TO THE POINT
Simple yet effective treatment plans should be considered to decrease caretaker burden in community veterinary medicine.

INSIGHTS IN DERMATOLOGY

Treating Common Skin Conditions of Dogs and Cats in Community Medicine Practice

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Treatment of skin disease in veterinary medicine must take into account evidence-based treatments, ability of clients to administer prescribed treatments, individual patients' tolerance and responses, and responsible antimicrobial stewardship. Establishing treatment plans based on these principles can be especially challenging in community medicine practice, in which treatment frequently needs to be based on presumptive diagnosis and barriers to care. In these circumstances, it is important to consider broadly efficacious and cost-effective treatments while promoting good antimicrobial stewardship. This article briefly outlines treatment recommendations for ectoparasitic infestations, bacterial and *Malassezia* skin infections, dermatophytoses, and allergies in cats and dogs, with specific emphasis on community veterinary medicine.

ECTOPARASITES

Ectoparasite treatments vary in spectrum and efficacy, making it difficult for veterinarians to select the best one for each patient. Common classes of ectoparasite treatments are summarized in **TABLE 1**. When deciding which formulation to use in community medicine practice, considerations must include cost, ease of administration, duration, and effectiveness. Isoxazoline-based products cover a broad range of safety and effectiveness, enabling their use as a treatment trial for many ectoparasitic infections, including demodicosis and sarcoptic mange. When only fleas are suspected, options include less expensive medications with a more limited spectrum. At times, combination products with heartworm and intestinal parasite coverage can be considered. Although more expensive per dose, long-acting medications alleviate the need for clients to administer doses at home, which can increase compliance and decrease overall costs, including time at the veterinary clinic and flares resulting from inadequate follow-up. These benefits should be weighed against the initial cost.

Topical therapies and environmental treatment may also be needed. Washable fabrics should be washed at temperatures of at least 55 °C (131 °F) and then sprayed (along with the rest of the environment) with a pyrethroid-containing product to help kill fleas, lice, and *Cheyletiella*.[9] Animals, particularly cats, should be evacuated when these products are used due to

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potential pyrethroid toxicity. Weekly to daily vacuuming of floors is also recommended.

If clinical signs of unconfirmed ectoparasitic infections fail to improve with treatment within 3 to 4 weeks, the patient should be reassessed and the diagnoses re-evaluated.[9] Infection with fleas and other ectoparasites frequently require treatment for several months. For patients with demodicosis, 2 negative skin scrapings at 1-month intervals are recommended.[10]

BACTERIAL AND *MALASSEZIA* SKIN INFECTIONS

Topical Therapy

Topical products typically contain ingredients effective against bacterial and yeast (*Malassezia*) infections or overgrowth, which may be clinically difficult to differentiate from one another without a microscope and the ability to perform cytology. Topical therapy alone is recommended for localized lesions, mild generalized superficial infections, and maintenance to prevent recurrence as both conditions are typically secondary to underlying disease.[11] Topicals are also recommended for synergistic effect whenever systemic medication is prescribed.[12] Topical treatments are frequently less expensive than systemic therapy, and evidence of success with less risk for toxicity has been reported.[12] In addition, many of these products are available over the counter, empowering clients to obtain them if they face barriers to returning to the clinic.

Bacterial and yeast skin infections can be treated with topical medications containing 3% to 4% chlorhexidine or 2% chlorhexidine and 2% miconazole or other topical azoles.[13-16] These products are available as shampoos, lotions, mousses, sprays, and wipes. Shampoos are useful for penetrating the canine hair coat and reaching the skin,[17] as well as for mechanical removal of crusts, scale, and debris and disruption of biofilms.[12] However, frequent baths may be challenging due to time constraints, patient temperament, and the need to access bathing facilities. When bathing is not

TABLE 1 Common Classes of Ectoparasiticides for Cats and Dogs

CLASS	MECHANISM OF ACTION	DRUGS	NOTES
Pyrethrin/Pyrethroid	Sodium-channel disruptor	Flumethrin	▪ Effectiveness against fleas may be reduced in some geographic areas ▪ Cats are very susceptible to pyrethroid toxicosis
		Permethrin	
		Pyrethrin	
Macrocyclic lactone	Glutamate-gated chloride channel activator	Selamectin	▪ Extra-label activity against *Cheyletiella*[1]
Phenylpyrazole	GABA- and glutamate-gated chloride channel antagonist	Fipronil	▪ Effectiveness against fleas may be reduced in some areas ▪ Extra-label activity against *Cheyletiella*[2]
Isoxazoline	GABA- and glutamate-gated chloride channel antagonist	Afoxolaner	▪ Extra-label activity against lice,[3] *Demodex*,[4] *Sarcoptes*,[5] and ear mites[6] ▪ The authors' treatment of choice for demodicosis
		Fluralaner	
		Lotilaner	
		Sarolaner	
Neonicotinoid	Nicotinic acetylcholine receptor agonist	Dinotefuran	
		Imidacloprid	▪ Extra-label activity of 10% imidacloprid plus 2.5% moxidectin against *Demodex*[7] and *Sarcoptes* mites[8]
		Nitenpyram	▪ Rapid kill but short duration of action
		Spinosad	
Oxadiazine	Voltage-dependent sodium-channel blocker	Indoxacarb	
Growth regulators	Chitin biosynthesis inhibitor	Lufenuron	▪ Do not kill or repel adult fleas
	Juvenile hormone mimetic	Pyriproxyfen	
		Methoprene	

GABA=γ-aminobutyric acid

possible, mousses and sprays can be used in combination with shampoos or as alternatives for topical treatment. Carefully clipping the hair short on affected areas can facilitate better contact with the skin and help prevent product build-up.

For clients who may not be able to afford or access commercially available products, dilute vinegar and bleach solutions (**TABLE 2**) are inexpensive antimicrobial therapy options. However, if too concentrated, these solutions can lead to skin irritation and thus must be made correctly. Dilute vinegar is made by mixing equal parts white vinegar and water, applying it to the skin, and allowing it to air dry.[18] These solutions are applied to the skin for 10 minutes before being rinsed off or allowed to air dry and can also provide anti-inflammatory properties.[19]

Antibiotics and antifungals are also available in topical formulations, including creams and ointments. Creams offer deeper penetration into the skin; ointments can serve to create a soothing, protective, occlusive barrier. Many veterinary products labeled for the treatment of otitis externa contain antibiotics and antifungals and can be used off-label on skin. Many of these products also contain a steroid to decrease inflammation; however, topical steroids should be used cautiously and for short durations to avoid side effects. Sprays can also be used to cover larger areas.

Systemic Therapy

Bacterial Infections

For patients with severe superficial or deep pyoderma, or when topical therapy alone is not effective, systemic antibiotic therapy is warranted. When prescribing antibiotics empirically, use first-tier antibiotics, such as cephalexin (**TABLE 3**).[20]

Second-tier antibiotics, such as fluoroquinolones, should only be used in the face of a culture indicating no susceptibility to first-tier antibiotics.[20] They should not be recommended based only on the failure of a first-tier antibiotic as resistance patterns can be unpredictable. Although less expensive, ciprofloxacin should not be used in veterinary medicine because its bioavailability and probability of effectiveness are variable and low and the likelihood of bacterial resistance is increased.[24]

Use of third-tier antibiotics such as linezolid and vancomycin is discouraged for skin infections in animals.[20]

Traditional anecdotal recommendations for treatment duration is to continue superficial pyoderma treatment for 1 week beyond clinical resolution and deep pyoderma treatment for 2 weeks beyond clinical resolution. Generally, most cases of superficial pyoderma are resolved after 3 weeks of treatment, although rapid improvement is seen in the first 1 to 2 weeks.[20] Deep pyodermas usually resolve after 4 to 8 weeks of treatment.[25] If the infection does not improve after 2 weeks of empiric antibiotic therapy or if new lesions appear while the patient is receiving antibiotics, resistance should be suspected and bacterial culture and susceptibility should be performed.[20]

Recheck examinations are valuable for guiding the duration of antibiotic therapy. Rechecks can help reduce the overall cost of treatment and risk for rapid recurrence. Patients should be re-examined 2 to 4 weeks after starting a systemic antibiotic and while the antibiotic therapy is still ongoing. In-person rechecks with the use of cytology are ideal, but when not possible, telemedicine can be considered. If the client is not able to bring the patient back for a recheck, consider aggressive topical therapy alone. Ideally, when dispensing systemic antibiotics, emphasize the critical importance of the patient's return.[20]

Malassezia Infections

If *Malassezia* dermatitis is severe or if topical therapy alone fails to resolve it, systemic medication may be necessary. Ketoconazole, itraconazole, and fluconazole at dosages of 5 to 10 mg/kg PO q24h have evidence for

TABLE 2 Topical Bleach Concentrations and Dilution Instructions

CONCENTRATION	STRONG (0.05%)	WEAK (0.005%)
5.25% (regular strength)	1 mL bleach to 105 mL water	1 mL bleach to 1050 mL water
8.25% (concentrated)	1 mL bleach to 165 mL water	1 mL bleach to 1650 mL water

To avoid contact reactions, use regular, unscented bleach.

efficacy in dogs.[12] Ketoconazole is typically the least expensive and may be the best option for community medicine practice. However, although possible with any azole antifungal, liver toxicity is more likely with ketoconazole. For cats, itraconazole should be the first choice.[12] Resolution of *Malassezia* dermatitis is typically seen within 3 to 4 weeks of treatment.[12] For patients undergoing long-term therapy with these medications, baseline and liver enzyme monitoring should be recommended.

When prescribing antibiotics empirically, use first-tier antibiotics, such as cephalexin.[20]

DERMATOPHYTOSES

Itraconazole and terbinafine are recommended for the treatment of dermatophytosis in cats and dogs.[26] Itraconazole is typically used at 5 mg/kg PO q24h. Because itraconazole concentrates in the skin and hair, alternate-week treatment (1 week on, 1 week off) has been used successfully in cats.[27] This protocol reduces the cost and stress associated with medications. Compounded itraconazole should not be used in either species. Terbinafine is used at 20 to 40 mg/kg and is more efficacious at higher doses.[26] Terbinafine concentrates in feline hair; however, pulse-therapy protocols in animals are not well researched.[26] Ketoconazole can also be used in dogs at a dose of 5 to 10 mg/kg PO q24h but may be less effective than itraconazole or terbinafine.[26] Medication should be continued until 2 cultures spaced 2 weeks apart are negative.[26] For patients receiving long-term therapy, baseline and liver enzyme monitoring should be recommended.

For cats and dogs, topical treatment and environmental decontamination are also recommended to prevent fomite contamination. Shampoos containing 2% chlorhexidine and 2% miconazole or lime sulfur dips (although not currently available as veterinary formulations) can be used twice weekly.[26] Dilute household bleach (1:100) or accelerated hydrogen peroxide effectively cleans nonporous surfaces.[28] Laundry can be cleaned with 2 washing cycles on the longest setting at any temperature.[26]

TABLE 3 Common Antibiotics Used to Treat Skin Infections

TIER[a]	ANTIBIOTIC	RECOMMENDED DOSAGE
1	Cephalexin	25–30 mg/kg PO q12h[21]
	Clindamycin	11 mg/kg PO q12h
	Sulfadiazine/trimethoprim	15–30 mg/kg PO q12h
	Sulfadimethoxine/ormetoprim	55 mg/kg PO on day 1, then 27.5 mg/kg PO q24h
	Amoxicillin/clavulanate	20 mg/kg PO q8h
1 or 2	Cefpodoxime[b]	10 mg/kg PO q24h[22]
	Cefovecin[b]	8 mg/kg SC q14d
2	Doxycycline or minocycline	10 mg/kg PO q12h
	Enrofloxacin[b]	10–20 mg/kg PO q24h
	Marbofloxacin[b]	5.5 mg/kg PO q24h
	Chloramphenicol	40–50 mg/kg PO q8h
	Rifampin	6–10 mg/kg PO q24h[23]
	Amikacin	15–30 mg/kg IV, IM, or SC q24h

[a]Use of third-tier antibiotics (e.g., linezolid and vancomycin) for skin infections in animals is discouraged.[20]
[b]Third-generation cephalosporins and fluoroquinolones should be used with caution due to potential selective effects for antibiotic resistance.[20]
NOTE: Some dosages and frequencies are higher than typical recommendations found in formularies due to perceived higher effectiveness for bacterial skin infections.

ALLERGIES

Treating allergies in cats and dogs can be time-consuming, complicated, and frustrating for clients and clinicians due to the variable clinical signs, chronicity, and potential comorbidities. Treatment can be divided into short-term treatments aimed at controlling acute flares and long-term treatments aimed at preventing flares or prolonging the time between flares. However, allergies cannot be cured, and lifelong treatment is necessary.

Short-Term Treatment

The 3 most important goals of short-term treatment are to treat any ongoing infection (as described above), relieve itching, and control inflammation. The medications most commonly used to provide rapid relief of pruritis are oclacitinib (Apoquel) and lokivetmab (Cytopoint), both manufactured by Zoetis (zoetisus.com), as well as glucocorticoids (TABLE 4). Of these, glucocorticoids are the most cost-effective, providing more benefit than oclacitinib and lokivetmab for inflamed skin and can be used when no contraindications exist. For patients with localized signs, topical glucocorticoids can be used to provide rapid relief.[31] Not all patients tolerate or respond the same to these medications; therefore, switching to another if significant reduction in pruritus is not seen or the patient develops an intolerance may be necessary. However, if the pruritus does not respond to glucocorticoids, the diagnosis should be re-evaluated.[31]

Long-Term Treatment

Proactive management of allergies can not only improve the patient's quality of life but can decrease the client's lifelong costs of managing flares and the risk for antibiotic resistance associated with frequent secondary infections. Common long-term treatment for allergies in dogs can include oclacitinib, lokivetmab, low-dose glucocorticoids, cyclosporine, and antihistamines; topical steroids, topical colloidal oatmeal or ceramides; essential fatty acids; hydrolyzed or novel protein diets (for food allergies); and allergen-specific immunotherapy (for atopic dermatitis). In challenging cases, a combination of therapies may be needed.

Although elimination diet trials and allergen-specific immunotherapy are ideal for long-term management of allergies, they may not be possible for clients who face barriers to care, including financial barriers. For those patients, long-term medical management should be used. Many options are available; however, glucocorticoids are inexpensive and, if the only effective and affordable treatment, can be used long term at the lowest dose and frequency needed to control clinical

TABLE 4 Common Rapidly Acting Systemic Antipruritic Medications

DRUG CLASS	DRUG	ANTIPRURITIC/ INFLAMMATORY DOSAGE	TYPICAL DURATION OF ACTION	NOTES
Glucocorticoid (strongest anti-inflammatory effect)	Prednisone, prednisolone	▪ **Dogs**: 0.5–1 mg/kg PO q24h ▪ **Cats**: 1–2 mg/kg PO q24h	12–36 hours	▪ Total daily dose can be divided for twice daily dosing ▪ Consider prednisolone for cats because some may not be able to efficiently convert prednisone to prednisolone[29]
	Methylprednisolone	▪ **Dogs:** 0.4–0.8 mg/kg PO q24h ▪ **Cats:** 0.8–1.6 mg/kg PO q24h	12–36 hours	▪ Total daily dose can be divided for twice daily dosing ▪ The long-lasting injectable Depo-Medrol (Zoetis, zoetisus.com) is not typically recommended due to the inability to withdraw in case of side effects
Janus kinase inhibitor (some anti-inflammatory effect)	Oclacitinib	▪ **Dogs:** 0.4–0.6 mg/kg PO q12h for up to 14 days, then 0.4–0.6 mg/kg PO q24h for maintenance	24 hours	▪ Approved only for use in dogs ≥1 year of age ▪ Has been used off-label in cats[30]
Monoclonal antibody targeting interleukin-31 (least anti-inflammatory effect)	Lokivetmab	▪ **Dogs:** 2–4.3 mg/kg SC q28d (dosed according to body weight chart)	4–6 weeks	▪ Can be used in dogs of all ages ▪ Do not use in cats

signs. Antihistamines and essential fatty acids can be used as steroid-sparing agents but are seldom sufficient as sole therapy. Although they add to the overall cost of treatment, blood work and urinalysis should be recommended every 6 months to 1 year when using medications for symptomatic treatment.

CONCLUSIONS

Cost-effective treatments with high margins of safety and broad effectiveness are especially useful in community medicine. Whenever possible, topical treatments should be used to increase the range of effectiveness, decrease risk for side effects, and promote good antimicrobial stewardship. Simple yet effective plans should be considered to decrease caretaker burden.[32] When implementing treatment, nonjudgmentally discuss the feasibility of recommendations with clients. Sending clients home with written information and instructions helps alleviate misunderstanding or inaccurate memory of instructions. Recheck examinations are also valuable for assessing adequate response to recommended therapy. When legal and applicable, telemedicine may be an option. If the patient does not respond as expected to treatment, the diagnosis should be re-evaluated. TVP

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easOtic®

(hydrocortisone aceponate, miconazole nitrate, gentamicin sulfate)

Otic Suspension for Dogs

Anti-inflammatory, antifungal, and antibacterial

Rx
For Otic Use in Dogs Only

CAUTION
Federal law restricts this drug to use by or on the order of a licensed veterinarian.

DESCRIPTION
EASOTIC® Otic Suspension contains 1.11 mg/mL hydrocortisone aceponate, 17.4 mg/mL miconazole nitrate and 1.5 mg/mL gentamicin (as sulfate). The inactive ingredient is a semi-liquid petroleum jelly.

INDICATIONS
EASOTIC Otic Suspension is indicated for the treatment of otitis externa in dogs associated with susceptible strains of yeast (*Malassezia pachydermatis*) and bacteria (*Staphylococcus pseudintermedius*).

DOSAGE AND ADMINISTRATION
Verify that the tympanic membrane is intact.
Shake well before each use.

Priming the canister: Prior to the first use of the dosing container, press firmly on the pump several times until the product fills the nozzle (canula tip) with a full dose of product.

Carefully insert the canula into the affected external ear canal(s) and apply 1 mL (a single pump) of Otic Suspension once per day for 5 days. Wash hands after usage.

CONTRAINDICATIONS
Do not use in dogs with known tympanic membrane perforation.

EASOTIC Otic Suspension is contraindicated in dogs with known or suspected hypersensitivity to corticosteroids,imidazole antifungals, or aminoglycoside antibiotics.

WARNINGS
Human Warnings: Not for use in humans. Keep this and all drugs out of reach of children. In case of accidental skin contact, wash area thoroughly with water. Avoid contact with eyes.

Humans with known or suspected hypersensitivity to hydrocortisone, aminoglycoside antibiotics, or azole antifungals should not handle this product.

In case of accidental ingestion by humans, contact a physician immediately. Physicians may contact a Poison Control Center for advice concerning cases of ingestion by humans.

Animal Warnings: As a class, aminoglycoside antibiotics are associated with ototoxicty, vestibular dysfunction and renal toxicity. The use of EASOTIC Otic Suspension in a dog with a damaged tympanic membrane can result in damage to the structures of the ear associated with hearing and balance or in transmission of the infection to the middle or inner ear. Immediately discontinue use of EASOTIC Otic Suspension if hearing loss or signs of vestibular dysfunction are observed during treatment (see **ADVERSE REACTIONS**).

PRECAUTIONS
Do not administer orally.

Concurrent administration of potentially ototoxic drugs should be avoided.

Use with caution in dogs with impaired hepatic or renal function (see **ANIMAL SAFETY**).

Long-term use of topical otic corticosteroids has been associated with adrenocortical suppression and iatrogenic hyperadrenocorticism in dogs (see **ANIMAL SAFETY**).

The safe use of EASOTIC Otic Suspension in dogs used for breeding purposes, during pregnancy, or in lactating bitches, has not been evaluated.

ADVERSE REACTIONS
In a field study conducted in the United States (see **EFFECTIVENESS**), there were no adverse reactions reported in 145 dogs administered EASOTIC Otic Suspension.

In foreign market experience, reports of hearing loss and application site erythema have been received. In most reported cases, the hearing loss and erythema were transient and resolved with discontinuation of EASOTIC® suspension.

To report suspected adverse drug events, contact Virbac AH, Inc at 1-800-338-3659 or the FDA at 1-888-FDA-VETS or www.fda.gov/reportanimalae.

For technical assistance or to obtain a Safety Data Sheet, call Virbac at 800-338-3659 or visit us at us.virbac.com.

PHARMACOLOGY
Hydrocortisone aceponate is a glucocorticoid with anti-inflammatory effects. Miconazole nitrate is an imidazole antifungal. Gentamicin sulfate is an aminoglycoside antibiotic.

In the target animal safety study, hydrocortisone aceponate, miconazole and gentamicin were shown to be systemically absorbed from the ears of healthy dogs (see **ANIMAL SAFETY**); increased systemic absorption may be observed in inflamed ears.

MICROBIOLOGY
The compatibility and additive effect of each of the components in EASOTIC® Otic Suspension was demonstrated in a component effectiveness and non-interference study. An in vitro study of organisms collected from clinical cases of otitis externa in dogs and from dogs enrolled in the clinical effectiveness study for EASOTIC Otic Suspension determined that miconazole nitrate and gentamicin sulfate inhibit the growth of bacteria and yeast commonly associated with otitis externa in dogs. No consistent synergistic or antagonistic effect of the two antimicrobials was demonstrated. The addition of hydrocortisone aceponate to the combination did not impair antimicrobial activity to any clinically-significant extent.

In a field study (see **EFFECTIVENESS**), the minimum of 10 isolates from successfully treated cases was met for *S. pseudintermedius* and *M. pachydermatis*.

EFFECTIVENESS
The effectiveness of this drug was evaluated in 157 dogs with otitis externa. The study was a double-masked field study with a placebo control. One hundred and four dogs were treated with EASOTIC Otic Suspension and 53 dogs were treated with the placebo control. Treatment was administered once daily for 5 consecutive days to the affected ear(s). The dogs were evaluated at 4 different intervals over the course of 1 month to determine response to therapy. The 6 clinical signs evaluated were: malodor, aural discharge, pruritus, erythema, swelling and pain. The individual clinical scores were assigned based on the severity of each sign. Success was based on clinical improvement at Day 28 ±2 days. The success rates of the 2 groups were significantly different (p=0.0179); 68.5% of dogs administered EASOTIC Otic Suspension were successfully treated, compared to 21.8% of the dogs in the placebo control group.

ANIMAL SAFETY
In the target animal safety study, EASOTIC Otic Suspension was administered at 0X, 1X, 3X and 5X the recommended dose for 15 consecutive days (3 times the recommended treatment duration) in laboratory Beagles, with 8 dogs per group. Hypersensitivity reactions in the external ear canal and inner pinnae were seen in all EASOTIC Otic Suspension groups and included mild to severe aural erythema (3X group), papules and ulceration (1X and 5X groups), otitis externa (3X and 5X groups), and otitis media (5X group). Renal tubular crystals were present in the cortex and medulla (0X, 1X, 3X, and 5X groups) and mild renal tubular basophilia and atrophy were present in one 5X group dog. Baseline cortisol values and the cortisol response to ACTH stimulation were lower in treated dogs compared to the control dogs. The ACTH stimulation test results are consistent with systemic absorption of topical corticosteroids causing suppression of the hypothalamic-pituitary-adrenal axis. Dogs in the 3X and 5X groups demonstrated elevations in AST and ALP, while dogs in the 1X, 3X, and 5X groups had elevated cholesterol, total protein, and albumin levels. Dogs in the 3X and 5X groups also had higher liver weights and greater food consumption.

STORAGE INFORMATION: Store at temperatures between 20º C-25º C (68º F-77º F), with excursions permitted between 15º C-30º C (59º F-86º F).

HOW SUPPLIED: EASOTIC Otic Suspension is supplied in a polyethylene canister, with a soft applicator canula.

Each canister contains ten 1 mL doses. Made in the U.S.A.

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