Signet BREEDING SERVICES

Genomic update from AHDB (5 mins)

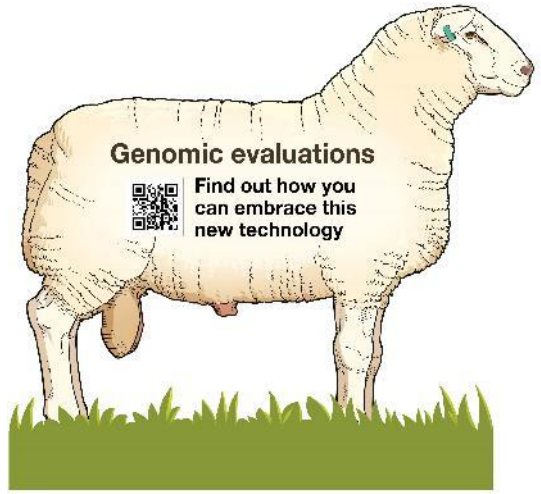
Understanding genetic relationships between flocks.
How are flocks connected? (5 mins)

Samuel Boon and Samir id-Lahoucine

(but remember the clever bits are always Samir)

Funded by your levy
AHDB
ahdb.org.uk

Why genomics?



- Correction of pedigree errors
- Informing breeders about major genes (including harmful recessives)
- More accurate and reliable breeding values
  - Cost-effective approach for traits that are hard or expensive to measure (like methane)
  - Ability to make early decisions on young animals
  - Ability to make faster progress on low heritability traits
- Ability to make more accurate comparisons between flocks (…breeds?).

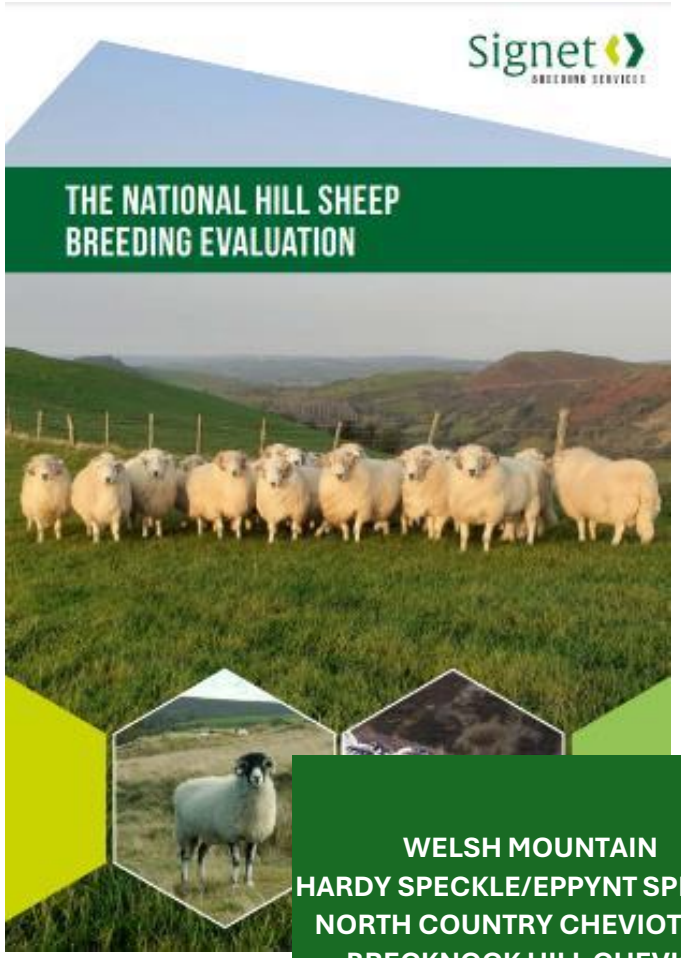
Where are we today?

- 94,819 genotypes (58,077 Welsh Mountain)
  - 94,816 sheep and 3 dogs we were sent by mistake
- 37 breeds (14 >1,000 genotypes)
- 512 different files, 10 different chip types

Current sources of genotypes

- Projects
  - Welsh Sheep Genetics Project
  - Breed for CH4nge
- Research
  - University of Nottingham
  - Roslin
- Breed Societies
  - Suffolk, Charollais, Hamp' Down
  - BFL (being set up)
- Private breeders / companies
  - SIG/Exlana and Innovis
- AHDB
  - CT scanned sheep
  - RamCompare sires
  - Ewe genotyping
- QMS
  - CT and Ram/Ewe Genotyping
- AgriSearch
  - Ram/Ewe Genotyping
- Sheep Ireland

Hill Sheep Evaluation



	Geno' Count
WELSH MOUNTAIN	58077
HARDY SPECKLE/EPPYNT SPECKLE	5151
NORTH COUNTRY CHEVIOT HILL	3308
BRECKNOCK HILL CHEVIOT	2218
SOUTH WELSH MOUNTN	1685
SCOTCHBLACKFACE	1353

FW LATEST KNOW HOW MARKETS DISCOVER WEATHER

Michael Priestley
11 July 2023

Sheep get genomic EBVs in major step for hill breeds

© HCC

A landmark project has yielded genomic values for the maternal, growth and carcass traits for six British hill sheep breeds.

Dubbed the most exciting breakthrough in decades, the genomic estimated breeding values (gEBVs) are available for Welsh Mountain, Eppynt Hill/Hardy Speckle, North Country Cheviot (hill type), Scottish Blackface, South Welsh Mountain and Brecknock Hill Cheviot, through Signet.


Defaid
u magu i berfformio, wedi'u magu i bara
Rhowch ffôn i ni am ragor o wybodaeth
01970 828 236
innovis
WWW.INNOVIS.ORG.UK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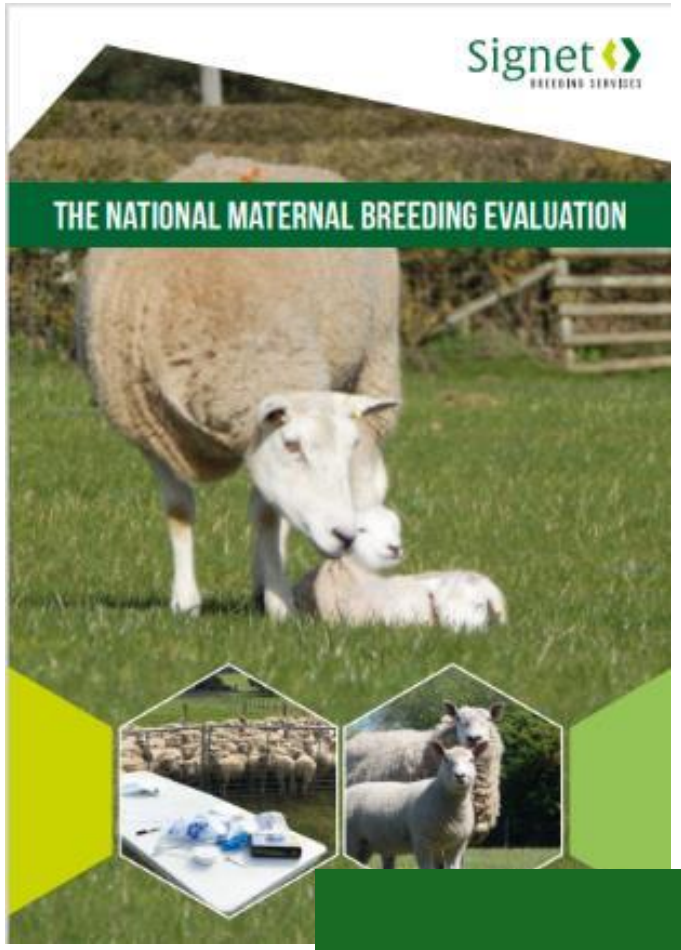
Maternal Sheep Evaluation

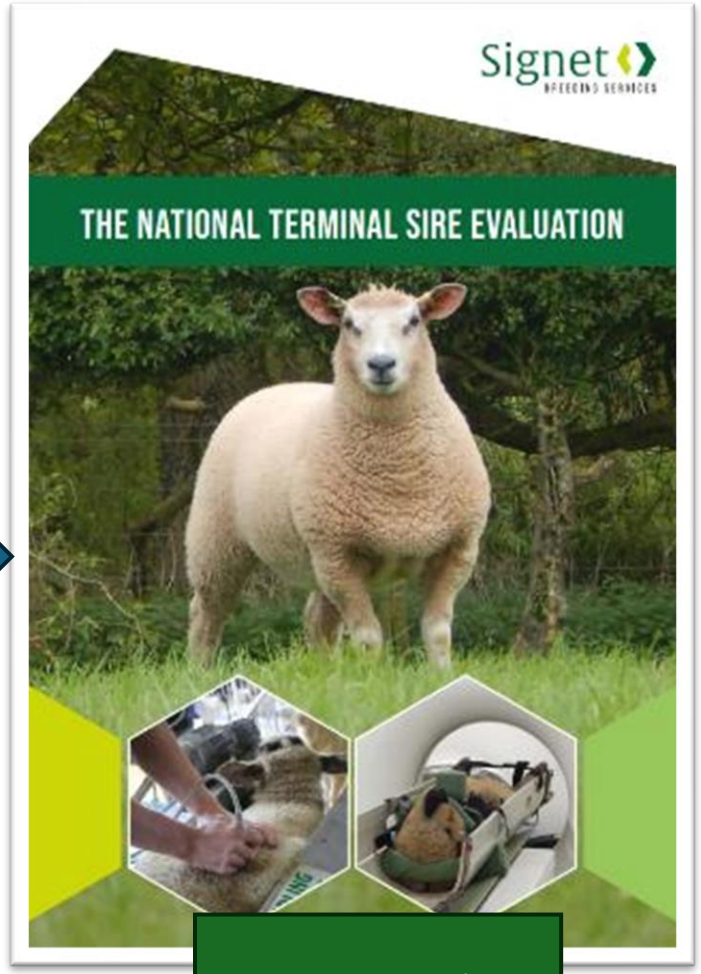


	Geno' Count
EXLANA	6312
LLEYN	2174

BREED FOR CH4NGE
BREEDING LOW METHANE SHEEP

FARMING connect

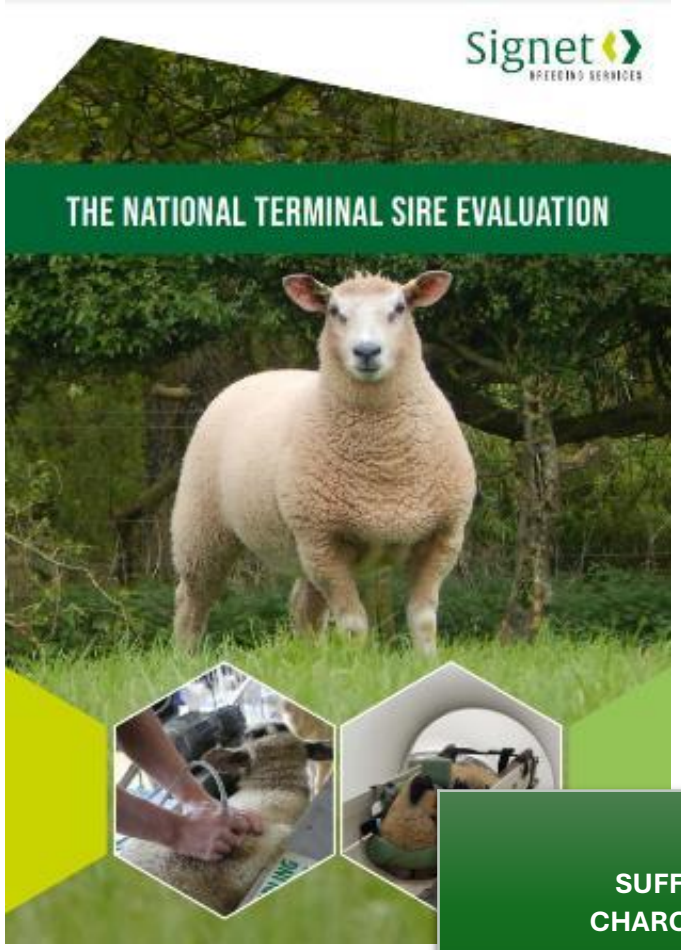
New Genetic Parameters for Carcase Traits



Genomics

New Breeding Indexes

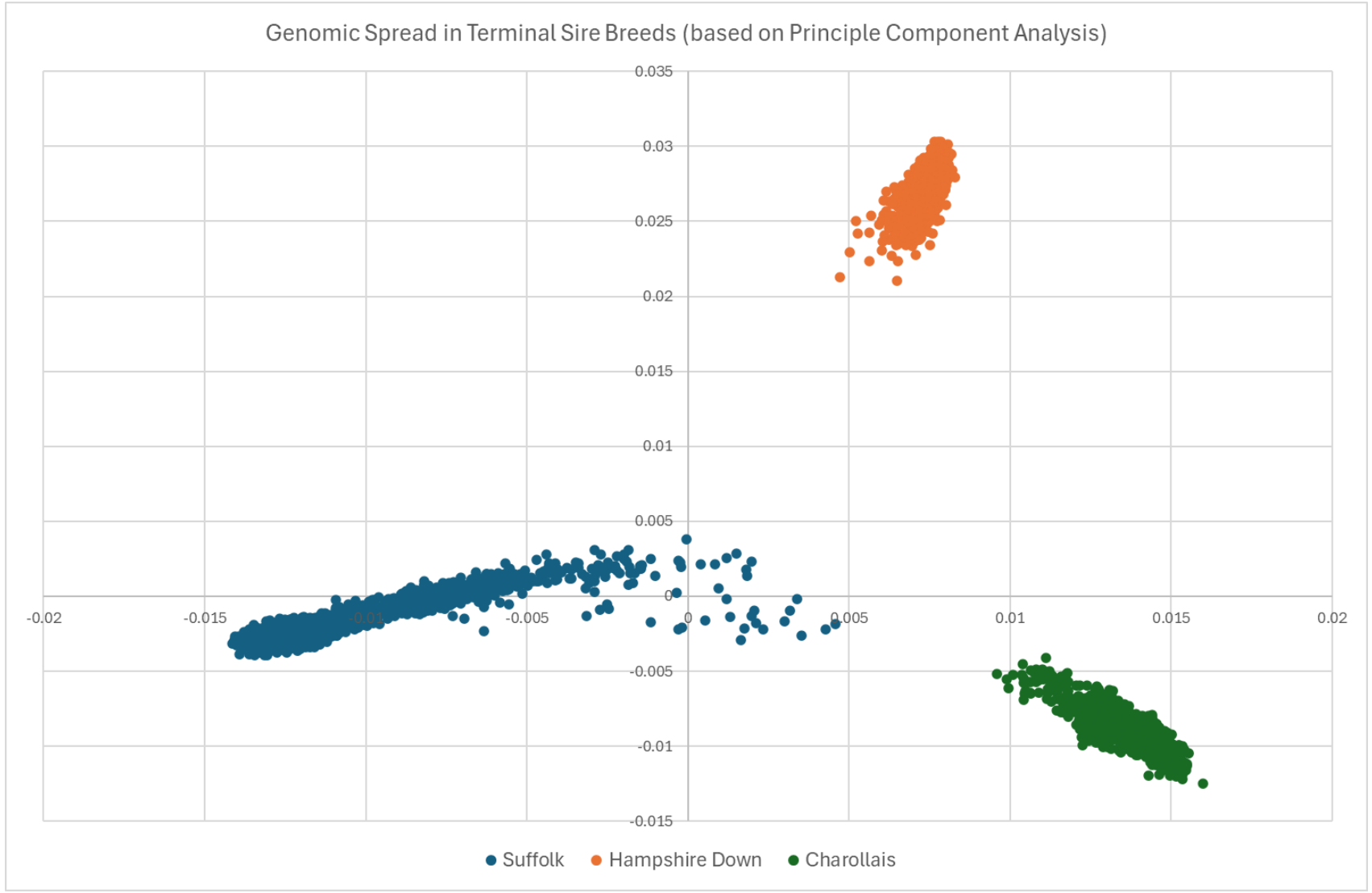
Terminal Sire Sheep Evaluation



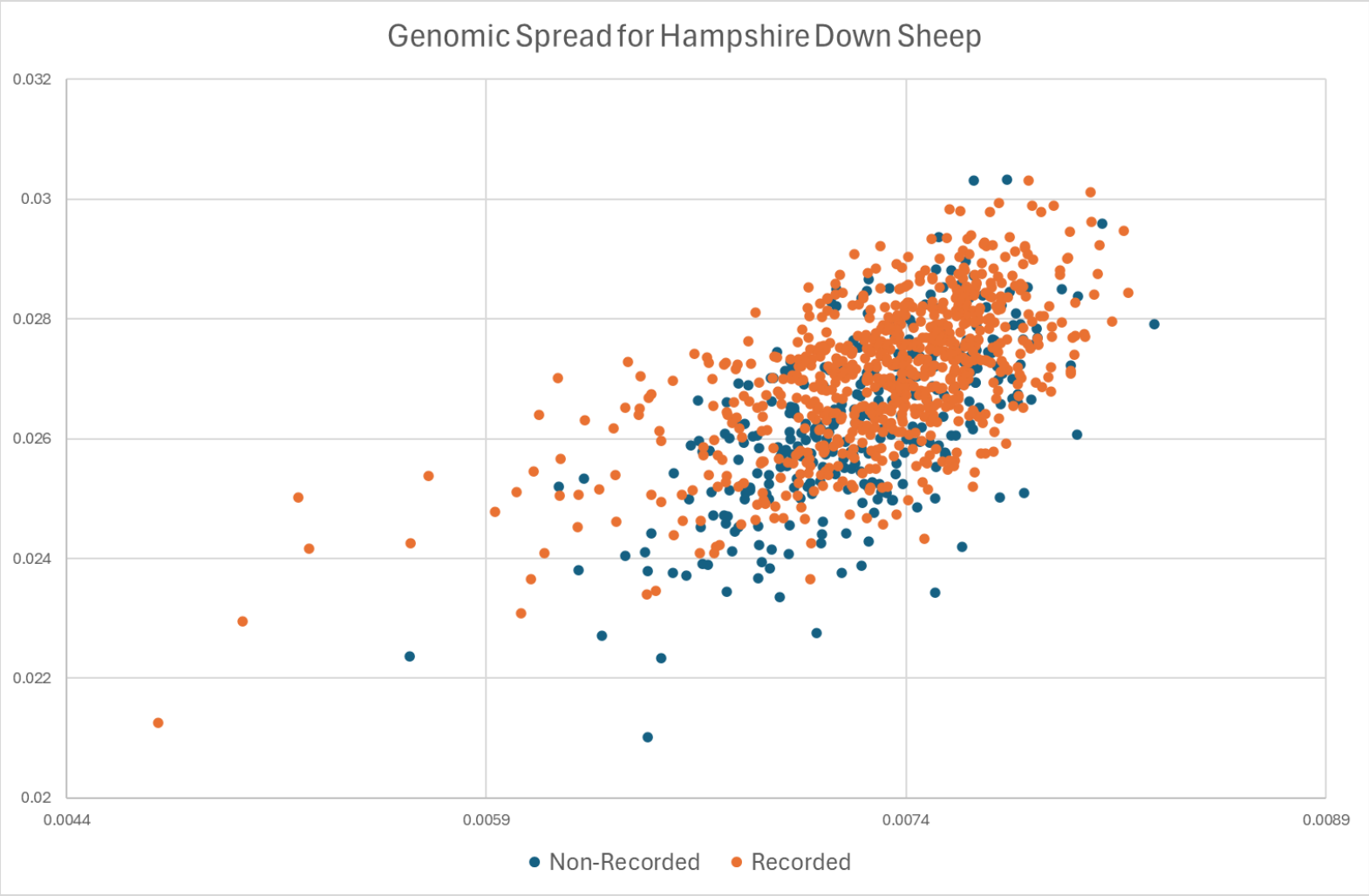
We have started with the three largest datasets:-

	Geno Count
SUFFOLK	4205
CHAROLLAIS	2611
HAMPSHIRE DOWN	1181
DORSET	1140

Question 1. Can we evaluate them together?

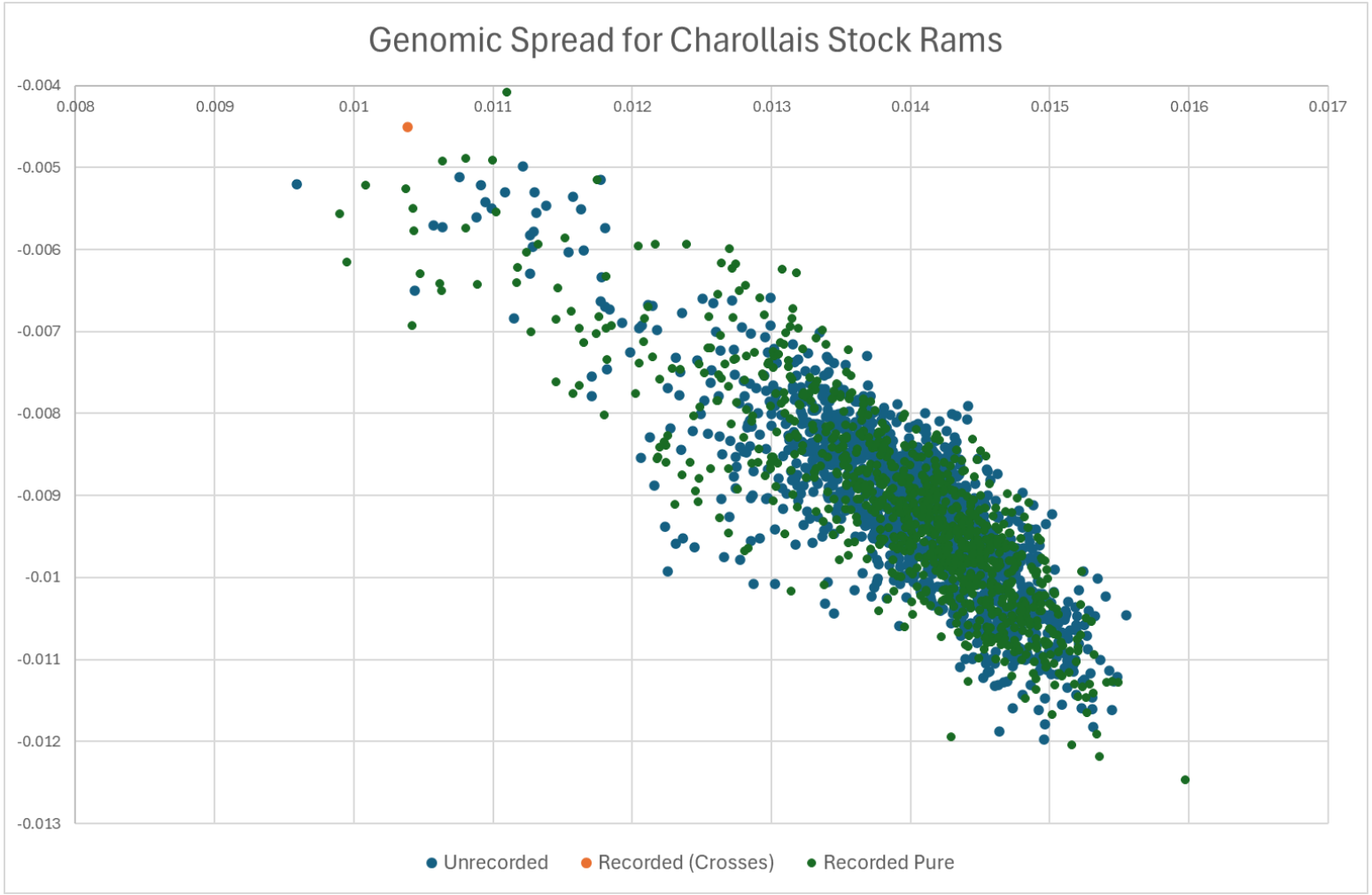


Hampshire Down



Correlation between current EBVs and genomic EBVs
>95% for all traits

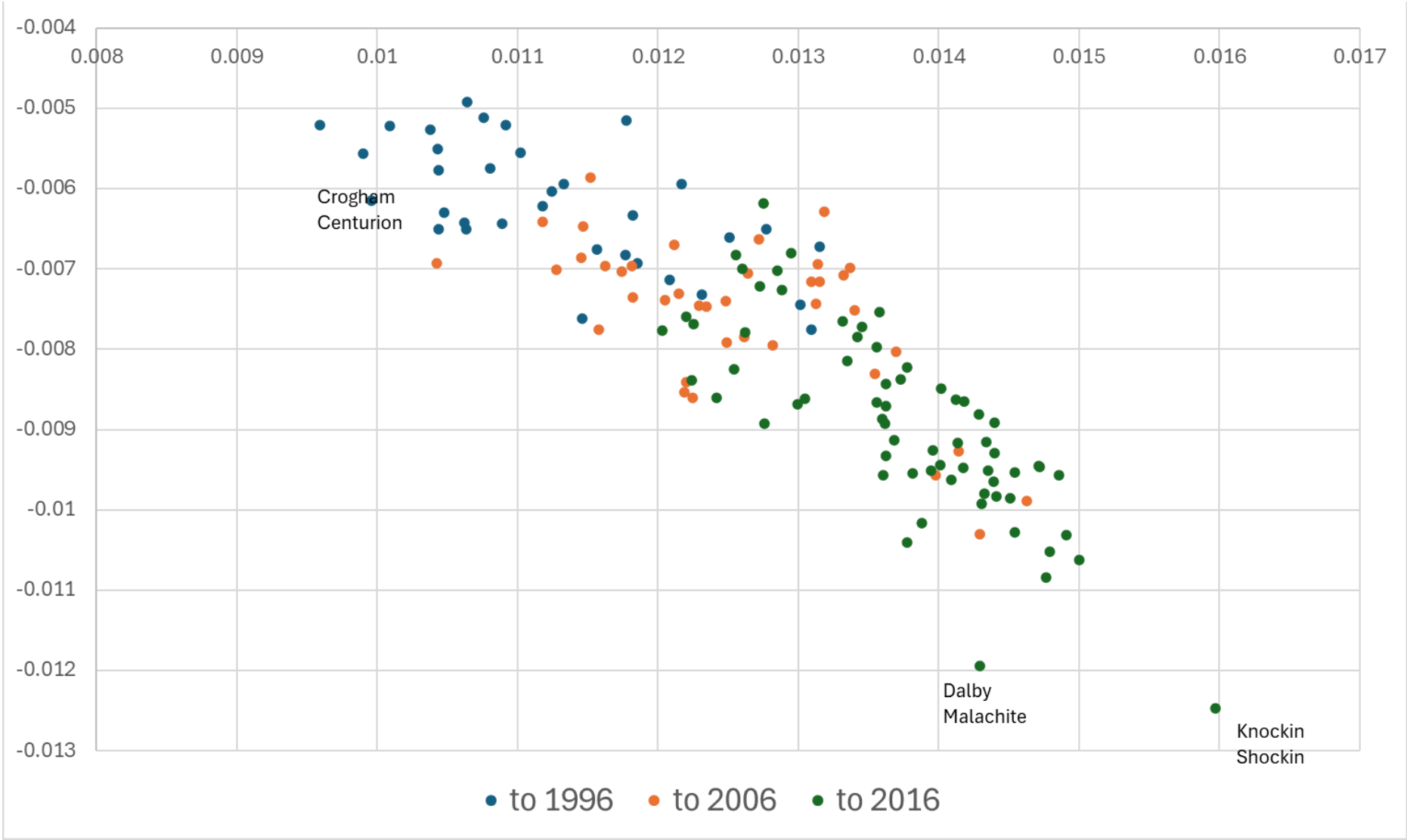
Charollais



Correlation between current EBVs and genomic EBVs
>90% for all traits, mostly over 95%

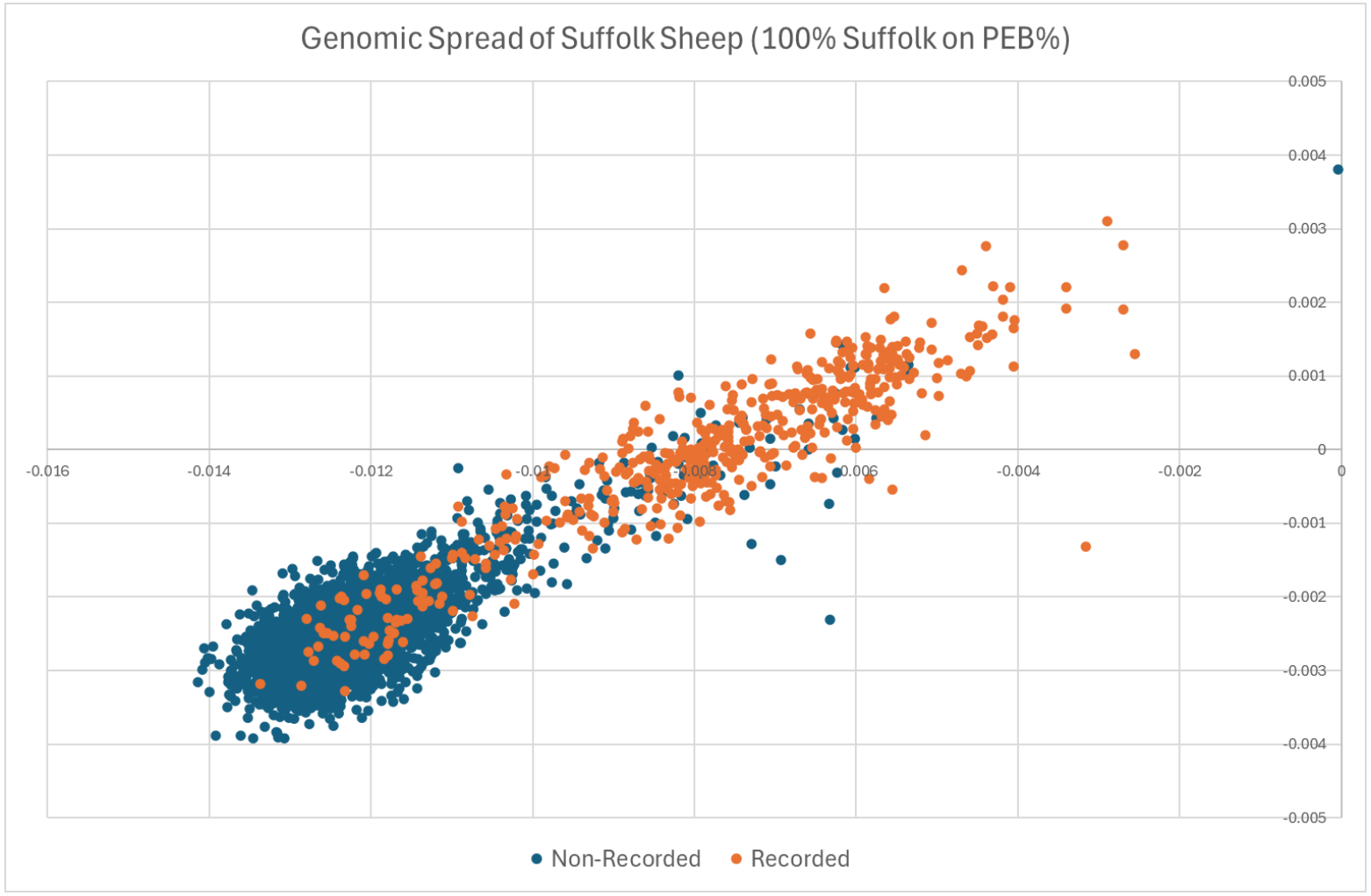
Charollais rams through the ages

CHAROLLAIS SHEEP SOCIETY



Genomic Spread indicating the "Purity" of Genotyped Suffolk Sheep and Suffolk Composites

Two strains of Suffolk sheep



Correlation between current EBVs and genomic EBVs >90% for most traits.

Two strains of Suffolk sheep, the implications…….

Correlation between current EBVs and genomic EBVs >90% for most traits.

Big (downward) changes in the EBVs for non-recorded, genotyped sheep.

- but hard to check the “truth”

AHDB’s starting point to only include:-

- Genotypes for sheep with an 8-week weight or scan weight (and their parents)

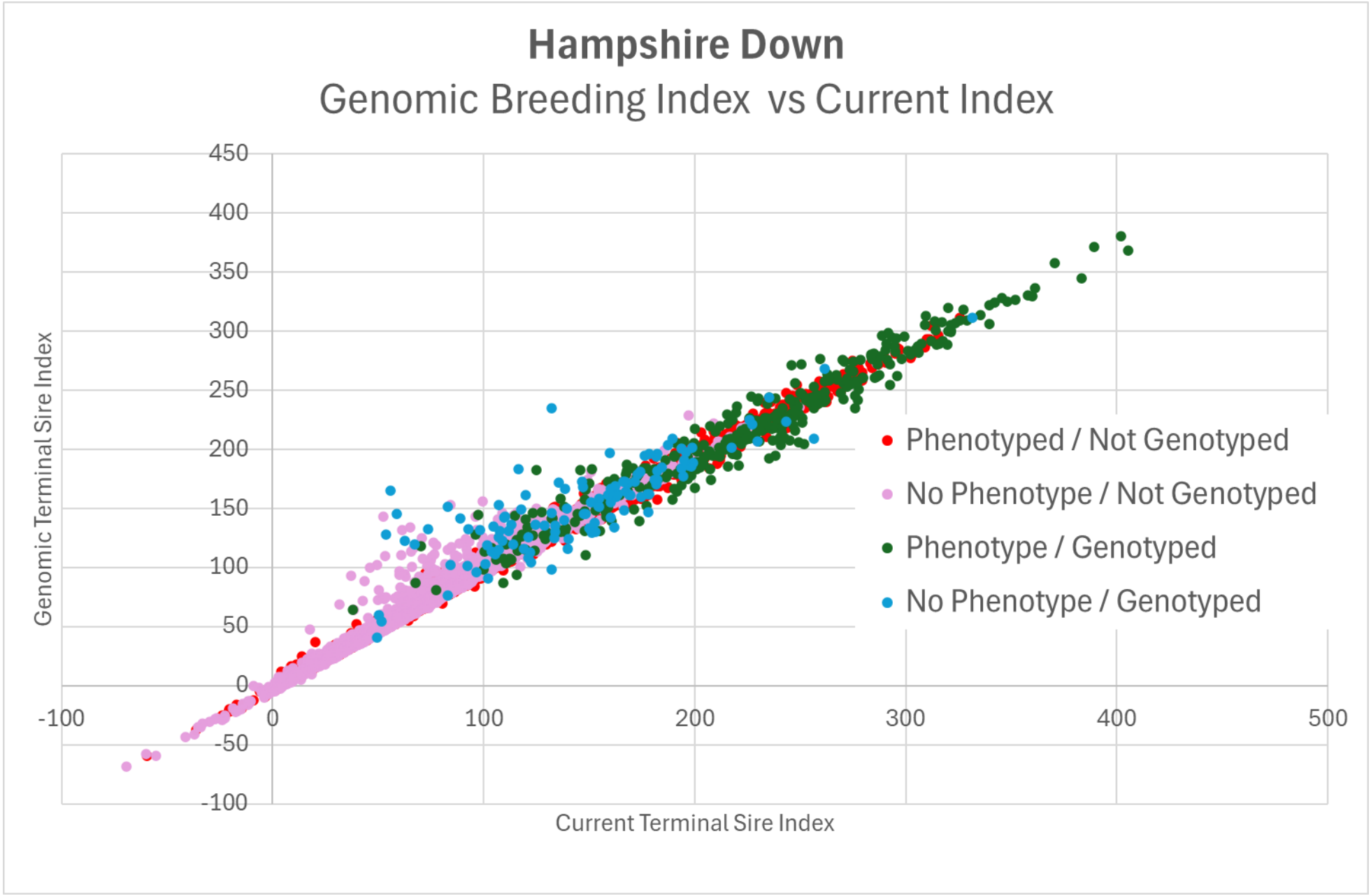
Impact (summarised)

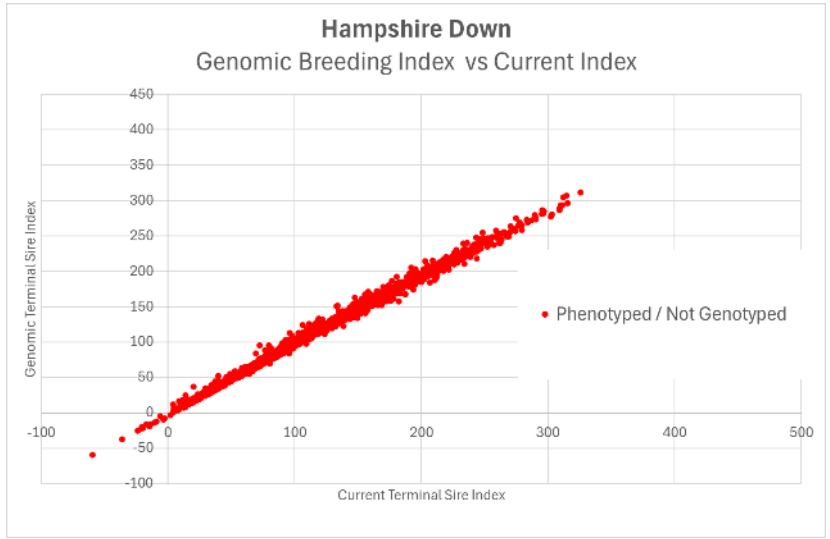
	Unmeasured Not genotyped
EBVs (Indexes)	Little
Accuracy Values	Little
Summary	Change if relatives are genotyped

Measured Not genotyped
Little
Little
Little change unless relatives genotyped

Impact (summarised)

	Unmeasured Not genotyped	Unmeasured Genotyped	Measured Not genotyped	Measured Genotyped
EBVs (Indexes)	Little	Lots of movement	Little	Some movement
Accuracy Values	Little	Big increase	Little	Increase
Summary	Change if relatives are genotyped	Big change possible, tending to be an increase	Little change unless relatives genotyped	Change expected, both upwards and downward


Hampshire Down
Genomic Breeding Index vs Current Index
Genomic Terminal Sire Index
Current Terminal Sire Index
450
400
350
300
250
200
150
100
50
0
-50
-100
-100
0
100
200
300
400
500
Phenotyped / Not Genotyped
No Phenotype / Not Genotyped
Phenotype / Genotyped
No Phenotype / Genotyped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Current Terminal Sire Index
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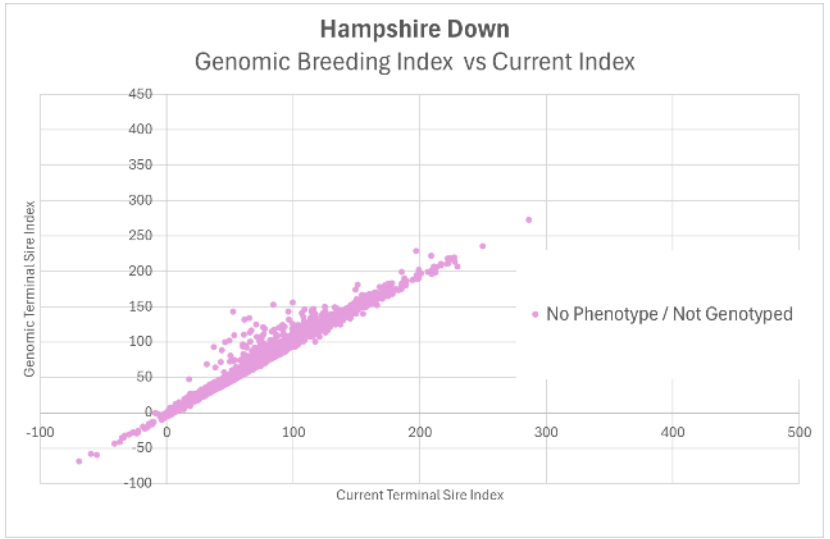
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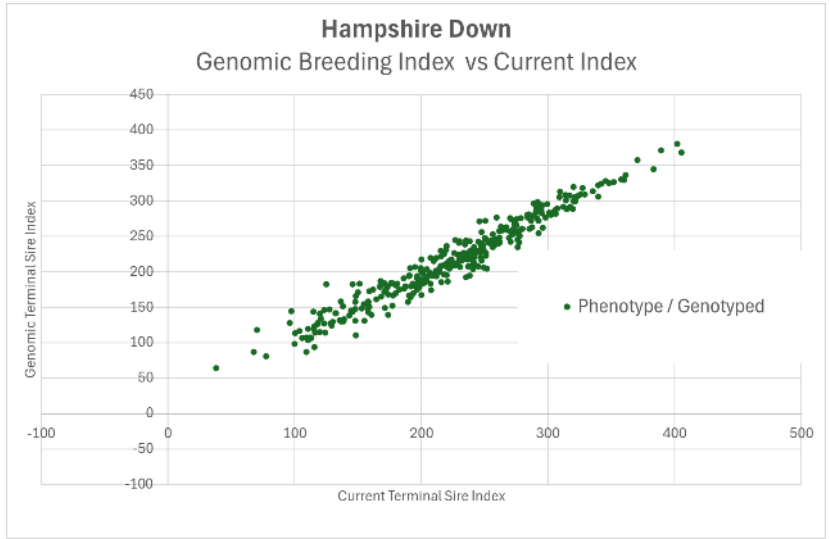
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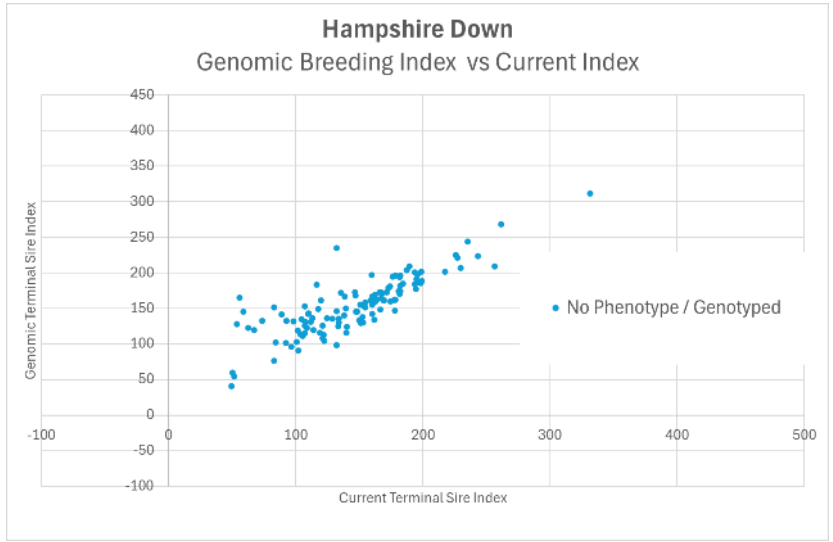
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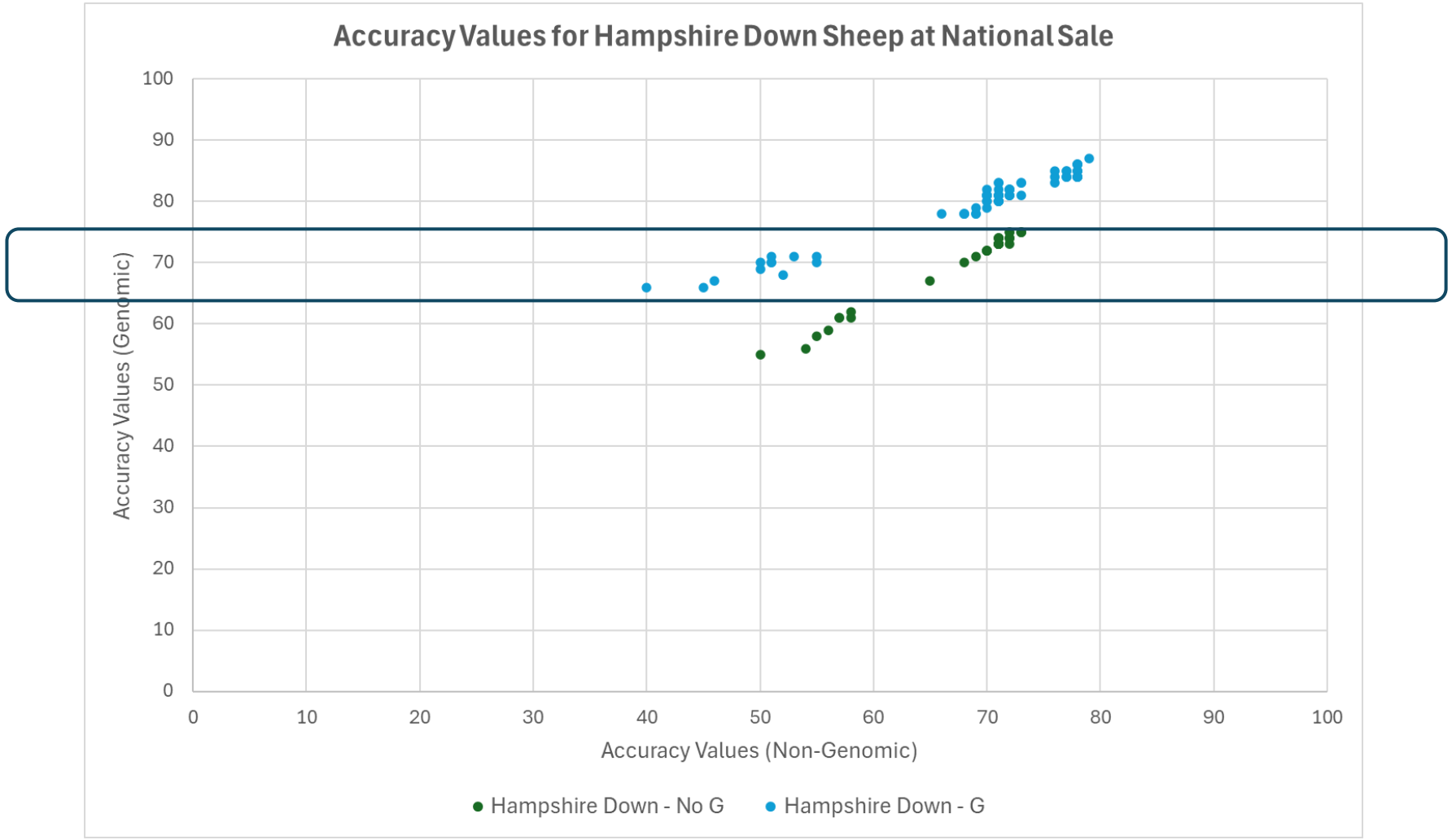
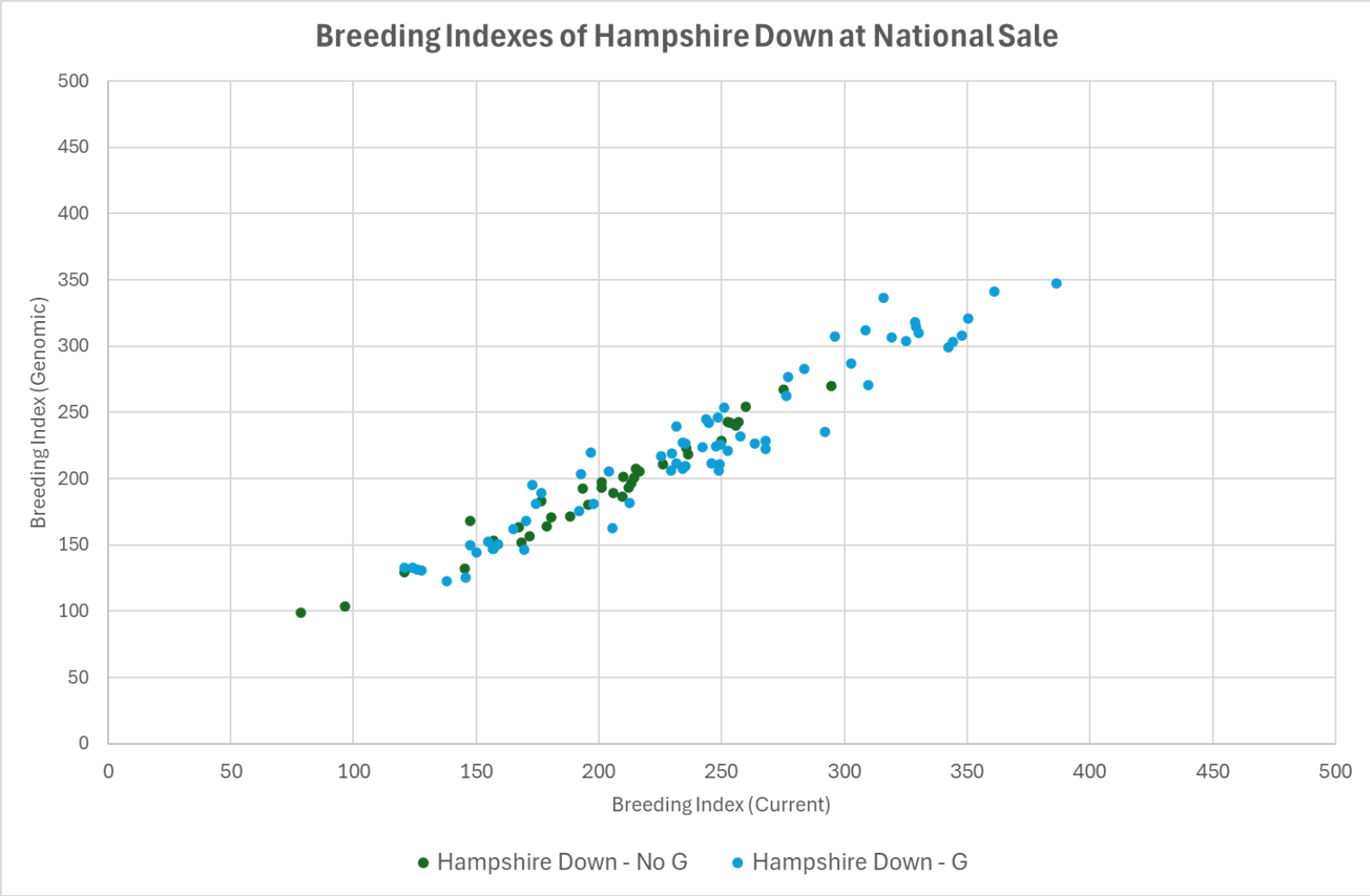
Genomic Terminal Sire Index
Current Terminal Sire Index
No Phenotype / Genotyped

Impact of Genomics at Point of Sale?



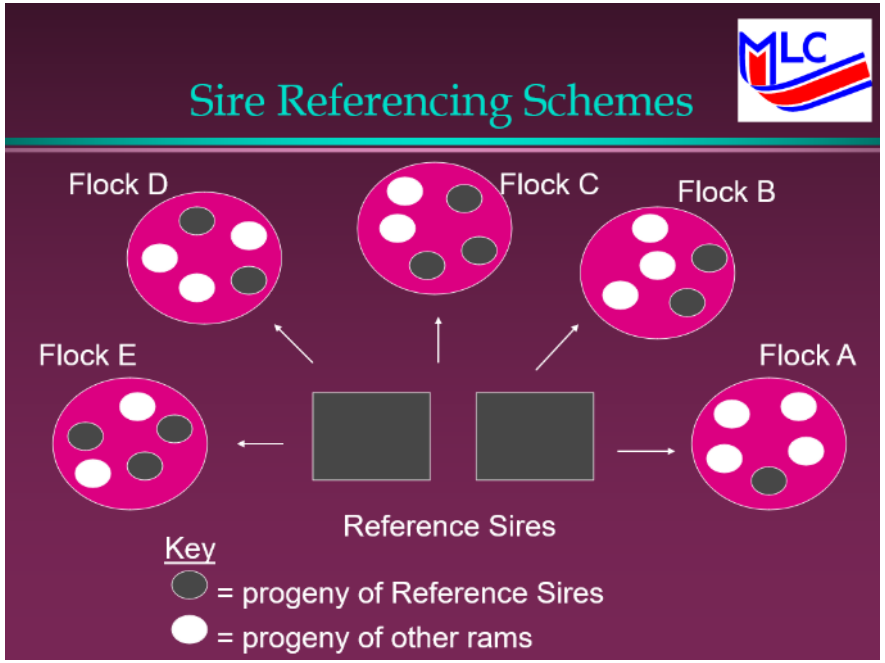
Impact of Genomics at Point of Sale?



The second oldest problem in sheep recording

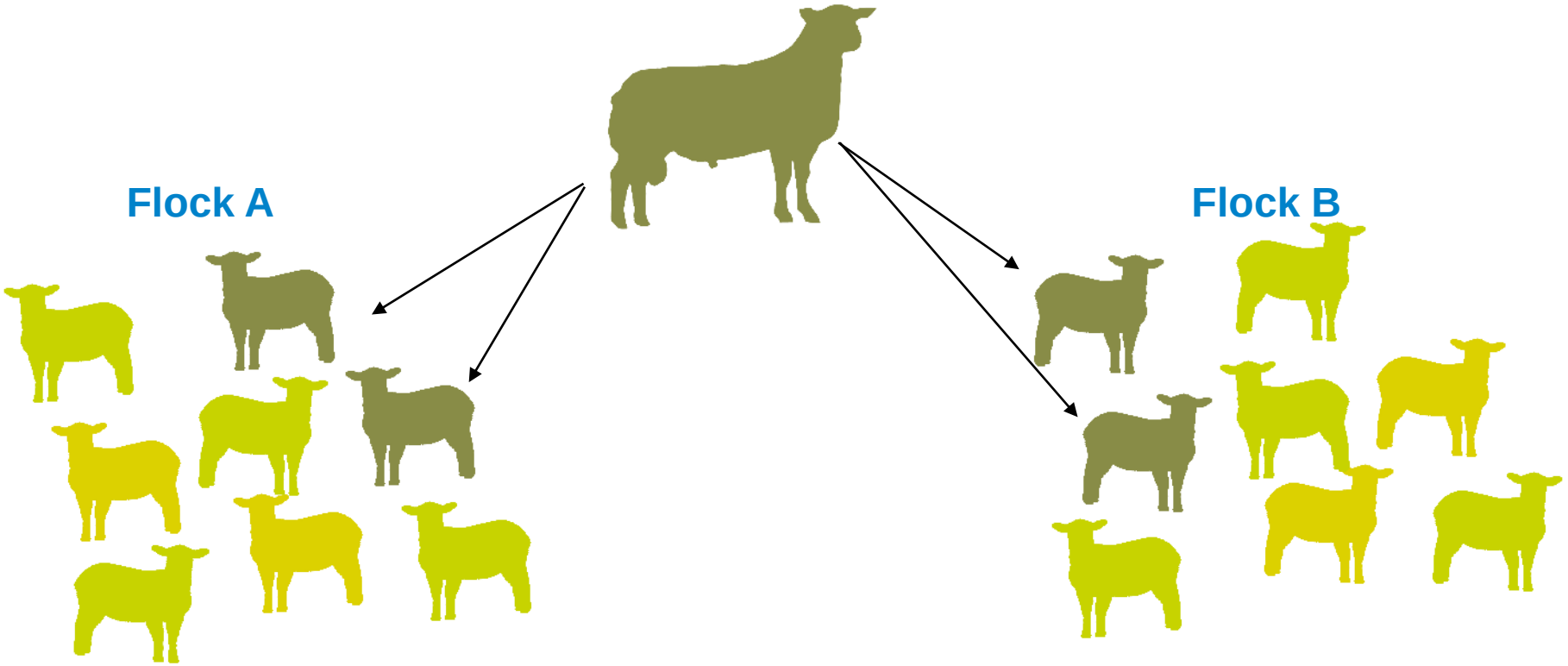
“How can I compare sheep in my flock with those in another flock”

“…and by the way, I don’t want to use AI ….. or share a ram …or buy a ram from them ….and they won’t buy one of mine….”



Genetic Linkage via Pedigree

Important when comparing sheep reared in different flocks



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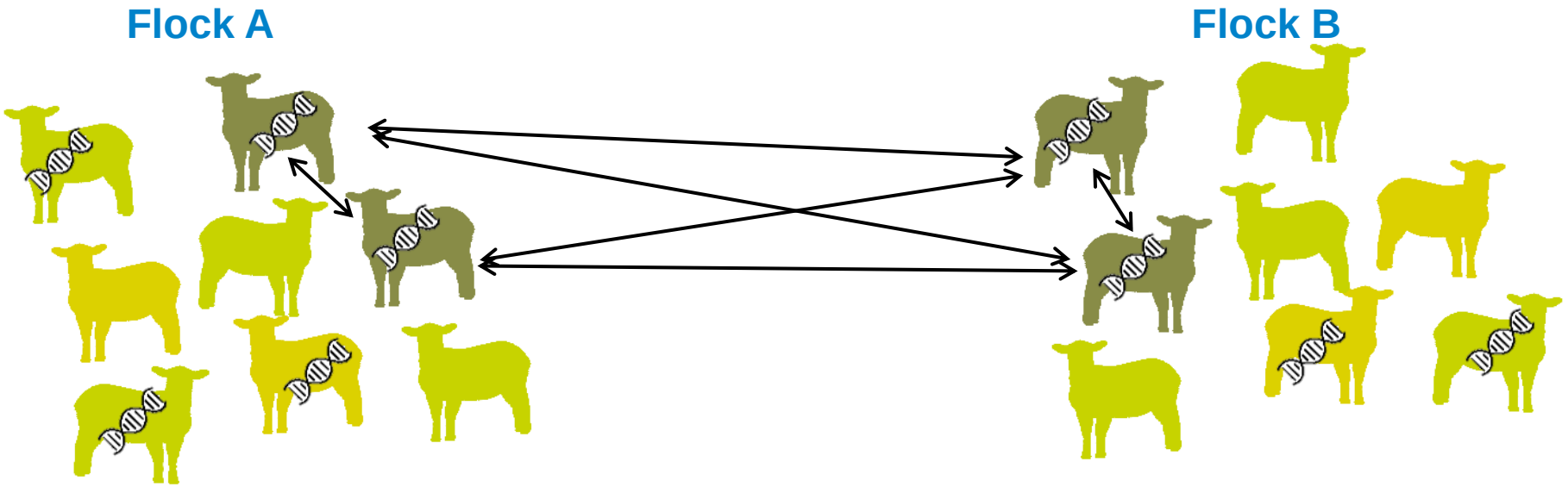
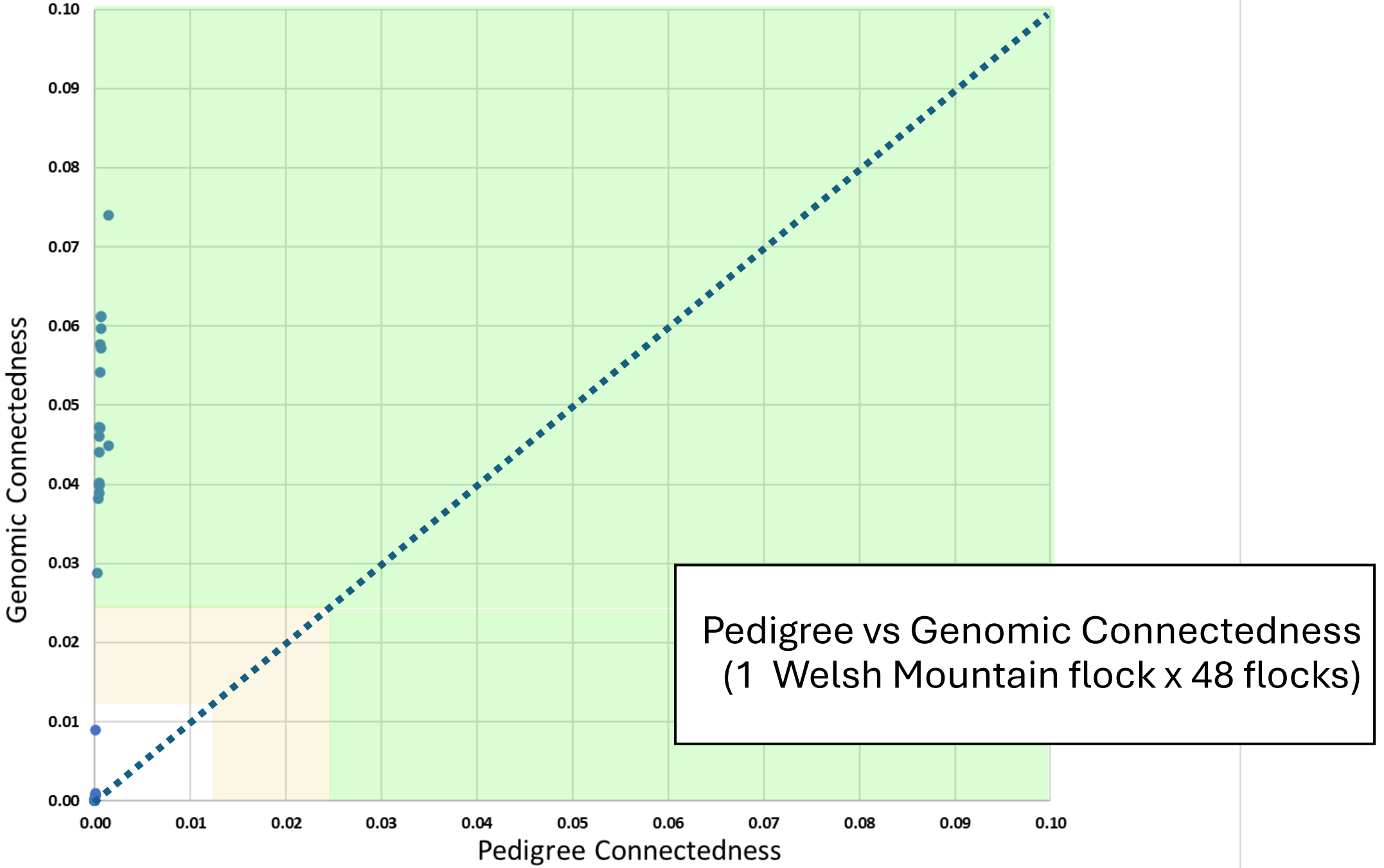
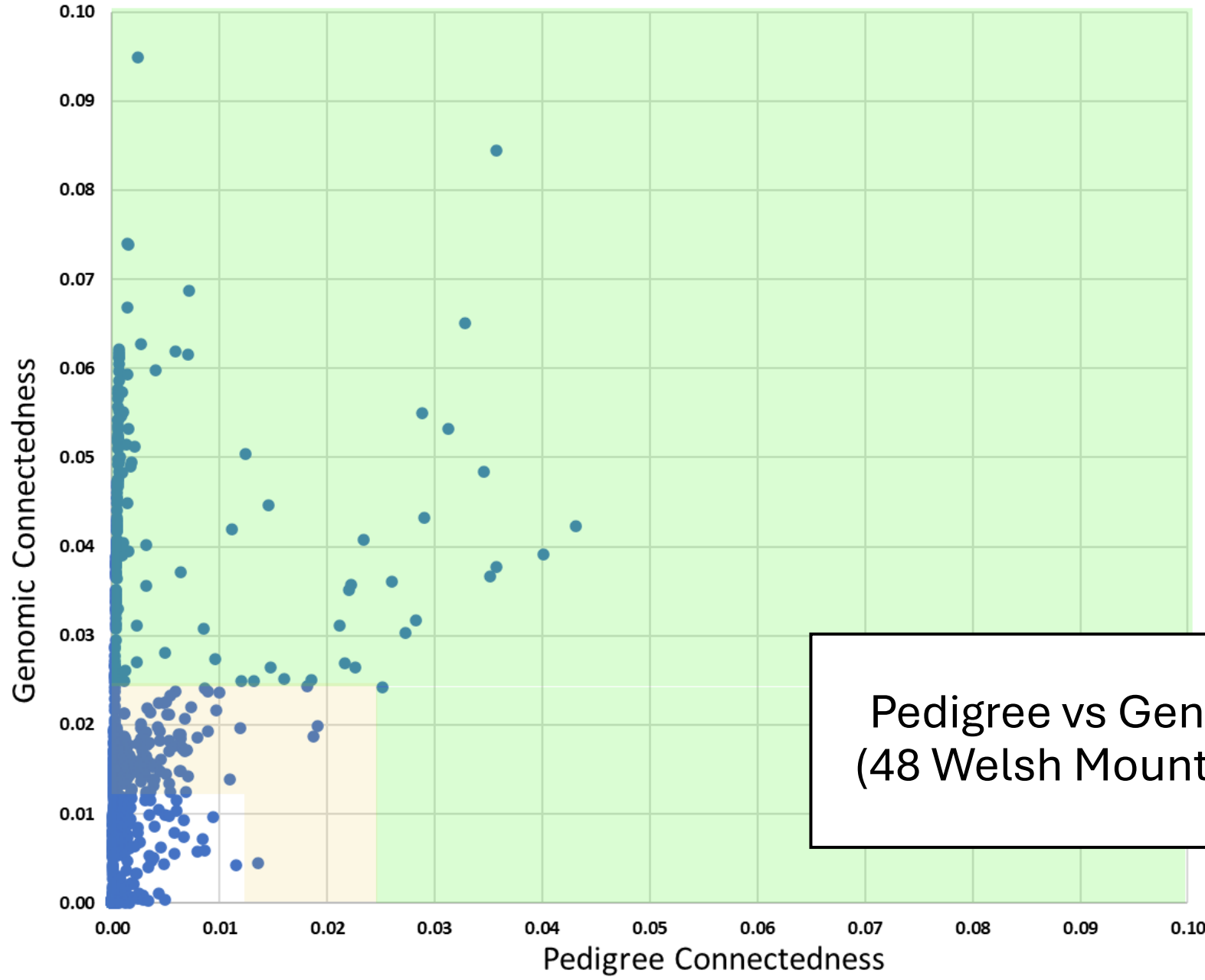




Pedigree vs Genomic Connectedness
(1 Welsh Mountain flock x 48 flocks)



Pedigree vs Genomic Connectedness
(48 Welsh Mountain flocks x 48 flocks)

The Future for Connectedness

- Short term look at alternative mathematical models based on pedigree

- Longer term consider genomic approaches
  - The challenge in many flocks, 0-10% of the sheep are genotyped

In Summary:
(Some of) The genomic opportunities and challenges

Challenges

- Resource limitations
- Adding £££££ value
  - Funding (hill/maternal flocks)

Opportunities

- Industry wide genotyping
- Sheep genotyped for other reasons
- Adding value to genotypes
  - Major genes (incl. new ones)
  - Parentage
- Point of sale predictors for unrecorded stock

Massive thank you to everyone working with us…..

#CollaborationIsKing