Use of Probiotics: Benefits of a Balanced Microbiome in the Intestinal Tract
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Did you know that there are over 1 billion bacteria (otherwise known as microflora or microbiota) in one teaspoon of stool, that microflora make up 50% of stool weight or that the bacterial cells residing in our bodies outnumber our cells 9:1? These microflora are essential for the development of a healthy, stable intestinal tract and a healthy immune system. Beneficial bacteria, such as bifidobacteria, lactobacilli and many species of enterococci provide nutrients for intestinal cells, promote absorption of nutrients, create a healthy intestinal environment and promote a healthy immune system that is primed and ready to fight potential pathogens.

The intestinal microbiome, the community of microflora residing in the intestinal tract, consists of a balance of beneficial and potentially harmful microflora. This microbiome is established early in life. Disruption of the microbiome can result in intestinal upset. However, the signs can be much more subtle than diarrhea, and can include poor skin and coat quality, exacerbation of inflammatory conditions, susceptibility to infections and a failure to thrive. Stress, travel, aging, changes in the environment, and long-term antibiotic therapy can disturb the balance of microflora within the microbiome. Probiotics, live beneficial micro flora consumed by the animal, can help to restore and maintain microflora balance during these times of stress.

Humans and livestock often consume probiotics, otherwise known as "live active cultures". Specific probiotic microflora include bifidobacteria and lactic acid bacteria such as Enterococcus faecium SF68 and lactobacilli. Doctors recommend probiotics to help establish a healthy microflora balance in infants, treat acute and chronic diarrhea, prevent traveler's diarrhea and prevent diarrhea associated with long-term use of broad-spectrum antibiotics. Recent research with humans has linked probiotic use to decreased allergies and atopic dermatitis in infants, and fewer sick days in both infants and adults. Likewise, livestock consuming probiotics have better fecal quality and reduced mortality. Until recently, few studies have evaluated probiotic efficacy in dogs.

A good probiotic should be safe, stable until consumed, survive in the gastrointestinal (GI) tract and promote a normal, balanced microbiome. Safety studies need to prove that the probiotic does not acquire antibiotic resistance, transmit antibiotic resistance to other microflora, or produce pathogenic factors. Stability studies must prove that the probiotic survives typical manufacturing, shipping and storage conditions. Because probiotics are live microorganisms, keeping them stable prior to consumption is one of the biggest barriers to producing an effective probiotic. Use of microencapsulation technology can help improve stability of probiotics.

Numerous studies have proven the efficacy of the probiotic Enterococcus faecium (SF68) in humans and livestock. Benefits in humans include reduction in acute and antibiotic-induced diarrhea in humans. SF68 has been proven to reduce mortality and improve micro flora balance, digestibility and fecal quality in livestock. Additional benefits in livestock included decreased severity and duration of diarrhea and reduced pathogen shedding. Decreased severity of protozoal parasitic infections has also been reported. SF68 improved immune response to Giardia infection in mice and decreased shedding of Giardia trophozoites in the feces of these
mice. Decreased incidence and duration of naturally occurring diarrhea and improved microflora balance has also been reported in kittens consuming SF68.

After extensive safety and stability evaluation, a series of efficacy trials were conducted to determine the benefits of the probiotic Enterococcus faecium (SF68) when fed to dogs. In the first study, healthy Beagle, Labrador Retriever and Manchester Terrier puppies were fed either a control diet or the same diet supplemented with SF68. Diets were fed from weaning to one year of age. Puppies fed SF68 had better fecal quality than puppies fed the control food. When compared to the control puppies, puppies fed the probiotic also maintained their vaccination titers longer and had higher levels of secretory IgA. Similarly, elderly Beagles fed SF68 for 6 months maintained higher fecal IgA than elderly Beagles fed a control food. Enhancement of these immune parameters indicates that ingestion of SF68 primes the immune system to respond quickly and effectively to external challenges.

Beneficial effects of early probiotic supplementation were evaluated in a third trial. Miniature Schnauzer, Shih Tzu and Labrador Retriever puppies were fed either a control food or the same food supplemented with SF68. The study was conducted from the initiation of solid food consumption (approximately 3 weeks of age) to one year of age. Fecal concentrations of beneficial bacteria (bifidobacteria and lactobacilli) were higher in puppies fed the SF68-containing food than in puppies fed the control food. Microbiome stability was investigated by conducting TTGE (temporal temperature gel electrophoresis) analysis of feces. Puppies fed SF68 had more stable microflora patterns than puppies fed the control food. This was reflected in better fecal quality throughout growth. Results of these studies indicate that ingestion of the probiotic Enterococcus faecium SF68 promotes intestinal health and balance in growing puppies and adult dogs.

In conclusion, while previous studies have proven the benefits of probiotics in humans and livestock, new research has shown that the probiotic, E. faecium SF68 can help promote a stable, healthy microflora balance and a healthy immune system in dogs.

Selected References:


Biographical Profile

Dr. Gail Czarnecki-Maulden is a Senior Research Nutritionist at Nestle Purina Research Center. She received her BS from Cornell University and her MS and PhD in Animal Nutrition from the University of Illinois. Before joining Nestle Purina, Gail was an Associate Professor of companion animal nutrition at the University of Illinois. Gail is a member of the AAFCO dog and cat nutrient profiles subcommittee, which sets nutrient standards for dog and cat foods in the US and is a member of the NAS/NRC Committee on Evaluating the Safety of Dietary Supplements for Horses, Dogs and Cats. She is also on the Scientific Advisory Board for the International Probiotics Association.

Use of Probiotics – conference notes

Gastrointestinal Microflora

Intestinal Microflora
- Several hundred different species
- Over 1 million bacteria per gram of feces
- Approx 50% of fecal weight is microflora
- 90% of cells in body – microflora

What do they do?
- *Potentially harmful microflora – pathogenic, produce enterotoxins (inflammatory toxins – diarrhea, arthritis, skin & coat quality), putrefactive substances, fecal odor, flatulence, potential carcinogens
- *Beneficial microflora – provide nutrients for intestinal cells (short chain fatty acids – energy for gut cells). This promotes absorption of nutrients by attaching to healthy intestinal cells and this ups mineral absorption which in turn produces vitamins.

No positive microflora can cause:
- Susceptible to infections, poor immune function, more GI upset, poor reproduction, short life, and increased allergies

Microflora imbalance can cause:
- Diarrhea
Subclinical issues: increase shedding of pathogens, decreased immunity, inconsistent fecal quality, poor skin and coat.

It is caused by:
- Stress – traveling, change in environment, infection, broad spectrum antibiotics, dietary change/poor nutrition, individual thresholds, life stage/style effects (puppies & geriatric dogs)

Improve by:
- Feeding probiotics – lactobacilli (acidophilus), bifidobacteria, enterococcus, faecium

Effective probiotics:
- Not all strains have benefits, can target benefit with specific probiotic
- Good probiotics needs to be able to survive in the GI tract and promote a normal balanced flora. It needs to be safe and stable until consumed.

Using probiotics to treat giardia – SF68 (enterococcus faecium) improved immune response to giardia

Clinical use:
- Restore microflora balance
- With or after long-term antibiotic use
- Success reported with;
  - Intermittent stress diarrhea
  - Chronic diarrhea
- Non responsive to other therapies
- Recurs after antibiotic removal

Non-clinical use:
- Sensitive dogs
- Maintain normal fecal quality

Sources for probiotics
- Yogurt – not all yogurts in the US have probiotic cultures
- Supplements

Evaluation of commercial products
- 75% had inaccurate labels
- 15% met label guarantee

Evaluate product label – guaranteed analysis: guaranteed number of live bacteria at end of shelf life. If a blend of probiotics, guarantee should be for each specific strain. Best if used by should be on label. Ingredients – should include specific probiotic strain.