Spotty Liver Disease: In reference to *Campylobacter hepaticus*

By Dr Sam Morgan BSc MVDr MRCVS

Mount Vets Poultry

sam.morgan@mountvets.com

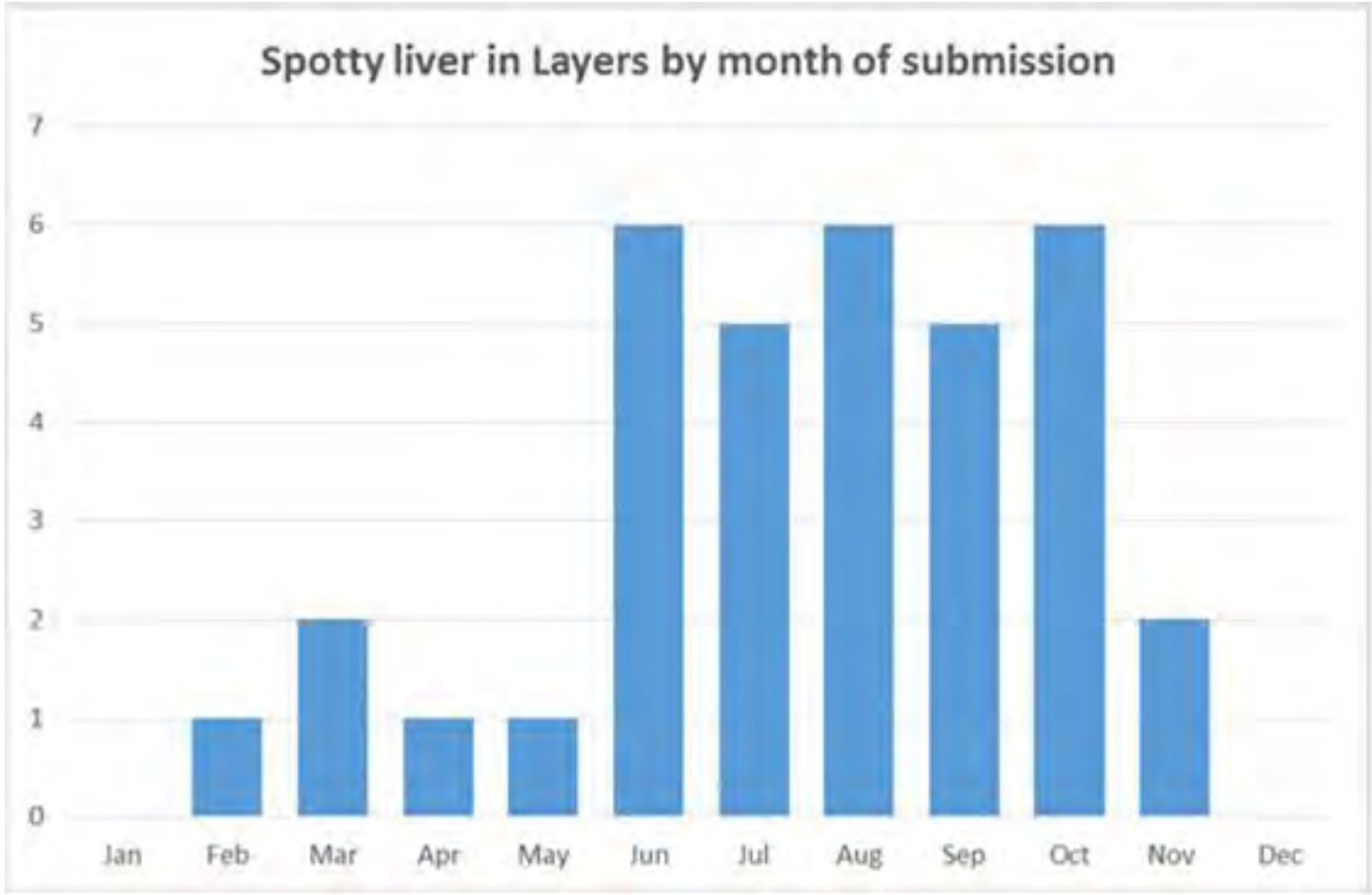
2003! My bosses talk to BVPA just after the rugby world cup.

History of spotty liver disease (SLD)

- Avian Vibrionic hepatitis (AVH) described as early as 1950s
  - Spot like lesions described on livers
- Avian vibrionic hepatitis, Avian infectious hepatitis, summer hepatitis and military hepatitis are likely to be all the same thing (forsyth et al. 2005)
- *Campylobacter hepaticus* (CH) isolated in 2015 from UK flocks by Tim Crawshaw and Stuart Young and in 2016 isolated in Australia flocks and classified as CH

Current status in the UK - Total number of submission diagnosed with Spotty Liver to APHA/SRUC per year

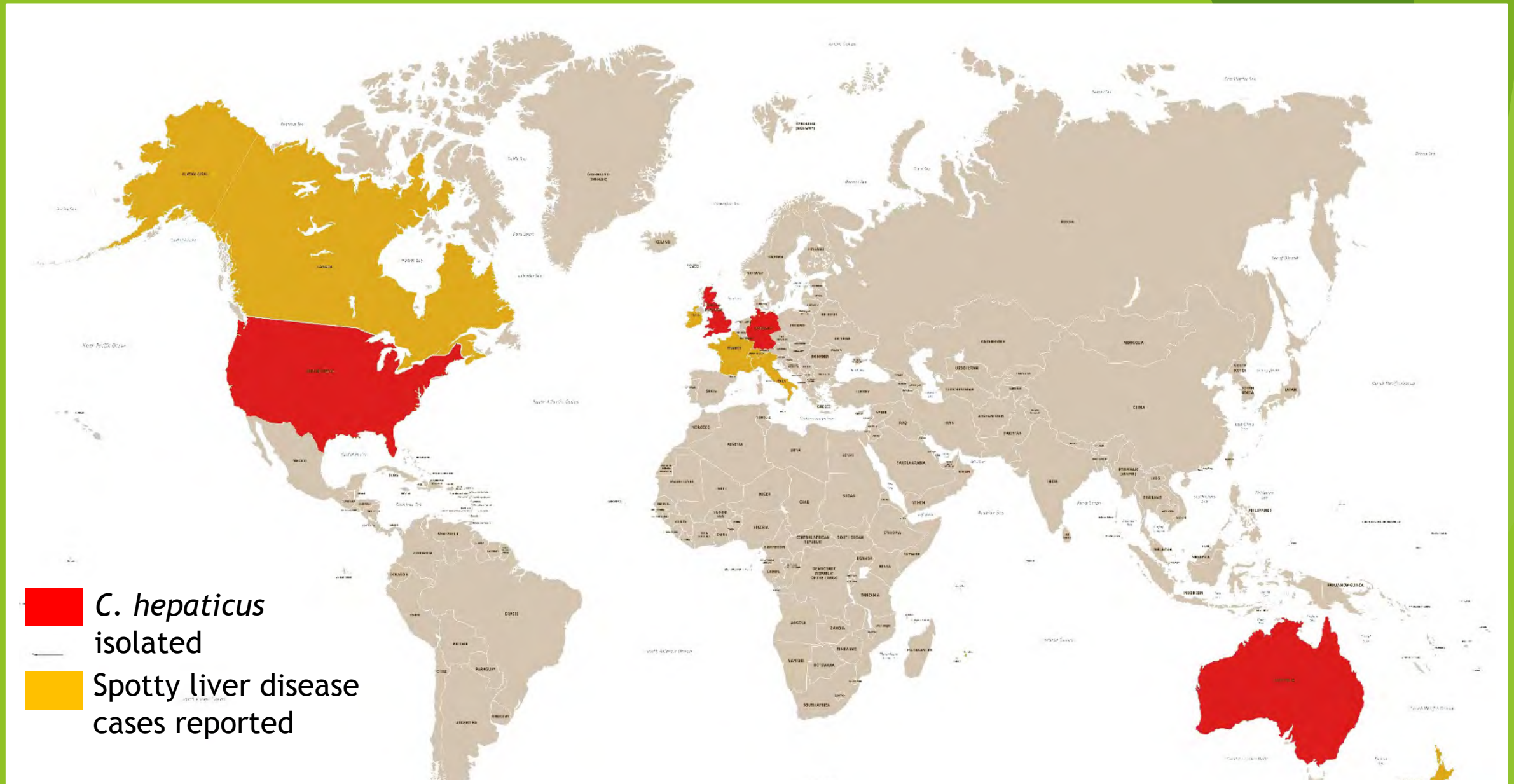
	2011	2012	2013	2014	2015	2016	2017	2018	Total
Total	10	5	2	3	4	4	1	2	31



Courtesy of the AEG based on VIDA

Status of SLD around the world

- First reported in the USA in the 1950's
- Canada, UK, Australia and Germany
- Most significant disease affecting the Australian layer industry
- Had a large economical effect in the USA, although the incidences of SLD are declining

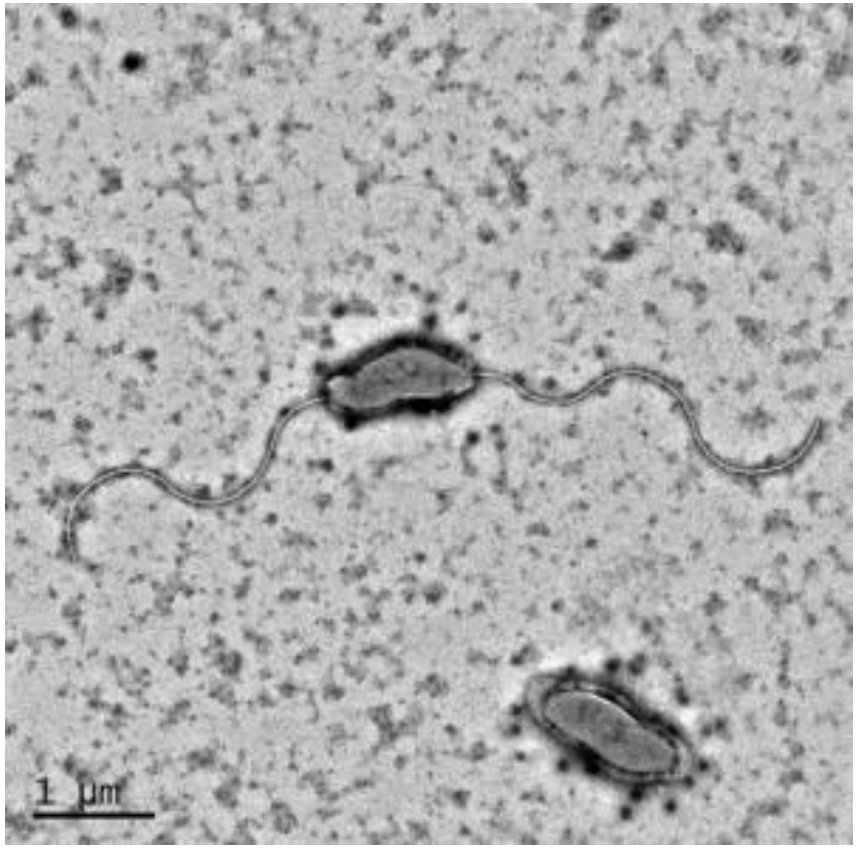


Courtesy of Tim Crawshaw

What is *Campylobacter hepaticus*?

- Gram negative S-shaped bacterium
- 3 days for colonies to form on blood agar in vitro
- Commonly seen in free range layers when they come into peak lay but also barn layer flocks and broiler breeders
- Occasionally in caged hens
- Reproduced in layers through a direct oral challenge - assumed transmission is via faecal oral route
- Clinical SLD needs CH and another ‘stressor’ which affects the enteric health and neurotransmitters

Transmission electron micrograph – s-shaped cell and bipolar flagellar



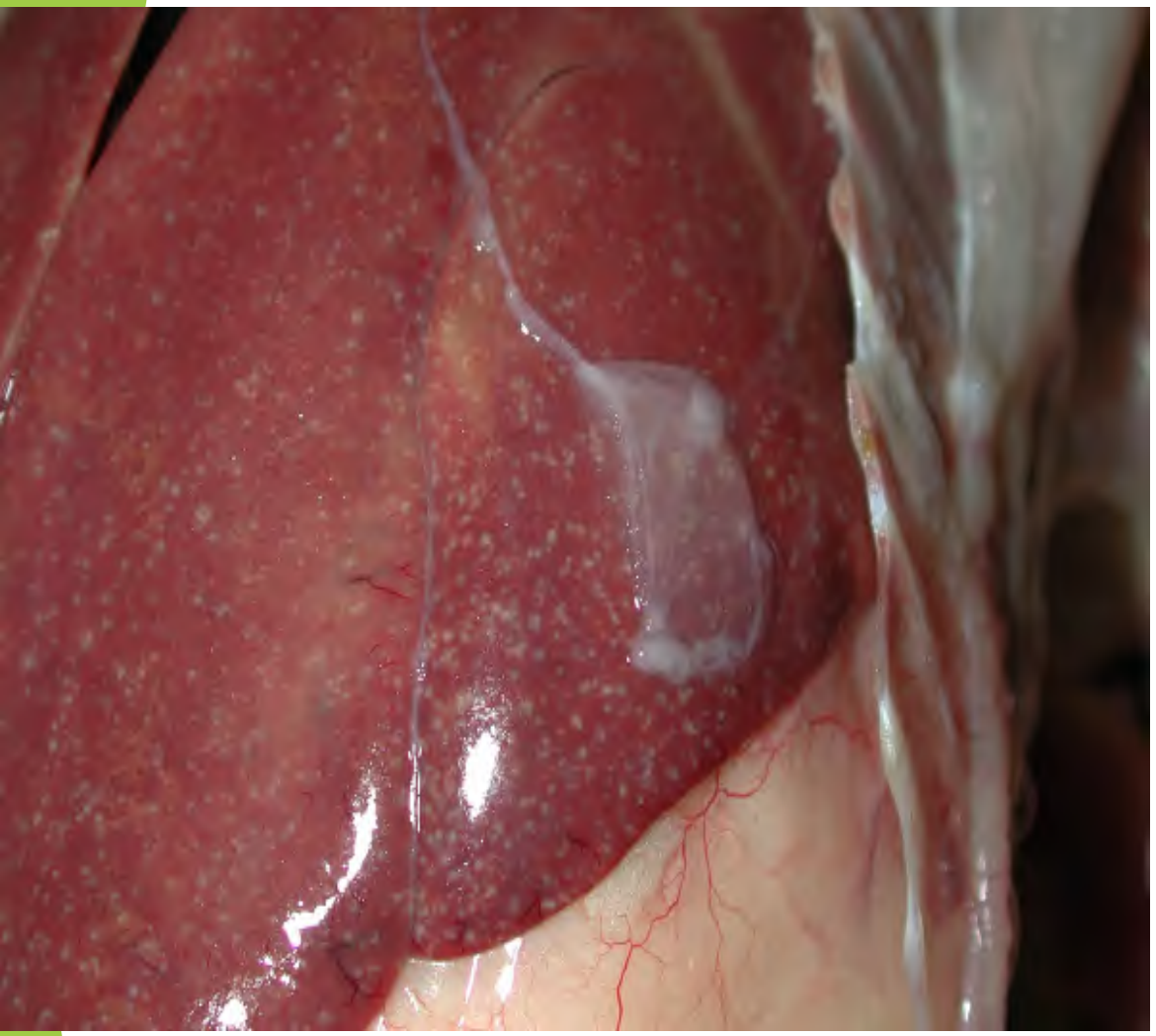
Does iron play a role in the pathogenesis?

- CH lacking genes for iron uptake
- *C.jejuni* and *C.coli* do not lack these genes
- Hypothesised that the bacteria congregates towards the liver due to the higher iron levels
- Iron level much higher in females than males, especially at peak lay
- Male birds seem to be more resistant to CH than females. Is this due to the lower iron levels?
- More research is needed!

Clinical picture of SLD

- Increase in mortality by 10% and drop in egg production by about 10-25%
- Most frequently seen when birds are coming into peak lay but can affect birds through out life
- Does the age or type of birds affect the pathogenicity?
- SLD can affect birds as young as 12 weeks of age
- Infects birds up to 8 weeks before clinical signs
- Small 1-2mm in diameter, whitish-grey spots on the liver
- Is there a minimum infective dose?

Postmortem findings



Postmortem findings

Spotty liver differentials – not all spots on liver are spotty liver!

- Histomoniasis
- Salmonellosis – Gallinarum, Pullorum
- Other bacterial infections e.g. Pasteurella, E.coli, Yersinia
- Mareks disease
- Lymphoid leukosis
- Avian tuberculosis

Sampling for CH

- Found throughout the SI and in the highest abundance in the caeca
- Generally found in moderate abundance in the gall bladder and lower amounts in the liver
- Grows better from samples taken from the bile duct
- Fresh samples provide better results
- APHA require liver (fixed and fresh) and a swab from the necrotic foci of the liver

Testing for CH

- Commonly done by postmortem and histopathology
- Rapid PCR test needed for better diagnostics – Australia?
- APHA currently developing one – nearing completion
- APHA require more samples to be submitted
- Post mortems, histopathology or livers for PCR testing
- APHA Lasswade

Where does it come from?

- No specific vectors or paratenic host has been identified as of yet
- Vectors – wild birds, rodents,
- Soil, faeces, water, flies, mites and dust – identified via PCR
- Recent research shows that CH has a coccoid and non-coccoid form which affects the infectability somehow
- Pullets can be infected in rear and not show signs until peak lay – issue for new, green sites
- All year round

Combatting spotty liver disease

- Reducing exposure to stressors is key – predators, feed outages etc
- Stress events can alter the gut microbiome
- Feed additives such as Sanguinarine and oregano have provided some success in promoting good gut health.
- Studies have shown a decrease in incidences and severity of outbreaks
- Feed additives need to be introduced into the ration at transfer or point of lay
- Best results seen when additives added at 16 weeks

Combatting spotty liver disease cont.

- So many strains of CH that vaccine development is hard and proving difficult
- Treatments with chlortetracycline and lincomycin but resistance is starting to creep in
- Tiamulin
- Australia have just had Amoxil (amoxicillin) approved (0 egg withdrawal) which can be used
- Environmental contamination can be cleaned but may be difficult in extensive and multi age sites
- **Biosecurity is key!**

Going forward…

- Passive or paratenic hosts need to identified
- Pathogenesis needs to be explored further
- Vaccine development
- Why is CH pathogenic to birds when *C.jejuni* and *C.coli* have a lower pathogenicity?
- Is it Zoonotic?
- How does CH cause liver damage? Does this damage cause the health and production loses?
- Is there a minimum infective dose

Key points

- Rapid PCR in development
- Biosecurity is very important
- Hygiene and cleaning can help to control the disease
- Good gut health is critical
- Stress plays an important role in the disease

An interesting way to deal with spotty liver

Acknowledgements

Stuart Young – Director - Mount Vets poultry

Hannah Mouland – Veterinary Surgeon – Mount Vets poultry

Prof. Rob Moore - RMIT University, Melbourne, Australia

Tim Crawshaw - Veterinary surgeon MRCVS

Alexandra Schock – APHA Lasswade – Avian pathology

Thank you for your attention!

- Mount vet poultry team
- sam.morgan@mounvets.com
- 01404 841011