Foodborne Toxoplasmosis:

Detection of viable parasites in retail meat

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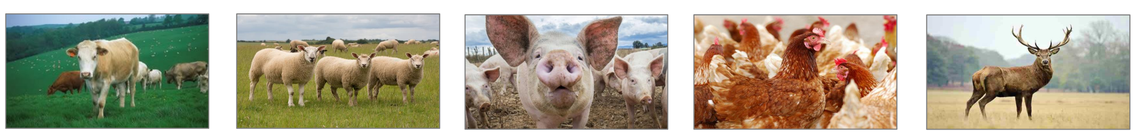
1. BACKGROUND

- *Toxoplasma gondii* is a zoonotic parasite of global importance.
- Symptoms are most severe in pregnant women and immune-compromised patients.
- Consumption of infected, undercooked meat is an important risk factor for transmission of the parasite.
- *T. gondii* is ranked as one of the most significant causes of disease burden, amongst the main foodborne pathogens, in Europe and the USA.
- There have been few studies assessing the risk of infection from retail meat samples.

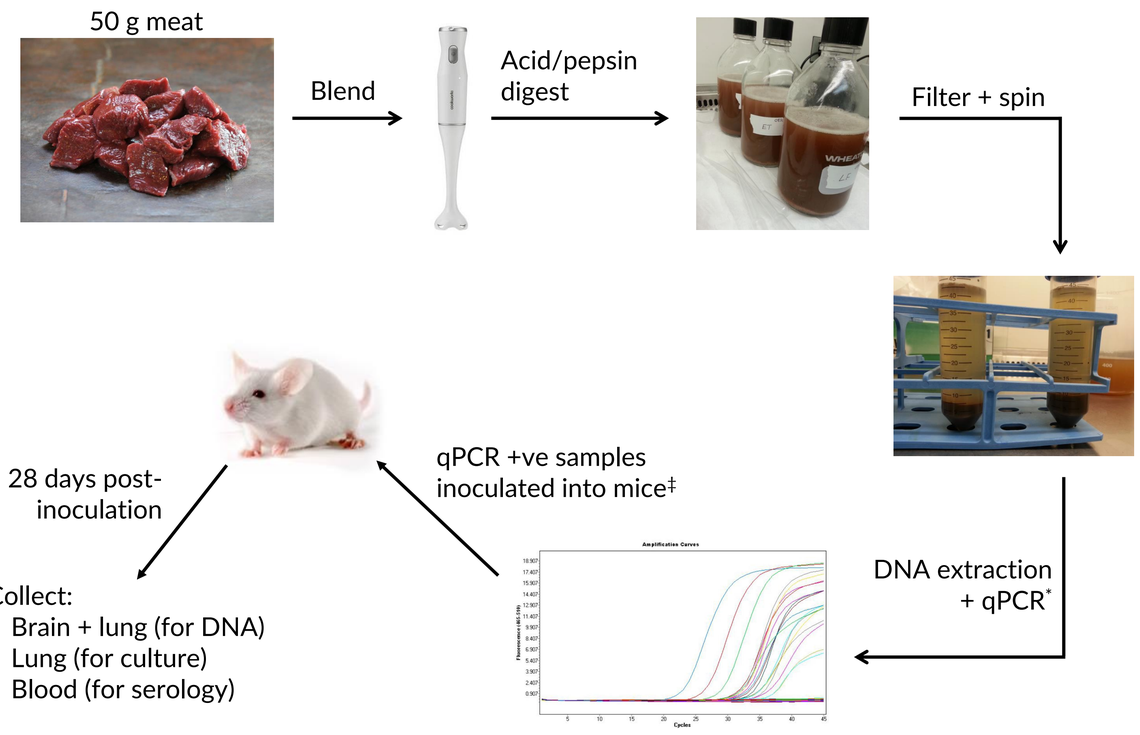
2. AIM

- To investigate the presence of *T. gondii* in retail meat samples, and to assess parasite viability in higher risk meats (SRP 2016-2022; Theme 3)



3. METHODS

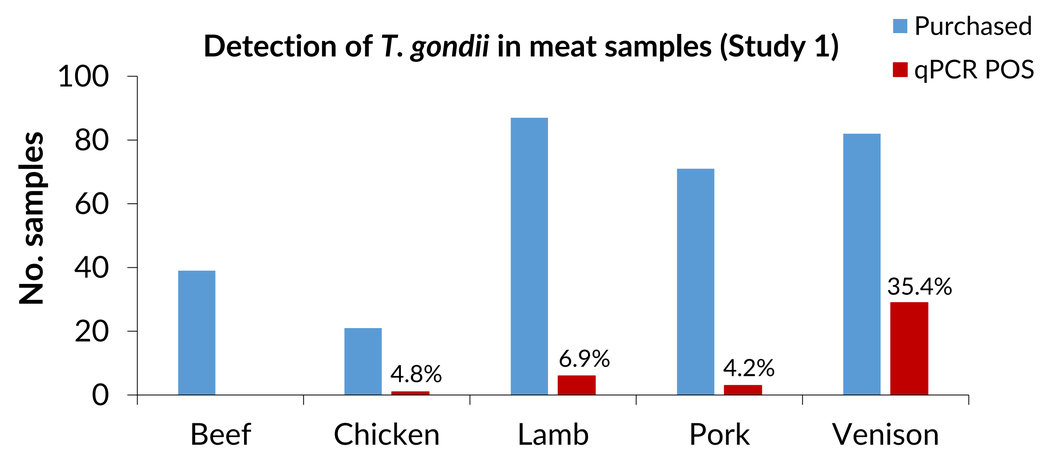
- Meat samples were collected from farm shops, supermarkets and butcher shops in Scotland:
  - 39 beef, 21 chicken, 87 lamb, 71 pork and 82 venison samples (Study 1)
  - 67 venison samples (Study 2)
  - 23 venison samples (Study 3)
- Samples were processed and screened for *T. gondii*, as outlined below, using qPCR (detection of *T. gondii* DNA) and a mouse bioassay (detection of viable parasites):

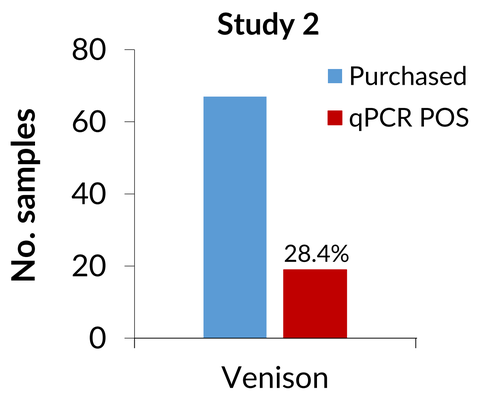


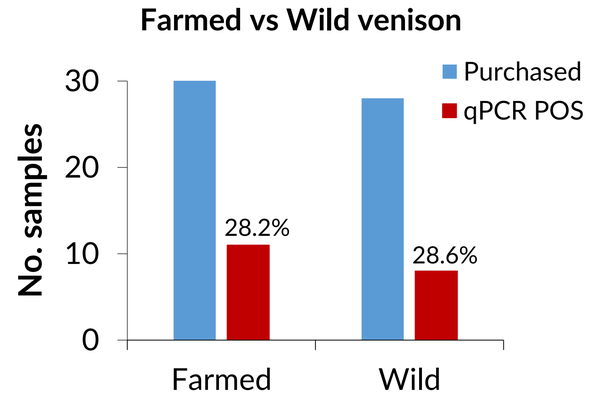
‡ Venison samples only (Study 3)

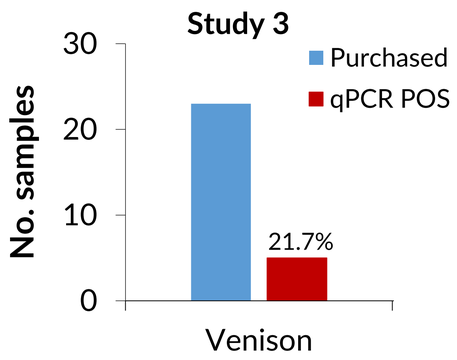
*Deoxyribonucleic acid and quantitative polymerase chain reaction

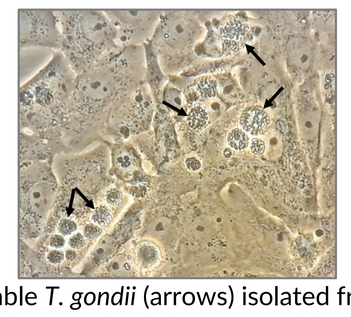
4. RESULTS











Viable *T. gondii* (arrows) isolated from venison products in a mouse bioassay

Table 1: Determination of parasite viability and genetic characterisation of isolated strains

Venison product positive by qPCR	No. mice positive/ No. mice inoculated	*In vitro* isolate	*Toxoplasma* Genotype
Diced wild Scottish venison	2/6	Yes	#3 (Type II-variant)
Diced wild Scottish venison	1/6	Yes	#3 (Type II-variant)
Venison grillsteak	0/6	No	N/A
Venison grillsteak	0/6	No	N/A
Venison grillsteak	0/6	No	N/A

5. CONCLUSIONS

- *T. gondii* detected in retail meat samples in Scotland
- Viable parasites isolated from venison products
- Game meat is a potentially significant source of foodborne toxoplasmosis

6. FUTURE DIRECTION & POLICY RELEVANCE

- Investigate genotypes of *T. gondii* in food animals, people, and water (in collaboration with Food Standards Scotland, Scottish Toxoplasma Reference Laboratory & Scottish Water; SRP 2022-2027 Topic B6)
- Assess mitigation strategies to help inform control measures and reduce transmission of foodborne toxoplasmosis (SRP 2022-2027 Topic B6)

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For further information:

Published Manuscript (Retail Study)

Published Manuscript (Viable parasites)

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