

the occurrence of gastrointestinal disease such as colic, especially when high volume high starch diets are fed. These findings may have implications for feeding horses with gastric emptying disorders and feeding horses following abdominal surgery.

**142** A LONGITUDINAL STUDY OF *HELICOBACTER* ANTIBODIES IN FOALS. Michael J. Murray, Meril Ltd., Duluth, GA, David R. Scott, Elizabeth A. Marcus, Department of Physiology, University of California, Los Angeles, CA.

**Background:** Species of gastric *Helicobacter* have been identified in humans and several animals. Based on results of PCR amplification of the *Helicobacter* specific *16s rRNA* gene from equine gastric mucosa, immunohistochemistry of the *H. pylori* UreI channel and *H. pylori* urease UreA subunit, histomorphologic changes in corresponding antral mucosa, and serology, we suspect that the equine gastric antral mucosa is colonized with a gastric *Helicobacter* species. However, this bacterium has been uncultivable to date.

**Aims:** To determine whether there are changes in the immunoblot patterns of antibodies to *Helicobacter* that may indicate the onset of *Helicobacter* infection in foals.

**Methods:** Sera were collected from 23 foals and their dams: from 7 foals at birth, 48 hours of age, and then for 6 consecutive months, and from 16 foals at 48 hours and then for 6 consecutive months. Sera were collected from 6 foals at 1 month of age and for 5 consecutive months. Serum antibodies to *H. pylori* proteins were determined by Western blot analysis.

**Results:** Sera obtained precolostrum were negative for antibodies to *H. pylori*, but sera obtained 48 hours after colostrum all had band patterns for antibodies against *H. pylori* proteins that were identical to the sera of their respective dams. As the foals aged, many of the original band patterns for *H. pylori* antibodies waned and new bands developed.

**Conclusion:** Foals are born without antibodies to *Helicobacter* proteins and obtain maternal antibodies from colostrum. The data reflect the waning of maternal antibodies and, we suspect, acquisition of innate antibodies as the foals were exposed to *Helicobacter* infection. It appears that equine *Helicobacter* infection is acquired in horses early in life.

**143** POTASSIUM PENICILLIN (KPEN), BUT NOT POTASSIUM CHLORIDE (KCL) STIMULATES LARGE INTESTINAL MOTILITY OF HORSES. AJ Roussel, RN Hooper, ND Cohen, RJ Hicks, AD Bye, J Schultze, Link Equine Colic Research Program Department Lg An Clin Scs Coll of Vet Med, Texas A&M University, College Station, TX.

This study evaluated the effects of KPEN or KCl on defecation, and on myoelectric activity of the cecum (CE) and pelvic flexure (PF) of horses. Six mature horses with 12 bipolar electrodes on the CE and PF were administered KPEN and KCl solution by intravenous bolus injection. Each horse received the following 4 series of KPEN and KCl injections administered 4 hours apart: 1) HI-KPEN ( $2 \times 10^7$  IU of KPEN) followed by HI-KCL (34 mEq KCl); 2) LO-KPEN ( $10^7$  IU of KPEN) followed by LO-KCL (17 mEq KCl); 3) HI-KCL followed by HI-KPEN, and; 4) LO-KCL followed by LO-KPEN. The amount of  $K^+$  and the volume was the same for both of the HI treatments and for both of the LO treatments. Defecations were recorded for 60 minutes following each injection, and myoelectric activity was recorded and stored on discs. A motility index (MI) was created by integration of the myoelectric waveform using a computer program. The 60-min period prior to injection served as the reference period. The 1st 15 minutes following injection was analyzed in 5-min segments, and the 60 minutes following injection was analyzed in 15-min segments. All colonic migrating myoelectric complexes (CMMC) were identified and the time of occurrence relative to treatment was recorded. The number of defecations and the MI for the segments were compared using the GLM procedure followed by Duncan's multiple range test. The number of defecations in the 1st 15 minutes after injection was significantly greater ( $p < .05$ ) for HI-KPEN (mean = 2.22) was than for either the HI-KCL or LO-KCL groups (mean = 0.44 and 0.44, respectively). There was also a significant difference ( $p < .05$ ) in the number of defecations between the 2 KPEN (mean = 1.83) groups combined and the 2 KCL (mean = 0.61) groups combined. The MI for the following segments was significantly greater from that of the reference period ( $p < .05$ ): LO-KPEN in the CE for the 1st 5-min segment (126% greater), in the PF for the 1st 5-min segment (161% greater) and in the PF for the 1st 15-min segment (123% greater); HI-KPEN in the PF for the 1st and 2nd 5-min segments (187% and 149% greater, respectively) and in the PF for the 1st, 2nd, and 3rd 15-min segments (155%, 143%, and 142% greater, respectively); HI-KCL in the PF for the 1st 5-min period (149% greater). CMMCs were more likely ( $p \leq .05$ ) to occur during the 10 minutes after KPEN (12/14 periods), but not after KCl (2/13 periods), compared to all other 10-min periods (14/270 periods). Intravenous injection of KPEN stimulates defecation and also CMMCs. Myoelectric activity was increased for up to 45 min following administration of KPEN. The effects of KPEN on motility appear to be the result of the penicillin, not the equimolar amounts of  $K^+$ , as KCl was virtually without effect.

**144** A RETROSPECTIVE ANALYSIS OF HEPATIC DYSFUNCTION IN HORSES WITH PROXIMAL ENTERITIS (1984–2002). Jennifer L. Davis, Anthony T. Blikslager, Katrina Catto, Samuel L. Jones. North Carolina State University, Raleigh, NC.

Proximal enteritis (PE) is a common cause of colic in horses characterized by inflammation of the proximal small intestine, ileus, fluid accumulation in the stomach and small intestine, and varying degrees of endotoxemia. The purpose of this study is to test the hypothesis that horses with PE are predisposed to hepatic injury. We also determined whether the presence of liver injury or dysfunction in horses with PE was associated with other clinical or clinicopathological abnormalities or affected outcome.

The medical records of all horses admitted for evaluation of abdominal pain, gastric reflux or small intestinal distention were reviewed. Horses were considered to have PE if the diagnosis was made at surgery or if they had a combination of 2 or more of the following criteria: small intestinal distention, greater than 10 liters of reflux in the 1st 24 hours, fever, or high peritoneal fluid protein concentration. Horses with small intestinal strangulating obstructions (SISO) diagnosed at surgery or necropsy were used as the control group. Historical and clinicopathological data were collected for each horse as well as results of liver ultrasound, biopsies or culture, case outcome, and necropsy findings. The data was analyzed using descriptive statistics as well as parametric and nonparametric analyses. Logistic regression was used to assess the association of clinicopathologic data with biochemical evidence of liver dysfunction in horses with PE, and to determine if horses with PE had a greater risk of elevated liver enzyme levels.

Horses with PE had significantly higher serum GGT, AST, ALP activities and total bilirubin concentrations than horses with SISO ( $p < .05$ ). Horses with PE also had significantly higher volume of reflux on admission, total volume of reflux and duration of reflux than horses with SISO ( $p < .05$ ). Logistic regression revealed that horses with PE had an increased risk for elevated liver enzymes if the anion gap was  $>25$ . Horses with PE were 11.3 times more likely to have a high GGT than were horses with SISO.

Our conclusion is that horses with PE are more likely to have hepatic injury than horses with SISO. The mechanism of hepatic injury may involve increased luminal pressure in the proximal small intestine leading to an ascending infection from the common bile duct, absorption of endotoxin or inflammatory mediators from the portal circulation, or hepatic hypoxia resulting from systemic inflammation and endotoxemic shock.

**145** PROGNOSTIC VALUE OF CLINICAL SIGNS AND BLOOD PARAMETERS IN EQUIDS SUFFERING FROM ACUTE HEPATIC INSUFFICIENCY: A RETROSPECTIVE STUDY ON 31 CASES. Amory H.<sup>1</sup>, Perron M.F.<sup>2</sup>, Sandersen C.<sup>1</sup>, Delguste C.<sup>1</sup>, Grulke S.<sup>1</sup>, Cassart D.<sup>1</sup>, Godeau J.M.<sup>1</sup>, Detilleux J.<sup>1</sup> <sup>1</sup>Faculty of Veterinary Medicine, University of Liege, Belgium and <sup>2</sup>Bully, France.

The purpose of this retrospective study was to investigate the prognostic value of clinical signs and selected blood parameters in equids suffering from acute hepatic insufficiency (HI).

Thirty-one equids (8 horses, 18 ponies and 5 donkeys) in which a diagnosis of acute HI had been made on the basis of clinical signs, results of ancillary tests and/or postmortem findings were included in the study. The cases were spited into 2 groups according to the short-term issue. Group 1 included 13 animals (7 females and 6 males;  $326 \pm 129$  kg;  $13.5 \pm 6.7$  years) which survived, and group 2 included 18 animals (7 males and 11 females;  $309 \pm 192$  kg;  $10.7 \pm 7.9$  years) which died or were euthanised. On each case, clinical signs and selected blood parameters at initial evaluation were collected. Frequency of the clinical signs and mean value of blood parameters were compared between the 2 groups. Moreover, receiver-operating characteristic (ROC) analyses were conducted to compute the sensitivity and specificity of each clinical sign and each blood parameter as a predictor of the issue.

Frequency of the clinical signs and values of blood parameters were not statistically different between the 2 groups, except for serum gamma glutamyl transferase (GGT) and alkaline phosphatase (ALP) which were significantly ( $p < .05$ ) different in group 1 ( $96.5 \pm 25.9$  and  $780.6 \pm 122.1$  UI/L, respectively) than in group 2 ( $277.5 \pm 69.6$  and  $1,346.9 \pm 217.8$  UI/L, respectively). The area under the ROC curve was  $0.79 \pm 0.01$  for GGT and  $0.84 \pm 0.08$  for ALP. The cut-off value was 224 UI/L for GGT and 820 UI/L for ALP, which gave a maximal sensitivity and specificity of 54% and 95% respectively for GGT and of 91% and 73% respectively for ALP.

In conclusion, this study underlines the prognostic value of serum GGT and ALP in equids with acute HI.

**146** EFFECT OF FITNESS ON GLUCOSE AND INSULIN RESPONSES TO DIETS VARYING IN STARCH AND FAT CONTENT IN THOROUGHBREDS WITH RECURRENT EXERTIONAL RHABDOMYOLYSIS. C J Finno, EC McKenzie, SJ Valberg. University of Minnesota, St Paul MN and JD Pagan, Kentucky Equine Research, Versailles, KY.

The glycemic index of various equine feeds is of great interest particularly