

# Using Food to Help Manage Your Dog's Skin Health

If your dog suffers with itchy skin or other skin conditions, a change in his skin microbiome may be to blame. This first-of-its-kind study shows how what you feed your pet can influence not only the health of your dog's skin, but immune function as well.

**Analysis by Dr. Karen Shaw Becker**

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## STORY AT-A-GLANCE

- Skin health in dogs is an important concern for pet parents dealing with an epidemic of atopic dermatitis (itchy skin and other skin conditions)
- A recently published small study shows that dogs had better skin microbiome diversity when fed less processed food for 30 days than after 30 days on a dry kibble diet
- Earlier research shows that when pregnant mother dogs are fed non-heat-processed, meat-based diets and their puppies are fed the same diet as their first solid food, it provides a protective effect against atopic dermatitis in adulthood

While it seems obvious that the food your dog eats influences his or her intestinal microbiome, much less clear is the connection between diet and nutrition on the largest organ and first defense against infection and injury, the skin microbiome, which hosts a wide variety of bacteria, fungi, and other organisms.

According to Gerardo Perez-Camargo, vice president of R&D for refrigerated fresh dog food maker Freshpet:

*"Skin health is an important area of interest as it literally impacts many pets and pet parents. Although diet has been used to help manage several skin conditions, the nutritional approaches have mainly been through the restriction of allergens or through the provision of nutrients (fatty acids, minerals or vitamins) that target the skin.*

*However, we believe that using a diet to manipulate the skin microflora is a novel nutritional approach. Several skin diseases are associated with alterations in the skin microbiome. It might be clear if the changes in skin microbiome are the cause or the consequence of the disease.*

*However, if we can affect the skin microbiome with the diet, that could provide us with another tool to help manage the condition or its symptoms. If we could find a way to use dietary interventions to either restore microbiome or prevent changes, it could open a new path to leverage nutrition to sustain skin health."<sup>1</sup>*

## Freshpet Diet Promoted Greater Microbe Diversity

Perez-Camargo and a team of academic and industry researchers conducted a first-of-its-kind study to compare the skin microbiomes of kibble-fed dogs vs. dogs fed fresh dog food (presumably Freshpet products). They published their results in the July 2022 journal *Animals*.<sup>2</sup>

For the record, I'm not endorsing the Freshpet brand of dog foods, in fact, I caution pet parents to be wary of any meat product that touts a refrigerated shelf life of more than a few weeks, and this brand is labeled for months. But as everyone who regularly reads here knows, I'm most definitely in favor of feeding pets less processed pet food over high-heat ultraprocessed dry food.

For the study, eight dogs with no history of skin disorders ate a fresh diet for 30 days in their homes, at which time the researchers collected and analyzed samples of the dogs' skin microbial communities. Next came a four-day transition period, followed by 30 days of dry kibble, after which the scientists again collected skin microbiome samples from the dogs.

Microbe diversity (which is desired) was higher after the 30-day fresh diet compared to after the kibble. Specifically, Alpha diversity was higher, and the proportion of *Staphylococcus* was higher, while *Porphyromonas* and *Corynebacterium* were lower. There were no visible differences on the dogs' skin other than the changes in microflora.

Details about how these changes may benefit the dogs remain for further study. Since the dogs' skins and coats were healthy at the outset, the researchers have no data on how diet may affect skin diseases associated with microflora imbalances, he said.

*"So far the evidence supports that this fresh diet containing prebiotics can increase skin microbiome diversity," Perez-Camargo said. "Microbiome diversity is associated with resistance shifts in microbial populations and stability ..."*

*Although at this point we do not fully understand the mechanisms that connect the diet and the skin microflora, we hope that more research helps grow knowledge in the field. In a similar way that the gut-brain axis is under exploration, we believe that there is also an opportunity to explore the gut-skin axis."*

## **Early-Life Diet Plays Major Role in Adult Atopic Dermatitis**

While the skin microbiome study discussed above is first-of-its-kind in comparing a Freshpet diet to a kibble diet, two years ago, members of the DogRisk research group at the University of Helsinki published a study suggesting that certain novel early-life risk factors, including diet, impact the prevalence of atopic dermatitis (itchy skin) when dogs reach adulthood.<sup>3</sup>

Specifically, when pregnant mothers are fed non-heat-processed, meat-based diets and their puppies are fed the same diet as their first solid food, it provides a protective effect against atopic dermatitis (itchy skin and other skin conditions) in adulthood.

The DogRisk researchers used an internet-based "food frequency" questionnaire as a data gathering tool that allowed them to link several non-modifiable and modifiable risk factors with the prevalence of canine atopic dermatitis. At the time the study was published in mid-2020, 12,000 dog owners had completed the survey.

It has already been established that atopy in adult dogs is significantly linked to belonging to an allergy-prone breed, having a mother with a history of atopy, and having an over 50% white coat. Most significant for pet parents, however, are modifiable risk factors, the most impactful of which is a dog's diet in early life.

DogRisk study results suggest that a non-heat-processed (raw), meat-based maternal diet during pregnancy and as a puppy's first solid-food diet at 1 to 2 months of age, offer a significant protective effect against atopic dermatitis in adulthood. The same diet fed at 2 to 6 months of age is also protective, but not significantly so.

The study results also suggest that an ultraprocessed carbohydrate-based maternal diet (i.e., commercially available kibble) during pregnancy and as a puppy's first solid diet at 1 to 2 months increased the likelihood of atopy in adulthood.

According to lead study author Dr. Manal Hemida, Postdoctoral Researcher with the DogRisk research group:

*"As the differently processed diets also have a very different macro-nutrient profile it is, at this stage, impossible to say whether it is the lack of 'cooking', the minimal amount of carbohydrates, preservatives and coloring agents, the different quality and quantity of animal proteins and fats, the non-sterility of the food, or something else, that made raw foods come out as superior for atopy health in our data."*<sup>4</sup>

Study co-author and Adjunct Professor Anna Hielm-Björkman, leader of the DogRisk research group, makes the point that these study results only suggest a cause-and-effect relationship, and further research is needed to confirm their findings.

## **Raw Diets Prompt Beneficial Skin Gene Expression**

A subsequent study published in October 2020, conducted by some of the same DogRisk researchers, provides additional evidence that diet makes a pronounced difference in the health of dogs' skin.<sup>5</sup>

The research team examined 48 Staffordshire Bull Terriers and selected four healthy dogs and four with atopic dermatitis for RNA sequencing. Their skin gene expression was compared between both atopic and healthy dogs, as well as between kibble and raw fed dogs.

*"Before the dietary intervention comparing atopic and healthy dogs, only a total of eight genes functioning in a range of ways in the skin were found, but the intervention increased this figure manifold," said lead study author Johanna Anturaniemi. "In other words, dietary intervention is extremely important for actual differences in gene expression to emerge."*<sup>6</sup>

The effect of diet on skin gene expression was primarily linked with the immune system, antioxidants, and inflammatory processes. The results indicate that raw food activates the immune defense system of the skin and also the expression of genes that increase antioxidant production or that have anti-inflammatory effects.

According to Anturaniemi, an earlier study also showed that raw meat-based diets produce an anti-inflammatory effect on blood gene expression.

## **Raw Diets Enhance the Skin's Immune Function in Puppies**

A particularly important finding, according to the researchers, is that the immune defense is activated in puppies who are raw fed. We know from research into human atopic dermatitis that the development of immunity has been inhibited and that broad exposure to microbes in childhood reduces the risk of allergic conditions.

The differences in skin gene expression observed in healthy vs. atopic dogs suggest that in the latter group, there may be deficiencies in lipid metabolism and keratinocyte proliferation, both of which play an important role in the healthy functioning of the skin barrier.

These results support earlier findings that in atopic dogs, the expression of genes that encourage the formation of new blood vessels — a process linked to inflammation of the skin — is amplified.

*"We identified several genes whose link with canine atopic dermatitis had not been reported earlier," Anturaniemi said. "Some of them are associated with previously known disturbed metabolic pathways, while the role of others in atopic dermatitis requires further investigation. Since the number of dogs involved in the study was small, the results can be considered preliminary."*

## Sources and References

<sup>1</sup> [PetfoodIndustry.com, October 18, 2022](#)

<sup>2</sup> [Leverett, K. et al. July 2022, Animals 12\(15\):1881](#)

<sup>3</sup> [Hemida, M. et al. PLOS ONE, May 29, 2020](#)

<sup>4</sup> [University of Helsinki News Release, November 11, 2020](#)

<sup>5</sup> [Anturaniemi, J. et al. Front. Vet. Sci., 16 October 2020](#)

<sup>6</sup> [ScienceDaily, November 13, 2020](#)

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