GUIDE TO:
Diagnosing Coccidiosis & Necrotic Enteritis

QTI
ANIMAL HEALTH & NUTRITION
<table>
<thead>
<tr>
<th>Site of Infection</th>
<th>Species</th>
<th>Oocyst Size</th>
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<tbody>
<tr>
<td></td>
<td>E. necatrix</td>
<td>20.4 x 17.2</td>
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<tr>
<td></td>
<td>E. tenella</td>
<td>22.0 x 19.9</td>
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<tr>
<td></td>
<td>E. mivati</td>
<td>15.6 x 13.4</td>
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<td></td>
<td>E. maxima</td>
<td>30.5 x 20.7</td>
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<tr>
<td></td>
<td>E. brunetti</td>
<td>24.6 x 18.8</td>
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<tr>
<td></td>
<td>E. acervulina</td>
<td>18.3 x 14.6</td>
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</tbody>
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E. acervulina
Scattered white plaque-like lesions containing developing oocysts are confined to the duodenum. These lesions may be elongated with the longer axis transversely oriented on the intestinal wall like rungs of a ladder. They may be seen from either the serosal or mucosal intestinal surfaces. They may range up to a maximum of 5 lesions per square centimeter.

Lesions are much closer together, but not coalescent. They may extend as far posterior as 20 centimeters below the duodenum in 3 week old birds. The intestinal wall shows no thickening. Digestive tract contents are normal.

Lesions are numerous enough to cause coalescence, giving the intestine a coated appearance. The intestinal wall is thickened and the contents are watery. Lesions may extend as far posterior as the yolk sac diverticulum.

Coalescing of the lesions is so complete that no distinct lesions may be apparent in duodenum. For this reason, such an infection may be overlooked on cursory examination. Intestinal wall is thickened and laden with oocysts.
E. maxima
Small red petechiae (small pinpoint lesions) may appear on the serosal side of the mid-intestine. There is no ballooning or thickening of the intestine, though small amounts of orange mucus may be present.

The serosal surface may be speckled with numerous red petechiae, and the intestine may be filled with orange mucus. There is little or no ballooning of the intestine. The intestinal wall will be thickened.

The intestinal wall is ballooned and thickened. The mucosal surface is roughened and the intestinal contents are filled with pinpointed blood clots and mucus.

Excessive hemorrhage, mucus and watery fecal material; undigested food particles and areas of necrosis.
There are very few scattered petechiae on the cecal wall and there is no thickening of the cecal wall. Normal cecal contents are present.

Lesions are more numerous, with noticeable blood in the cecal contents. Normal cecal contents are present.

Large amounts of blood or cecal cores are present. Cecal wall is greatly thickened. Little, if any, fecal contents are present in the ceca.

Blood-filled cecal pouches.
E. mivati
Since lesion appearance and location are similar in many respects to *E. acervulina*, descriptions given for *E. acervulina* may be used but with the following differences: *E. mivati* has a tendency to move in a posterior direction with the progression of the infection, thus late infections may extend further down the tract. The shape of individual lesions is frequently more rounded so that the ladder-like description is less likely to apply. Severe congestion has not been noted with this species.

A severe infection produced by taking in numerous oocysts has caused a complete fusion of lesions. Occasionally, small petechiae are observed. The intestinal wall is greatly thickened and weight loss of the bird would occur with this degree of infection. Although death is usually rare, if it occurs in severely infected birds, it is scored as a +4.
Small scattered petechiae and white spots are easily seen from the serosal side. Little if any damage is apparent on the mucosal surface.

Numerous petechiae are visible on the serosal surface. A slight ballooning confined to the midgut area may be present.

There is extensive hemorrhage into the lumen of the intestine and the serosal surface is covered with red petechiae and/or white plaques. The serosal surface is rough and thickened with many pinpoint hemorrhages. Normal intestinal contents are lacking. Ballooning extends over the lower half of the small intestine.

Ballooned intestine with thickened wall, dark and white spots on serosa (salt & pepper appearance like), heavy mucus production, massive hemorrhage with coagulated blood, cecal content dehydrated.
E. brunetti

+2

+3

+4
There are no gross lesions. In the presence of distinct lesions, parasites may go undetected unless scrapings from suspicious areas are examined microscopically.

The intestinal wall may appear grey in color. The lower portion may be thickened. Flecks of salmon-colored material sloughed from the intestine are present.

The intestinal wall is thickened and a blood-tinged catarrhal exudate is present. Transverse red streaks may be present in the lower rectum and lesions occur in the cecal tonsils. Soft mucus plugs may be present in this area.

Severe hemorrhage and coagulated blood present in the lower small intestine.
Necrotic Enteritis
+1 Dilated small intestine contains yellow-brown, watery, foul smelling content. Intestinal wall is thin and weakened. The thickened mucosa layer has separated from the gut muscular layer.

+2 Swelling of the intestine is noticeable. Intestinal wall is reddened and there are several pale yellow areas of necrosis. There is ulceration of the mucosa.

+3 Intestine is dilated and thin walled. Extensive areas of necrosis and ulceration. Flecks of blood are present. Content is brown from sloughed mucosa and necrosis.

+4 The entire surface of the mucosa is necrotic. Sloughed necrotic debris has left paler areas where no mucosa remains and the underlying submucosa is exposed.
Necrotic Enteritis
There is mild erosion of the villi tips and some separation of the villi tips. There is early separation of cells from the basement membrane.

Moderate erosion of the villi tips with loss of villi material into the gut. Mild leakage of fibrin into the lumen.

Severe erosion of the villi tips with leakage of villi material into the gut lumen. The epithelium of the upper half of the villi is separating from the basement membrane.

Virtually all the surface enterocytes are necrotic, resulting in a layer of fibrin and necrotic debris over the entire mucosal surface.
Normal Intestinal Tract

Necrotic Enteritis
**Normal Intestinal Tract**

Long finger-like projections are the villi which absorb nutrients from the gut. Villi are separate from each other, yet securely attached to the gut wall.

**Necrotic Enteritis**

Intestinal content of a bird with necrotic enteritis, revealing large numbers of gram positive rod-shaped *Clostridium perfringens* bacteria.
Lesion scoring for coccidiosis is based on system developed by Johnson & Reid, 1970 Experimental Parasitology, 28:30-36
Your Questions Answered...

• No other additional natural feed-additive products should be necessary with EnteroBac.
• EnteroBac may be used from day-1 without the use of additional anticoccidials.
• EnteroBac can be used in segmented rations in conjunction with a coccidiosis vaccination program (i.e. Bio-shuttle).
• The inclusion rate of EnteroBac is 2-3lb./ton feed.