In today’s veterinary nutraceutical market there are a plethora of choices when it comes to gastrointestinal (GI) support. One of the major concepts in GI support centers on the utilization of probiotics. Probiotics are defined as bacterial or fungal organisms that confer a benefit to the animal when ingested. This advantage comes in many ways, from immunologic enhancement, to improved gastrointestinal health. A considerable amount of confusion centers on the fact that many of the products are labeled as single strain or multi-strain and may also be enhanced with prebiotics. Prebiotics are soluble or mixed fiber sources that beneficial bacteria use for nutrients in order to propagate and thrive in the gastrointestinal tract. Products with both probiotics and prebiotics mixed together are often called synbiotics. Now that the terminology has been dissected, we can start to make sense of the evidence regarding probiotics. Research in this area is in its infancy in veterinary medicine compared to human medicine. In an attempt to unravel this mystery, important questions must be asked. We are slowly beginning to be able to answer some of these questions, which will aid practitioners in case selection and strain choice.

Which strain should I use?
The World Health Organization released a consensus statement for probiotic use in humans in 2006. It was recommended to select a strain based on its ability to survive to the target area and to have proven efficacy for a specific disease process. The report stated that “it is the specificity of the action, not the source of the microorganism that is important.”

In veterinary medicine, one of the more confusing concepts surrounding the use of probiotics is picking a strain that will confer an advantage to the animal. Surprisingly the microbiome of the gastrointestinal tract has billions of species of bacteria, many of which we can’t identify even using the most progressive technique of testing (pyrosequencing). What we do know is the microbiome can be associated with many different diseases from GI ailments to obesity.

The strains most commonly found in commercial probiotics are enterococcus, lactobacillus, bifidobacteria, streptococcus and occasionally some yeasts. Strain choice is not random. The most extensively studied veterinary probiotic to date is Enterococcus faecium SF68. This probiotic is different in respect to stability, in that it is not inherently resistant to digestion, but rather is protected by microencapsulation. Microencapsulation allows this probiotic to survive the noxious gastric environment.

There is ample evidence that Enterococcus faecium SF68 results in an alteration of the GI flora in both dogs and cats, resulting in a decrease in clostridial species and an increase in beneficial flora, such as lactobacillus. Additionally, evidence in colony puppies and kittens suggests that this probiotic enhances immunoglobulin production to vaccination during a time of susceptibility, which may confer a benefit. In a clinical study looking at cats with chronic herpes infection, supplementation with Enterococcus faecium SF68 showed modest decrease in the incidence of conjunctivitis over a 5 months period.

Clinical testing in shelter cats has shown a definitive benefit of Enterococcus SF68 in diarrhea outbreaks, making it a logical choice for routine feline colitis. Canine clinical studies have been less rewarding, primarily because in shelters where this probiotic has been studied, the incidence of diarrhea may not be high enough or long enough to show definitive benefits. However, a recent abstract did show that speed to recovery from diarrhea in shelter dogs was faster with Enterococcus faecium SF68 plus metronidazole than with metronidazole alone. In addition, a Bifidobacteria animalis strain has come on the market that has similar evidence of surviving the gastric environment and ameliorating the incidence of diarrhea in kennel dogs.

Does it have to be alive?
Dead or alive is a debate that will transcend the ages depending on what the probiotic is meant to do for the patient. In some cases, such as immunity enhancement in puppies and elderly dogs, there may not be a need for living bacteria. The gut associated lymphoid tissue is important in triggering a local and systemic immune response. Delivery of a large amount of bacterial wall protein and bacterial DNA to this lymphoid tissue may be able to stimulate a robust immune response in the absence of live microorganisms. This makes dead bacteria a potential immune stimulus that may confer advantages to some immunocompromised patients. On the other hand, if we wish to confer GI support via alterations in the microbiome then evidence suggests that live organisms need to be administered to help colonize the gastrointestinal system. These live bacteria may help the animal’s own good bacteria, such as lactobacillus and bifidobacteria, thrive; while decreasing potentially harmful species, such as clostridium. This principle has been shown with a only few veterinary products to date.

What product to choose?
A study in 2002 evaluated 13 probiotics for label and content accuracy. They sourced five human and eight veterinary probiotic products. Labeling of the contents was often quite vague including “infant probiotic blend,” “most bioactive strains,” and “dried lactobacillus.” Examination revealed only two of these products contained the correct strain(s) and amount of live bacteria. In this study, all of the veterinary products had less than 2% of the amount of live bacteria labeled on the product.

A 2011 study examined 25 different commercially available veterinary probiotics. This report revealed that only two veterinary products (FortiFlora, Nestlé Purina PetCare and Prostora Max, The Iams Company) were correctly labeled and had at or above the number of live organisms that were claimed. Proviable, another veterinary exclusive probiotic, was not evaluated in this report, but this is expected to colonize with at least one strain, based on dog and cat pyrosequencing data.

These findings show that one must judiciously choose a probiotic product. It is important not only to research the desired probiotic strains’ published efficacy, but also to consider the company manufacturing the product. These studies should discourage veterinarians from recommendation of over-the-counter products.
to their clients without sound data to ensure adequate quantities of living bacteria. What can be said currently is that some of the probiotics exclusively for sale by veterinarians appear to be labeled properly and consistently deliver the claimed amount of live bacteria.

Is more always better?
When reading labels for probiotics some products tout that they contain multiple strains making them preferable to single strain products. There is very little research to suggest that single versus multiple strains is better.1,2 In many cases, the total number of live bacteria delivered is more important than multi-strains for the immune response, as well as the colonization. It is likely more important that we deliver minimally 10^9 bacteria per strain than delivering multiple strains.1,2 Only one product that is multi-strain has been examined in the veterinary literature with 16S pyrosequencing techniques. This product contains strains of lactobacillus, enterococcus, streptococcus and bacillus species. In vivo, only streptococcus and enterococcus numbers increased suggesting that the lactobacillus and bifidobacterial species did not colonize efficiently.13 Another take-home message regarding probiotics is that the colonization effects are not permanent. Once discontinued, the microbiome will often shift back to a similar profile as what was present before providing the probiotic.3,4

Got Prebiotics?
The area of prebiotic (fiber) research in veterinary medicine is more robust than the probiotic research since it is well documented that fiber can also alter the microbiome in the GI tract.16-18 This has been shown through culture, PCR, and, more recently, pyrosequencing data. This is why veterinarians have been altering fiber in diets for years. A more global understanding has led to utilization of soluble fibers (not insoluble fiber) as a component for dog foods and synbiotic supplements. Most commonly used are soluble fiber substrates like small oligosaccharides (FOS, MOS, arabinose, gums), inulin (from chicory root) and soy fiber, as well as mixed soluble fiber sources like beet pulp, psyllium, and tomato pomace. All have been historically employed to help with fecal quality and to promote a stable, healthy fecal microbiome. The soluble fiber sources often result in higher acid fermenting bacteria like lactobacillus, which produce the volatile fatty acids that are beneficial to the enterocyte or colonocyte.5,19 However, you can get too much of a good thing as excessive soluble fiber in the diet can cause extensive acid fermentation in the hindgut, resulting in loose stools.20 Therefore, a balance needs to be achieved.

A recent study utilizing a synbiotic showed little influence on the fecal microbiome in dogs; however, only 500 mg of soluble fiber was used per day.11 This same product showed a modest amelioration of diarrhea in cats.21 Therefore, it’s possible that 500 mg is adequate to alter fecal quality in cats, while in dogs this quantity is too small and needs to be scaled to size. An outbreak of viral diarrhea occurred in a sled dog kennel. The dogs receiving a synbiotic containing about 5 grams of primarily soluble fiber (1.5% of dry matter) had less diarrhea and more rapid resolution.13 The amount of fiber in this study is closer to what is reported in well controlled studies to cause significant alterations in the fecal microbiome.16-19

Utilizing prebiotics with probiotics is in its infancy and requires more studies in defined clinical GI diseases before firm recommendations can be made regarding the amount and sources of fiber needed to enhance the effects of probiotics on the GI tract.

When should a probiotic be used?
More importantly from a clinical perspective is the idea of utilizing a probiotic judiciously. The question we have to ask ourselves clinically is: what diarrhea disease are we dealing with? In common stress diarrhea, chronic colitis, antibiotic-induced diarrhea, dysbiosis or viral/protozoal diarrhea, trying to re-establish a more beneficial microbial flora may be prudent. In contrast to the demonstrated efficacy of probiotics for common cases of diarrhea, the role of probiotics as a first line of treatment for complex GI conditions (such as inflammatory bowel disease) remains unclear; however, dysbiosis has been recognized in inflammatory bowel disease, hence probiotic use may be warranted. The next step in veterinary probiotic research is to start prospective clinical trials for defined GI ailments, to truly identify how probiotics influence various disease processes and when they should be used to alleviate GI and other ailments.

References available upon request.

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