Developing a parasite control program for your facility

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June 2019

Develop a great working relationship with a veterinarian near you!

- Be honest with them about:
  - Your facilities
  - Your staff
  - Your budget

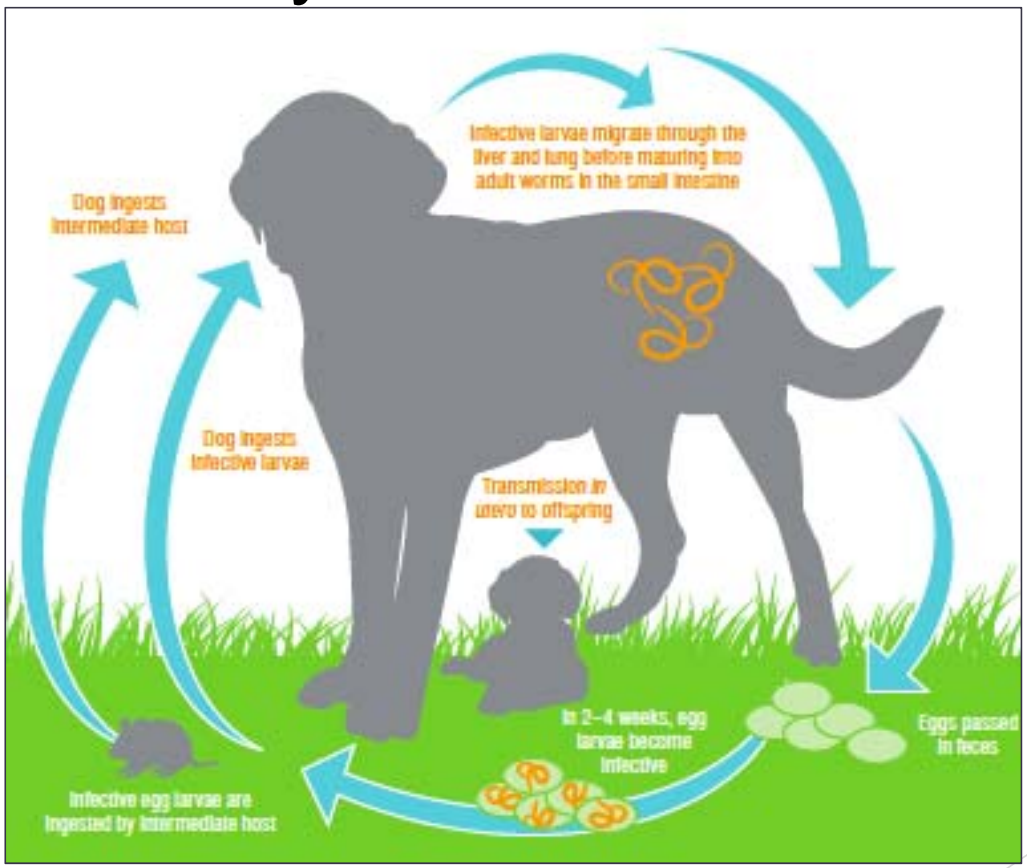
- An open dialogue is the best path to providing the best care for your animals.

- www.capcvet.org

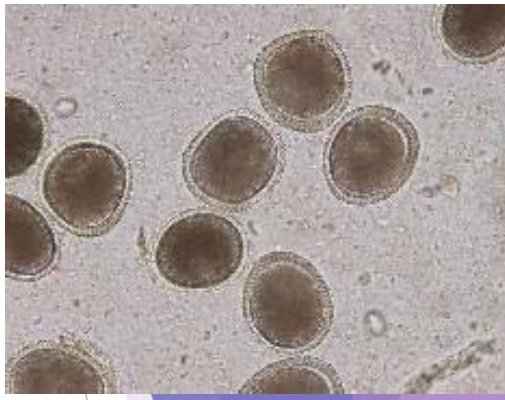
Outline

- Internal parasites
  - Roundworms
  - Hookworms
  - Coccidia
  - Giardia
  - Others
- Planning for internal parasites
- External parasites
  - Fleas
  - Ticks
  - Mites
  - Flies
- Planning for external parasites

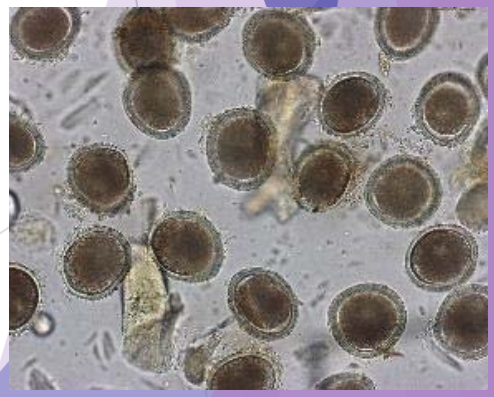
Roundworm life cycle



Depending upon the route of infection, the prepatent period can be as short as 3 weeks.

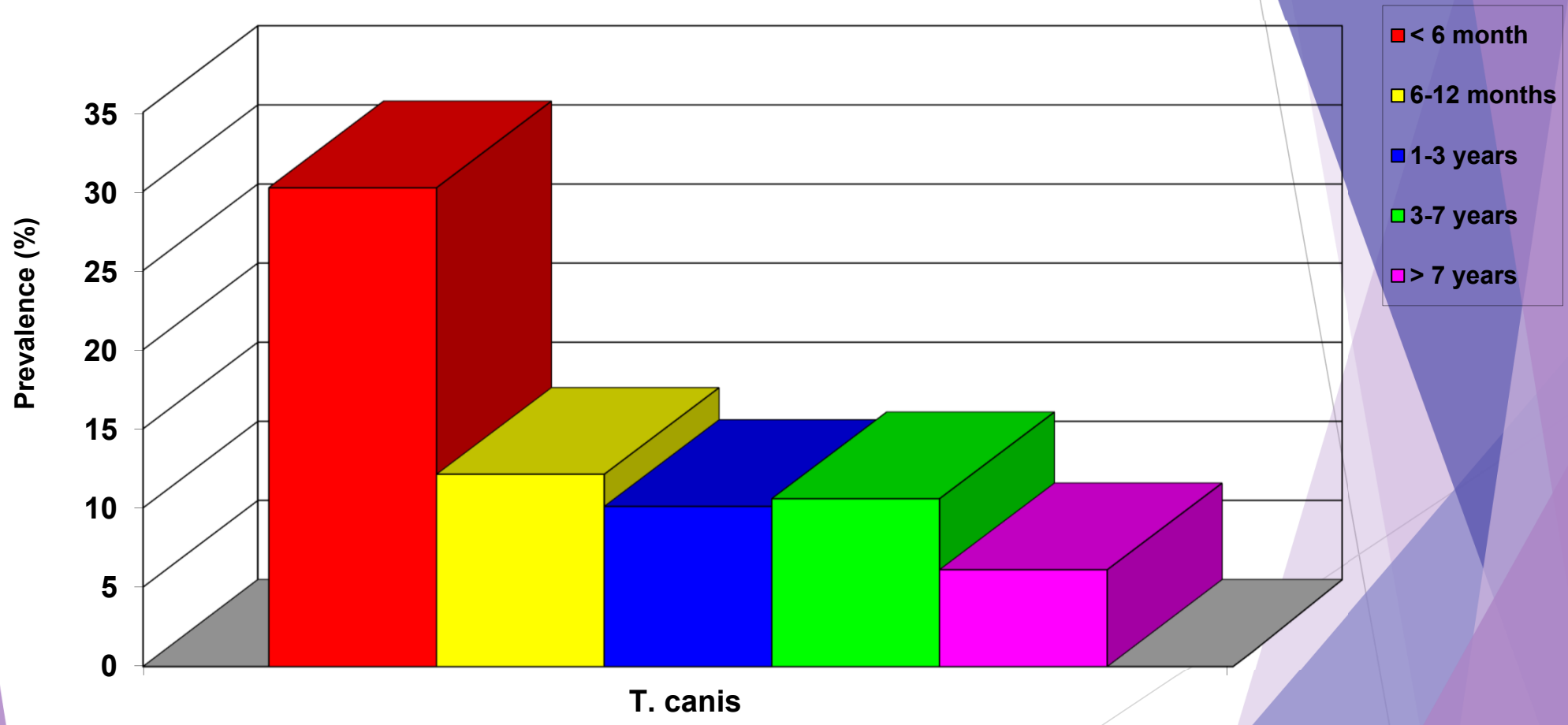


Toxocara canis eggs



Toxocara cati eggs

Prevalence - Age

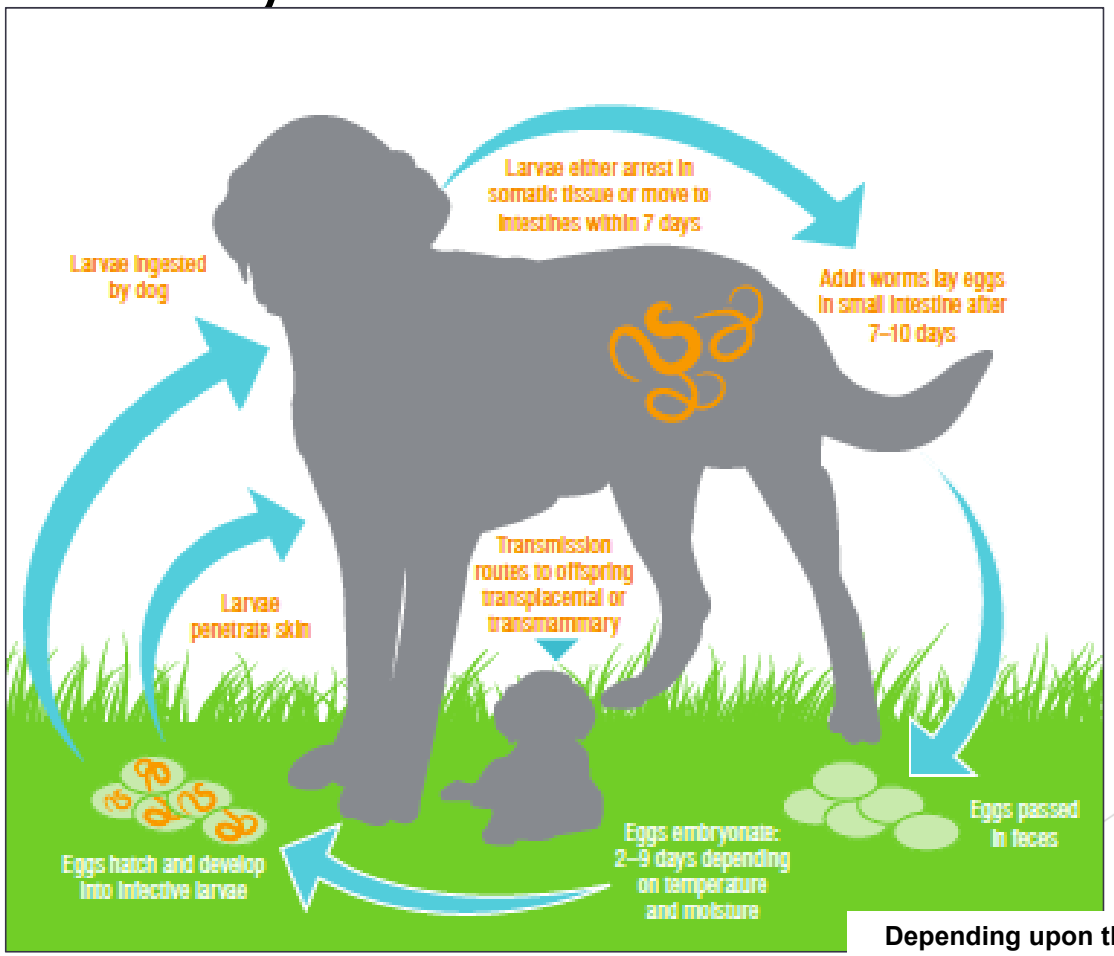


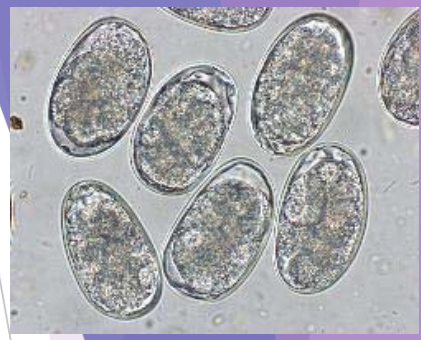
6,458 canine fecal samples

Clinical implications of ascarids

- Clinical signs are highly variable due to parasitic burden:
  - Asymptomatic
  - Potbellied, smaller than normal
  - Dry skin, poor hair coat—dermatitis
  - Malnourished appearance
  - Diarrhea or constipation
  - Vomiting and diarrhea
  - Death due to intestinal obstruction
- Zoonotic:
  - Visceral larva migrans, ocular larva migrans, overt toxocariasis

Hookworm life cycle

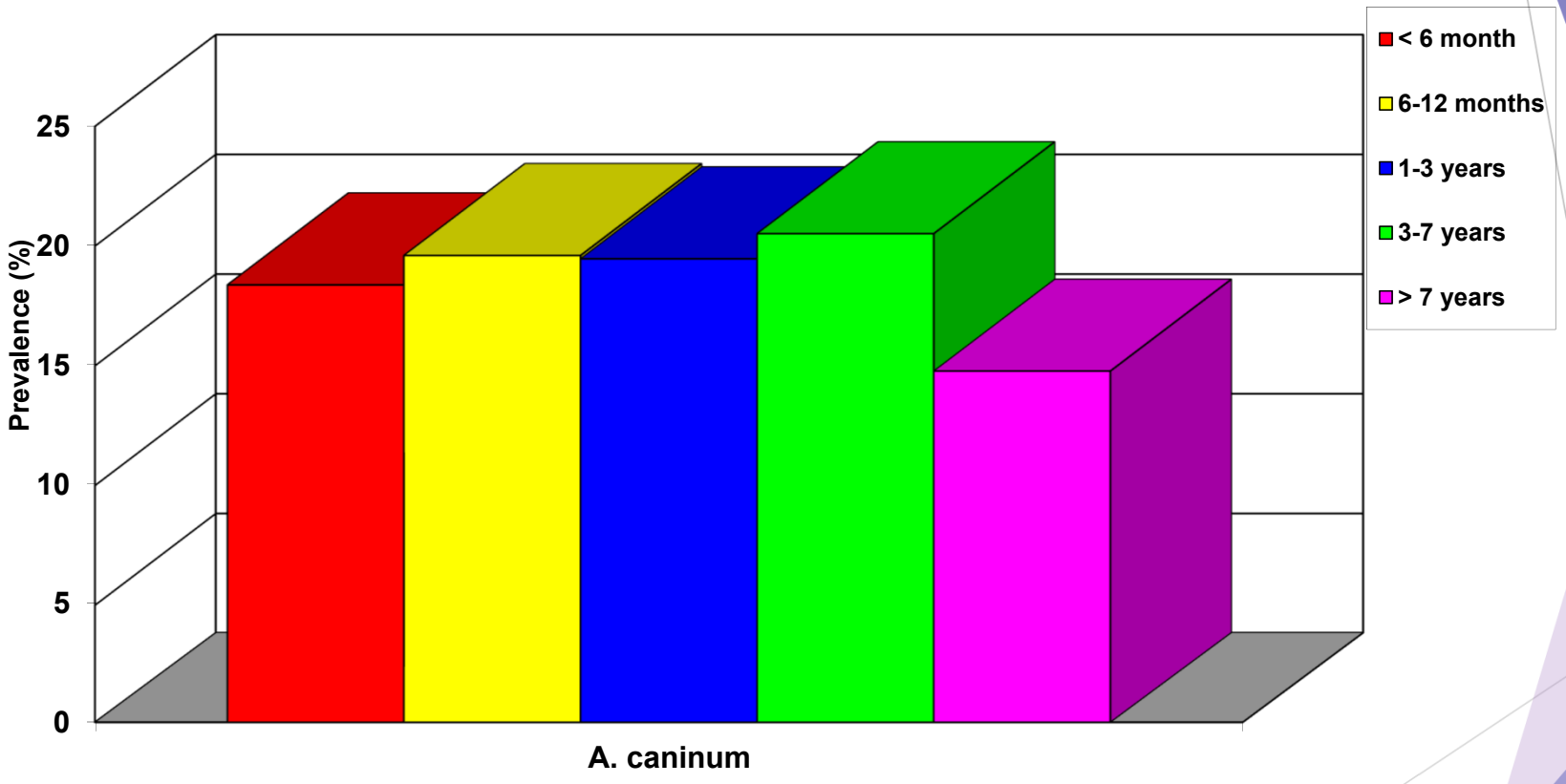




Ancylostoma caninum
eggs ~60 × 40 µm

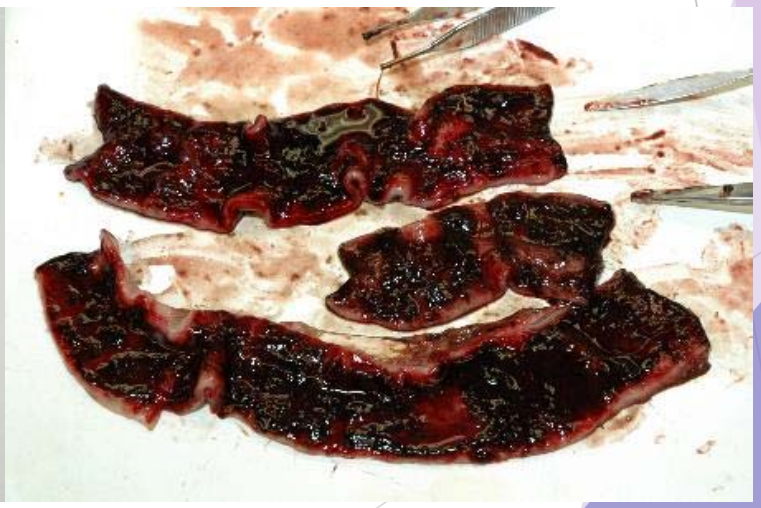
Depending upon the route of infection, the prepatent period can be as short as 2 weeks.

Prevalence - Age



Clinical implications of hookworms

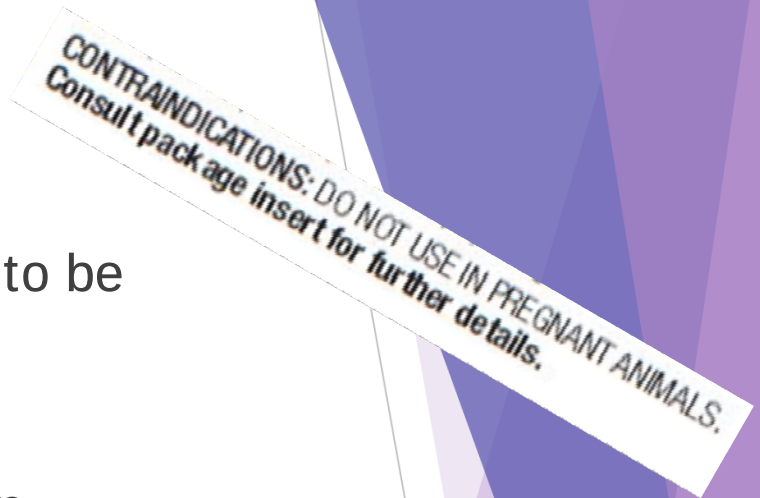
- Diarrhea and bloody feces:
  - May contain bloody mucus or are dark and tarry
- Anemia, general weakness, emaciation, and death
- Zoonotic



Controlling intestinal worms

- The program must start with pregnant animals to be successful

- Start puppies on deworming strategy at 2 weeks
  - 2, 4, 6, 8 weeks then monthly afterward
- Start kittens on deworming strategy at 4 weeks



Coccidia

- *Cystoisospora sp.*
  - *Formerly Isospora sp*
- *Hammondia sp.*
- *Sarcocystis sp.*
- *Toxoplasma sp.*

Coccidia

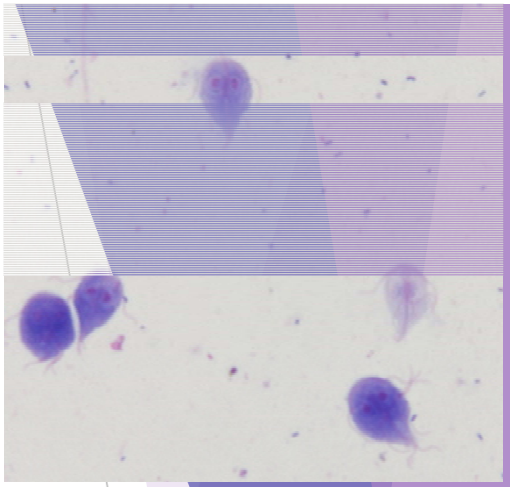
- Disease of young animals
- Disease of animals in confinement
  - Shelters, kennels, etc.
- Coccidia are infectious after several days in the environment

- Diarrhea ➔ Dehyrdration

Giardia

- Immediately infectious to dogs and cats
- Cysts are very environmentally stable
  - Weeks to months in water/moist environments

- Profuse watery diarrhea

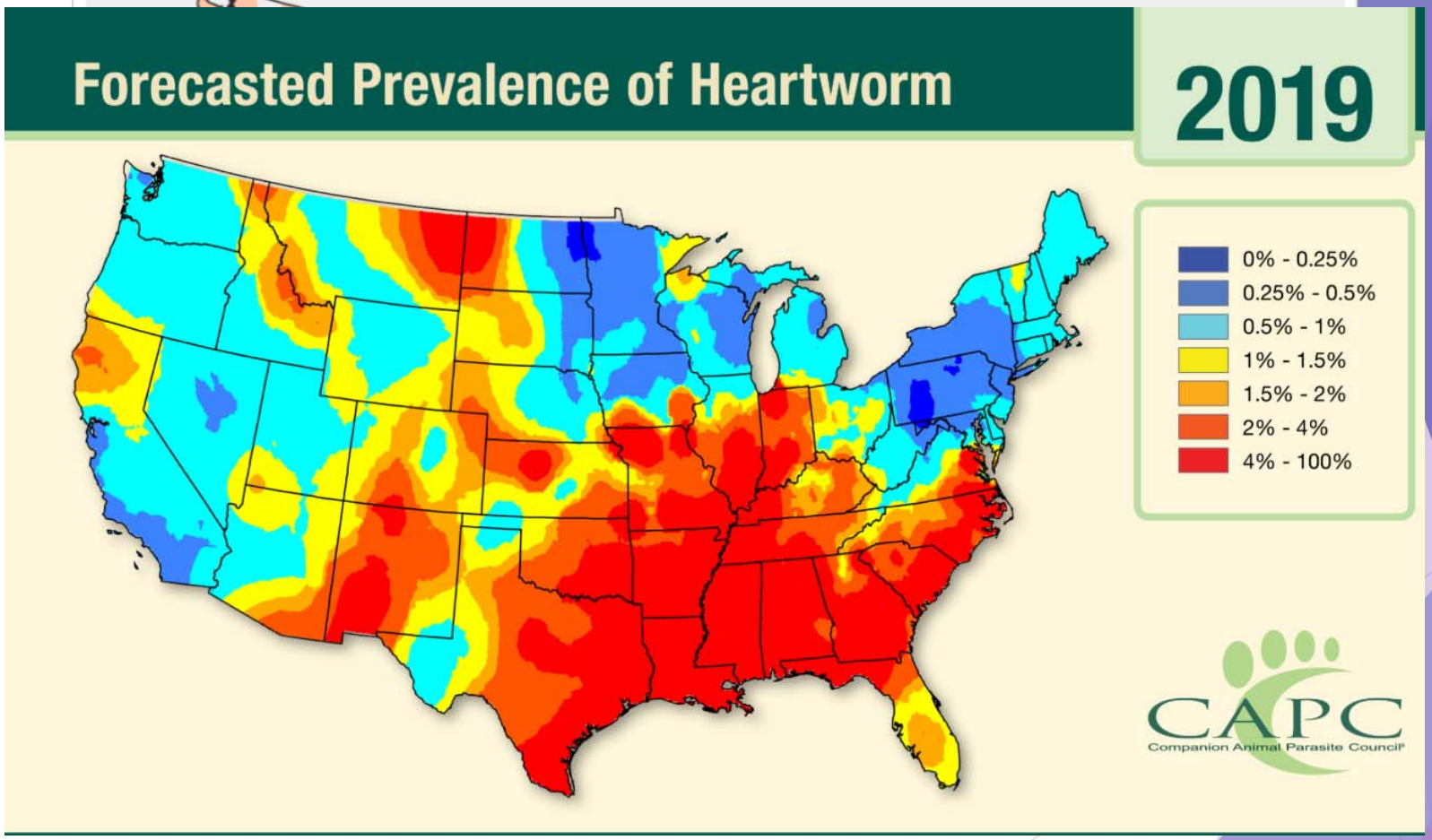


Managing Giardia

- When treating, you must address the environmental contamination
  - Dog's/cat's own fur
  - Litter box
  - Food/water bowls
  - Bedding
- Must bathe animal on the last day of treatment AT MINIMUM

Heartworm

- Occurs in Europe, Asia, Australia, Africa, South American and North America
- Reported in all 50 states
  - Endemic (at least regionally) in all states but Alaska
  - **Highest incidence** - S. East, Mississippi & Ohio river valleys & California North Central Coast and Sierra Nevada Foothills.
  - **Lowest incidence** - Rocky Mountains, Pacific North West and upper plains states.
- Estimates of numbers of dogs infected
  - 2010 – 2012 survey of 10.7 million dogs in U.S., 1.3% had positive antigen tests.
  - CAPC reported 136,924 positive heartworm tests in 2017 out of 10,217,791 total tests
    - Mainly reporting results from IDEXX and Antech
    - Does not include the majority of practices doing in-house heartworm tests


Forecasted Prevalence of Heartworm
2019
0% - 0.25%
0.25% - 0.5%
0.5% - 1%
1% - 1.5%
1.5% - 2%
2% - 4%
4% - 100%
CAPC
Companion Animal Parasite Council

Travel Cases!

- This is a major diagnostic challenge for many vector-borne diseases
- A good history is key!!
- Pet travel to and from endemic areas
  - 14% of pet owners take their pets on trips over 50 miles

Heartworm has spread due to increased transportation of dogs from southern enzootic areas and decrease in mosquito control programs because of societal concerns about the use of outdoor pesticides.

HUNDREDS OF DOGS BROUGHT TO COLORADO TO FIND LOVING HOMES

October 4, 2017

DONATE TO

Last month, the [
project. In just tw
League's transfer
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The relocation pr
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A total of 339 Texa
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Upon arriving at t
vaccinations. Son

To ensure the safe
assessment. Anin

If you are interest

Route	Cost
Alabama (I-59, B'ham, Gadsden, Tuscaloosa Thurs pm P/U)	$160.00
Alabama (I-65, Mobile Thurs 7 am CST P/U)	$185.00
Alabama (I-65, Montgomery, Clanton, B'ham, Athens Thurs P/U)	$160.00
Arkansas (I-40, Little Rock, Lonoke, Forest City Thurs am P/U)	$160.00
Arkansas (Texarkana Wed 10 pm CST P/U)	$160.00
Louisiana (I-12, Covington Wed 9 pm P/U)	$185.00
Louisiana (I-20, Haughton/Shreveport Wed pm P/U)	$160.00
Louisiana (I-20, West Monroe Thurs 6 am P/U)	$160.00
Mississippi (I-20, Clinton, Meridian; Thurs am P/U)	$160.00
Mississippi (I-20, Meridian, Clinton Wed pm P/U)	$160.00
New York SAT delivery (Syracuse, Castleton-on-Hudson/Albany)	$0.00
Northeast SAT Deliveries (MD, PA, NJ, NY, CT, MA Q, VT, NH)	$0.00
Tennessee (East Fri pm P/U)	$160.00
Tennessee (I-24, Chattanooga Thurs pm P/U)	$160.00
Tennessee (I-40, Memphis, Jackson, Dickson, Franklin, Lebanon Thurs P/U)	$160.00
Texas (I-30, Garland/Dallas Wed 7 pm P/U)	$185.00
Texas (Austin, Spring/Houston, Garland Wed P/U)	$185.00
Texas (Flower Mound Wed 4 pm P/U)	$185.00
Texas (I-20, Longview, Lindale Wed pm P/U)	$185.00
Texas (I-45, Spring/Houston Wed 11 am)	$185.00
Texas (Wichita Falls every 3 weeks Wed 2 pm P/U)	$185.00
Virginia (I-81, Wytheville, Roanoke, Staunton, Quicksburg, ClearBrook Fri pm)	$125.00

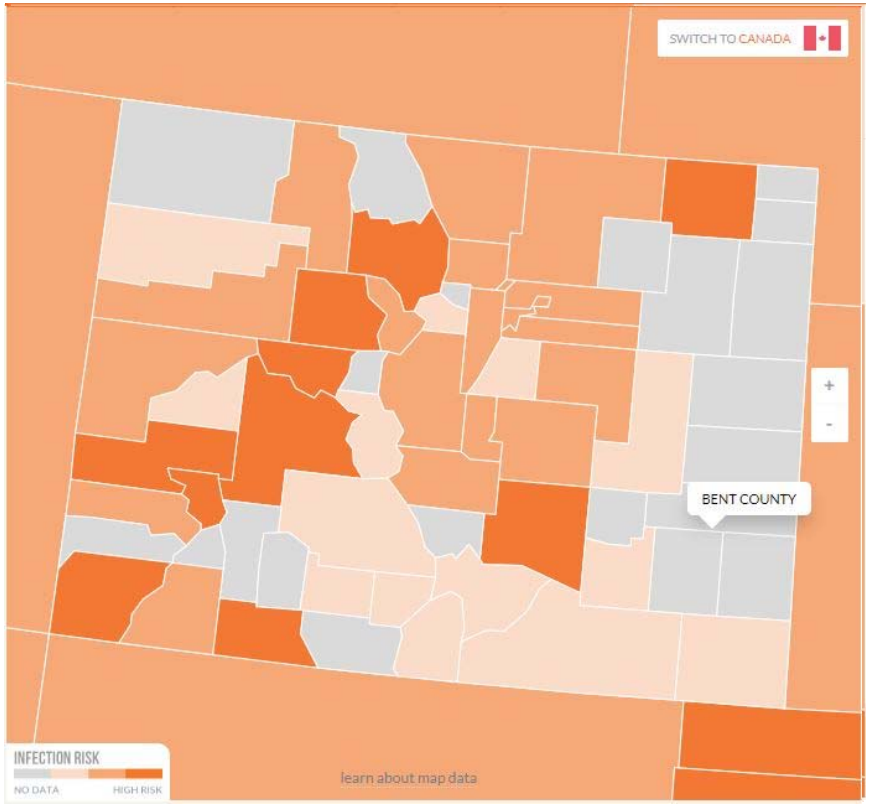
Other locations and private transports available, so don't hesitate to ask.
In addition to dogs, P.E.T.S. has safely transported cats, horses, pigs and rabbits.
Please contact us for more information

nted dogs from out of state, predominantly to the
in 2016 to Colorado shelters and rescues, where the
s around 90 percent and virtually no adoptable dogs
k of space to hold them.

RESCUE EXPRESS
HAS SAVED THE LIVES OF
18567
ANIMALS SINCE
FEBRUARY 14, 2015

New Routes Coming Soon

We've added **2 new buses** to serve storm affected areas in **Texas**, **Louisiana**, and **Florida**.



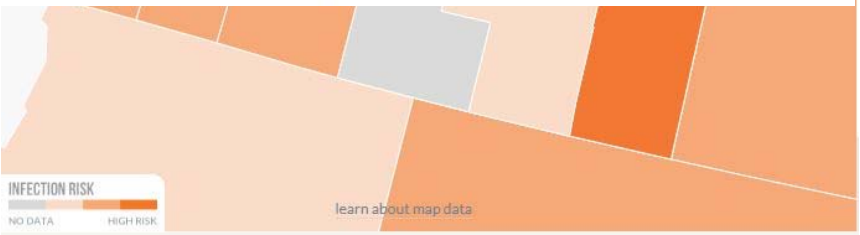
2013
2014
2015
2016
2017

2012

Washington

Dogs: CVI required. CVI must identify each animal and certify the rabies vaccination is current and the animal does not originate from an area under quarantine. Dogs 6 months or older may be required to be tested negative for heartworm. Dogs that are family pets, have been owned more than one month, and are not going to be sold or have a change of ownership and are traveling by private conveyance with their owner or handler are exempt from the heartworm test requirement.

2017



Heartworm has spread due to increased transportation of dogs from southern enzootic areas and decrease in mosquito control programs because of societal concerns about the use of outdoor pesticides.

The following document was developed by the American Heartworm Society in collaboration with the Association of Shelter Veterinarians.

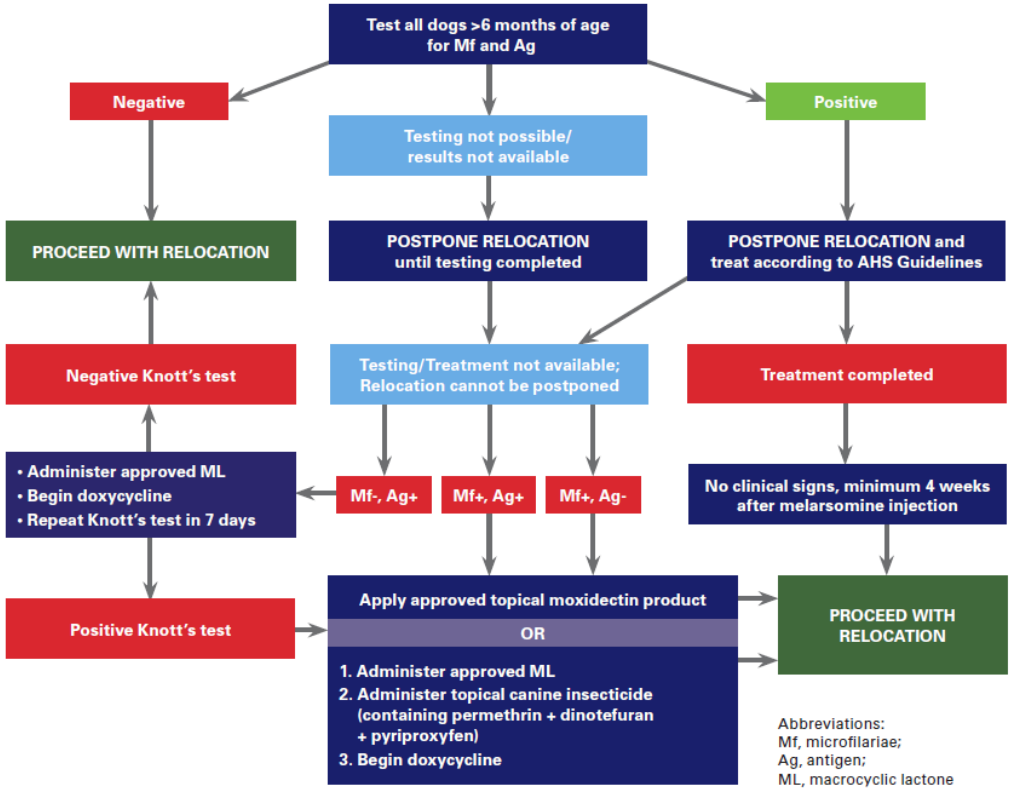
AMERICAN HEARTWORM SOCIETY™ EST.1974

ASSOCIATION OF SHELTER VETERINARIANS™

mosquitoes and subsequent transmission of infective larvae during transportation and for 1 month thereafter.[7]

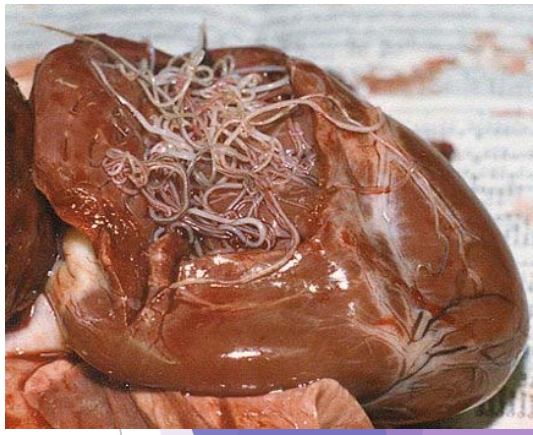
ii. Begin doxycycline therapy. Administration of a 4-week course of doxycycline will render microfilariae incapable of normal development to infective larvae in mosquitoes and subsequent

ALGORITHM FOR MINIMIZING HEARTWORM TRANSMISSION IN RELOCATED DOGS



Abbreviations:
Mf, microfilariae;
Ag, antigen;
ML, macrocyclic lactone

Heartworm in shelters



- Shelter animals are at a higher risk of getting heartworms because they are in close contact with other animals that are heartworm positive
- Mosquito control is very important in animal facilities
  - Remove any standing water or items that collect water
    - Old tires

Other internal parasites

- Tapeworms
  - The most commont tapeworm is associated with fleas
- Trich in cats
  - Tritrichomonas blagburni
  - Intestinal protozoa that can cause diarrhea in cats
  - Typically seen in shelter animals or catteries

Planning for internal parasites

- Cleaning
  - Prompt pickup of feces is the #1 strategy!
  - Dilute bleach can effectively eliminate SOME parasite eggs/cycsts
    - Not all- Roundworm eggs develop just fine in bleach
  - Allow the kennels to dry
    - Parasites are most sensitive to dessication
  - Clean in the correct order
    - Healthy puppies/kittens/mothers/pregnant animals
    - Healthy adult animals
    - Sick animals

Outside management

- Keep grass mowed low
- Let as much sunshine in as possible
- Level out low spots / Don’t let water pool

- Remember: Once contaminated, the soil can harbor parasite eggs for years

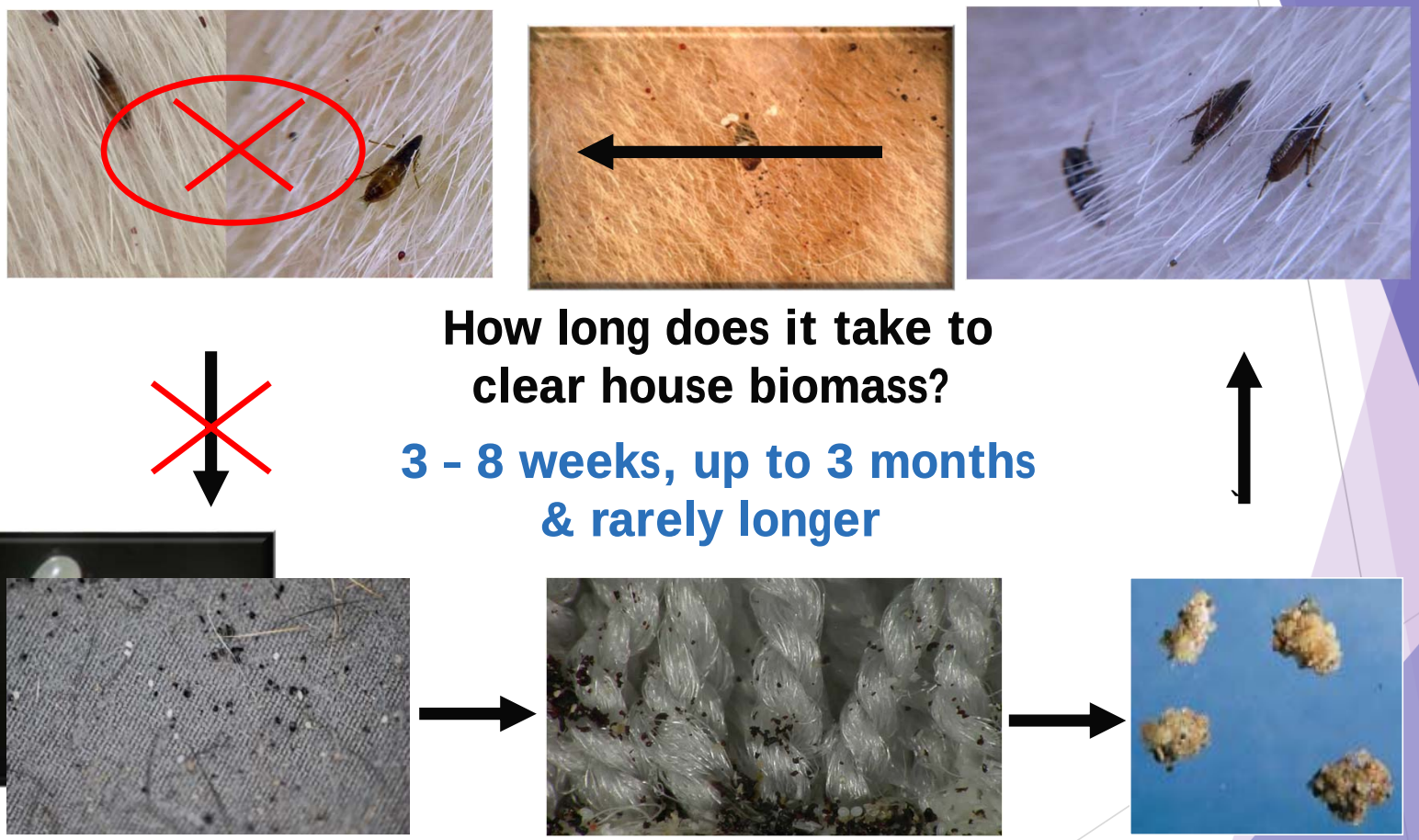
External parasites

- Fleas
- Ticks
- Mites
- Flies

Fleas

- By the time a pet owner notices fleas, immature flea stages have been developing in the home for 1-2 months.
  - This “bio-mass” of immature flea stages provides an ongoing source of new adult fleas that will continually reinfest pets
- Must treat every animal
  - Cats, dogs, ferrets, rabbits

“Development Window”



How long does it take to clear house biomass?

3 - 8 weeks, up to 3 months & rarely longer

Dryden MW et al, Vet Parasitol. 2011;182:281-6.

Within 24 hours of pets acquiring fleas, females are laying eggs. If you have fleas on a dog or cat, this biomass is in the carpet, cracks or grooves in hardwood floors or outdoors in shaded habitats.[1,2]

1. Dryden MW. How you and your clients can win the flea control battle. *Vet Med.* Supplement March: 17-26, 2009.
2. *Dryden MW: Host association, on-host longevity and egg production of Ctenocephalides felis felis. Vet Parasitol. 34:117-122, 1989*

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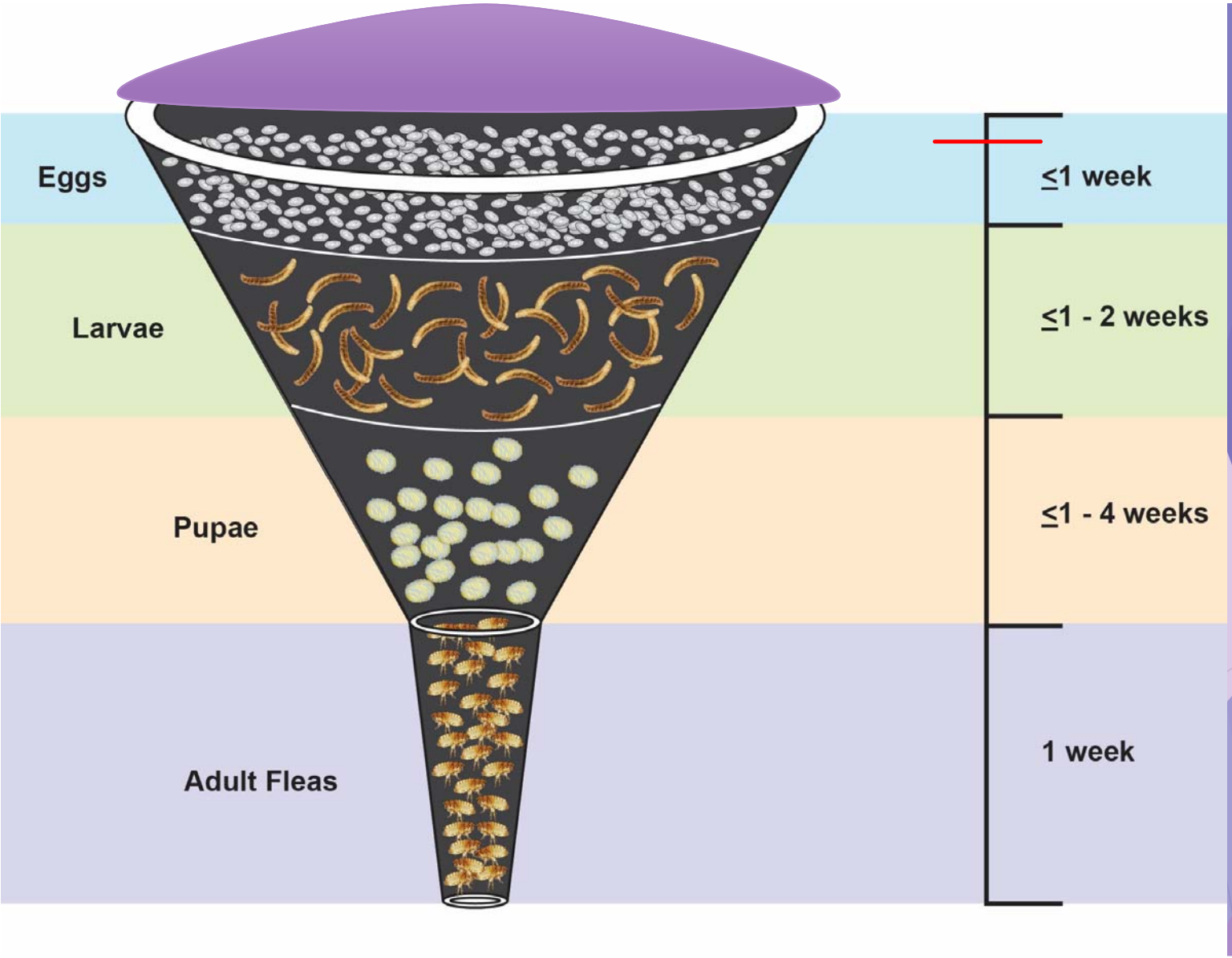
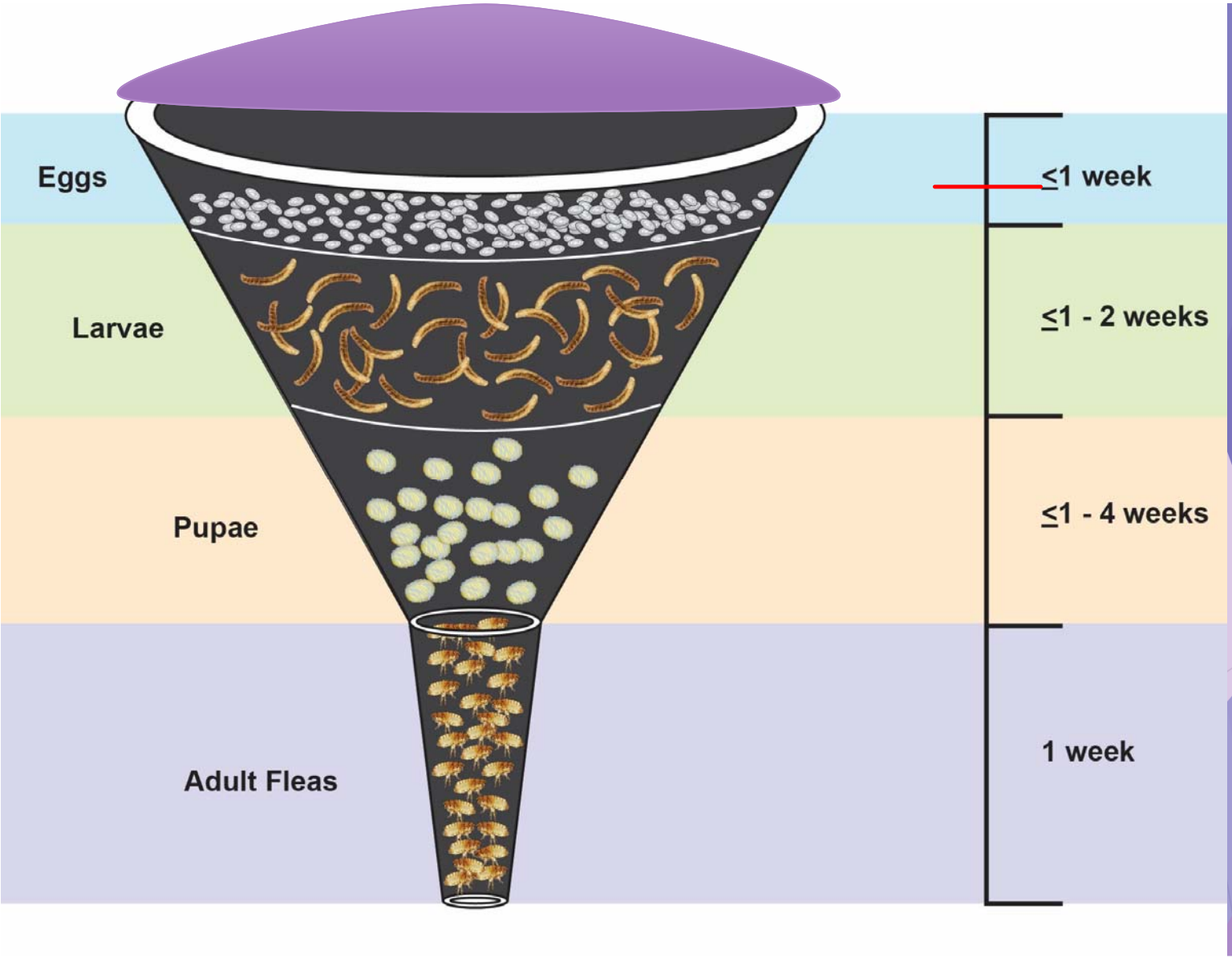

Eggs
Larvae
Pupae
Adult Fleas
≤1 week
≤1 - 2 weeks
≤1 - 4 weeks
1 week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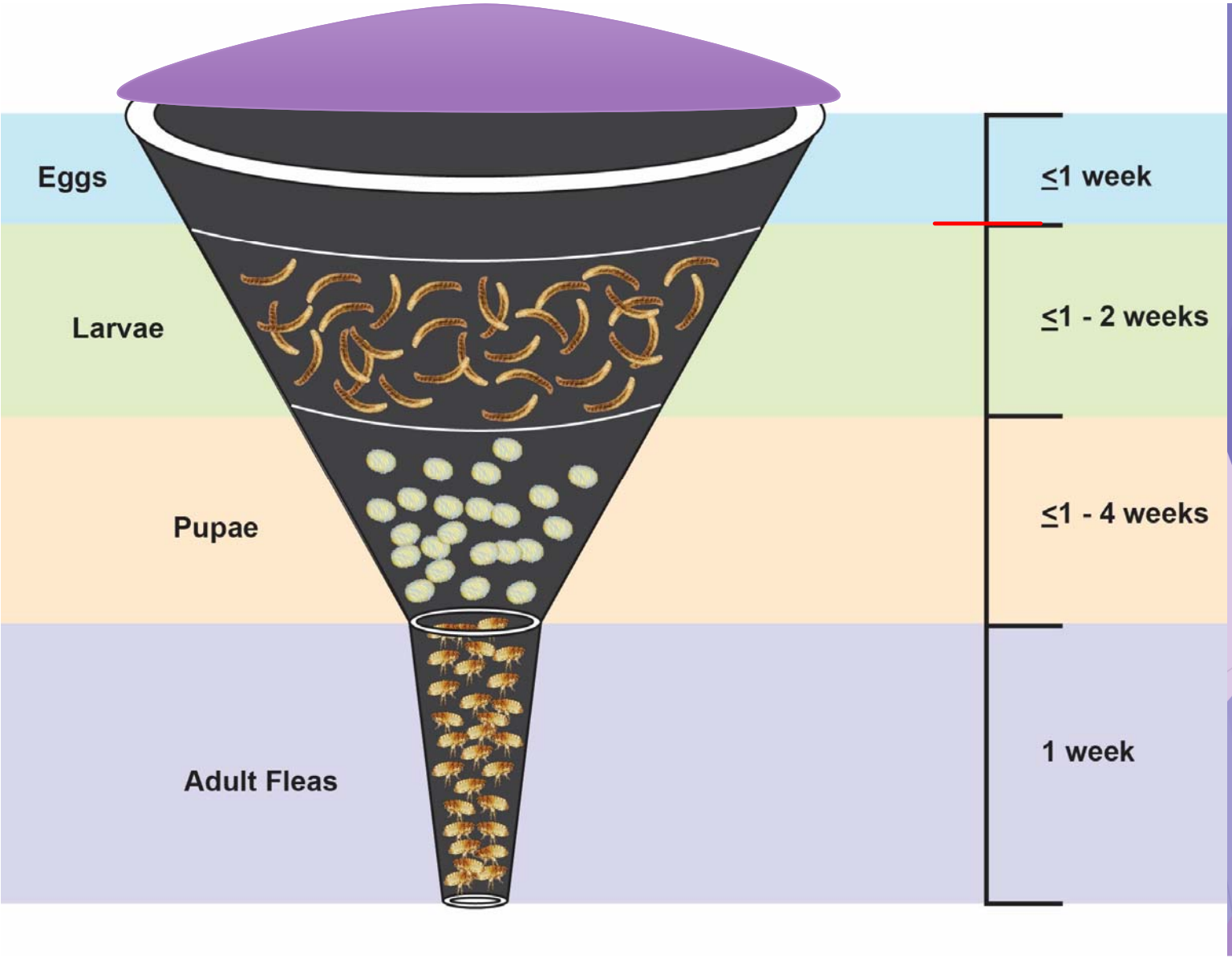
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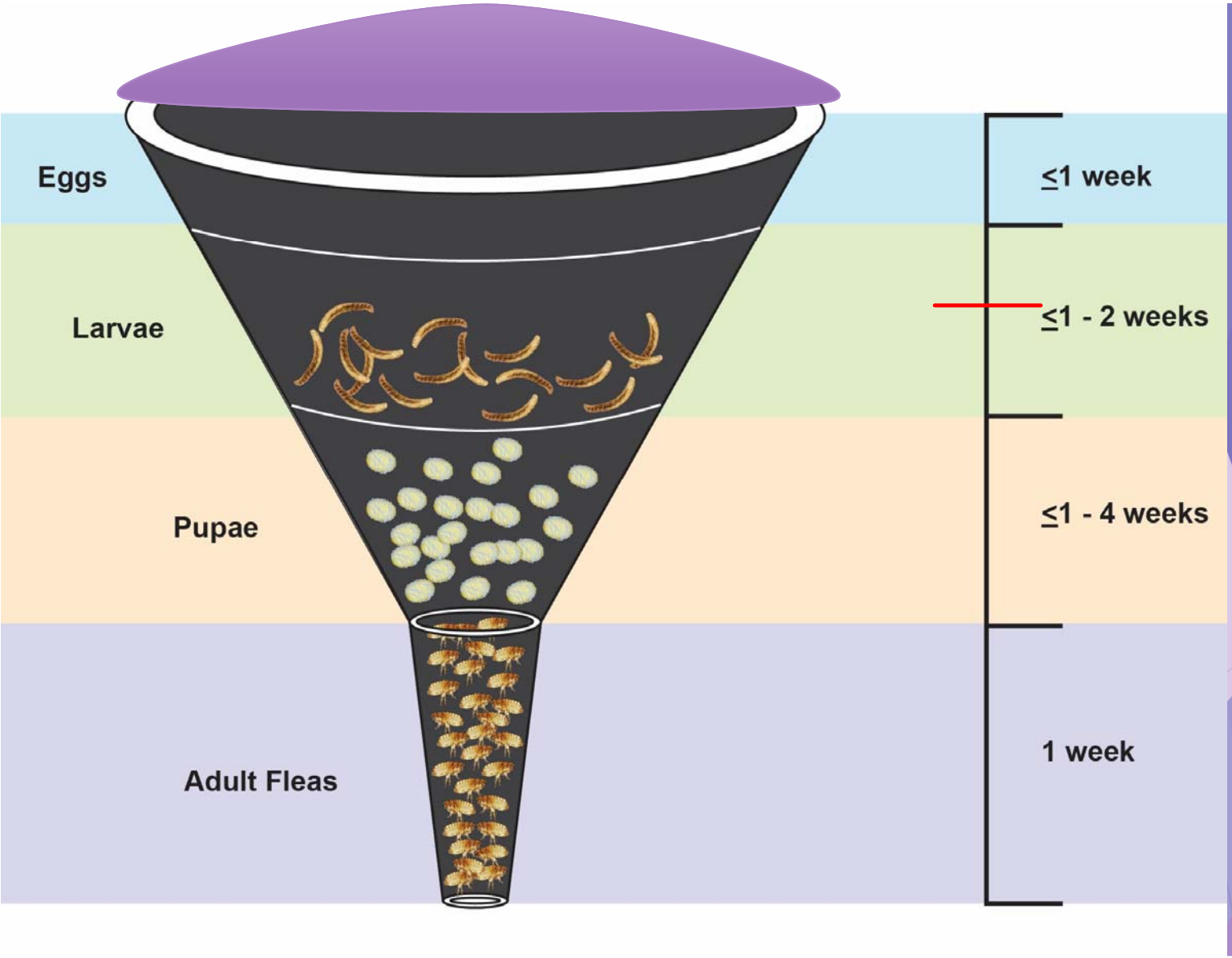
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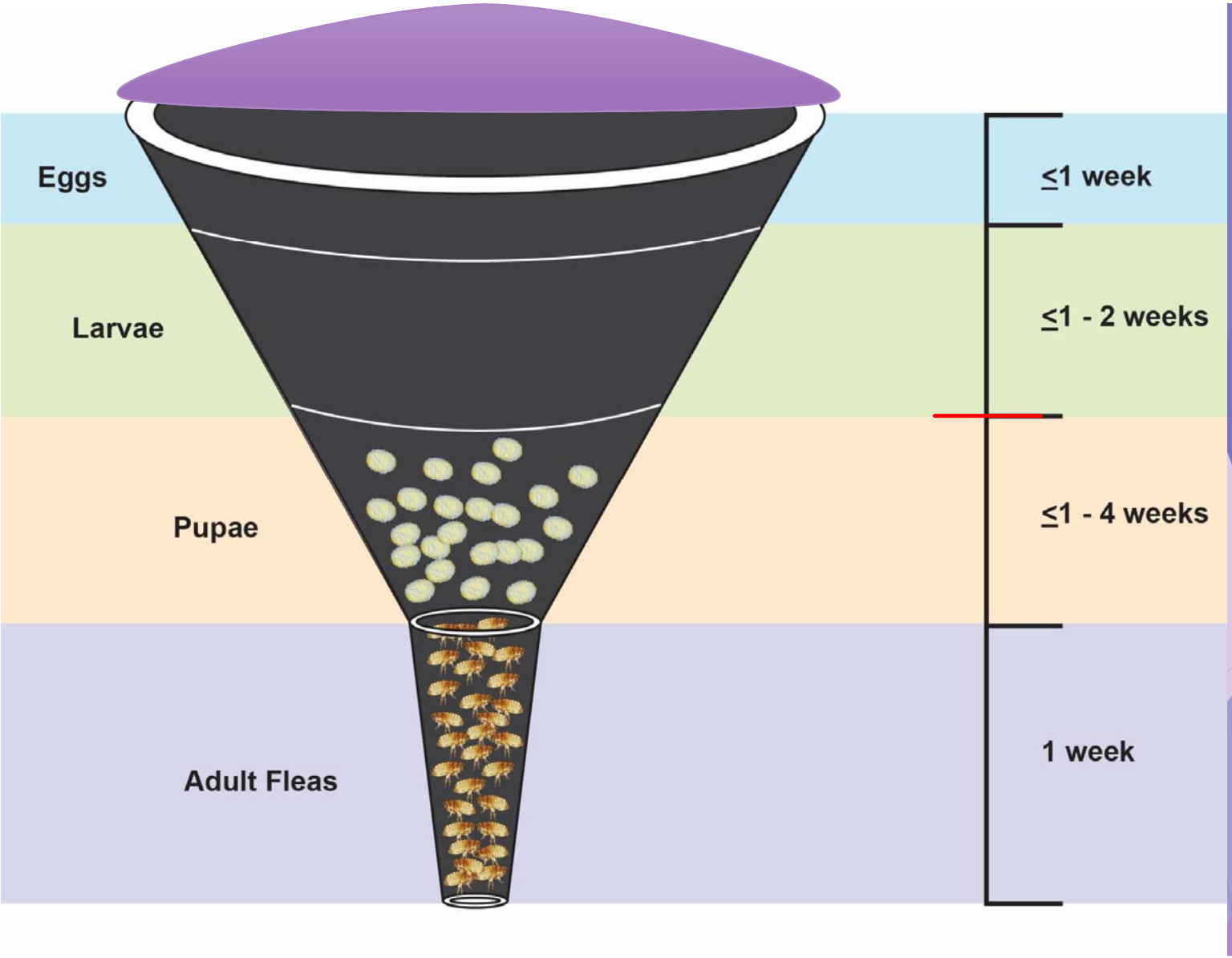
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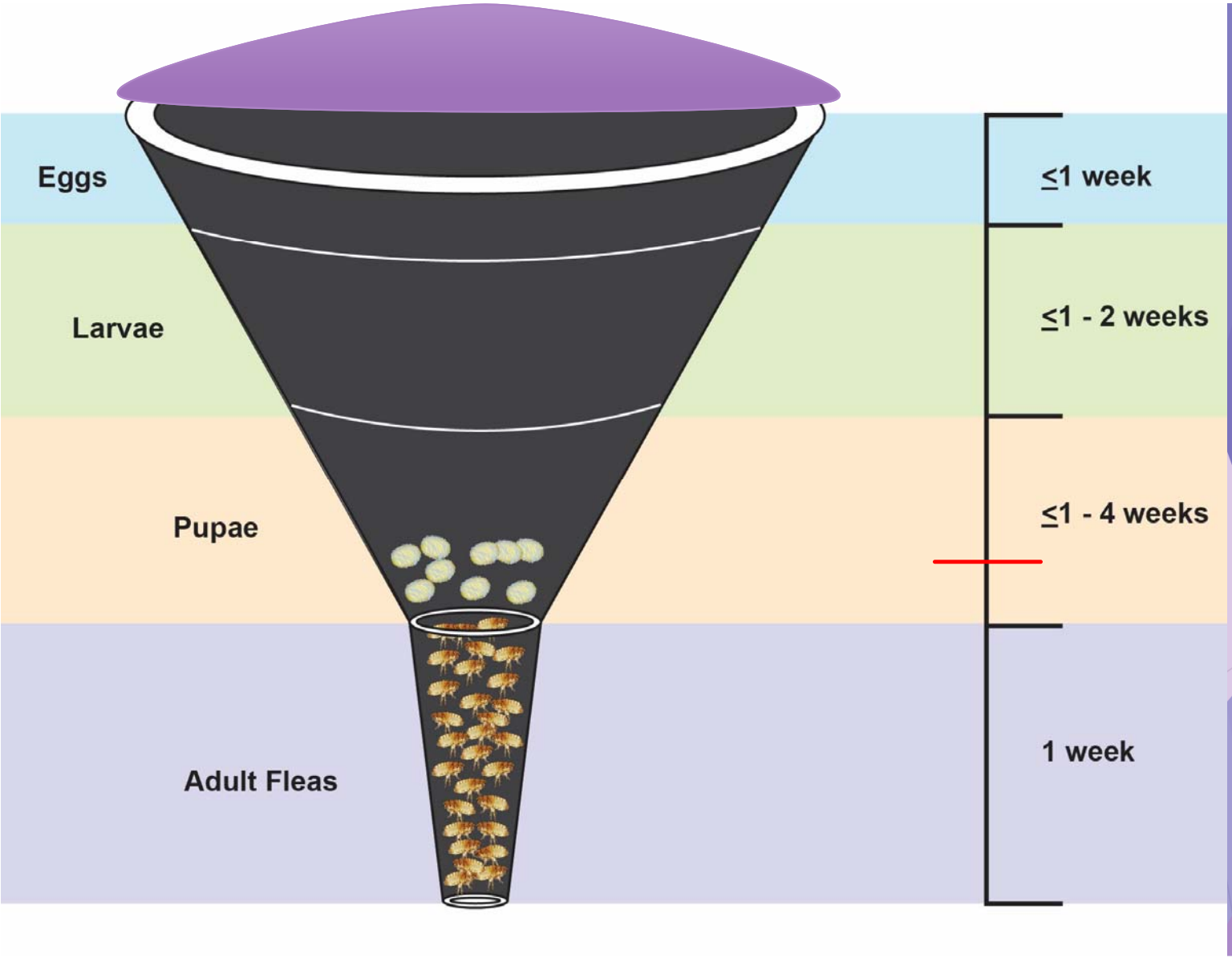
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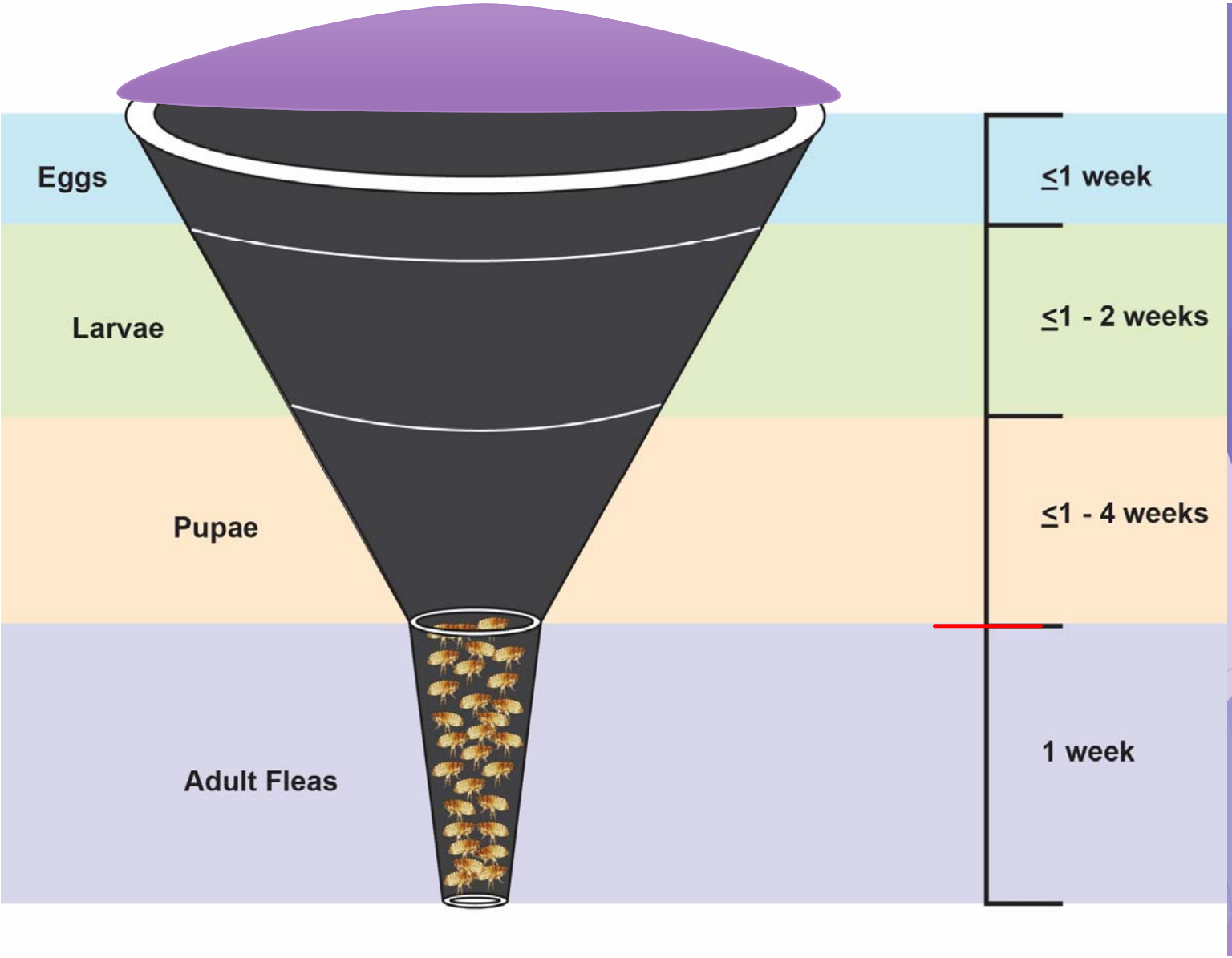
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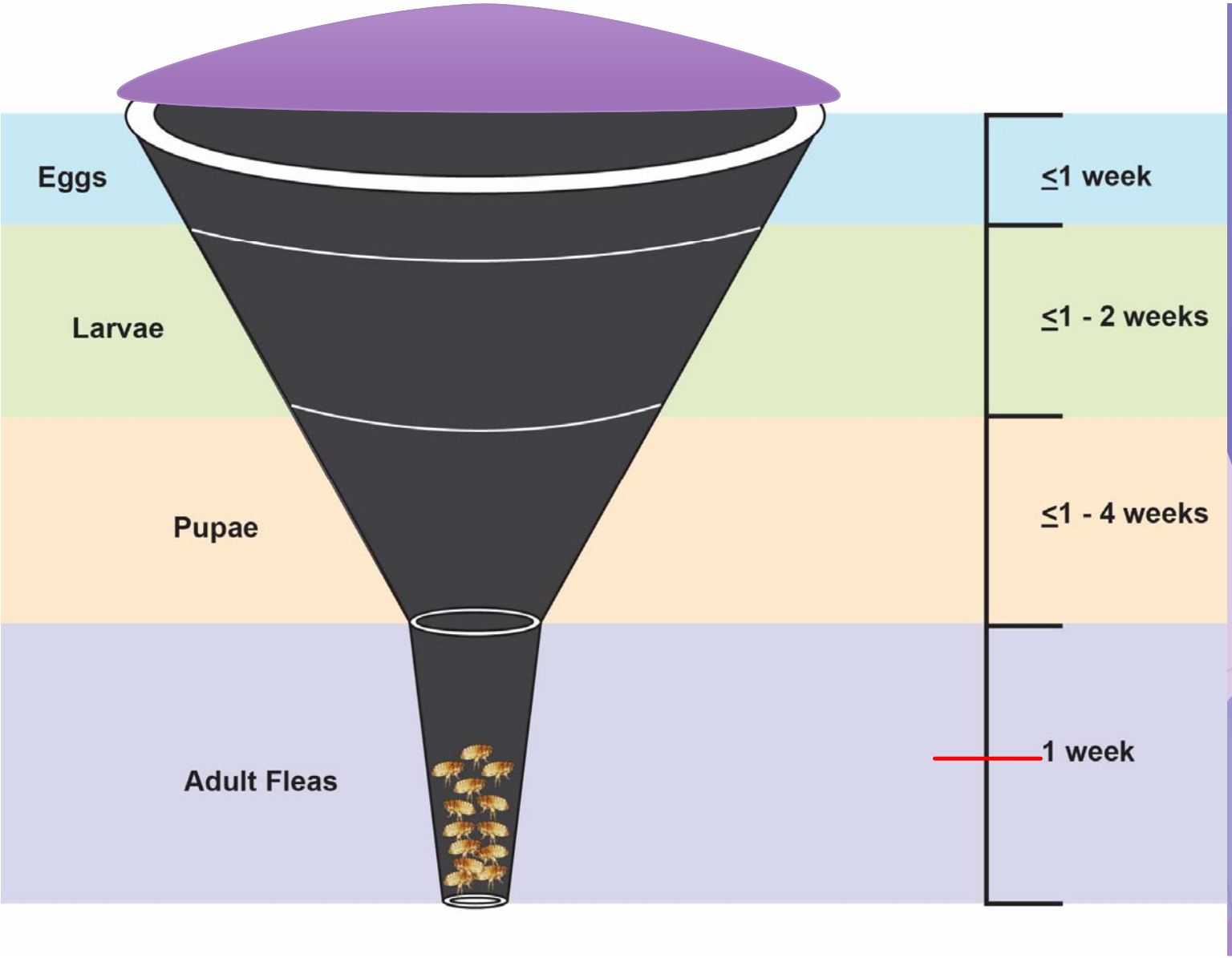
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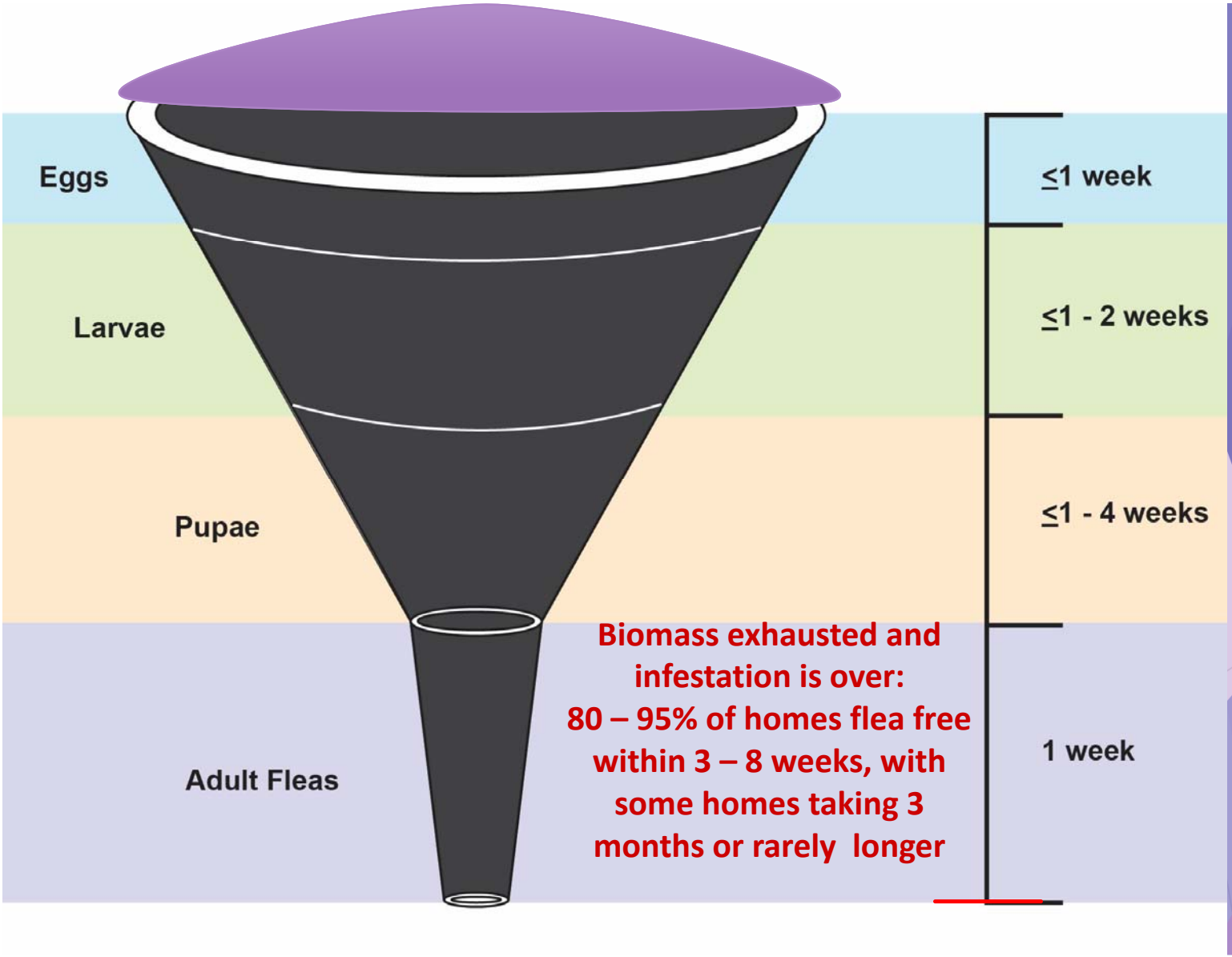
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Adult Fleas
≤1 week
≤1 - 2 weeks
≤1 - 4 weeks
1 week
Biomass exhausted and infestation is over:
80 – 95% of homes flea free within 3 – 8 weeks, with some homes taking 3 months or rarely longer

Premises Treatments

- Premises treatment
  - Sprays, directed aerosols, total release aerosols & Pest Control Services
  - Adulticide (pyrethroids) & IGR (methoprene or pyriproxifen)
    - Currently I rarely recommend indoor insecticide treatments
  - Two applications 7 to 10 days apart
  - Outdoors: imidacloprid-cyfluthrin, esfenvalerate, permethrin) every 7 – 10 days.

Indoor Infestations
Rhipicephalus sanguineus

- Indoor tick populations can explode unchecked
  - presence of dogs
  - protected environment
    - cracks and crevices to lay eggs, molt
- large numbers of ticks on dogs
- occasional bites on people and rarely, cats

Infested Kennel

Treatment - Premise

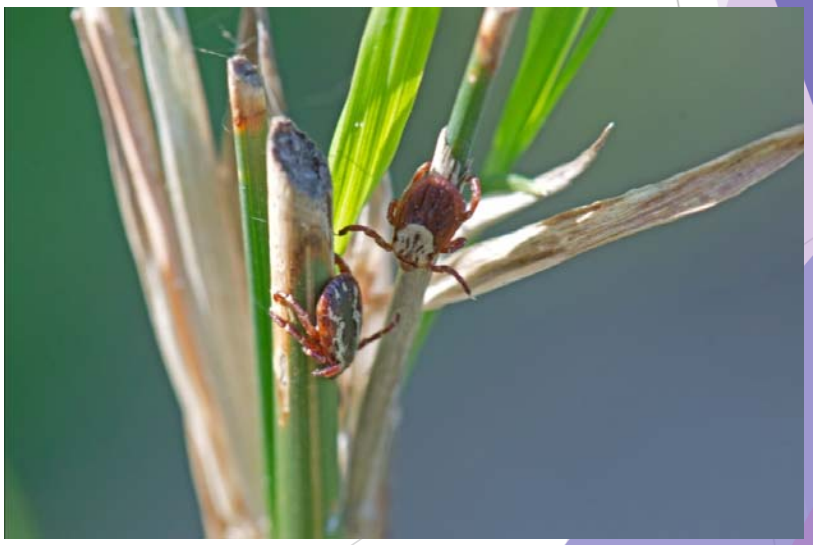
- Kennel
  - Brown dog tick infestations can occur in the kennel. Must treat under cages, in cracks, up under false ceilings etc. Female ticks crawl to secluded sites to lay eggs.
  - Pest Control Specialist often best if facility is infested.

Chemical treatment outdoors

- Cyfluthrin
  - effective *on Ixodes scapularis & Amblyomma americanum*[1], Most commonly used by licensed applicators *for I. scapularis, Dermacentor variabilis, A. americanum*[23]
- Carbaryl
  - Effective *on I. scapularis* but not on *A. americanum.*[24]
- Permethrin
- Bifenthrin

(note)

- Should be dry before animals and humans allowed access
- Pyrethroid products should not be applied around fish-containing ponds or streams.



Mites

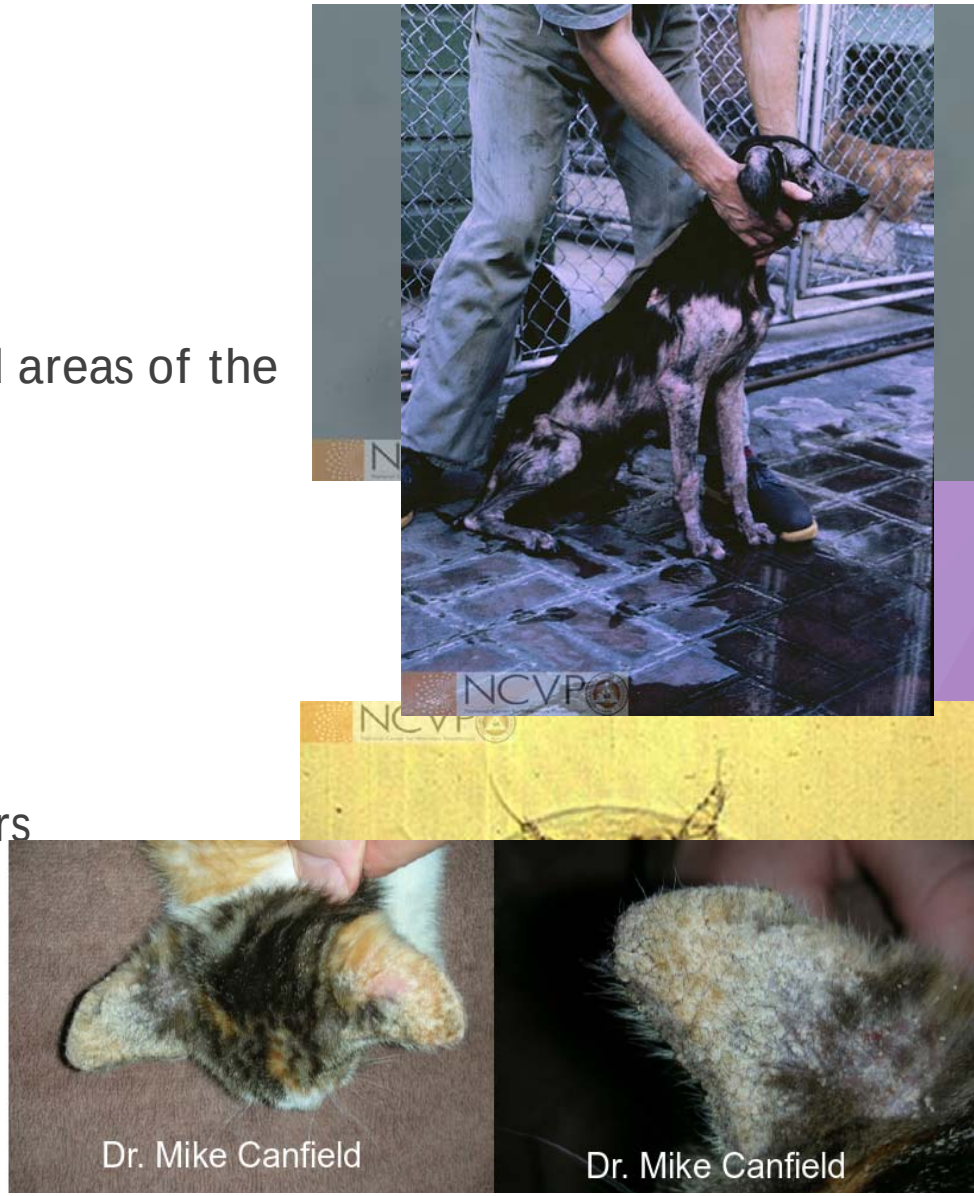
- Demodectic mange
  - Demodex spp. in cats and dogs
  - Normal inhabitant of the skin
  - Disease occurs when animal is immunosuppressed
- Sarcoptic mange
  - Sarcoptes scabiei in dogs
  - Notedres cati in cats
  - Contagious
- Ear mites
  - Otodectes sp. In dogs and cats
  - Contagious

Demodex

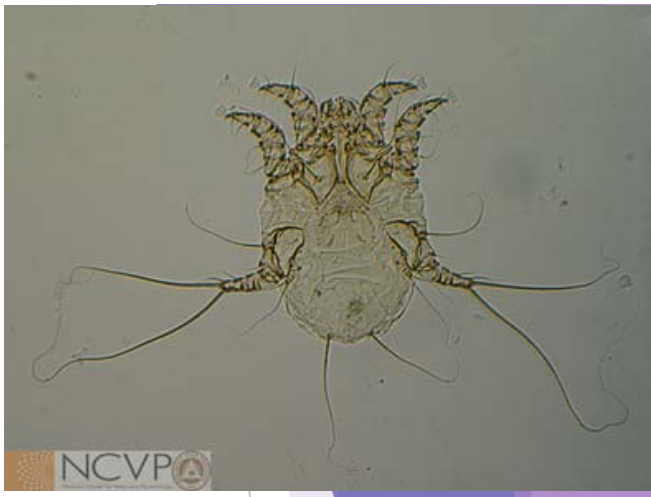
- Juvenile localized
  - Small patchy hairless spots
  - Can progress to generalized
- Generalized demodicosis
  - Problem with the immune system allows the mites to over-populate
    - Lack of food and shelter can be the problem

“Scabies”

- Sarcoptes scabiei in dogs
  - Most commonly seen on the thin skinned areas of the abdomen, chest, ears, and elbows
  - Intensely itchy
  - Contagious
    - Separate from other animals
- Notedres cati in cats
  - Most commonly seen on the face and ears



Ear mites



- Otodectes cynotis in dogs and cats
  - Most commonly found in the ears, but can spread to head and neck
  - Black, waxy exudate in ears
  - Contagious

General tips for treating mites

- Topical and systemic treatment options
- Commonly requires bathing/ear cleaning due to the secondary bacterial infections that occur from itching
- Not just a single treatment, some of these animals takes months to get better

Flies

- Filth flies
  - House fly

- Fly strike
  - Stable fly

Control – *House Fly*

1. Sanitation – The "KEY" to fly control
   - House fly control in confinement operations may be fruitless without proper sanitation (manure & waste management).
     - Scrape pens, alleyways & fence lines to remove manure.
     - Construct outside runs with good drainage.
2. Physical - screen windows & doors
3. Residual surface sprays - (only helps for a short time)
   - Apply to resting sites such as ceilings, panels and walls.
     - (Fenthion, Diazinon, Permethrin, Cyfluthrin, Spinosad etc..)

Musca domestica

4. Baits
   - Insecticide impregnated material that kills flies when they land and feed on bait. Baits attract using pheromones and sugars.
     - House fly pheromone attractant (Muscalure & Muscamone) Z-9-Tricosene (Musca domestica sex & aggregation pheromone) to attract flies.
5. Traps –
   - Ultraviolet light traps
     - Attract and collect the flies inside an inverted cone or kill them with an electrocuting grid.
   - Attractant (sugar and pheromone) based traps

Musca domestica

Insecticide treated baits for *Musca domestica*

Musca domestica

Fly Strike

- Stable flies (*Stomoxys calcitrans*) biting ears or face of dogs. Especially tips of ears with resulting ulceration.
- Prevent flies by applying repellents –
  - Only repellent that works well is permethrin
  - No truly 100% effective repellents for stable flies
- Area control with insecticide sprays or fly traps.

Zoonoses

- We're caring for the animals, but also protecting ourselves/workers/families
- Roundworms
- Hookworms
- Tapeworms
- Giardia
- Fleas and flea-borne diseases
- Ticks and tick-borne diseases
- Scabies (transiently)

All images provided by Dr. Kevin Kazacos

Take-home message

- There is absolutely substitution for proper hygiene/sanitation
- Develop a great working relationship with your local vet
- Target the source
  - Treating pregnant/lactating animals
  - Separate/isolate contagious animals
  - Target your treatments

Questions? bhh@vet.k-state.edu