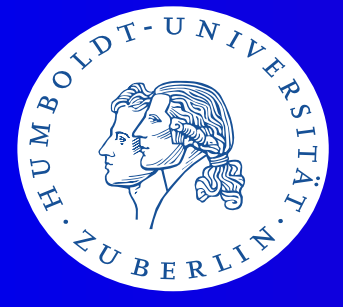
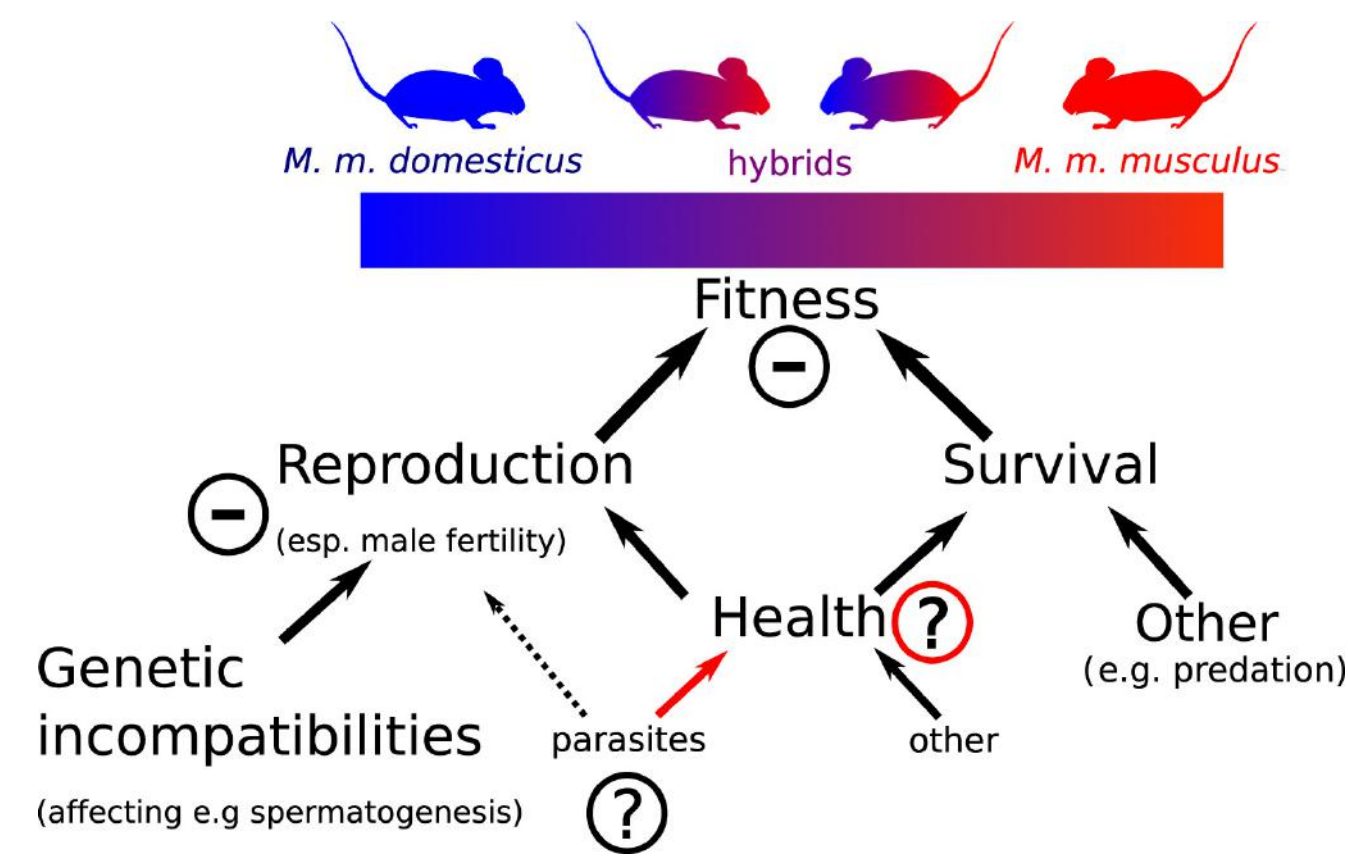
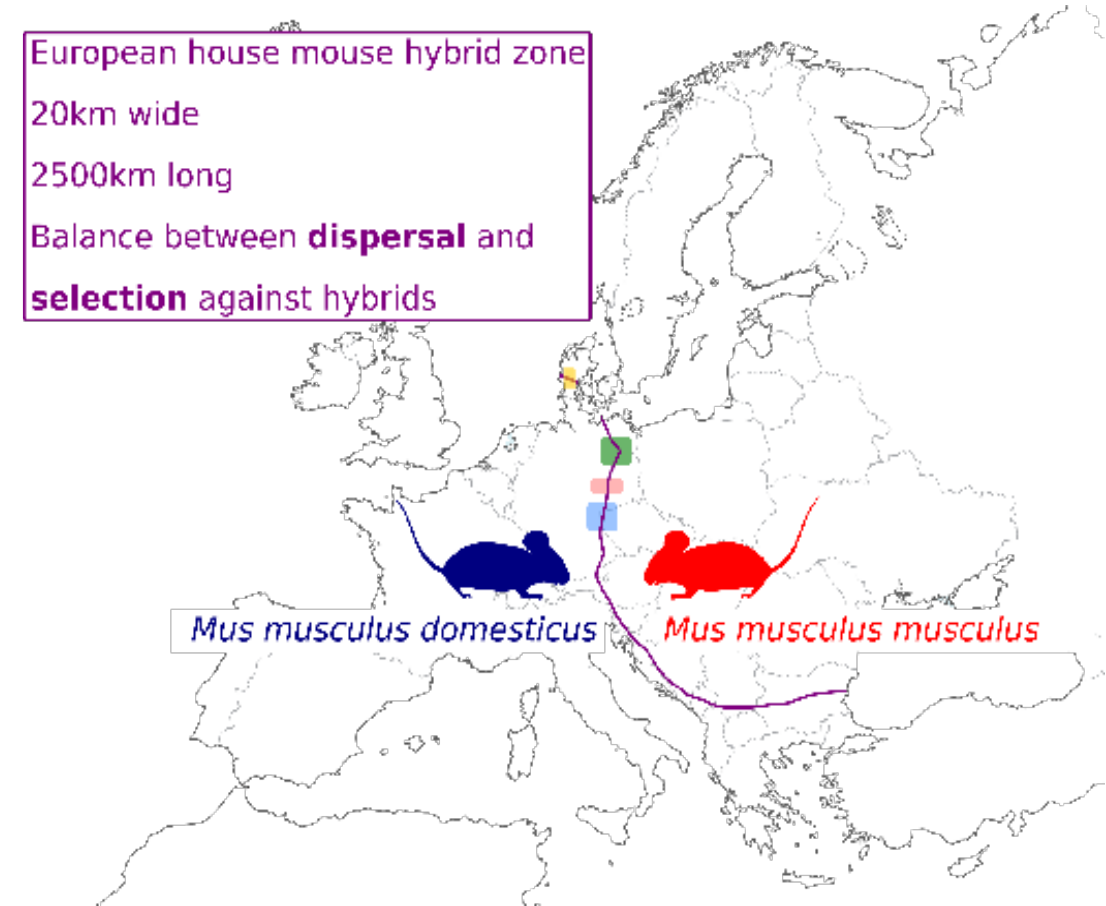


HYBRID VIGOR OR VULNERABILITY? EIMERIA SPP. IN THE EUROPEAN HOUSE MOUSE HYBRID ZONE



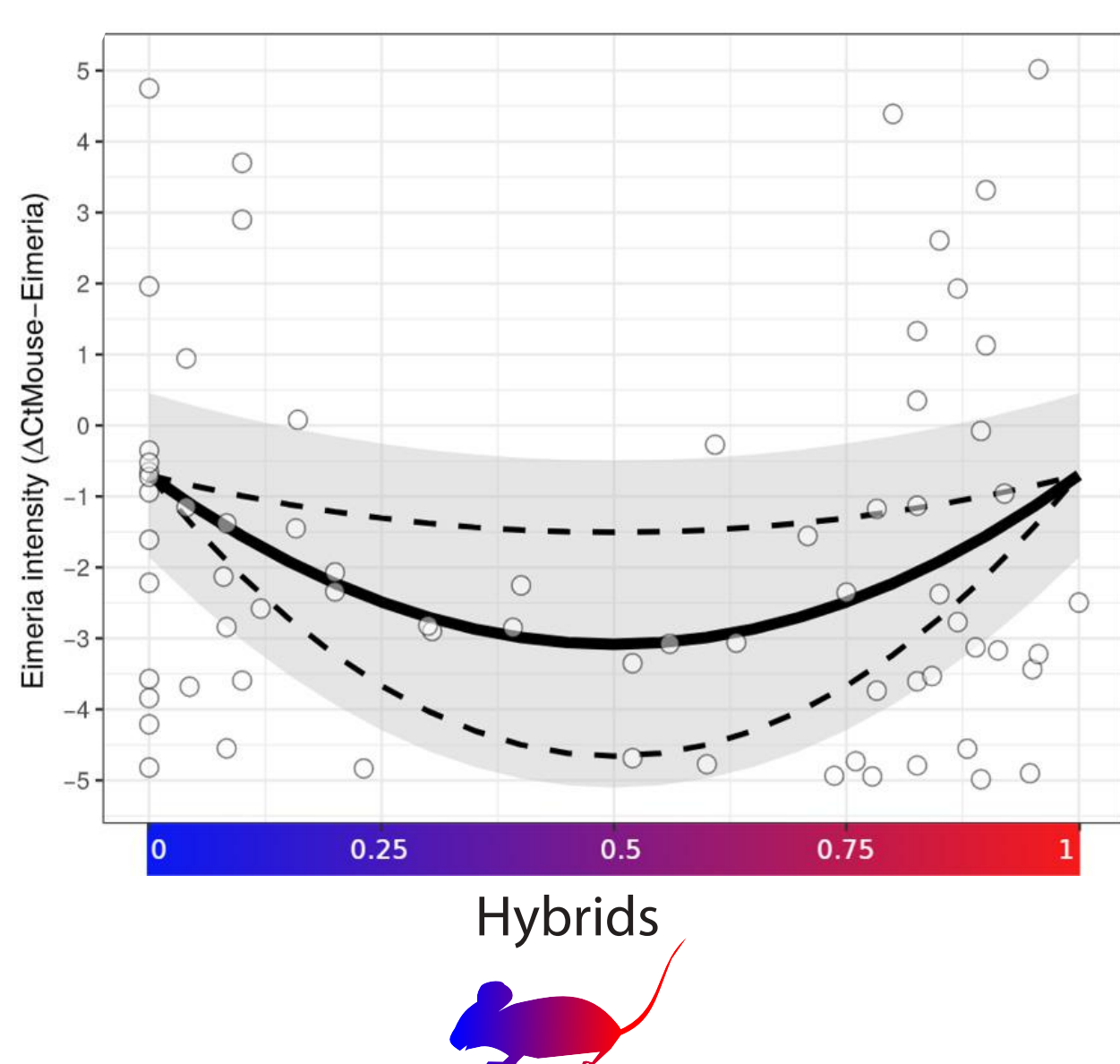
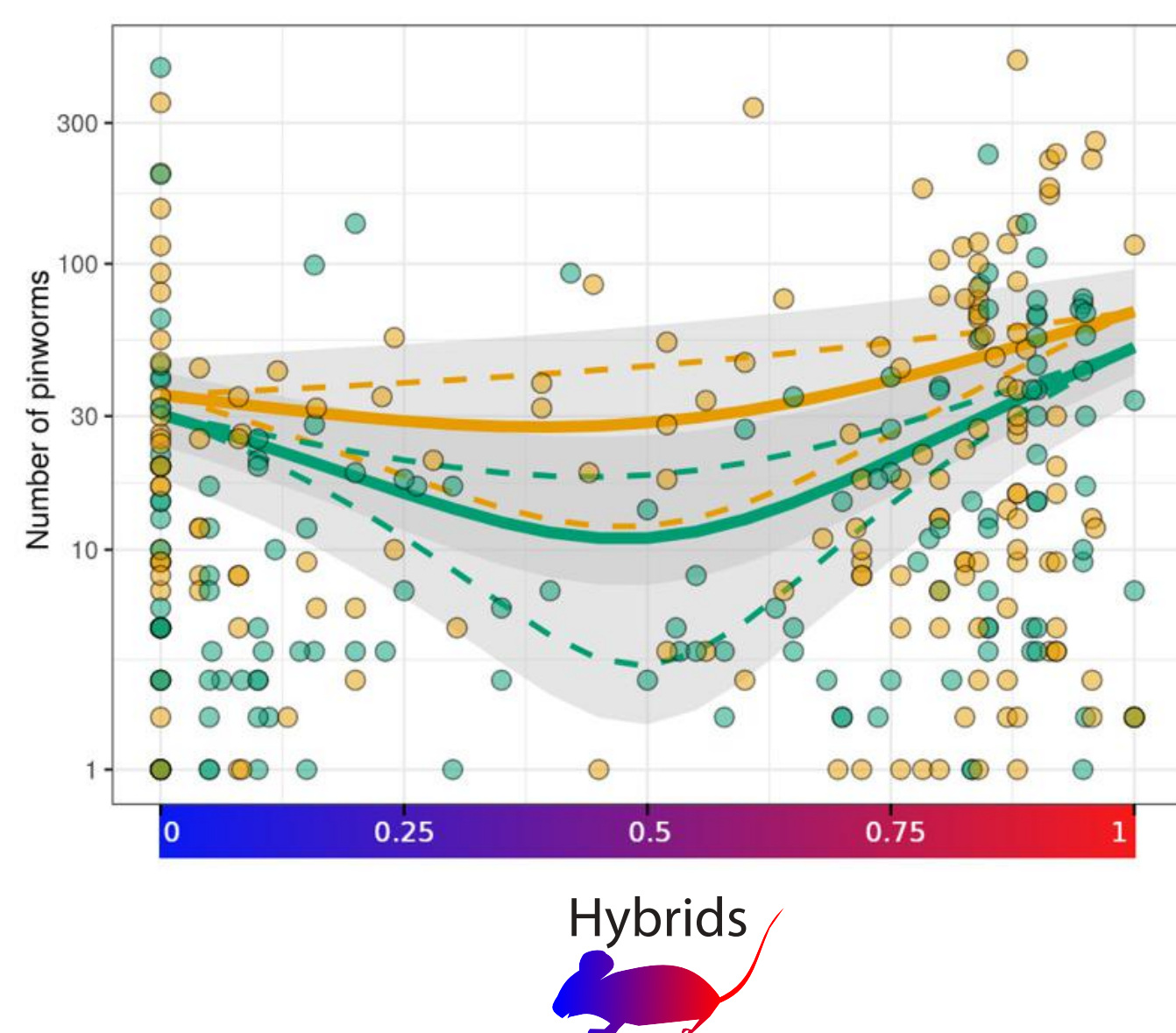
F Webster, A Balard, LL Bednář, S Rausch², E Heitlinger

The European House Mouse Hybrid Zone (HMHZ) is a natural laboratory to study the genetic impact of hybridization on disease resistance and tolerance



BACKGROUND

- Hybridization merges isolated gene pools, creating **novel genotypes**
- In the EHMZ, hybrid male fertility is reduced by disrupted spermatogenesis
- Hybrid zones result in extensive genetic variation, with the potential for advantageous or detrimental combinations due to **hybrid vigor** or **genetic incompatibilities**. Different fitness components, like immune function, might show varied effects due to genetic mixing.
- Resistance** against parasites is **increased** in hybrids in the EHMZ
- Lower infection intensities observed in hybrid mice for *Eimeria* spp. and pinworms



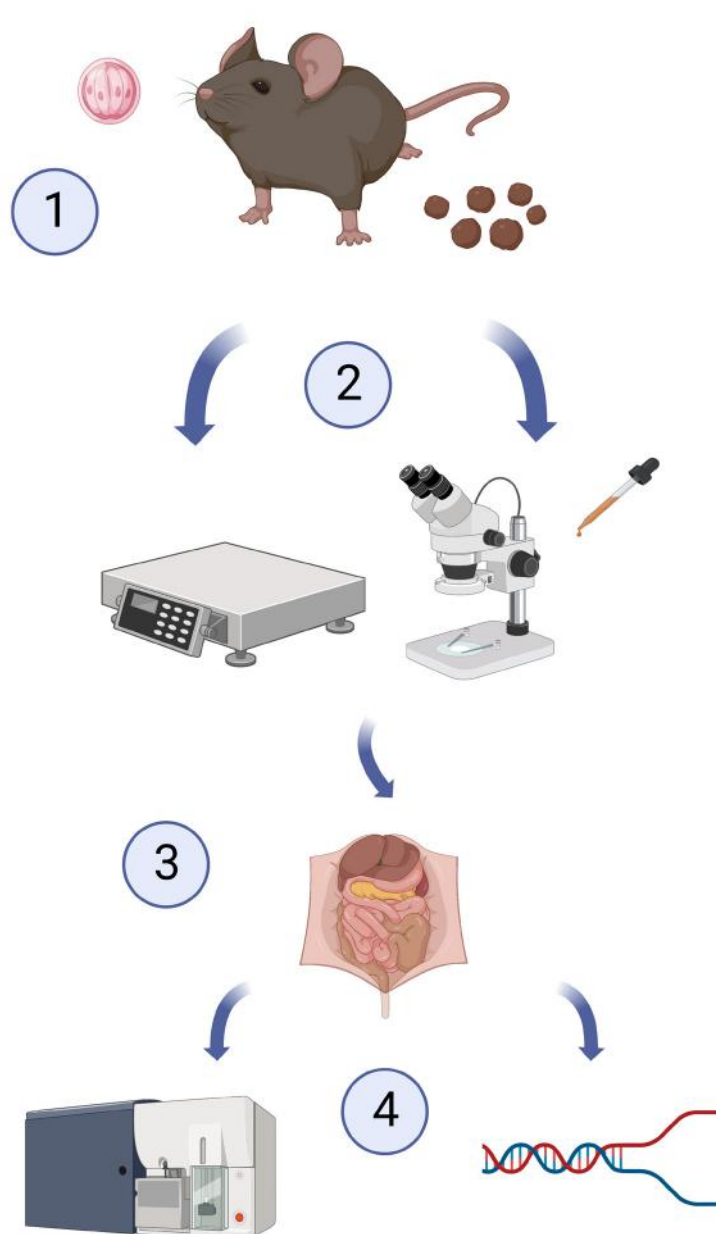
Hybrid mice show reduced infection intensities with pinworms and *Eimeria* spp.

Research question:

How does genetic diversity in the house mouse hybrid zone influence the

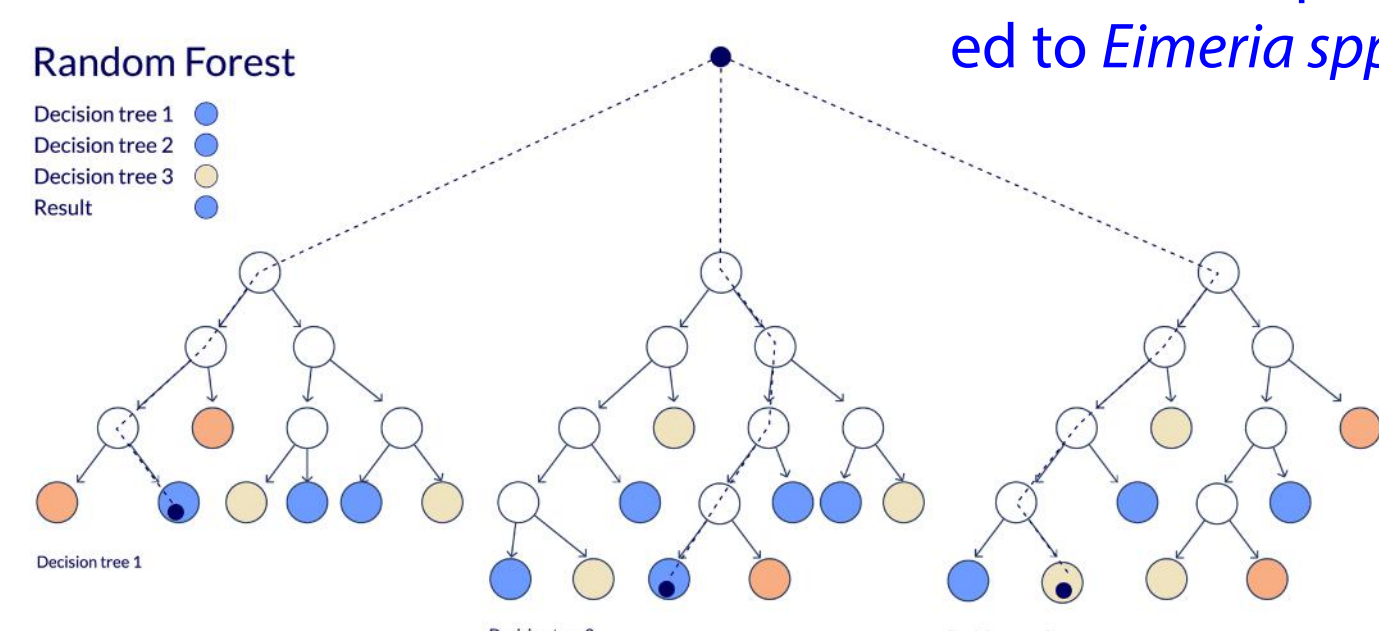
METHODS

Experimental Design and Procedures:



- Day 0: Mice were either infected with *Eimeria falciformis*, *Eimeria ferrisi*, or left as uninfected controls. Total mice involved: 136.
- Day 1 - 8: Daily measures of **weight** and **fecal flotations** to quantify parasite load
- Day 8: Dissections
- Immune gene expression RT-qPCR**

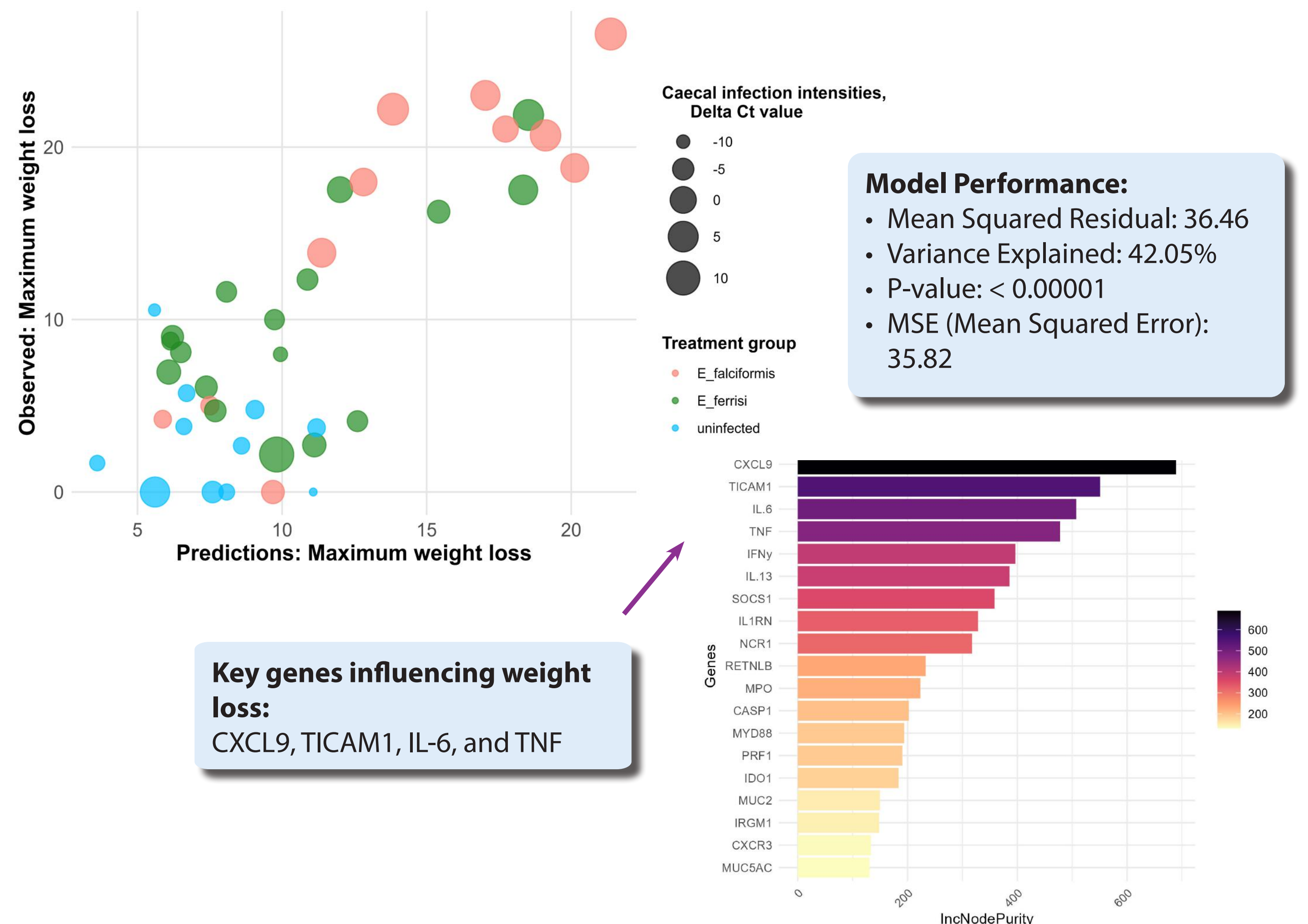
Predictors: Expression of 19 immune genes related to *Eimeria* spp. infections



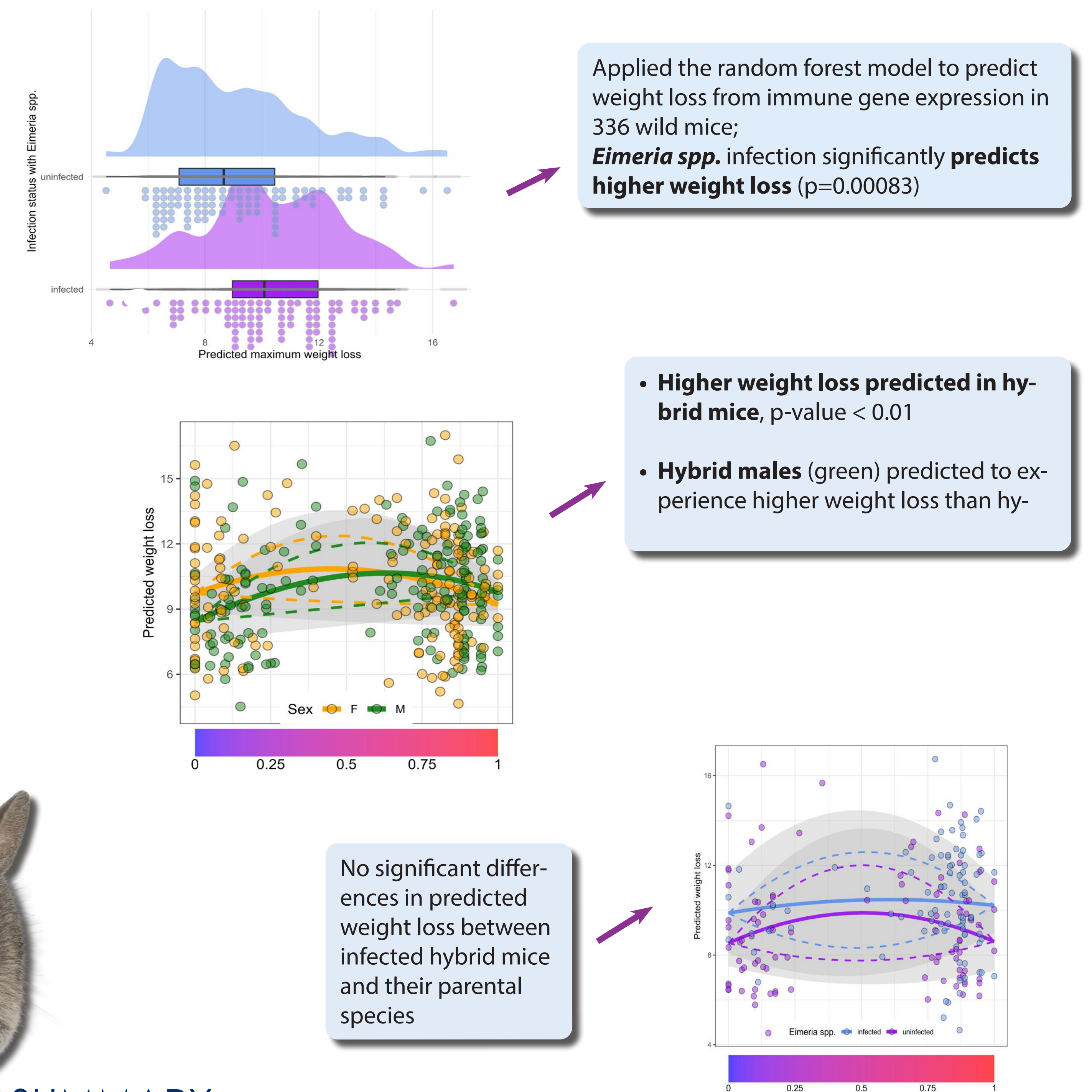
Predictions: maximum weight loss during infection

RESULTS

Training and testing the random forest model on the laboratory infection data



Testing the random forest model on data obtained from the field



SUMMARY

- Developed a random forest model capable of accurately predicting weight loss (due to *Eimeria* infections)
- Eimeria* spp. negatively affects the health of wild mice
- Predicted higher weight loss in hybrid mice, particularly in hybrid males
- Key genes influencing weight loss during infections include CXCL9, TICAM1, IL-6, and TNF

References

- Balard, A. et al. Intensity of infection with intracellular *Eimeria* spp. and pinworms is reduced in hybrid mice compared to parental subspecies. *BioRxiv* 683698, (2019).
- Baird, S. J. E. et al. Where are the wormy mice? a reexamination of hybrid parasitism in the European house mouse hybrid zone. *Evolution* 66, 2757–2772 (2012).
1. Balard, A. & Heitlinger, E. Shifting focus from resistance to disease tolerance: A review on hybrid house mice. *Ecology and Evolution* 12, e8889 (2022).



Fay Webster is a PhD candidate with a focus on host-pathogen interactions in the European house mouse hybrid zone. Collaborating with the Humboldt University of Berlin and the Leibniz Institute for Zoo and Wildlife Research, her work employs molecular methods to study the dynamics between wild mice and eimeria pathogens.

