

4th Fel. Pract. Sem.
8/92

MANAGEMENT OF RINGWORM INFECTIONS IN CATTERIES

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MANAGEMENT OF RINGWORM INFECTIONS IN CATTERIES

Ringworm infections [dermatophytoses or dermatomycoses] can cause very serious problems in any multi-cat facility. The presence of inapparently infected cats [asymptomatic carriers] that transmit the organism to other cats and the persistence of infectious fungal spores in the environment for long periods of time make dermatophyte infections difficult to manage. Treatment of each infected individual can be an expensive and time-consuming project. Loss of revenue from the sale of kittens during the lengthy treatment period and potential damage to the reputation of the cattery are additional factors that help to make ringworm infection one of the most trying of cattery problems to manage. As we will see in the following discussion, successful control hinges not only upon specific medication but upon good husbandry as has been previously discussed. Armed with an understanding of the fungal organism, its diagnosis, and its treatment, we will discuss ways in which any cattery should be able to lessen the devastation that results from ringworm infections.

Ringworm = dermatophyte infection of keratinized tissues of the skin and hair. Almost all dermatophyte infections in cats are caused by *Microsporum canis*. Much less commonly, it may be caused by *Trichophyton* spp. or *Microsporum gypseum*.

M. canis is well adapted to living on the haircoat of cats because it may induce very little of the inflammatory reaction that helps to eliminate the infection. Thus, infected cats may show little to no evidence of infection but continue to be sources of infection to other cats.

No dermatophyte is a normal skin inhabitant. If it is cultured from a cat, that cat is infected and should be treated.

Ringworm infection can imitate almost any other skin disease in cats. It is prudent to consider performing a dermatophyte culture for the diagnosis of any skin disease.

Short-haired cats are just as likely to be asymptomatic carriers as long-haired cats.

Predisposing Factors:

Host

[1] Age:

- more common and more severe in kittens -- can be life-threatening.

[2] Concurrent Illness:

- any illness has the potential to adversely affect immunity and the ability to extinguish a dermatophyte infection. This is especially true for cats infected with FeLV and/or FIV.

- [3] **Poor nutrition.**
- [4] **Pregnancy or lactation** may depress immune system and thus predispose to infection.
- [5] **Possible genetic predisposition.**

Environment

- [1] **Overcrowding:**
 - increases possibility of exposure.
 - increases the amount of infectious fungal spores in the environment.
 - creates "stress" that has adverse effects on immunity.
- [2] **Inadequate cleaning and disinfection:**
 - allows for accumulation of spores -- a particularly difficult problem if cats are housed in carpeted or upholstered areas.
- [3] **Lack of segregation of cats into appropriate groups:**
 - allows youngest and most susceptible cats to mix with infected ones. Infection in these younger cats tends to produce more fungal spores than infections in adult cats and thus create even greater environmental contamination.

Diagnosis:

Wood's Lamp -- an ultraviolet light source that causes infected hairs to fluoresce a bright "apple green".

- [1] **Disadvantages:**
 - less than 50% of *M. canis* strains will cause fluorescence.
 - inadequate warming of lamp will prevent fluorescence.
 - may take up to 5 minutes for light to make certain strains glow.
 - will not detect inapparent carriers.
 - previously used topical medicines may destroy the fluorescence or may also cause false positives.
- [2] **Advantages:**
 - relatively inexpensive screening tool in cattery.
 - a positive is suggestive of infection.
 - useful for selecting potentially infected hairs for culturing.

Direct microscopic examination of hair

- [1] **Advantage** -- can provide diagnosis of infection in minutes.
- [2] **Disadvantages:**
 - requires careful selection of hair to be examined -- Wood's Lamp may be helpful.
 - may require the proper chemical clearing agent.
 - requires much practice to master the technique.
 - unable to diagnose inapparent carriers.

Culture -- special culture media [dermatophyte test medium or DTM] changes color when positive for a dermatophyte. The culture media incorporates a pH indicator that changes to a red color when protein utilization by dermatophytes causes alkaline metabolites. Non-dermatophyte fungal contaminants utilize carbohydrates in the media and thus don't create alkaline metabolites.

[1] Disadvantages:

- most costly to perform.
- may take up to 2 weeks or longer to identify the infection.

[2] Advantages:

- the most accurate technique by far.
- can identify asymptomatic carriers.
- useful in determining when to discontinue therapy.

False positives:

- can occur rarely with certain contaminant fungi.
- will occur with overgrowth of any fungi, especially beyond 14 days.

False negatives:

- can occur rarely -- a few *M. canis* strains may fail to produce a color change in the media. Mechanism not known, but some strains may fail to produce enough alkaline metabolites to induce a color change, or previous topical medication may alter their ability.

Therefore, probably best to culture at the same time on Sabouraud's dextrose agar and then view the cultured organism under the microscope for positive identification.

Culture technique:

- [1] Select abnormal hairs from lesion periphery -- may clean with 70% isopropyl alcohol first to help remove contaminants. Make sure the root end of the shaft is included. A Wood's Lamp may be useful -- select hairs that fluoresce. Imbed hairs onto surface of the agar and loosely close cover.
- [2] To detect inapparent carriers, use the "MacKenzie brush technique". Brush a new toothbrush fresh from the cellophane pack vigorously over the cat's coat for several minutes. Hairs should be visible in the bristles; if not, brush again. Gently imbed the bristles in the culture media. *M. canis* usually grows within 7-10 days -- may take 14-21 days for inapparent carriers.

Treatment:

- may be expensive and difficult to eliminate from a cattery, but it will certainly be worth the effort to reduce incidence and severity as much as possible.

- will require treatment of all infected cats [apparent or inapparent] and the environment.
- if one cat is infected, it is likely that all cats will be infected. Some may initially culture negative, but usually all will eventually culture positive.
- remember to institute good general husbandry as described earlier, ie., reduce overcrowding, eliminate other diseases, segregate cats according to age and susceptibility, etc.

Antifungal medications -- fall into two categories: topical and systemic.

- topical:

- those for local application -- creams and ointments. Many products available. Can be used concurrently with whole-body treatment. Particularly useful for application around facial areas. Local application to lesions only is inadequate therapy for the cat because the whole cat is usually infected.
- those for whole-body application -- shampoos and dips. Use every 5-7 days.
 - chlorhexidine shampoo -- use prior to dip. Most commonly recommended product.
 - chlorhexidine solution -- most commonly recommended dip. Ideal concentration to use is not known so recommended concentrations vary. Safe product but local irritation to the skin and corneal ulcers have been reported.
 - Lime-sulfur dip -- again recommended concentrations vary so follow your veterinarian's recommendations. Rotten egg odor is biggest drawback - many cats strongly resist its use. It may also discolor white cats, tarnish jewelry, and stain fabrics. Skin irritation and vomiting after licking the solution are the most common side effects although hypothermia in kittens has also been reported [may have been due to chilling rather than a direct effect of the product].
 - Captan -- recommended dilutions vary. Vomiting is the most common side effect. It is a contact sensitizer in people and has carcinogenic potential so it does not come highly recommended.
 - Povidine-iodine solution or dilute chlorine bleach -- both can be very irritating to the skin of cats and both have the potential to temporarily change haircoat color. Not highly recommended.
- **systemic** ie., those that are given internally
 - griseofulvin -- drug of choice for systemic therapy
 - multiple formulations exist, eg, microsize, ultramicrosize in polyethylene glycol [PEG], and a microsize formulation in a pediatric suspension.
 - dosage recommendations vary among veterinary dermatologists.

- needs to be given on a daily basis -- once weekly administration is not effective. Intestinal absorption is improved if given with a fatty meal.
 - beware of potential toxic reactions! Appears to be idiosyncratic [ie., not related to the dose given, rather related to an individual's own susceptibility] in many instances. Siamese, Abyssinian, and Persian [esp. Himalayan?] cats seem to be more prone to problems with the drug. Signs are variable and include listlessness, fever, loss of appetite, vomiting, diarrhea, jaundice, incoordination, lowered white blood cell count and anemia.
 - can cause birth defects, stillbirths, and weak neonates if given to pregnant animals especially if given during the first trimester. Its use in pregnant queens should be avoided although use in the second half of pregnancy may cause no adverse effects.
 - should have a physical examination and appropriate laboratory tests performed every 2-3 weeks during treatment to detect early evidence of toxicity [particularly true for the breeds discussed above].
- ketoconazole -- currently being studied at various institutions.
 - conflicting reports on incidence of side effects and development of resistance.
 - reserve for those few cats that appear to have griseofulvin resistant strains or that develop drug intolerance.
 - itraconazole -- newer systemic antifungal. Few reports on its use at this time.

Treatment of Entire Cattery

- expect duration of treatment to be 8 weeks to several months. Good husbandry as previously discussed can be the difference between success and failure.
- movement of cats into and out of the cattery should cease as should breeding.
- toothbrush-culture all cats and quarantine all infected animals. [Even the ones that culture negative will probably eventually culture positive -- it may be best to treat all cats from the beginning]
- clip the cats, including the whiskers. This will eliminate many infectious spores and will also make topical therapy much easier. Clip in an area that is easy to clean and disinfect -- burn the hair and consider disposing of clothing.
- whole-body topical therapy should be performed every 5-7 days
- chlorhexidine shampoo followed by chlorhexidine dip -- don't rinse off the dip.
- topical ointment or cream to obvious lesions and to areas around mouth and eyes.

- culture all cats every 2-4 weeks and continue therapy for 1 month after all cats culture negative.
- if cats still culture positive after 1-2 months of therapy, consider using systemic therapy in addition to the topical therapy. Use in non-pregnant queens, toms, and kittens >12 weeks of age. Take adequate measures to guard against toxicity.

Treatment of Kittens Only

This technique is much less desirable but may be helpful if unable to treat the entire cattery. The goal is to produce and sell kittens that remain free of ringworm infection after placement in their new home or cattery.

- isolate the pregnant queen and clip haircoat.
- treat topically with shampoos and dips every 5-7 days.
- after the kittens are born, begin griseofulvin therapy of the queen.
- at weaning [preferably at 4-5 weeks of age], segregate the kittens and culture. Begin topical therapy with baths and dips every 5-7 days.
- if culture positive, begin griseofulvin therapy if >12 weeks of age.
- sell kittens only after culturing negative at least once. Prophylactically bathe and dip every 5-7 days until sold.

Treatment of the Environment -- a critical step in managing ringworm in a cattery. Remember, microscopic fungal spores can persist in the environment and retain their ability to cause infection for up to 18 months.

- the most cost-effective disinfectant is a 1:10 dilution of chlorine bleach in water. A 1:4 dilution of chlorhexidine is also effective. Disinfect all smooth surfaces. Cages should be disinfected daily and the rest of the cattery at least once weekly.
- dispose of bedding, stuffed toys, carpeted scratching posts, brushes and other grooming equipment that may harbor spores.
- thoroughly clean any carpet that can't be discarded. Commercial steam cleaning is recommended but the temperature of the water forced into the carpeting [not the temperature of the water in the reservoir] must be at least 110 degrees F. to effectively kill spores. It is unlikely that many spores will be killed with steam-cleaning alone, but the physical removal of as many spores as possible is very important. Addition of an antifungal disinfectant to the cleaning solution will increase the effectiveness.
- after cleaning as described, regularly vacuum carpeting -- preferably at least once daily. Dispose of vacuum cleaner bag after each use.
- thoroughly clean ventilation ducts and vents. Regularly change and dispose of furnace filters.
- don't neglect to clean and disinfect cars, portable cages, etc. that infected cats may have contacted.

Prevention of Introduction of Ringworm into the Cattery

Newly acquired cats, cats on loan, and cats returning from shows must go into quarantine before mingling with the other cats. Culture immediately and, as a precaution, bathe and dip with antifungal products every 5-7 days until results of fungal culture are known. At shows, don't share grooming equipment and try to groom and house your cat as far from others as possible.

Suggested additional readings:

Medleau Linda, White-Weithers Norma E. Dermatophytosis in Cats. In COMPENDIUM ON CONTINUING EDUCATION FOR THE PRACTICING VETERINARIAN, 13(4), April, 1991.

Moriello, Karen A. Management of Dermatophyte Infections in Catteries and Multiple-Cat Households. In VETERINARY CLINICS OF NORTH AMERICA: SMALL ANIMAL PRACTICE, 20(6), Nov. 1990.