



HOW WE'RE FIGHTING FOOT FUNK WITH
ANTIMICROBIAL-FREE
INSOLES

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GREEN PAPER SERIES - PT.2

THE KEEN EFFECT
OPEN SOURCE INITIATIVE

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INTRODUCTION

We love making the most original, purposeful, comfortable, and durable footwear on the planet, but we really just want to make a difference. As a family-owned and values-led business, we've always felt we have a shared responsibility to do things the right way. The kind of products we make and how we treat our environment and each other are part of a mission we've taken to heart since KEEN was conceived in 2003.

CONSCIOUSLY CREATED

As shoemakers, we know the most meaningful thing we can do to reduce our impact is to change how shoes are designed, made, distributed, and owned. From the design and construction of our original products to how we operate our offices, warehouses, and garages, we are always conscientious about making things better.

Consciously Created is comprised of four pillars: Harvest Materials, Source Ethically, Detox the Planet, and Make for Life.

DETOX THE PLANET INITIATIVE

We're doing our part to Detox the Planet by removing the most toxic chemicals found in footwear supply chains. Our Detox Initiative is rooted in the Six Classes approach as defined by the [Green Science Policy Institute](#). Today, we're proud to be free of five of the six classes of these chemicals.

In 2012, we zeroed in on antimicrobials. Recognizing the potential harm these substances pose to human health and the environment, we embarked on a journey to find a safer alternative. We believe in the power of radical transparency, collaboration, and open-source innovation to drive change. By openly discussing our process, challenges, and successes, we hope to inspire other companies to join us in our mission to consciously create and contribute to a healthier planet. This is the second paper in our Open Source Initiative Green Paper Series, which shares our learnings and facilitates transparency in the footwear manufacturing industry.



ANTIMICROBIALS' EFFECTS ON PEOPLE AND THE PLANET

Antimicrobials, a broad class of chemicals used to kill or inhibit the growth of microorganisms, have been a topic of growing concern in recent years. They're found in a wide variety of products, from disinfectants and sanitizers to textiles and plastics. While under specific conditions they're effective at killing harmful bacteria and fungi, their widespread use has raised serious questions about their unintended impact on human health and the environment.

Some of the key concerns associated with antimicrobials include:

ANTIMICROBIAL RESISTANCE

The overuse of antimicrobials can lead to the development of [antibiotic-resistant strains of bacteria](#), making infections harder to prevent and treat. This is a major concern in healthcare settings worldwide.

ENVIRONMENTAL IMPACT

Antimicrobials can persist in the [environment](#), potentially affecting wildlife and ecosystems by speeding up the development and spread of resistance, and bioaccumulating in our marine food systems.

HUMAN HEALTH RISKS

Some antimicrobials, like triclosan, have been linked to serious [health problems](#) in humans, including endocrine and hormone disruption, and potential increased risk of cancer.

EFFECTIVENESS

There's ongoing [debate](#) about whether the use of antimicrobials in consumer products, like clothing and footwear, provides any real benefit, or if it's mostly marketing hype.

REGULATION

There's a lack of [regulation, oversight, and general awareness](#) regarding antimicrobials, especially in consumer products. This means that potentially harmful chemicals can end up in products.



OUR QUICK, TWO-STEP PROCESS FOR ANTIMICROBIAL-FREE INSOLES

1. Find a safe, effective, affordable, nontoxic alternative to fight the foot funk.
2. Make an implementation plan and stick to it.

1. FIGHTING FOOT FUNK

Why did we look for an antimicrobial treatment to add to our footwear in the first place?

Foot funk. More commonly known as foot odor, foot funk is caused by a cocktail of factors that come together to create that all-too-familiar stink.

For decades, the footwear industry has been combating this issue with antimicrobials, a class of substances that includes biocides and pesticides. These commonly used substances come with a heavy price — they can contribute to cancer risk; a risk we were no longer willing to take with our shoes.

What cooks up this foot funk? Let's break it down:

- **Bacteria:** Many [bacteria](#), for example [Staphylococcus](#), are always present on our skin, from our heads to our toes. They are a natural part of our body's ecosystem.
- **Dead skin:** : [We shed millions of skin cells every day](#), including through our feet. These can accumulate in our shoes and socks, providing a feast for bacteria.
- **Sweat and moisture:** Our feet are home to numerous sweat glands. When we engage in activities that heat up our feet in shoes, they sweat, creating a damp environment that bacteria love.
- **Friction:** The constant rubbing of our feet against our shoes can lead to skin irritation and increased sweating.

When these elements come together, it's like a party for the staph bacteria. They thrive on the dead skin cells, and the [microbial degradation](#) of dead skin cells and skin proteins is what makes the foot funk kick in. It's not the bacteria itself that stinks, but the process of the bacteria eating dead skin cells.

THE SEARCH FOR AN ALTERNATIVE

In the mid-2010s, we were introduced to a company working to find plant-based solutions for problematic conventional chemistry. Today, they are known as [EVOCO](#). They developed a safe, effective, affordable alternative called [Cleansport NXT](#), which uses Lactobacillus, a commonly used probiotic, or good bacteria, that's found all around (and in) us, and offers nontoxic health benefits. The manufacturers of Cleansport NXT state it to be free from toxic chemicals including pesticides, heavy metals, and VOCs.

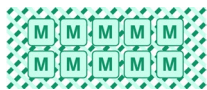
Probiotics like the one used in Cleansport NXT offer a promising alternative to traditional antimicrobial treatments. They provide a way to control odors without the associated risks and drawbacks of chemical antimicrobials, reflecting a broader shift toward more conscious and health-oriented practices.



- A. Environmental Impact:** Traditional antimicrobial treatments often contain chemicals that can persist in the environment, potentially harming wildlife and ecosystems. Probiotics, on the other hand, are naturally occurring organisms that can break down and do not leave harmful residues.
- B. Human Health:** Some antimicrobials are known to be toxic to human and ecological health. Probiotics are generally recognized as safe and are even used in food and dietary supplements.
- C. Antimicrobial Resistance:** The widespread use of antimicrobials can lead to the development of antimicrobial resistance, making them less effective over time and contributing to a global health threat. Probiotics do not contribute to this problem, as they work in a different way, breaking down organic material associated with foot funk rather than killing bacteria.
- D. Responsible Materials:** Probiotics offer a more health-centered approach, aligning with a growing emphasis on developing and using responsible materials. They can be used without the need for toxic chemicals including heavy metals or QACs that are harmful to the environment. While antimicrobials kill bacteria, including beneficial ones, probiotics work by breaking down odor-causing organic material. This can be a more targeted and effective approach to odor control without the collateral damage to beneficial microorganisms, and human and environmental health.
- E. Effectiveness:** To guarantee effectiveness, we conducted wear testing on dozens of pairs of KEEN shoes that were worn during hikes along the Pacific Crest Trail from Canada to Mexico. We saw no odor issues with the probiotic solution.
- F. Ethical Considerations:** The use of natural, nontoxic substances aligns with ethical considerations regarding human health, animal welfare, and environmental stewardship.

HOW IT WORKS

So how does the probiotic *Lactobacillus* fight foot funk? The process works like this: selected microbes are bonded to the surfaces of the fabric, resulting in thousands of microbes for every square inch. These microbes remain dormant within the fibers until they come in contact with organic material, like sweat. Once activated, the microbes work to reduce the odor-causing organic material like dead skin cells and *Staphylococcus* bacteria. After breaking down the partially decomposed organic material, the odor is significantly reduced, and the microbes return to their dormant state until reactivated. This natural, innovative solution offers a safe and effective alternative to traditional odor control methods.



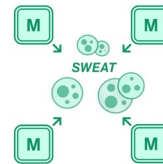
Selected microbes are bonded to the surface resulting in thousands of microbes to every square inch of fabric.



Microbes lay dormant in the fibers of apparel and sports products until activated.



Once microbes come in contact with organic material (sweat), they activate.



Activated microbes work to reduce the odor-causing organic material.



With the partially decomposed organic material broken down, the odor is reduced and the microbes go dormant until reactivated.

1. IMPLEMENT AND STICK TO IT!

KEEN already had six months to a year of inventory of our original, antimicrobial anti-odor application. Transparently, we didn't want to waste that inventory, or quite literally dump antimicrobials down the drain, so we used up the excess and made the switch once it was gone. It took about 18 months to fully integrate Cleansport NXT into our supply chain.

At KEEN, we apply anti-odor treatments to the insole of our shoes. This is the sometimes-removable, foot-shaped piece found in most shoes that contacts the bottom of the foot. To simplify the process, we planned to just switch our standard anti-odor treatment to Cleansport NXT. In working with our insole suppliers, we discovered that the application process for the alternative was slightly different than standard practices. In partnership with our suppliers, we were able to edit our production process to accommodate Cleansport NXT.

Whenever we consider a switch to a more sustainable material or application, the alternative must follow three simple principles: Is it safe, is it effective, and is it affordable? Cleansport NXT hit all three buckets. The cost to make the switch was \$0.02/pair, which we absorbed into our overall cost.

STEADY PROGRESS AND THE ROAD AHEAD

Since making the switch, we've steadfastly maintained our commitment to not using antimicrobial odor control on our fabric insoles. We've proudly dubbed all EVOCO Cleansport NXT applications as "Eco Anti-Odor," a testament to our dedication to eco-conscious practices, and we've integrated it into our footwear where we've determined odor control treatment to be essential.

Since our transition, we estimate to have circumvented the use of over 146,000 pounds of antimicrobials. But this is just the beginning.

LOOKING FORWARD

As we look to the future, we're reminded of the journey that brought us here. It's been a long road, filled with challenges and triumphs. When we embarked on this Detox Initiative, we didn't anticipate the time it would take to eliminate harmful substances from our supply chain. But every hour spent, every hurdle overcome, has been worth it.

To date, we've collectively invested about 11,000 hours in this initiative. And the result? We've prevented more than 180 tons of harmful chemicals from being introduced into the environment. But we're not stopping there. Our commitment to creating a healthier planet and healthier people is unwavering.



JOIN US ON THIS JOURNEY

We're excited about the future and the positive changes we can make together by ridding products of anti-odor antimicrobials. We hope you'll join us on our journey to rid our shared supply chain of harmful substances forever. We believe in transparency, in open dialogue, and in the power of collective action. And we have work to do. Our next challenge is removing solvent-based adhesives from shoemaking.

We welcome your questions, comments, and feedback at detox.initiative@keenfootwear.com.

