



Histomonosis in UK commercial poultry: an update

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A bit about me:

- Studied at Cambridge Vet School and graduated in 2013.
 - Elective project investigated haematology and serum biochemistry parameters in broilers and layers.
- Spent 2 years working for Slate Hall Veterinary Practice.
- Then at Hipra UK as poultry technical and marketing manager 2015-2017.
- Now back at Slate Hall as an associate.



Histomonas meleagridis

- *Histomonas meleagridis* has been a problem in the industry for over a century.
 - In turkeys morbidity is often 80-100% with mortality greater than 85%.
 - Chickens, pheasants and other galliformes are known carriers, with lower morbidity and mortality seen in these species.
 - The economic impact of increased “niggling” mortality and reduced egg production is still large.



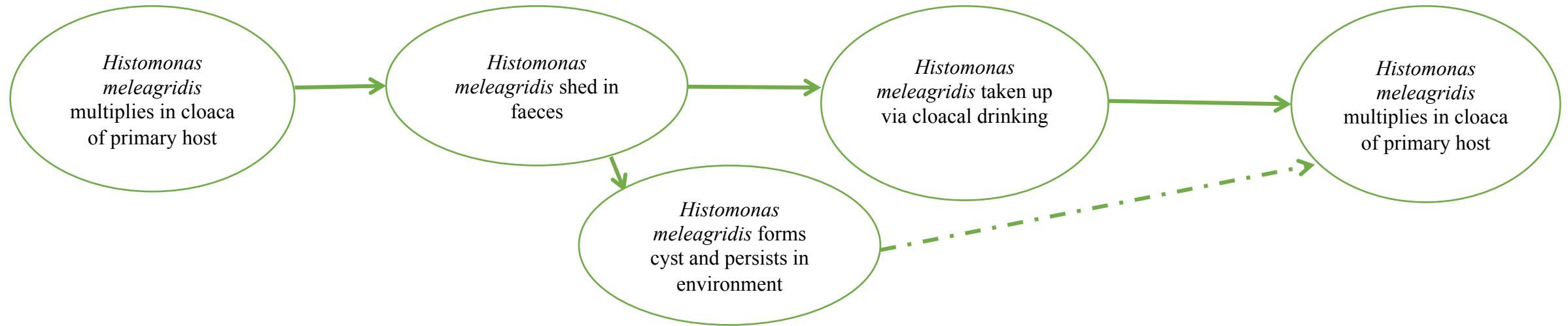


Histomonas meleagridis

A flagellate parasite of the intestinal lumen, which:

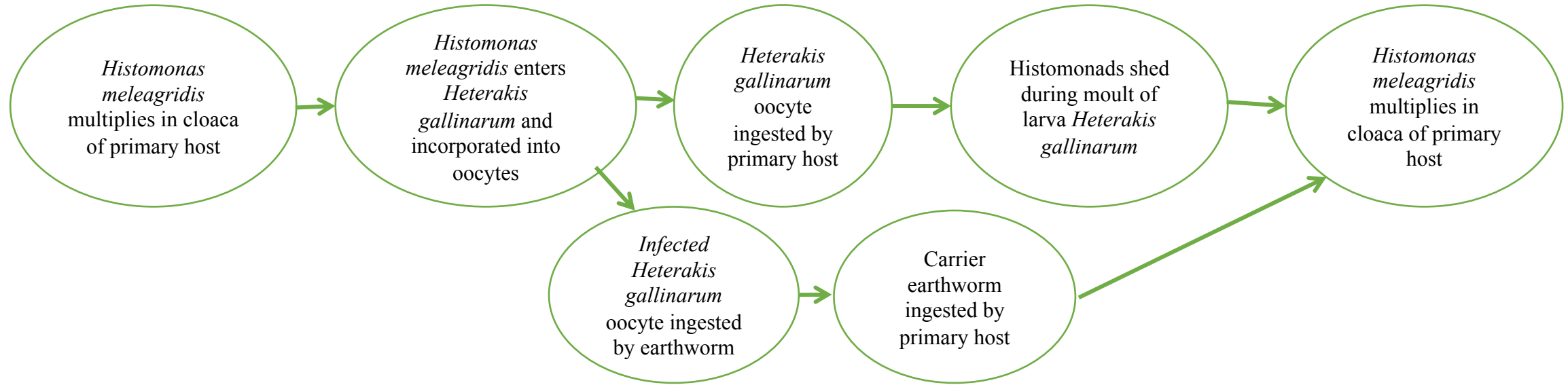
- first colonises the caecum
 - leading to caecal core formation.
- then colonises the liver
 - leading to multifocal hepatitis.

Histomonas meleagridis



- The epidemiology of the disease is complex with routes of infection including:
 - Horizontal transmission via cloacal drinking.
 - Ingestion of carrier caecal worm (*Heterakis*) oocysts or larvae, or ingestion of carrier earthworms.
- A cyst stage has now been discovered which can survive in the environment

Histomonas meleagridis



- The epidemiology of the disease is complex with routes of infection including:
 - Ingestion of carrier caecal worm (*Heterakis*) oocysts or larvae, or ingestion of carrier earthworms.
- *Histomonas* can multiply in female *Heterakis*, so colonisation in chickens increases the level of *Histomonas* infection pressure in the environment.

Treating histomonosis

- Drugs that were historically used to control disease outbreaks, have now been withdrawn from the EU and US markets due to human toxicity and carcinogenicity concerns.
 - They did not prevent the incorporation of *Histomonas meleagridis* into *Heterakis* oocysts.
- Currently there are no licensed veterinary medicines for treatment of histomonosis in the UK.
- Paromomycin has been used with some success under SIC – more on this later in the day.



Treating histomonosis

Essential oil supplements and organic acids are being used as interventions.



- Herb oil blends:

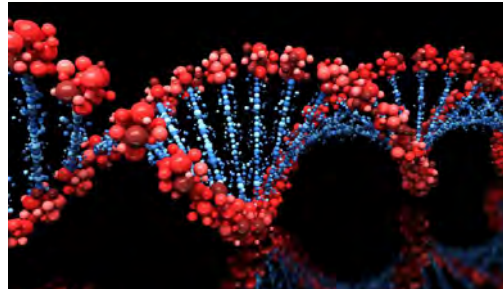
- One study shows reduced mortality in turkeys given in feed and in water herbal oil supplementation prior to challenge (cinnamon, garlic, lemon and rosemary) cf. no treatment. (Hafez et al, 2007)
- Cinnamon, garlic and lemon oils have demonstrated a lethal effect on *Histomonas meleagridis* in vitro (Zenner et al 2003).
- Oregano oil – no published research! Clinical experience has shown variable results.
- In feed and/or in water?
- Variation in composition and quality...

- Natustat:

- Some research shows comparable results with 1.925 kg/tonne inclusion cf. Nitarsone at 187.5 g/tonne for FCR, mortality, caecal lesion score and liver lesion scores at 28 and 35 days old (Duffy et al 2005)
- Clinical experience has not shown prevention of histomonosis in chickens undergoing challenge.

- Organic acid blends

- Many products out there!
- No published research!
- Likely to influence general intestinal health.
- Clinical experience has not shown efficacy in controlling outbreaks.



My research

- Currently diagnosis is based on PM findings, with histology to identify the organisms.
- Molecular diagnostics (PCR) and blood testing (ELISA) can give unreliable results with false positives and negatives relatively common.
- The knowledge of different strains of *Histomonas*, and what these mean in infections is not good.
- Are there any virulence factors in the genome that we can identify?
- Knowledge of the situation in the UK is lacking – let's find out what is going on!



Work so far

- Case studies: interviews of farms with clinical cases – ongoing!
- Prevalence pilot study: screening British birds.
- PCR screening panel: development of suitable primers.





Case studies

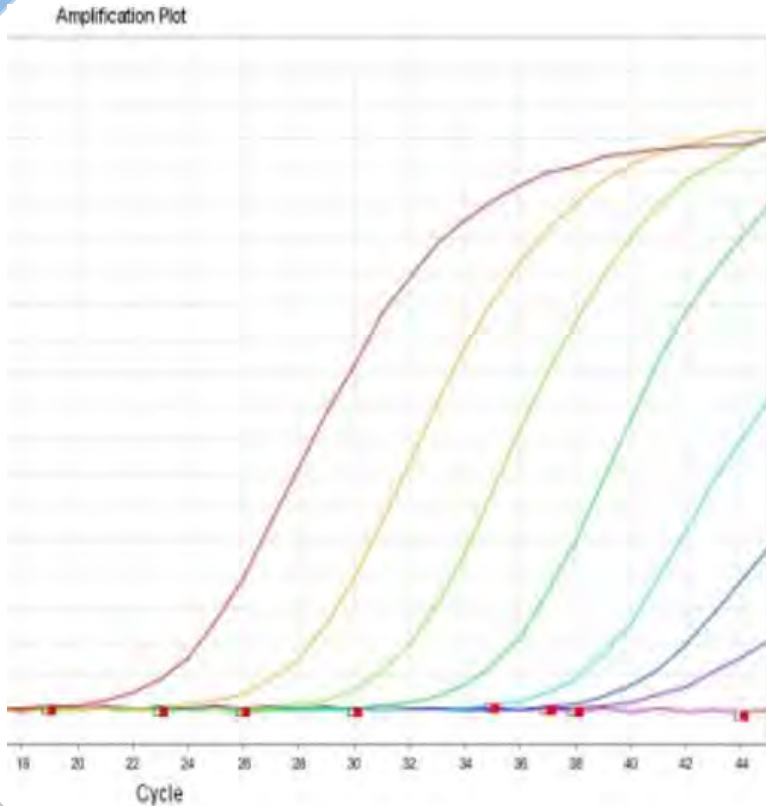
- Relatively few cases per year.
- Large number of variables.
- Some common themes emerging:
 - Stress – internal or external!
 - Prior challenge on farm/use as chicken site.
 - Access to range.
- BUT no definitive trigger identified...yet!
- More cases please.

Pilot study

- Caecal samples gathered from 28 farms within one company and screened for *Histomonas* by commercial PCR.
 - Some positives found (Ct value 21-35), but not in every sample from the same house.
 - What does this mean?
- Further work required to establish level of sub-clinical infection in British turkeys: expand to other turkey growers.
- Plan to correlate with production and antibiotic usage data to establish whether challenge impacts performance.
- Potential to expand into other populations: broiler breeders, FR layers.



Pilot study



- Litter samples taken from 14 farms, matched to caecal contents sampling and screened for *Histomonas* by commercial PCR.
 - No positives from any of the farms, including those found to be positive in at least 1/5 caecal content analysis.
 - In separate tests one house positive for *Histomonas* on post mortem and with high flock mortality: Ct value of 29.8.
 - Caecal contents from birds on the same farm had Ct value 28.2 in a house with no clinical signs.
 - How does this compare to dust samples?
 - How does this compare to caecal contents in clinically sick birds?

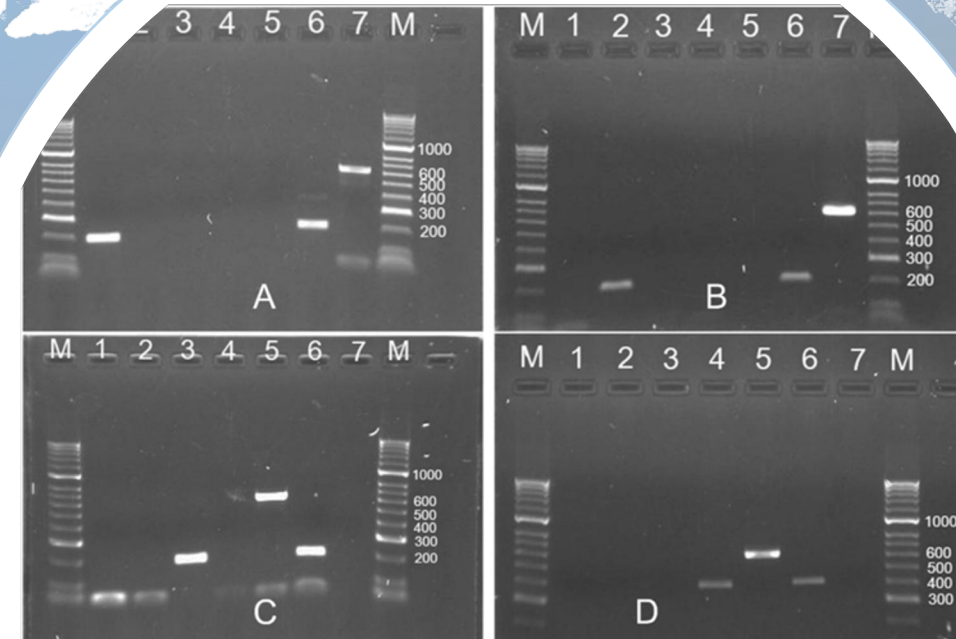
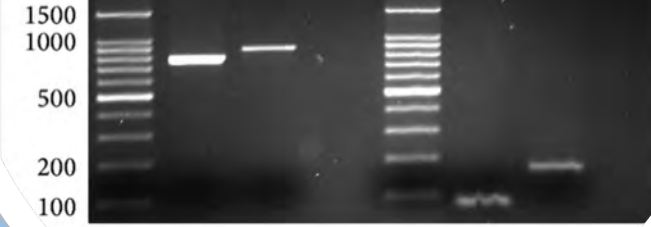


PCR screening panel

- Why not genome sequencing?
 - Pure *Histomonas meleagridis* DNA isolation is extremely difficult:
 - Co-culture with bacteria required.
 - Growth medium contains rice particles.
 - Contains micronuclei.
 - How many?!
 - Lots of different populations to look at.
 - Which one is representative in each population?
 - £££££££
 - Talent!
 - Bioinformatics is a specific skill set.
 - Microbiome analysis?

PCR screening panel

- Primer targets have been identified and primers designed, negative controls (other flagellate protozoa) have been obtained. Positive control to come from clinical isolates when culture achieved.
- Samples still being collected from cases to analyse with various primers and allow sequencing of different PCR products.
 - What genotypes are present in the UK?
 - Is there a correlation between genotype and mortality?
 - Will different cases highlight any differences in the *Histomonas* genes detected?
 - Is there a difference detectable in the *Histomonas* isolated from clinically normal birds? Or between chicken and turkey isolates?





Please contact me with any questions,
suggestions or cases of histomonosis:
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Thank you for your attention, any questions?

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