2012-12-04-179 Paratuberculosis databases updated (2012-11-30)
To: (08) Mycobacterial diseases; (23) Veterinary education; (27) Scientific information
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New publications in the PARATUBERCULOSIS database (1330-1334)

Clinical and pathological insights into Johne's disease in buffaloes
Tropical Animal Health and Production, 44, 1899-1904

Alternative diagnostic tools and interesting epidemiological assumptions were associated with an outbreak of Johne's disease. In a buffalo herd infected with paratuberculosis, seven clinically affected animals and 21 animals with anti-Mycobacterium avium ELISA reactions were identified. Total herd included 203 buffaloes. Most lesions were comparable to those described in buffaloes and cattle affected by Johne's disease. Water buffalo behaviors such as communal nursing and allosuckling may be additional risk factors for this disease. Detection of positive Ziehl-Neelsen staining and anti-M. avium immunolabeling in rectal biopsies from one buffalo with paratuberculosis are highlighted as auxiliary diagnostic tools for Johne's disease in live animals

Environmental contamination with Mycobacterium avium subspecies paratuberculosis within and around a dairy barn under experimental conditions
Journal of Dairy Science, 95, 6477-6482

To establish environmental contamination in and around a dairy barn, cows shedding Mycobacterium avium ssp. paratuberculosis (MAP) were housed in a freestall barn. Fecal samples were collected 15 times at 3-wk intervals, and samples of all animals were cultured by using the Trek Diagnostic Systems culture system (Cleveland, OH) to quantify levels of MAP shedding. In parallel, air and floor dust samples were collected inside and outside the experimental farm and analyzed by IS900 real-time PCR. for the presence of MAP DNA. Inside the barn, MAP was detected with equal frequency in samples directly contaminated with feces compared with air dust samples above animal level and in dust samples of the corridor. Dust samples collected within the barn were positive more frequently than outside samples, with exception of the outside sample from the farmer's doormat. The risk of MAP exposure was distributed evenly within the dairy barn. Additionally, footwear should be considered as a high-risk fomite for dispersion of dust-related MAP outside the barn. Prevention of MAP exposure in youngstock may require housing of youngstock in separate barns as an additional management measure

Producer survey of bird-livestock interactions in commercial dairies
Journal of Dairy Science , 95, 6820-6829

The objective of this producer survey was to identify and estimate damage caused by bird-livestock interactions in commercial dairies. The interactions between birds and livestock have previously been implicated in causing economic damage while contributing to the environmental dissemination of microorganisms pathogenic to livestock and humans. Very little research exists to help producers understand what bird species use dairies, why they use dairies, or the scope and nature of damage created as a result of bird-livestock interactions. To better characterize these interactions, we surveyed dairy operators within Pennsylvania,
New York, and Wisconsin. Survey results suggest that the most common and destructive bird species found on commercial dairies are invasive to North America, and their use of dairies is associated with the loss of cattle feed, increased operating costs, and an increase in dairies self-reporting Salmonella spp. and Mycobacterium avium ssp. paratuberculosis. Cattle feed loss estimates generated from this survey were used to parameterize an input-output (IO) economic model using data from 10 counties in the state of Pennsylvania (Bedford, Berks, Blair, Bradford, Chester, Cumberland, Franklin, Lancaster, Lebanon, and Somerset). This IO model allowed us to estimate direct, indirect, and induced economic effects of feed loss from bird damage to dairies within these counties. The IO model output suggests that feed loss costs Pennsylvania between $4.11 and $12.08 million (mean $10.6 million) in total economic damage, with approximately 43 to 128 jobs (mean 112) forgone statewide in 2009.

Transmission of Mycobacterium avium subsp. paratuberculosis: Dose-response and age-based susceptibility in a sheep model
Preventive Veterinary Medicine, 107, 76-84

Factors which influence the transmission of Mycobacterium avium subsp. paratuberculosis (MAP) between susceptible hosts are poorly defined, despite this organism causing economically significant disease in ruminants worldwide. A randomised longitudinal field trial was conducted using natural pasture-based exposure of 840 Merino sheep in a factorial design to test infection and disease outcomes in relation to age at first exposure and the level of exposure to MAP. Pasture contamination was initiated by MAP infected “donor” sheep which were present for 14.5 weeks of the 2.5 year study period. Sheep exposed to higher doses had 3.5 times greater odds to shed MAP in their faeces (assessed by faecal culture) compared to animals exposed to lower doses of infection. Similarly, sheep exposed to MAP as lambs had 7 times higher odds to shed MAP compared to animals that were exposed for the first time as adults. However, animals of all ages and exposed at all doses were equally likely to be colonised by MAP (measured by culture of intestinal tissues) suggesting that some animals are inherently susceptible to infection. Age at first exposure was a significant determinant of histopathological lesion development, as lambs had about three times higher odds of developing severe lesions than adults after equivalent time (P=0.026). Mortalities due to paratuberculosis were strongly determined by the level of exposure; sheep exposed to high doses had 18 fold higher odds of death (P=0.007). Sheep exposed as lambs had 5 fold higher odds of dying due to paratuberculosis than adults (P=0.046). The results of this study provide sound experimental evidence for management recommendations in extensively grazed livestock to reduce the transmission of MAP by limiting exposure of young animals and reducing the levels of MAP pasture contamination. (C) 2012 Elsevier B.V. All rights reserved.

1334 Tharwat, M., Al-Sobayil, F., Hashad, M., Buczinski, S. (2012)
Transabdominal ultrasonographic findings in goats with paratuberculosis
Canadian Veterinary Journal-Revue Veterinaire Canadienne, 53, 1063-1070

FULL PAPER NOT AVAILABLE
This study describes the transabdominal ultrasonographic findings in 54 goats with confirmed Johne's disease (JD). Compared with the control group (0.8 +/- 0.4 mm thick), the test group presented with mild (2.8 +/- 0.2 mm), moderate (4.2 +/- 0.4 mm), and severe (6.9 +/- 1.1 mm) thickening of the intestinal wall. The most outstanding ultrasonographic findings were pronounced enlargement of the mesenteric lymph nodes in 49 goats. In 36 goats, the enlarged lymph nodes showed a hypoechoic cortex and a hyperechoic medulla. In 7 goats, the cortex and medulla were hypoechoic. In 5 goats, the cortex and medulla could not be differentiated. In the remaining cases, the cortex and medulla contained small hypoechoic lesions. Necropsy findings included enlarged mesenteric lymph nodes in 52 goats and thickening of the small intestinal wall in 30 goats. Compared with the postmortem results, the antemortem ultrasound sensitivity in detecting intestinal wall thickness and enlarged mesenteric lymph nodes was 80% and 94%, respectively.

New publications in the CROHN'S DISEASE AND PARATUBERCULOSIS database (758-759)

**Viral Infection Augments Nod1/2 Signaling to Potentiate Lethality Associated with Secondary Bacterial Infections**

*Cell Host & Microbe, 9*, 496-507

Secondary bacterial infection is a common sequela to viral infection and is associated with increased lethality and morbidity. However, the underlying mechanisms remain poorly understood. We show that the TLR3/MDA5 agonist poly I:C or viral infection dramatically augments signaling via the NLRs Nod1 and Nod2 and enhances the production of proinflammatory cytokines. Enhanced Nod1 and Nod2 signaling by poly I:C required the TLR3/MDA5 adaptors TRIF and IPS-1 and was mediated by type I IFNs. Mechanistically, poly I:C or IFN-beta induced the expression of Nod1, Nod2, and the Nod-signaling adaptor Rip2. Systemic administration of poly I:C or IFN-beta or infection with murine norovirus-1 promoted inflammation and lethality in mice superinfected with E. coli, which was independent of bacterial burden but attenuated in the absence of Nod1/Nod2 or Rip2. Thus, crosstalk between type I IFNs and Nod1/Nod2 signaling promotes bacterial recognition, but induces harmful effects in the virally infected host.


**Chaperone Activity of Small Heat Shock Proteins Underlies Therapeutic Efficacy in Experimental Autoimmune Encephalomyelitis**

*Journal of Biological Chemistry, 287*, 36423-36434

To determine whether the therapeutic activity of alpha B crystallin, small heat shock protein B5 (HspB5), was shared with other human sHsps, a set of seven human family members, a mutant of HspB5 G120 known to exhibit reduced chaperone activity, and a mycobacterial sHsp were expressed and purified from bacteria. Each of the recombinant proteins was shown to be a functional chaperone, capable of inhibiting aggregation of denatured insulin with varying efficiency. When injected into mice at the peak of disease, they were all effective in reducing the paralysis in experimental autoimmune encephalomyelitis. Additional structure activity correlations between chaperone activity and therapeutic function were established when linear regions within HspB5 were examined. A single region, corresponding to residues 73-92 of HspB5, forms amyloid fibrils, exhibited chaperone activity, and was an effective therapeutic for encephalomyelitis. The linkage of the three activities was further established by demonstrating individual substitutions of critical hydrophobic amino acids in the peptide resulted in the loss of all of the functions.