


Dog gut health

The importance of protein
ingredient choice for supporting
canine gastrointestinal health



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Introduction

In a survey of pet parents, healthy digestion was the top benefit that consumers wanted to see in pet foods and treats (ADM, 2023). Indeed, wellness claims broadly were consistently among the top benefits selected. The canine gastrointestinal tract is a complex organ that requires proper nutritional support to function optimally. An impaired gastrointestinal tract may lead to poor nutrient absorption or nutrient utilization; further exacerbating underlying causes of gastrointestinal distress. In some instances, underlying problems such as ingredient sensitivities or infection can make proper nutrition a challenge.

02.

The importance of gastrointestinal health

Food sensitivities in dogs refer to adverse reactions to certain ingredients or nutrients in their diet. For example, some dogs may lack the necessary enzymes to break down lactose, leading to lactose intolerance (Webb & Twedt 2003). Other dogs may have a sensitivity or allergenicity to specific proteins. In some instances, these sensitivities may develop over time due to repeated exposure to the same ingredient (Webb & Twedt 2003). These sensitivities can cause a wide range of symptoms, from simple lethargy to skin issues and even weight loss and can significantly impact a dog's overall health and well-being (Zoran 2021). Other symptoms of food sensitivities include vomiting, diarrhea, and excessive gas (Verlinden et al 2006).

Food sensitivities can develop at any age and can be triggered by a wide range of ingredients, including protein sources like dairy or grains like wheat, and additives like artificial colors or preservatives (Purina Institute). Chronic gastrointestinal issues, including irritable bowel syndrome (IBS) or inflammatory bowel disease (IBD), can be associated with prolonged dietary sensitivities (Lecoindre & Gaschen 2011). Recent research has even suggested that intestinal permeability may be associated with subsequent development of diseases such as Crohn's (Turpin et al., 2020).



Pathogenic infection may also contribute towards impaired gastrointestinal function. Colonization of the gut with pathogenic organisms may induce disease, including damaging the epithelial barrier that prevents entry against other pathogens. Even an overabundance of microorganisms not inherently deemed pathogenic (dysbiosis) may result in sub-clinical damage. Emerging recently is the impact of nutrient levels, especially protein levels, on gastrointestinal health. In weanling pigs, higher protein levels were found to be associated with higher incidences of diarrhea and intestinal inflammation due to a proliferation of

undesirable microorganisms resulting from undigested proteins (Yin et al., 2021, Marchetti et al., 2023). Similar observations have been found in companion animals (Ephraim et al., 2020). With many commercial dog foods in excess of AAFCO or FEDIAF protein requirements, and some approaching double these requirements, ensuring appropriate nutrient bioavailability is crucial. In severe cases of food sensitivity, infection, or nutrient excess, dogs may experience a failure to thrive.

How then do we feed our dogs for a healthy gastrointestinal tract?



03.

Torula yeast as a functional ingredient

Torula yeast can be cultivated on a wide diversity of feedstocks: agricultural products and, even, forestry products. After the cultivation process, the yeast cells are harvested and dried to create a highly nutritious, palatable, and safe ingredient for pet food. More specifically the high protein content of Torula yeast, typically around 55%, makes it an excellent protein source for pets with sensitivities or allergies to more conventional protein sources like egg or soy.

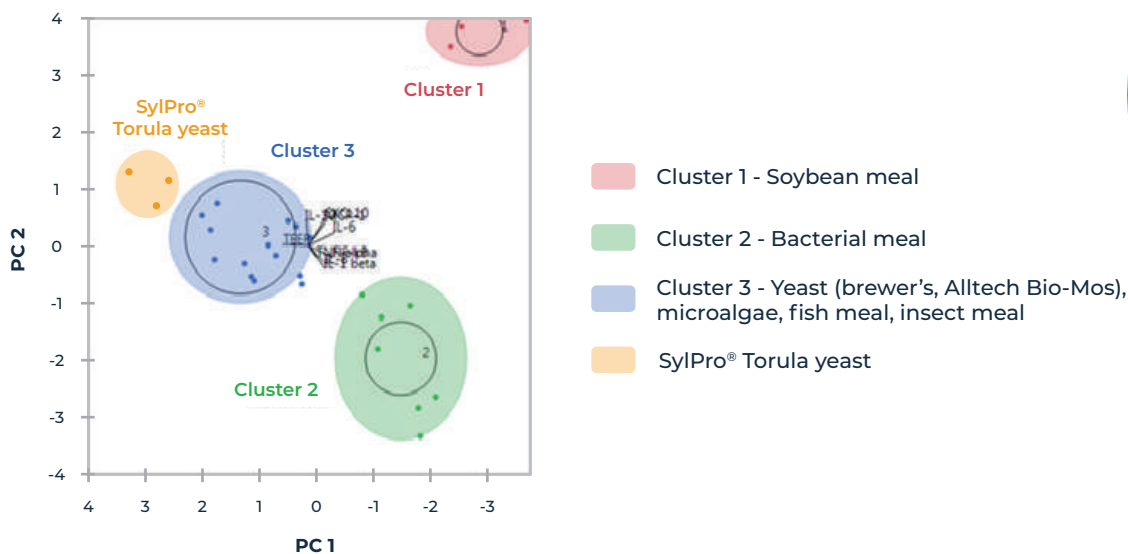
Previous reports have highlighted how Torula yeast can increase the palatability of pet food. In both cats and dogs, Torula yeast has been shown to have excellent palatability (Vasseur & Ekmay 2023). This can be particularly beneficial for picky eaters or dogs that have reduced appetites due to illness, stress, or age. By increasing the palatability of food, Torula yeast can help ensure that pets consume a balanced diet that meets their nutritional needs, promoting optimal health and longevity.

The choice of protein ingredient can have differing physiological impacts on gastrointestinal health. A comparative study of conventional and alternative protein sources on an in vitro "leaky gut" model

revealed differing impacts on barrier integrity and inflammatory response (Marzorati et al., 2023). Yeast, and Torula yeast in particular, had the most pronounced anti-inflammatory properties; whereas, other protein sources could even have pro-inflammatory properties. The positive impact of Torula yeast in a leaky gut model has also been reported in a subsequent study (Verstrepen et al., 2023).

In work performed in weanling pigs, the inclusion of Torula yeast lowered the severity and frequency of diarrhea induced by soybean meal (Espinosa et al., 2023). Removal of Torula yeast from the diet resulted in a reversal of the improvement.

Figure 1: Caco-2/THP1 co-culture - "leaky gut" model



Wherein several modes of action have been highlighted for the beneficial impacts of yeast products, these mechanisms are often dependent on yeast's interaction with microbiota. For example, mannan oligosaccharides present in the cell wall are capable of binding to pathogenic organisms and preventing their colonization of the gastrointestinal tract. These in vitro models highlight a mechanism distinct from their interactions with microbiota.

Nonetheless, the role of the microbiome on gastrointestinal health has received great attention. Much of the focus has been on specific probiotics or prebiotics that may

help modulate the microbiome with an emphasis on dietary fiber. A high level of protein digestibility is crucial for maintaining gastrointestinal health. Recent evidence suggests that undigested and unabsorbed protein is subsequently fermented by gut microbiota (Yin et al., 2021, Marchetti et al., 2023). The metabolites resulting from protein fermentation are considered to be pro-inflammatory and can result in chronic sub-clinical inflammation. Thus, the composition of the gut microbiome is not only modulated by fiber components in a diet but also by its protein components and their bioavailability.

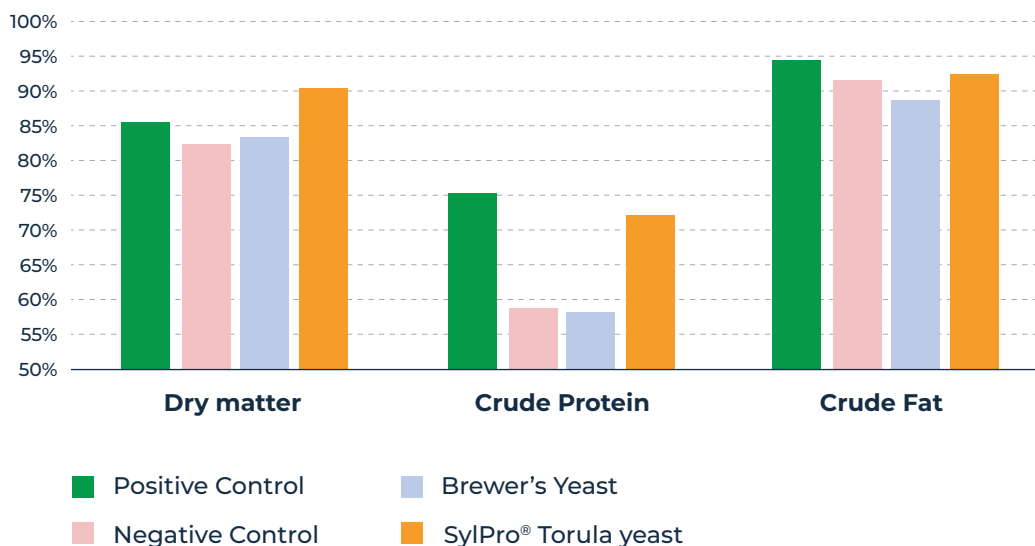
04.

The benefits of torula yeast in dog food

In a 4-week trial in adult Labrador retrievers with chronically loose stools (Timlin et al, 2024), four groups of ten dogs were tested: three groups with poor stool quality and one positive control group with normal stool quality. All dogs acclimated to a common control diet for one week, then the three poor stool quality groups switched to test diets for four weeks. One group remained on the control diet, one group switched to a brewer's yeast diet, and one group to a SylPro®-based diet, Arbiom Torula yeast ingredient.

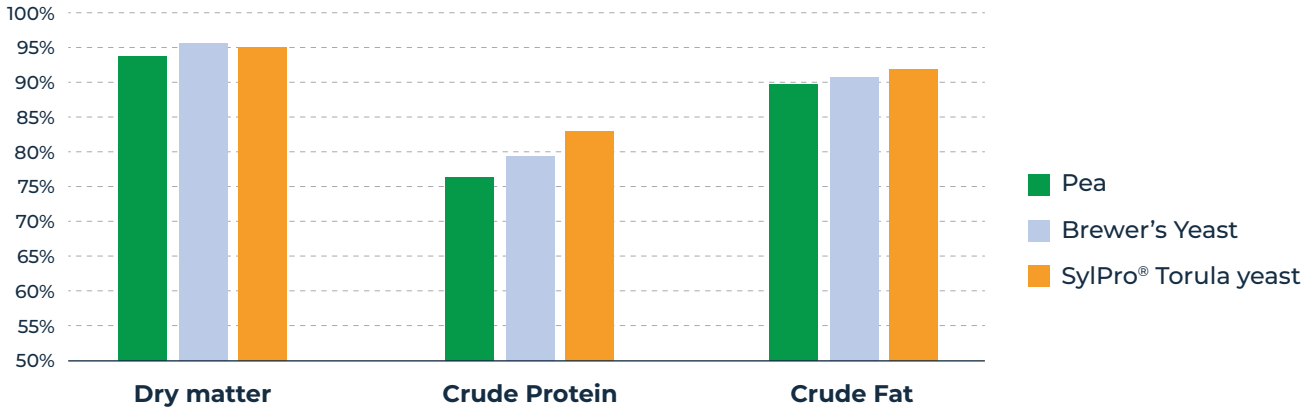
Dogs were housed individually overnight in temperature-controlled kennels and were aired in outside yards for 6-8 hours per day, dependent on weather. The digestibility of the control diet was dependent on whether the group of dogs had normal or poor stool quality. Dogs with normal stool quality exhibited a high level of nutrient digestibility compared with dogs with poor stool quality consuming the same diet. The inclusion of SylPro® increases the digestibility of dry matter, protein, and fat among dogs with chronically loose stools to near positive control levels, whereas brewer's yeast did not.

Figure 2: Apparent digestibility coefficients of Torula yeast in dogs with gastrointestinal issues



Further, in a 10-week trial in senior Labrador retrievers, a comparison between pea protein concentrate, brewer's yeast, and SylPro® Torula yeast was made in plant-based formulations. It was observed that brewer's yeast was less digestible than Torula yeast which resulted in greater production of protein fermentation metabolites (isovaleric acid, isobutyric acid, valeric acid) compared with Torula yeast and pea. The inclusion of Torula yeast also promoted an improvement in bone mineral density, while the inclusion of pea or brewer's yeast promoted the deposition of fat.

Figure 2: Apparent digestibility coefficient of Torula yeast in senior dogs



Conclusion

In conclusion, Torula yeast in dog food offer numerous benefits, including improved digestion, enhanced nutrient absorption, strengthened immune function, increased palatability, reduced risk of allergies, all within sustainable production.

Torula yeast is a premium ingredient of choice in pet food for susceptible animals due to its high nutritional value, digestibility, and gut health benefits. Its rich protein, vitamin, and mineral content can support the growth, development, and overall health of sensitive dogs, and other susceptible animals. Meanwhile, its improved nutrient absorption reduces the risk of digestive upset, making it an ideal ingredient for pets with sensitive digestive systems. The inclusion of Torula yeast in pet food not only provides balanced nutrition but also offers a palatable solution for picky eaters, making it a must-have ingredient in the pet food industry prone to providing well-being to our beloved pets.



References

All references are available upon request.

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About Arbiom

Arbiom is committed to feeding the world in a sustainable and healthy way. Driven by our values of Excellence, Inclusivity and Sustainability, our passionate team leverages the power of fermentation to create the next generation protein ingredients by tapping into nature-based solutions.

Arbiom truly adds to the food supply by creating rather than redistributing proteins. Our products are purpose-grown, protein-rich and natural. With excellent functional and sensory properties, they are a perfect solution to healthy human and animal nutrition.

Arbiom's first industrial project is underway in France, providing a safe and secure supply of 10.000 tons of product per year to customers and partners.



ARBIOM

Excellence in Protein

About SylPro®

SylPro® is Arbiom's protein-rich ingredients for feed. It represents the next generation of food ingredients, offering science-backed nutritional, and sustainability benefits for a range of feed applications.

SylPro® offers key benefits as a protein source for animal health:

- High protein content and balanced amino acid content
- Class-leading digestibility and bioavailability
- Sustainability benefits with low carbon footprint and clean-label compliance
- Purpose grown and consistent product

Arbiom has demonstrated SylPro® delivers superior nutritional performance in several in vivo feed trials. SylPro® can be used as a protein ingredient for petfood, aquaculture and weanling pig diets.

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