Overview of Strongyloides: A Significant Disease of Orangutans

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So, all animals get parasites. Why do we care?
Population Review

- Most significant cause of mortality in orangutans aged 1 month to 8 years
- 27% of institutions reported diagnosing in a 10 year period
- Difficult to detect using standard fecal parasite diagnostics
What is it?

• Strongyloidiasis = infection with *Strongyloides* spp nematodes
• NOT the same as *strongyles*
• Two species
  – *Strongyloides stercoralis*
  – *Strongyloides fuelleborni*
1. Rhabditiform larvae in the intestine are excreted in stool.
2. Development into free-living adult worms.
3. Eggs are produced by fertilized female worms.
4. Rhabditiform larvae hatch from embryonated eggs.
5. The rhabditiform larvae develop into infective filariform.
6. Infective filariform larvae penetrate the intact skin initiating the infection.
7. The filariform migrate by various pathways to the small intestine where they become adults.
8. Adult female worm in the intestine.
9. Eggs deposited in intestinal mucosa, hatch, and migrate to lumen.
10. Autoinfection: Rhabditiform larvae in large intestine, become filariform larvae, penetrate intestinal mucosa or perianal skin, and migrate randomly to other organs.

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Clinical Signs—ADULTS

• Usually NONE
• Rarely GI signs
  – Intermittent diarrhea and constipation
  – Abdominal pain; bloating
• May affect skin
  – Itchiness
  – Red rash
Clinical Signs—JUVENILES

• Depends on worm burden
  – Can be NONE
  – Can be SUDDEN DEATH

• Often non-specific
  – Lethargy, weakness, “ADR”

• Respiratory
  – Coughing
  – May mimic viral respiratory infections
Why a problem?

- Naïve immune system in young animals
- Sudden, high level exposure
- Smaller size relative to worm size
- Difficult to detect with screening methods
Diagnosis

• Fecal testing?
  – Who?
• Serologic test?
  – Not specific
  – Orangutans?
• If there is a clinical suspicion, TREAT!!
Screening

• Infrequent, low-level shedding = easy to miss
• Single sample = 70% missed
• 7 consecutive samples improves sensitivity
Screening

- Direct/flotation/centrifugation not as good
- Baermann technique
Screening

• Charcoal Culture Method
Prevention

• Basic sanitation
  – Reduce contact with feces
• Prophylactic treatment
Prophylaxis

- Most common = monthly ivermectin
- DOC in human treatment
- Others = albendazole, fenbendazole, pyrantel*, and rotations.
- Difficult to assess relative efficacy of Txs
  - Normally low or absent shedding
What about resistance?

• Common concern with parasite Tx
• Difficult to measure with *Strongyloides*
  – Normally low to absent shedding
• Has not been documented in orangutans
• High risk of disease to infant more significant
• Rotating dewormer could help?
SSP Vet Recommendation

• Institutions with pregnant or infant/juvenile orangutans should prophylactically treat ALL orangutans in the group monthly to reduce shedding and environmental load, thereby reducing the risk of *Strongyloides* to the infant

• Ivermectin at 0.2 mg/kg orally once a month is the most common regimen used and appears to be safe and effective

• Screen each individual annually using Baermann technique for 7 days in a row to help assess efficacy of preventive program
Really? EVERY Orangutan?

• YES

• Infants when they begin to take oral medications

• Include pregnant and lactating females
Is Ivermectin Safe?

• **Pregnancy category C:** “Either studies in animals have revealed adverse effects on the fetus (teratogenic or embryocidal, or other) and there are no controlled studies in women or studies in women and animals are not available.”

• **Rat Studies**

• **Lactation:** “Ivermectin is excreted in low concentrations in human milk. Ivermectin should be used in breast-feeding women only when the risk to the infant is outweighed by the risk of disease progress in the mother in the absence of treatment.”
Bottom Line

• *Strongyloides* are common
• *Strongyloides* are difficult to detect
• Preventive treatment is easy
• Preventive treatment is safe
• Preventive treatment keeps baby orangutans from dying
Questions?