Smarter

SMAll RuminanTs breeding for Efficiency and Resilience

TEXEL SHEEP SOCIETY

SRUC

Does including genomic information improve breeding values for production and health traits?

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Showcasing Smarter Sheep Science

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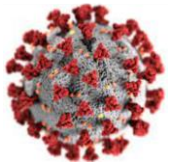
Available data

- Pre-existing data
  - Genotyped population, n > 8,000
  - Footrot phenotypes, n = 8,572
  - Mastitis phenotypes, n = 6,676

- Year 1: data collection [2019]
  - Footrot phenotypes, n = 426
  - Mastitis phenotypes, n = 473

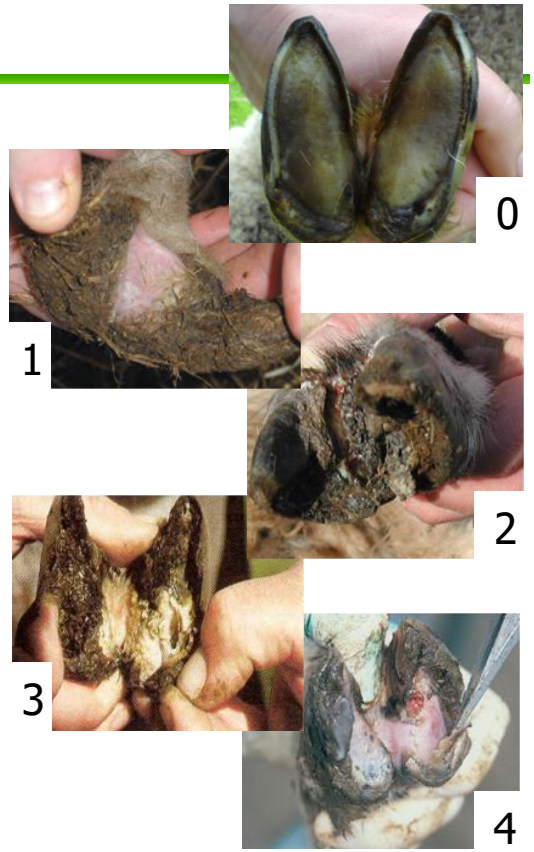
- Year 2: no data collection [2020]



- Year 3: data collection [2021]
  - Footrot phenotypes, n = 762
  - Mastitis phenotypes, n = 784

Health traits scoring

- Footrot
  - Each hoof scored: range 0 to 4
  - All four scores summed together: range 0 to 16



- Mastitis – as proxy trait: California Mastitis Test (CMT)
  - Milk sample from each side of the udder scored: range 0 to 4
  - Two scores from two sides summed together: range 0 to 8

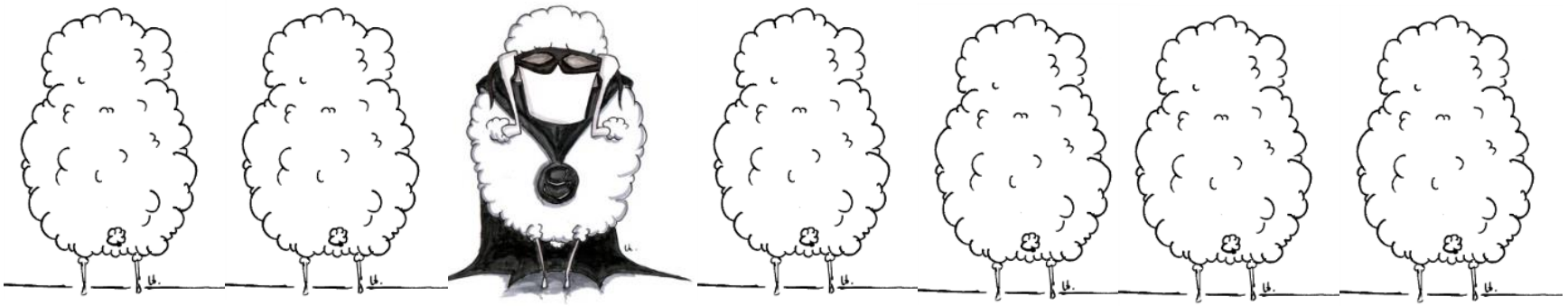
Is there potential for improvement?

	N animals with phenotype
Footrot	6,216
California Mastitis Test	3,346

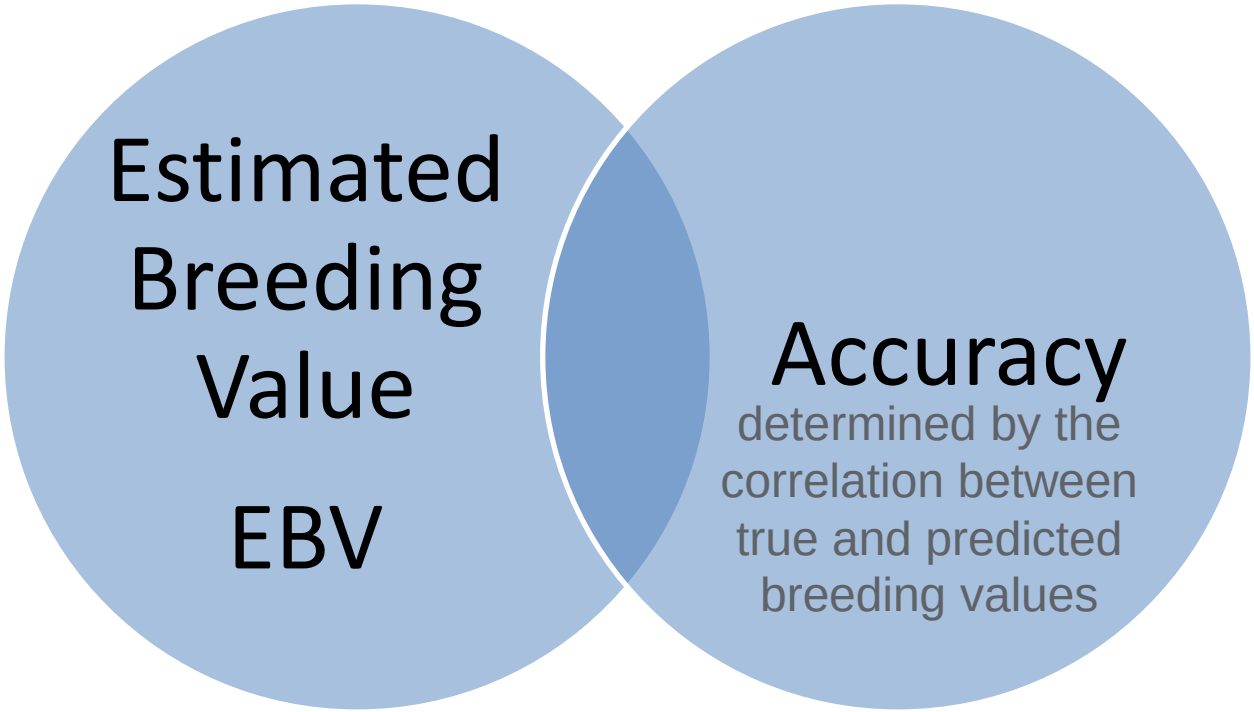
	heritability
Footrot	0.12 (0.02)
California Mastitis Test	0.07 (0.03)

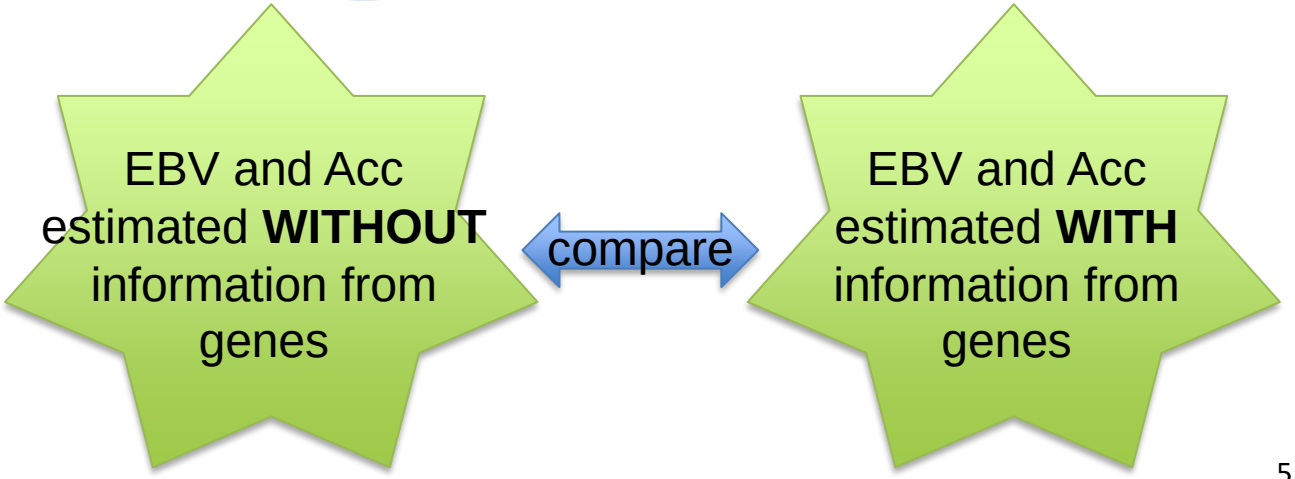
a measure of how well differences in genes account for differences in particular traits

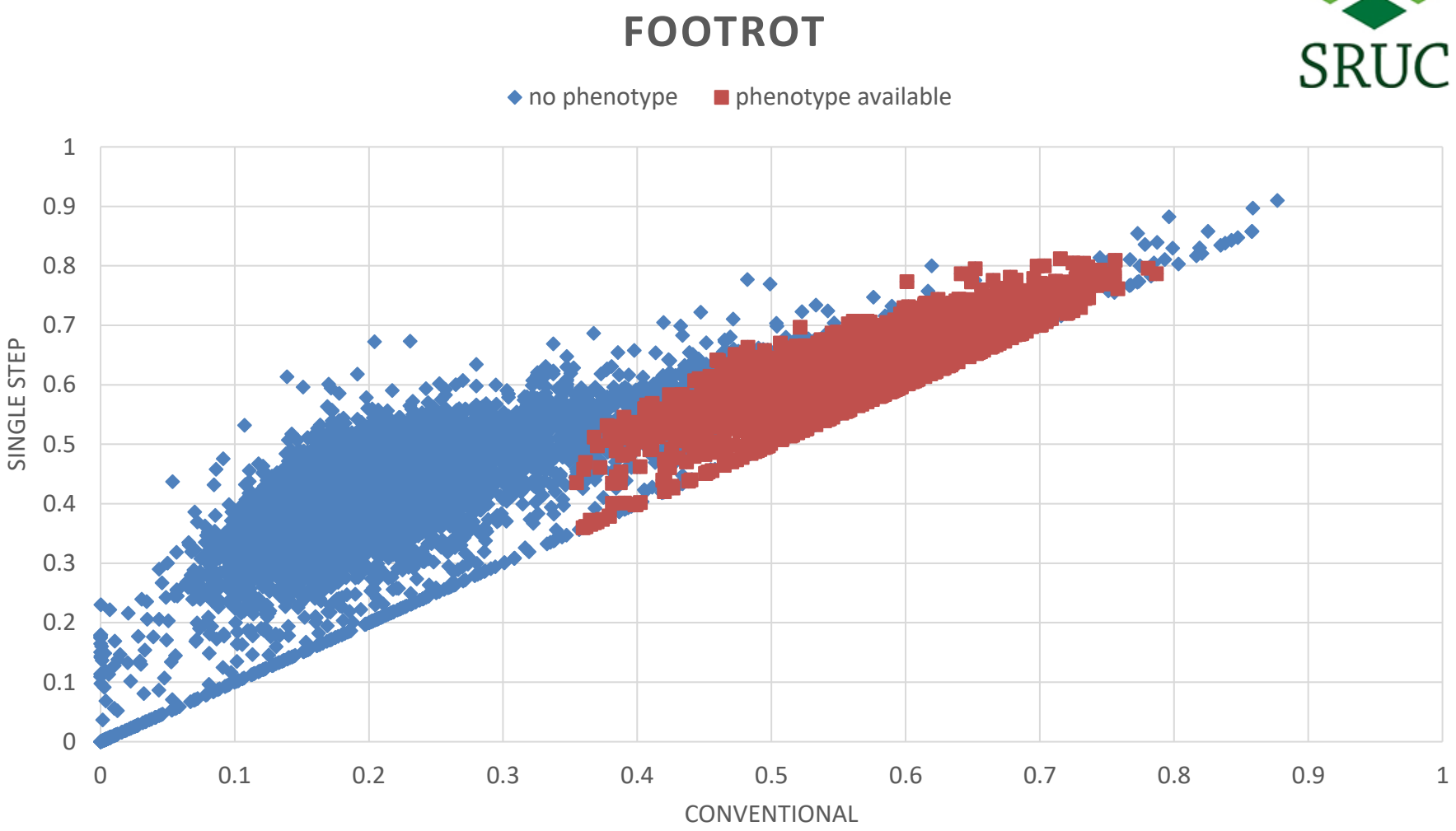
close to zero indicates that almost all the variability in a trait is due to environmental factors, with **very little influence** from genes



What have we done to see if there is an improvement?

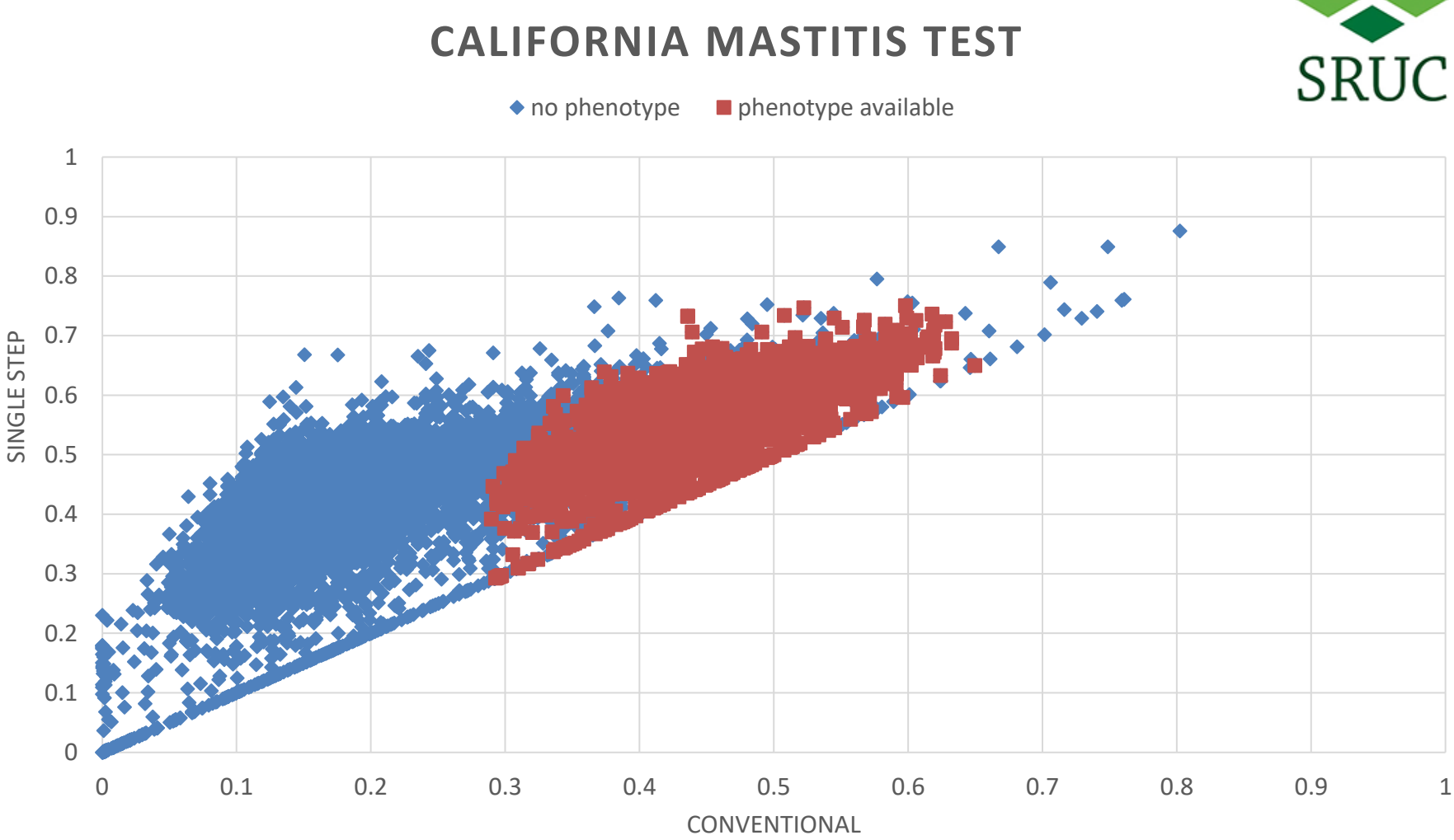






genotyped = 9,391

phenotyped = 4,506

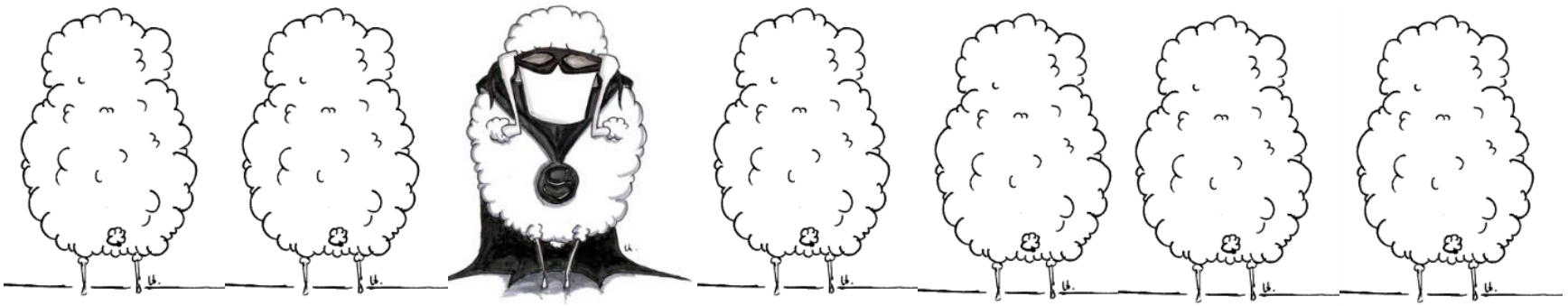


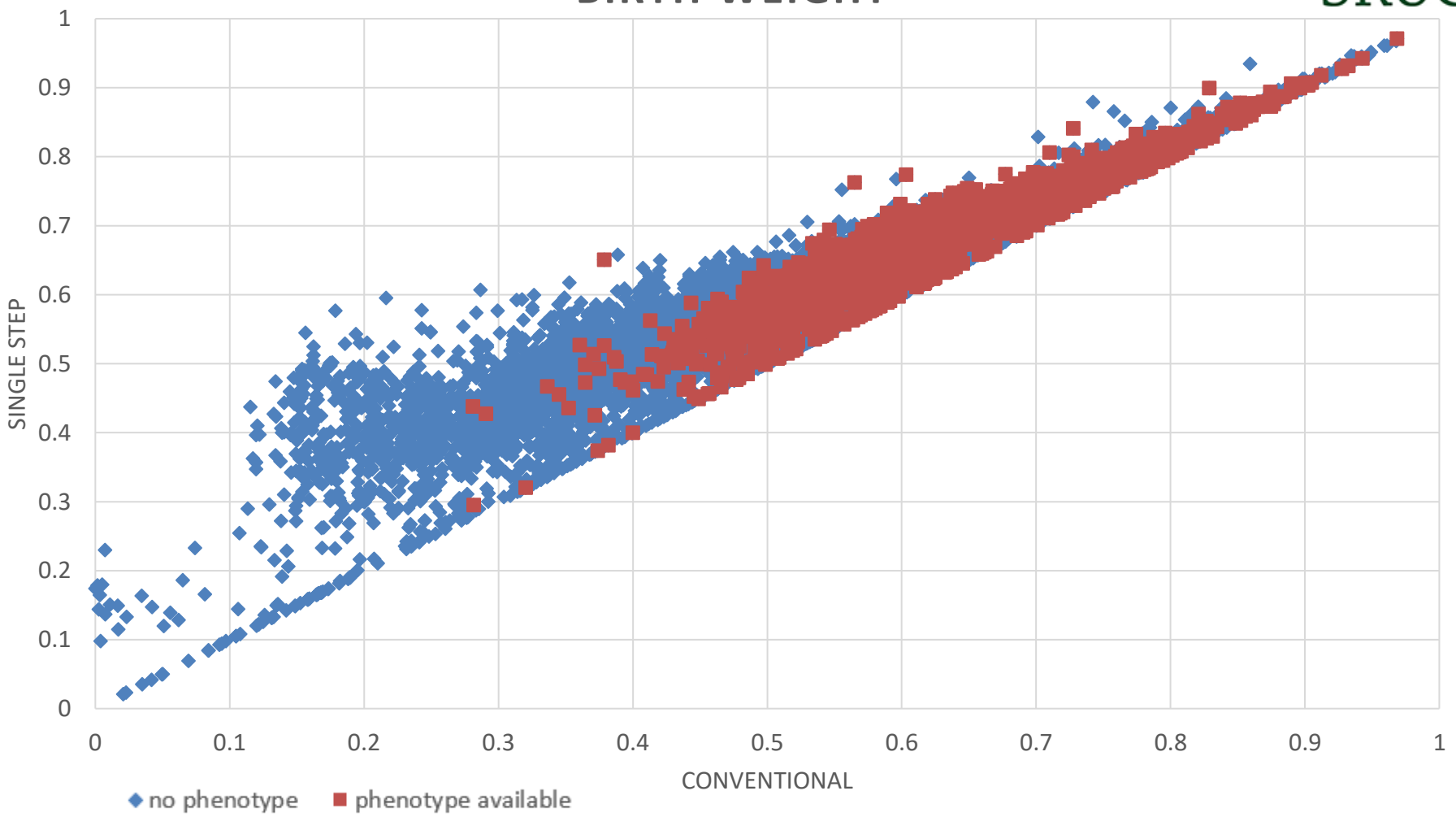
genotyped = 9,391

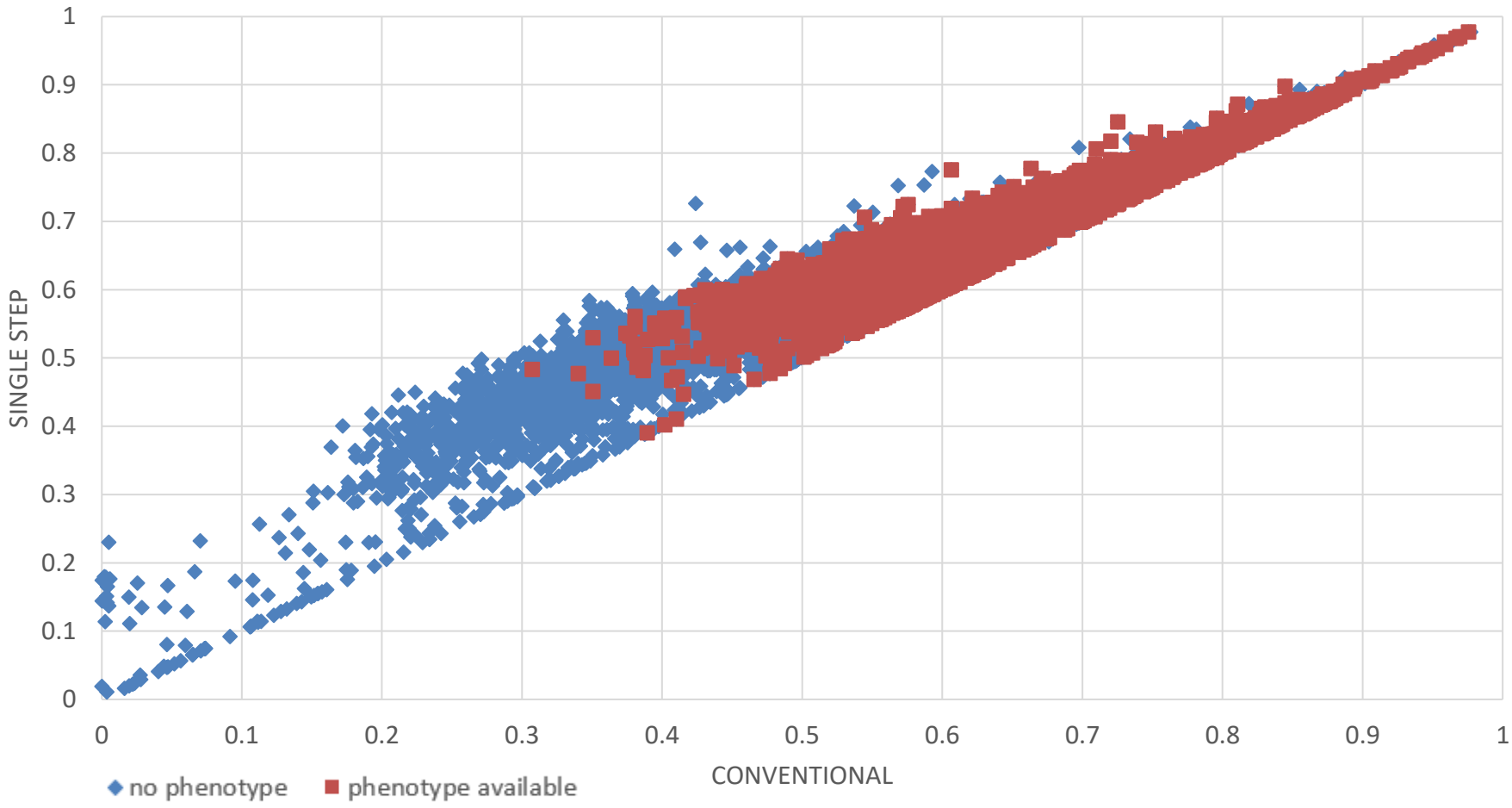
phenotyped = 3,434 (females only)

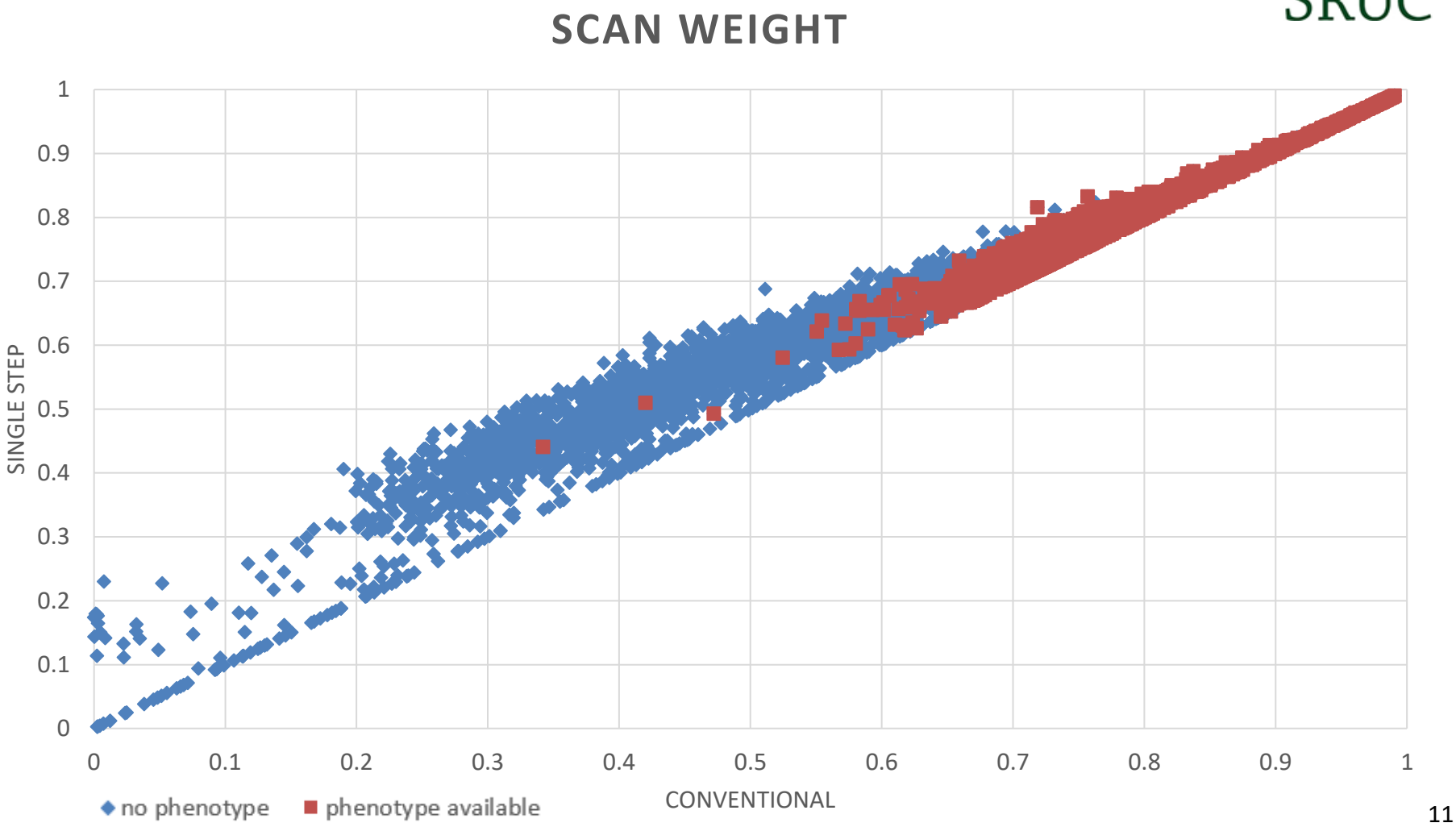
How about production traits?

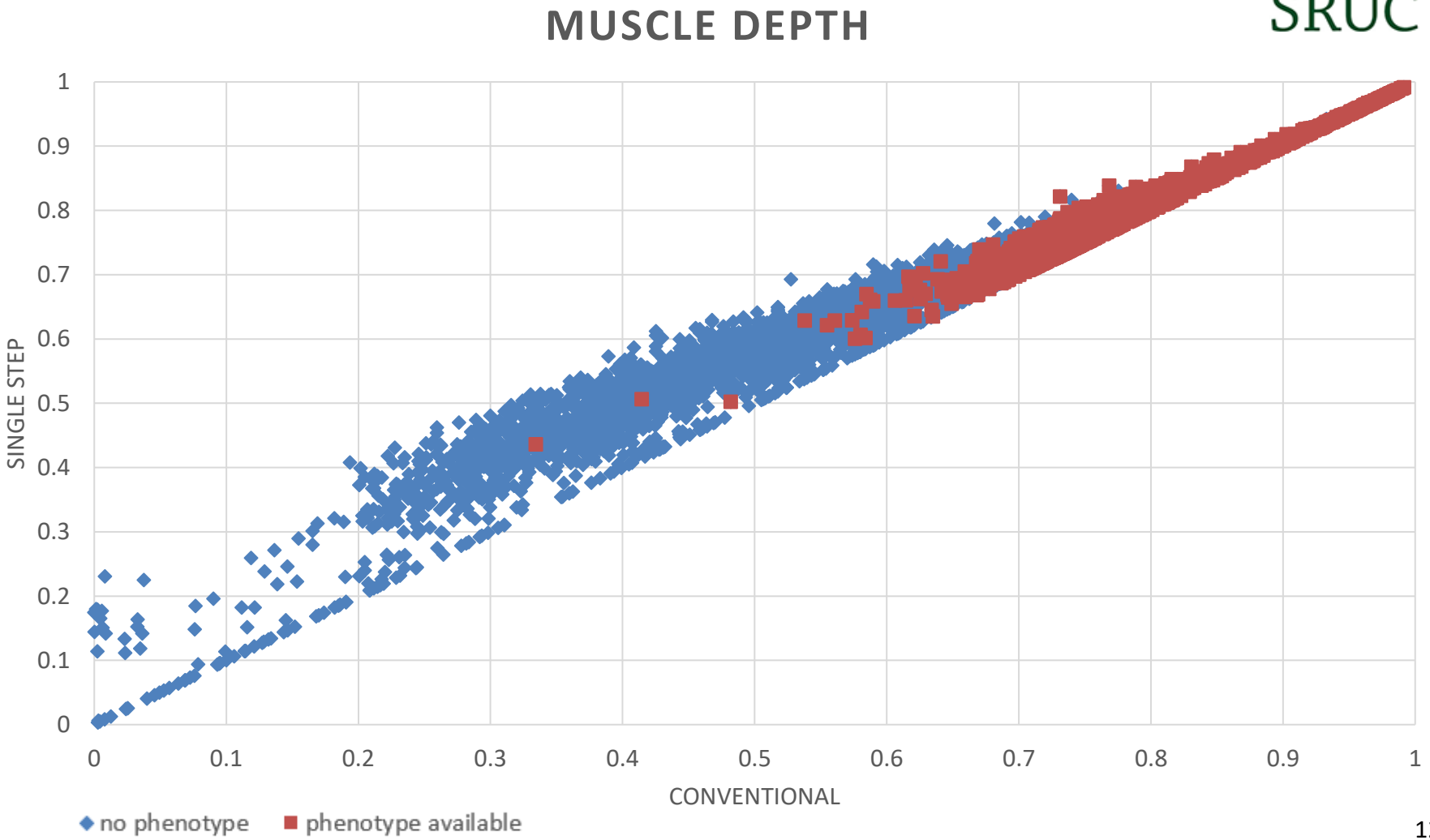
	N animals with phenotype	heritability
birth weight	33,857	**0.10 (0.01)**
weaning weight	72,845	**0.09 (0.01)**
scan weight	70,492	**0.33 (0.01)**
muscle depth	67,865	**0.36 (0.01)**
fat depth	67,867	**0.36 (0.01)**

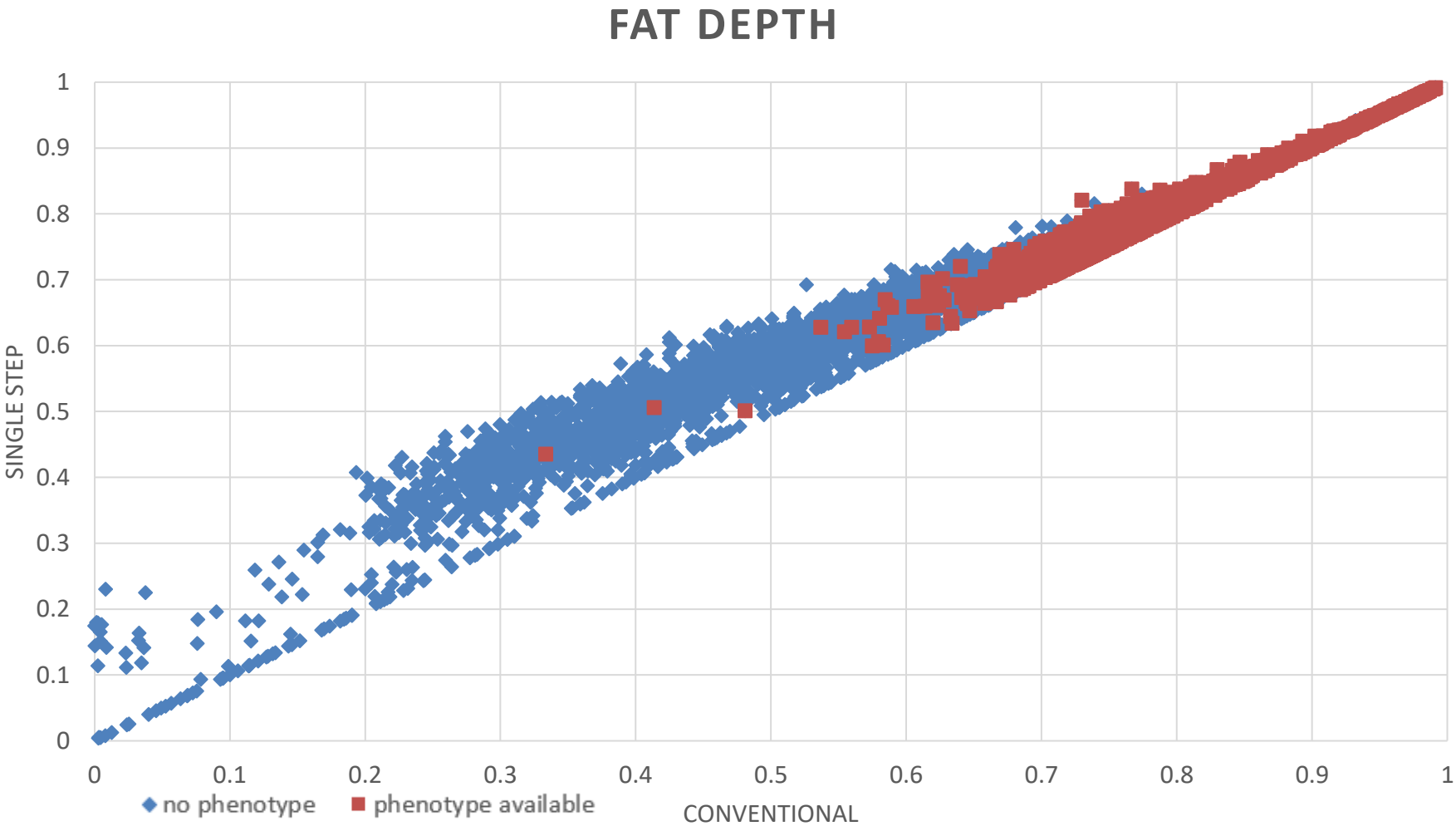



BIRTH WEIGHT
SINGLE STEP
CONVENTIONAL
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
no phenotype
phenotype available


EIGHT WEEK WEIGHT
SINGLE STEP
CONVENTIONAL
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
no phenotype
phenotype available


SCAN WEIGHT
SINGLE STEP
CONVENTIONAL
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
no phenotype
phenotype available


MUSCLE DEPTH
SINGLE STEP
CONVENTIONAL
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
no phenotype
phenotype available


FAT DEPTH
SINGLE STEP
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
no phenotype
phenotype available
CONVENTIONAL

Take home message

Does including genomic information improve breeding values for production and health traits?

Animals without phenotypic data gain the most in EBV accuracy when genotypic information is included

Both phenotyped and un-phenotyped can gain accuracy, hence their estimated breeding values will be closer to real breeding values

SMARTER PARTNERS

Thank you for your attention

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