References


Transmission of Lawsonia intracellularis to weanling foals using feces from experimentally infected rabbits

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Equine proliferative enteropathy (EPE) is an emerging enteric disease of foals caused by Lawsonia intracellularis. Affected foals, generally less than one year of age, display lethargy, anorexia, fever, weight loss, peripheral edema, diarrhea and colic. Transmission of L. intracellularis is thought to occur through the ingestion of feed or water contaminated with L. intracellularis-infected feces from free-living or domestic animals. Lawsonia intracellularis has been detected by PCR in the feces of a variety of domestic and wild animals. Recently, the authors found that 7.5% of fecal samples and 27% of serum samples from cottontail rabbits from a farm with endemic occurrence of EPE tested positive for L. intracellularis by PCR and serology, respectively. Of interest was that on this farm, a large population of rabbits lived in the hay barn and directly contaminated hay fed to the horses. The goal of this study was to determine if feces from rabbits experimentally infected with L. intracellularis could be the source of infection for naïve weanling foals. Two 9-week-old New Zealand white rabbits were experimentally infected with 2.5 x 10^9 L. intracellularis of equine origin via nasogastric intubation, while two rabbits served as uninfected controls. Eight weanling foals randomly assigned to one of two groups (infected and control) received daily feces from the infected or control rabbits mixed with feed or water. All rabbits and foals were monitored daily for the development of clinical abnormalities and were weighed once weekly for the duration of the study. Feces were collected every day to every other day for the quantitative molecular detection of L. intracellularis via real-time PCR. Blood was collected weekly for the measurement of concentrations of total solids and serologic analysis. None of the infected rabbits or foals developed any clinical signs or hypoproteinemia compatible with PE. Onset of fecal shedding of L. intracellularis was detected by PCR on days 3 and 9 post-challenge in the 2 infected rabbits. The duration of fecal shedding was 6 and 9 days for the 2 infected rabbits. All infected foals began to shed L. intracellularis between days 10 and 14 post-infection, and fecal shedding lasted between 4 and 10 days. Feces and rectal swabs indicated that control rabbits and control foals, respectively, remained PCR negative for L. intracellularis throughout the entire study period. A humoral immune response was detected in all infected rabbits and foals. This study represents the first report documenting the successful feco-oral transmission of L. intracellularis using infectious fecal material from rabbits. Lagomorphs may represent an effective reservoir/amplifier host for L. intracellularis due to their large population, their close contact to horses, their short reproductive cycle and their world-wide distribution.

Emerging outbreaks associated with equine coronavirus in adult horses

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Equine coronavirus (ECoV) has been identified by electron microscopy, culture and more recently by PCR in feces of foals with and without enteric disease. A recent study reported on the isolation of ECoV from the feces of 2- to 4-year-old horses with pyrogenic and enteric disease living in stables of a racetrack in Japan. However, little is known about ECoV, especially with regard to molecular diagnostics of field samples and the clinical significance of ECoV PCR positive fecal results. The purpose of this study was to describe clinical, hematological and fecal PCR results from 161 horses involved in outbreaks associated with ECoV. The outbreaks happened at four separate boarding facilities between November 2011 and April 2012 in the States of California, Texas, Wisconsin and Massachusetts. The population of horses per stable ranged from 28 to 65 horses. Following the molecular detection of ECoV in the feces from the initial index cases, the remaining herdmates were closely observed for the development of clinical signs. Fecal samples were collected from sick and healthy horses for the PCR detection of ECoV. Clinical pathology from sick horses was evaluated when available. All four outbreaks involved primarily adult horses ranging in age from 1 to 29 years (median 15 years). Fifty-eight horses developed clinical signs with 12 to 16 sick horses per outbreak. The main clinical signs reported were anorexia (52), lethargy (46) and fever (43). Changes in fecal character, ranging from soft-formed to watery consistency and colic were observed in 12 and 4 horses, respectively. Clinical signs generally resolved within 1-4 days with supportive care. Four horses from 3 different outbreaks were euthanized or died due to rapid progression of clinical signs. The cause of death could not be determined with necropsy evaluation in 2 horses, while septicemia secondary to gastrointestinal translocation was suspected in 2 horses. Blood work was available from 10 horses with clinical disease and common hematological abnormalities were leukopenia due to neutropenia and/or lymphopenia. Feces were available for ECoV testing by real-time PCR from 44 and 99 sick and healthy horses.
respectively. 38/44 (86%) horses with abnormal clinical signs tested PCR positive for ECoV, while 89/99 (90%) healthy horses tested PCR negative for ECoV. The overall agreement between clinical status and PCR detection of ECoV was 89%. The study results suggest that ECoV is associated with self-limiting clinical and hematological abnormalities in adult horses. Real-time PCR is a sensitive and fast diagnostic tool to document the presence of ECoV in feces from horses with unspecific clinical signs.

Parasitologic, Physiologic, and Performance Parameters of Yearling Horses Receiving Daily Pyrantel Tartrate

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Daily pyrantel tartrate is approved in horses for the prevention of Strongylus vulgaris larval infections, and for the control of adults and L4s of other large strongyle species, cyathostomins, pinworms and ascarids. A masked, controlled, clinical trial was conducted to evaluate the effects of daily pyrantel tartrate on additional parasitologic, physiologic, and performance parameters of yearling horses exposed to repeated, mixed strongylid infections. Twenty-eight yearling horses were treated with strongylid-harming that performance benefits of parasite control may not become apparent for months following implementation. Serum albumin concentrations were frequently higher (P < 0.05) in treated geldings, suggesting that male horses may have less resilience against the harmful effects of parasitism than females. Daily pyrantel tartrate reduced the numbers of S. vulgaris larvae in arterial lesions by 98.7% (P=0.0002). Treated horses harbored significantly fewer lumenal cyathostomins than controls (P < 0.05; efficacy = 93.98%), and accumulated only 55% as many encysted mucosal larvae. The ceca and ventral colons of treated horses weighed significantly less (as a percentage of ante-mortem body weight) than those of controls, ostensibly due to less inflammation and associated edema. Group differences in strongylid numbers would likely have been far greater if 11/14 controls had not received rescue treatment, and if the groups had grazed separate pastures. No adverse events were associated with the daily administration of pyrantel tartrate to 14 pastured, juvenile horses over a 5.5-month period. Daily pyrantel tartrate provided excellent prophylaxis against infections with strongylin and cyathostomin nematodes, as confirmed by significantly lower egg counts and larval and adult worm numbers. Ancillary benefits included improved BCS scores, higher serum albumin levels, and less gut inflammation.

Laboratory animal models for Lawsonia intracellularis: discovering the truths of cross-infection

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Lawsonia intracellularis causes proliferative enteropathy (PE) in a variety of animal species worldwide, with equine and porcine PE (EPE and PPE, respectively) being of economic relevance. To date PPE infection models in pigs and rodents have been repeatedly published, but EPE is experimentally reproduced only in foals. To develop an EPE model, we attempted to infect hamsters and rabbits, as they are naturally affected by PE. Inocula derived from EPE and PPE diseased animals were used to infect rabbits and hamsters in 2 experimental trials each. Controls, when involved, were sham-treated. Trial-1: 9 New Zealand white does were assigned to 2 groups: 3 uninfected controls and 6 EPE-challenged does. Infected rabbits were challenged with cell-cultured EPE-strain L. intracellularis. Trial-2: 6 does were inoculated with EPE-strain L. intracellularis. Trial-3: 29 weanling Golden Syrian hamsters were randomly divided in 9 uninfected controls and 20 EPE-challenged subjects. Trial-4: 24 weanling hamsters were randomly divided in 6 uninfected controls, 9 EPE-challenged and 9 PPE-challenged subjects. In both rabbit trials, onset of clinical signs was monitored for 21 days post infection (DPI). Only EPE-challenged rabbits developed mild depression and moderate weight-loss at the disease peak (14DPI). Hamsters were observed for 21DPI (Trial-3) to 24DPI (Trial-4) and never developed clinical signs. Diagnostic techniques used in horses were applied. Antemortem: serology was tested weekly (rabbits) and/or at euthanasia (both species); and fecal DNA shedding was analyzed through qPCR. Post-mortem: routine H&E staining and immunohistochemistry (IHC) labelling with L.