



Nottingham Trent
University



Eriskay Pony Genotyping Project 2024



Overview

- ▶ Sample collection & DNA Sequencing
- ▶ Data analysis
- ▶ Within Breed Diversity
- ▶ Relationships With Other Breeds
- ▶ The Future
- ▶ Questions





DNA Sampling and Extraction

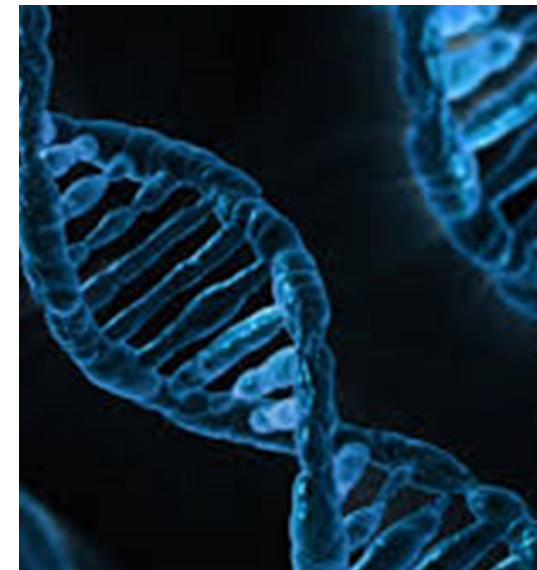
- ▶ 125 hair samples submitted
- ▶ Approx 25% of Eriskay Population
- ▶ 96 samples sequenced

The Equine Genome & DNA Testing

- ▶ Whole Genome Sequencing (2.3 billion base pairs)
- ▶ SNPS sequencing (70K to 700K base pairs)
- ▶ STR Microsatellite sequencing (12 to 17 base pairs)

```

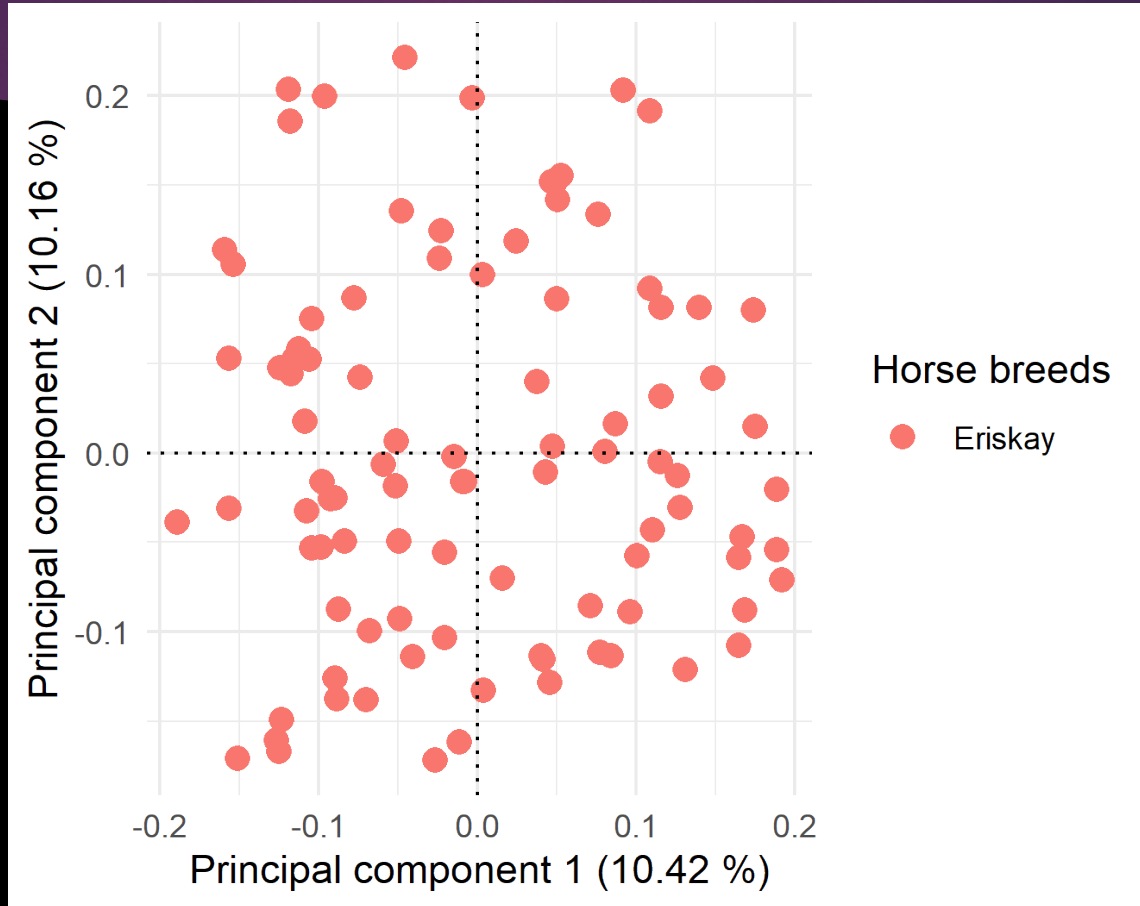
-----
DNA Enquiry (Non-WBY)
-----
Sex: F Mare      Colours: B      Date: 
Cleveland Bay Horse Cse:      Tst:      Ctry:
DNA parentage tested      No: None
YDF:      NA no:      Py
YDF:      NA no:      Py
Results-----Source
VHL HTG AHT HMS HTG AHT HMS ASB HTG HTG HMS HMS ASB f
tem : 20 4 4 7 6 5 6 2 10 7 3 2 17 2
mal : MP M LO JL JK OP K O M 1
ire : IM KM OP J GO KO OP IK OR O M I
Dam : IP KM HL JL JK LP K O M FN 1
LEX HMS CA4
tem : 33 1 25
mal : GL
ire :
Dam : L
-----
  
```



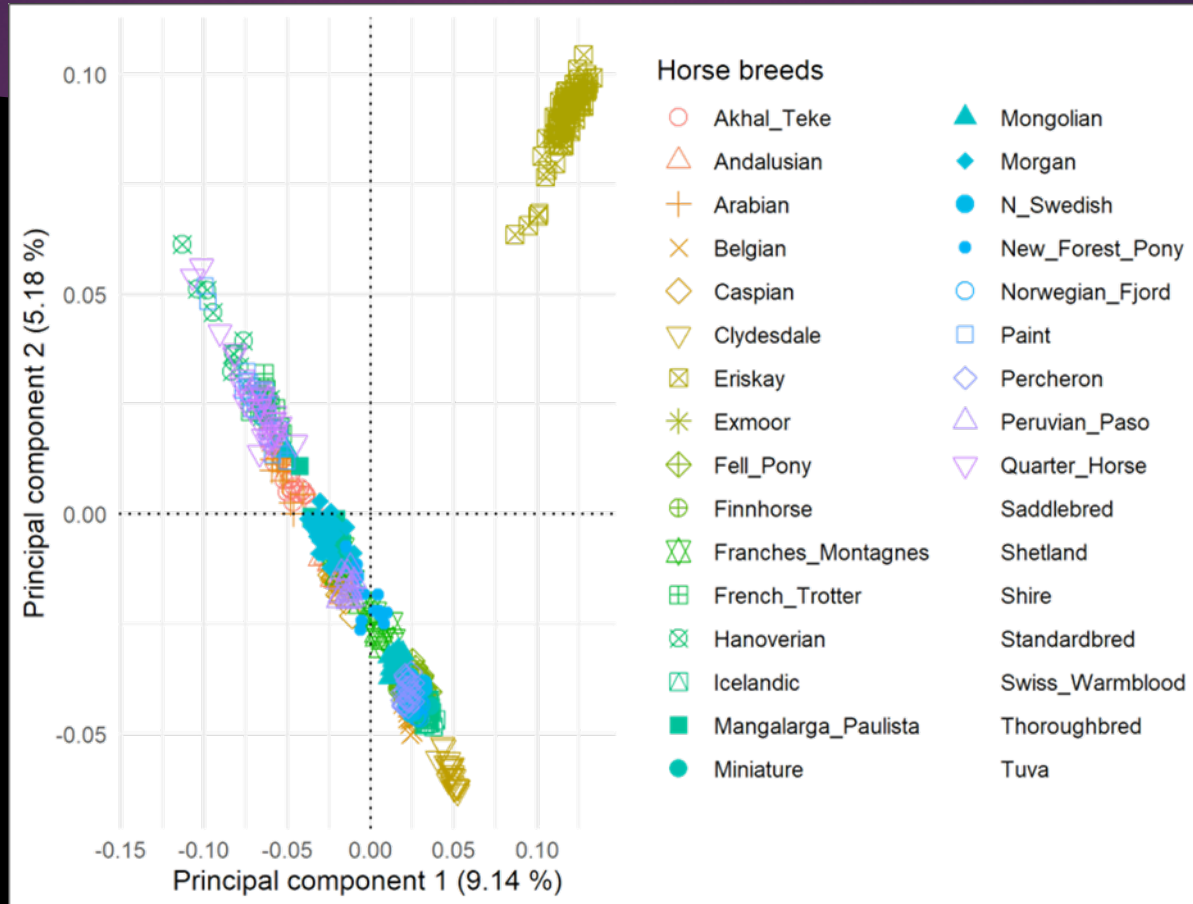


- **GGP Equine** – upgraded to ~80,000 SNPs
- Add-on content – Causative mutations
Health Traits, Coat Colours, Performance Markers
- Parentage SNPs, ISAG Core Panel and Warmblood 200SNP panel
- Improved coverage of the Equine genome and increases average Minor Allele frequency
- Improved imputation to Affymetrix Equine HD
- Y and Mitochondrial Marker addition

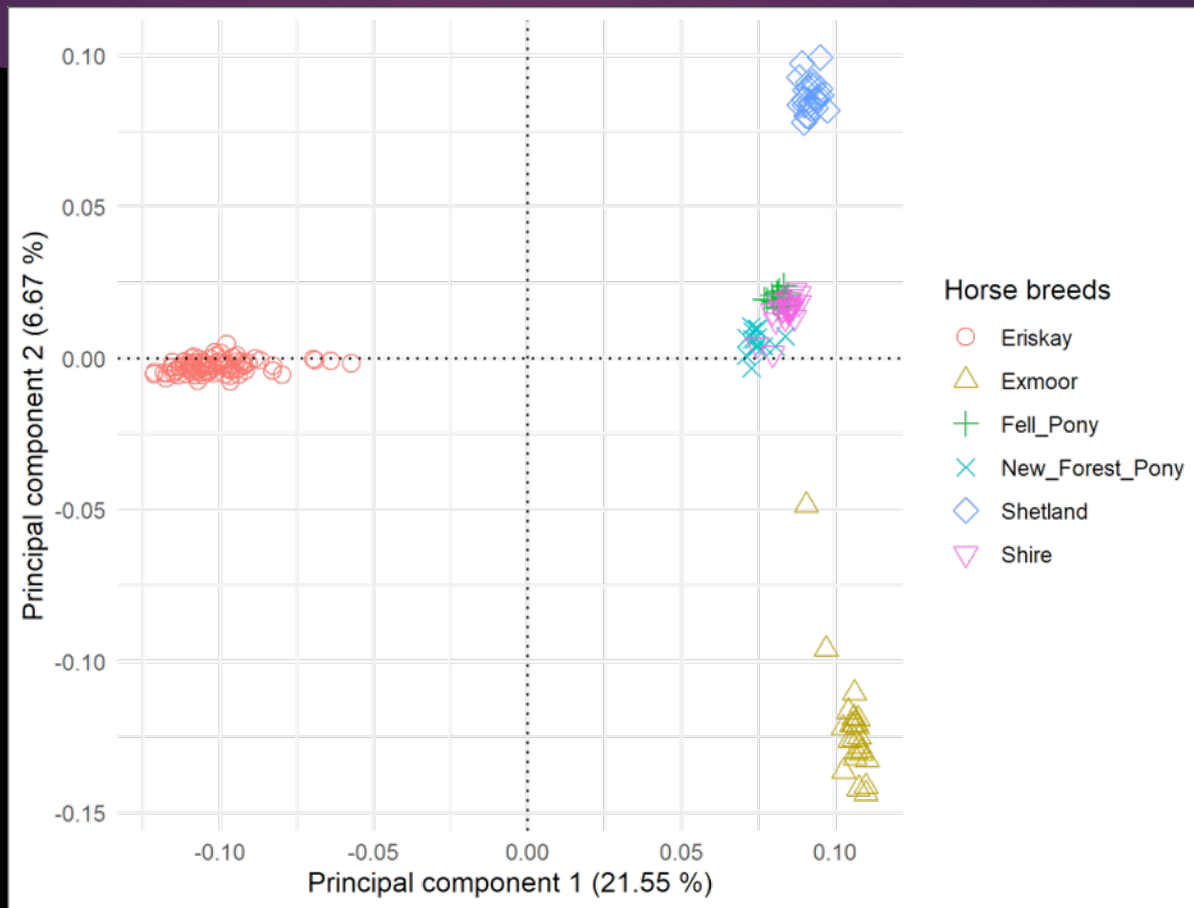
Principal Component Analysis



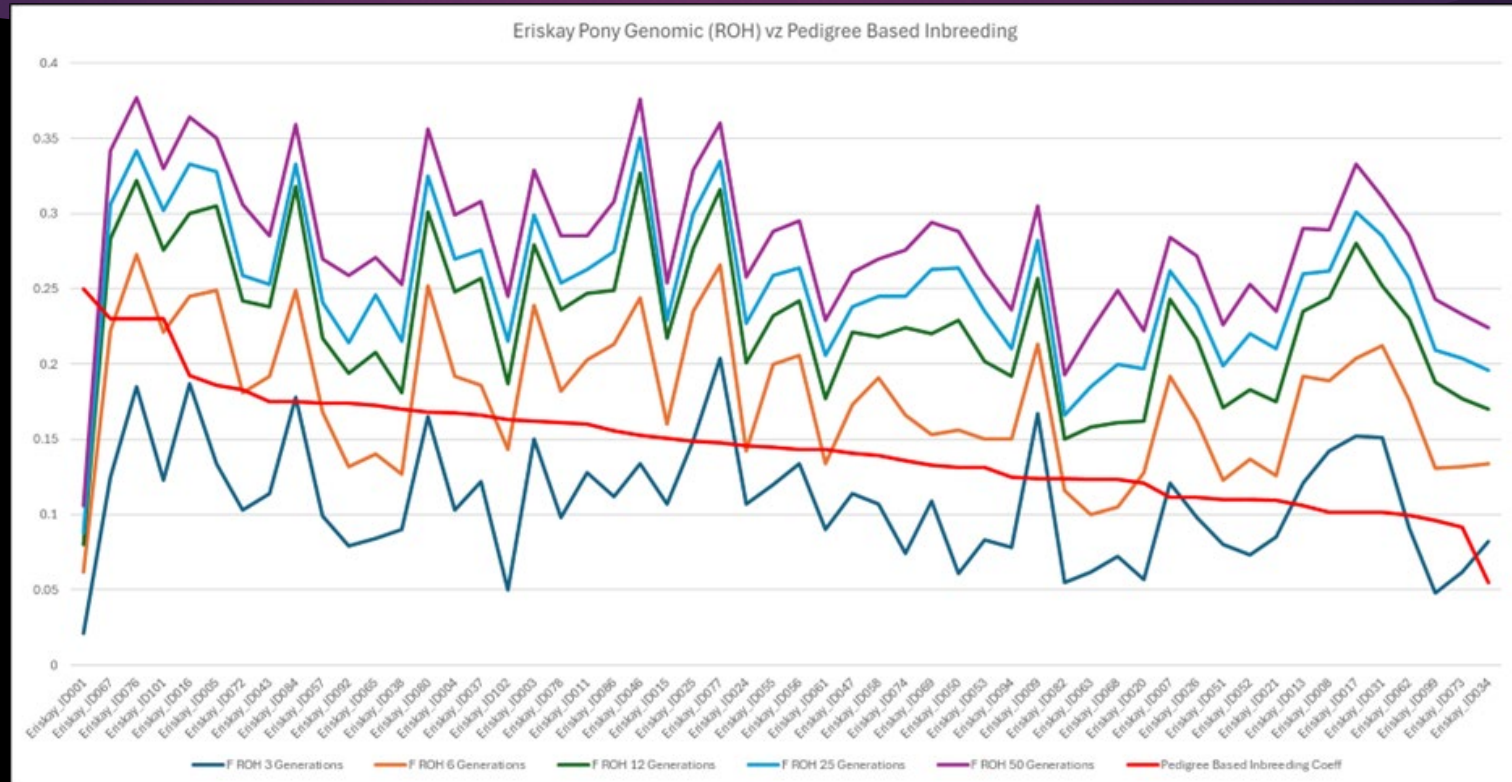
Principal Component Analysis



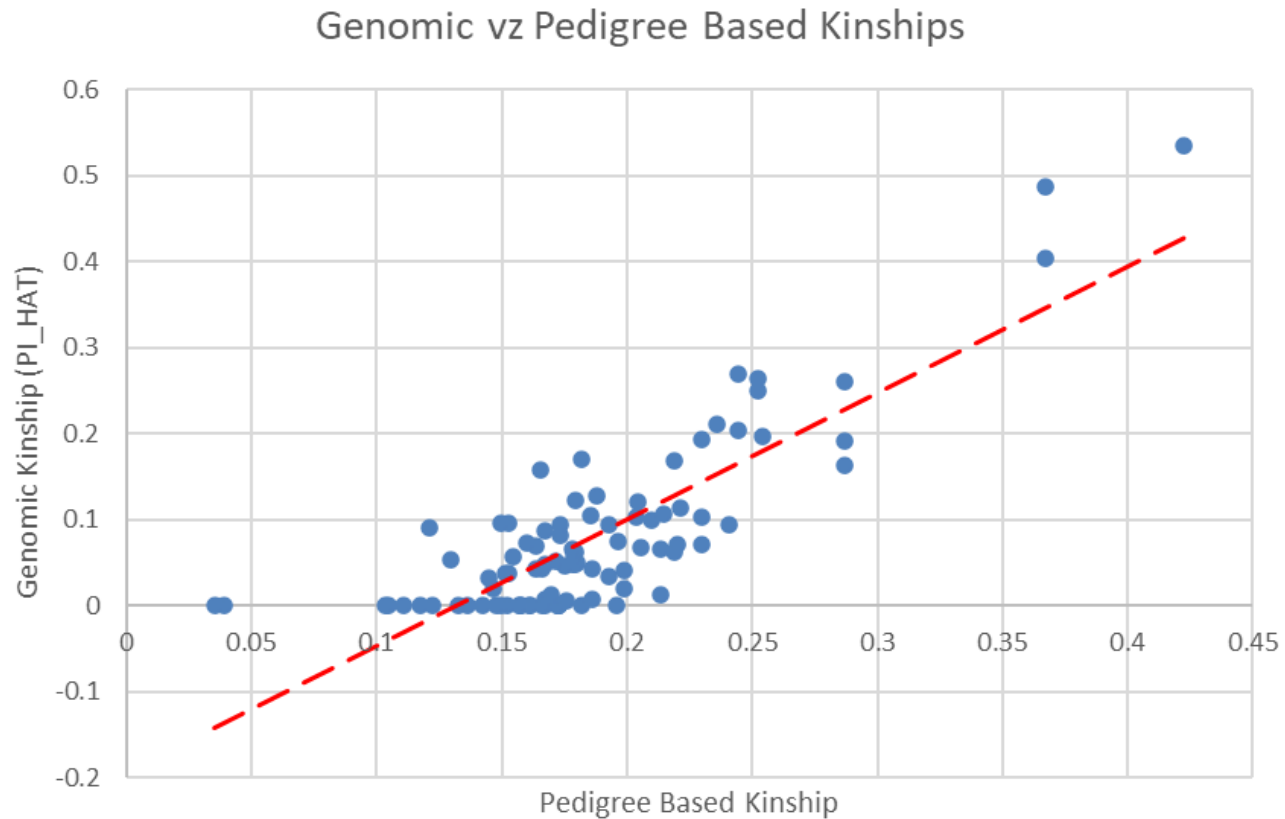
Principal Component Analysis



Genomic Inbreeding (ROH)

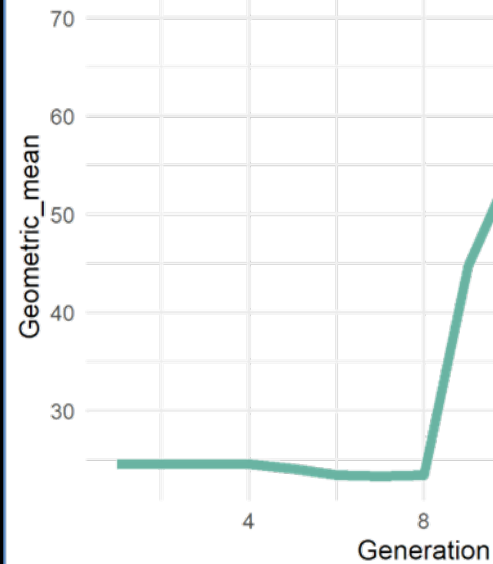
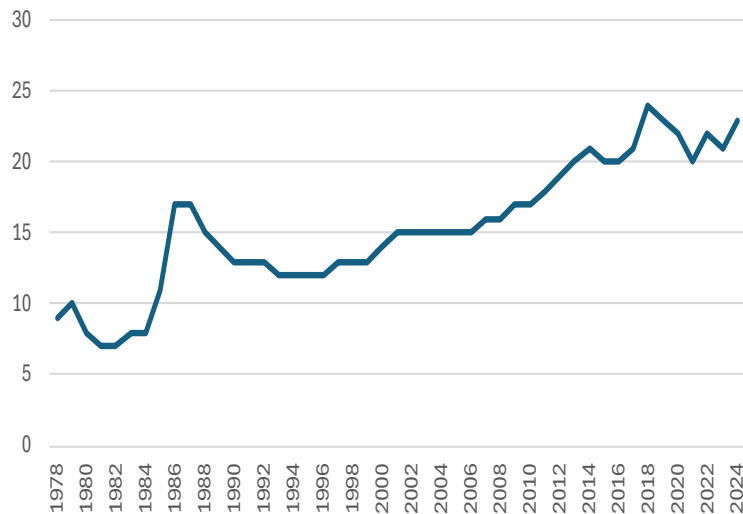


Genomic & Pedigree Based Kinships

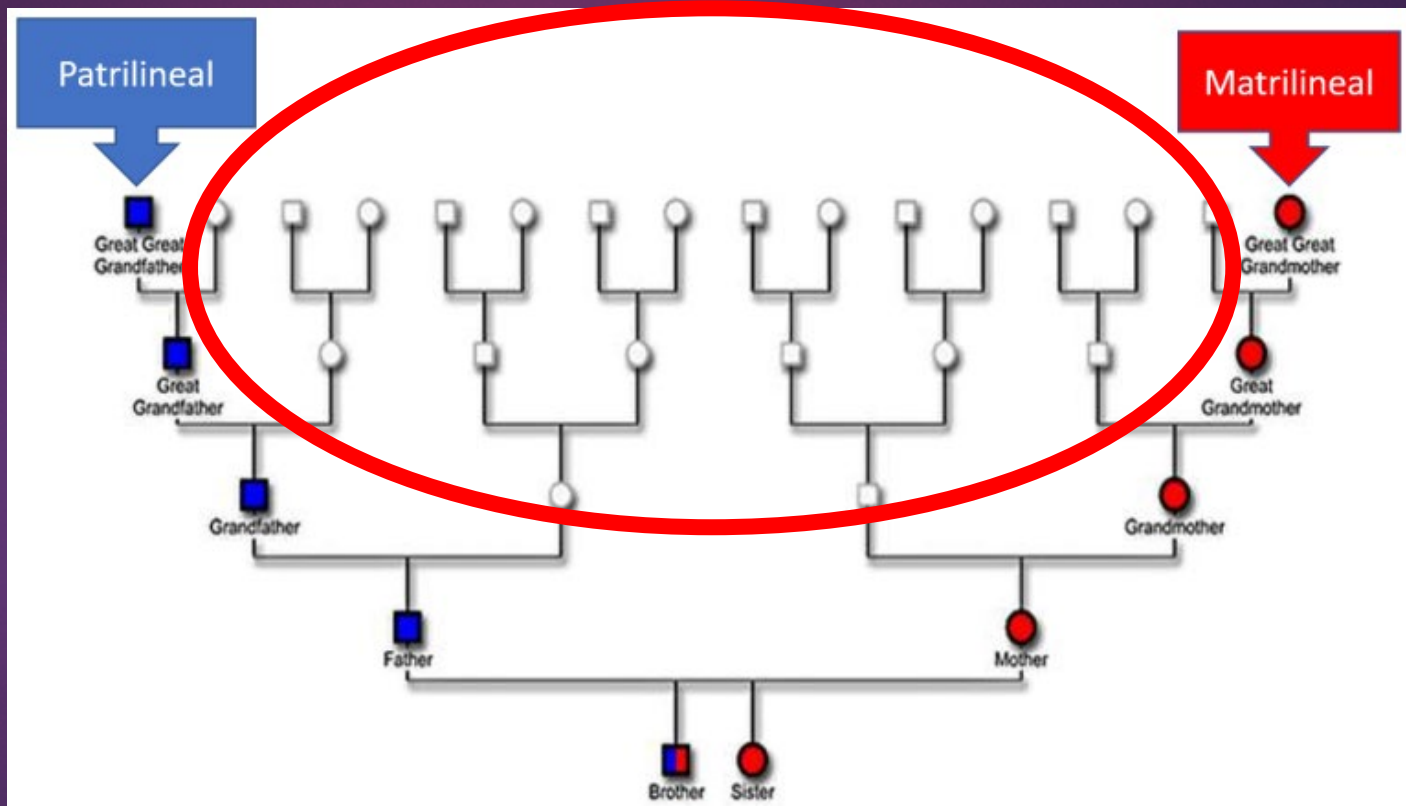


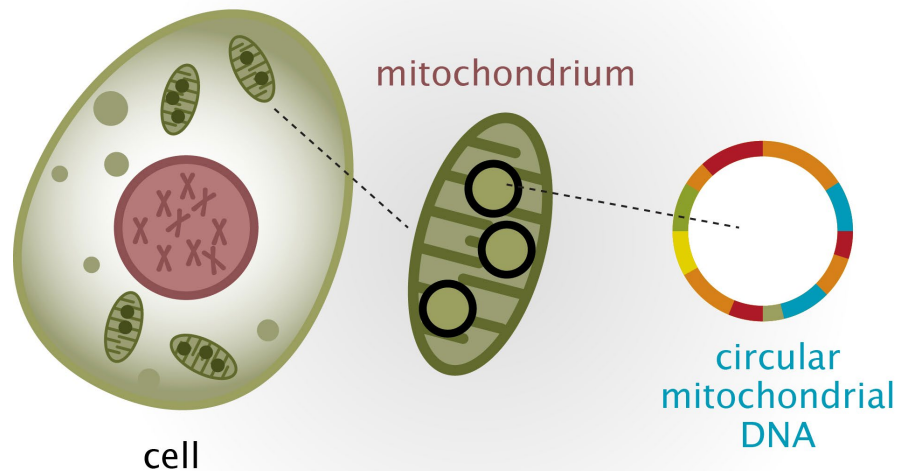
Genomic & Pedigree Based Ne

Ne Coancestry



Male and Female Ancestry Lines

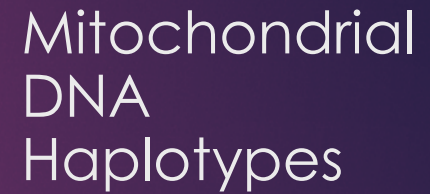




(c) CMG, UZ Brussels, Belgium

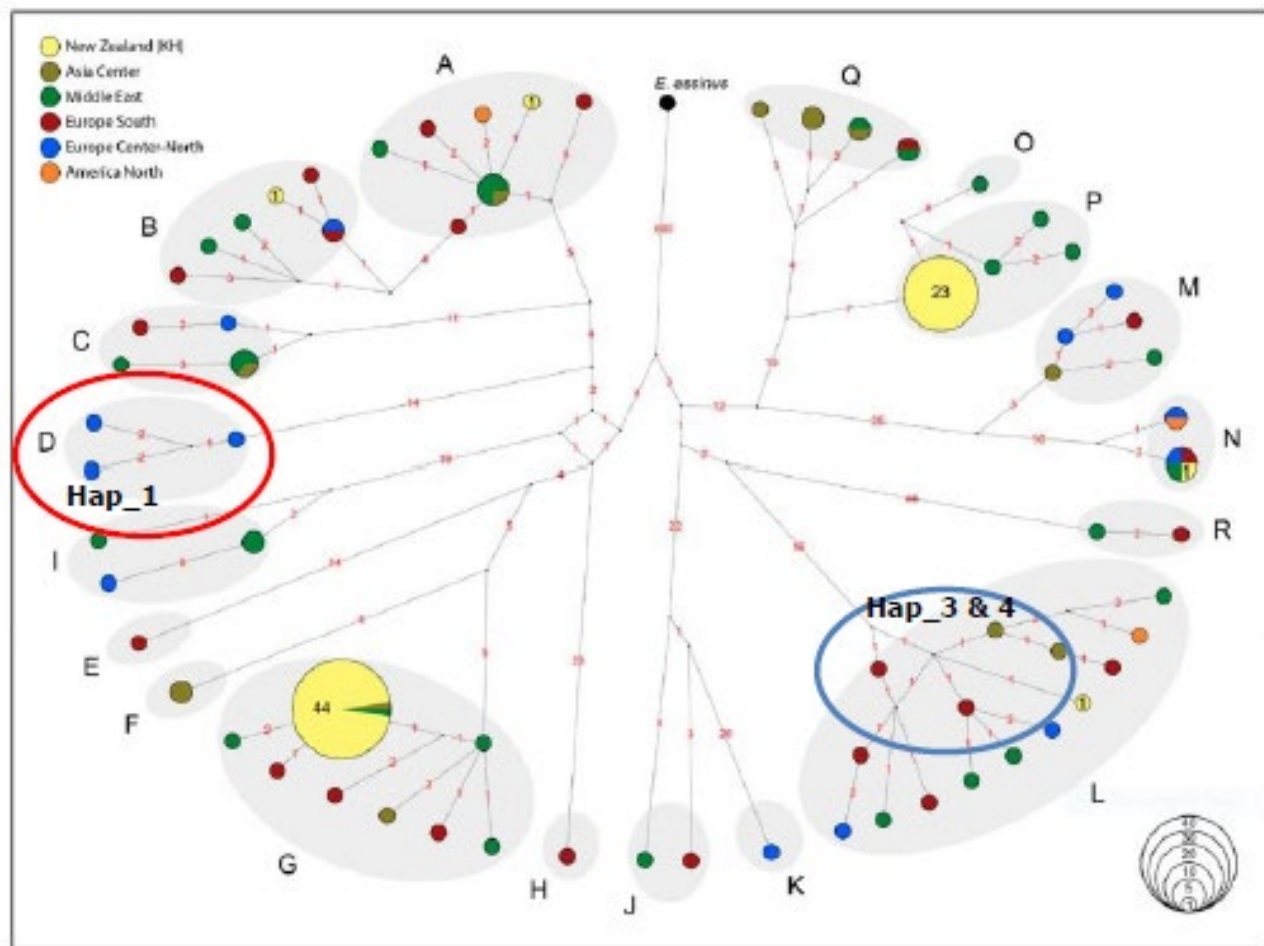
Mitochondrial DNA

(Maternal inheritance in both males and females)

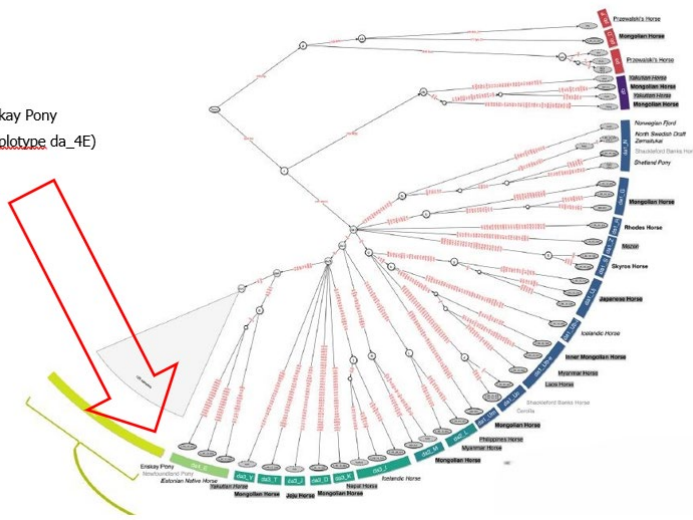


Peggi 007/65

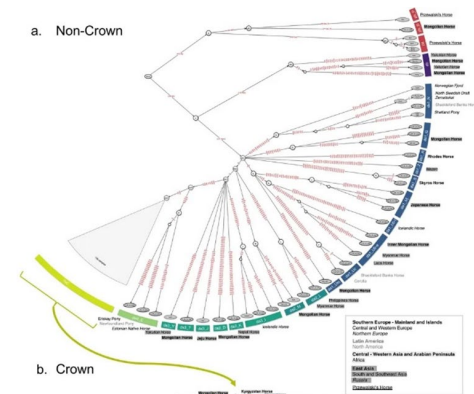
Mitochondrial DNA Haplotypes



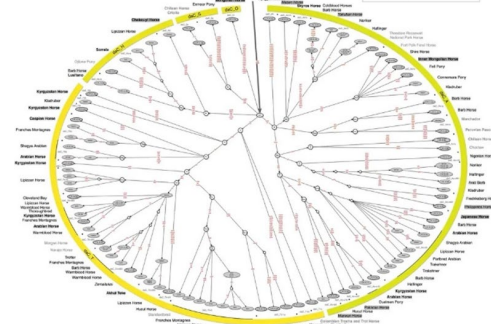
Eriskay Pony
(Haplotype da_4E)



a. Non-Crown



b. Crown



Y Chromosome Haplotypes (Paternal inheritance in males only)



Y Chromosome da4-E Haplotype



Highland Pony

Y Chromosome daC_Ad-bS Haplotype
(shared with Shires Clydesdales and some Fell Ponies)

Findings

- ▶ The Eriskay Pony is unrelated to any other UK native pony
- ▶ Closest relatives are in Estonia Lithuania and Newfoundland
- ▶ There is maternal but no paternal diversity in the breed
- ▶ Pedigree Based breed management is validated



Recommendations

- ▶ Breeding Advice (SPARKS Mk2)
- ▶ Maintenance of Female mtDNA haplotypes
- ▶ Future Monitoring
- ▶ Gene Banking
- ▶ Tissue Banking
- ▶ SNP Databank





Questions?