

Case 1. Tissue from an ox.

Ileum **(1 pt.)** and attached jejunum: Within the ileum, there is necrosis and loss of villi **(1 pt.)**, and crypts are herniated into the underlying depleted **(1 pt.)** Peyer's patches **(2 pt.)**. Crypts are markedly ectatic **(1 pt.)** up to 750um in diameter, are lined by epithelium which ranges from attenuated to columnar, and in many areas piles up in a disorganized fashion and loses polarity **(1 pt.)**. Lining epithelial cells are often necrotic, **(1 pt.)**, with increased mitotic figures, and small clusters of lymphocytes and transmigrating neutrophils within the epithelium, and denuded areas contain moderate numbers of robust bacilli adherent to the denuded lamina propria. The lumens of these dilated crypts contain moderate numbers of degenerate neutrophils, necrotic epithelial cells, few lymphocytes, streams of mucin and fibrin, moderate hemorrhage, and abundant necrotic debris **(1 pt.)** (crypt abscesses) **(1 pt.)**. Occasionally, large filamentous post-mortem bacteria are present. The surrounding lamina propria contains moderate numbers of macrophages neutrophils, and lymphocytes. Villar architecture overlying these crypt abscesses is lost and replaced by a coagulum of abundant fibrin, hemorrhage, and cellular debris **(1 pt.)**. In the adjacent jejunum, villi are markedly blunted with loss of villar epithelium and an increase in intraepithelial lymphocytes. The underlying crypts are mildly to markedly dilated, tortuous and contain varying amounts of necrotic epithelial cells and cellular debris. **(1 pt.)** (crypt abscesses) **(1 pt.)**.

MORPHOLOGIC DIAGNOSIS: Small intestine: Enteritis, necrotizing, diffuse, severe, with focally extensive Peyer's patch necrosis and crypt abscesses. **(3 pt.)**

CAUSE: Bovine pestivirus (Salmonella typhimurium – OK) **(3 pt.)**

O/C: **(1 pt.)**

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Case 2. Tissue from a pig.

Lung. Multifocally, small bronchioles **(1pt)** are lined by attenuated to necrotic **(2pt)** epithelium and their lumens are filled by are lined with sloughed necrotic epithelium, degenerate neutrophils, and cellular debris. **(1pt)** Many airways are lined by attenuated to hyperplastic **(1pt)** columnar epithelium which ranges up to three disorganized layers and there is multifocal mild edema. Surrounding these areas, alveolar spaces contain low to moderate numbers of foamy alveolar macrophages **(1pt)**, admixed with viable and rarely degenerate neutrophils **(1pt)**, edema fluid, fibrin, and small amounts of cellular debris. Diffusely, alveolar septa **(1pt)** are moderately to markedly thickened **(1pt)** by type II pneumocyte hyperplasia **(2pt)**, and low to moderate numbers of histiocytes **(1pt)**, neutrophils, lymphocytes, and moderate and small amounts of fibrin **(1pt)** and cellular debris. Interlobular septa are mildly expanded with clear space (emphysema) and edema fluid.

MICROSCOPIC DESCRIPTION: Lung: Bronchiolitis, necrotizing, multifocal, moderate, with diffuse histiocytic interstitial pneumonia and type II pneumocyte hyperplasia. **(3pt)**. (This can also be classified as a bronchointerstitial pneumonia, but It is necrotizing in the airways and proliferative in the septa, so that that makes for a difficult descriptor for a bronchointerstitial pneumonia).

CAUSE: Swine orthomyxovirus (swine influenza) **(3pt)**

O/C: **(1pt)**

Case 3. Tissue from an alpaca.

Heart: Along the epicardium, there are multiple foci of acute hemorrhage **(1pt)** which surrounds and separates epicardial adipocytes and subepicardial Purkinje fibers. There is mild multifocal subepicardial edema **(1pt)** and mild serous atrophy of fat. Multifocally in the subepicardial myocardium and deeper within the myocardium, there are randomly scattered focal areas in which cardiomyocytes are shrunken and hyalinized (degeneration) **(1pt)** with occasionally fragmentation, myofibril disarray, and rare contraction bands (necrosis) **(2pt)** Within these areas, the perimysium is mildly expanded by edema, satellite nuclei are hypertrophic **(1pt)**, and rarely necrotic myofibers are infiltrated by low numbers of macrophages.

Kidney: There are multiple, wedge-shaped areas of infarction **(2pt)** within the proximal cortex **(1pt)** which are characterized by a loss of differential staining of glomeruli, tubules, and markedly congestion of vessels, hypereosinophilia, and pyknotic nuclei (coagulative necrosis) **(1pt)**. Adjacent tubules are often lined by hypereosinophilic swollen epithelium with discrete vacuoles (degeneration), occasionally with pyknotic nuclei (necrosis) **(1pt)** and rare mitotic figures. Tubular lumina contain moderate amounts of granular protein debris and rarely sloughed cells. **(1pt)** Rarely, tubular epithelial cells exhibit basophilic cytoplasm, and mild piling up (regeneration). There is marked congestion of interstitial capillaries.

MICROSCOPIC DESCRIPTION: 1. Heart, myocardium: Necrosis, multifocal, moderate. **(2pt)**

2. Heart, epicardium: Hemorrhage, acute, multifocal, moderate. **(2pt)**

3. Kidney, cortex: Infarcts, acute, multifocal to coalescing. **(2pt)**

CAUSE: Oleander toxicosis (or yew toxicity) **(1pt)**

O/C: **(1pt)**

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Case 4. Tissue from a calf.

Lung: Diffusely, there is necrosis **(1pt)** and loss of airway epithelium **(1pt)** with replacement by an eosinophilic coagulum contain fibrin, cellular debris, viable and degenerate neutrophils and small amounts of hemorrhage. **(1pt)** The epithelium and submucosa are often infiltrated by moderate numbers of neutrophils, histiocytes and lymphocytes. **(1pt)** Other airways are lined by attenuated **(1pt)** to hyperplastic, disorganized epithelium **(1pt)** and lumina contain viable and degenerate neutrophils **(1pt)**, fewer foamy macrophages **(1pt)**, fibrin, and cellular debris. Surrounding alveoli variable combinations and concentrations of neutrophils, foamy macrophages, edema fluid, fibrin and cellular debris, **(1pt)** and in some areas, there is septal necrosis **(1pt)**. Alveoli and airways contain small numbers of 60-80um diameter multinucleated viral syncytia **(2pt)** with up to 12 nuclei and abundant foamy vacuolated cytoplasm. Interlobular connective tissue is expanded by clear space (emphysema) and edema. **(1pt)** Diffusely, there is marked congestion of septal and interstitial tissue capillaries.

MICROSCOPIC DESCRIPTION: Lung: Bronchopneumonia, necrotizing and suppurative, diffuse, severe with rare multinucleated viral syncytia. **(3pt)**

CAUSE: Bovine paramyxovirus (BRSV) **(3pt)**

O/C: **(1pt)**