

## **FOOD SAFETY FOR THE CANINE ATHLETE AND THEIR OWNERS**

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Health risks to canine athletes can be divided into three areas 1) environmental, 2) infectious, and 3) dietary. Considerable effort has been placed on reducing traumatic injuries as well as limiting the occurrence of infectious diseases in racing greyhounds. Until recently, however, the potential medical consequences of foodborne diseases have been largely ignored. Of particular concern is the fact that many foodborne diseases of dogs also have the potential of causing significant disease in humans.

The requirement for high quality, calorically dense, low cost food for the canine athlete has resulted in the feeding of diets other than those which are normally available commercially. These diets often contain raw or poorly cooked meat, and as a consequence present special health-related risks to the animal as well as their owners. Some trainers believe that the dogs perform better on raw meat than cooked meat. In many cases, raw meat can make up as much as 50 to 75% of the diet of racing greyhounds. In the United States, a large percentage of this meat is 4D-meat (diseased, debilitated, dying, and dead animal) and is mixed, ground, and frozen in various sized blocks ranging from 5 to 40 pounds.

Meat suppliers clearly have an interest in selecting carcasses that will provide the freshest and most wholesome meat, but often find this difficult because of limited supply or inability to detect disease causing bacteria. Rather than purchase meat pooled from various animals of unknown health status, some owners purchase or kill a single animal which is used as a source of meat. The act of using meat from a single health animal may be the basis for food-related disease being infrequent in countries other than the United States and in sled dogs.

Foodborne diseases in dogs appear to be rare with the exception of greyhounds in the United States. Clinical enteritis ("kennel sickness", "blowouts") characterized by diarrhea is relatively common in racing greyhounds. The clinical signs are mild to severe diarrhea which typically resolves in a few days. While some of this is simply related to changes in diet (digestibility, fat content, etc.), a significant portion is likely related to foodborne infections introduced by the new diet. The occurrence of "blow-outs" in racing greyhounds appears to be significantly higher in the United States than other countries. In addition, "Alabama Rot" which is caused by the ingestion of shiga-like toxin producing bacteria in contaminated meat has only been reported in the United States.

The occurrence of disease related to contaminated meat is closely related to how the meat is handled on the farm or track prior to feeding. Preventative measure should include the proper cooking and storage of meat whenever possible. All raw 4D-meat

should be handled in a fashion that limits human exposure. This includes wearing gloves when handling raw meat and thoroughly cleaning all surfaces that come in contact with raw meat. It is particularly important that children, persons taking antibiotics, or persons immunosuppressed for any reason to avoid contact with raw 4D meat.

The increased occurrence of blow-outs and Alabama Rot during warm weather and in southern climates suggests factors other than just contaminated meat are important in the occurrence of disease. Principle among these is the temperature of the meat once it has thawed. When large blocks of frozen meat are thawed at room temperature, the outermost surface of the meat can reach unacceptably high temperatures before the center has thawed. One of the principle tenets of good safety is to thaw meat slowly at refrigerator temperatures. Thawing meat in a camp cooler will significantly reduce the growth of bacteria on the surface. In the case of *Salmonella*, growth occurs at 42°F with fastest growth occurring at 97°F. Little growth occurs when the temperature is below 42°F or above 115°F. The organism is killed at temperatures greater than 152°F.

Given the amount of raw meat fed to grayhounds, it would be reasonable to suspect that if contamination was widespread the occurrence of disease would be much higher than it is. Nevertheless, clinically evident food-contamination related diseases clearly do occur in greyhounds and present a significant risk to the health of the dogs as well as the financial future of the trainer and owner. In addition, the consequence of subclinical infections may have on performance are not known but should not be ignored.

Clinical signs of foodborne diseases are, for the most part, associated with enteritis and can range from loose feces to watery and occasionally bloody diarrhea. Foodborne diseases are related to bacterial contamination, yet the clinical signs often mimic viral enteritis. Diagnostic efforts to determine the cause of blowouts are not routine as most cases spontaneously resolve in a few days. Many foodborne pathogens do not cause clinical disease for several days following ingestion. For example, the incubation period for campylobacter enteritis is 2 to 5 days and for *E. coli* food poisoning can be as long as 10 days. In those cases which have been examined, it is not uncommon to isolate the same strain of *Salmonella* from feces as well as the meat.

While lateral infections occur with all the pathogens that cause food poisoning, most are the result of ingestion of contaminated food. On the other hand, in comparison to the large outbreaks of foodborne infections, the clinical signs are often ignored because only a few individuals are involved. Thus, the lateral transmission rate may be greatly underestimated.

Many of the foodborne pathogens have the ability to persist in the environment for extended periods. In some case the occurrence of food-poisoning is often associated with inadequate hygiene and failure to isolate dogs with diarrhea and who

are shedding organisms in large numbers. All facilities and equipment should be frequently cleaned with soap and then disinfected with diluted household bleach (4 oz/gal of water) or commercially available phenolic compounds.

The interest in reducing the risk of human foodborne diseases has accelerated the development of a number of rapid, highly sensitive procedures to detect contamination by disease causing organisms. It is hoped that these techniques will soon be available to help assure the quality of meat being fed to racing greyhounds and other performance dogs.

While a number of foodborne bacteria have the potential of causing disease, several warrant special consideration. On rare occasions foodborne diseases in dogs are caused by *Yersinia enterocolitica* and *Staphylococcus aureus*. In addition, *Clostridium perfringens* is of special concern in greyhound puppies, but it is uncertain if it is related to food or environmental contamination.

### SALMONELLOSIS

*Salmonella* infection rates in racing greyhounds are high, yet clinical signs are relatively uncommon. All evidence suggests that at least 50% of the 4D-meat sold is contaminated with *Salmonella*; *Salmonella typhimurium* being the most common. Interestingly, *S. typhimurium* is also the most common serovar isolated from outbreaks in humans and animals. It is estimated that as many as 5% of people in the United States are chronic carriers of *Salmonella*.

Large numbers of *Salmonella* must be ingested to induce disease while smaller number have the potential of inducing the carrier state. In most cases, infection is related to contaminated food that has been handled incorrectly (e.g. improper refrigeration) so that a few organisms are allowed to multiply to high numbers. Environmental contamination with *Salmonella* can be a significant problem as the organism can withstand a wide range of pH and temperatures and can survive both drying and freezing.

While most cases of salmonellosis in dogs is related to enteritis, occasional systemic infections occur which have high morbidity rates. This is particularly true in puppies and young dogs. Fortunately, and perhaps for good reason, the meat that is fed greyhounds under the age of 6 months is often cooked.

Antibiotic therapy can reduce the clinical signs but fails to prevent the development of carriers or shorten the duration of shedding. Prophylactic treatment with antibiotics to prevent salmonellosis is not effective. In fact, individuals being treated with antibiotics for unrelated infections are often at greater risk of developing severe salmonellosis. Antibiotics appear to reduce the normal "protective" microflora, but have little effect on most strains of *Salmonella* as many are resistant to commonly used antibiotics. *Salmonella* isolates obtained from 4D meat have shown high rates of resistance to ampicillin, ceftiofur, clindamycin, erythromycin, neomycin, oxacillin, penicillin, tetracycline, and sulfadimethoxine.

## **CAMPYLOBACTERIOSIS**

In contrast to many other foodborne diseases, *C. jejuni* has the potential of causing illness after ingestion of only a few organisms. Human cases of campylobacteriosis occur more frequently than salmonellosis; an estimated 4 million cases annually in the United States. A significant portion of these are believed to be due to lateral transmission from household dogs. It can be isolated from almost 30% of dogs with diarrhea; yet most infected dogs are asymptomatic.

Clinical signs occur most commonly in young dogs and is related to enteritis which can range from poorly formed feces to mucohemorrhagic diarrhea. In most cases, clinical signs spontaneously resolve in less than two weeks. Diagnosis is often possible by phase-contrast or darkfield microscopy. Several antibiotics are effective against campylobacter. On the other hand, many campylobacter isolates produce Beta-lactamase, and thus are resistant to penicillin and related antibiotics. Prevention is related to good hygiene as the organism is relatively fragile in comparison to salmonella and will not survive drying, low pH, or heat.

## **COLIBACILLOSIS**

As in humans, the most significant disease associated with *E. coli* food contamination in dogs is when the organism produces cytopathic toxins (shiga like-toxins). These toxins are absorbed through the intestine and damage vascular endothelial cells causing infarction, edema, thrombocytopenia, and anemia. The most common strain is *E. coli* O157:H7.

Surveys of raw meat approved for human consumption show that *E. coli* O157:H7 is present in 1.5 to 3.5% of ground beef, pork, poultry, and lamb. Other studies provide data that over 10% of the beef and nearly 4% of the pork approved from human consumption at the retail level is contaminated. Given that most of the meat provided to greyhound has been condemned, the contamination rate in 4D-meat is certainly much higher. It is not uncommon for trainers to comment on the poor quality of the meat which was fed several days prior to an outbreak of diarrhea or Alabama Rot. Unfortunately because of this delay, retrospective microbiological examination of the meat is often impossible.

In humans, most cases of *E. coli* O157:H7 infections are characterized by diarrhea with abdominal cramps. Less frequently, there is bloody diarrhea and nausea. Infections in children can lead to hemolytic uremic syndrome which can be fatal because of renal failure, pancreatic necrosis, and neurologic complications. Case fatality rates can be as high as 31%.

In greyhounds, shiga-toxin producing *E. coli* cause Alabama Rot. The disease is characterized by focal dermal necrosis, dependent edema, and occasionally renal failure. Like hemolytic uremic syndrome in humans, clinical Alabama Rot only occurs in a fraction of those dogs that are exposed. Clinical disease is dependent on a number of factors including genetic susceptibility, previous disease, and the amount

of the organism ingested. Antibiotic therapy is of little value in either of these diseases because the disease is caused by the toxin and the bacteria do not invade.

### **SHIGELLOSIS**

*Shigella* is an infrequent cause of food-poisoning in dogs, but its occurrence has likely been underestimated. In contrast to other food-related bacterial diseases, lateral transmission is frequent because only a few organisms are needed to cause disease. Typically, the disease is similar but more severe than salmonellosis. Children and young animals are more susceptible.

### **LISTERIOSIS**

*Listeria* has the unique ability to grow at low temperature, and thus can contaminate food which has been refrigerated at temperatures that inhibit the growth of other bacteria. Infections in dogs are rare, but in all cases are associated with the ingestion of contaminated meat or milk products. In contrast to most other foodborne diseases, listeriosis is a septicemic disease which is characterized clinically by diarrhea, vomiting, fever, and embolic microabscessation in a multiple organ system. The organism is sensitive to most antibiotics including penicillin. Isolation of the organism from suspected cases requires incubation at 4°C (cold-enrichment).

### **TUBERCULOSIS**

The resurgence of tuberculosis in recent years is reason for concern when condemned rare meat is being fed to dogs. Ingestion of contaminated meat or milk is the most common means by which dogs become infected with *Mycobacterium bovis*. In most cases, the dogs become subclinical carriers and help maintain the organism in the environment. Fortunately, infected dogs appear to only rarely transmit the infection to humans. Dogs which develop clinical disease often suffer from respiratory disease, anorexia, weight loss, and fever.

### **Selected References**

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