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## NATURAL TOPICAL SOLUTIONS TO HELP MANAGE SKIN INFECTIONS



**EASE OF USE  
FOR HIGH  
COMPLIANCE**



**SCIENTIFICALLY  
PROVEN  
EFFICACY**



**TRENDSSETTING  
INNOVATIONS  
SINCE 2003**



*Naturally efficient*





## Facts

### Bacterial skin infection is one of the main reasons for antimicrobial use in dogs and cats<sup>1</sup>.

Different types of pathogens can be encountered in pets such as bacteria and fungi, including yeasts.

Bacterial skin infection is one of the most common reasons for consulting a dermatologist<sup>2</sup>.

These infections include pyoderma, which is often secondary to underlying disorders such as atopic dermatitis, Flea Allergy Dermatitis (F.A.D), demodicosis, sarcoptic mange, hyperadrenocorticism...<sup>3</sup>.

Several types of pyodermas exist :

**Surface pyoderma** (intertrigo and microbial overgrowth syndrome)

**Superficial pyoderma** affecting the epidermis (impetigo, bacterial folliculitis)

**Deep pyoderma** affecting the dermis or even the hypodermis (furunculosis, bacterial cellulitis)

«64% of dogs with canine atopic dermatitis develop a chronic bacterial infection which can reach up to 100% depending on the breed<sup>4</sup>».

Staphylococci are most often implicated in skin infections in dogs.

« In dogs, the pathogen identified in over 90% of cases is *Staphylococcus pseudintermedius*<sup>2</sup> ».

« More than 80% of staphylococcal strains produce penicillinases (resistance to penicillin G), 28% are resistant to clindamycin, 36% to tetracyclines, 13% to fluoroquinolones, and approximately 13% are resistant to first-generation cephalosporins and the combination of amoxicillin and clavulanic acid. There has been an increase in the frequency of staphylococcal strains resistant to methicillin<sup>5</sup>».



*Malassezia dermatitis* is another very common skin disease in pets and a frequent reason for consulting a veterinarian.<sup>6</sup> Identification of the pathogen, *Malassezia pachydermatis*, along with any underlying conditions such as allergies is key to guiding the overall management of the condition.



### 1. Antimicrobial resistance, a real public health challenge around the world

Antimicrobial resistance remains **one of the 10 major threats** to humanity<sup>8</sup>. According to the World Health Organization (WHO), it was responsible for **1,27 million deaths** in 2019<sup>9</sup> and could lead to up to **10 million deaths per year by 2050** if we do nothing<sup>8</sup>.

This phenomenon is partly due to the inappropriate use of systemic antibiotics in both human and veterinary medicine<sup>10</sup>.

For several years, the risk of resistance, particularly of methicillin-resistant strains of *S.pseudintermedius*, has been steadily increasing. To act against this antimicrobial resistance, guidelines on the proper use of antimicrobials in case of skin infections, written by veterinary scientific committees (WAVD and ISCAID) have multiplied.

### 2. Biofilm



The frequent formation **of bacterial biofilms** could also explain the phenomenon of **antimicrobial resistance**.

The protective matrix they form **limits the effectiveness of antibiotics**, but also that of antibodies and inflammatory cells of the animal. The action of flux pumps within the biofilm **allows certain antibiotics to be expelled** from the matrix. Finally, collaboration between bacteria **reduces** their metabolic activity and therefore their **receptivity to antibiotics**.

**In dogs**, biofilm formation has been proven in **skin and ear infections as well as in bite wounds**. Electron microscopy observations have revealed their presence in approximately 60% of chronic wounds in dogs.



# Diagnosis

For each suspected case of pyoderma, a stepwise approach needs to be used before prescribing an antimicrobial treatment. Indeed, this can **contribute to reducing the inappropriate use of antimicrobials, promoting faster treatment success and preventing relapses** <sup>7</sup>.

## SKIN EXAMINATION

Recognize skin lesions typically associated with surface, superficial and deep pyoderma

## CYTOLOGY

Identify bacterial aetiology e.g. intracellular cocci within neutrophils  
Confirm that this is a pyoderma

## FURTHER DIAGNOSTIC TESTS

Identify primary causes and rule out differential diagnoses  
Why did the dog develop pyoderma?

Is **BACTERIAL CULTURE (BC) & ANTIMICROBIAL SUSCEPTIBILITY TESTING (AST)** needed for treatment choices?

### TOPICAL THERAPY

Laboratory test results are not applicable for drugs applied topically

Breakpoints for topically applied drugs are not available

**Not needed**

### SYSTEMIC THERAPY

#### LOW concern about drug resistance

BC/AST to guide responsible drug choices

If choosing drugs empirically, only consider first-choice agents

**Preferred & recommended over empirical choices**

#### HIGH concern about drug resistance

History of recurrent pyoderma, repeated antimicrobials, MRS infection  
High regional prevalence of MRS  
Rods or polymicrobial cytology

**Always & strongly recommended**

Diagram taken and adapted from the Guidelines on the use of antimicrobials in canine pyoderma by the International Society for Companion Animal Infectious Diseases (ISCAID) © 2025 A. Loeffler, C. L. Cain, L. Ferrer, K. Nishifuji, K. Varjonen, M. G. Papich, L. Guardabassi, S. M. Frosini, E. N. Barker, J. Scott Weese. Veterinary Dermatology published by John Wiley & Sons Ltd on behalf of ESVD and ACVD.

For more details



# Managing pyoderma



Topical therapy is a great opportunity to promote responsible antimicrobial use in the management of patients with pyoderma.<sup>7</sup>

« Topical therapy used as sole antimicrobial treatment is **the treatment-of-choice** for **all cases of surface and superficial pyoderma** and also should be considered as **adjunct therapy** in **all cases of pyoderma** that require systemic treatment. »

Guidelines 2025

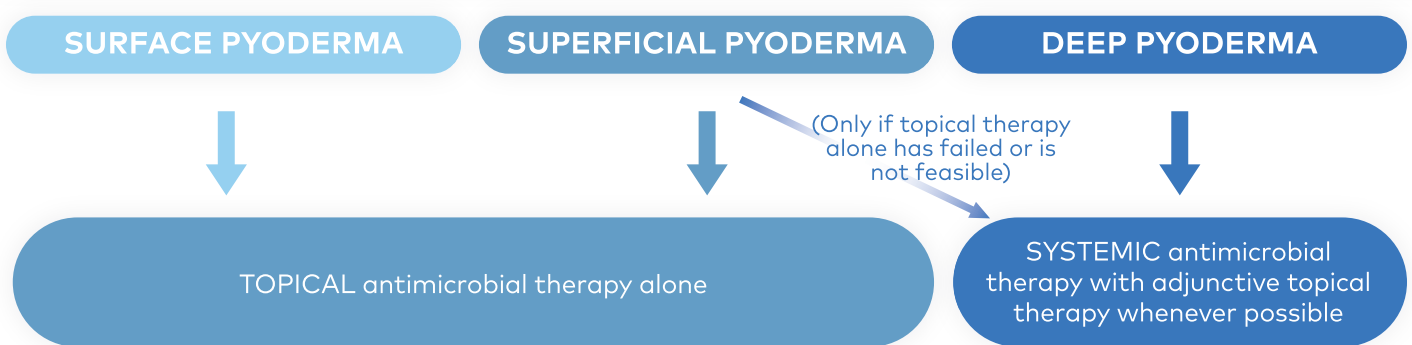


Diagram taken from the Guidelines on the use of antimicrobials in canine pyoderma by the International Society for Companion Animal Infectious Diseases (ISCAID) © 2025

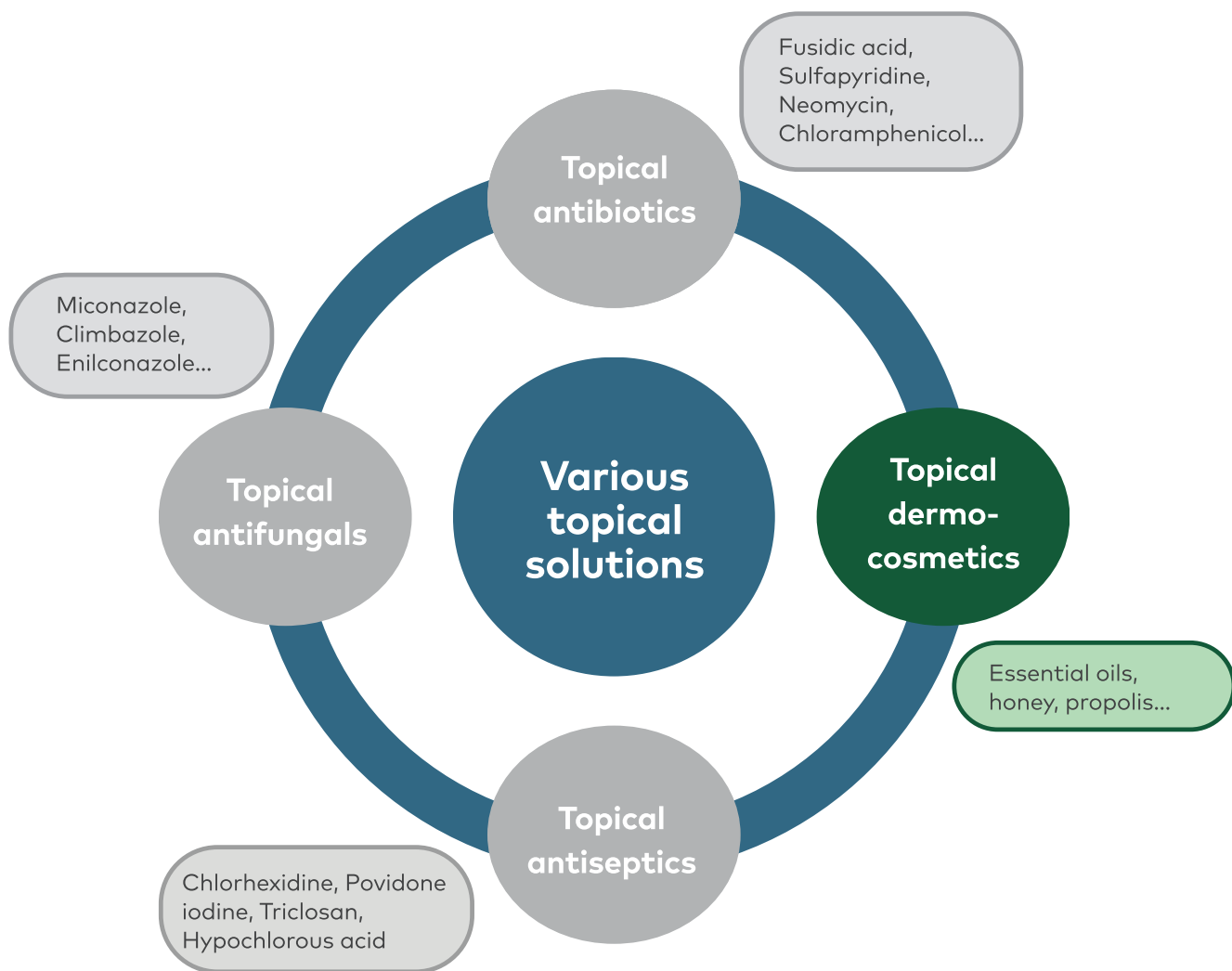
A.Loeffler, C. L.Cain, L. Ferrer, K.Nishifuji, K.Varjonen, M G Papich, L.Guardabassi, S M. Frosini, E N Barker, J Scott Weese. Veterinary Dermatology published by John Wiley & Sons Ltd on behalf of ESVD and ACVD.

As skin lesions are directly accessible, topical treatments (which come in various forms: spot-on, cream, shampoo, spray, wipes, foams, etc.) are particularly recommended in veterinary dermatology.<sup>2</sup>

## Topical treatment offers many advantages<sup>7</sup> :

- ✓ Reduces the need for systemic antimicrobials and limits their impact on the gut microbiota, as well as other adverse effects.
- ✓ Effective in the treatment of superficial and surface pyoderma; can replace systemic antimicrobials.
- ✓ When used as adjuvant therapy, it can reduce the duration of systemic treatment required.<sup>7,11</sup>
- ✓ Effective against staphylococci that are sensitive or resistant to methicillin.
- ✓ Low risk of inducing antimicrobial resistance when used correctly, thanks to the high local concentration of active ingredients at the site of infection.
- ✓ **Safe, generally well tolerated, and suitable for long-term use.**<sup>7,12</sup>
- ✓ **Often cost effective.**
- ✓ **Reduces malodor, scales and crusts, number of bacteria and biofilm and increases cleanliness. Improves hygiene and skin condition.**

# Various topical solutions are available for the management of skin infections



Discover the guidelines<sup>11,12,13</sup> available on the website of the **World Association for Veterinary Dermatology** by scanning this QR code



Discover the **2025 guidelines on the use of antimicrobials in canine pyoderma** by the International Society for Companion Animal Infectious Diseases (ISCAID)<sup>7</sup>



In this brochure, we will focus on essential oils as alternative substances to help manage skin infections.

## Our solution



« Phyto-aromatherapy [...] opens a new way, without toxicity, without environmental impact and without harmful side effects » <sup>14</sup>

In the current context of rising antibiotic resistance and need for action, **essential oils should be part of the veterinarian's arsenal for managing skin infections.**

They indeed **offer interesting perspectives** thanks to their **multiple biological properties**, demonstrated in the literature, such as anti-inflammatory, sedative, digestive, **antimicrobial**, antiviral, and antioxidant effects. <sup>15</sup>



## HYGIENE IS ESSENTIAL



Bathing, regardless of the product used, is beneficial because of its mechanical action.

It cleanses the skin and removes dandruff and crusts. Water also rehydrates the *stratum corneum* and prepares the skin for the action of the active ingredients that will be used. In cases of pyoderma, it is therefore recommended to **bathe frequently**, initially every two days and then weekly as a maintenance.<sup>2</sup>

However, bathing can be challenging and thus reduce owner compliance, which is crucial in cases of skin infections. Therefore, various complementary or alternative formulations that are easier to use are available, such as rinse-free foams.

### PYOclean® Shampoo

Purifying Shampoo



Once to twice weekly



### PYOclean® Mousse

Rinse-free cleansing and purifying foam



As often as needed



100% natural active ingredients that purify, moisturize and support the skin barrier. *Oregano and manuka essential oils, propolis, honey, green apple lipoamino acids, EFA...*



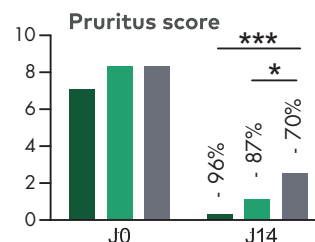
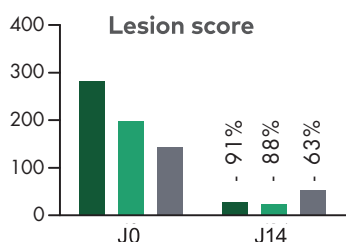
Easy to use

*Rinse-free foam to space out shampoos, for frequent baths or localized areas, for animals with an aversion to water...*



### Efficacy proven in a published study<sup>16</sup>

- **30 dogs** with superficial pyoderma assigned to 3 groups:
  - Group 1: **PYOclean® Shampoo** twice a week & **PYOclean® Mousse** once a day
  - Group 2: **PYOclean® Shampoo** twice a week & **PYOclean® Spray** once a day
  - Group 3: Medical shampoo containing chlorhexidine, miconazole and microsilver (Biohex® Vetbiotek, USA) twice a week
- Duration : **14 days**
- Evaluation criteria: cytological, lesion and pruritus scores



Statistical significance; \*\*,  $p < 0.01$  ; \*\*\*,  $p < 0.001$

●● These natural topical solutions can be considered as effective alternatives in a multimodal approach for managing superficial pyoderma in dogs.

## STRENGTHENING THE SKIN BARRIER TO REDUCE RELAPSES



In some cases, infections can recur or even become chronic. To limit relapses, it is important to strengthen the skin barrier, which may be altered and contribute to the proliferation of pathogens on the animal's skin.



**PYOspot®**  
Purifying spot-on

1 pipette per week in one point between the shoulder blades



100% natural active ingredients that purify, moisturize and support the skin barrier.  
*Neem and ajowan extracts, palmarosa and savory essential oils, EFA*



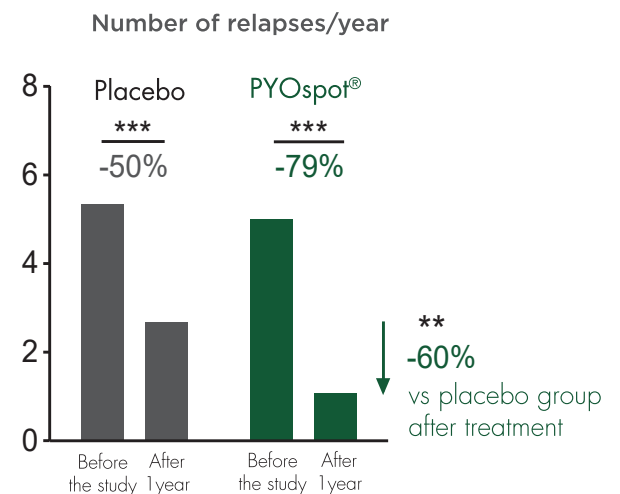
Easy to use



Efficacy proven in a published study<sup>17</sup>

- **25 dogs** with at least **3 episodes of pyoderma** per year
- 1 application of **PYOspot®** per week
- Follow-up of the number of relapses over one year

●● Regular and long-term use of **PYOspot®** in addition to treatment for the underlying condition significantly reduces recurrent episodes of pyoderma. This natural topical solution could be a valuable complementary solution to control recurrences especially on a long-term basis.



## LOCALIZED AREAS



In cases of localized pyoderma, « sprays and lotions are interesting »<sup>2</sup>



### PYOclean® Spray

Purifying spray

Twice a day



100% natural active ingredients that purify, moisturize and support the skin barrier.  
*N-acetylcysteine, manuka & lavandin essential oils, prebiotic, EFA...*

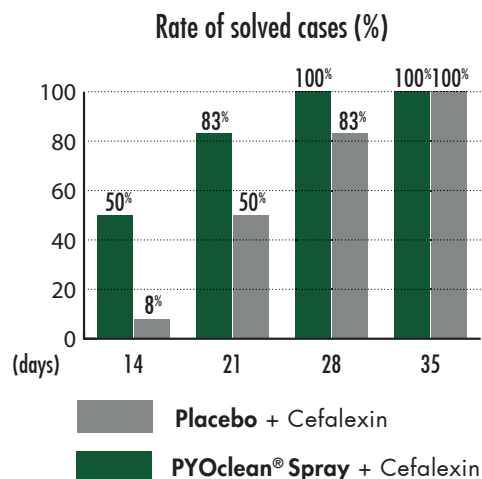


Ideal for chin acne, pododermatitis, lip edges, skin folds...



### Efficacy proven in a published study<sup>18</sup>

- 12 dogs with superficial pyoderma
- Systemic treatment: **cefalexin** (15 mg/kg twice a day) in association with **PYOclean® Spray** on half of the body and a **placebo** spray on the other half
- Duration: **4 weeks**
- Follow-up of case resolution on D14, D21, D28 et D35



Hind limbs after 14 days:



PYOclean® Spray



Placebo

These results show that the use of **PYOclean® Spray** can help hasten the resolution of pyoderma when used in conjunction with systemic antimicrobial therapy. It could also shorten the duration of antimicrobial treatments.

## IN CASES OF OTITIS EXTERNA



### PYOclean® Oto Purifying ear cleanser



100% natural active ingredients that purify, moisturize and support the skin barrier.

*N-acetylcysteine, red myrtle essential oil, honey, propolis...*



Hygienic and practical single-doses:

limit cross-contamination between ears  
improve compliance (easy and constant dosage)

**During otitis externa: once a day** to cleanse and prepare the ear canal prior to receiving the medical treatment.

**Regular use** to limit relapses: **once a week.**



Can be used on **rabbits**



### Clinical case<sup>19</sup>

- **10 dogs** (18 ears) presenting with erythematato-ceruminous otitis externa or abnormal epithelial migration
- **PYOclean® Oto** application as stand-alone care once a day to twice a month depending on the cases
- Duration: **3 months**



**-43%\*\*\***  
Abnormal epithelial migration



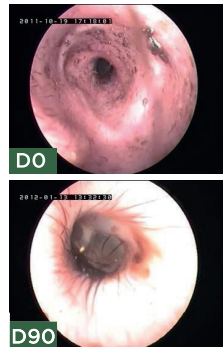
**-91%\*\*\***  
Erythema



**-75%\***  
Pruritus

\*\*\*p<0,001 \*p<0,05

Erythematoceruminous otitis in a 3-year-old Beagle



© M.-C. Cadiergues



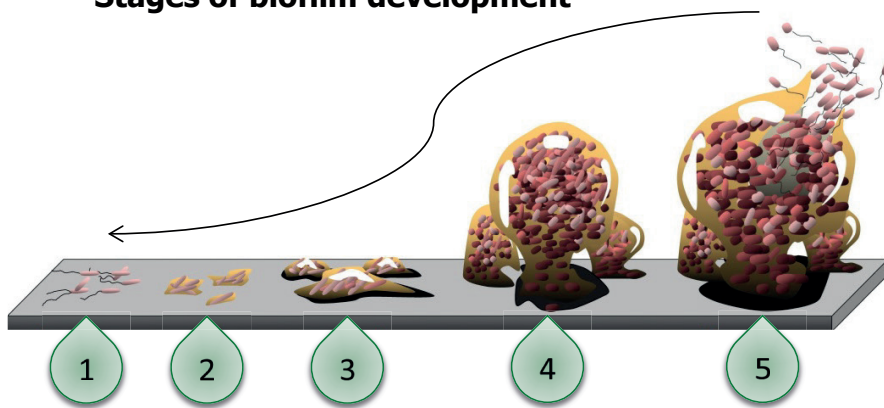
## WHAT ABOUT BIOFILM ?



Indeed, biofilms are communities of microorganisms that bind together and secrete an adhesive and protective matrix, giving them remarkable resistance.

**Substances** such as **manuka essential oil**, **N-acetylcysteine** and **Tris-EDTA** have been successfully tested to **combat *Staphylococcus pseudintermedius* biofilm formation** <sup>5</sup>.

### Stages of biofilm development



- 1 Initial attachment:**  
reversible/transitory adherence
- 2 Irreversible attachment:**  
irreversible adherence, unicellular layer
- 3 Initial phase of biofilm maturation:**  
aggregation in micro-colonies
- 4 Growth and maturation of biofilm**
- 5 Dispersion and distribution of biofilm**



## ANTIBIOFILM SOLUTIONS



### PYOclean® Spray

Purifying spray



### PYOclean® OTO

Purifying ear cleanser



### PYOclean® Mousse

Purifying rinse-free cleansing foam

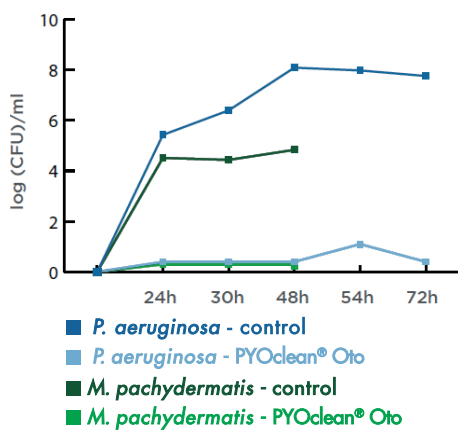
**Ingredients that can help limit biofilm formation :** *N-acetylcysteine, Manuka essential oil and Propolis*



**In vitro efficacy proven in a published study** <sup>20</sup>

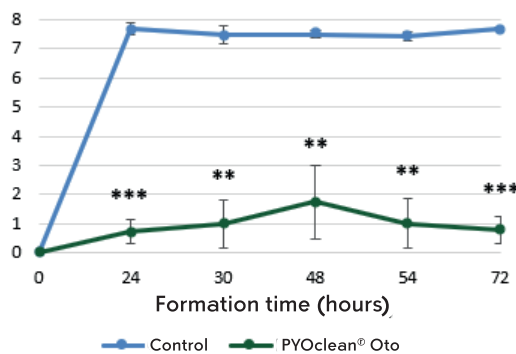
- Test on *Malassezia pachydermatis* & *Pseudomonas aeruginosa*, often involved in otitis with **PYOclean® Oto**
- Test on *Staphylococcus pseudintermedius* with **PYOclean® Spray**
- **Follow up of biofilm formation on 48 or 72h in the presence of PYOclean® Oto and PYOclean® Spray** or sterile distilled water as a control, with adhering cells counting
- Follow up on performed biofilms after 240min with **PYOclean® Oto**

Effect of **PYOclean® Oto** on biofilm formation versus control

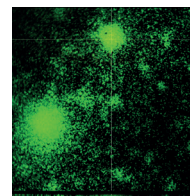


\*p<0,05 vs control

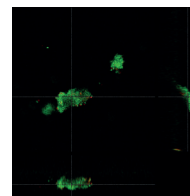
Effect of **PYOclean® Spray** on biofilm formation of *S.pseudintermedius* vs control



Effect on a *P. aeruginosa* mature biofilm after contact with **PYOclean® Oto** (confocal microscopy)



Control



After 1h of contact with **PYOclean® Oto**

**PYOclean® Spray and PYOclean® Oto can help limit biofilm formation and weaken existing biofilms**

# References

- Beco L, Guaguère E, Lorente Méndez C, Noli C, Nuttall T, Vroom M. Suggested guidelines for using systemic antimicrobials in bacterial skin infections (part 2): antimicrobial choice, treatment regimens and compliance. *Vet Rec.* 2013;172(6):156–160.
- Bensignor E. Atlas des pyodermes canines. 2e éd. Paris: MedCom; 2014.
- Duangkaew L, Larsuprom L, Lekcharoensuk C, Chen C. Effect of a mixture of essential oils and a plant-based extract for the management of localized superficial pyoderma in dogs: An open-label clinical trial. *Vet Med.* 2017;47(4):513–522.
- Picco F, Zini E, Nett C, et al. A prospective study on canine atopic dermatitis and food-induced allergic dermatitis in Switzerland. *Vet Dermatol.* 2008;19:150–155.
- AFVAC - GEDAC. Fiches de recommandations pour un bon usage des antibiotiques. 2022.
- Guillot J, Bond R. Malassezia yeasts in veterinary dermatology: an updated overview. *Front Cell Infect Microbiol.* 2020;10:79. doi:10.3389/fcimb.2020.00079.
- Loeffler A, Cain CL, Ferrer L, Nishifuji K, Varjonen K, Papich MG, et al. Antimicrobial use guidelines for canine pyoderma by the International Society for Companion Animal Infectious Diseases (ISCAID). *Vet Dermatol.* 2025;36(3):234–282. doi:10.1111/vde.13342.
- Ministry of Agriculture and Food Sovereignty, Ecoantibio 3 plan (2023–2028) [Internet]. 2024. Available: <https://agriculture.gouv.fr/le-plan-ecoantibio-3-2023-20288b>.
- Murray CJL, Ikuta KS, Sharara F, Swetschinski L, Aguilar GR, Gray A, et al. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet.* 2022;399(10325):629–655.
- Santoro D. Topical therapy for canine pyoderma: what is new? *J Am Vet Med Assoc.* 2023;261(S1):S140–S148. doi:10.2460/javma.23.01.0001.
- Morris DO, Loeffler A, Davis MF, Guardabassi L, Weese JS. Recommendations for approaches to meticillin-resistant staphylococcal infections of small animals: diagnosis, therapeutic considerations and preventative measures. *Vet Dermatol.* 2017;28:304–e69.
- Bond R, Morris DO, Guillot J, Bensignor EJ, Robson D, Mason KV, et al. Biology, diagnosis and treatment of Malassezia dermatitis in dogs and cats: Clinical Consensus Guidelines of the World Association for Veterinary Dermatology. *Vet Dermatol.* 2020;31:27–e4.
- Moriello KA, Coyner K, Paterson S, Mignon B. Diagnosis and treatment of dermatophytosis in dogs and cats. *Vet Dermatol.* 2017;28:266–e68. doi:10.1111/vde.12440.
- May P. Guide pratique de phyto-aromathérapie pour les animaux de compagnie. 2e éd. 2024. Book
- Galgano M, Capozza P, Pellegrini F, Cordisco M, Sposato A, Sblano S, et al. Antimicrobial activity of essential oils evaluated in vitro against Escherichia coli and Staphylococcus aureus. *Antibiotics.* 2022;11:979.
- Sheinberg Waisburd G, Romero Núñez C, Martín Cordero A, Heredia Cárdenas R, Flores Ortega A. Efficacy of plant extract-based solutions compared to chlorhexidine and miconazole shampoo for the treatment of superficial pyoderma in dogs. *Vet Med Sci.* 2025;11(1):e70075. doi:10.1002/vms3.70075.
- Fadok V, Seckerdiekt F, Bensignor E, Noli C, Oliveira A, Mueller R. Topical application of a proprietary blend of essential oils and plant extracts is associated with fewer relapses of pyoderma. *Vet Dermatol.* 2020;31(Suppl. 1):6–109p75.
- Bensignor E, Fabries L, Bailleux L. A split-body, randomized, blinded study to evaluate the efficacy of a topical spray composed of essential oils and essential fatty acids from plant extracts with antimicrobial properties. *Vet Dermatol.* 2016;27:464–e123.
- C. Pressanti, M-C. Cadiergues, Efficacy of a natural ear cleanser in dogs with erythematoceruminous otitis externa or abnormal epithelial migration. Poster 2012 AFVAC.
- Bensignor E, Feuillolay C, Andriantsalama R, Fabries L, Roques C. Posters présentés à l'ESVD 2018 et au NAVDF 2019. In vitro antibiofilm properties of topical products containing N-acetylcysteine and natural components derived from plants. *Vet Dermatol.* 2018;29:355–374 p356.



# WHY INCLUDE THE PYO RANGE IN YOUR CARE PROTOCOL FOR THE MANAGEMENT OF SKIN INFECTIONS

- To help **purify the skin**
- To promote the **cutaneous barrier repair** and contribute to **restore the balance of the skin microbiota**
- To help soothe and hydrate the skin

## REACTIVE CARE

**Medicated treatments** .....  
 (antibiotics, antifungals, oclacitinib...)



In association with **PYO range**.....  
 Natural topical solutions - **Chlorhexidine-free**



## PROACTIVE CARE



VP10625ENT

Training & Scientific support  
 Veterinary corner  
[www.dermoscent.com](http://www.dermoscent.com)

