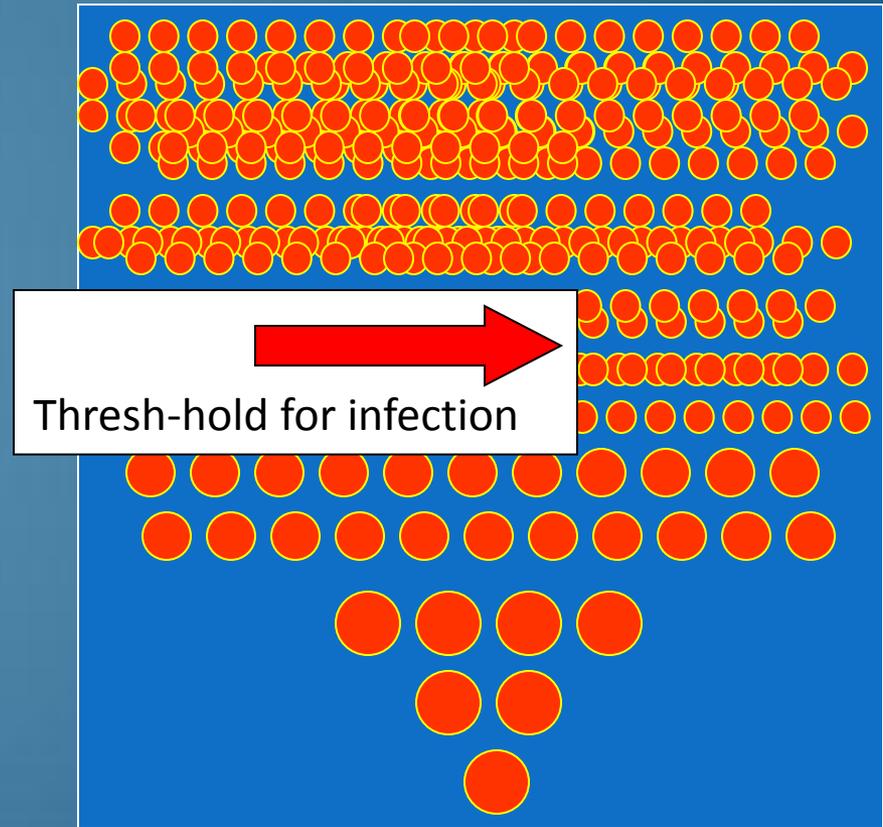
Animal exposure in the shelter  
Airborne  
Environmental  
Fomite  
Commingling

Animal re-entry to community  
Offsite adoptions  
Foster care  
Reclaim  
Adoption



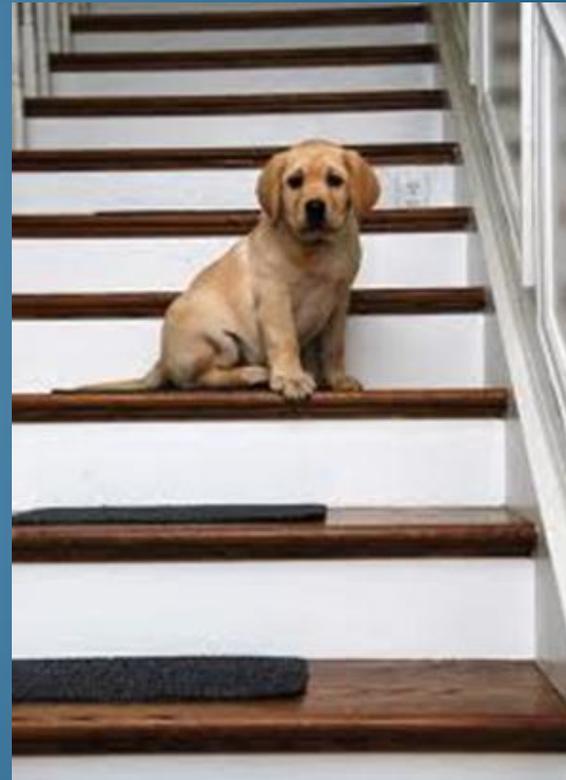
# Dose effect: why any of us are alive

- Dose = sources  $\times$  transmission opportunities
- Dose to cause harm = immune status  $\div$  virulence of germ
- Worry more about transmission opportunities when source numbers are high
- Worry more about dose when immune status is low or virulence is high



# Preventing zoonotic disease in 3 easy steps:

- Reduce exposure for high risk people
- Reduce transmission to all people
- Reduce the source of disease by minimizing animals risk and maintaining good animal health



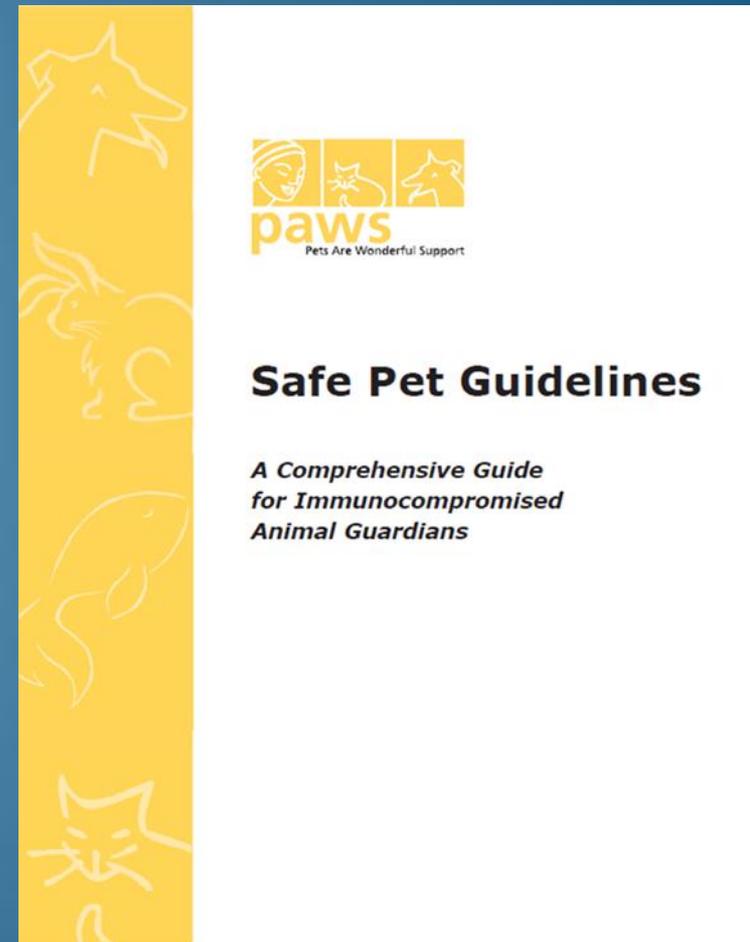
# High(er) risk people

- Age: < 5 years, geriatric
- Pregnant
- Immunosuppressive conditions or treatment
- High degree of direct animal contact
- High risk behaviors



# Protecting the immune compromised client

- May not know who they are
- Make information on health risks available to all
  - Visibly posted
  - In foster and adoption materials
- If you know, promote adoption direct from home/rescue or clean foster of healthy, vaccinated, examined, parasite free adult animal
- Remember pets also promote health



# Reducing transmission: what's most important for animals?



A. Hands



B. Clothes

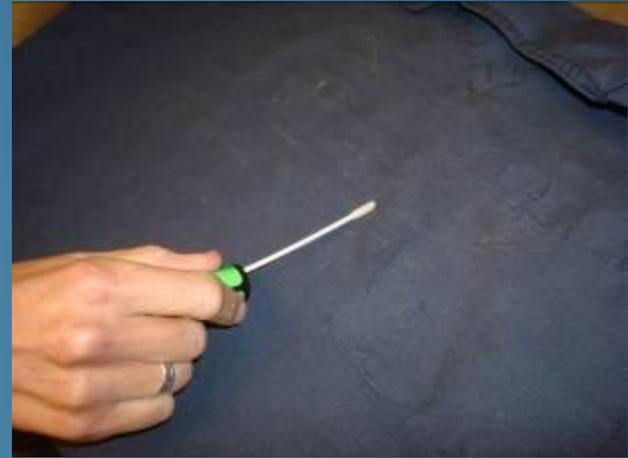


C. Feet

# Putting things in perspective



# Putting things in perspective



Test/ Site:  
Limit: 0  
RLU: 66899

Test/ Site:  
Limit: 5000  
RLU: 2362640  
Result: Fail

# Reducing transmission: what's most important for people?



A. Hands

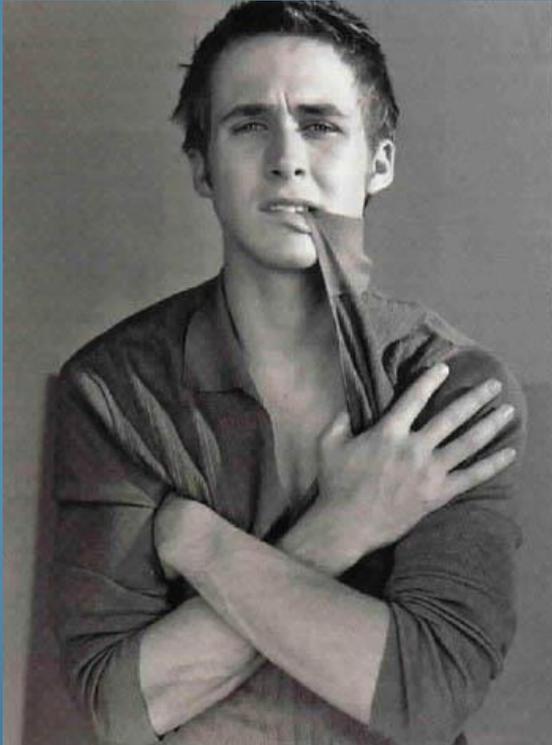


B. Clothes

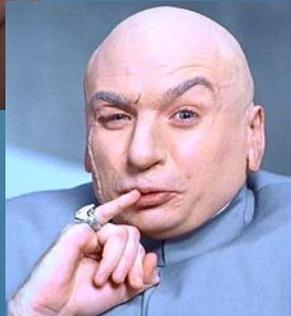


C. Feet

# Relatively uncommon behaviors



# More common behaviors



Which was most effective at reducing bacterial count on vet student's hands?



A.



B.

Traub-Dargatz, J. L., J. S. Weese, et al. (2006). "Pilot study to evaluate 3 hygiene protocols on the reduction of bacterial load on the hands of veterinary staff performing routine equine physical examinations." *Can Vet J* 47(7): 671-6.

- Reduction factors (RFs) for bacterial counts on examiners' hands were compared when performing a standardized equine physical examination, followed by the use of one of 3 hand-hygiene protocols (washing with soap, ethanol gel application, and chlorhexidine-ethanol application)...The RFs were significantly different ( $P < 0.0001$ ) between the hand-washing group and the other 2 treatment groups (the alcohol-gel and the chlorhexidine-alcohol lotion). The use of alcohol-based gels or chlorhexidine-alcohol hand hygiene protocols must still be proven effective in equine practice settings, but **in this study, these protocols were equivalent or superior to hand washing for reduction in bacterial load on the hands of people after they perform routine physical examinations.**

# Hand sanitizers

- Sometimes superior to hand-washing
- Before and between handling to protect animals
- After handling to protect people
- 60-80% ethanol or isopropyl
- Emollients to protect skin
- 20-30 seconds, all surfaces
- Within 3 feet of “point of care”/all animal housing areas
- Ineffective against some important pathogens



[http://www.youtube.com/watch?v=0at\\_jtzJCDM](http://www.youtube.com/watch?v=0at_jtzJCDM)

# Hand washing and gloves

- After contamination with feces, blood, body fluids etc.
- After inadvertent exposure to durable organisms
- Thorough drying
- Animal housing for highest risk, food prep, bathrooms



# Moisture is hazardous to health

- Patrick, D., F. G, et al. (1997). "Residual moisture determines the level of touch-contact-associated bacterial transfer following handwashing. ." Epidemiology and Infection **119** (3): 319-325.
- We report here a new and critical determinant of the effectiveness of hand hygiene procedures, namely the amount of residual moisture left on the hands after washing and drying. When samples of skin, food and utilities were touched with wet, **undried** hands, microbial numbers in the order of **68000, 31000 and 1900** respectively translocated to these representative surfaces. Bacterial numbers translocating on touch contact decreased progressively as drying with an air or cloth towel system removed residual moisture from the hands. A **10 s cloth towel–20 s air towel** protocol reduced the bacterial numbers translocating to skin, food and utilities on touch contact to **140, 655 and 28** respectively and achieved a 99·8, 94 and 99% reduction in the level of bacterial translocation associated with wet hands. Careful hand drying is a critical factor determining the level of touch-contact-associated bacterial transfer after hand washing and its recognition could make a significant contribution towards improving handcare practices in clinical and public health sectors.

# Bad idea



Chertow D. Outbreak of *Escherichia coli* O157:H7 related to direct and indirect animal contact in petting zoos—Florida, 2005. In: Programs and abstracts of the 55th Annual Epidemic Intelligence Service Conference, Atlanta, GA; April 24–28, 2006.

# Gloves

- Planned exposure to durable organisms, feces, blood, etc.
- For all during high risk periods
  - Change between animals to protect animals
  - Remove after handling to protect people
- Cheap “sandwich prep” gloves okay for casual use
- Caution with latex
- Wash hands after removal



# Designated feeding stations

- No animals allowed in food areas
- No food allowed in animal areas
  - Includes storage areas for vaccines and drugs
- Clearly designate with signage
- Provide hand sanitizer and accessible hand washing station



This is not Europe

# Keeping things in perspective

- Touching animals is important to:
  - Take care of them
  - Provide enrichment/relieve stress
  - Encourage adoption
- Animals that are too hazardous to touch should not be in public areas



# Speaking of hazards: minimizing risk of bites and scratches

- Encourage/require reporting of bites *and scratches*
- Wash vigorously with soap and water
- Offer referral for medical care
- Rabies response according to local health authority
- Provide high risk staff with pre-exposure rabies prophylaxis
- Double compartment housing and/or feral cat boxes for quarantine/aggressive animals
- Restrict access using locked doors, clear signage



# Source reduction: animal risk factors

- Symptoms
- Antibiotic treatment
- Co-infections
- Pregnancy
- Birthing
- Stress
- Parasites
- Age: < 6-9 months

Keep separate from  
high risk public  
Practice greater  
transmission control  
Practice preventive  
care and thoughtful  
antibiotic use

Increase supervision  
and transmission  
precautions with  
juveniles



# Risk reduction: sick/symptomatic

- Daily monitoring to identify/flag early in the day
- Population monitoring to identify trends
  - Appropriate diagnostics if substantial increase
- House with restricted public access
- Hand hygiene and protective gear
- In adoption *maybe* if:
  - Not on antibiotics
  - Mild signs
  - Singly housed, minimal contact
  - Minimal number affected
  - Proper signage
  - Adequate supervision

**I AM BEING MONITORED FOR  
UPPER RESPIRATORY  
INFECTION**

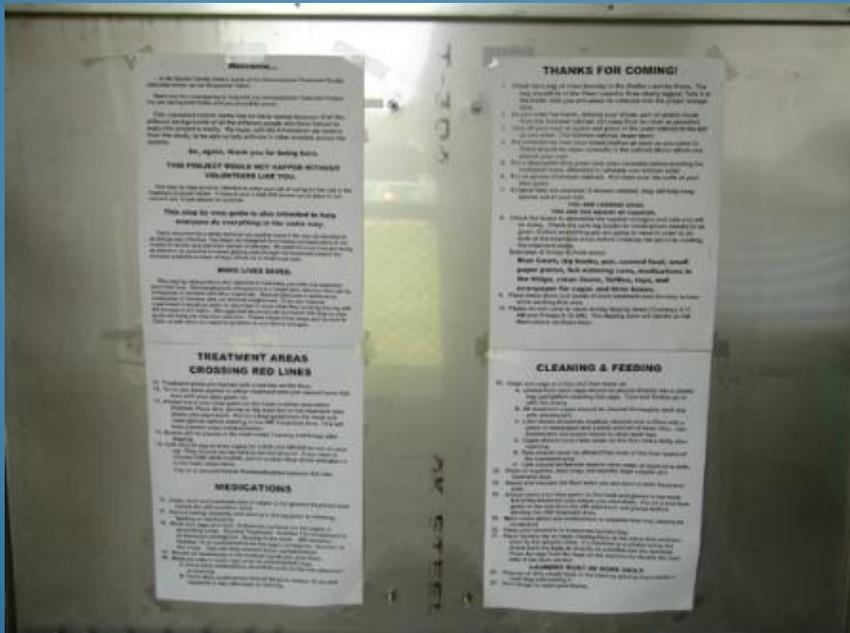
- Staff only to handle to handle me please
- Wash hands after handling
- Clean cage last
- Hang towel over cage and notify medical staff immediately of any of the following:
  - Loss of appetite
  - Depression
  - Green or yellow nasal or ocular discharge
  - Diarrhea or vomiting
  - Any other sign of serious illness

Date, observations and initials of observer:

Date 1: _____	Signs: _____	Initials: _____
Date 2: _____	Signs: _____	Initials: _____
Date 3: _____	Signs: _____	Initials: _____
Date 4: _____	Signs: _____	Initials: _____
Date 5: _____	Signs: _____	Initials: _____

Remove sign if no sneezing for 3 days.

# You can lead a horse to water with really clear signage and proper equipment....

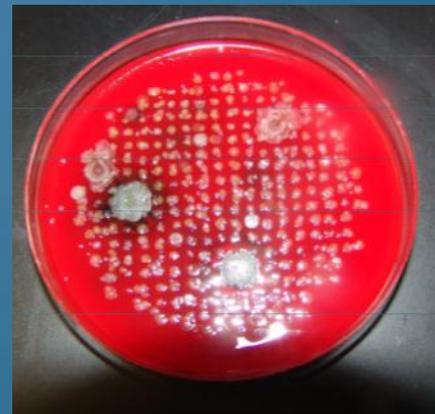


...but you still can't always make him  
drink



# Risk reduction: antibiotics

- Avoid antibiotics when possible
  - Good conditions overall to prevent illness
  - Good conditions in treatment areas
  - Supportive care
- Use antibiotics effectively when necessary
  - Shortest possible time
  - Highest safe dose
  - Likely to be effective against pathogen of concern
  - Diagnostics if needed
- Educate foster care providers



# A note about “diarrhea diagnostics”

- GI diagnostics usually inappropriate in asymptomatic individuals
  - E.g. Giardia ELISA
  - Exception for very high risk, e.g. known exposed, or establishing background prevalence
- Diarrhea diagnostics often unhelpful in individual animals
  - Available tests commonly fail to detect some pathogens
  - Many pathogens commonly found in sick and well animals at similar frequencies
- Depending on age, symptoms, circumstances and overall health, consider empirical/supportive response, save your time and money for population problems
  - Withhold food or modify diet?
  - Treat suspect problem?
  - Treat symptoms?
- Diarrhea/vomiting diagnostics very important in population
  - GI PCR panel, culture
  - Compare results to expected background levels
  - Use a reputable lab

# Risk reduction: housing and care

- Double-compartment housing to protect staff, animals, public
  - Bites, scratches
  - Disease transmission
  - Fecal exposure
- Prioritize for highest risk:
  - New intake/high risk transfer
  - Juveniles
  - Sick animals



# Fecal/oral separation



# Risk reduction: internal parasites



Companion animal parasite council:  
<http://www.capcvet.org/>

- Roundworm: visceral/ocular larva migrans
- Hookworm: cutaneous larva migrans
- Transmammary +/- in utero transmission
- ~ 1 in 4 infected, often without symptoms
- Roundworm eggs very difficult to kill

<http://www.cdc.gov/parasites/zoonotichookworm/resources/prevention.pdf>

# Risk reduction: internal parasites



- Pyrantel pamoate (e.g. Strongid, Nemex), fenbendazole (e.g. Panacur), others effective
- Treat all animals on intake, pregnant/nursing moms, puppies and kittens every 2 weeks from 2-8 weeks of age
  - Avoid Drontal-plus in pregnant, < 4 weeks
- Treat long term shelter animals, pets of staff and foster parents monthly
  - Combo products e.g Interceptor, Revolution, Profender, Advantage Multi
  - Or just pyrantel monthly
- Limit access to play-yards for juveniles of all species
- Promptly pick up feces

<http://sheltermedicine.com/shelter-health-portal/information-sheets/internal-parasite-control-guidelines>

If you don't take precautions, be prepared to break out the flamethrower



<http://www.youtube.com/watch?v=76J6k9dfc4Y>

# Or the bulldozer



# Risk reduction: external parasites

- Fleas
  - Cat scratch fever (*Bartonella henselae*)
  - Tapeworms
- Ticks
  - A variety of hideous diseases, some potentially fatal
- Treat all on intake if possible
- Treat monthly for long term shelter pets, staff and foster parent pets
- Treat environment as needed

## Texas Animal Shelter Battles Tick Infestation

By Dustin Vissering



**A** Texas animal shelter has a really, really bad infestation. How bad? Imagine finding more than 600 ticks on one dog.

# Frequently asked question

- Frequently Asked Questions about external parasite control
- **Is it okay to split large-dog size packages of Advantage, Frontline, Promeris or Revolution and use them on multiple smaller animals?**
- This is an attractive option for shelters because it is cost-saving, and may allow shelters to treat large numbers of animals with products that would otherwise be unaffordable. This approach is widely used, and appears to be safe and effective. However, using Advantage, Frontline or Promeris in this way is actually illegal, although it is acceptable to use this method with Revolution. This is because Advantage, Frontline and Promeris are considered pesticides rather than medications, and, as such, are regulated by the Environmental Protection Agency (EPA) rather than the Food & Drug Administration (FDA). Unlike the FDA, the EPA does not allow for use of products in any manner other than exactly as product label describes. The splitting of large sizes of Revolution to use on multiple smaller animals is off-label, but is acceptable as long as it is done under the direction or supervision of a veterinarian.

# Risk reduction: ringworm

- Screen all on intake
  - Higher risk: Cats versus dogs, juvenile, long haired, hoarding background, any skin lesion/condition
- High quality Woods lamp
- Truly dark room
- Trained staff
- Direct exam and fungal culture for definitive diagnosis

## Cat shelter being sued

[Discuss](#) [Comments](#) [Images](#) [E-mail](#) [Print](#) [Twitter](#) [Facebook](#) + -

By George Breithaupt  
June 15, 2010 10:20 am EDT

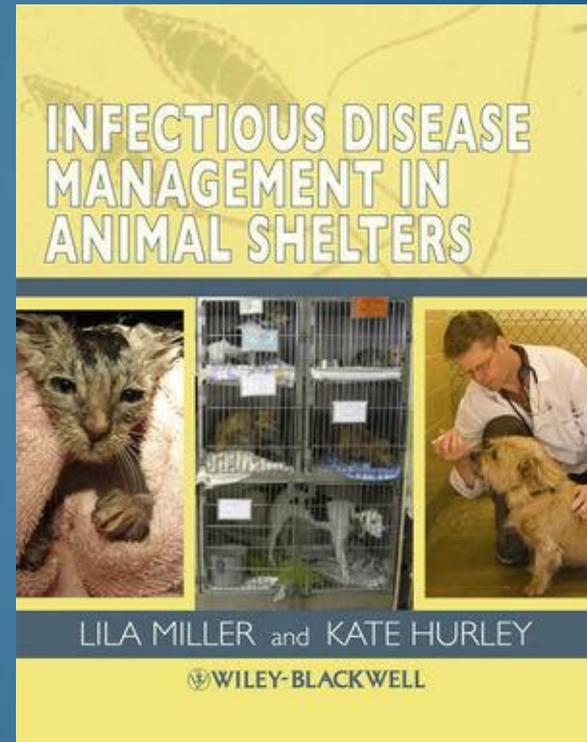
MOUNT VERNON — Maria Fabish of Dublin has filed a case in small claims court against the Knox County Humane Society, alleging that staff at the society knew a cat was ill before adopting it out Dec. 31, 2009.

"The cat actually presented healthy when I got her," Fabish said. "Within a week of having her, she developed an upper respiratory infection. I took her to my vet and they told me she had herpes, which I guess is rampant in shelters. So we treated that."

Fabish said that within two weeks the cat started to develop lesions, dry skin and scaly scabs on her ears. The vet diagnosed it as ringworm.

# Risk reduction: Ringworm

- Treatment option may assist “recognition”
- Use proven treatment
- Topical key to reduce contamination
- Verify cure with fungal culture
- 2-3 at least one week apart



# Risk reduction: Ringworm

- Mechanical cleaning and bleach 1:10 (1.5 cups per gallon) to decontaminate
- Stay tuned for more info on accelerated hydrogen peroxide
- Verify via environmental cultures



# Selected resources

- Infectious Disease Management in Animal Shelters: Chapter 14, Internal parasites; Chapter 15, Bacterial and protozoal gastrointestinal disease; Chapter 16, Dermatophytosis; Chapter 17, Ectoparasites; Chapter 23, Zoonoses (Wiley Blackwell, or available on Amazon)
- CDC Healthy Pets <http://www.cdc.gov/healthypets/>
- Companion animal parasite council [www.capc.org](http://www.capc.org)
- UC Davis Koret Shelter Medicine Program <http://sheltermedicine.com/shelter-health-portal/information-sheets/zoonotic-diseases-in-shelters> and many other portions of our website
- ASV Guidelines for Standard of Care in Animal Shelters, [www.sheltervet.org](http://www.sheltervet.org), especially public health section

Questions?

