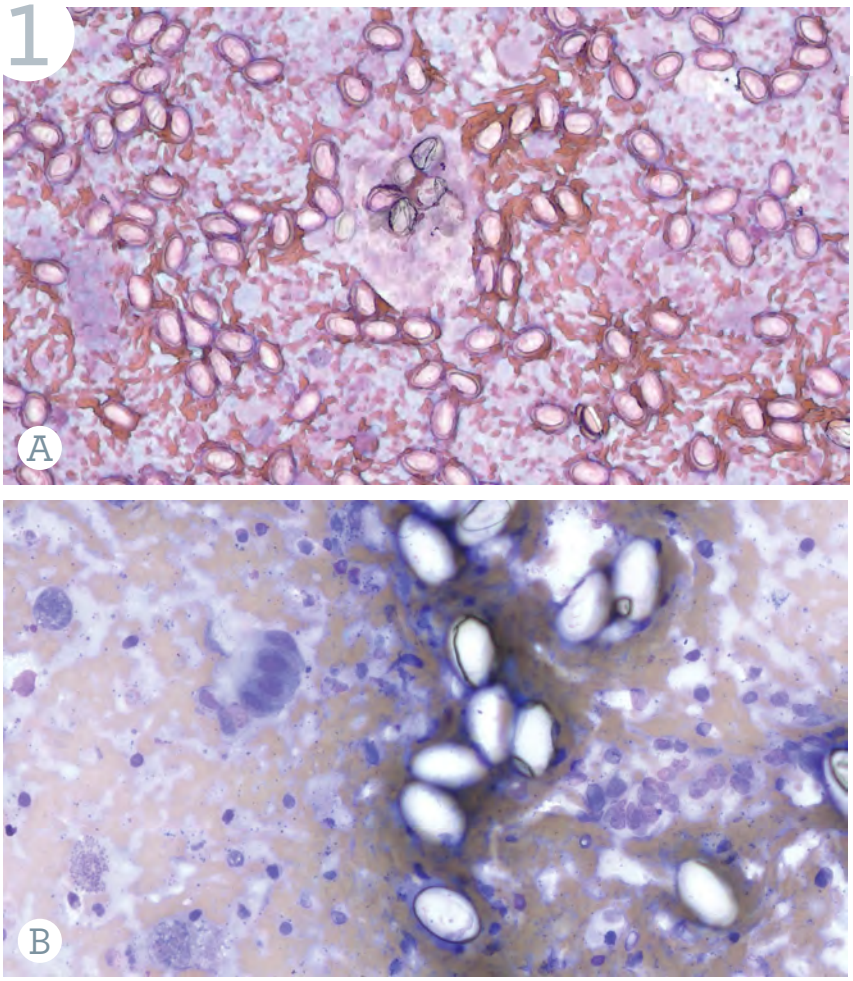

FIGURE 1: Leishman's stained **(A)** and Diff-Quik stained and higher magnification **(B)** hepatic impression smears show a variable number of oval, clear, coccidian oocysts with refractile walls.

A protozoan *problem*

Pathologist **Lisa Schmidt**, from SVS Laboratories, discusses a case of hepatic coccidiosis in a rabbit.

A 10-WEEK-OLD WEANLING rabbit who weighed 380g (half that of its littermates) presented to the lab. The day prior to their death the kit had appeared normal, but 24 hours later they were lethargic and unable to stand. Despite supportive care, the kit died.

NECROPSY

On necropsy the rabbit was thin, lacked body fat reserves (subcutaneous and intra-abdominal) and had a slight pot belly. The liver had a few scattered round, yellow to pearl grey, spherical nodules up to 3mm^3.

CYTOLOGY

Impression smears were made of the liver nodules. They showed a variable number of coccidial oocysts (Figure 1) and were supportive of hepatic coccidiosis. For tips on making impression smears, see box.

HISTOPATHOLOGY

The bile ducts were dilated with papillary epithelial hyperplasia and periportal fibrosis and inflammation (Figure 2). Coccidial oocysts were seen in the lumina of affected degenerate ducts. A diagnosis of hepatic coccidiosis was confirmed.

DISCUSSION

Typically, coccidiosis is a disease of intensively managed animals, especially young, naïve animals who can develop high parasite burdens (Uzal et al., 2016). In rabbits, *Eimeria stiedae* is one of the most common causes of clinical coccidiosis. Unlike most coccidial infections, *Eimeria stiedae* preferentially infects the biliary epithelium (Barthold et al., 2016). Naïve rabbits are often infected by ingesting sporocysts (sporulated oocysts) found in the environment of contaminated premises, where they can remain viable for several months, and on fomites. Once ingested, sporozoites invade the duodenum and migrate rapidly to the bile duct epithelial cells via lymphatic and haematogenous routes. Coccidial reproduction begins once organisms are in the bile duct epithelial cells. The prepatent period is 15–18 days and infected rabbits can shed oocysts in the faeces for seven weeks or more (Baker, 1998; Barthold et al., 2016; Uzal et al., 2016). While liver nodules in this case were only 3mm^3, they have been reported to be as large as 3cm in diameter in the literature.

Other gross findings that may be seen in affected rabbits include dark-brown to green soiling around the perineum due to diarrhoea, ascites, hepatomegaly and a thickened gall bladder with viscous, green bile and inspissated material (debris) (Barthold et al., 2016).

In this case, the kit showed clinical signs consistent with hepatic coccidiosis. The typical clinical findings are summarised in Table 1. While a serum sample was unavailable for analysis in this case, clinical pathology abnormalities associated with liver

IMAGERY: SUPPLIED

TIPS FOR MAKING IMPRESSION SMEARS FROM TISSUES

STEP 1. Blot the cut surface of the tissue with gauze or paper towel to remove surface blood and serum, until almost dry.

STEP 2. Lightly tap the dried surface onto a dry slide. The tissue can be touched multiple times on the same slide in different locations.

STEP 3. Allow the slide to air dry before staining.

If you have a core biopsy, the tissue can be rolled across a piece of paper towel prior to being gently rolled across a glass slide.

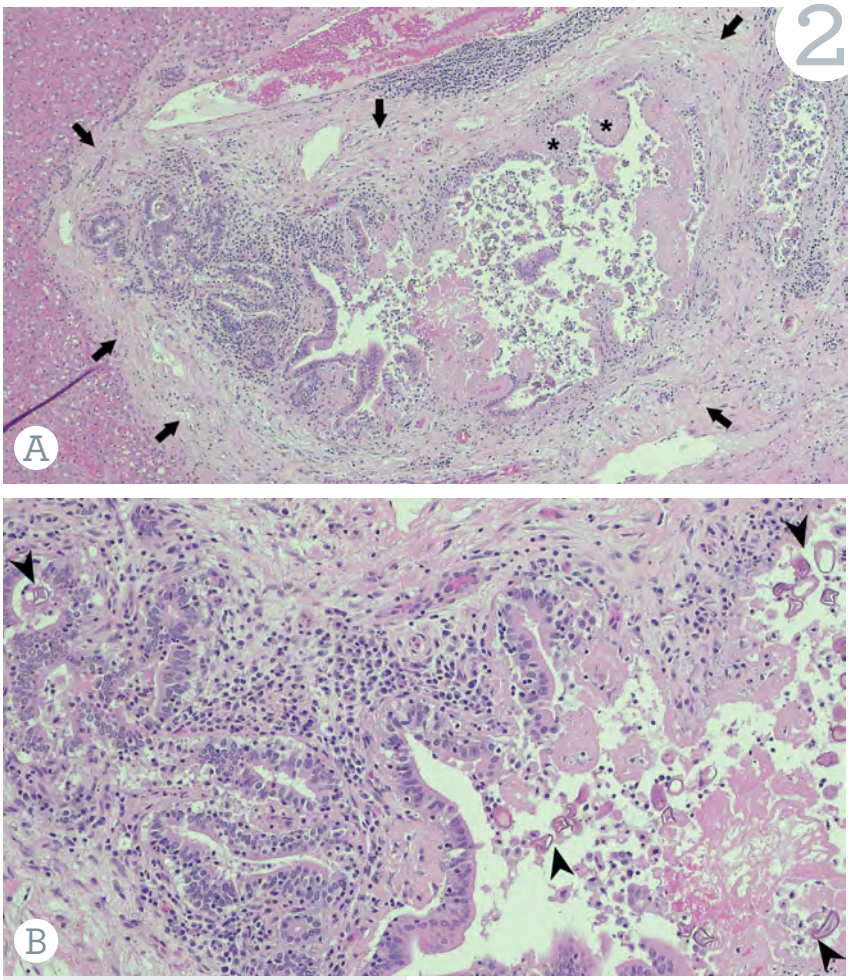

FIGURE 2: (A) Low magnification showing periportal fibrosis (arrow) and papillary epithelial hyperplasia (*). **(B)** Higher magnification showing a few intra-ductal coccidia oocytes (arrowhead).

disease can be seen. The clinical presentation is described in Table 1.

A definitive diagnosis of hepatic coccidiosis due to *Eimeria stiedae* is made by demonstrating oocysts in the bile ducts on histopathology (Barthold et al., 2016). In chronic lesions, organisms may be sparse to absent in bile ducts with prominent periportal fibrosis. In this case, postmortem exam findings and cytology were highly suggestive of hepatic coccidiosis. Faecal flotation could also be used to add support to a diagnosis of coccidiosis. In this case, the kit had 4+ coccidia and 700 eggs per gram of strongyle nematodes.

TABLE 1: Clinical presentation of hepatic coccidiosis

Typical age	Weanling rabbits
Clinical signs	Anorexia Weight loss or poor weight gains ± Distended abdomen (due to an enlarged liver and/or ascites) ± Diarrhoea ± Icterus
Serum chemistry	Elevated alanine transaminase (ALT) Hyperbilirubinaemia ± Hypoglycaemia ± Hyperlipaemia ± Hypoalbuminaemia ± Hypergammaglobulinaemia

SUMMARY

Eimeria stiedae is an important cause of mortality in weanling rabbits, and clinical signs of infection vary with the severity of infection. In mild cases rabbits may have growth retardation. In heavily infected cases rabbits may show signs related to hepatic pathology including dullness, anorexia and debilitation, and/or diarrhoea and/or constipation. Hepatomegaly, ascites and icterus are also reported. VS

REFERENCES:

Baker DG. Natural pathogens of laboratory mice, rats, and rabbits and their effects on research. *Clinical Microbiology Reviews* 11(2), 231–66, 1998

Barthold SW, Griffey SM, Percy DH. *Pathology of Laboratory Rodents and Rabbits*. 4th Edtn. Pp 297–300. Blackwell Publishing, Ames, Iowa, USA, 2016

Uzal FA, Platter BL, Hostetter JM. Alimentary system. In: Maxie MG (ed). *Jubb, Kennedy, and Palmer's Pathology of Domestic Animals* Vol 2. 6th Edtn. Pp 227–39. Elsevier, St Louis, Missouri, USA, 2016