Smallholder dairy cattle epidemiology and health genetics in Tanzania

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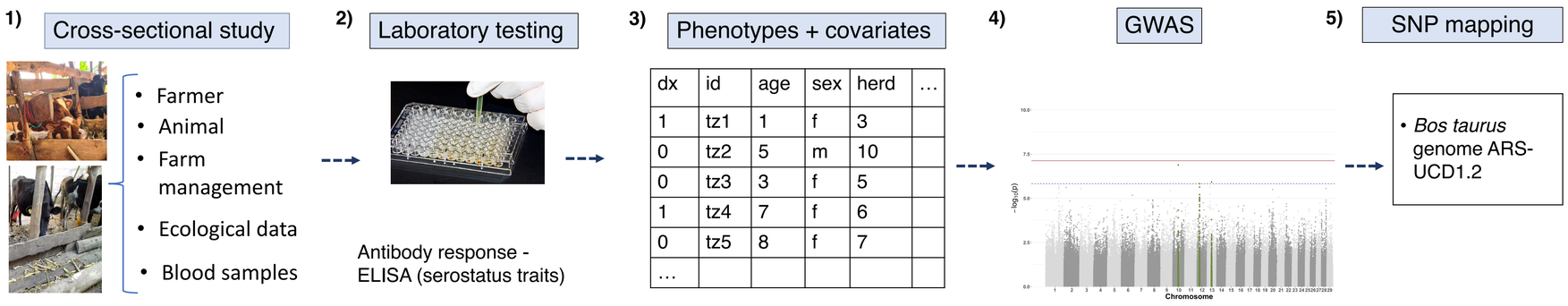
INTRODUCTION

- High pathogen burdens threaten efficient livestock production in LMICs.
- Breeding disease resilient/tolerant dairy cattle could improve animal welfare, health and production while reducing livestock carbon emissions.
- Genetic component to susceptibility or tolerance of infectious diseases in cattle largely unquantified[1].

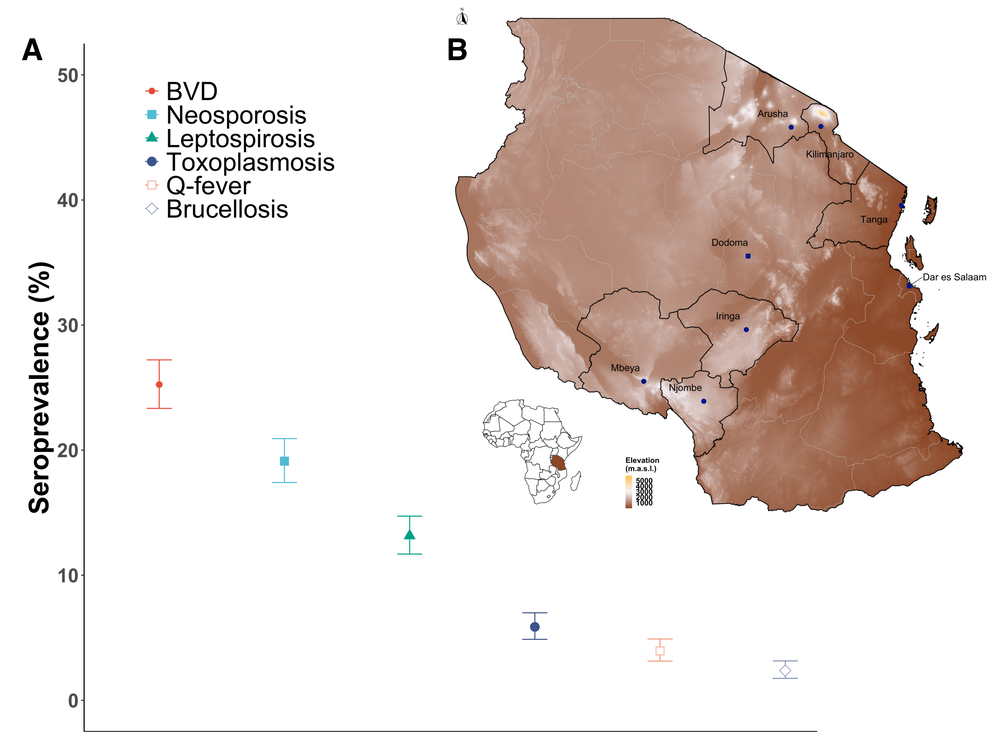
MATERIAL AND METHODS

- Crossbreed cattle (n = 2045) were genotyped and screened for six infectious diseases (**Fig 1A**) of production (and public health) importance across six dairy regions in Tanzania (**Fig 1B**).
- Genome-wide association studies[2] (GWAS) identified **41** SNP markers (**Fig 2**) linked to pathogen-specific serostatus while accounting for relatedness, population structure, and other environmental risk factors.

Methodological framework



RESULTS



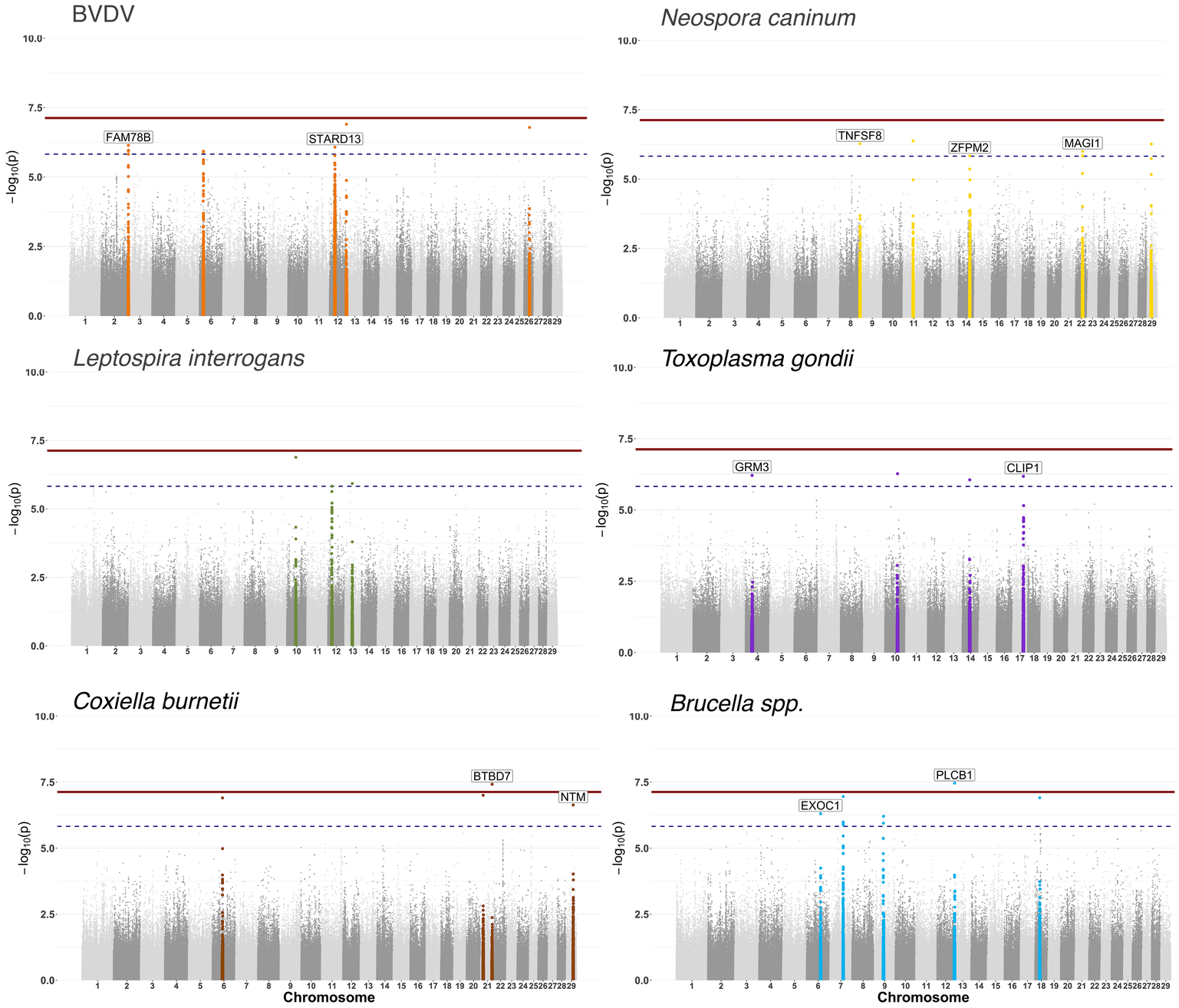


Fig 1. Sampling across six dairy regions in Tanzania in which seroprevalence for BVDV, *Neospora caninum, Leptospira interrogans* serovar Hardjo, *Toxoplasma gondii, Coxiella burnetii* (Q-fever) and *Brucella spp.* was variable and relatively high for most diseases.

Fig 2. Manhattan plots show regions (colour-coded dots) in the *Bos taurus* genome with strong association to serostatus for a given pathogen. Several SNP markers mapped to several annotated regions.

DISCUSSION AND CONCLUSION

- Serostatus is heritable in this cattle population (h^2, 0.05 – 0.46).
- Preliminary genome scans revealed loci potentially consistent with the polygenic nature of immunological response to viral, bacterial and parasitic diseases.
- Several loci mapped to genes in the cow genome involved in pathogenesis (**EXOC1**, **NTM**), immunological response (**TNFSF8**) and disease resistance (**FAM78B**)[3,4,5].

CONTACT

- Exciting new projects starting soon. **Follow the QR codes for more information.**

- **Prof Mark Bronsvoort (PI)**
- **Dr Enrique Hernandez**
- **CTLGH**

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UKRI Biotechnology and Biological Sciences Research Council
ILRI International Livestock Research Institute
SRUC
CGIAR
UKaid from the British people
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