

## ABOUT ABBY

ABBY IS A 5 YEAR OLD PUREBRED GERMAN SHEPHERD, WEIGHING AROUND 90 LBS. IT WAS OUR DREAM TO FINALLY BE ABLE TO HAVE A DOG LIKE HER. ABBY WAS A GREAT FIT WITH US, AND EVERYONE JUST LOVES HER. SHE'S BEEN IN OUR FAMILY LONG ENOUGH TO SEE 3 GRANDCHILDREN COME INTO HER LIFE AND SHE INSTANTLY BECAME THEIR PROTECTOR. SHE TRIES TO HERD THEM LIKE LITTLE SHEEP SOMETIME AND THE 1 ½ YEAR OLD BECOMES A LITTLE OVERWHELMED BY HER SIZE, BUT TAKES HER GENTLE KISSES LIKE THE OTHER 4 & 6 YEAR OLDS DO.

WHEN ABBY WAS AROUND 3, SHE BECAME VERY SICK. WE DIDN'T KNOW WHAT WAS WRONG WITH HER. SHE WAS HUNGRY ALL THE TIME, BUT CONSTANTLY LOST WEIGHT. SHE WAS GETTING SKINNIER BY THE DAY. HER STOOLS AND HER COAT WERE NOT AT ALL NORMAL. THOSE WERE THE FIRST SIGNS THAT SOMETHING WAS REALLY WRONG WITH HER. AT NIGHT SHE WOULD EVEN STEAL BREAD OR ANY FOOD THAT WAS LEFT ON THE COUNTER. IT WAS A HORRIBLE THING TO WATCH YOUR DOG SLIP AWAY, AND WE WERE FRANTIC TO FIND OUT WHAT WAS WRONG WITH HER. FINALLY AFTER A BARRAGE OF TESTS, SHE WAS DIAGNOSED WITH EXOCRINE PANCREATIC INSUFFICIENCY. THAT DISEASE IS THE INABILITY TO PROPERLY DIGEST FOOD DUE A LACK OF DIGESTIVE ENZYMES MADE BY THE PANCREAS. IT SEEMS TO BE A DISEASE IS PREDOMINANT IN GERMAN SHEPHERDS. NOW WITH EVERY MEAL HER FOOD HAS TO BE TREATED WITH A POWDERED ENZYME FOR 20 MINUTES PRIOR TO HER EATING. HER TREATS HAVE TO BE LIMITED ALSO, AND THERE CAN'T BE ANY GRAIN PRODUCTS IN HER FOOD. AFTER DIAGNOSIS AND PROPER MEDICATION SHE CAME DOWN A LONG ROAD BACK TO HEALTH. SHE PUT HER WEIGHT BACK ON AND HER COAT BECAME SHINY AGAIN. WE CAME VERY CLOSE TO LOOSING HER TO THAT TERRIBLE ILLNESS. SOME PET OWNERS ARE UNAWARE THAT THEIR DOG MAY HAVE THIS DISEASE AND EITHER WATCH THEM SLOWLY DIE OR HAVE THEM PUT DOWN. ABBY LOVES TO SWIM, FETCH BASKETBALLS AND PLAY WITH OUR GRAND KIDS. IT TAKES HER ABOUT 1 MINUTE TO DEFLATE A NEW BASKETBALL WITH HER POWERFULL JAWS. IT SOON BECAME OBVIOUS TO US, THAT PLAYTIME AND WALKS WERE NOT ENOUGH FOR HER. SHE NEEDED A JOB!! HER MIND NEEDED TO BE AS ACTIVE AS HER BODY WAS. THAT'S WHERE KIRBY MACINNES CAME INTO OUR LIVES. KIRBY HAS TAKEN HER UNDER HER WING FOR TRAINING, AT WHAT EVER SHE FEELS ABBY WILL EXCEL AT. THEREFORE, WE OFFERED ABBY UP TO KIRBY'S TRAINING PROGRAM. WE ARE VERY PROUD TO HEAR HOW WELL SHE IS DOING AND TAKING TO THE TRAINING. WHEN SHE COMES HOME FROM A SESSION WITH KIRBY, SHE IS BONE AND MIND TIRED. SHE HAS A VERY WELL ADJUSTED LIFE NOW, AND IS THE HAPPIEST WE HAVE SEEN HER. SHE CAN'T WAIT TO GO WHEN KIRBY ARRIVES TO TAKE HER OUT TO WORK, AND WE ARE VERY HAPPY FOR ABBY TO HAVE THIS TO LOOK FORWARD TO.

# EPI in Dogs



## Exocrine Pancreatic Insufficiency

---

[Symptoms](#) [Causes](#) [Diagnosis](#) [Management](#) [Breeds at Risk](#) [Links](#) [Quick-Start Guide](#)

---

Please visit our sister site, [Bloat in Dogs](#). Knowing the symptoms and causes could save your dog's life.

**Exocrine Pancreatic Insufficiency (EPI)** is a potentially life-threatening disease in some dogs, yet most dog owners know very little about it and a lot of contradictory information has been published. Even good veterinarians may not recognize EPI since it's not a common disease. The good news is that many EPI dogs live long and happy lives because their EPI is being managed appropriately by their human family. If you suspect your dog may have EPI (for example, has "cowpie" stools that won't clear up), the very best thing you can do is confirm the [diagnosis](#) immediately, so you can begin [managing](#) EPI as soon as possible.

### **What is EPI?**

EPI occurs when the part of the pancreas ([acinar tissue](#)) that produces digestive enzymes no longer functions properly. As a result, the dog can't digest its food. **That's why an EPI dog will literally starve to death without proper treatment.** It's estimated that more than half the cases occur in German Shepherd Dogs (GSDs) or dogs that are closely related to GSDs, such as Shiloh Shepherds, but any breed (or mixed breed) can get EPI. This page provides links to information on EPI and summarizes some of the key points we found in the sites we researched. It's intended to help you successfully manage your dog's EPI. It's also intended to provide a broad overview and basic understanding, and then point you to some resources that can help in greater depth. Although we have researched the information carefully, we cannot attest to its accuracy. **Please consult with your veterinarian for medical information.**

EPI is sometimes also referred to as PAA (Pancreatic Acinar Atrophy), Pancreatic Hypoplasia, Malabsorption, or Malassimilation. There is no cure, although for unknown reasons a very tiny percentage of dogs diagnosed with EPI return to

normal after a number of months. Some EPI dogs stabilize fairly quickly and are relatively easy to maintain; others have a very difficult road filled with constant challenges. Set-backs can and do occur. However, with proper care, many EPI dogs live long, full, and normal lives.

- ◆ Costs for managing EPI can be greatly reduced if you turn to the right resources.
- ◆ Preparing food for your EPI dog isn't hard, just different and takes extra effort.
- ◆ Many EPI dogs continue to do all the activities they did before, including agility, search & rescue, therapy, hiking, you-name-it!
- ◆ EPI, in and of itself, does not shorten a dog's lifespan. The key is successful [management](#).
- ◆ Other than your vet, your best source for EPI support, advice, and information is the [K9-EPIGLOBAL Yahoo Group](#). Membership is required (no cost), and a pre-condition is that your dog has received a positive diagnosis of EPI. According to comments we've seen on quite a few different websites, it has been instrumental in vastly improving, and sometimes even saving the lives of EPI dogs. Receiving a diagnosis of EPI can feel overwhelming and daunting. This group helps you deal with the many and varied challenges.

### **SIBO & B12 Deficiency: EPI's Nasty Companions**

- ◆ **SIBO (Small Intestinal Bacterial Overgrowth)**  
It's been said that [70%](#) of dogs with EPI [also develop](#) a condition called "[SIBO](#)."
  - ◆ Has some of the same [symptoms](#) as EPI
  - ◆ Occurs when undigested food sits in the [small intestine](#) and is attacked by "bad" anaerobic bacteria
    - ◆ Some bad bacteria are always present, but are normally held in check by the "good" bacteria
    - ◆ Since bad bacteria thrive on undigested food (especially starch, sugars, and grains), this causes an explosion in their growth
  - ◆ Can result in permanent [digestive problems and food allergies](#) if not treated timely
  - ◆ Results in nutrient [malabsorption](#) because the bad bacteria...
    - ◆ [Compete](#) for calories and nutrients
    - ◆ [Produce](#) toxins
    - ◆ [Damage](#) small intestine's absorptive surfaces (mucosa)
    - ◆ Cause symptoms in your dog that lead to...
      - ◆ Reduced food intake (due to reduced appetite)
      - ◆ Altered food intake (which can change the nutrient balance)
      - ◆ Reduced immunity
  - ◆ Also sometimes referred to as "[Antibiotic-Responsive Diarrhea](#)" (ARD)
- ◆ **B12 Deficiency**  
It's been reported that about [50%](#) of dogs with EPI lose the ability to process [vitamin B12](#).
  - ◆ B12 is [necessary](#) for many things

- ◆ Essential for digestion
- ◆ Deficiencies can lead to [impaired cognitive function](#) due to neurological complications
- ◆ An EPI dog that's deficient in B12 will have [difficulty gaining weight](#), even when on enzymes
- ◆ An EPI dog is considered at [high risk](#) for B12 deficiency (if not immediately, then eventually)
- ◆ EPI dogs need mid to upper range levels of B12
- ◆ If a stabilized EPI dog is producing "good poop" but starts losing weight, ask your vet to test for B12 immediately new
- ◆ Biggest long-term survival [risk](#) for EPI dogs is caused by untreated B12 deficiencies

***This information is not intended to replace advice or guidance from veterinarians or other pet care professionals. It is simply being shared as an aid to assist you with your own research on this very serious condition.***

To support critical research on EPI in dogs, please contact [Dr. Leigh Anne Clark](#) of Clemson University.

[Back to Top](#)

## Symptoms

Typical symptoms often include some (but not necessarily all) of the following, according to the links below. Unfortunately, even good veterinarians may not be very familiar with EPI because they don't see it often, so it's especially important that owners recognize the symptoms. The sooner EPI is diagnosed, the better chance your dog has of avoiding serious side-effects and living a full and normal life. It's [recommended](#) that any dog (especially a shepherd) that has chronic diarrhea and weight loss have a [cTLI test](#). If your dog has several of these symptoms (particularly some of the top five listed below), please strongly consider getting a cTLI test as soon as possible.

- ◆ **"Cowpie" stools**
  - ◆ This is one of the most common symptoms of EPI & may be the first sign the owner sees
  - ◆ Often they are yellow, orange, gray, or pale-colored
- ◆ **Diarrhea that won't go away**
  - ◆ "Cow-patty" seems to be most common form
    - ◆ See [photo](#) (scroll to pg 26)
    - ◆ Sometimes appearance is compared to pudding or soft-serve ice cream
  - ◆ Watery or very loose diarrhea also occurs with some frequency
    - ◆ Often this version is due to SIBO
  - ◆ Diarrhea doesn't go away, no matter what you or your vet try

*Many, many EPI dogs were initially assumed to have Giardia or some other condition*

- ◆ Can be a symptom of EPI, SIBO, and/or B12 deficiency
- ◆ **Rapid weight loss**
  - ◆ Normally occurs since the dog is literally starving to death
  - ◆ If your dog has long hair or thick fur, this might not be immediately obvious in the beginning
  - ◆ It's not unusual for a 100 lb dog to lose 1/2 lb a day
  - ◆ SIBO can also cause some weight loss
  - ◆ B12 deficiency will also cause weight loss
- ◆ **Ravenous appetite (polyphagia)**
  - ◆ Usually occurs since the dog is starving
  - ◆ Some dogs may lose their appetite instead
    - ◆ Loss of appetite is associated with SIBO and/or B12 deficiency (both often accompany EPI)
    - ◆ Ironically, SIBO can instead cause increased appetite in some dogs
- ◆ **Voluminous & frequent stools** which may have a fluffy, pulpy, putty-like, or watery appearance
  - ◆ Much greater quantity of stools than normal and may occur several times a day.
    - ◆ Food is passing through your dog's body without being used
    - ◆ Often 3 or more bowel movements per day
  - ◆ Texture is not compact.
  - ◆ Surfaces lack the "wrinkled" appearance of normal dog stool
- ◆ **Gas (burping, flatulence, etc.)**
  - ◆ Often seen with EPI (before enzyme treatment begins)
  - ◆ Very common early symptom of SIBO
  - ◆ Higher risk of [Bloat](#) due to gas
- ◆ **Greasy or oily-looking stools and/or particularly foul-smelling stools**
  - ◆ Caused by inability to digest fats (steatorrhea)
  - ◆ May appear to have a transparent sheath covering
  - ◆ May cause some staining of fur
  - ◆ Can be symptom of both EPI and SIBO
- ◆ **Dry, dull, or brittle coat**
  - ◆ Possibly excessive shedding too
- ◆ **Gurgling and loud digestive sounds in the tummy (borborygmus)**
  - ◆ Typical early symptom of SIBO, which often accompanies EPI
- ◆ **Abdominal discomfort**
  - ◆ Symptom of SIBO which often accompanies EPI
- ◆ **Vomiting, regurgitation, throwing up, or wet burps**
  - ◆ Symptom of SIBO so often seen in dogs with EPI
  - ◆ May be mostly liquid (often brown)
- ◆ **Eating stools / feces (coprophagia)**
  - ◆ Quite a few EPI dogs do this. Many stop once they begin enzyme supplementation.
  - ◆ Lots of dogs that never develop EPI do this too.
  - ◆ May accompany SIBO due to malabsorption.
- ◆ **Eating non-food items (pica)**
  - ◆ Some EPI dogs will eat sticks, stones, paper, dirt, their toys, etc.
  - ◆ Pica can also be a sign of SIBO
- ◆ **Temperament changes showing fear and/or aggression**
  - ◆ Some EPI dogs understandably become temporarily aggressive because they're starving to death. This no doubt makes them feel afraid and desperate.
  - ◆ B12 deficiencies can affect cognitive functions
  - ◆ SIBO creates on-going abdominal discomfort which may aggravate behavior issues
- ◆ **Failure to gain weight or failure to thrive, malaise (even when on enzymes)**
  - ◆ Symptom of B12 deficiency, which often accompanies EPI

- ◆ *Could also be a symptom of SIBO, particularly if SIBO has been long-term and damaged the gut*
- ◆ Elevated "ALT" and/or decreased cholesterol in a typical blood test
  - ◆ *A typical blood test CANNOT diagnose EPI; however, some dogs have elevated ALT and/or decreased cholesterol prior to their EPI diagnosis.*
  - ◆ *ALT stands for "Alanine Aminotransferase" (sometimes called SGPT). Elevated ALT can indicate liver issues.*
  - ◆ *May also have decreased serum tocopherol (vitamin E) and decreased serum vitamin A*
  - ◆ *May have prolonged bleeding times due to malabsorption of fat-soluble vitamin [K](#)*

[Back to Top](#)

---

## Causes

### EPI

*Both genetic and environmental factors are believed to probably cause EPI.*

- ◆ It's believed that EPI probably has a genetic origin, as well as environmental.
  - ◆ Researchers strongly believe EPI has a genetic component, but the exact mode of inheritance is not known.
  - ◆ [Prior research](#) suggested that EPI was [inherited](#) in an "autosomal recessive" manner (i.e., both parents had to be carriers for a dog to get EPI); however, it's no longer believed that both parents must be carriers in this manner.
- ◆ Latest research by [Dr Leigh Anne Clark](#) and her Research Associate, Dr Kate Tsai of Clemson University yielded exciting new findings to help understand the causes of EPI. New
  - ◆ The study found that autoimmune reactions which can destroy digestion-related parts of the pancreas play a key role. New
    - ◆ These autoimmune reactions were found to have a relationship to a certain chromosome and a particular gene. New
    - ◆ The "[alleles](#)" associated with this particular gene appear to be significant. New
      - ◆ Dogs that had one particular allele associated with this gene had an increased EPI risk. New
      - ◆ Dogs that other alleles associated with this gene appeared to have more protection from EPI. New
  - ◆ Summary of Dr. Clark's project: New
    - ◆ [Dog Leukocyte Antigen 88 Typing in German Shepherd Dogs Having Pancreatic Insufficiency](#) New
- ◆ *The best way to ensure EPI is not passed on to future generations is through careful breeding.*
  - ◆ Don't breed dogs diagnosed with EPI.

- ◆ Don't repeat matings that produced any EPI pups. The sire and/or dam of any EPI puppy is almost certainly a carrier.
- ◆ Dogs with parents, siblings, or other close relatives who have produced an EPI puppy may be carriers themselves.

### Illness

- ◆ Certain illnesses, such as chronic [pancreatitis](#), can [lead](#) to EPI.
- ◆ Although pancreatic tumors (such as insulinoma) are not common, pancreatic surgery related to a tumor can lead to EPI [symptoms](#). New
  - ◆ Results of a [cTLI test](#) may or may not be normal.
  - ◆ Support for insulinoma is available at the [InsulinomaDog Yahoo Group](#).
- ◆ When EPI occurs in senior or geriatric dogs, it's generally believed that there's probably some underlying medical condition.

## B12 Deficiency

- ◆ *Intrinsic Factor*. A [dog's ability to absorb B12](#) requires something called "[intrinsic factor](#)."
  - ◆ A [dog's pancreas produces](#) intrinsic factor, thus the increased likelihood of B12 deficiency [in EPI dogs](#).
  - ◆ Intrinsic factor [binds to and protects](#) B12 from being destroyed during digestion.
  - ◆ Your dog may be consuming plenty of B12, but it can't process what it consumes because its pancreas is no longer producing adequate intrinsic factor.
- ◆ *SIBO*. SIBO's bad bacteria use B12, which can cause [B12 deficiencies](#).
- ◆ *H<sub>2</sub>-receptor blockers*. B12 deficiencies can also be caused by [chronic use](#) of H<sub>2</sub>-receptor blockers (e.g., cimetidine, ranitidine, famotidine) because an acidic environment is needed to absorb B12.

## SIBO

- ◆ Could be due to a [variety](#) of different [reasons](#), such as...
  - ◆ Malabsorption / [malnutrition](#) due to inadequate digestive enzymes (e.g., EPI), or other reasons
    - ◆ Can leave undigested food ("[substrate](#)") in small intestine on which bad bacteria thrive
  - ◆ Decreased output of pancreatic antimicrobial factors caused by EPI
    - ◆ Can lead to overrun in bad bacteria
  - ◆ Decreased mucosal immunity and [damage to intestinal mucosa](#)
  - ◆ Inadequate intestinal [motility](#) (movement of food through the gastrointestinal (GI) tract)
  - ◆ Obstructions
  - ◆ Inadequate acids due to acid-suppressing medications or other causes
  - ◆ Anatomical problems due to surgery, disease, or other causes
  - ◆ Immune deficiencies ([such as Immunoglobulin A \(IgA\)](#))
    - ◆ Certain breeds, such as [German Shepherds](#), may be more prone.

- ◆ Other
- ◆ Believed to be caused by [colonic bacteria](#) invading small intestine
- ◆ *Contributing Factors*
  - ◆ Starches and sugars (including grains), since SIBO bacteria thrive on these
  - ◆ Antibiotics, since these kill off friendly bacteria
  - ◆ [Stress](#)
- ◆ [German Shepherds](#) and dogs closely related to GSDs may be more [predisposed](#)
  - ◆ Some reports also mention Chinese Shar Peis

[Back to Top](#)

---

## Diagnosis

If you think your dog may have EPI, ask your veterinarian for two blood tests: **cTLI & Cobalamin/Folate.**

- ◆ These are not routine blood tests, so you need to ask for them by name.
  - ◆ Ideally the [blood for both tests](#) should be drawn at the same time so you won't lose valuable time beginning treatment.
  - ◆ Getting both tests at once is [strongly recommended](#) by Texas A&M University (TAMU)
- ◆ If your vet submits the samples *directly* to TAMU for analysis rather than going through an intermediary lab:
  - ◆ [TAMU will consult directly with your vet](#) about the meaning of the test results and possible management approaches
  - ◆ You'll receive the test results [faster](#)
- ◆ **cTLI Test**
  - ◆ *Purpose.* Tests dogs for EPI
    - ◆ Dog must be [fasted](#) for a minimum of 12 hours before the blood is drawn
    - ◆ Be sure your vet draws enough blood or this will be a problem. ([See requirements](#))
    - ◆ Taking enzymes [won't affect](#) test results, so if your dog is already on enzymes, no need to stop them prior to testing
  - ◆ *Results:*
    - ◆ **Normal range for cTLI: 5.7 - 45.2 µg/L**
    - ◆ Values below 2.5 µg/L are diagnostic for EPI
    - ◆



Values between 3.5 and 5.7 µg/L are rarely if ever associated with signs of EPI

- ◆ May reflect subclinical pancreatic [problems](#)
- ◆ Could eventually [lead to EPI](#)
- ◆ For results in this range, TAMU recommends retesting after one month ([See guidance](#))
- ◆ cTLI stands for "Canine Trypsin-Like Immunoreactivity"
  - ◆ Measures the amount of [trypsinogen and trypsin](#) in the blood (normally released by the pancreas in healthy dogs)
  - ◆ If your dog wasn't fasted for a minimum of 12 hours, the cTLI score may be [higher](#) than it should be.

### ◆ Cobalamin/Folate Test

- ◆ *Purpose.* Tests for vitamin B12 (cobalamin) deficiency and SIBO
  - ◆ Dog must be fasted for a minimum of 12 hours before the blood is drawn
  - ◆ Be sure your vet draws enough blood or this will be a problem. ([See requirements.](#))
- ◆ *Results:*
  - ◆ **Normal range for Cobalamin (B12): 252 - 908 ng/L**
    - ◆ *Low values.*
      - ◆ Indicate [B12 deficiency](#)
      - ◆ Often associated with SIBO (bacteria bind to B12)
      - ◆ Could be temporary (e.g., caused by SIBO and/or on-going diarrhea)
      - ◆ May be permanent since the pancreas is involved in the processing of B12
    - ◆ *Normal values.* If your dog has been diagnosed with EPI but is within normal cobalamin (B12) ranges, you should retest periodically since B12 takes a fairly long time to deplete.
      - ◆ B12 is [critical](#) to the body, so you don't want to take chances with this.
      - ◆ It's not unusual for EPI dogs with normal B12 values to become deficient months, or even years later; so periodic testing is strongly advised.
    - ◆ *High values.* No known significance. (See [TAMU](#))
  - ◆ **Normal range for Folate (tests for SIBO): 7.7 - 24.4 µg/L**
    - ◆ *High values.* Suggest SIBO, because bad bacteria produce folate.
      - ◆ If the bad bacteria have migrated up from the colon to the "proximal" part of the small intestine (which is where the body absorbs folate), test results will be "high."
        - ◆ *Note:* The *proximal* small intestine is in closest *proximity* to the stomach.

*Normal values.* SIBO often exists even when test results are within [normal range](#), so pay close attention to your dog's [symptoms](#) ([TAMU](#), [WSU](#), [WSAVA](#), [AVMA](#), [CVJ](#))

- ◆ If the bad bacteria are in the "distal" part of the small intestine (which can't absorb folate), test results will be "normal" because the folate produced by the bad bacteria is simply excreted in feces.
  - ◆ *Note:* The *distal* small intestine is more *distant* from the stomach (it's closer to the colon).
- ◆ *Low values.* Not indicative of SIBO; however, may indicate other problems (e.g., disease affecting the [proximal small intestine](#) since that's where folate is [absorbed](#)).
- ◆ Reading results together can be particularly helpful
  - ◆ [Cobalamin and folate](#)
  - ◆ [Cobalamin, folate, and cTLI](#)

### ● Tests That Don't Diagnose

- ◆ Regular blood tests *do not* diagnose EPI, SIBO, or B12 deficiencies
  - ◆ Complete Blood Count (CBC) results are [often normal](#) in EPI dogs.
    - ◆ Some EPI dogs may have [elevated ALT](#) and/or [decreased cholesterol](#) levels, but this doesn't diagnose EPI.
    - ◆ Even blood protein levels (for example, albumin "ALB") are [surprisingly well maintained](#) in EPI dogs.
  - ◆ Regular blood tests can be useful in ruling out other medical conditions.
- ◆ Colonic or fecal cultures [can't diagnose SIBO](#) because they don't necessarily reflect what's happening in the small intestine.

[Back to Top](#)

---

## Management

[Exocrine Pancreatic Insufficiency \(EPI\)](#) :: [Cobalamin \(B12\) Deficiency](#) :: [Small Intestinal Bacterial Overgrowth \(SIBO\)](#)

### Managing Exocrine Pancreatic Insufficiency (EPI)

[Enzymes](#) :: [Diet](#)

Success in managing EPI is primarily judged by if your dog produces [normal stools](#). What is "normal" can vary from dog to dog, but for most dogs it means the

consistency is firm (not hard), the appearance is wrinkled (not smooth), and the [color](#) is some shade of brown. Regaining lost weight is also highly desirable. Eliminating or reducing other symptoms usually will happen if these two things occur. Many sources say that one in five dogs doesn't respond to the enzymes; however, our research suggests that's just not true. It seems that most EPI dogs respond well to the enzymes as long as EPI is properly managed, plus any [B12 deficiency](#) and [SIBO](#) (if a B12 deficiency and/or SIBO exist) are also properly managed. If there are other health problems, obviously the chance for complications increases. This website gives only a general overview on how to manage EPI. Since every dog is different, you can learn what has worked for others and get advice for particular stumbling blocks you encounter on [K9-EPIGLOBAL](#) or [EPI4DOGS](#).

### ◆ Enzymes

- ◆ Absolutely necessary to manage EPI
  - ◆ Necessary, because your dog's pancreas can no longer produce enzymes needed for [digestion](#)
  - ◆ Will enable your dog to [regain health](#)
  - ◆ Must be given for the rest of your dog's life whenever your dog is fed

### ◆ Enzyme types....

- ◆ *Porcine powder.* [Porcine \(pig\) pancreatic enzyme powder](#) is the main method used manage EPI.
  - ◆ Commercially available and easy to use
  - ◆ Many brands available (e.g., [Viokase-V](#), [Pancreatin 6X](#), [Bio Case V](#), etc.)
  - ◆ Most dogs do equally well on any brand
    - ◆ *Normal Strength Enzymes.* Amounts of the three [digestive enzymes](#) ([Lipase](#), [Protease](#), [Amylase](#)) are [approximately the same](#) in many brands
      - ◆ Lipase digests fat
      - ◆ Protease digests protein
      - ◆ Amylase digests starch
    - ◆ Some brands (e.g., [Viokase-V](#)), typically require a vet's prescription; however, not all brands require a prescription.
  - ◆ *Special Strength Enzymes.* Some enzymes are available in special strengths (e.g., Pancreatin 4X and 8X).
    - ◆ [Pancreatin 4X](#), often available in health food stores or drug stores, is relatively weak.
    - ◆ [Pancreatin 8X](#) is stronger than the standard Pancreatin 6X but can be more practical for dogs needing higher doses.
  - ◆ [Enzyme Diane](#) is a great source for high-quality enzyme powder at very affordable prices.
    - ◆ She sells samples of different strengths so you can determine what works best for you.
    - ◆

As the "mom" of an EPI dog herself, she understands the need for reasonably-priced enzymes and participates in several EPI discussion forums.

- ◆ We recommend wearing a surgical-type mask (available at hardware stores or medical supply stores) when working with powdered enzymes, particularly for those with asthma or other respiratory concerns.
- ◆ *Porcine pills.* Powdered enzymes are generally considered to be much more effective than pills.
  - ◆ A few dogs refuse to eat food mixed with dissolved powdered enzymes so must take pills instead
- ◆ *Fresh pancreas.* Fresh beef or pig pancreas can be excellent; however, availability may be difficult
- ◆ *Plant-based enzymes.* These are considered least effective for managing EPI.
  - ◆ Some plant-based enzymes, for example ProZyme, may be beneficial as a supplement to add later on (see "Food" discussion below).
  - ◆ If your dog is allergic to meat (particularly pork), plant-based enzymes may be necessary.
    - ◆ We do not endorse any particular brand, and every dog is different so what works well for one may not work for another. Owners of several EPI dogs that cannot tolerate porcine enzymes have reported some success with the plant-based enzyme product, Total-Zymes.
  - ◆ Plant-based enzymes are available without prescription from many pet-product dealers.
- ◆ **Enzyme Preparation....**
  - ◆ *Method.* Mix enzymes well with warm water and room-temperature food
    - ◆ Ensure enzymes are thoroughly dissolved so they...
      - ◆ Are activated by the warm water
      - ◆ Completely blend with the food particles
      - ◆ Don't cause ulceration and bleeding of the dog's mouth and throat
    - ◆ Add enough warm water so mixture has consistency of mush, oatmeal, or even thick soup
      - ◆ Exact amount of water isn't important
    - ◆ Remember, digestion takes place in the bowl, not in your dog
      - ◆ What the enzymes can't touch, won't be digested
        - ◆ Undigested food doesn't benefit your dog and may contribute to SIBO
  - ◆ *Quantity.* It's generally recommended to start with 1 tsp enzyme powder to one cup of food. (1 tsp refers to normal-strength enzymes; not 4X or 8X special-strengths.)
    - ◆

After 3-5 days, if your dog's stools are still soft, you'll need to adjust the amount up or down slightly until you find the right dosage.

- ◆ If you need to adjust the enzyme dosage, it's generally recommended to adjust the enzyme quantity by 1/8 tsp at a time, and then try that dosage for 3-5 days.
- ◆ Finding the right enzyme-to-food ratio for your dog is trial-and-error.
- ◆ Each dog is different, so there's no formula.
- ◆ Food with higher percentage of moisture than kibble (e.g., raw and canned) needs less enzymes per cup.
- ◆ If you grind kibble, the 1 tsp/1 cup ratio is based on whole kibble, so adjust accordingly.
  - ◆ Weighing 1 whole cup of kibble, and then using the same weight of ground kibble works well.
- ◆ Take careful notes so you'll know what works and what doesn't.
- ◆ Some sources say [large dogs](#) need more enzymes, but this seems variable.
- ◆ Once your dog is stabilized, it's often possible to slowly [reduce](#) the amount of enzymes.
- ◆ With time, you may need to adjust enzyme quantity again, for example...
  - ◆ If you change what you're feeding your dog
  - ◆ If your dog's cTLI number continues to decrease
- ◆ *Temperature.* Enzymes are activated by moisture and by warmth.
  - ◆ Mix enzymes with warm water and food, then let the mixture soak ("preincubate") at room temperature for an adequate amount of time.
    - ◆ Don't add enzymes to cold food.
    - ◆ Preincubating anywhere from 86 -130 degrees F (30--55 degrees C) should be fine.
      - ◆ Ideally the mixture will be similar to your dog's body temperature.
  - ◆ After the food/enzyme/water mixture has adequately preincubated, it's fine to store it in the fridge until mealtime.
    - ◆ Cold slows enzymes down significantly, but doesn't stop or destroy them.
    - ◆ To serve, you may want to consider warming the food first.
      - ◆ Many do this by soaking the bowl of food in another bowl of very warm water.
  - ◆ *Caution:* Excessive heat (e.g., boiling water or cooking/baking/microwaving) [destroys](#) enzymes that are still active.
- ◆ *Time.* Let the food/enzyme mixture soak a *minimum* of [30](#) minutes.
  - ◆

Soaking longer works better for many dogs. One-hour soaks work well for many.

- ◆ Soaking gives the enzymes time to "digest" the food, because your dog can't.
- ◆ Inadequately soaked enzymes can cause painful sores or [bleeding](#) in your dog's mouth and throat.
  - ◆ Inadequately soaked enzymes are still caustic
  - ◆ May cause your dog to avoid food due to pain
- ◆ **Enzyme Storage....**
  - ◆ Enzymes must be stored in a cool, dry location in a sealed container (such as Tupperware) or they won't work.
  - ◆ Moisture activates the enzymes so it's absolutely essential to keep them moisture-free.
    - ◆ Storing enzymes in an air-tight container is critical. (If air can seep in, so can moisture.)
    - ◆ If you store in the fridge or freezer, watch for condensation as that can destroy enzymes.
  - ◆ Excessive heat destroys the enzymes, so pick a cool location.

## ◆ Diet

### ◆ **Food basics....**

- ◆ *Start simple.* Just food and enzymes.
  - ◆ Pick a food with a single protein source
  - ◆ Don't mix raw, cooked, canned, and kibble. Pick just one.
  - ◆ Measure food exactly (by cup or by weight)
  - ◆ *No treats whatsoever.* It's hard to do, but truly necessary.
- ◆ **Guidelines.** Pick a [food](#) that's:
  - ◆ Less than 12% Fat
  - ◆ Less than 4% fiber.
    - ◆ Fiber [inhibits](#) the [activity](#) of pancreatic enzymes
  - ◆ Grain-free (e.g., no wheat, rice, oats, etc.).
    - ◆ [Few](#) EPI dogs tolerate grains well.
- ◆ *Kibble.* If you're feeding kibble, switch to one that meets the guidelines above (for example, [Natural Balance grain-free Limited Ingredient Diets](#)).
  - ◆ It's safest to start with a food that's within the guidelines since that works for almost all EPI dogs.
  - ◆ Later you may be able to change to a food that's outside the recommended guidelines.
- ◆ *Raw.* If you feed [raw](#), you'll need to alter the bone content to accommodate EPI needs.
  - ◆ *Advantages.* Some dogs are unable to fully stabilize until they [switch](#) to raw feeding.
    - ◆ Raw food has its [own enzymes](#) which can aid digestion.
    - ◆ Raw diets may require fewer added enzymes than kibble diets.

If you've never fed raw before, you may want to start with a pre-made raw (for example, [Nature's Variety](#)).

- ◆ A number of EPI dogs have reported excellent results with this, even when nothing else has worked well (but see "Bone Content" paragraph below regarding 50/50 adjustments to make).
- ◆ Some sources say a raw diet is preferable for many EPI dogs, but many EPI dogs are fed kibble and do just fine on it.
- ◆ **Bone Content.** Feeding raw to an EPI dog is different than standard raw diets.
  - ◆ EPI dogs can only tolerate about half the bone content as regular raw diets.
  - ◆ If you feed raw (including pre-made raw), mix it 50/50 with de-boned meat such as ground turkey.
- ◆ **Grinding.** Grind kibble or raw food in a food processor, blender, or grinder.
  - ◆ Grind before mixing food with enzymes and warm water
    - ◆ Ensures all parts of food are exposed to the enzymes
    - ◆ Can pre-soak kibble in water until it's soggy instead of grinding (so enzymes can reach all parts)
    - ◆ *Note:* If your kibble gets entirely soft and mushy (no hard parts) after incubating, there is no need to grind or pre-mush.
  - ◆ Food that doesn't come in direct contact with enzymes probably won't be digested and may contribute to SIBO.
  - ◆ Prepared, pre-ground raw (such as [Nature's Variety](#)) usually doesn't require additional grinding.
- ◆ **Frequency.** Feed [smaller meals more often](#), especially in the beginning.
  - ◆ Easier on your dog's digestive system
  - ◆ Start with 3-4 meals daily
  - ◆ Once your dog's target weight is reached, you can probably go to [two meals](#) daily.
- ◆ **Later on....**

Once your dog is stabilized on a food-to-enzyme ratio and is producing good stools regularly, you may experiment by slowly adding one supplement at a time, then waiting 4-7 days, to learn what your dog can tolerate and what helps your dog.

  - ◆ **The "3-S" Change System: Slow-Small-Single.**
    - ◆ Make changes very *slowly*.
    - ◆ Make changes in *small* increments.
    - ◆ Make just a *single* change at a time.
    - ◆ *because....*
      - ◆ Avoids upsetting your dog's already-sensitive GI system.
      - ◆ Reduces likelihood of gas, which could put your dog at increased risk of [bloat](#).

- ◆ Allows you to truly understand the effect of each change.
- ◆ Allows time for your dog to adjust to the change before you assess its impact.
- ◆ Allows you to immediately discontinue anything that creates obvious problems for your dog, without giving your dog a large dose of it.
- ◆ *Probiotic.* A [probiotic](#) supplement will help bring back and maintain the [friendly bacteria](#) in your dog's digestive system.
  - ◆ Start slowly using only a small fraction of the recommended dose initially, then increase gradually.
  - ◆ [Friendly gut bacteria](#) are essential for long-term success.
    - ◆ They [limit](#) harmful bacteria
    - ◆ They [enhance](#) immunity
    - ◆ Consider starting with [lactobacilli and/or bifidobacteria](#) (particularly [lactobacillus acidophilus](#))
  - ◆ Especially critical if you're dog has had antibiotics
    - ◆ Antibiotics [destroy](#) both good and bad bacteria
  - ◆ Yogurt may [not](#) be the best choice
    - ◆ It's a [weak](#) probiotic at best, and many dogs have difficulty digesting it.
    - ◆ The forms of bacteria generally used in yogurt [don't naturally occur](#) in the GI tract of dogs
  - ◆ Each dog is different, so we don't recommend any particular brand. Brands which owners have reported worked well for their EPI dogs include [Allerdophilus](#), [NOW Acidophilus & Bifidus](#), and [Primal Defense](#).
  - ◆ Some probiotics (such as [Allerdophilus](#)) may be taken with food; others (such as [Primal Defense](#)) are best taken on an empty stomach. A few (such as [Intestinal Care DF](#)) must be refrigerated. Check labels for details.
- ◆ *Prebiotic.* A [prebiotic](#) supplement promotes friendly bacteria and [helps them thrive](#)
  - ◆ Decreases bad bacteria
  - ◆ [Improves](#) mucosal and gastrointestinal health
  - ◆ Some examples of prebiotics are beet pulp, FOS (fructo-oligosaccharides), inulin, and arabinogalactans (AG)
- ◆ *Fish oils.* Consider adding to meals (easily digested; very [beneficial](#))
  - ◆ Start with a tiny amount and increase very slowly
  - ◆ Cod liver oil, particularly in winter (has [Vitamin D](#))
    - ◆ Dogs make Vitamin D in their [fur](#) when sunlight hits it, so they have less Vitamin D in winter.
  - ◆ Omega 3 Wild Salmon oil is fine the rest of the year
- ◆ *Coconut Oil.* Consider adding to meals a small amount of coconut oil, which is a [Medium-Chain Triglyceride \(MCT\)](#)
  - ◆ More [easily absorbed by the body](#) than [other fats](#)
  - ◆



- Can be [particularly useful](#) in pancreatic insufficiency situations
- ◆ May provide other [health benefits](#), including [antimicrobial](#) (contains both [lauric and caprylic acid](#))
  - ◆ Has been reported to help fight [yeast](#)
- ◆ Start with a extremely tiny amount and work up to 1 tsp daily (or less frequently)
  - ◆ May cause gas for some dogs
- ◆ Available from health food stores (get it in [glass jars](#))
- ◆ *Vitamins*. Some dogs may benefit by the addition of vitamins. Some vitamins which have been mentioned as particularly beneficial to EPI dogs are listed below. (Each dog is different, so these may not be advisable for all, and/or others may be desirable.)
  - ◆ [Vitamin B12](#). See discussion [below](#).
  - ◆ [Vitamin E](#)
  - ◆ Zinc. [EPI](#) has been [associated](#) with a [high risk](#) for [zinc deficiency](#).
    - ◆ One study of human EPI patients showed that only a small daily dose ([15 mg or less](#)) was needed.
    - ◆ Zinc [helps](#) fight infection and enhance immunity
    - ◆ [Diarrhea](#) and [malabsorption](#) can cause zinc deficiencies.
    - ◆ Zinc deficiency can result in [loss of appetite](#).
  - ◆ Vitamin K deficiency is [rare](#).
- ◆ *Plant-based enzymes*. Consider adding a plant-based enzyme supplement (e.g., [Prozyme](#), [Total-Zymes](#), etc.), since they may enhance health and put weight on your dog
- ◆ *Increasing Fat*. You may wish to experiment slowly with other foods, including one that has a slightly [higher fat](#) content
  - ◆ EPI dogs, once stabilized, can often manage a [higher amount of fat](#)
  - ◆ Can be [beneficial](#) for EPI dogs (but probably not those with SIBO)
- ◆ *Mixing raw*. You may wish to experiment with mixing a small amount of raw meat (not more than [20%](#)) with kibble
- ◆ *Treats*. If you want to try treats...
  - ◆ Some EPI dogs can manage a small amount of carefully selected treats. Unfortunately, many EPI dogs cannot.
  - ◆ Dogs on raw diets seem to have better luck working in occasional, small treats
  - ◆ Experiment very, very carefully with tiny low-fat meat treats, for example...
    - ◆ [Dehydrated liver bits](#)
    - ◆ Dehydrated "cookies" made from enzyme-treated/preincubated ground kibble
    - ◆ Meat that has been ground and preincubated with enzymes

- ◆ Many have had success in substituting non-food rewards
    - ◆ Playtime, toys, car rides, walks - - the ideas for rewards are endless....
- ◆ *Incubating supplements.*
  - ◆ Some supplements *should* be incubated, because they require digestion
    - ◆ *Example:* Kelp, fish oils, coconut oils
  - ◆ Some supplements *should not* be incubated, or they will be destroyed
    - ◆ *Example:* Probiotics (such as acidophilus)
  - ◆ For some supplements, it doesn't seem to matter
    - ◆ *Example:* L-Glutamine
  - ◆ Whether or not a supplement should be incubated can be confusing. A general rule of thumb is that if it's a food-like substance which likely contains carbohydrates, fats, or proteins, it should be incubated. Some supplements may contain fillers or extra ingredients that require incubation, so read labels closely. Good advice on this topic is available from the [K9-EPIGLOBAL Yahoo Group](#).
- ◆ *Bottom line: Each EPI dog is different.* What works well for one may not work at all for another.
  - ◆ Make changes slowly.
    - ◆ You can't judge by the first couple days, since there may be an adjustment period.
    - ◆ Don't make a new change until you know what results your last change is consistently producing.
    - ◆ Remember that food [transit time](#) through a dog varies, but normally takes at least a day, so when you're on "poop patrol," what you see probably reflects what your dog ate a day or two earlier.
  - ◆ Make changes one at a time.
  - ◆ Keep notes. That way you can refer back to the details of what worked and what didn't.

## Managing Cobalamin (B12) Deficiency

If your EPI dog has been diagnosed with a B12 deficiency, you'll [need to restore](#) the B12 in order for your dog to regain health. A recent study showed that not properly treating a B12 deficiency results in a poor prognosis for the dog.

- ◆ *B12 Protocol.* An initial [series of B12 subcutaneous injections](#) is necessary.
  - ◆ B12 is a water-soluble vitamin and any [excess is readily disposed](#) by the body, so B12 injections should be seriously considered for any dog testing below the normal range.
  - ◆ [Retest](#) a month after the last B12 injection to determine if the B12 problem has been resolved or if regular injections should continue.
  - ◆

This is often referred to as the "TAMU (Texas A&M University) B12 Protocol."

- ◆ **Home Injections.** B12 subcutaneous shots can usually be given at home by the dog's owner after being taught how, even by owners with no medical training.
  - ◆ B12 injection materials can be purchased relatively inexpensively.
  - ◆ Please consult with your veterinarian for guidance.
- ◆ **What to avoid.** Please note that TAMU does not recommend the use of injectable multi-vitamin or B-complex formulations because they:
  - ◆ Have much lower amounts of B12
  - ◆ Often cause pain at the injection site
- ◆ **Oral Supplements.**
  - ◆ Oral B12 supplements are ineffective for correcting a B12 deficiency.
  - ◆ **Exception:** "Intrinsic factor" supplementation
    - ◆ We know of only two B12 supplements that also include intrinsic factor, and they have worked well for a number of EPI dogs with B12 deficiencies when given daily.
    - ◆ The products are Metagenics Intrinsic B12/Folate™ and Wonder Laboratories TRINFAC-B™. They are commercially available from several internet vitamin companies, as well as from health care practitioners. *Updated*
    - ◆ Dogs using these supplements should be tested periodically to ensure their B12 levels are adequate.
    - ◆ For more information, please visit K9-EPIGLOBAL Yahoo Group.
  - ◆ **Important Cautions:** If your dog has a B12 deficiency, it's essential to consult with your veterinarian.
    - ◆ Do not switch from subcutaneous injections to supplements without closely working with your vet.
    - ◆ Virtually all dogs with B12 deficiencies must get the "B12 Protocol" series of subcutaneous injections, even if you decide to try intrinsic factor supplementation later.
    - ◆ **Serious B12 deficiencies can be fatal if not properly managed.**

## Managing Small Intestinal Bacterial Overgrowth (SIBO)

If your dog has been diagnosed with SIBO (or if you and your vet determine your dog probably has SIBO based on observation of symptoms), you'll need to beat this nasty, insidious disease for your dog to recover.

**Eliminating SIBO:** Reestablishing a healthy environment in the gut is the ideal long-range solution.

- ◆ **Remove** SIBO bacteria using tylosin, metronidazole, or other prescribed antibiotic, as recommended by your vet.
  - ◆ 6-week treatment with Tylan (tylosin) and/or Flagyl (metronidazole) antibiotics is usually recommended.
  - ◆

- ◆ Shorter treatments may be not be enough for stronger bacteria.
- ◆ Recommended dosages for both tylosin and metronidazole are normally [weight-based](#). (pgs 205-206 of link)
- ◆ If SIBO is present, your dog should show some [response](#) to the antibiotics within a week.
- ◆ If your dog has a bacteria that doesn't respond to tylosin or metronidazole, another antibiotic (perhaps amoxicillin or oxytetracycline) may be needed.
- ◆ Owners often report best success when probiotics are used along with antibiotics.
  - ◆ Give 4 hours apart from the antibiotic so they won't be destroyed
  - ◆ Increase probiotics when antibiotics are decreased or discontinued
- ◆ [Tylosin](#). Has both [antibiotic and anti-inflammatory](#) properties and is often [recommended](#).
  - ◆ Described as the "[antibiotic agent of choice](#)" for [treating SIBO](#).
    - ◆ Tylan powder dosage should be based on the [dog's weight](#), as prescribed by your veterinarian (pg 205 of link)
      - ◆ For example...
        - ◆ An owner of a 30-lb dog reported success using 1/8 tsp twice daily for at least 6 weeks
        - ◆ An owner of a 60-lb dog reported success using 1/4 tsp twice daily for at least 6 weeks
        - ◆ An owner of a 90-lb dog reported success using 3/8 tsp twice daily for at least 6 weeks
        - ◆ An owner of a 120-lb dog reported success using 1/2 tsp twice daily for at least 6 weeks
      - ◆ *It's very important to check with your veterinarian on all medicine doses and before giving any medication, as your dog's circumstances may vary from others.*
      - ◆ *We highly recommend your vet be made aware of the dosage recommendations in Dr. Steiner's book, [Small Animal Gastroenterology](#), since he and TAMU are world-renowned experts in this area.* (pg 205 of link)
    - ◆ Recent studies suggest tylosin is only [bactericidal](#) at appropriate weight-based doses (pg 205 of link)
    - ◆ Extremely bitter, so many owners put the powder in [gel or veggie caps](#) (available from health food stores)
    - ◆ Some dogs may need to continue with daily tylosin if symptoms won't resolve after the initial treatment.
  - ◆ Owners often report best success with [increasing probiotics and adding prebiotics](#).
  - ◆ SIBO may recur from time-to-time, in which case many owners turn again to Tylan.
    - ◆ May return if your dog eats something it shouldn't.
  - ◆ A very few dogs must remain on small doses of tylosin permanently.

- ◆ Doses are normally reduced slowly so long-term maintenance is at the lowest dose possible.
- ◆ Giving probiotics regularly should decrease the amount of tylosin needed.
- ◆ Tylan is available on the [web](#) or may be purchased through your vet.
- ◆ **[Metronidazole](#)**. Has both [antibiotic and anti-inflammatory](#) properties.
  - ◆ Has been reported to occasionally have [side-effects](#), including [neurological](#).
    - ◆ Side effects aren't generally associated with short courses of treatment.
    - ◆ Signs may begin [7-12 days](#) following the start of treatment, but could start at any time.
  - ◆ Must be obtained by prescription from your vet.
  - ◆ Consult with your veterinarian for guidance.
- ◆ **Repair** any [damage](#) to the gut and its [mucosa](#) that SIBO has caused.
  - ◆ Can lead to allergies (especially protein allergies) and other, more serious problems
  - ◆ Associated with "Leaky Gut Syndrome"
  - ◆ [L-Glutamine](#) can be very beneficial
    - ◆ Preserves intestinal [barrier](#) function
    - ◆ Increases "[brush border](#)" enzyme activity
    - ◆ Promotes protein synthesis
    - ◆ Aids recovery from intestinal injury
    - ◆ Helps the body resist bad bacteria, stimulates the immune system, and generally helps GI functions
  - ◆ Consider including a prebiotic such as a [FOS](#) (fructo-oligosaccharides), which stimulates Short Chain Fatty Acids (SCFAs) that help heal the [intestine's](#) mucosa.
    - ◆ This has proved to be a key factor in helping some EPI dogs overcome SIBO and keep it from returning.
  - ◆ Other supplements which may be beneficial:
    - ◆ [N-Acetyl-Glucosamine \(NAG\)](#).
      - ◆ Mix with food prior to [incubation](#) before feeding to an EPI dog.
      - ◆ *Note:* Contains shellfish so should be avoided by dogs with such allergies.
    - ◆ [Deglycyrrhizinated Licorice \(DGL\)](#).
      - ◆ Powder from the capsule should be mixed with food prior to [incubation](#) before feeding to an EPI dog.
      - ◆ *Note:* In DGL, licorice extract has been specially deglycyrrhizinated to avoid side effects.
  - ◆ See [K9-EPIGLOBAL Yahoo Group](#) for details on repair techniques that have helped others.
- ◆ **Replace** inadequate digestive enzymes with the right amount of digestive enzymes.
  - ◆ Prevents undigested food ("substrate") in the gut which feeds the bad bacteria

- ◆ See discussion on [enzymes](#) above.
- ◆ **Reinoculate** the gut with [friendly bacteria](#) from probiotics (e.g., acidophilus).
  - ◆ Consider starting with one that includes [lactobacilli and/or bifidobacteria](#).
    - ◆ [Lactobacillus](#) is particularly beneficial to the small intestine.
    - ◆ Start at a low dose and increase slowly so you won't upset your dog's gut.
    - ◆ Can help counteract negative effects of [stress](#) on the gut.
    - ◆ Consider a dairy-free version
      - ◆ SIBO can harm the intestinal lining which produces the [lactase](#) needed to digest dairy products, so a dairy-free probiotic may be a wise choice.
      - ◆ Yogurt is not a good choice (see reasons [above](#))
  - ◆ Start giving probiotics while giving antibiotics, so you can build up the friendly bacteria.
    - ◆ Give probiotics at least two hours (preferably four hours) away from antibiotics or they'll be destroyed.
    - ◆ [Discolored "poop"](#) (especially yellow, orange, or green) is often a sign that friendly bacteria are lacking.
  - ◆ Continue probiotics indefinitely to help prevent recurrence of SIBO.
  - ◆ Consider including a prebiotic (such as [FOS](#)) since these [stimulate](#) the growth of friendly bacteria.
- ◆ **Provide** Nutritional Support. Considered [essential](#) to long-term management of SIBO.
  - ◆ Feed a [highly digestible](#) diet while fighting SIBO
    - ◆ Reduces undigested food left in the small intestine so bad bacteria can't feed on it
      - ◆ Undigested food causes [gas, tummy rumblings](#), and/or diarrhea
        - ◆ Often due to [malabsorbed carbohydrates or proteins](#)
        - ◆ Reducing carbohydrates (especially fiber) and trying a different protein source may be helpful
    - ◆ "Hypoallergenic" diets are often recommended
  - ◆ Feed a grain-free diet low in starch and sugars
    - ◆ SIBO bacteria thrive on these
    - ◆ Grains convert to sugars in the digestive tract
  - ◆ Feed a [low-fat](#) diet while fighting SIBO
    - ◆ Increased fat metabolism can result in inflammation of the GI tract and promote diarrhea
  - ◆ Avoid dairy products
    - ◆ Most dogs don't do well on dairy products
    - ◆ SIBO can damage the gut's "brush border membrane" which produces [lactase](#) (necessary to digest dairy)
    - ◆ If dairy can't be digested, the bad [bacteria](#) feed on it
  - ◆ Include a small amount of [fish oils](#) (e.g., wild salmon oil and/or cod liver oil)
    - ◆ Contributes to membrane health and has an anti-inflammatory effect
  - ◆ SIBO may result in...

- ◆ Deficiencies in certain [fat-soluble](#) vitamins (A, D, E)
  - ◆ Vitamin K deficiency is [rare](#) in SIBO
- ◆ B-12 deficiencies (since bad bacteria use it)
- ◆ Greater [intolerances to carbohydrates](#) (if gut's "brush border enzyme activity" is reduced by SIBO)
  - ◆ Undigested carbohydrates become food for bad bacteria.
- ◆ Dietary [elimination trials](#) may be needed if [allergies](#) are contributing to gut problems.
  - ◆ Common dog-food proteins such as chicken can be culprits.
- ◆ Various supplements such as L-Glutamine may be very helpful (see [K9-EPIGLOBAL Yahoo Group](#) for details).

[Back to Top](#)

---

## Breeds At Greatest Risk

It's estimated that over 50% (and possibly as many as 75%) of EPI cases occur in the following breeds:

- ◆ German Shepherds
- ◆ Shiloh Shepherds
- ◆ German Shepherd mixes

Some sources have reported higher-than-expected rates in the following breeds also:

- ◆ Rough-Coated Collies
- ◆ Terrier breeds
- ◆ Cavalier King Charles Spaniels
- ◆ Chow Chows
- ◆ English Setters

***The rest of the cases occur in all the other breeds. No breed is immune. In fact, EPI is now being reported in breeds where it has never been seen previously as well as in non-Shepherd mixed breeds.***

[Back to Top](#)