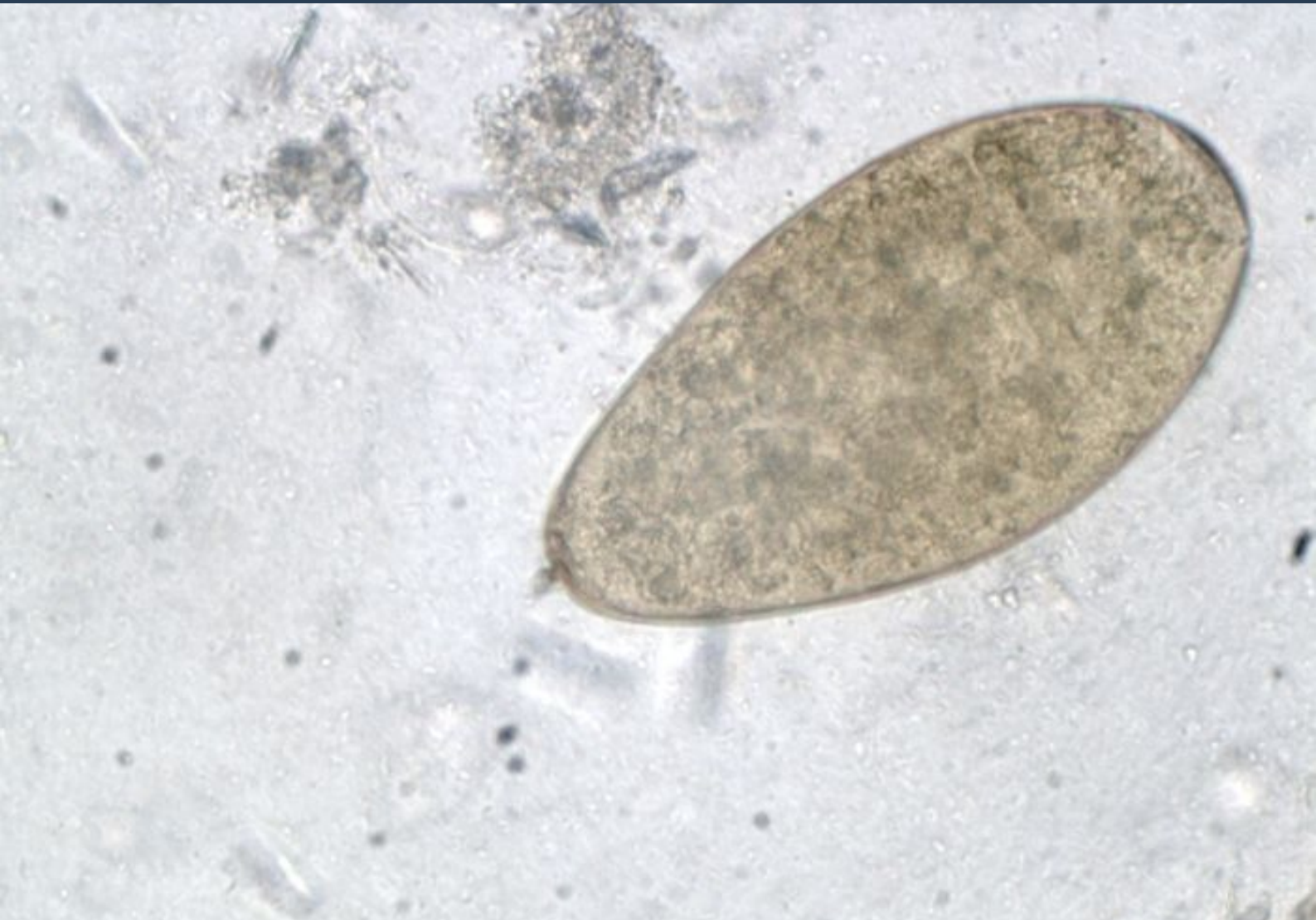# The Design and Testing of a Novel Anti-Fasciola Vaccine

Identification and use of a series of recombinant proteins and partial antigenic fragments targeting all stages of within-host lifecycle

About **University of Liverpool**

By facilitating access to our expertise, facilities and networks, the University of Liverpool offers the means to transform ideas into creative solutions, improved performance, new technologies, strategies, applications, products or skills.

Background

Fasciola hepatica

- Globally distributed helminth parasite
  - Predominately infects livestock
  - Evidence that circa 70% of UK dairy herds are exposed
- Presenting as a chronic wasting disease of production or giving rise to acute fatal infection
  - Economic losses estimated to reach
- Current control measures rely on chemotherapy
  - Tricalbendazole targets both adult and juvenile
  - Sustained used has lead to resistance that continues to develop

Tech Overview

Liverpool researchers proposed a novel vaccine:

- Multiple polarised immune responses contribute to protection
- Single component vaccines have a low reproducibility
- Parasite immunomodulation must be overcome

Vaccine components

- 12 Antigenic fragments selected for:
  - Induction of antibody
  - IFN-γ production
- Neutralisation of a key immunomodulator

Challenge Model

- Rat vaccination & challenge
- 3 immunisations
- 30 metacercariae oral challenge

Vaccine protection

Figure 1 , Figure 2 , Figure 3

Elevated correlates of protection

Figure 4 , Figure 5

Stage of Development

- Identified a cocktail of recombinant proteins and partial antigenic fragments targeting all stages of within host lifecycle
- Validated their use in a rodent vaccine/challenge model
- Displaying reduced parasite burden, pathology, clinical disease

Future work

- Developing a method for prioritising B-cell responses and reducing number of vaccine components
- Bovine vaccine/challenge finishes in May 2020 determining if current success is replicated in target hosts
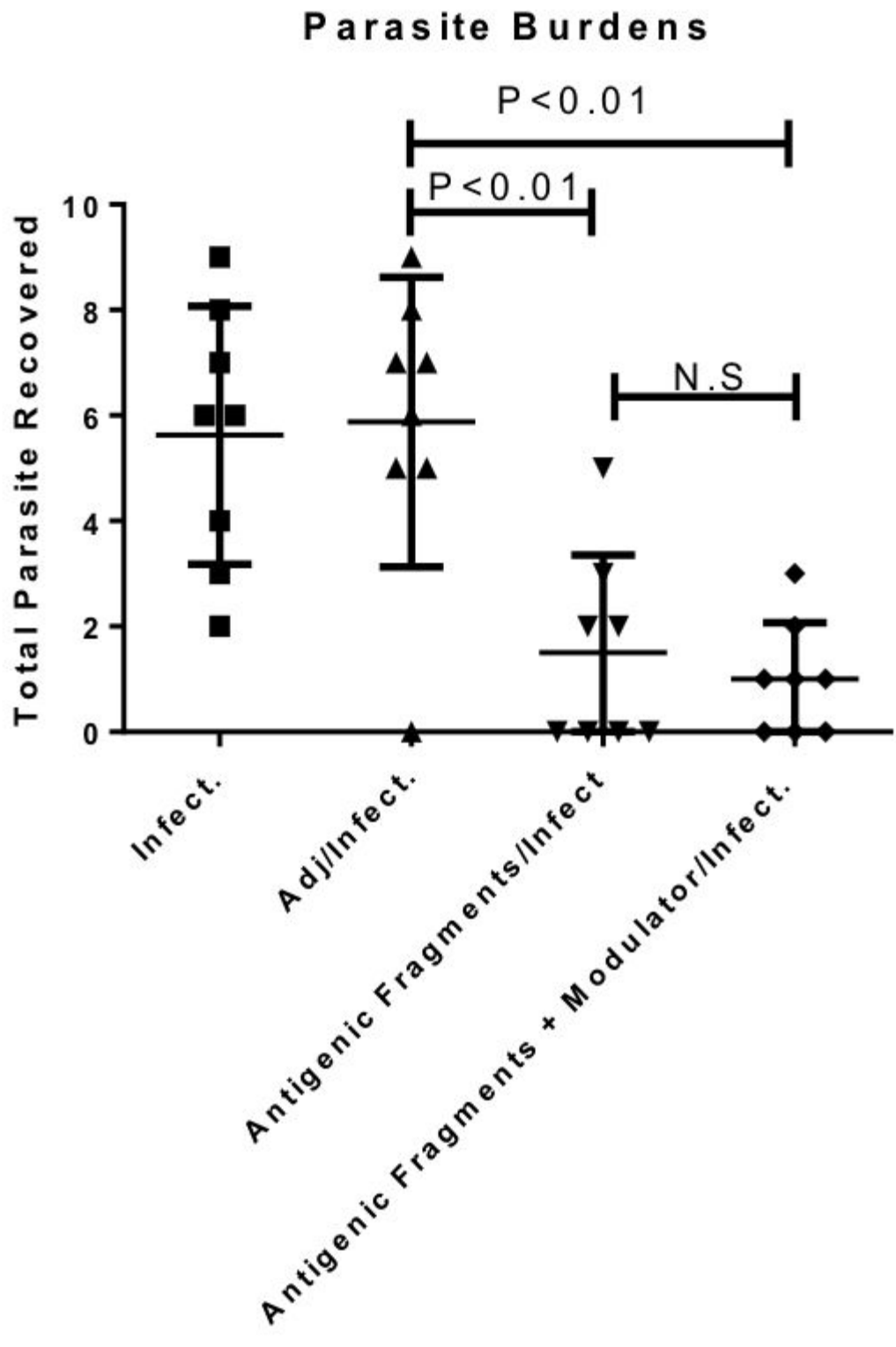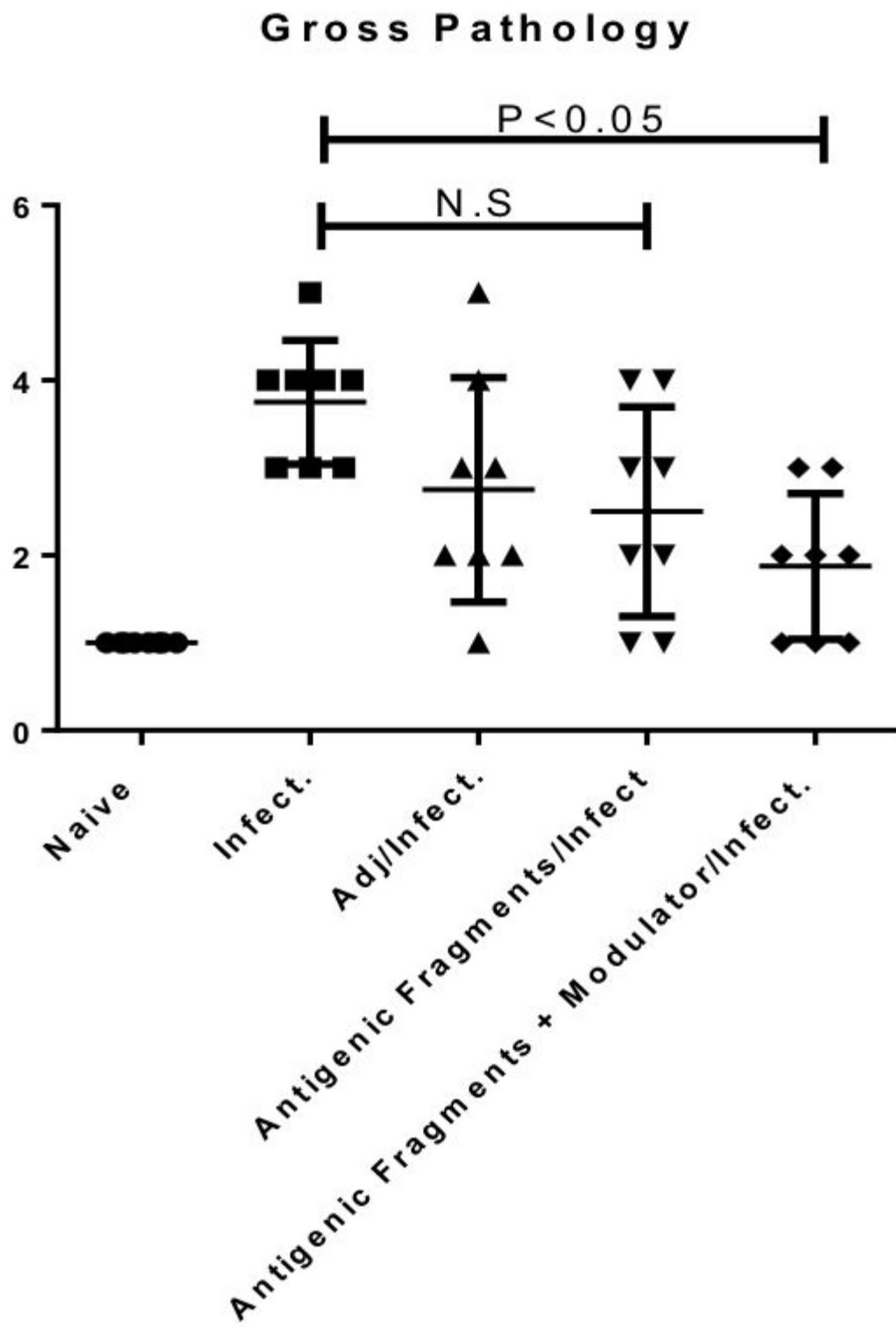
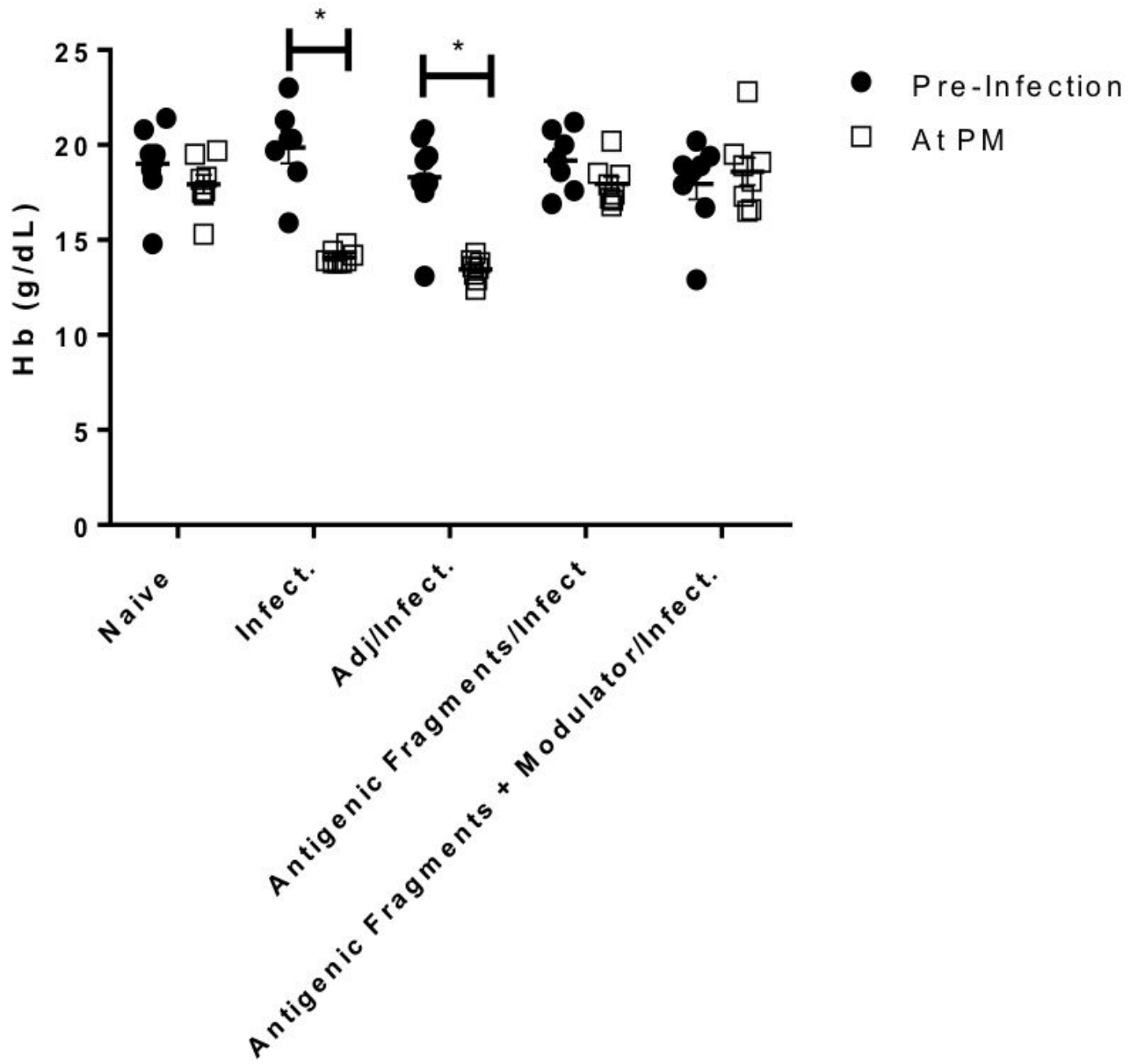Figure 1

Parasite Burdens

Figure 2

Gross Pathology

Figure 3

Figure 4

anti-LFH IgG1

Figure 5