

Kittens: Their microbiomes are what they eat

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For animals as well as people, diet affects what grows in the gut. The gut microbial colonies, also known as the gut microbiome, begin to form at birth. Their composition affects how the immune system develops and is linked to the later onset of metabolic diseases such as obesity.

Common wisdom is that cats, by nature carnivorous, are healthiest when fed high-protein diets. Researchers at the University of Illinois wanted to find out if this is true.

"There are a lot of diets now, all natural, that have high protein and fat and not much [dietary fiber](#) or carbohydrates," said [animal sciences](#) researcher Kelly Swanson. He and his team examined the effect of [dietary protein](#):carbohydrate ratio on the gut microbiomes of growing [kittens](#).

One month before mating, eight domestic shorthair female cats were randomly assigned to one of two dry diets: high-protein, low-carbohydrate (HPLC) or moderate-protein, moderate-carbohydrate (MPMC). When the kittens were born, they were housed with their mothers until they were 8 weeks old, weaned, and then fed the same diets as their mothers.

After weaning, the 30+ kittens were twin- and triple-housed within the dietary-group cages. They were allowed to go into a common area furnished with toys and scratching posts to play with people and each other.

"It became quite a party right away," said Swanson. "It was a bit chaotic but fun as well."

Twelve of the kittens became part of the study. The researchers took [fecal samples](#) at weaning and 4 and 8 weeks after weaning. They extracted [bacterial DNA](#) and used bioinformatics techniques to estimate total [bacterial diversity](#).

"This was one of the first studies in cats to use sequencing to really lay out what is in the gut in regards to microbiota and apply it to nutrition," Swanson said.

The researchers found important differences between the two groups in microbiome composition. As they had expected, levels of proteolytic bacteria (which break down protein) were higher for kittens on the HPLC diet and levels of saccharolytic bacteria (which break down carbohydrates) were higher for kittens on the MPMC diet.

They also looked at relationships between the diets and physiology. The kittens fed the MPMC diet had high levels of bifidobacteria, which was linked to higher blood ghrelin levels. Ghrelin is a hormone that stimulates appetite and thus may be linked to weight gain.

At the same time, the bifidobacteria may promote better gastrointestinal health. Low levels in humans have been linked to inflammatory bowel disease.

Other bacteria found at higher levels in the MPMC kittens, including lactobacilli, are also linked to gut health. The researchers found a positive relationship between lactobacilli, blood cholesterol, and blood leptin levels. Leptin is the signal that tells the body to stop eating. Hence, lactobacilli may be linked to cholesterol metabolism, appetite, and body weight regulation.

Although kittens fed the HPLC diet had lower levels of some health-promoting bacteria, including Bifidobacterium, Lactobacillus, and Megasphaera, all the animals were healthy throughout the study.

Swanson hopes to use the associations found in this study as a basis for further research. "There were some interesting observations that could have applications for disease or the practical side of owning a pet," he said.

"The cat is fairly unique metabolically," he added, "But when it comes to gut microbes, there are a lot of similarities to other species. If you feed the bacteria in a cat, dog, or human colon the same substrate, there are probably going to be similar outcomes."

The research has been published online in *British Journal of Nutrition*.

Provided by University of Illinois at Urbana-Champaign

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