

## **The Use of Direct-Fed Microbials in Dogs**

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**An energetic and beautiful dog is the pride of every dog owner.** Feeding selected cultures of lactic acid-producing bacteria and yeast boosts the health and performance of dogs, according to many owners. Understanding the benefits of direct-fed microbial cultures, also known as probiotics, can help you decide when to use these products with your dog.

In 1908, the Russian biologist Eli Metchnikoff credited the long lives of certain Bulgarian and Russian citizens to the consumption of large amounts of fermented milk products (4). The key organism in these foods was later identified as *Lactobacillus acidophilus*, a lactic acid-producing bacteria (10). The lactic acid-producing bacteria are so named for their ability to produce lactate. However, lactate production is only one of many benefits derived from this collection of bacteria. The lactic acid-producing bacteria most frequently featured in direct-fed microbial products include *Lactobacillus acidophilus*;, *Streptococcus (Enterococcus) faecium* and *Lactobacillus lactis*.

For many centuries, people have observed that their animals were healthier when fed feedstuffs resulting from yeast fermentation. Yeast are fungi, or one-cell organisms that reproduce by budding, or producing daughter cells. The yeast species most utilized by the direct-fed microbial industry are *Saccharomyces cerevisiae* and *Aspergillus oryzae*.

Based on the work of Metchnikoff and others, scientists developed the idea of directly feeding live, lactic acid-producing bacteria and yeast to animals for improving their health and performance. The observed benefits may result from: 1) competition for attachment sites in the digestive tract, 2) competition for essential nutrients, 3) production of antimicrobial substances, 4) increasing the growth of beneficial bacteria and 5) stimulating the immune system (5).

### **Competition For Attachment Sites In The Digestive Tract**

Some disease-causing bacteria reduce an animal's ability to absorb nutrients by disrupting the lining of the small intestine (5). Studies indicate that the lactic acid-producing bacteria attach to the small intestine and produce a substance to prevent disease-causing organisms from binding to the intestinal wall (7). In addition, the attachment of the beneficial bacteria may increase the absorptive surface area of the small intestine and enhance enzyme activity for greater nutrient absorption by the animal (8, 11).

### **Competition for Essential Nutrients**

Bacteria, both health-promoting and disease-causing, require certain nutrients for growth. Lactic acid-producing bacteria could utilize vitamins, amino acids or other nutrients that might otherwise support the growth of harmful bacteria (5).

### **Production of Antimicrobial Substances**

Considerable research has focused on the ability of direct-fed microbial cultures to produce substances that inhibit disease-causing organisms. Lactic, acetic and formic acid lower the intestinal pH to create an environment unsuitable for harmful organisms(8). Lactic acid-producing bacteria also secrete hydrogen peroxide, resulting in conditions unfavorable for oxygen-requiring microorganisms (2).

Bacteriocins are microbial-produced substances that inhibit the growth of bacteria which are often genetically related (8). Research has documented the ability of lactic acid-producing bacteria to inhibit *E. coli*, *Salmonella typhirium*, *Staphylococcus aureus* and *Clostridium perfringens*(5). The reduction of diarrhea-causing organisms is especially important in newborn and young animals.

### **Increasing The Growth Of Beneficial Bacteria**

Enhancing the growth of beneficial bacteria boosts the performance of healthy animals. The B vitamins, enzymes and other factors secreted by lactic acid-producing bacteria and yeast stimulate other health-promoting bacteria (3, 5, 12). Enhancing fiber digestion could reduce the stools produced by dogs. The ability of yeast to increase food intake has been recognized for centuries.

### **Stimulating The Immune System**

Recent advances in animal health indicate the importance of proper immune function. Research indicates that lactic acid-producing bacteria heighten immune function at the digestive tract and whole-system levels (6). Experiments with bacteria-free extracts from lactic acid-producing cultures demonstrate improved macrophage activity against *E. coli* (9) and *Salmonella typhirium* (1). The role of direct-fed microbial cultures in stimulating the immune system warrants further research.

### **The Use Of Direct-fed Microbial Products With Puppies**

Puppies are born with bacteria-free digestive tracts, which are quickly populated by disease-causing and health-promoting bacteria. The question becomes, "Which type of bacteria will dominate?" Providing direct-fed microbial cultures shortly after birth can favor the beneficial bacteria. The lactic acid-producing bacteria could inhibit diarrhea-causing microorganisms, and can aid the puppy in the absorption of nutrients. Microbial gels and pastes are available for oral delivery to puppies, or as dry cultures to be mixed with dry or moist foods.

### **The Use Of Direct-fed Microbial Products With Growing And Mature Dogs**

Diet changes and other challenges at weaning can alter a puppy's nutrient intake and health status. Controlling harmful bacteria in the digestive tract during variable food intake is very important. The microbial gel and paste products can be placed directly in the puppy's mouth, and the owner can confidently know that an animal with low or no food consumption received the intended microbial dose. Dry products can be mixed with the dry or moist food for daily maintenance .

Yeast and yeast cultures aid in stabilizing the microbial balance in the digestive tract, which may reduce the problems resulting from bloat. In addition, yeast stimulates fiber-digesting bacteria to reduce the volume of stool produced by a dog. Yeast infections caused by *Candida* species can affect a dog's health. However, direct-fed microbial products feature only the *Saccharomyces* or *Aspergillus* species, and not the harmful *Candida*.

Breeding, whelping, showing and heavy training can alter food intake and increase a dog's susceptibility to disease-causing organisms. Restoring nutrient intake, stabilizing the balance of digestive tract bacteria and proper immune function become critical during these challenging periods. Many dog owners and trainers indicate that direct-fed microbial cultures can play a major role during these critical periods. In addition, improving the nutritional status of the dog enhances the hair coat and energy level. The oral and dry direct-fed microbial products used for puppies work equally well with mature dogs, although the amount of lactic acid-producing bacteria and yeast should be increased.

### **Direct-fed Microbial Products And Storage**

Direct-fed microbial products are available that feature only lactic acid-bacteria or yeast, and others include bacteria and yeast combinations. Microbial gels and pastes are placed between the lower teeth and cheek of the puppy or dog. Certain dry powders are dispersible in milk replacers. Other dry products are readily mixed in the dry or moist food. However, always be sure to purchase reputable products handled properly by the manufacturer and seller. The direct-fed microbial products should be stored in cool, dry locations to maintain their microbial viability. The microbial products should not be frozen or exposed to high environmental temperatures.

Foodstuffs resulting from microbial fermentation have benefited animals and their owners for many centuries. Continuing research projects and practical experience document the benefits of providing direct-fed microbial products to dogs in many situations. Direct-fed microbial products can help you achieve an energetic and beautiful dog!

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