



# Promoting Gut Health in Dogs

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Gut health concerns the whole digestive tract, which starts in the mouth and ends with, surprisingly, the rear end, or more biologically accurate, the rectum and anus.



## The Mouth

In humans, digestion begins in the mouth. We physically break down food with our teeth, and salivary enzymes get to work.

This is slightly different in the dog. The structure of their teeth means they are equipped for ripping and tearing, and then swallowing larger chunks of foods, whereas we humans have flat surface teeth made for grinding.

Nevertheless, even for the dog, dental health is important when we are considering gut health.

## Promoting Dental Health

### Limit or avoid ultra-processed foods

In ancient human hunter-gatherer communities, cavities and gum disease were a rarity, and this remains true in modern times; Aboriginals living a traditional lifestyle do not generally get dental disease until they adopt a Western diet.

There are a number of reasons for this.

Like the gut, the mouth contains its own microbiome. It is a community of microbes that maintain balance; the good guys keep the bad guys in check. Not only do ultra-processed foods skew the balance in the mouth, they damage the microbiome of the gut, too. As we know, the gut is home to a great deal of immune tissue, and so in effect it trains the immune response. It is thought that much of the damage originating in the mouth is due to an improperly regulated immune response and not solely to oral bacterial pathogens.

### Offer opportunities to chew

Chewing stimulates saliva which produces anti-bacterial agents, helping to keep the mouth clean. In addition, the abrasion that occurs during chewing helps to scrape deposits off the teeth.

## What type of chew is best? Here's what the data suggests:



### Raw bones

reduced mouth bacteria by

**79%**



### Daily brushing

reduced it by

**70%**



### Marketed dental chews

reduced it by

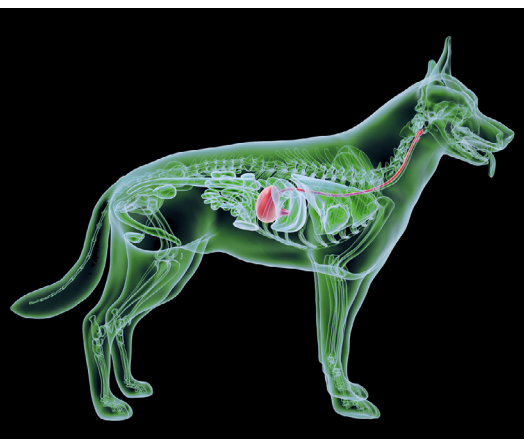
**54 - 60%**

## Diet

Periodontal disease in dogs may be related to the texture of a diet, with an abrasive, fibrous diet more beneficial than a soft and mushy one. The diversity and improved texture that you can include in a fresh-food diet is unmatched!

Not only do fibrous vegetables provide something to gnaw on, but fibre is beneficial to the gut microbiome. Fibre is undigested carbohydrate which can be fermented by bacteria in the gut. In this process, metabolites are produced which support intestinal integrity, immune function and more.

Moving on from the mouth, food makes its way down the oesophagus and into the stomach.



## Stomach

The stomach is like a washing machine; it churns food around, but it also releases enzymes, acid and hormones to break food down into a usable form.

An enzyme is a protein that speeds up chemical reactions in the body. Digestive enzymes speed up chemical reactions that break down food molecules into something that may be used by the body.

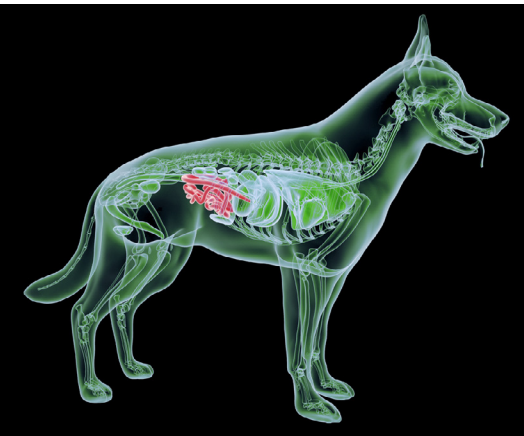
The stomach also releases hydrochloric acid, more commonly known as stomach acid, from the parietal cells. This highly acid environment causes proteins to lose their characteristic folded structure and break down. Stomach acid also inhibits the growth of many microorganisms, which is helpful in preventing infection.

Digestive hormones are also made in the stomach. The 'two Gs' are released – gastrin and ghrelin. **Gastrin** stimulates the release of stomach acid when it senses the stomach has been stretched. **Ghrelin** tells the brain that the body needs to be fed; it increases appetite.

Sufficient secretion of stomach acid is necessary to support digestive health, and there are several medications that can influence this. In a case of too much stomach acid, proton pump inhibitors such as omeprazole will help, while for too little stomach acid, certain antihistamines will help.

However, while these medications may occasionally be necessary, it is worth considering how they affect digestive health.

In the stomach, food is turned into a substance known as chyme, which moves into the small intestine.



## Small Intestine

The small intestine is full of tiny, carpet-like projections called villi and microvilli, which increase the surface area of the organ, which in turn boosts nutrient absorption. In effect, they allow whatever is in the small intestine to be absorbed into the bloodstream.

Inflammation in the intestine can result in poor absorption and extraction of nutrients. Inflammation may have a number of causes:

- food sensitivities
- viral/bacterial infection
- parasites
- chronic body-wide inflammatory conditions
- medications and flea or worm treatments.

If inflammation in the digestive tract is suspected, an elimination diet may be helpful – removing all food and then introducing one novel protein for an 8–10-week period. You then introduce other novel proteins one at a time and monitor for any change in symptoms.



## Pancreas

The pancreas is like the factory of the digestive system, producing enzymes and hormones that feed into the small intestine to further digest the chyme.

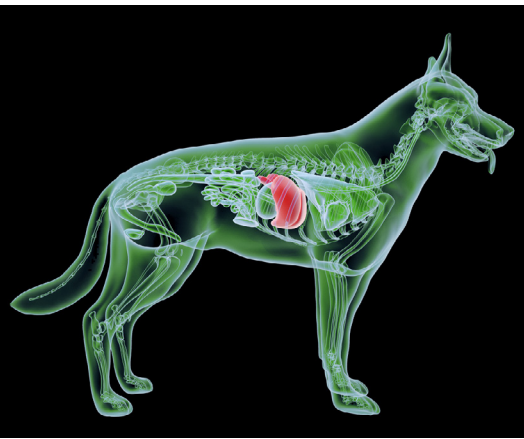
The pancreas produces:

- lipase – breaks down fat
- protease – breaks down protein
- amylase – helps to break down starch

It also produces a range of hormones:

- insulin – promotes the absorption of glucose from the blood into the liver, fatty tissue and skeletal muscle cells
- glucagon – the messenger which tells the liver to release stored sugar
- gastrin and amylin – while most of the gastrin is released in the stomach, some is made in the pancreas, too. Amylin helps control appetite and stomach emptying.

In cases of pancreatitis, these functions become somewhat compromised, which is why malnutrition is associated with this condition. Reducing the digestive burden on the pancreas can help in these cases. Fasting can be useful for a short period, followed by the introduction of easy-to-digest foods, low in starch and often cooked.



## Liver Health

To further assist with digestion, bile acids are made by the liver and stored in the gallbladder. Bile is secreted into the small intestine and helps with fat digestion and absorption. For this reason, the liver and gallbladder are also important for the digestion and metabolism of fat-soluble vitamins.

The health of the liver directly affects a dog's ability to thrive, so we want to reduce unnecessary burden on the liver where possible, enabling it to get on with the job it is designed to do.

The liver also plays a role in metabolic detoxification; whatever the body is exposed to, the liver will help break down and excrete it safely. Exposure to environmental toxins can place an unnecessary burden on the liver, so we need to limit these as much as possible.

### Promoting Liver Health

- Offer filtered water
- Opt for non-toxic cleaning products
- Limit artificial fragrances around the home
- Consider the necessity of all current medications and supplements
- Consider current vaccination and the flea/worm schedule (is there a place for titre testing, worm counts and repellents?)
- Offer bio-available, easy-to-digest foods where budget and access allow.

Moving through the small intestine, food eventually reaches the large intestine.



## Large Intestine

The large intestine is responsible for four main things: hydration, nutrient absorption, waste compaction and nourishing the microbiome.

### Hydration

The large intestine reabsorbs fluid and electrolytes. Here the contents from the gut turn from liquid to solid (which indicates that runny poop hasn't spent enough time in the large intestine, for one reason or another).

### Nutrient Absorption

While most nutrient absorption occurs in the small intestine, it also occurs in the large intestine, thanks to the microbiome.

### Waste Compaction

At the end of the large intestine, the rectum stores and compacts the waste produced by the body, including dead red blood cells, which make poop brown!

## The Microbiome

The large intestine is home to the all-important microbiome. This community of microbes has gained a lot of attention in recent years, for good reason. Microbes are, of course, found throughout the digestive tract, but the majority are found within the large intestine. These guys can make vitamins, amino acids, hormones and chemical messengers. They train the immune system, strengthen the gut barrier, communicate with other vital organs, including the brain, prevent invasion from pathogens, influence gut movement and function – and love eating fibre!

Dysbiosis of the microbiome is a state where things are not going well in the large intestine. Dysbiosis can disrupt the intestinal barrier, increasing susceptibility to harmful antigens. This mechanism also fires up the immune system, creating an inflammatory response.

A number of factors can cause gut dysbiosis, including:

- overuse of antibiotics
- use of proton pump inhibitors
- use of antihistamines
- poor liver function
- poor motility
- digestive disorders
- poor pancreatic function
- inflammation in the gut
- stress
- environmental toxins
- dietary choices.

## Supporting Gut Health and Preventing Dysbiosis

Preventing dysbiosis starts in puppyhood. Increasing evidence indicates that the foetus develops in an environment that is not entirely germ-free. Many microbial species have been detected in the umbilical cord, the amniotic fluid and the foetal membranes in apparently normal pregnancies without any indication of inflammation or disease. After birth, the new-born acquires microbes from the environment, food, and nearby animals and humans. In the first month of life, the gut microbiota is less stable, but its stability and biodiversity increases over time.

As a puppy is growing, it is essential to:

- avoid the *overuse* of antibiotics – antibiotics are lifesavers, but they can often be prescribed inappropriately;
- avoid the **overuse** of medications – medications are beneficial in acute disease episodes, but the long-term use of many medications often serves as a band-aid, preventing us from getting to the root of the problem;
- support normal motility – avoid stressful triggers where possible;
- limit exposure to environmental toxins – in the form of cleaning and grooming products, pesticides, plastics, contaminated water, etc.



In addition, nutrients are key!

Micronutrient deficiency (of zinc, vitamins D and A, folate) in early life is seen to influence the maturation of the gut microbiota and its interaction with the host, so it is essential to ensure adequate levels in puppyhood.

Oysters are the highest zinc-containing food, but red meat and poultry provide a substantial amount.

Sources of Vitamin D:

- flesh of fatty fish (salmon, tuna and mackerel)
- fish liver oils
- beef liver
- egg yolks.

Sources of Vitamin A:

- carotenoids: sweet potatoes, dark leafy greens, yellow/orange/red fruits/vegetables.
- retinoids: animal meat, liver, fish oil.

Sources of folate:

- dark leafy greens – spinach, broccoli
- liver
- seafood
- seeds
- eggs
- nuts

## **Fibre**

Fibre feeds the microbiome. It is absolutely essential for the maintenance of gut health.

Fibre is a non-digestible carbohydrate, having a number of health benefits. As it makes its way through the digestive tract, it slows glucose absorption, which helps modulate blood sugar levels. It also forms a gel-like substance which traps potentially harmful pathogens.

Fermentable fibres produce short-chain-fatty-acids (SCFAs) which have unique roles throughout the body. Not only do they contribute to maintaining a healthy and tight gut barrier, they are also precursors to many neurotransmitters, which directly affect mood and behaviour.

Fibre supports bowel health by maintaining regularity and improving stool bulk which is key to anal gland health in the dog.

## Sources of Fibre

### 1 Broccoli

Not only is broccoli a great source of fibre, it is packed with vitamins and minerals. You will find vitamins A, C and E, fibre and antioxidants in these little green trees.

Vitamin A helps maintain the structural and functional integrity of mucosal cells in innate barriers (the skin, respiratory tract, etc).

To serve: Chop and lightly steam or blend.



### 2 Berries

Berries contain anthocyanins (Greek anthos = flower and kyáneos = blue). Many studies have linked these compounds with antioxidant, anti-inflammatory and anti-carcinogenic properties. In addition, they have also demonstrated antimicrobial properties, specifically in cranberries and blueberries.

Berries also pack a fair punch in terms of fibre content. Great berries to include are raspberries, blueberries and cranberries.



### 3 Apples

Apples contain a range of antioxidants, meaning they help protect against oxidative stress. Apples are also a source of vitamin C and potassium.

Chop into slices – just remember to avoid the seeds.



### 4 Mushrooms

Mushrooms have been found to be:

- anti-inflammatory
- anti-microbial
- antioxidant
- prebiotic
- anti-diabetic

And they are a great source of fibre! Cook them fully – lightly sauteed is fine.



## 5 Leafy greens

Green leafy vegetables such as spinach, kale, watercress and broccoli contain concentrations of vitamins A, C, E and K, along with many of the B-vitamins. They also contain carotenoids. Carotenoids act as an antioxidant, deactivating free-radicals and limiting the damage they can cause.

Beta-carotene, one of the carotenes found in green leafy veg like spinach and kale, turns into Vitamin A in the body. Vitamin A is important in maintaining healthy skin and mucous membranes and supporting a functioning immune system.

Green leafy vegetables are also a rich source of folate, as the word 'foliage' suggests. Folate functions as a coenzyme in many processes in the body, helping tissues grow and making cells work. Folate is also involved in neurotransmitter synthesis, so it is implicated in mood regulation and subsequently in behaviour.

To serve: Lightly steam your kale or spinach, or blitz it up in a blender, pop it in a freezer mould and add it to the bowl.



## 6 Carrots

Raw carrots can be fed as snacks or training treats, but you can also feed them cooked. A great source of carotenoids and vitamin C, carrots support immune function and promote healthy mucosal membranes throughout the body. Carrots are a great source of prebiotic fibre, too.



## 7 Pumpkin

Pumpkin contains vitamins A, C and E, as well as minerals like iron, copper and potassium. It is also a great source of fibre. Offering pumpkin to your dog is a great way to support their digestive health.

## Probiotics Vs Prebiotics

### Prebiotics

Prebiotics are fibres that feed the beneficial microorganisms residing in the intestine.

Prebiotics were first introduced as a functional food in 1995 by Marcel Roberfroid. In 2007, Roberfroid clarified that only two classes of fructooligosaccharides (FOS) meet the full definition of a prebiotic. These are oligofructose and inulin.



In addition, you may also find prebiotics containing the following:

- Mannan oligosaccharides (MOS) – from the yeast *Saccharomyces cerevisiae*
- Galactooligosaccharides (GOS) – found in dairy, beans and root vegetables

Food sources of prebiotics:

- mushrooms
- chicory root
- garlic
- asparagus
- dandelion greens
- bananas.

## Probiotics

Probiotics are live microorganisms that, when ingested, enhance intestinal microbial balance.

Rather than encouraging the growth of beneficial bacteria and suppressing the growth of pathogenic bacteria, probiotics are thought to introduce beneficial bacteria into the environment. They are somewhat transient, which is why there may be regression of symptoms when a probiotic is ceased.

The primary bacterial populations that benefit both cats and dogs are lactic acid bacteria, especially lactobacilli, bifidobacteria and enterococci.

Fermented foods contain naturally occurring probiotics, but they can be an issue for dogs suffering bacterial overgrowth.



## The Gut as the Second Brain

The gut can function independently of the brain, meaning that it does not need to be told what to do. However, it can equally lose much of its function during times of stress and when resources are redirected away from it. The movement of food can be affected, meaning food spends too little or too much time in certain places in the digestive system. This can lead to nutrients not being absorbed efficiently or, alternatively, food fermenting and causing bloating/flatulence or even conditions like small-intestinal-bacterial overgrowth.

Building stress resilience in dogs and reducing exposure to stressful triggers is important in supporting digestive health and, naturally, for overall health, too.

Potential stressors:

- Psychological – emotional stressors such as depression, anxiety, fear, trauma;
- Physical – over-exertion, accidents, trauma, pain;
- Environmental – pollutants, extreme temperatures, allergens, radiation;

- Biological – bacteria, mould, virus, parasites;
- Chemical – toxins, pesticides, herbicides, heavy metals, fumes, dust;
- Consumable – highly processed foods, GM foods.

There is such a thing as good stress, though. Good stress includes exercise, challenges, learning new skills and more! However, the body cannot differentiate between types of stress – whether the source is good or bad, the body's response is the same. So we need to be mindful of how big the dog's stress burden is, and limit excessive stress of any kind.

## Take-aways

- The whole of your dog's digestive system, from mouth to rectum, is involved in maintaining health.
- Keep inflammation down – caused by parasites, over-use of medication, processed foods, and food sensitivities.
- Where pancreatic function is compromised, consider short fasts and use easy-to-digest foods, low in starch.
- Support liver health by reducing the use of toxins in the home and diet.
- Maintain a healthy microbiome by
  - limiting processed foods and ingested and environmental toxins
  - limiting the duration of medication, especially antibiotics
  - ensure sufficient zinc, folate and vitamins D and A in puppyhood
    - Zinc = oysters, red meat, chicken
    - Folate = leafy greens, liver, seafood, seeds, eggs
    - Vit D = salmon, tuna, mackerel, fish liver oils, beef liver, egg yolks.
    - Vitamin A = sweet potatoes, leafy greens, yellow/orange/red fruit and veg, meat, liver, fish oil.
  - feeding plenty of fibre – raw and cooked vegetables
- Reduce excessive stress on the body and brain.
- Give raw bones to reduce mouth bacteria.

**Good health starts in the digestive system! Take care of your dog's digestive system, and much else will take care of itself.**