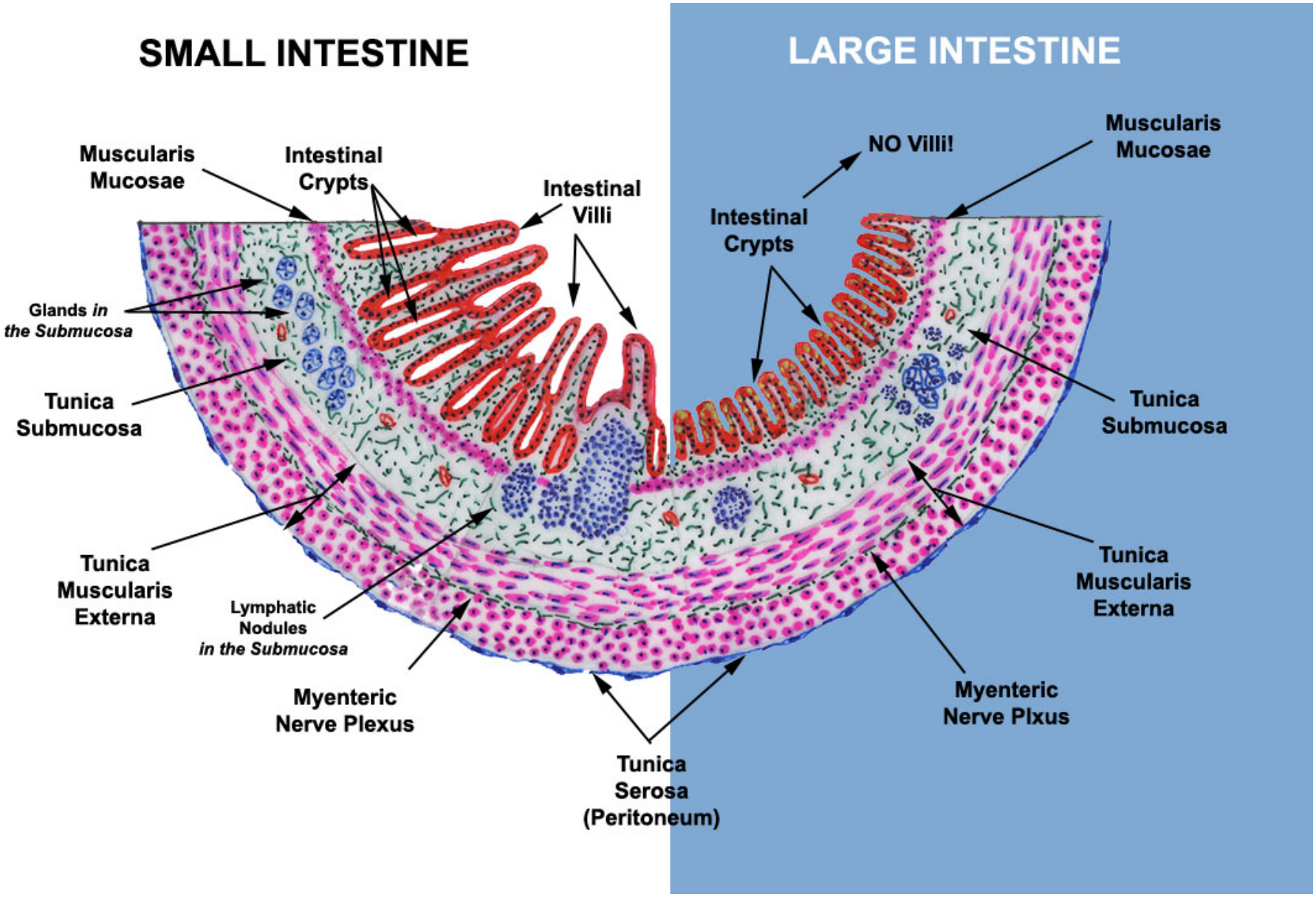
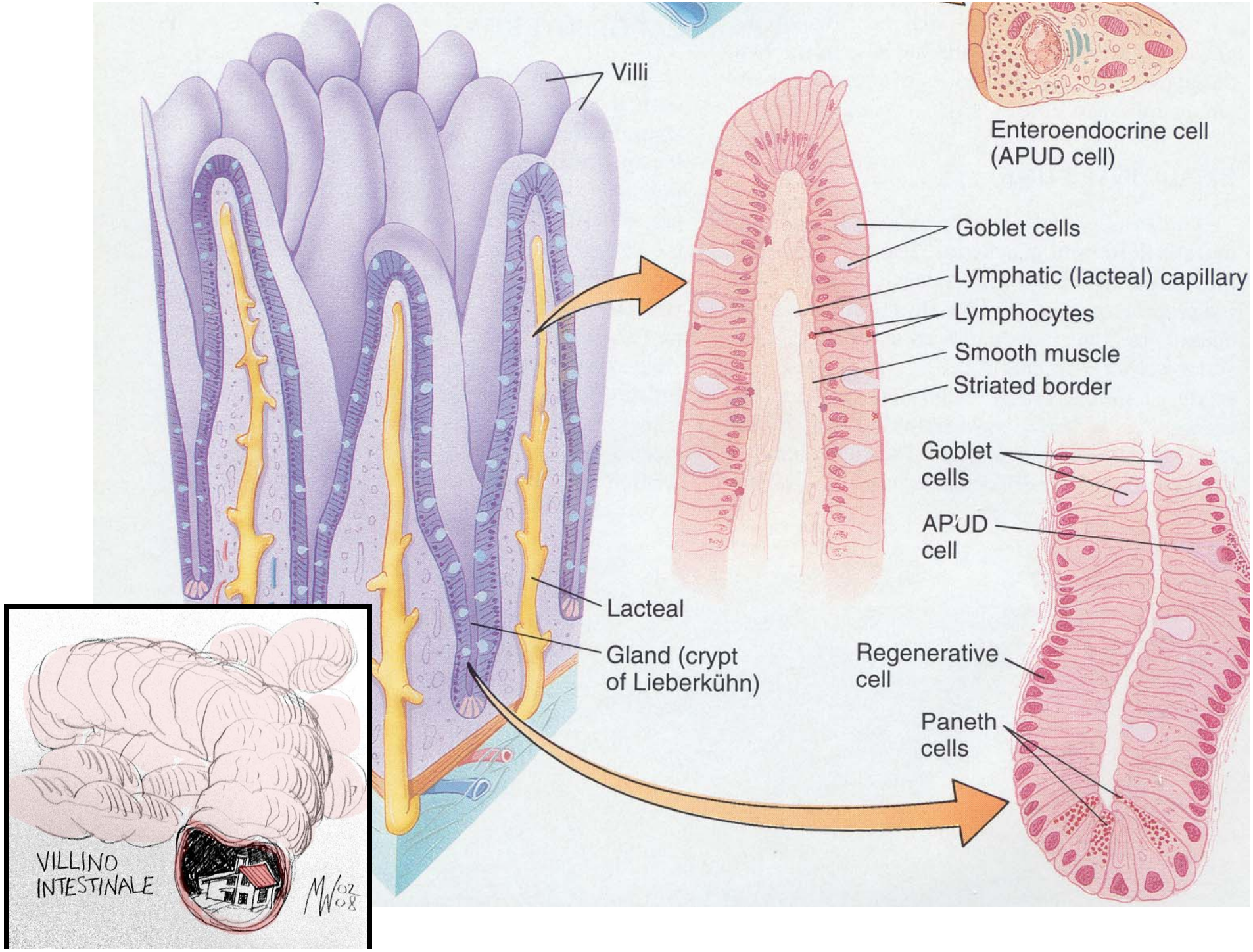

SMALL INTESTINE
LARGE INTESTINE
Muscularis Mucosae
Intestinal Crypts
Intestinal Villi
Glands in the Submucosa
Tunica Submucosa
Tunica Muscularis Externa
Lymphatic Nodules in the Submucosa
Myenteric Nerve Plexus
Tunica Serosa (Peritoneum)
NO Villi!
Intestinal Crypts
Muscularis Mucosae
Tunica Submucosa
Tunica Muscularis Externa
Myenteric Nerve Plxus

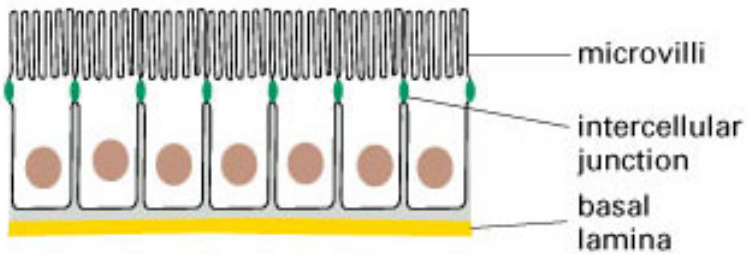

Villi
Enteroendocrine cell
(APUD cell)
Goblet cells
Lymphatic (lacteal) capillary
Lymphocytes
Smooth muscle
Striated border
Goblet
cells
APUD
cell
Lacteal
Gland (crypt
of Lieberkühn)
Regenerative
cell
Paneth
cells
VILLINO
INTESTINALE

Intestinal villi
Jejunum

200 µm
200 um

Digestion

- Digestion in the lumen
  - pancreatic enzymes
  - bile
- Digestion at the brush border
  - carbohydrases
  - peptidases

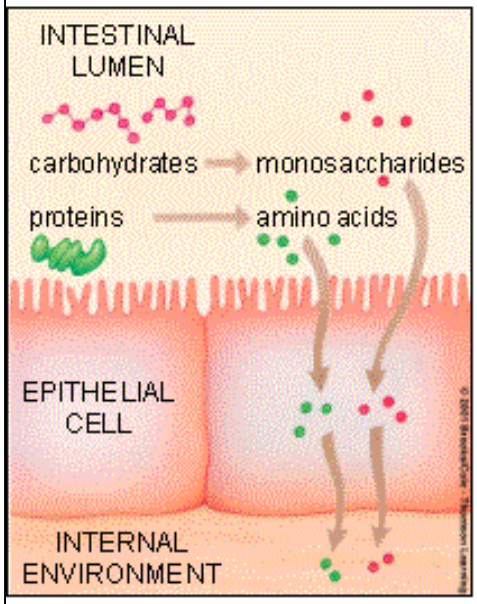


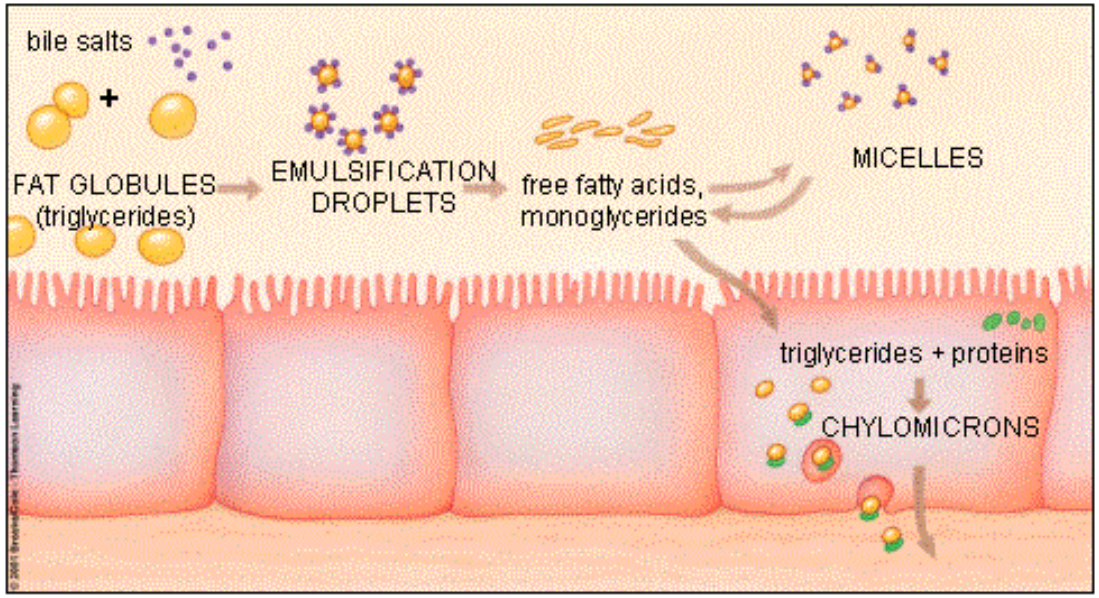
Absorptive cells have numerous hairlike projections called microvilli on their free surface to increase the area for absorption.

Adjacent epithelial cells are bound together by cell junctions that give the sheet mechanical strength and also make it impermeable to small molecules. The sheet rests on a basal lamina.

Monosaccharides and amino acids are actively transported across plasma membrane of epithelial cells, then from cell into internal environment

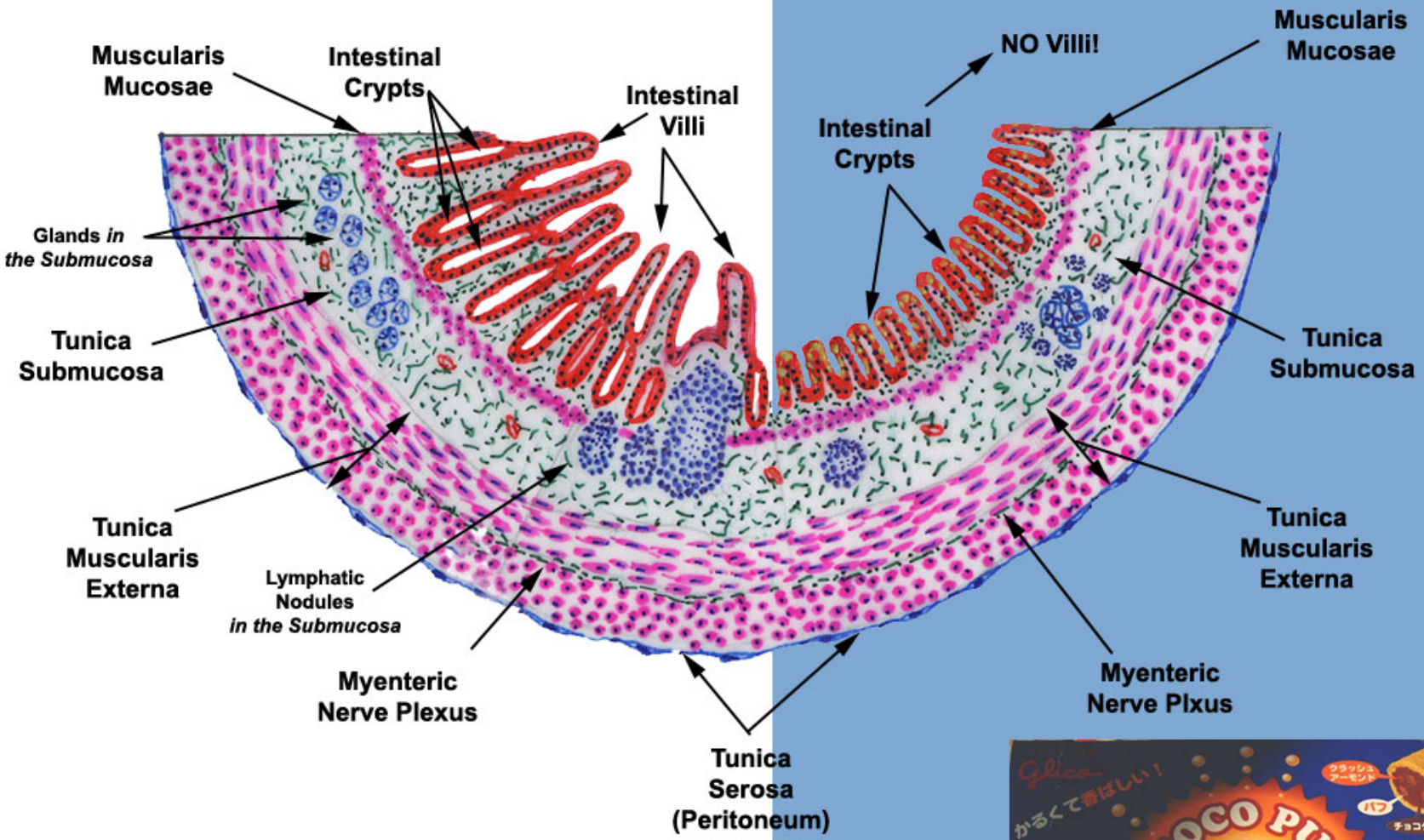
Fat Absorption
Chylomicrons leave epithelial cells by exocytosis and enter internal environment

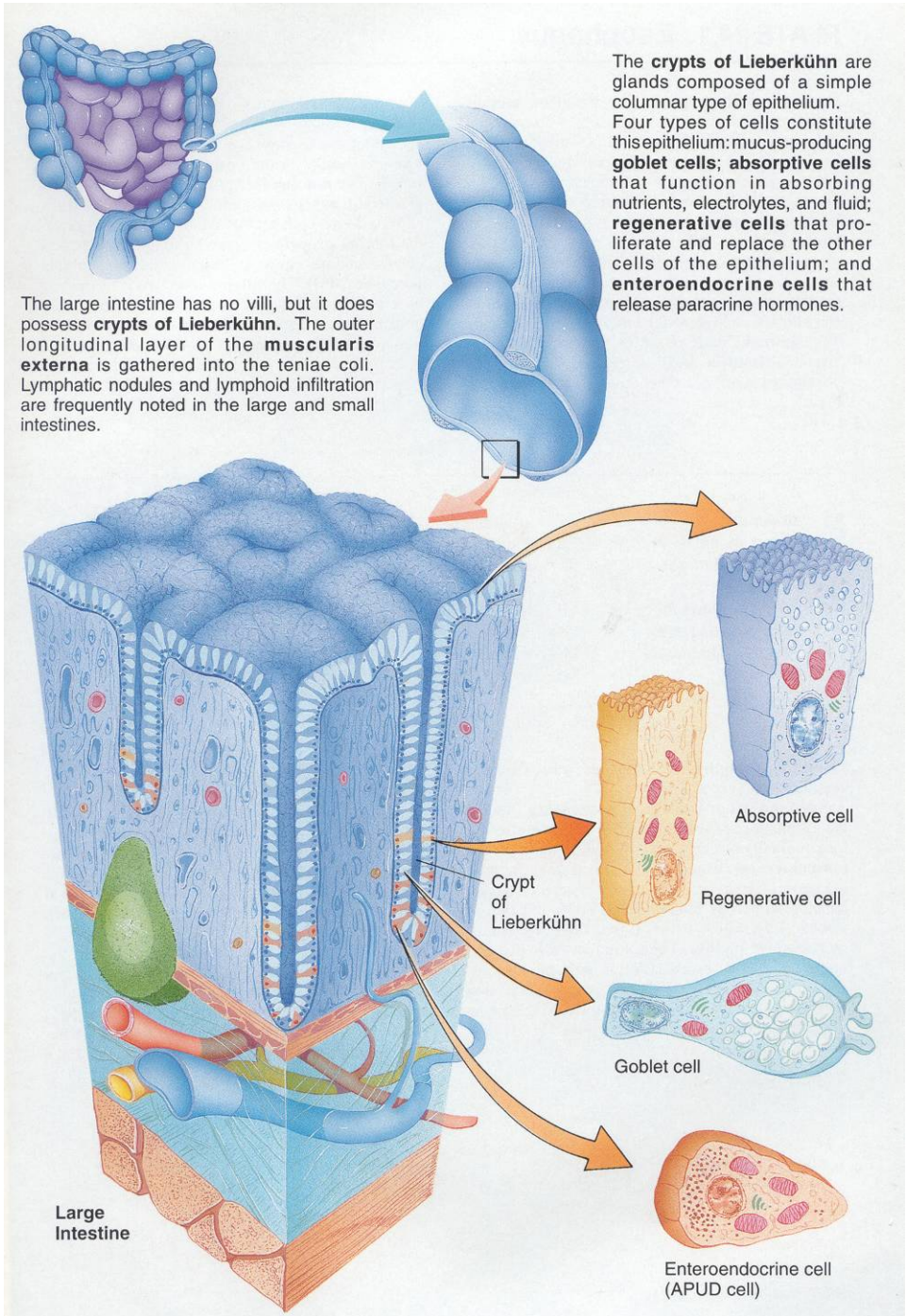




SMALL INTESTINE

LARGE INTESTINE





GRAPHIC 14.2. Large Intestine

colon

Features to note:

NO villi; mucosal surface is FLAT

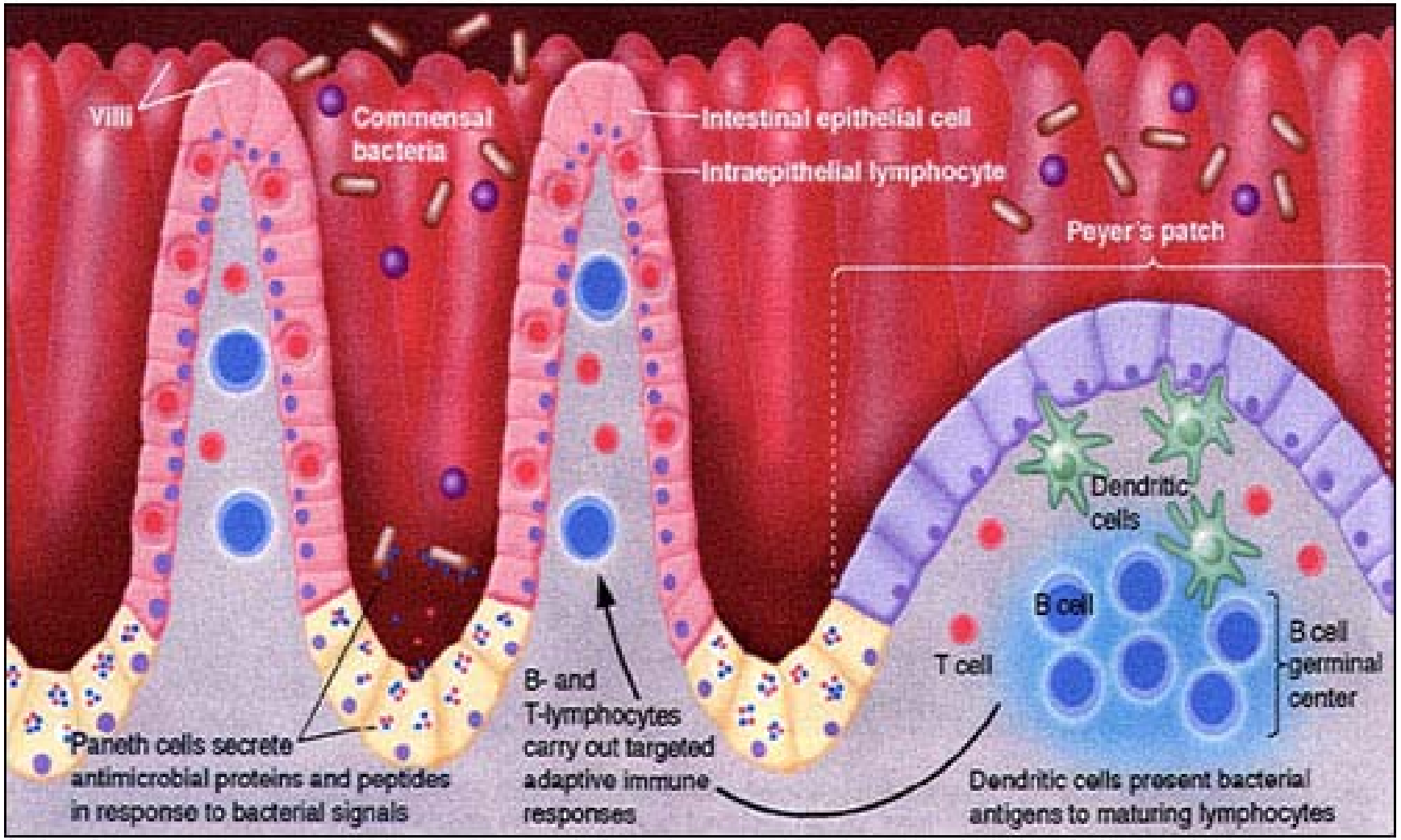
Lots of mucous cells

Lamina propria usually not as expansile as in small intestine

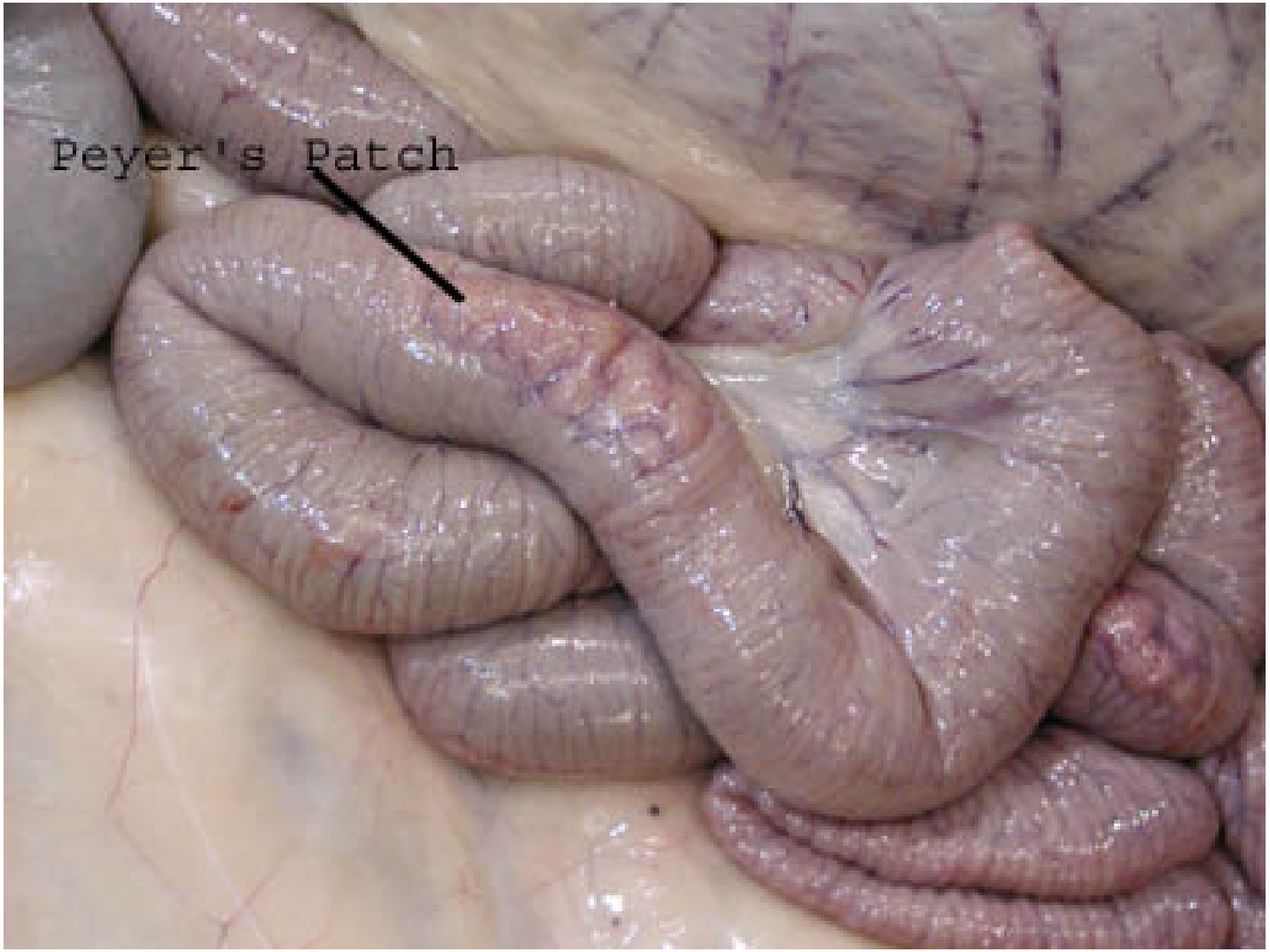
Primary function of colon is to absorb water.

Also to store feces until appropriate!

Peyer’s patches



Peyer’s patch



Small bowel vs. large bowel

- Colon presented with more small intestinal fluid than capable of absorbing.
- Diseased colon cannot absorb normal amount of fluid from small intestine.

Most diarrheas are small bowel problems

What's the Word?

- Inflammation of:
  - Small intestine? enteritis
  - Large intestine? colitis
  - Cecum? typhlitis
  - Rectum? proctitis

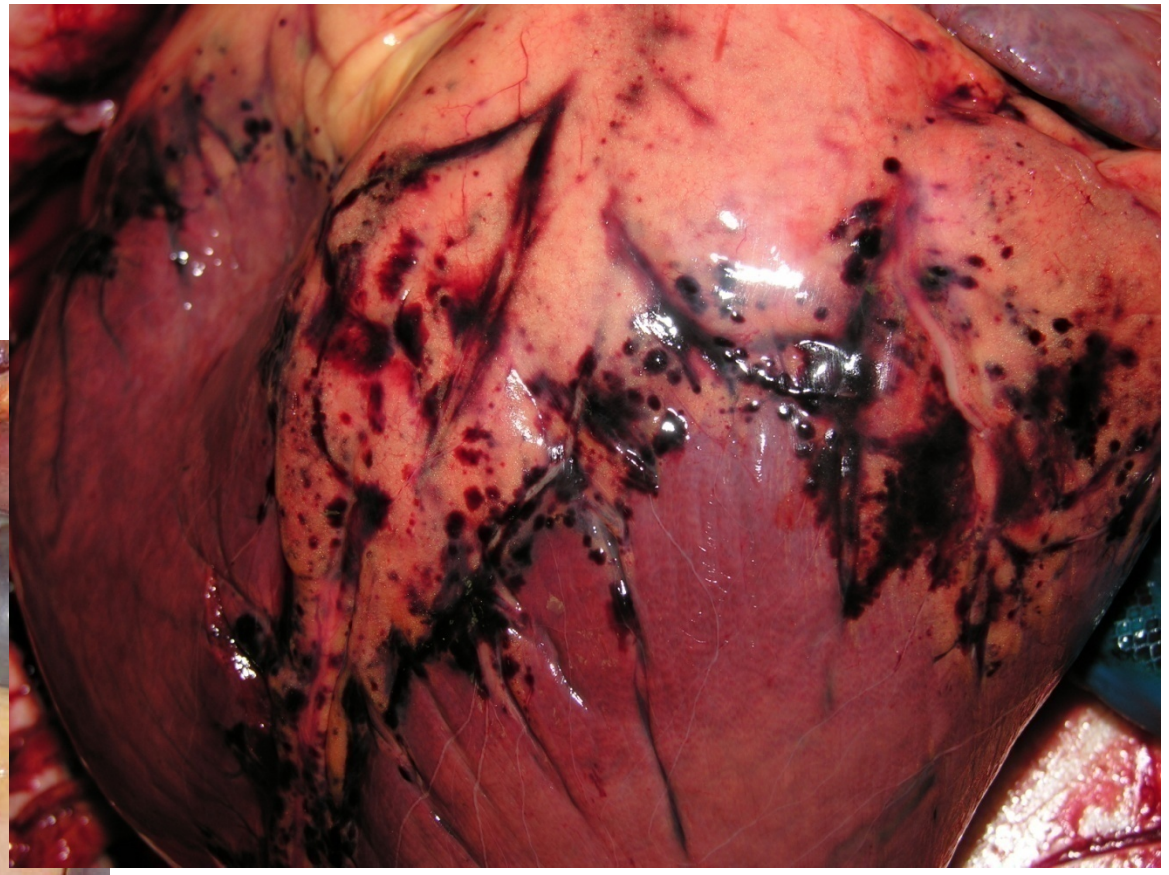
Why do animals with diarrhea die?

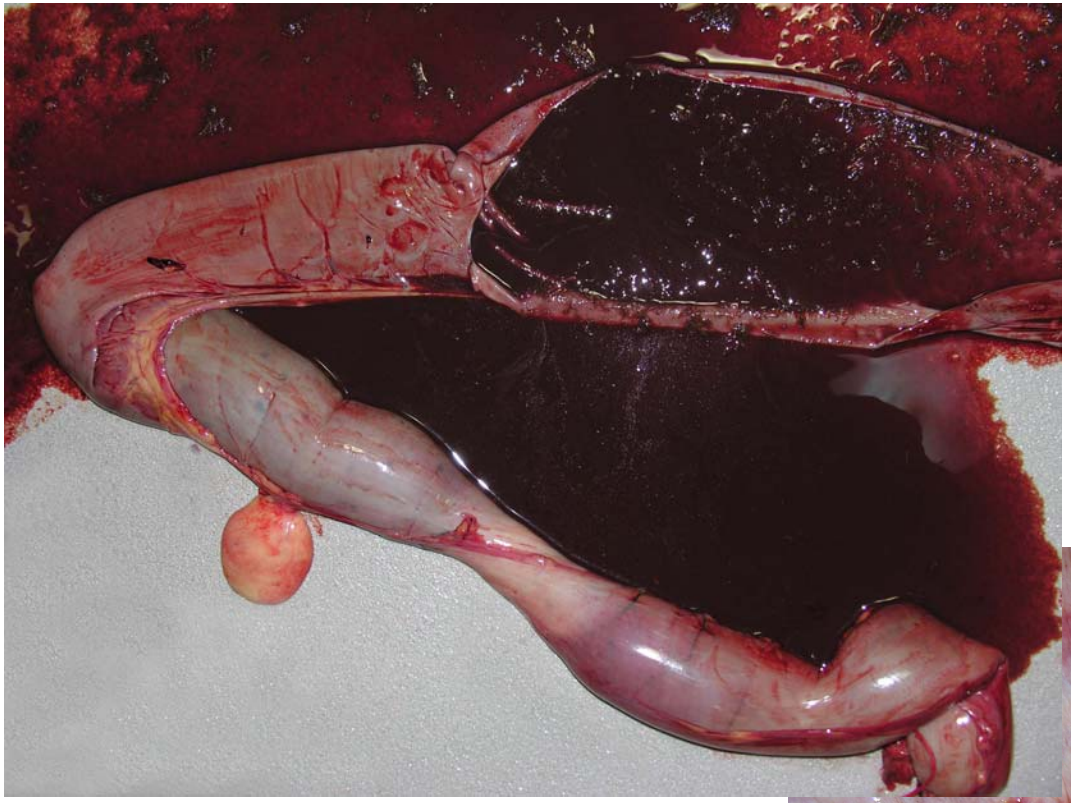

Morphologic diagnosis?

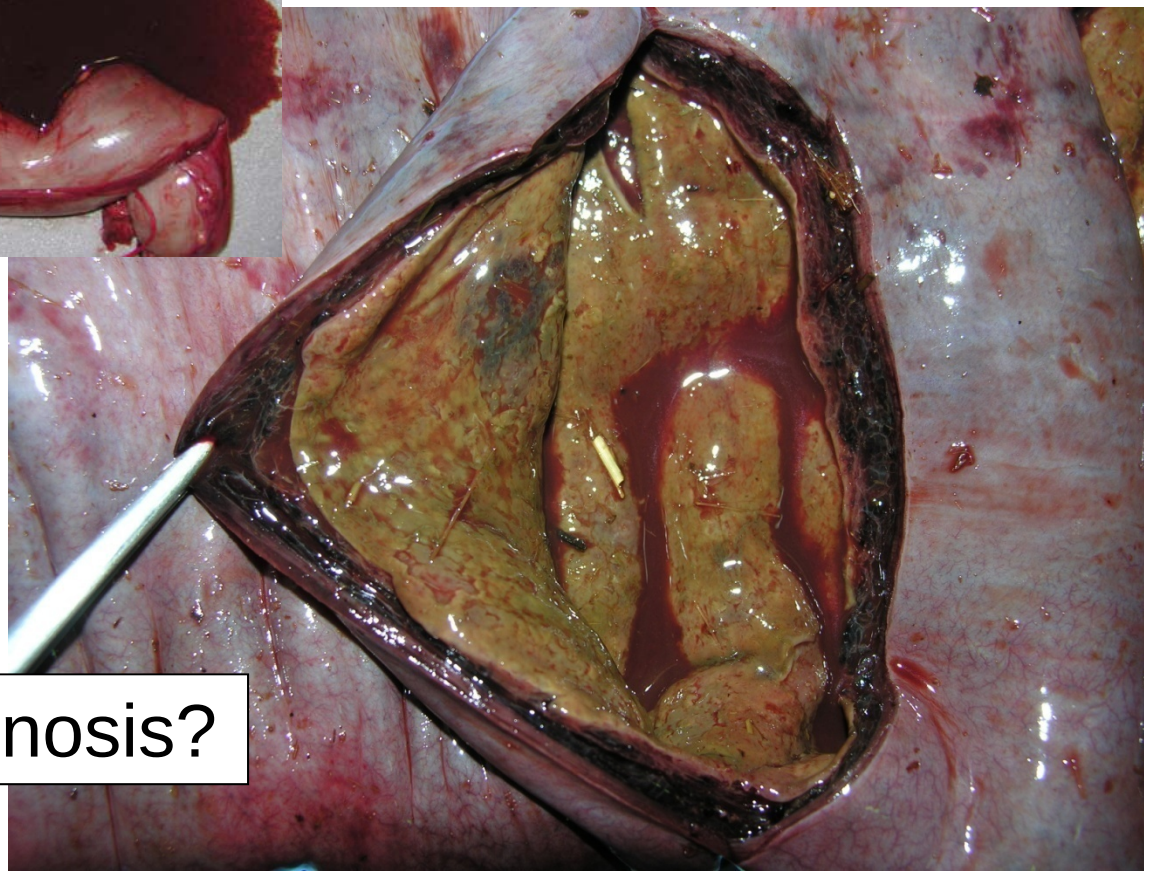
Two Reasons for Diarrhea

- Cannot absorb (malabsorptive)
- Leaky gut (effusive)

Diarrhea - CASES







Morphologic diagnosis?

Morphologic diagnosis?

Why is there diarrhea? (PATHOGENESIS)

Salmonella ingested, grew in intestinal cells → →

Diarrhea → →

Salmonella also causes septicemia, endothelium damaged → → DIC, also thrombosis of gut epithelium → → more diarrhea

DIARRHEA IS EFFUSIVE

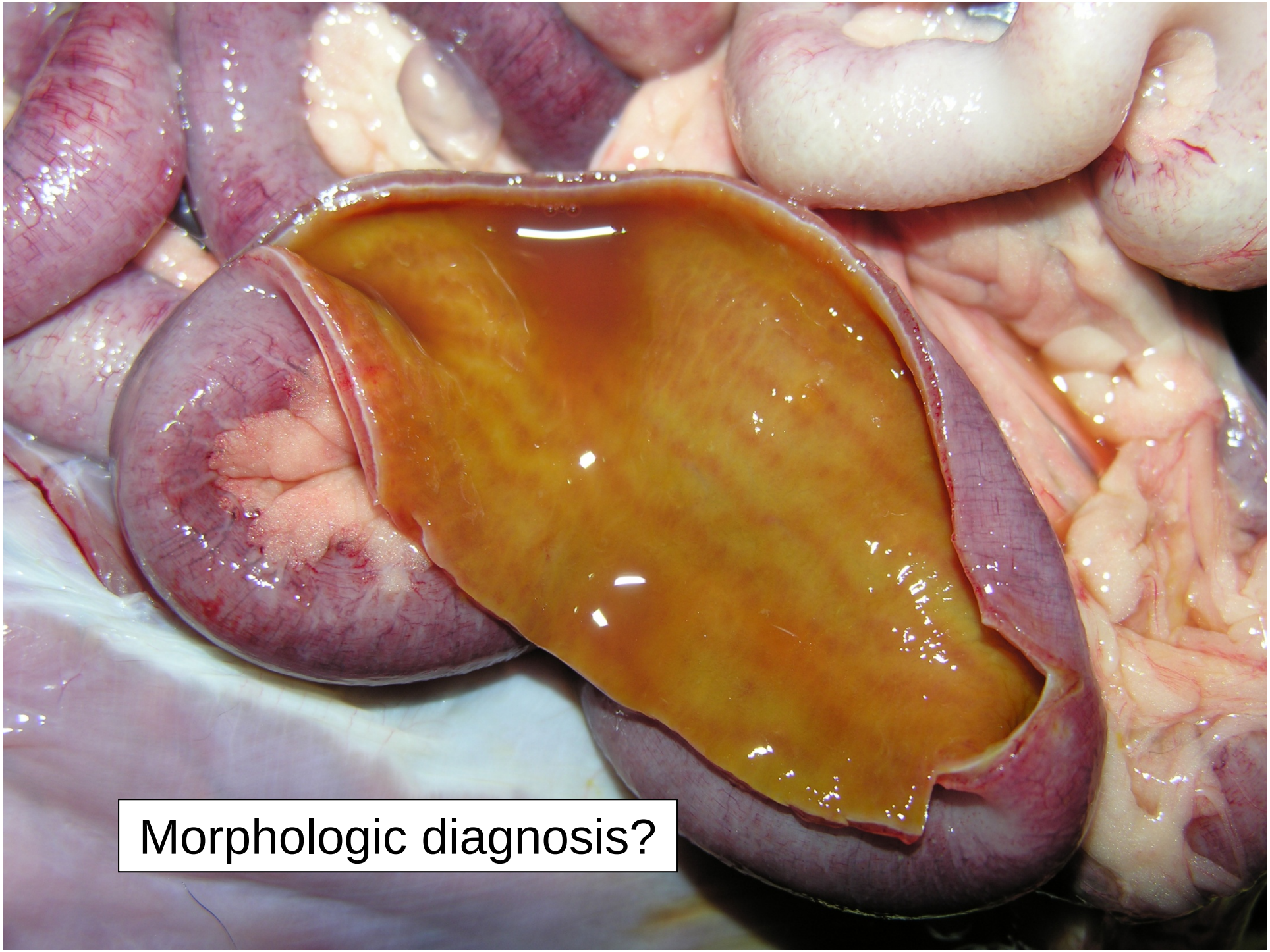
Why did the horse die? (PATHOGENESIS)

Diarrhea → → SEVERE DEHYDRATION

DIC → → ORGAN SYSTEM FAILURE

HORSE DIES


Morphologic diagnosis?


Morphologic diagnosis?

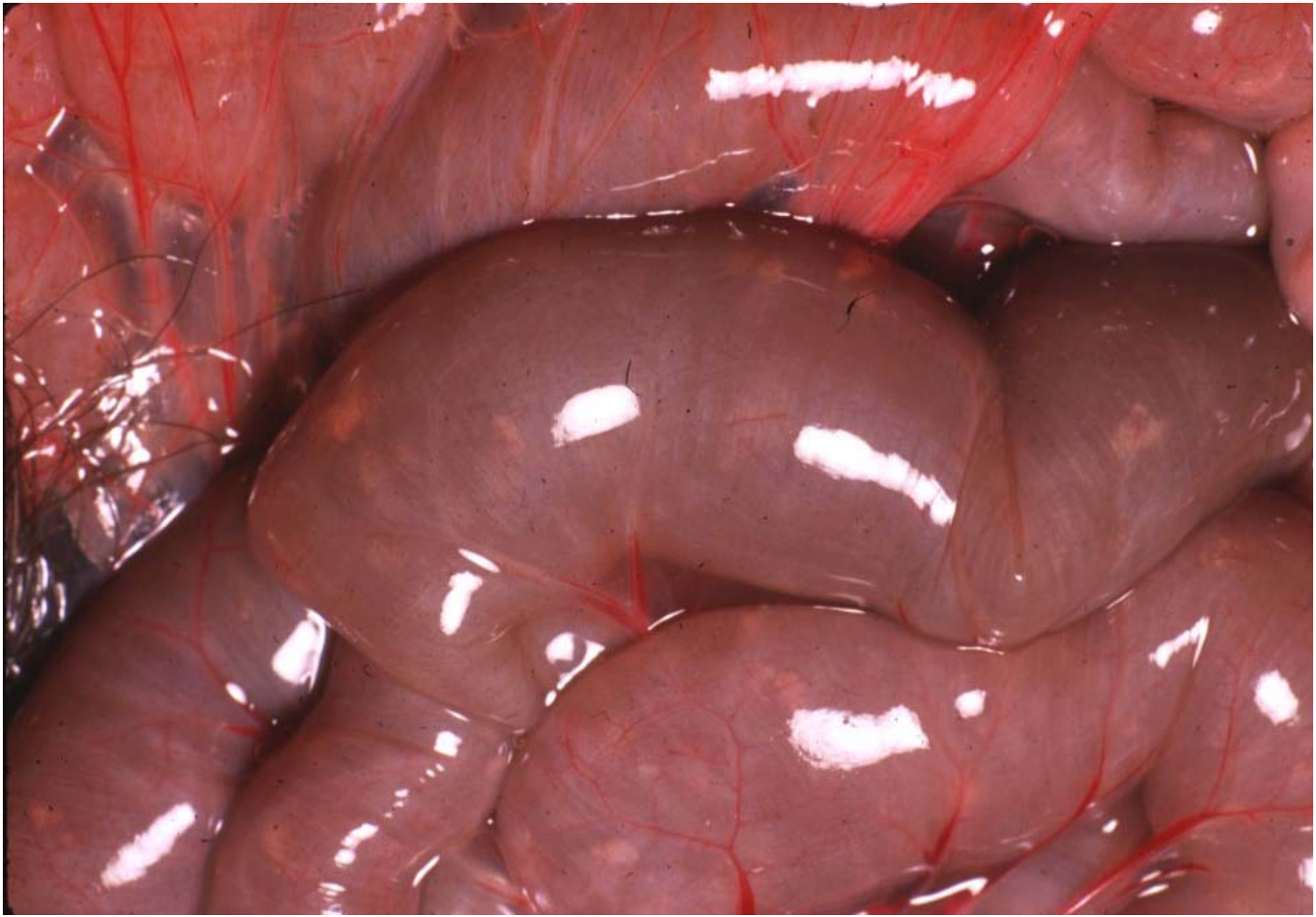
Why is there diarrhea? (PATHOGENESIS)

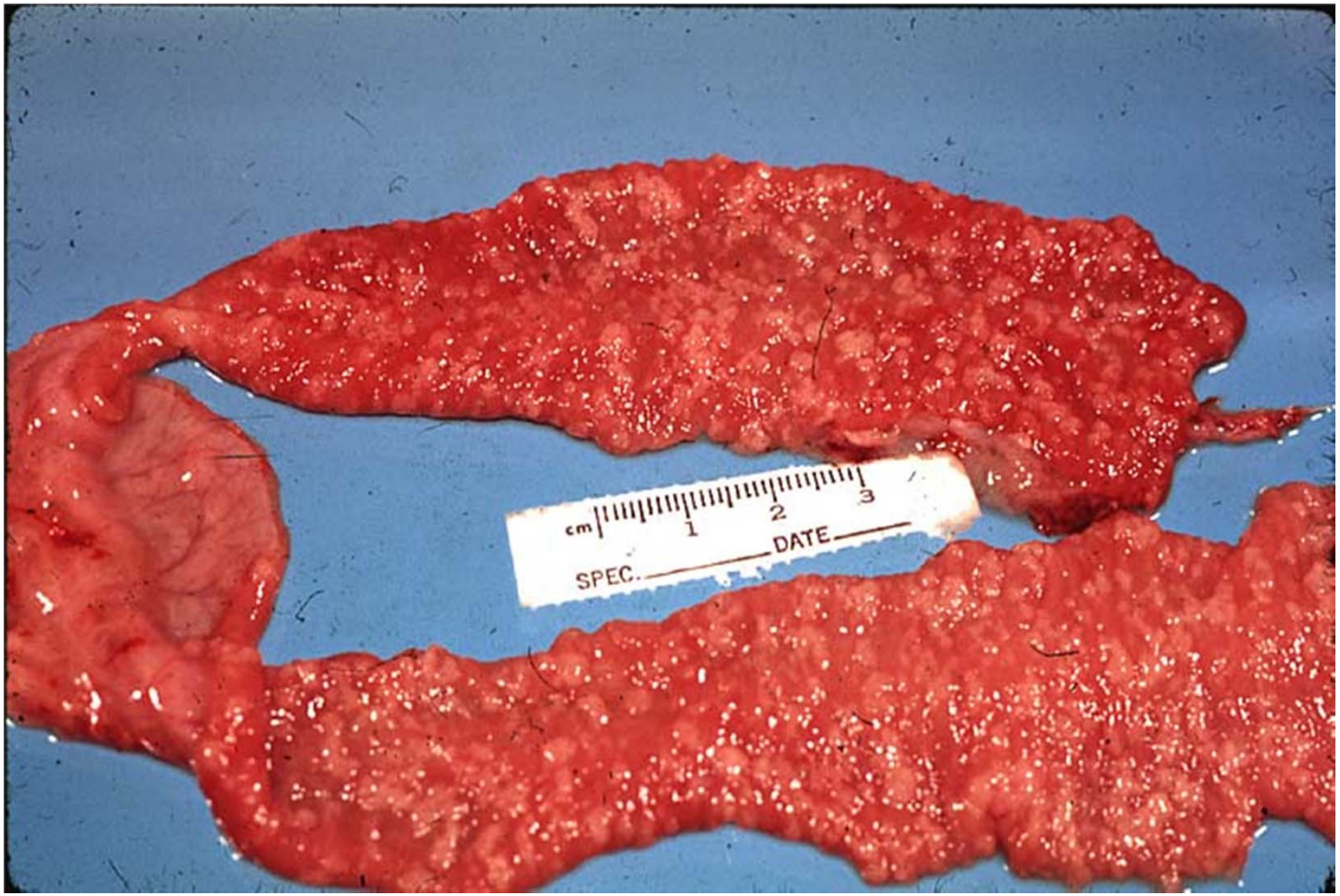
Parvovirus infected intestinal crypt epithelial cells → →

Crypt cells died (exploded) → →

Ulcerated areas oozed fluid into lumen, also cannot absorb → → diarrhea

DIARRHEA IS EFFUSIVE





Morphologic diagnosis?

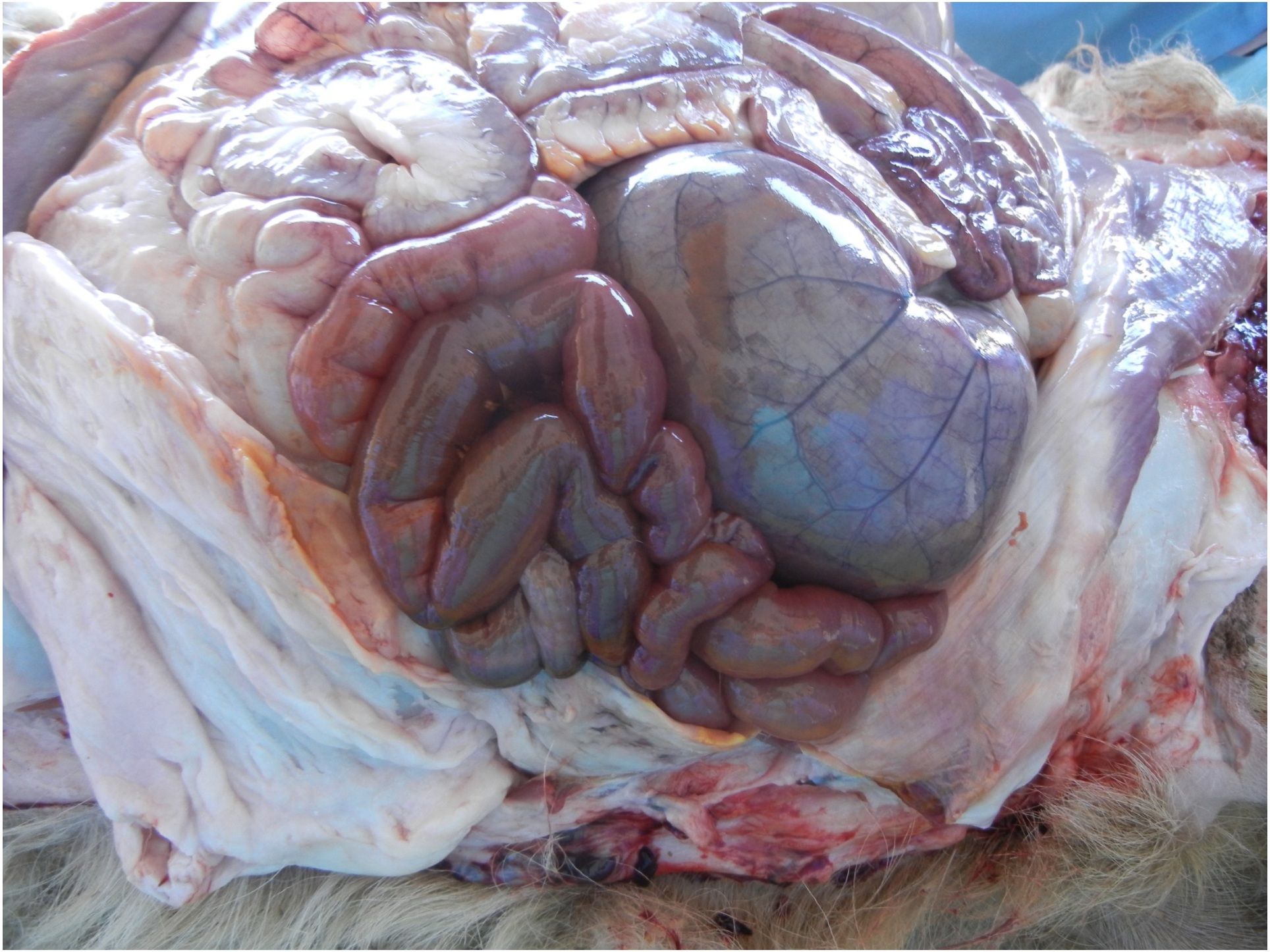
Why is there diarrhea? (PATHOGENESIS)

Coccidia grow within epithelial cells, grow in a neighborhood, explode cells when they mature → →

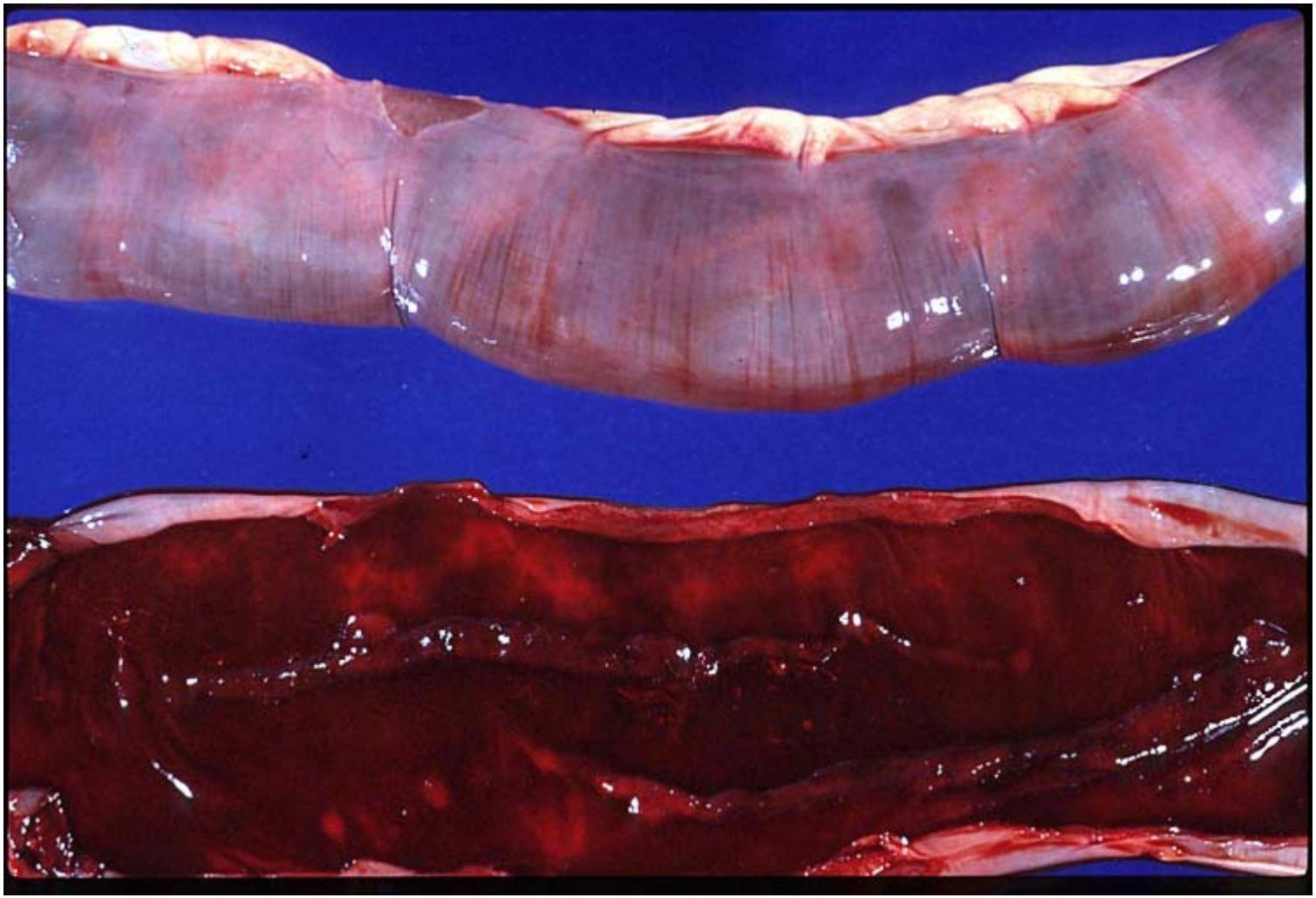
Ulcerated areas ooze fluid, plus decreased surface for absorption → →

Diarrhea

DIARRHEA IS EFFUSIVE




0 1 2 3 4 5 6 7 8 cm 10



Morphologic diagnosis?

Why did the sheep die? (PATHOGENESIS)

Excess grain in intestine → → Clostridia grew very well → → produced TOXINS

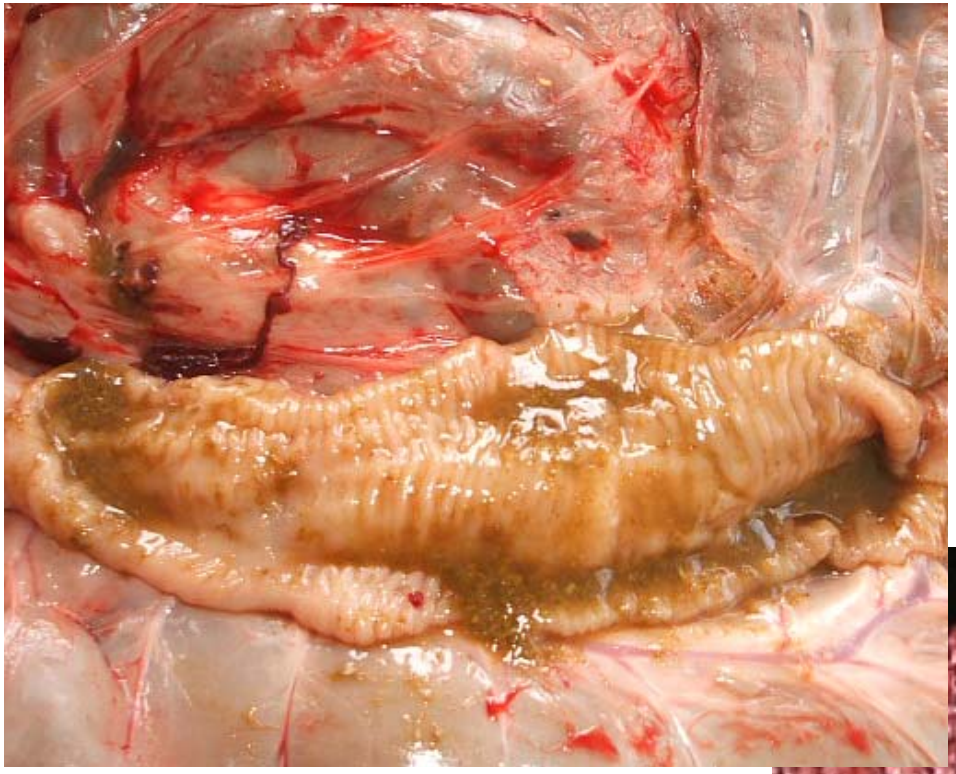
Toxins in intestine act on vasculature → → edema, hemorrhage

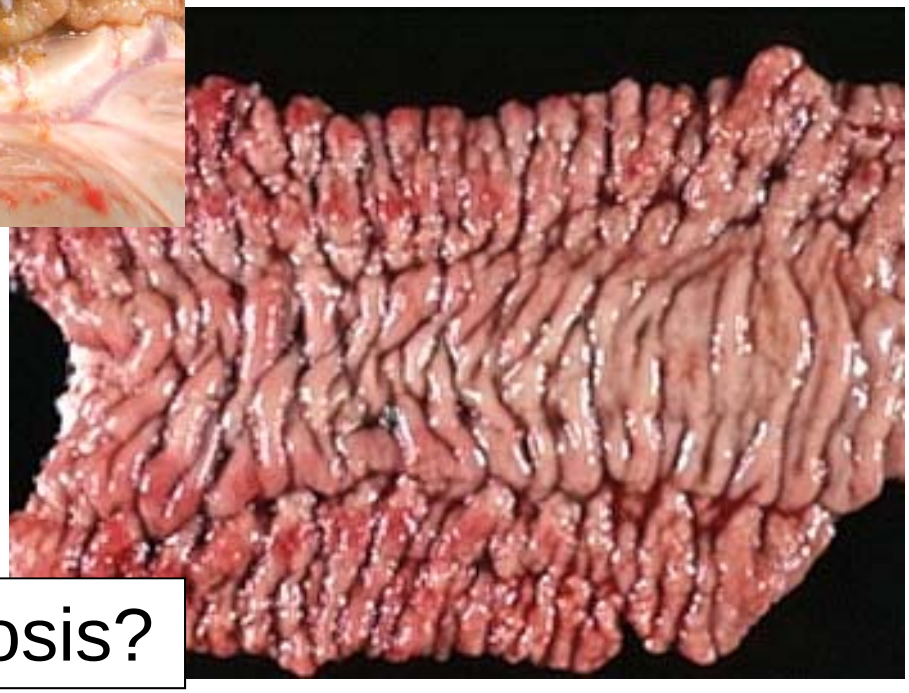
Ulcers, hemorrhage, effusive diarrhea → → dehydration

SHEEP DIES

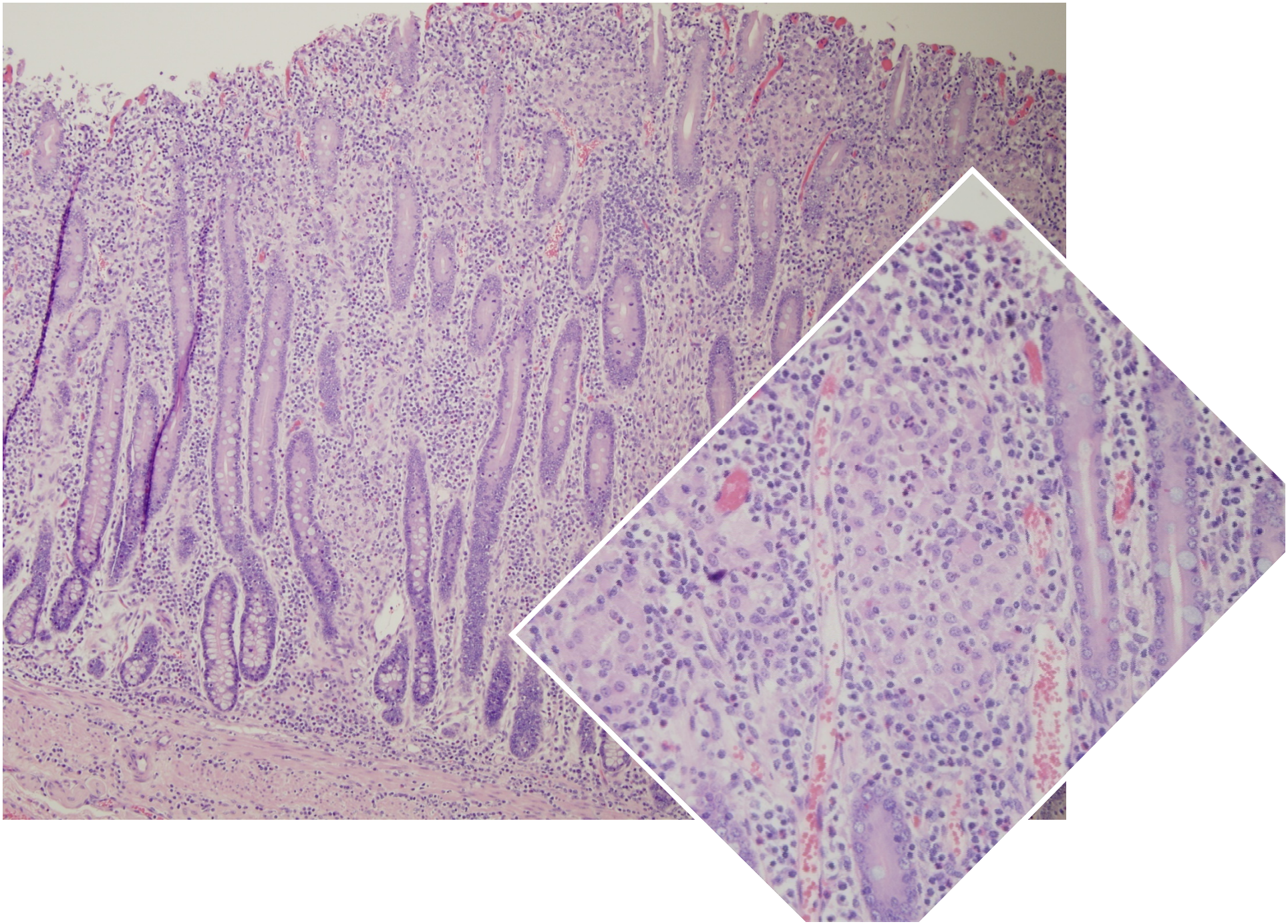
Two Reasons for Diarrhea

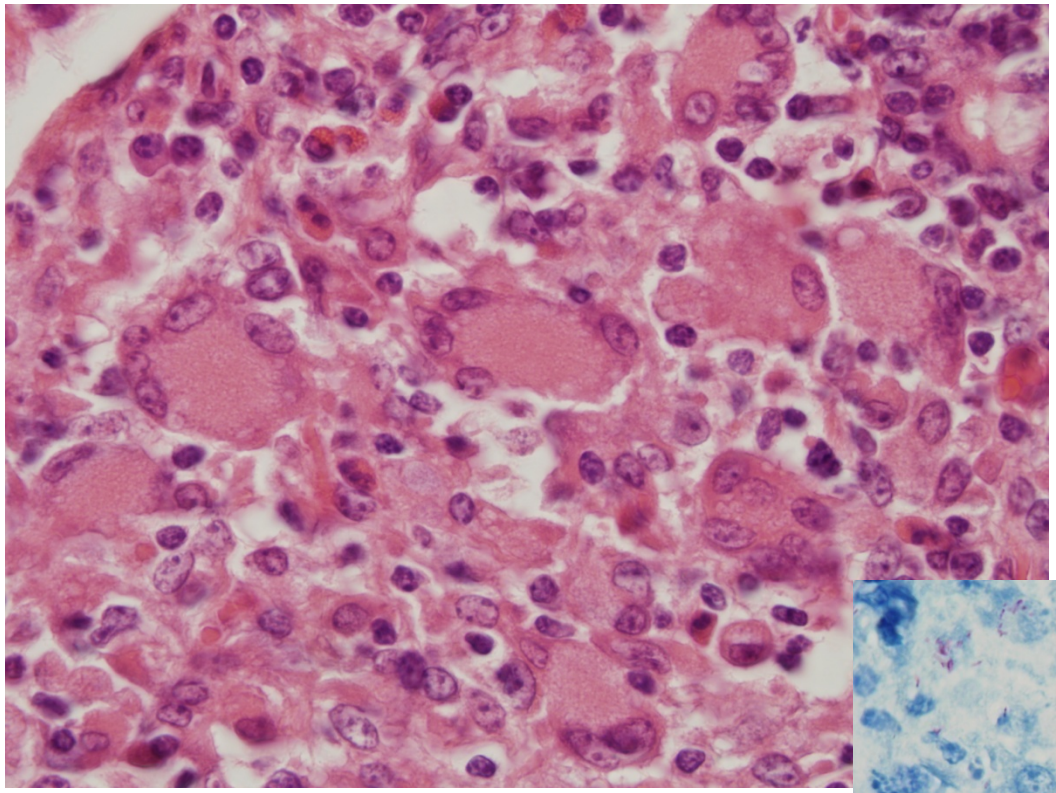
- Cannot absorb (malabsorptive)
- Leaky gut (effusive)

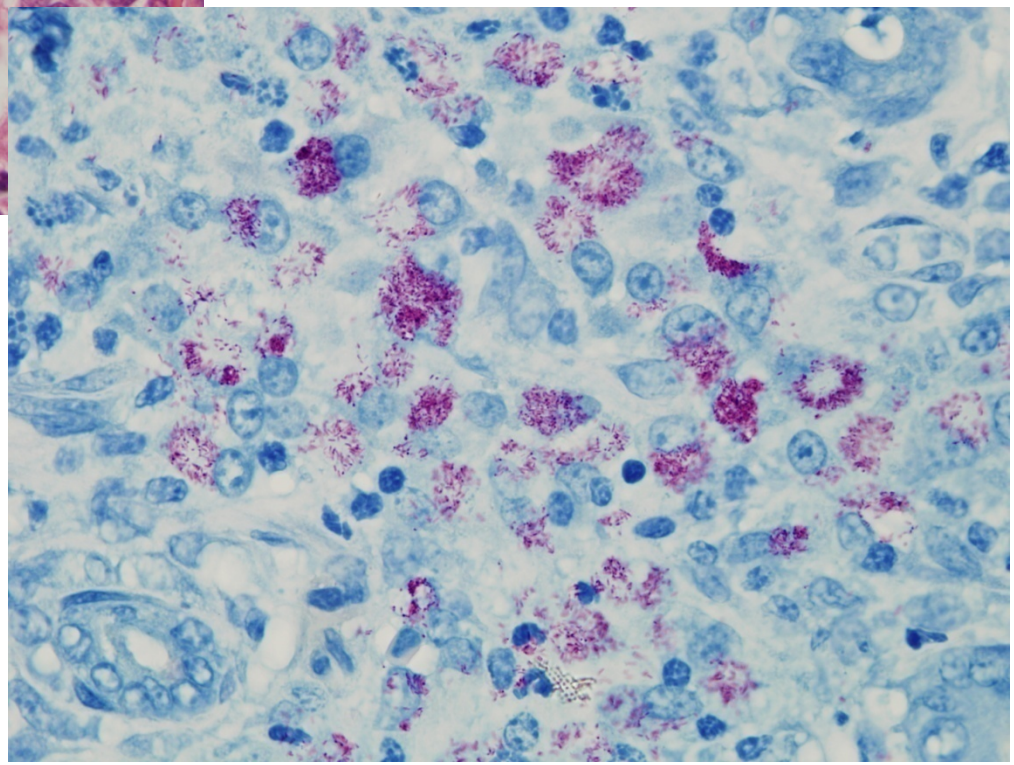




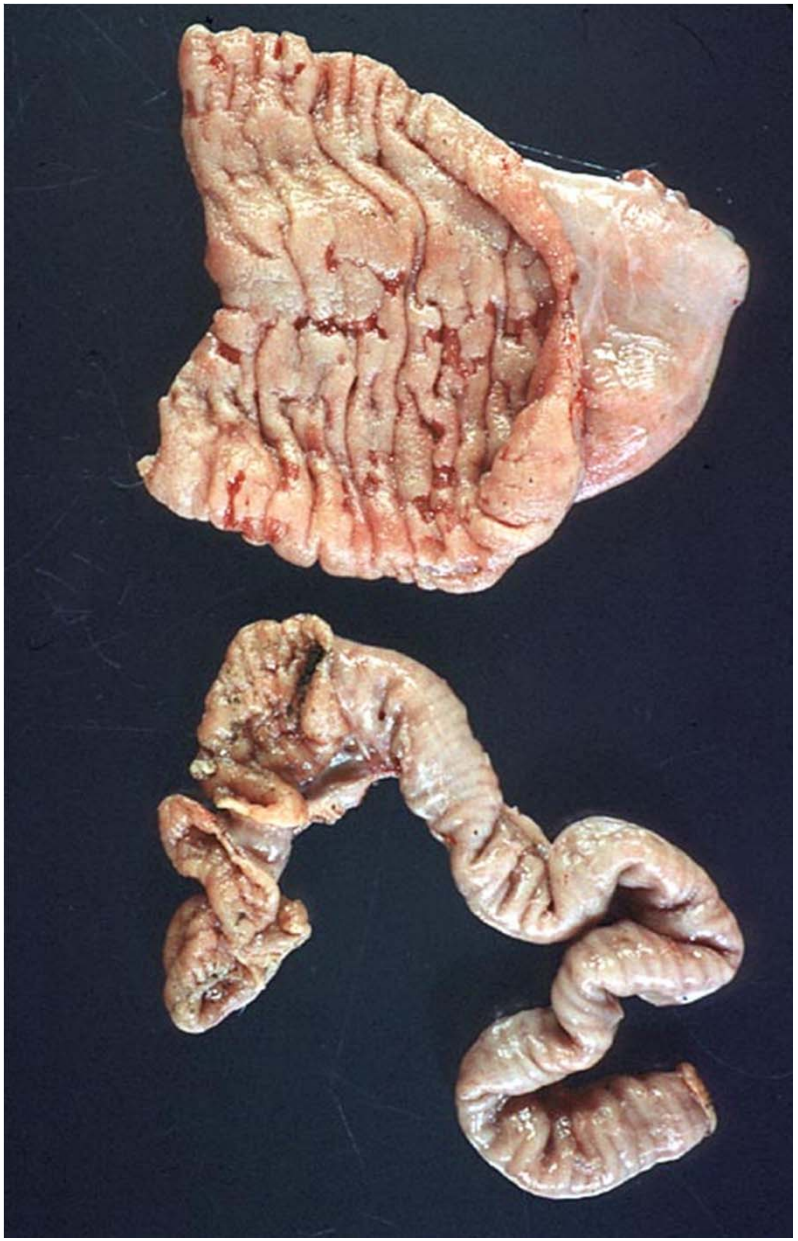
Morphologic diagnosis?







Johne’s disease



Problems in the sheep (PATHOGENESIS)

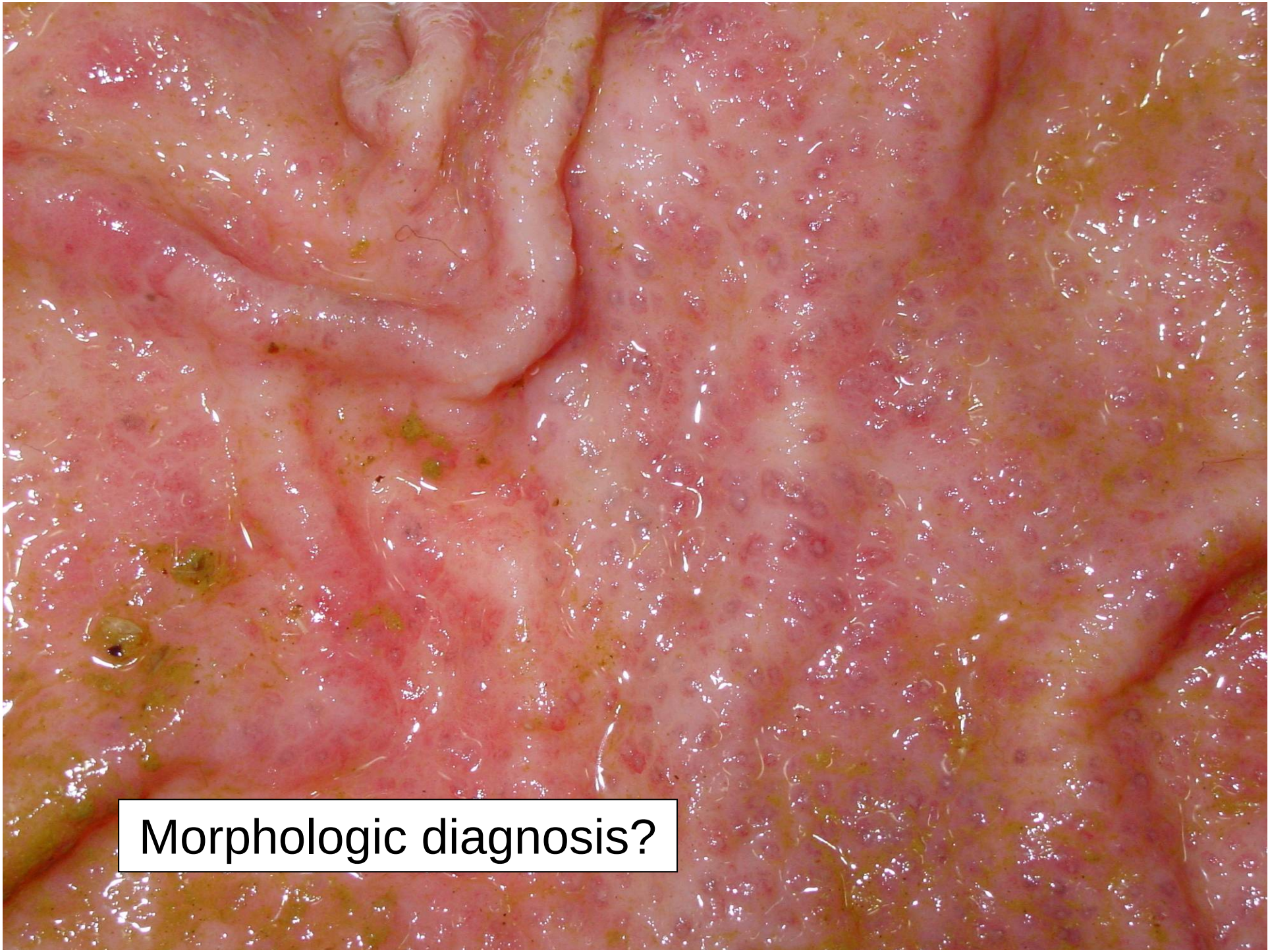
Mycobacterium avium subspp. *paratuberculosis* infects the sheep when she is young → →

The bacteria lives HAPPILY in the macrophages of the lamina propria in the small intestine → →

More macrophages come in to battle the bacteria, but they all get infected and end up plugging the lamina propria → → malabsorption → →

Diarrhea, hypoproteinemia

FOREVER THIN, FOREVER WITH DIARRHEA


Morphologic diagnosis?

Why is there diarrhea? (PATHOGENESIS)

Ostertagia encysts in the abomasum → →

Chronic abomasitis → →

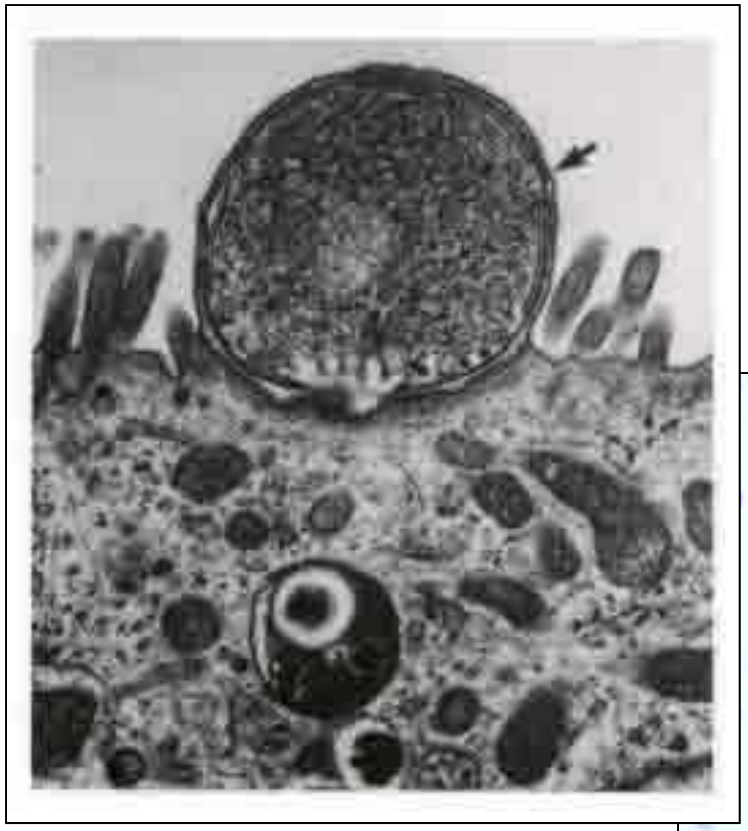
No acid or pepsinogen produced → →

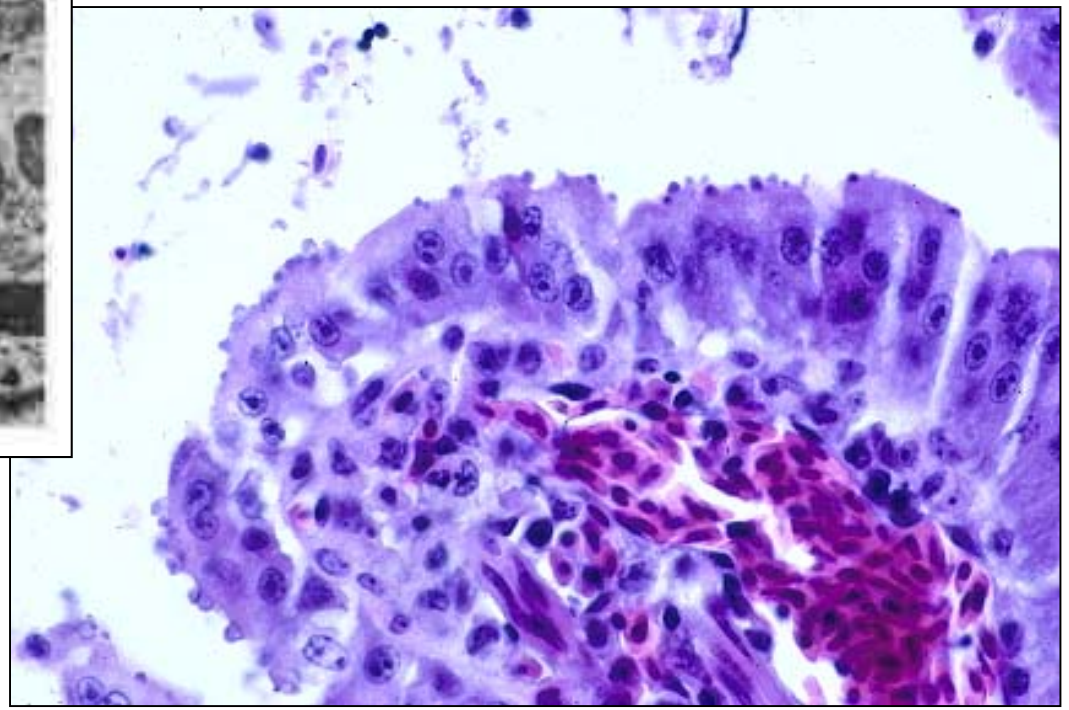
No protein digested → → protein moves right through the tract, carrying water with it

DIARRHEA IS MALABSORPTIVE


Morphologic diagnosis?

Cryptosporidium





Why is there diarrhea? (PATHOGENESIS)

Cryptosporidium grows within the brush border → →

Brush border obliterated, so it cannot absorb → →

Nothing absorbed, nonabsorbed nutrients carry water all the way through → →

DIARRHEA IS MALABSORPTIVE