# AVIAN COCCIDIOSIS

- One of the most potentially destructive diseases in domestic poultry production.
- Most costly of all poultry diseases.
- Strictly a gut infection in chickens and turkeys.
- All avian species affected.
- Host specific.

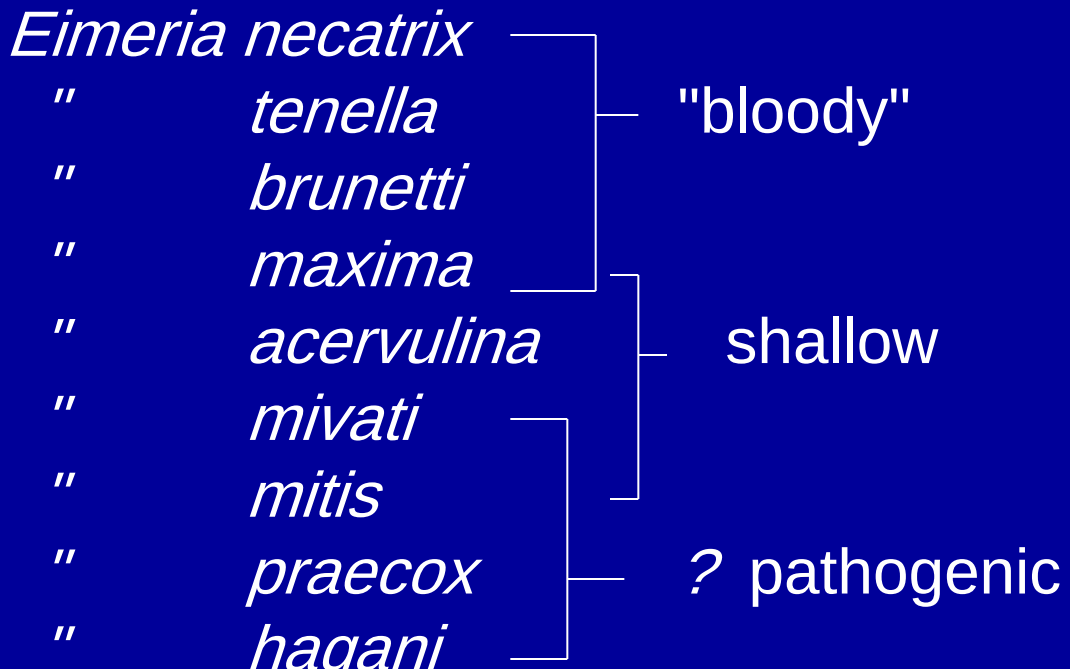
# ETIOLOGY

- Protozoa - genus *Eimeria*.
- Direct short life cycle, sexual and asexual phases with high reproductive potential.
- 1 oocyst produces 1,500,000 oocysts.
- Self limiting - severity of infection, dosage dependent.

# ETIOLOGY (CONT.)

- Modern poultry production methods encourage severe infection. Mixed infections are common in chickens.
- Poultry raised on the floor are highly susceptible throughout their life.
- Pullets raised on wire away from fecal contamination have a low chance of infection but remain susceptible.
- Oocyst are resistant to adverse environmental conditions.
- Exposure related immunity develops.

# SPECIES AFFECTING CHICKENS



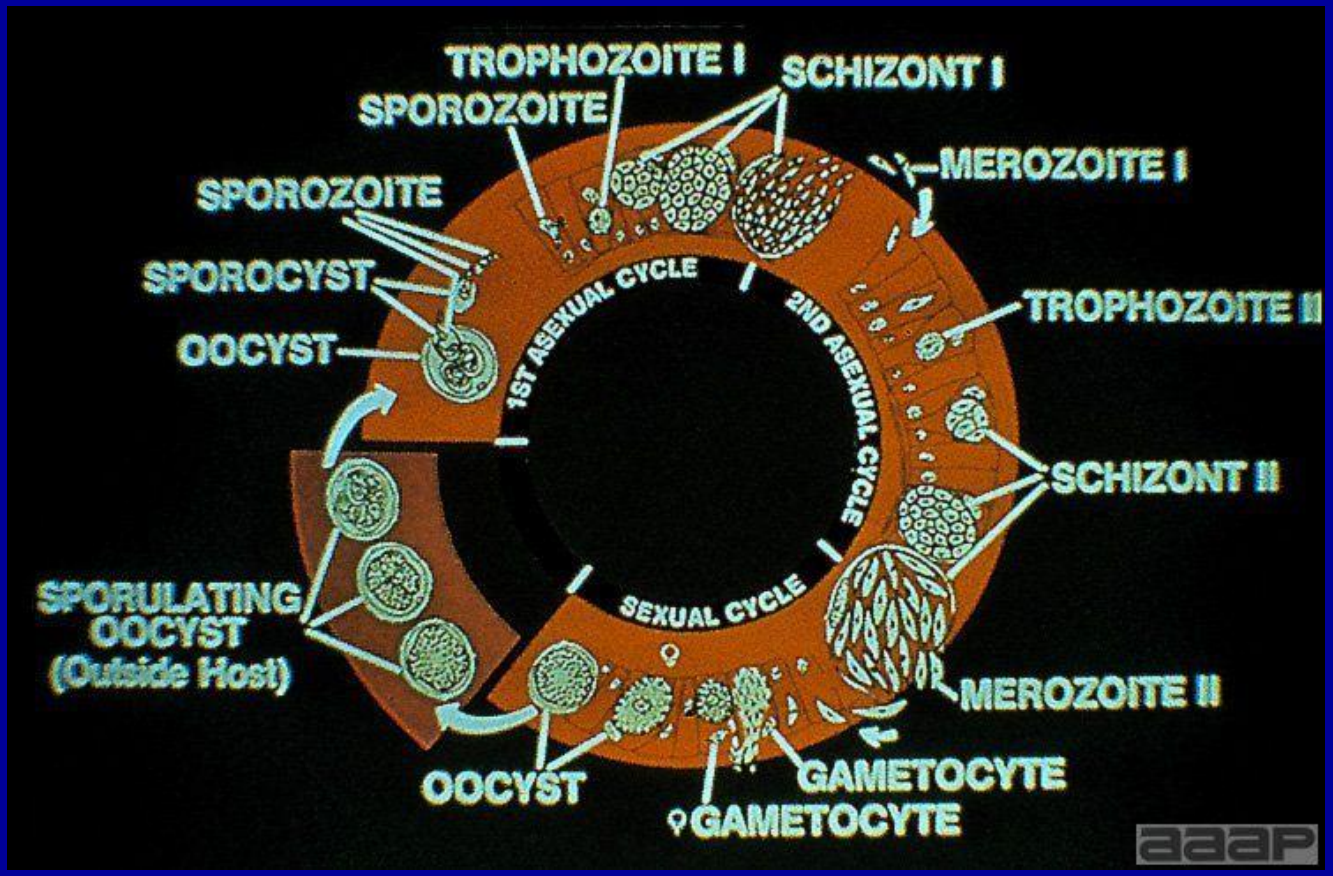
# INCUBATION PERIOD

- Depend on species of coccidia 7-8 days to complete life cycle.
- Mortality - depends on coccidia species and dosage. Usually 5 to 8 days after infection.
- Blood appears - 4-5 days depending on coccidia species.

# COURSE OF DISEASE

- 1-3 wk. on a flock basis.
- Depends on species of coccidia.
- Immunity develops.

# *E. Tenella* life cycle



# ECONOMIC EFFECT

- Mortality - variable.
- Poor feed conversion and weight gains.
- Reduction of desired pigmentation.
- The lack of uniformity in pullets.
- Above depends on species of coccidia, dosage, condition of overall health and genetics of the chicken.
- Every ton of feed has $5/ton of coccidiostat.

# METHOD OF SPREAD

- The natural behavioral traits are conducive to ingestion of sporulated oocyst.
- Starts in a few birds and dosage is built up over one or two passages and whole flock may be exposed.

# SIGNS

- Typical "sick bird" - depressed and ruffled feathers.
- May or may not have bloody diarrhea depending on species of Coccidia.
- Mortality - may be first thing noticed. Species dependent.
- Loss in egg production - rare because usually exposed and immune before the start of lay.

# Typical sick chicken

# POSTMORTEM LESIONS

- *Eimeria tenella* - cecal coccidiosis.
- Erosions of cecal wall with free blood and bloody cores in ceca.
- Caseous cores (old cases).
- Micro - presence of ovoid oocyst in cecal scraping from sub-epithelium.
- Oocysts are double walled.

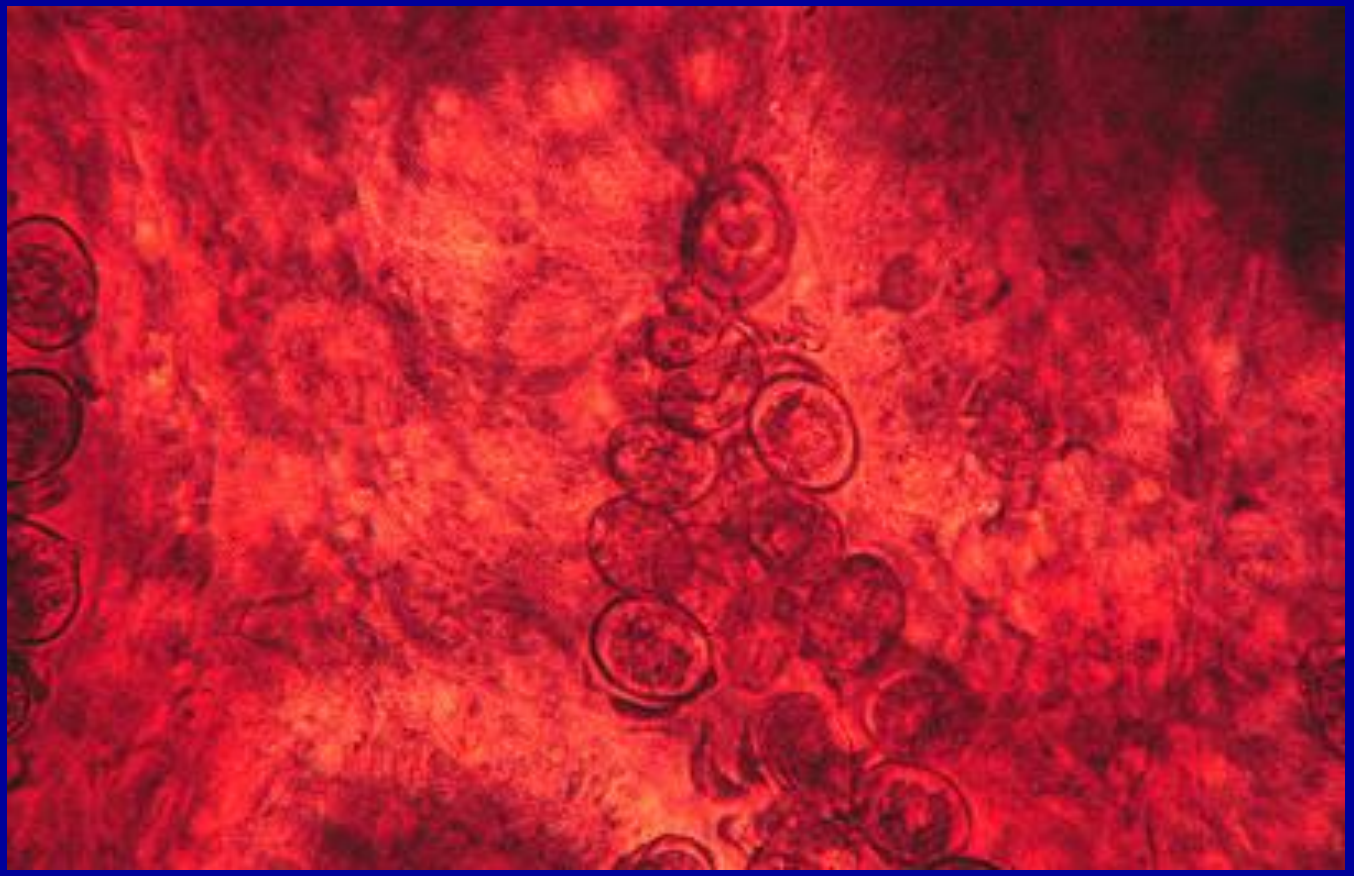
# *E. tenella vs. normal*

# *E. tenella*

# *E. tenella*

# *E. tenella*

# *E. Tenella* oocysts



# POSTMORTEM LESIONS

- *Eimeria necatrix* - mid gut.
- Ballooning in mid gut.  Parasite in sub-epithelium.
- Serosa - white spots and petechial hemorrhages
- Open gut - mucoid blood-filled exudate.
- Micro - gut has large schizonts (single wall with little definition) but no oocyst.  Life stages moves to ceca  where oocysts are found.
- Ceca-oblong ovoid oocyst with no wall erosion.
- Less likely to be a mixed infection.

# *E. necatrix*

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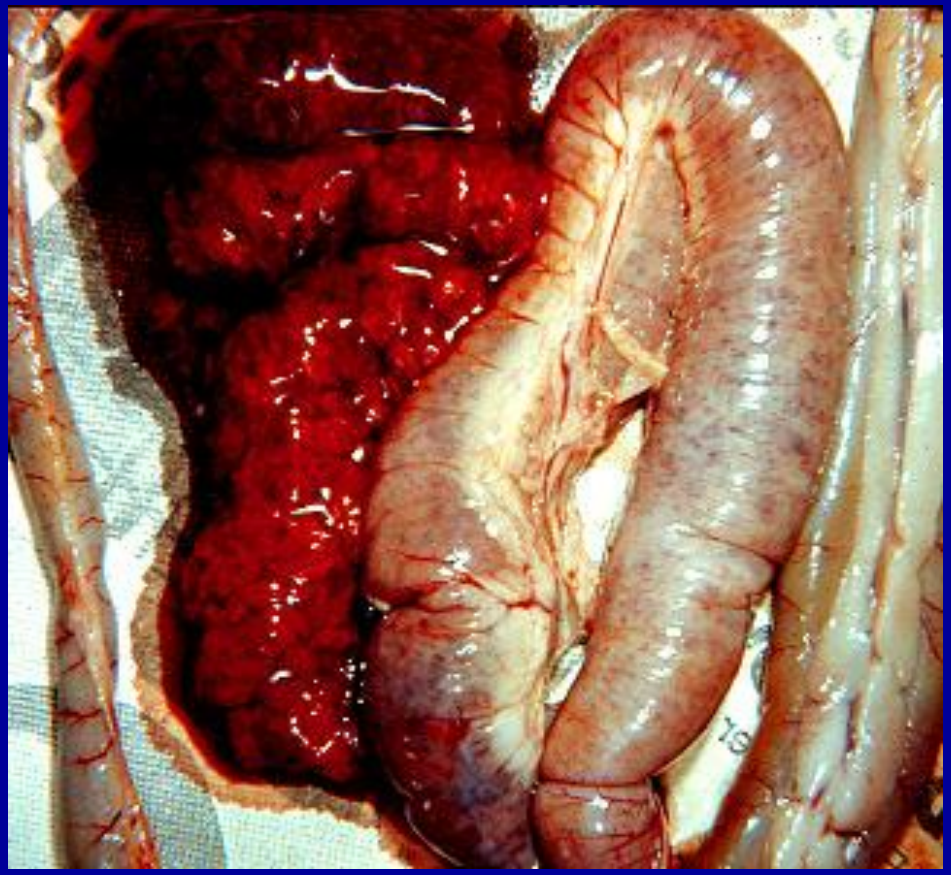
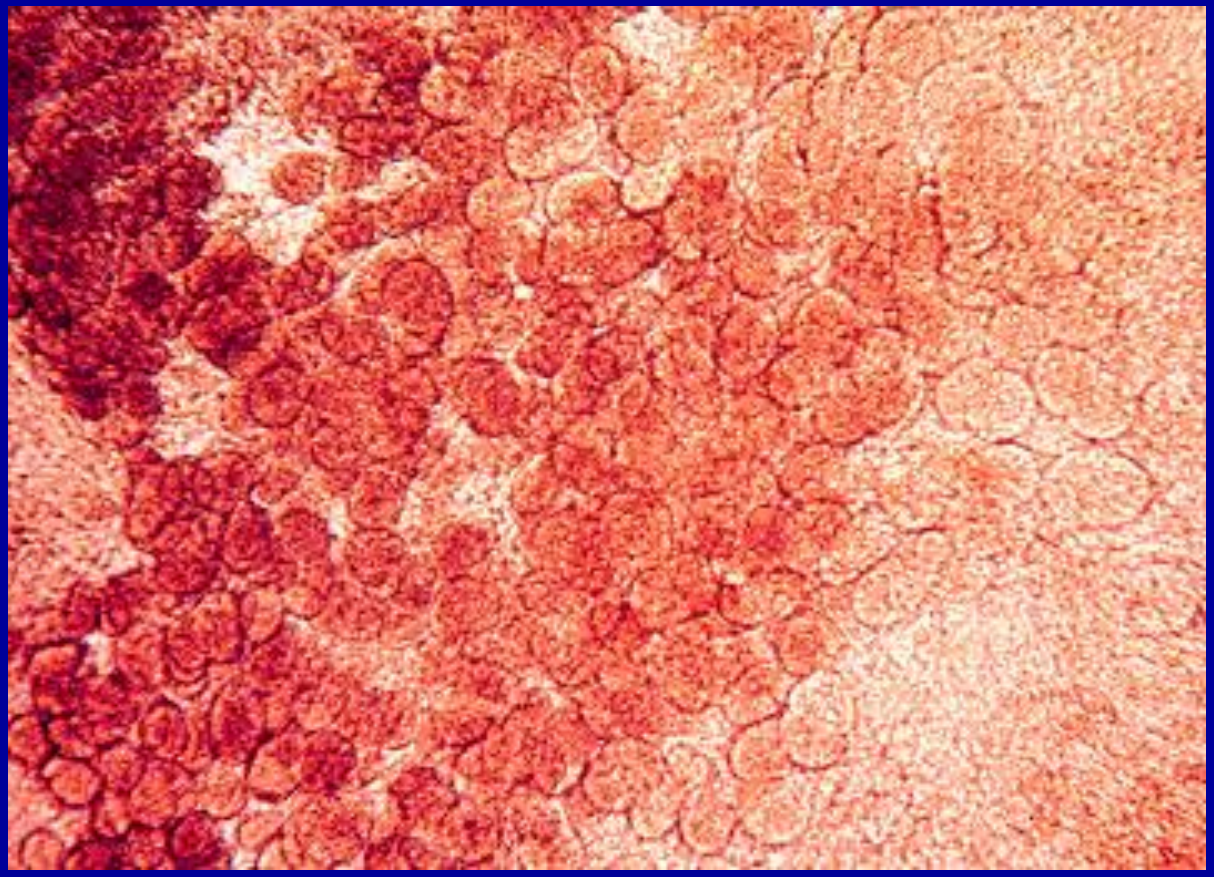
# E. necatrix

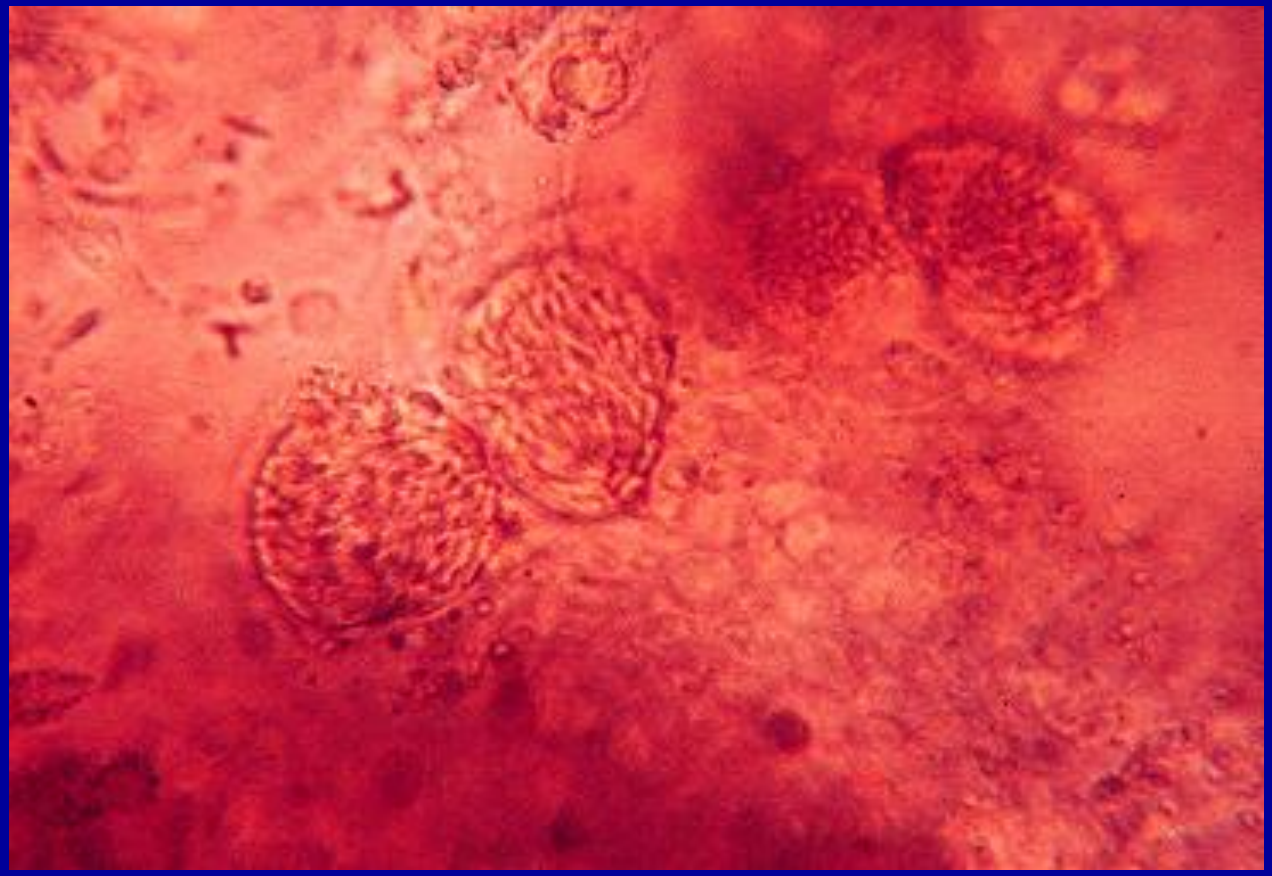


# *E. necatrix*

# *E. necatrix* scraping



# *E. necatrix* schizonts



# POSTMORTEM LESIONS

- *Eimeria brunetti* - mainly in lower SI and rectum. Some infection in mid SI and ceca.
- Serosa - ecchymotic white areas with thickening of lower SI and rectal walls.
- Open gut - *coagulative* necrosis, mucoid bloody enteritis in lower gut.
- Micro - large ovoid oocyst in coagulative material. Infection in sub-epithelium.

# *E. brunetti*

# *E. brunetti*

# POSTMORTEM LESIONS

- *Eimeria maxima* - midgut - “salt and pepper” lesions.
- Serosa - faint hemorrhages and wall ballooning.
- Open gut - blood-tinged mucus sometimes orange exudate.
- Micro - large golden color oocyst in gut is diagnostic. 30 x 20 microns.

# *E. maxima*

# *E. maxima*

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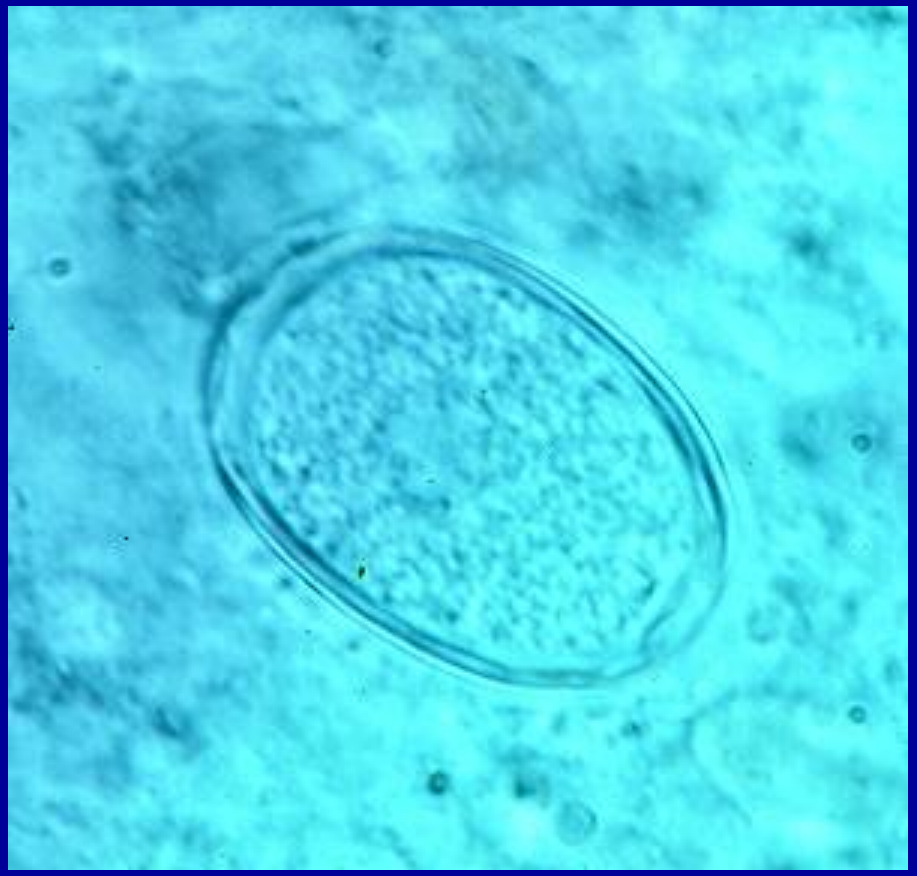
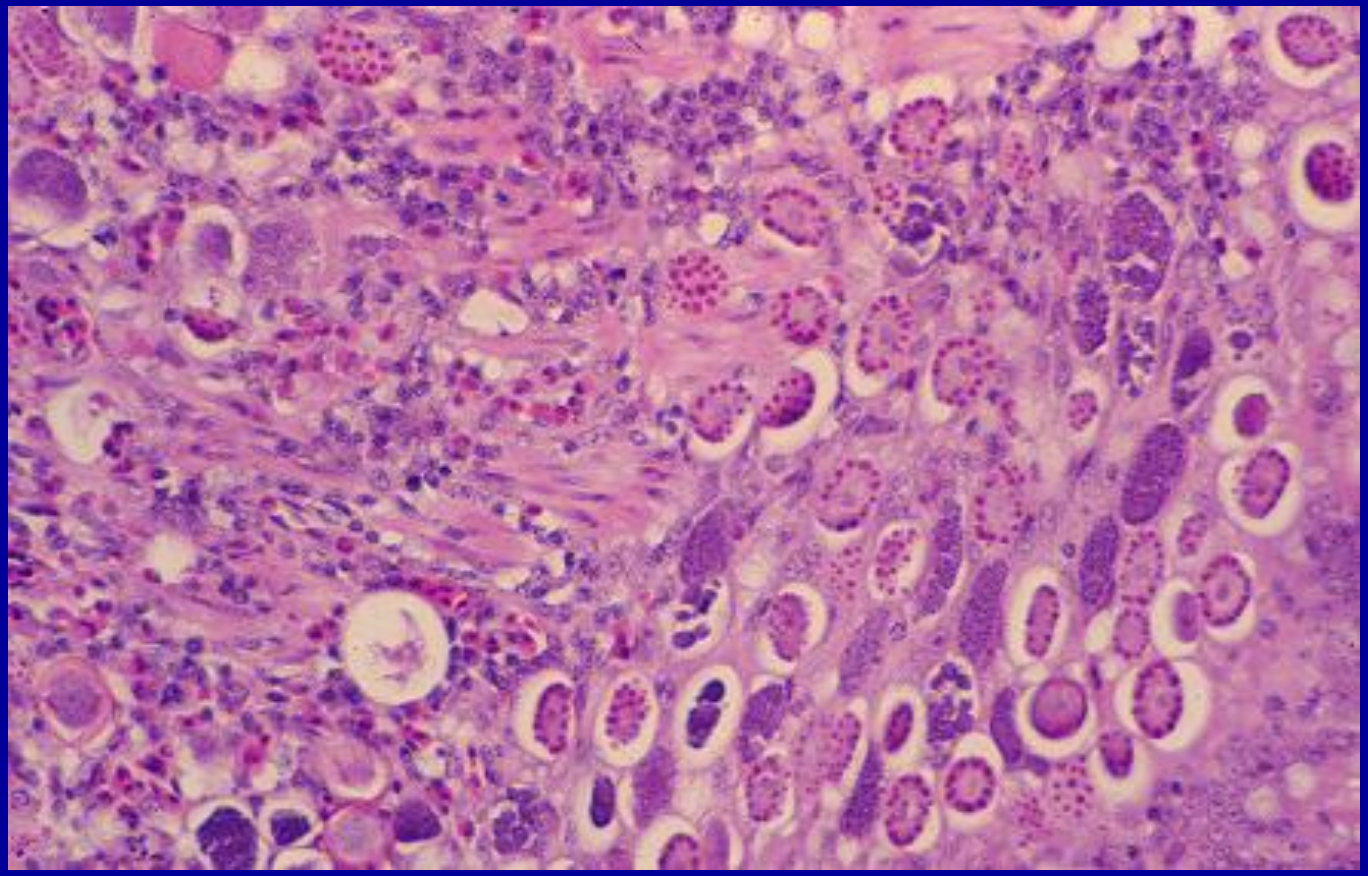


# *E. maxima* schizots



# POSTMORTEM LESIONS

- *Eimeria acervulina* - usually in duodenal area.
- Serosa - white plaques that may be elongated and have a tendency to be "Ladder like" (horizontally) or in severe infections coalesced plaques and wall thickening. The ladder lesions are becoming less common.
- Open gut - only the epithelium is affected. May be whitish petechiae to coalesced lesions with a milky appearance (oocyst) in severe infection. Pathology depends on dosage.
- Micro - small (18 x 14 microns) ovoid oocyst from gut epithelium.

# *E. acervulina*

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# POSTMORTEM LESIONS

- *Eimeria mivati* - some disagreement over the actual authenticity of this being a separate species from *E. acervulina.*
- Occurs in the epithelium of the upper gut.
- Serosa - similar to *E. acervulina* but round lesions and more gut thickening.
- Open gut - depending on dosage from individual plaques to coalesced large infected areas that appear milky.
- Micro - similar to *E. acervulina* with more macrogametocytes present mixed with oocyst.

# *E. mivati*

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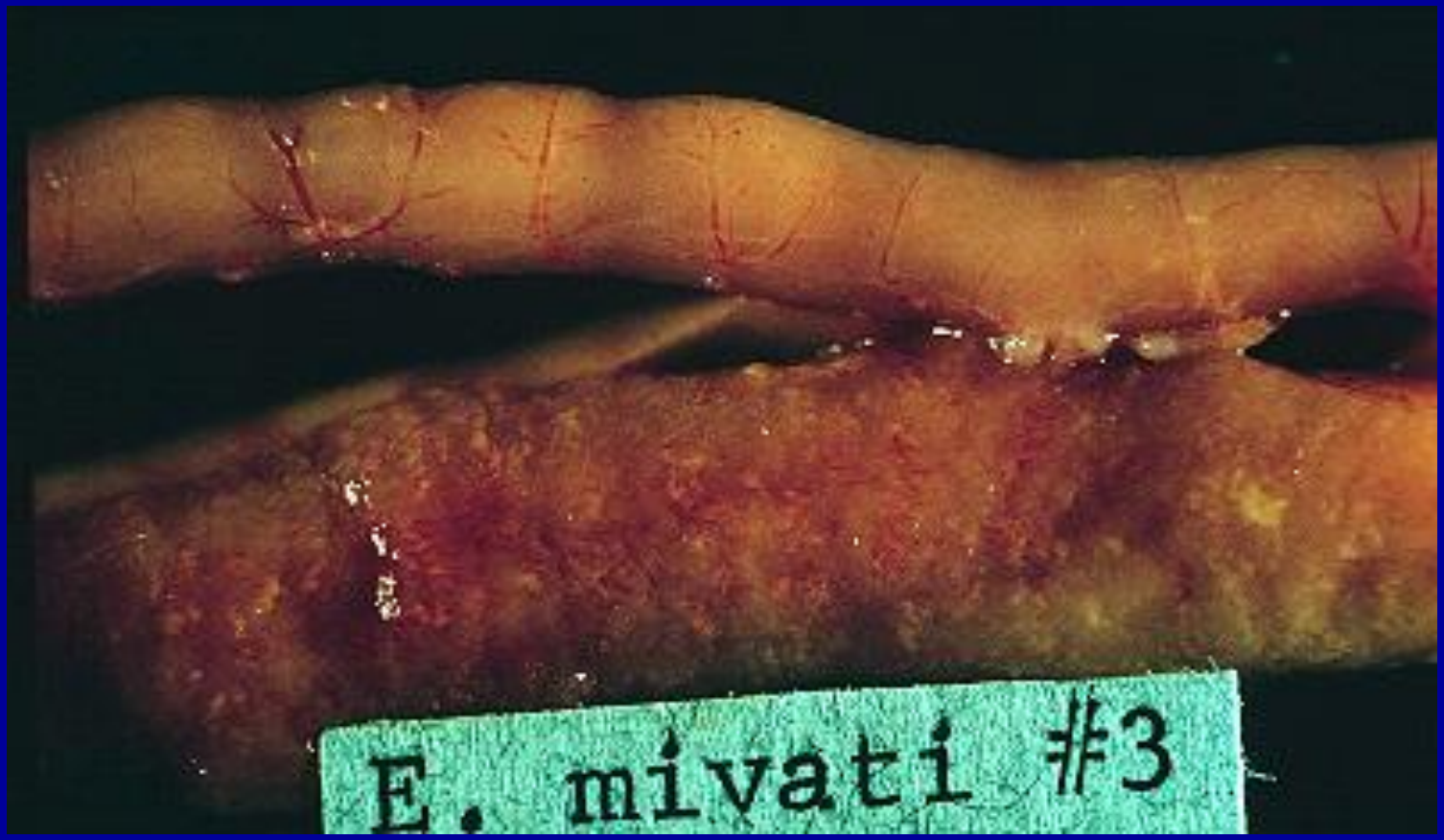


# *E. mivati* oocyst

# POSTMORTEM LESIONS

- *Eimeria mitis* - low in pathogenicity lower third of the SI.
- Serosa - difficult to see any lesions.
- Open gut - slight mucoid appearance, look for oocyst with microscope.
- Micro - very small (15 x 14 microns) subspherical oocyst.
- *E. praecox* - slightly pathologic causing diarrhea.
- *E. hagani* - needs research.

# DIAGNOSIS

- The presence of lesions and some stage of the life cycle of coccidia (usually oocyst).
- Need to look at live and dead birds.
- Select birds typical of the flock, not culls. Culls may be off feed and not ingesting coccidiostat so are very likely to have cocci even if it is not a flock problem.
- Must use light microscope to confirm.
- Can speciate by location of lesions and type and size of oocyst.

# DIAGNOSIS (CONT.)

- The serosal surface is examined for white plaques and hemorrhagic petechiae. The area of the gut affected is considered.
- The gut is opened and the mucosa of the affected area is scraped off with a spatula and placed on a microscopic slide.
- A cover-slip is applied to the scraping and mashed to produce a thin smear.
- The slide is then examined with a light microscope. Low power (100x) is used for scanning and high dry power (430x) for detail examination and measurements.

# DIAGNOSIS (CONT.)

- Many times coccidiosis will be caused by a mixture of species. Usually if birds are dying, there is a predominance of one deep invading species.
- Coccidiasis-presence of stage of life cycle (usually oocyst) without lesions in the gut or effect on production.
- Disease has a tendency to be over-diagnosed by servicemen.

# COMMENT

Other enteritis problems may appear similar to coccidiosis. However, a microscopic examination should clarify the diagnosis. Don't treat for coccidiosis unless you know for sure.

# Nonspecific enteritis

# Nonspecific enteritis

# TREATMENT

- Follow directions closely.
- Treatment - usually in water.
- Overtreatment can cause drug toxicity (Sulfas).
- Take into consideration the season of the year. Sulfa drugs can be toxic if birds change their drinking habits based on temperature.
- Some drugs can be used for both treatment and control.
- Treatment - really prevention.

# TREATMENT CHICKENS

| | Water | Feed |
|---|---|---|
| Sulfaquinoxaline | + | + |
| Amprol®* | + | |
| Sulfadimethoxine | + | |

*Approved for laying hens

# PREVENTION

- Genetics - not developed.
- Nutritionally - certain vitamins help but not reliable.
- Quarantine & depopulation - not practical - can make things worse.
- Sanitation - not practical - may produce more susceptible birds.  Very resistant to chemicals.

# PREVENTION (CONT.)

- Reduced exposure - shift from floor to cage rearing but bird must remain in cages or on wire for life.
- Immunization - requires exposure (natural or planned) to live coccidia. This is used in broiler breeders or leghorns. Vaccine available.
- Chemotherapy - coccidiostats - presently most practical and most used.

# COCCIDIOSTATS

Trade names

| Ionophores | Withdrawal (days) |
|---|---|
| Coban® (Summer) | 0 |
| Avatec® | 5 |
| Bio-Cox® (Summer) | 0 |
| Cygro® | 3 |
| Monteban® (Narasin) | 0 |
| Maxiban® (Narasin + Nicarb) | 3 |

# COCCIDIOSTATS

Trade names

| Chemicals | Withdrawal (days) |
|---|---|
| Nicarb® (Winter) | 4 |
| Amprol®, Amprol +®, Amprol Hi-E® (A thiamine analog) | 0 |
| Coyden® at 0.125% (25% premix) | 5 |
| Zoamix® | 0 |
| Decox® | 0 |
| Rofenaid® | 5 |
| Stenoral® | 3 |

# SHUTTLE AND ROTATION PROGRAMS

- These programs have been used to stop strain resistance to specific drugs.
- Rotation involves complete change of drugs for several months or years hoping resistance will disappear.
- Shuttle programs involve the change of Coccidiostats within a grow-out period of a single flock.

# TYPICAL SHUTTLE PROGRAM

**Summer**

| | |
|---|---|
| Coban | 3-4 weeks |
| Avatec | 5th week until withdrawal |

**Winter**

| | |
|---|---|
| Nicarb | 3 weeks |
| Coban | 5th week |

# IMMUNITY

- 2-3 cycles of infection to develop sufficient immunity (depending on species of coccidia).
- **Coccivac®** - must give in first 7-10-days and proper management of coccidia shed - need 20% moisture in litter.
- 4-6 species used in the vaccine depending on geography.
- **Coccivac** - mainly used in breeders, layer pullets, and roasters.
- **Coccivac -** now given as an eyedrop in the hatchery or sprayed on the feed at 3 days

# IMMUNITY (CONT.)

- Important to develop immunity in breeders and floor layers.
- Amprol - step down program.
- Research being done on new immunizing agents.

# TURKEY COCCIDIOSIS

- Etiology - same genus; *Eimeria*
- Incubation period - same as chicken
- Course of disease - usually about (4-5 days)
- Mortality - low 5% except *E. adenoides*
- Method of spread - same as chicken
- Symptoms - Not as severe, more like "Shallow" invaders, weight loss. No bloody diarrhea like in chickens.

# IMPORTANT SPECIES AFFECTING TURKEYS

- *Eimeria meleagrimitis*
  " a*denoides*
  " g*allopavonis*

  } pathogenic
- 4 other species - non-pathogenic
- *Eimeria dispersa* – affects quail also

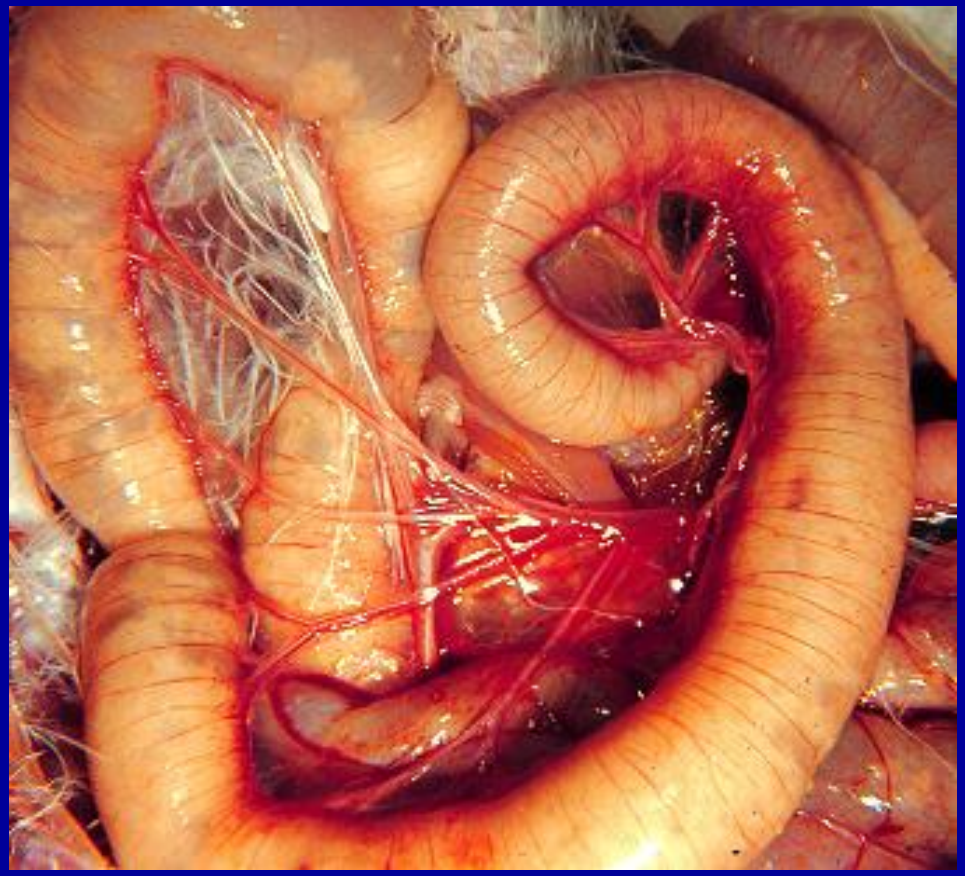
  This one is not host specific.

# POSTMORTEM LESIONS

- *E. meleagrimitis* - upper two-thirds white or green cheesy mucous casts
- Blood rare
- Micro-oocyst in small intestine

# *E. meleagrimitis*

# *E. meleagrimitis*



# *E. meleagrimitis*

# POSTMORTEM LESIONS

- *E. adenoides* - lower third small intestine, ceca, and large intestine
- Dilation, edema and caseous exudate "cottage cheese"
- Mortality may reach 100% in young
- This doesn't occur often and is not seen in Georgia.

# *E. adenoides*

# *E. adenoides*

# POSTMORTEM LESIONS

- *E. gallopavonis* - lower third & ceca.
- Same as *E. meleagrimitis*, but in lower intestines and ceca, in between the cecal pouches.

# *E. gallopavonis*

# *E. gallopavonis*

# TURKEY TREATMENT

- Sulfaquinoxaline (SQ) - toxic
- Amprol
- Sulfadimethoxine (Agribon@) in water

# CONTROL

Try to develop some immunity in the poults. Feed coccidiostats during brooding

- Sulfaquinoxaline (SQ)
- Amprol
- Zoalene
- Coban - need to start birds on this or can get toxicity characterized by a “knockdown” where birds are recumbent with feet stretched out behind
- Stenoral
- Avatec