



DIGESTIVE HEALTH

**in Dogs &
Cats**



? DID YOU KNOW?

Antibiotics are dispensed in 1 in 3 veterinary consults across Australia,¹

with antibiotic-associated diarrhoea (AAD) frequently presenting as a complication of use.²



DIGESTIVE DISORDERS IN DOGS AND CATS

Digestive disorders are common in companion animals and cause stress to both pet and owner.³ There are a number of commonly diagnosed digestive disorders seen by veterinarians including acute gastroenteritis, colitis, pancreatitis, exocrine pancreatic insufficiency and inflammatory bowel disease (IBD).^{4,5}

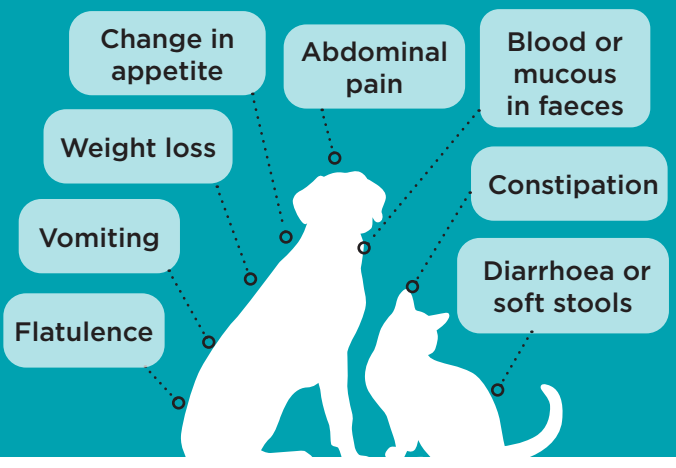
The most common signs of digestive disorders are soft stools and diarrhoea.⁴ Common causes of diarrhoea include medications (especially antibiotics), dietary indiscretion, abrupt dietary changes, hypersensitivities and dietary intolerances.⁶

THE GASTROINTESTINAL MICROBIOME

The canine and feline gastrointestinal (GI) systems are home to a community of microorganisms essential to their normal form and function. This diverse and complex collection of microorganisms, including bacteria and yeast, comprises the GI microbiome.⁸

The GI microbiome is involved in metabolism, gut epithelial health, energy balance, skin health and neuro-behavioural development.⁸ It primes and stimulates the immune system both inside and outside of the gut, aids in the defense against invading intestinal pathogens and provides nutritional benefits to the host.^{7,9} Therefore, a healthy, balanced and stable GI microbiome plays an active role in a range of vital physiological processes that are crucial for overall health.¹⁰

COMMON SIGNS OF DIGESTIVE DISORDERS⁴



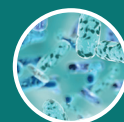
? DID YOU KNOW?

10x

The number of microorganisms and their genetic material in the GI microbiome is approximately 10 times more than the total number of cells in the host body.⁷



Similarly to the human fingerprint, every dog and cat host their own unique and individual microbial profile. No two microbiomes are the same overall.⁷



Differences in composition, species richness and total numbers of bacteria occur along the length of the GIT.⁷

AN IMBALANCE IN THE MICROBIOME

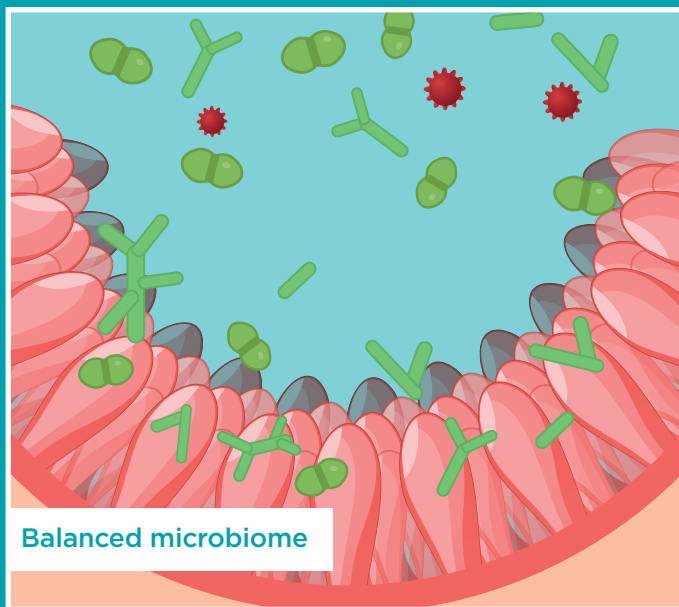
The balance between beneficial “good” and pathogenic “bad” bacteria in the GI microbiome of mature dogs and cats is remarkably stable. However, its composition can be influenced during the life of the animal in response to several factors such as diet, environment, medications and disease.¹¹ An imbalance of the GI microbiome is referred to as intestinal dysbiosis.¹²

Profound alterations in the GI microbiome are found in acute and chronic enteropathies in dogs and cats such as inflammatory bowel disease, as well as in cases of treatment with antibiotics (AAD) and other medications.¹³ The GI microbiome also plays a role in diseases distant from the GIT such as atopic dermatitis, obesity and anxiety, therefore a dysbiosis can influence the health of an animal overall.^{8,14,15}

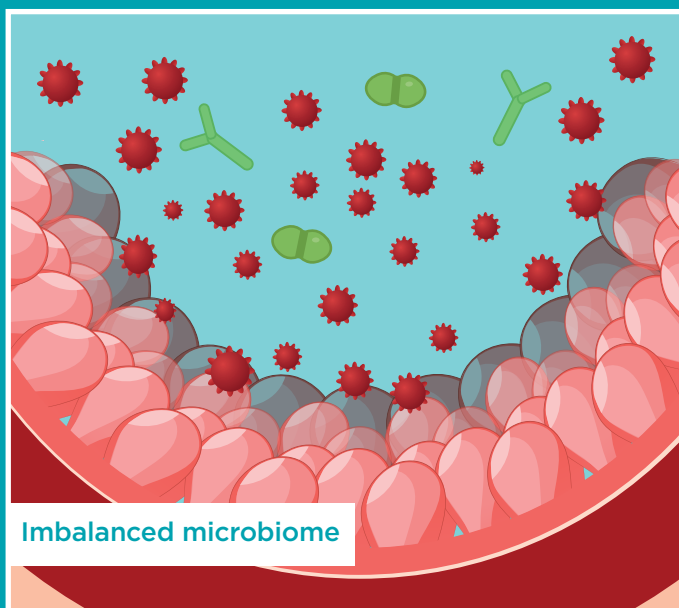
ANTIBIOTICS AND DYSBIOSIS

Antibiotic administration can induce gut dysbiosis, with broad-spectrum antibiotics causing rapid and significant drops in richness, diversity, and evenness of microorganism groups found within the GIT.¹⁵

The intestinal dysbiosis can persist for several weeks to months following cessation of antibiotic treatment, and the return to the initial composition is rarely fully achieved.^{7,15}



Balanced microbiome



Imbalanced microbiome



Beneficial bacteria



Pathogenic bacteria

THE SCIENCE BEHIND PROBIOTICS & PREBIOTICS

Probiotics are defined as “live” microorganisms, that when administered in adequate amounts, confer a health benefit on the host.¹⁶ Commonly used commercial probiotics include *Lactobacilli*, *Bifidobacterium* and *Enterococci* species.^{14,16,17,18}

Although probiotics are typically unable to colonise the gut due to competition with the already established microbiota, they still have beneficial effects during their transit through the GIT.¹⁴ Probiotic bacteria produce metabolites and antimicrobial peptides and proteins that modify the local microbiota and interact with the host immunity, thus improving clinical signs of GI disorders.¹⁵

Prebiotics are non-digestible food substances, like fibre, that support the growth and health of the host’s resident beneficial bacteria. Probiotics supply an exogenous source of live bacteria to the host and when combined with prebiotics are called ‘synbiotics’.



Understanding probiotic yeast

Until now, practitioners have faced the challenge of commercial and veterinary probiotic products not being listed for use concurrently with antibiotics. This has been especially problematic in cases of AAD commonly seen in practice.² Yeast are naturally resistant to antibiotics, which sets them apart from probiotics of bacterial origin.⁹

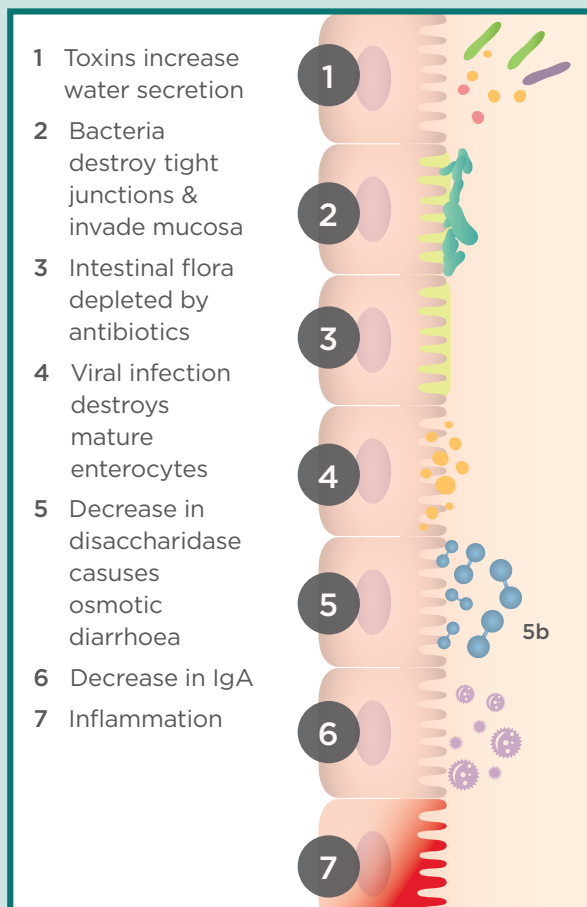
Saccharomyces boulardii is a strain of yeast which has been extensively studied in both humans and animals for its probiotic effects.⁹ It is non-pathogenic and is antibiotic-resistant so therefore can be prescribed to patients receiving antibiotics.⁹

Within the lumen of the intestine, *S. boulardii* exerts many positive and protective effects through several different mechanisms.¹⁹ It degrades toxins of pathogens, interferes with the adherence of pathogenic bacteria along the GIT, modulates normal microbiota by supporting the establishment of beneficial bacteria, and preserves normal intestinal physiology.¹⁹

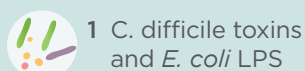
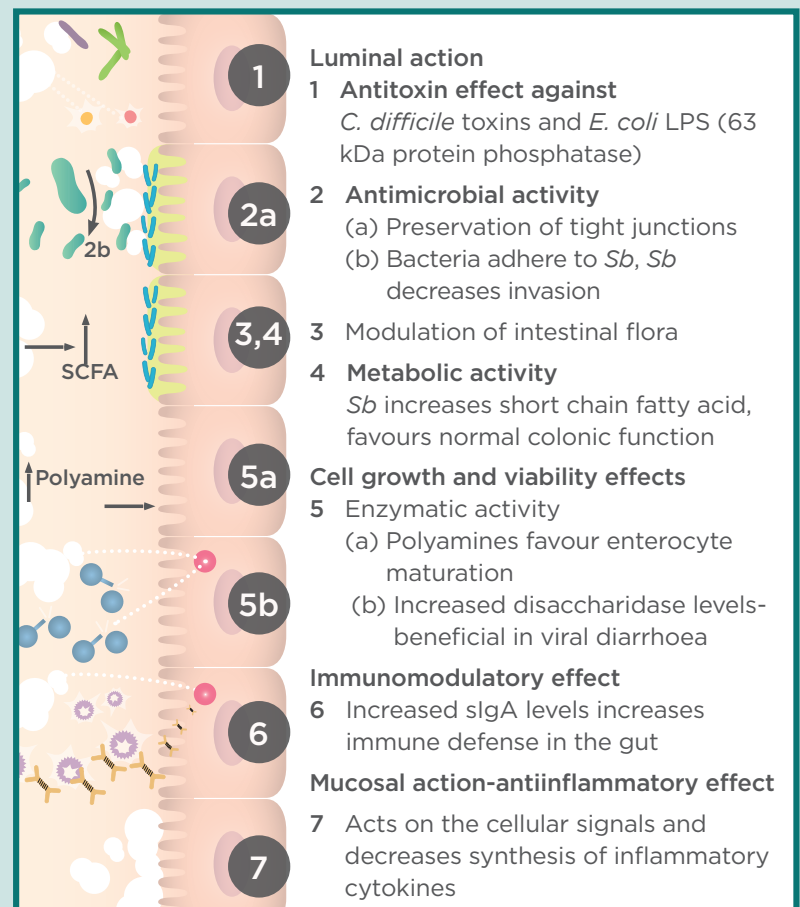
It directly restores normal short chain fatty acid (SCFA) balance.² Normally in a healthy and balanced GI microbiome, resident bacteria convert complex carbohydrates into beneficial SCFAs.¹⁹ SCFAs provide energy for endothelial cells, increase anti-inflammatory regulatory T cells and modulate intestinal motility.⁸

In addition, *S. boulardii* increases mucosal surface antibody levels and acts as an immune regulator by decreasing inflammatory mediators.¹⁹

Destructive effects of pathogenic microbes



Protective effects of *S. boulardii* (Sb)



1 *C. difficile* toxins and *E. coli* LPS



3 Intestinal flora



2a Tight junction



5 Immature enterocyte with virus



5b Accumulation of disaccharides in lumen



6 Pathogens, in the absence of sIgA



6 Secretory IgA (sIgA)

Combating antibiotic resistance with probiotic yeast

Antibiotic resistance is a global issue which impacts the future of both human and animal health.¹

The frequency of antibiotics being prescribed in veterinary clinics in Australia alone is only one example that highlights the global need to reduce antimicrobial use and thereby reduce selective pressures on microbes.¹ Resistant genes may be transferred between resident bacteria in the hosts' gut microbiome but also to and from transient bacterial probiotics. No gene transfer occurs between bacteria and yeast. This lack of gene transfer as well as yeasts' natural resistance to antibacterial antibiotics, are major arguments for using yeast as a probiotic in antibiotic-treated patients.²

RESTORING BALANCE IN THE MICROBIOME

Saccharomyces boulardii: an effective probiotic in the prevention and treatment of antibiotic-induced diarrhoea in dogs²⁰

Twenty-four dogs of different breed, sex and age were divided into three equal groups: groups I, II and III.

Dogs in groups I and II received intramuscular (IM) injections of the antibiotic lincomycin (150mg/kg/d) until diarrhoea occurred. After the onset of diarrhoea, all dogs in group II, were given 1000mg/d of *S. boulardii* orally for 10 days. Dogs in group I did not receive *S. boulardii*. The duration of diarrhoea in group II dogs was significantly shorter than that of group I. Dogs in group III were given IM lincomycin at the same dose for 10 days together with 1000 mg/d of *S. boulardii* orally. None of the dogs in group III developed diarrhoea.

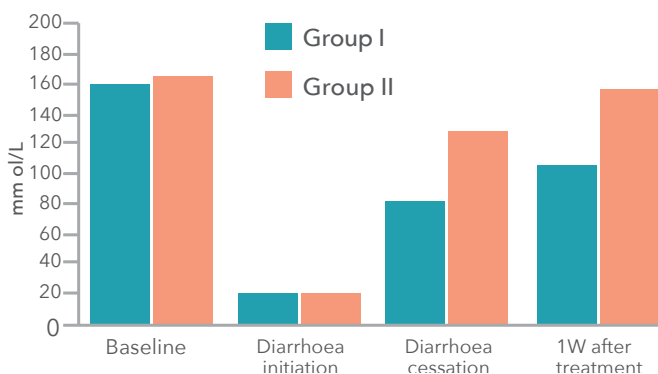


Figure 1. Mean values of TSCFAs in groups I and II. Group III did not develop diarrhoea and showed no significant change in TSCFAs 1 week post treatment vs baseline reading

The mean values of total short-chain fatty acids (TSCFAs) in both groups I and II decreased significantly at the time of onset of diarrhoea. At both time points of diarrhoea cessation and one week after treatment, the TSCFAs were significantly higher in group II than they were in group I.

A decrease in TSCFAs was demonstrated to be the cause of diarrhoea in dogs treated with lincomycin. *S. boulardii* as a probiotic was proven to be an effective cure for AAD when given after the onset of diarrhoea and also proved to be an effective prevention of the occurrence of AAD when given together with lincomycin from the beginning of antibiotic treatment.



Saccharomyces boulardii achieves better control of clinical signs in dogs receiving treatment for inflammatory bowel disease⁵

In a prospective, non-randomised, double-blinded, placebo-controlled study, the effects of *S. boulardii* were evaluated in four healthy control dogs and 20 dogs with inflammatory bowel disease.

Healthy controls received *S. boulardii* at 1×10^9 cfu/kg twice daily for 10 days. Faecal samples for culture were collected throughout the treatment period. *S. boulardii* was present in the faeces from day 1 of treatment, and a steady state was reached at day 5. No short-term adverse effects were reported by owners.

Dogs with IBD were all treated with diet, antibiotics and steroids, and either *S. boulardii* at the same dose of the healthy controls, or a placebo. Body condition score (BCS) and the validated negative outcome predictor Canine Chronic Enteropathy Clinical Activity Index (CCECAI) together with its characteristics (attitude, appetite, vomiting, stool consistency, stool frequency, weight loss, serum albumin, ascites or peripheral oedema and puritis) were used to quantify improvements during treatment. BCS, the overall CCECAI score, as well as stool consistency and stool frequency within CCECAI results, improved significantly in dogs with IBD receiving *S. boulardii* vs the placebo.

S. boulardii can be supplemented to achieve better control of clinical signs in dogs treated for IBD, compared to standard therapy alone, without adverse effects.

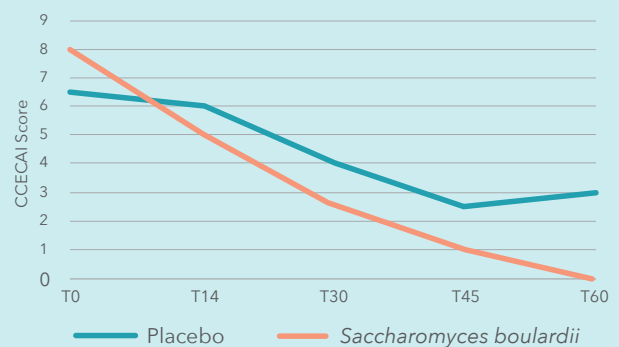


Figure 1. CCECAI negative outcome predictor scores in dogs receiving *S. boulardii* improved significantly more than dogs receiving a placebo at day 45 of treatment (T45) and day 60 (T60). In dogs receiving *S. boulardii*, the CCECAI score was significantly decreased ($P < 0.01$) at days T14, T30, T45 and T60 compared to the baseline score at day 0.

Disclaimer: Median values at time points are approximate from original graph.

CHOOSING THE RIGHT PAW PROBIOTIC FOR YOUR PATIENT

Please read the labels and follow the directions for use

PAW Digesticare: Multi strain probiotic & wholefood powder



PAW Digesticare is a highly palatable powder that combines a multi-strain probiotic powder with a fermented wholefood powder, providing beneficial bacteria to improve and support the long-term health and function of the GI microbiome in dogs, cats & pocket pets by sprinkling over either wet or dry food daily.

Key ingredients:

Probiotics: *Lactobacillus acidophilus*; *L.delbrueckii subspecies bulgaricus*; *L.plantarum*; *L. rhamnosus*; *Bifidobacterium bifidum*; *Enterococcus faecium*; *Streptococcus alivarius subspecies thermophilus*

Fermented wholefoods: Naturally fermented organic whole grains and seeds, alfalfa grass, quinoa, spirulina and other legumes and cereals to provide easily absorbed nutritional support.

Dosage: Each level scoop contains 2g

Dosage (for daily administration)	Maintenance
Puppies/kittens	2g
Small dog	2g
Medium dog	4g
Large dog	6g
Cats	2g

Size: 150g Tub

Storage:

- Keep below 25°C
- If the product is stored under refrigerated conditioned (below 8°C), the expiry date can be extended by 12months.

Warnings/Safety:

- For animal use only.
- PAW DigestiCare should not be used in conjunction with penicillins, cephalosporins, tetracyclines, avoparcin, gentamycin, lincomycin, streptomycin, tiamulin or tylosin.

PAW Digesticare SB: Gastrointestinal support for use with antibiotics



PAW Digesticare SB contains 10 billion CFU of *Saccharomyces cerevisiae (boulardii)*, a probiotic yeast shown to help reduce duration & occurrence of antibiotic associated diarrhoea and help support digestive system health. The two-part capsule is simple to dispense and easy to dose, simply open and sprinkle over the pets' food daily.

Key ingredients: Each 500mg capsule contains 10bn CFU *Saccharomyces cerevisiae (boulardii)*

Dosage: Daily dosage 1-2 capsules for any sized dog

Size: 30x 500mg capsules

Storage: Store below 30°C

Warnings/Safety:

- For animal use only
- For Veterinary supply only

CHOOSING THE RIGHT PAW PROBIOTIC FOR YOUR PATIENT

Please read the labels and follow the directions for use



PAW DIGESTICARE

PAW DIGESTICARE SB

Re-balance gastrointestinal microbiome

- Antibiotic associated diarrhoea: prevention and treatment
- Acute uncomplicated GI disorder



Immunomodulation

- Modulation of concurrent enteropathies (CE) in dogs ± concurrent medications
- Modulation of CE in untreated cats



Support a healthy GI microbiome

- Adult cats and dogs
- Pocket pets (guinea pigs, ferrets, rabbits)



Establish the GI microbiome

- Puppies
- Kittens



Introducing the PAW Practitioner Range

Developed for vets, by vets.



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