

Epidemiology

Typically, the viral infection peaks after weaning. Recently weaned puppies are at an increased risk due to the higher mitotic index of their enterocytes. The higher mitotic rate is not only secondary to continued growth and development but also the change in diet and intestinal bacterial flora. A seasonal distribution has been reported in some geographic areas. This could reflect the times when dogs are more prone to be outdoors and come into contact with the virus in the environment. Another study found that in dogs over 6 months of age, intact male dogs were twice as likely as female dogs to develop parvoviral enteritis. A surveillance study from Australia found a correlation between clusters of disease outbreak and regions of relative socioeconomic disadvantage.

If the dam has antibodies to canine parvovirus, either from surviving a natural infection or from vaccination, then these will be passed to the puppies through colostrum. The puppies will be protected for the first several weeks of life. The maternally derived antibodies will strongly protect young animals from infection by sequestering the virus prior to the onset of viremia. The antibody titer transferred to the neonate by absorbed colostrum antibodies is about 50-60% of the mother's titer – i.e. each puppy's maternal antibody titer is determined by the serum titer of the mother at whelping, the amount of colostrum ingested and the overall litter size. (Figure 4)



Figure 4: A large litter of puppies receiving colostrum full of maternal antibodies.

Maternal antibodies to parvovirus have a half-life of approximately 10 days. They can protect puppies up to 20 weeks of age. They can also interfere with effective vaccination. Only 90% of puppies vaccinated at 12 weeks of age will develop protective immunity. Dr. Pollock and Dr. Carmichael showed that dogs with haemagglutination inhibiting antibody titers of >1:80 were protected however dogs with a titer >1:20 often failed to respond to vaccination. This there is a “Window of Susceptibility” that occurs when the virus can infect puppies that are partially vaccinated. The vaccine has been unable to produce a sufficient natural antibody response in the puppy due to a high maternal antibody concentration. As this maternal antibody concentration declines prior to the next vaccine administration the puppy can be at risk.

The duration of this “Window” can be decreased by using less attenuated, higher virus titer vaccines. The “Window” effect is more important in a kennel environment where there is potential for over-crowding, disease outbreak and higher viral contamination in the environment. Other risk factors for young puppies include ingesting an insufficient amount of colostrum or ingestion of colostrum that does not contain a sufficient amount of maternally derived antibodies. Non-vaccinated puppies are at risk, especially as their maternally derived antibodies decline with age.

The disease may be more rapid or severe with concurrent infection with other enteric viruses such as Canine Corona virus. Intestinal parasites can also play a role in the severity of the disease, adding insult to the intestinal mucosa.