ELECTRON MICROSCOPIC IDENTIFICATION OF VIRUSES ASSOCIATED WITH POULT ENTERITIS IN TURKEYS GROWN IN CALIFORNIA 1993–2003

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Study Results

Poulter enteritis (PE) is one of the most common diseases seen in young turkey flocks. Since 1993, more than 1800 cases of suspected PE have been submitted for examination by negative stain electron microscopy; this has involved more than 2400 individual results, since in many cases more than one virus was identified; at least 1500 individual results were positive for viruses. Viruses have been identified in poult, as young as 3 days and up to 9 weeks of age. The most commonly found viruses are rotavirus-like viruses (RVLVs), and small round viruses (SRVs) ranging in size from 15–30 nm, either alone or in combination. Reovirus, birnavirus, and adenovirus have also been detected. There has been no evidence to suggest the presence of coronaviruses.

Significance of Study Results

Electron microscopy has aided considerably the detection of viruses associated with PE and has established that a variety of viral species can be present in different combinations in the gastrointestinal tract of young commercial poult. More recently, molecular methods have furthered our knowledge of viruses associated with PE. This report documents cases of poulter enteritis submitted to the California Animal Health and Food Safety Laboratory System (CAHFS) between 1993 and 2003. A survey of this type for PE has not previously been undertaken.

Additional Information

PE is a disease syndrome of young turkeys up to 7–10 weeks of age, although the majority of enteric infections occur in the first 3–4 weeks of life. Clinical signs include diarrhea, stunting, listlessness, litter eating, and increased mortality. Gross lesions associated with PE include small intestines that have pale serosa, are segmentally dilated and have watery contents, ceca that are distended and have frothy contents, and gizzards containing litter. Etiological agents associated with PE include viruses, bacteria, and parasites. Other causes implicated in this syndrome include nutrition, and management.

Viruses associated with poulter enteritis include rotavirus-like viruses, astroviruses, enterovirus-like viruses, toroviruses, and coronaviruses. Coronaviruses have also been associated with poulter enteritis – mortality syndrome (PEMS), which was first reported in 1991 in the Carolinas. Subsequent studies have shown that coronaviruses are not always associated with PEMS cases. Poult experimentally infected with coronavirus isolates only experienced mild disease.

In California, PE is second only to colibacillosis as the most commonly diagnosed syndrome of turkeys. The main viruses associated with PE are RVLVs and small round viruses between 25–30 nm in diameter (Figure 1). RVLVs include all viruses that have a “rota-like” appearance and thus include atypical rotaviruses, pararotaviruses, and antigenically distinct rotaviruses; since these viruses are morphologically indistinguishable by EM, no attempts were made to differentiate them. Small round viruses include the avian enterovirus-like viruses (ELVs) so named because of their location in the intestine and because they cannot be specifically characterized. Picornavirus virions are non-enveloped and lack surface structure and range between 22 and 30 nm in diameter. Astroviruses also fit into this size range and are known to be present in turkeys. The identity of SRVs estimated to be 20–25 nm in diameter is unknown, but this size range does overlap with that reported for astroviruses and ELVs. Whether there is more than one virus type in the 20–30 nm size range has not been conclusively determined. PCR testing was not performed on any of the poulter enteritis samples submitted for EM investigations and reported here.

In concurrence with other studies, this study found that that the majority of RVLVs and SRVs (including astrovirus) associated with PE were detected in the first 4 weeks of life and as early as 3 days of age, and that SRVs (25–30 nm) appear earlier than, and peak before RVLVs. More cases of PE were seen in the winter months (November–February) than summer months (June–August); this correlates with the coolest and warmest times of the year when temperature effects are more stressful.

Birnavirus and adenovirus were detected at low levels. Adenovirus virions identified were assumed to be hemorrhagic enteritis virus, since birds were routinely vaccinated. The significance of birnavirus in the PE syndrome is unknown. Birnaviruses associated with SRVs 15–20 nm diameter were observed on 19 occasions; these viruses have not been detected on their own, and their identity and significance is unknown; in terms of size they are compatible with circoviruses. Clinically and pathologically, researchers found no evidence for coronaviruses being present during the years reviewed. Spiking mortality associated with coronaviruses was not seen in turkey flocks in California during the period reviewed.

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