Interbull Meeting 2026

Assessing the impact of hormonal interventions on genetic evaluation in New Zealand

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Introduction

- Hormonal interventions are being used on farm to manage cows' fertility.
- Genetic evaluation of fertility does not take this into account.
- Synchronised animals are getting an unfair advantage in genetic evaluation. The degree of bias is unknown.
- Can we use the data provided to account for bias introduced through synchrony? How much bias is there?

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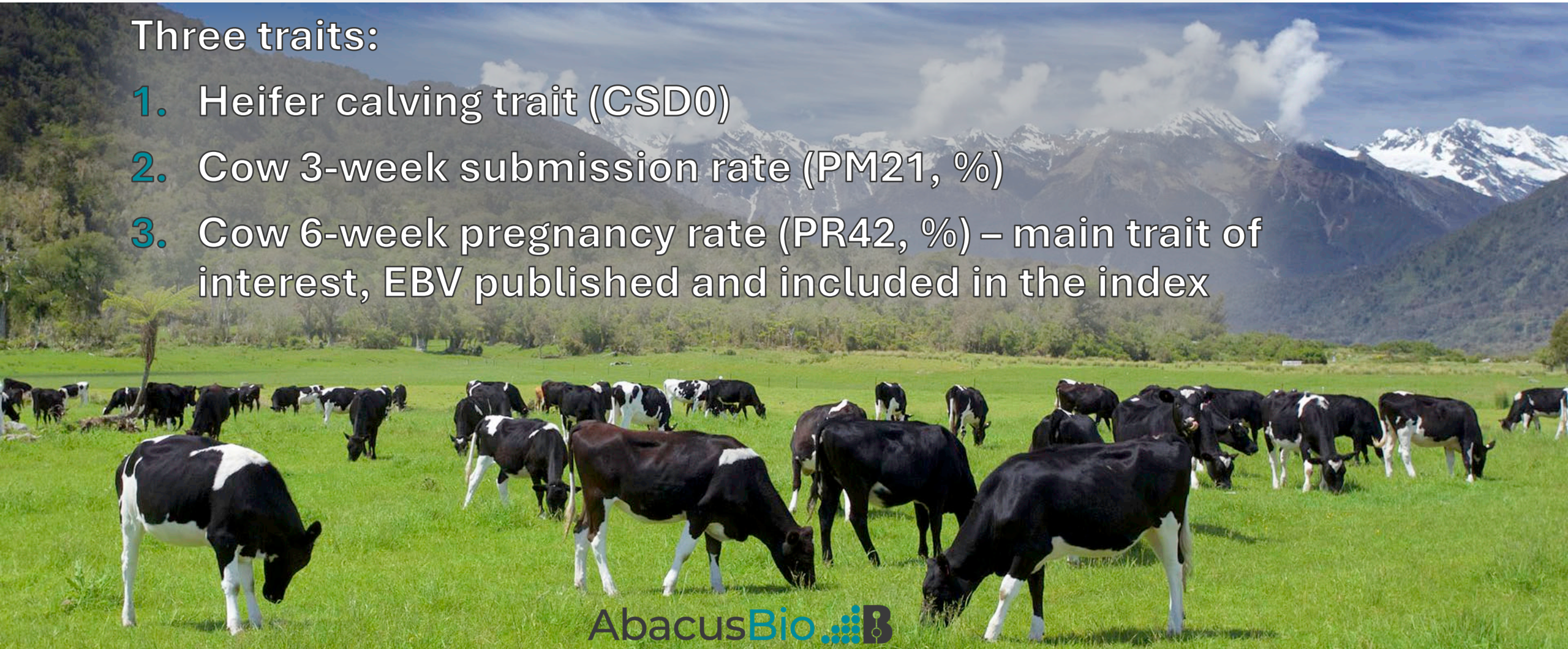
Fertility evaluation in NZ



Three traits:

1. Heifer calving trait (CSD0)
2. Cow 3-week submission rate (PM21, %)
3. Cow 6-week pregnancy rate (PR42, %) – main trait of interest, EBV published and included in the index

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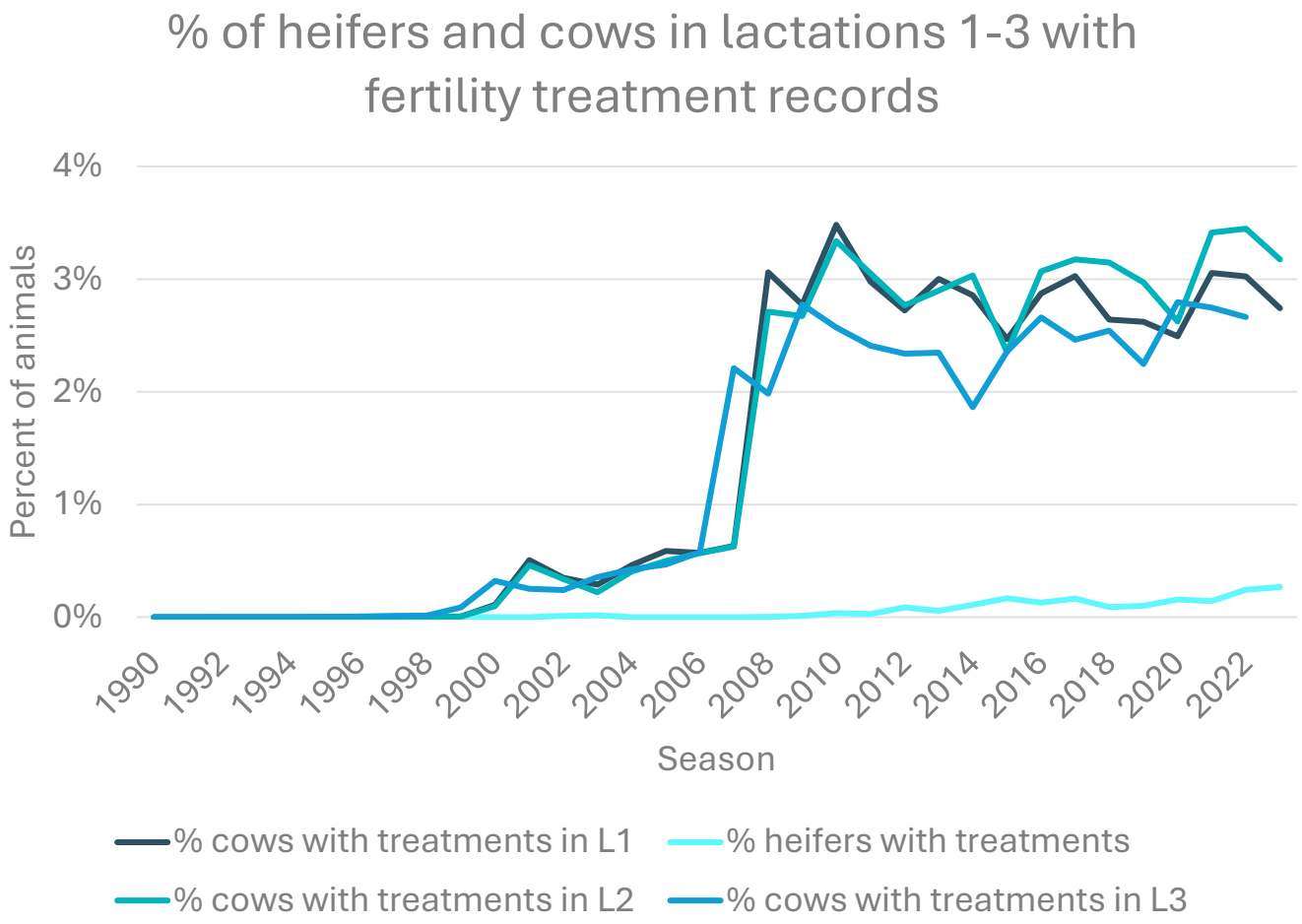
Data

- Provided by LIC
- Contains information about health treatments recorded in 1997-2023 seasons
- Includes reproductive treatments



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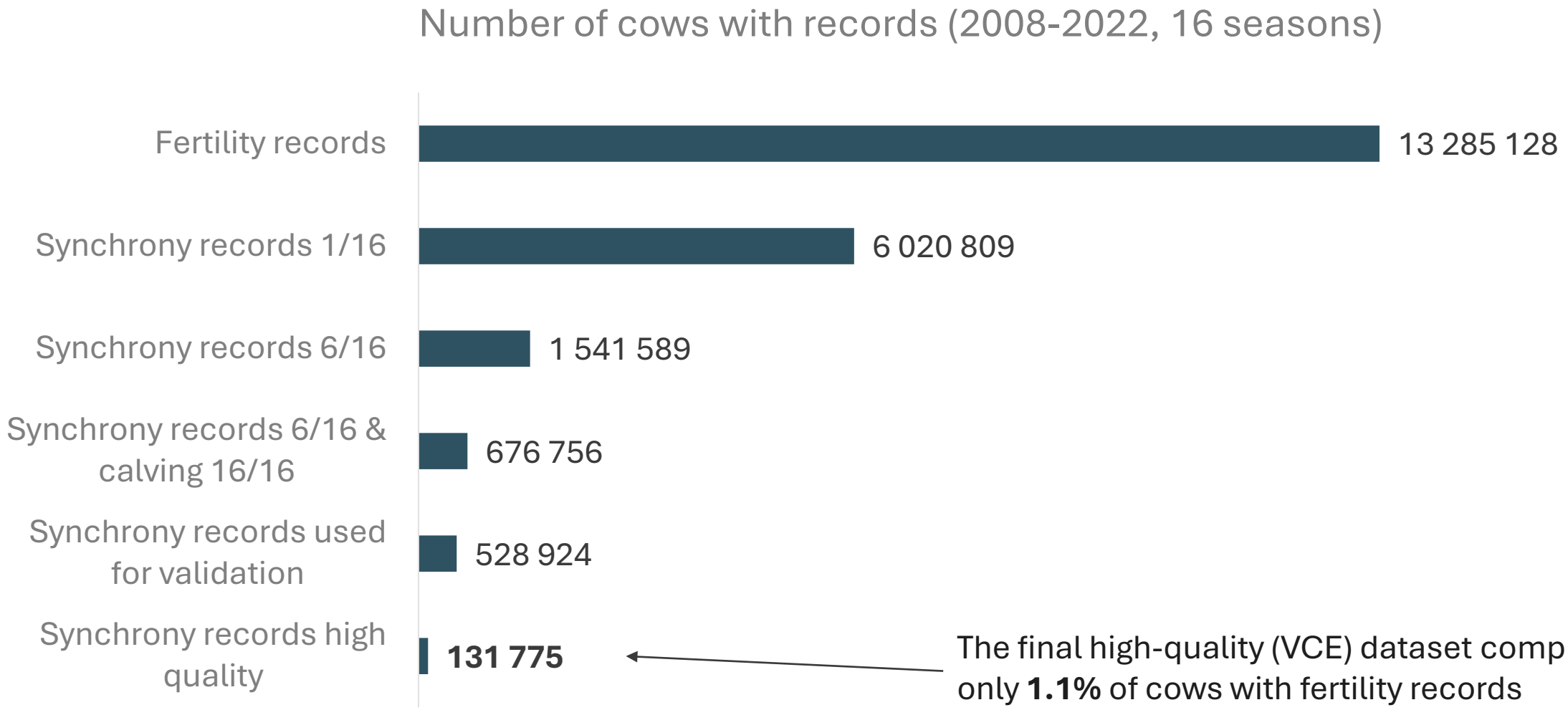
Data - VCE



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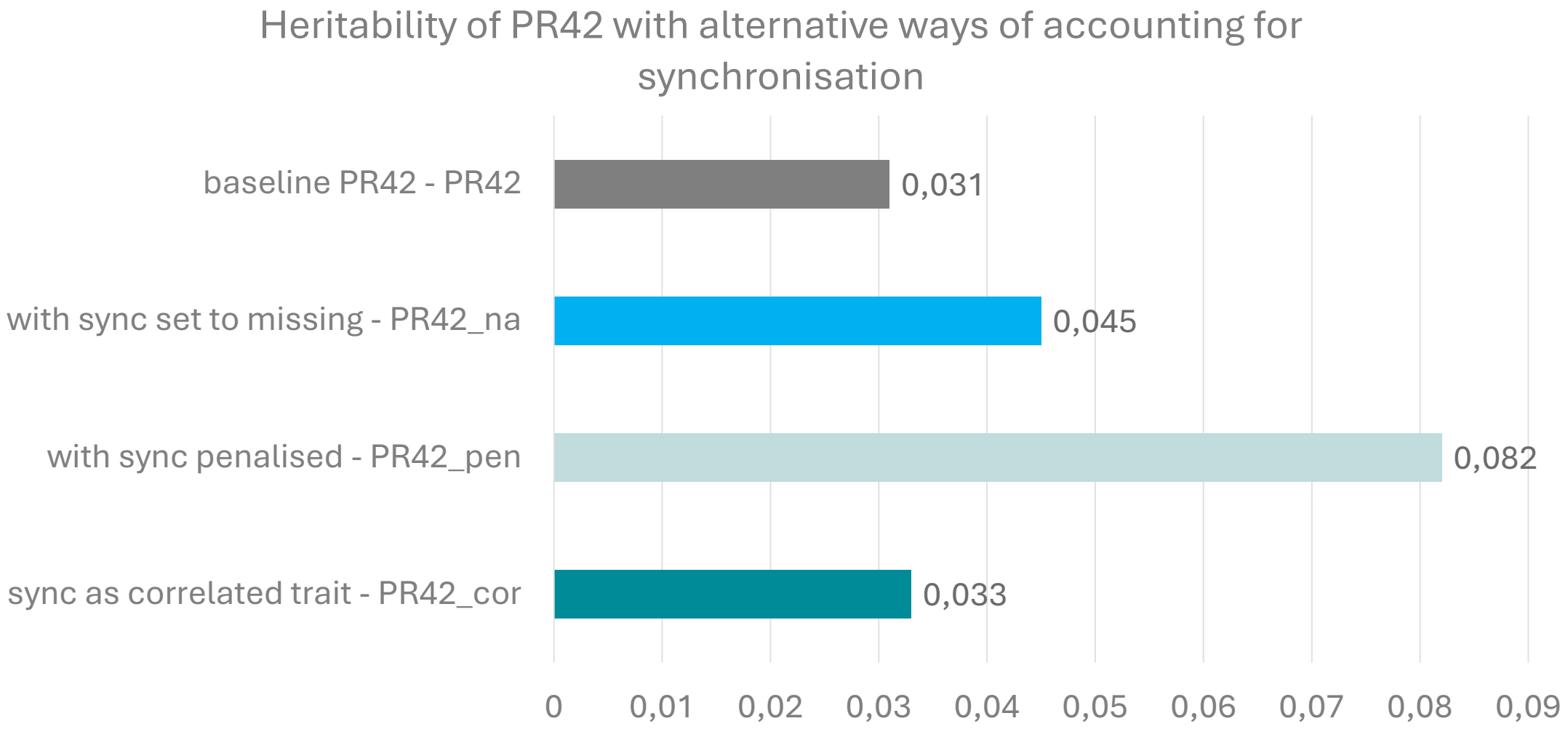
Considered options

- Current fertility traits and model – synchronisation not accounted for
  - PR42: As baseline
- Synchrony as a data filter
  - PR42_na: If synchronised – set fertility phenotypes to missing
  - PR42_pen: If synchronised – apply penalty (phenotype = 0)
- Synchrony as a correlated trait
  - PR42_cor: As in baseline
  - PSYNC: probability of being synchronised (binary)

PR42 heritability



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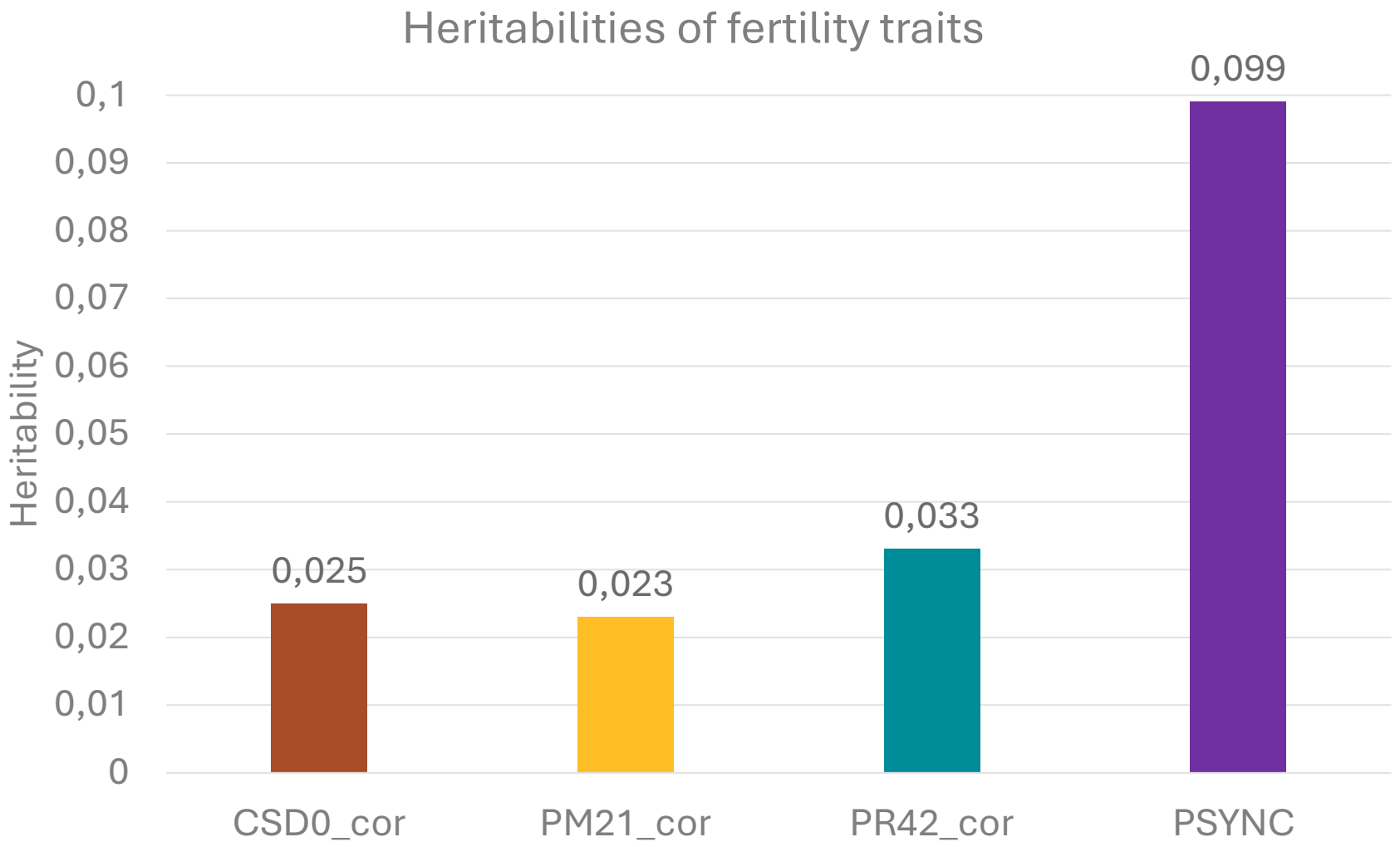
Synchrony trait heritability

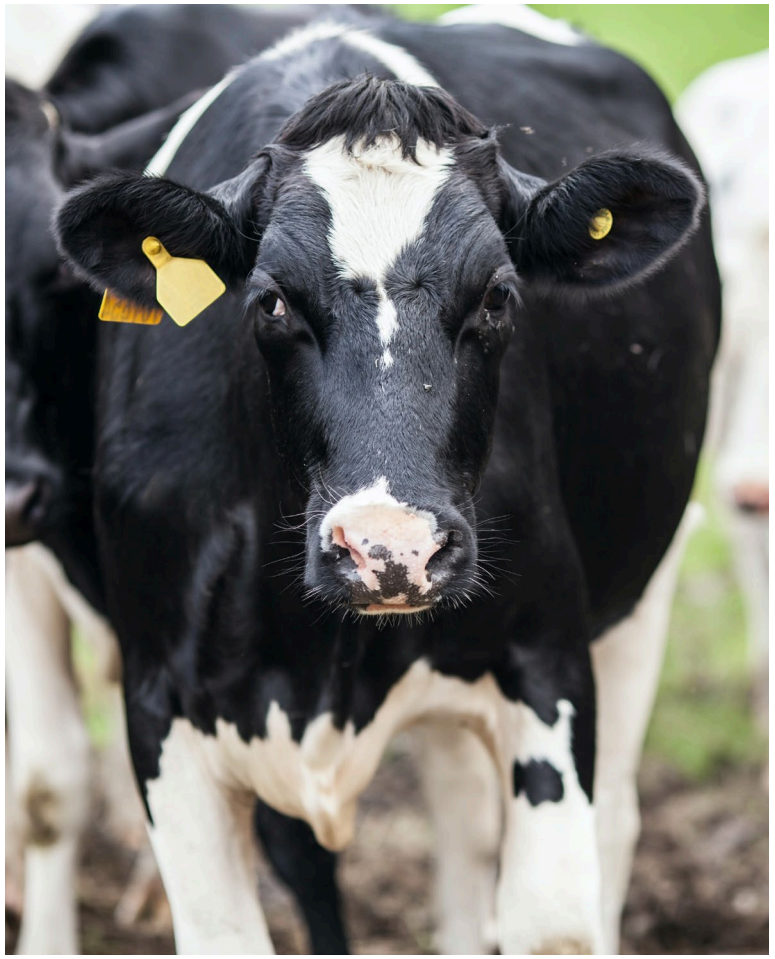


When we add **synchrony use as correlated trait** (PSYNC), it has substantial heritability.

PR42 heritability remains similar to the baseline PR42 result.

Next steps

- Initial findings looked highly promising:
  - PR42 heritability increases from 0.03 to 0.08
  - PSYNC heritability close to 0.1
- Not enough data for GE implementation
- Pivoted to try and answer research questions using dataset generated by masking good quality data:



1. What is the impact of not accounting for synchrony?
2. How much data do we need to account for synchrony use?

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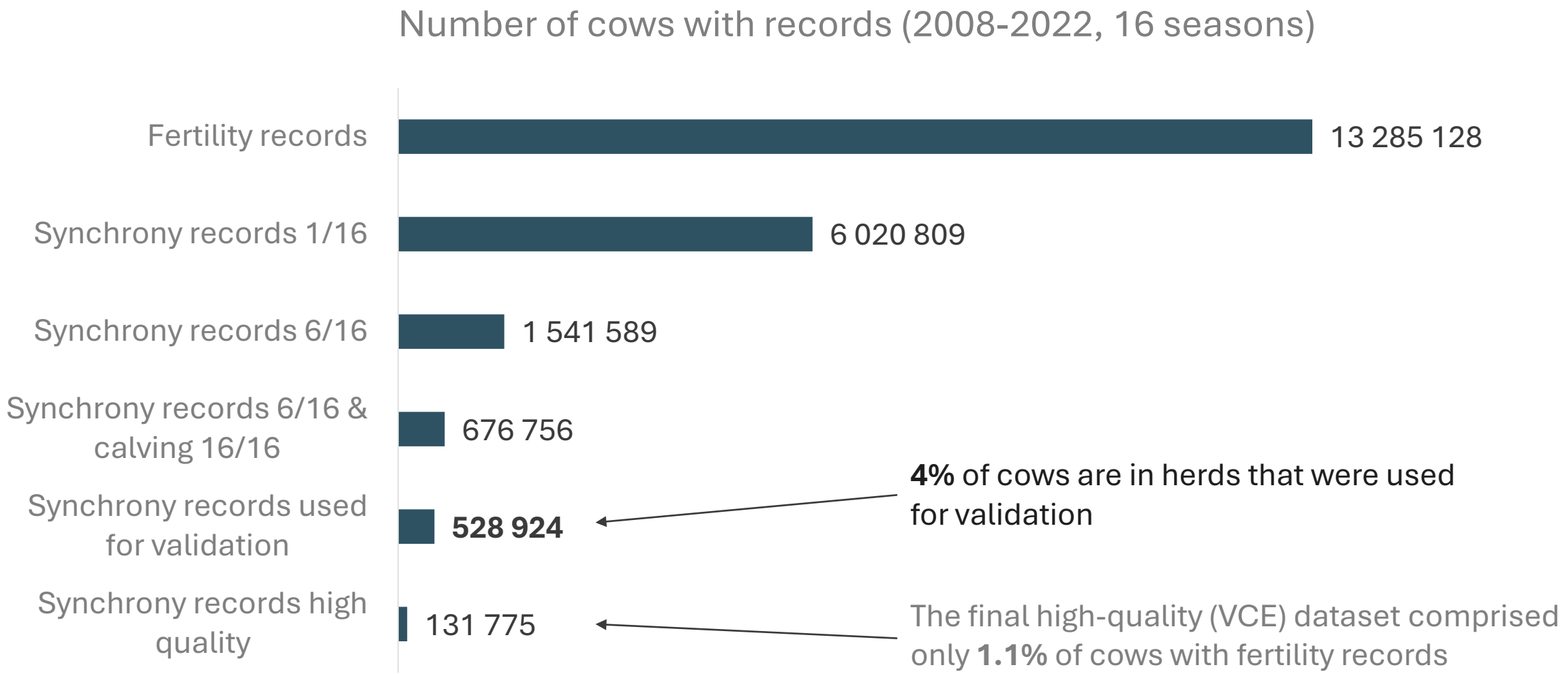
Data - Validation



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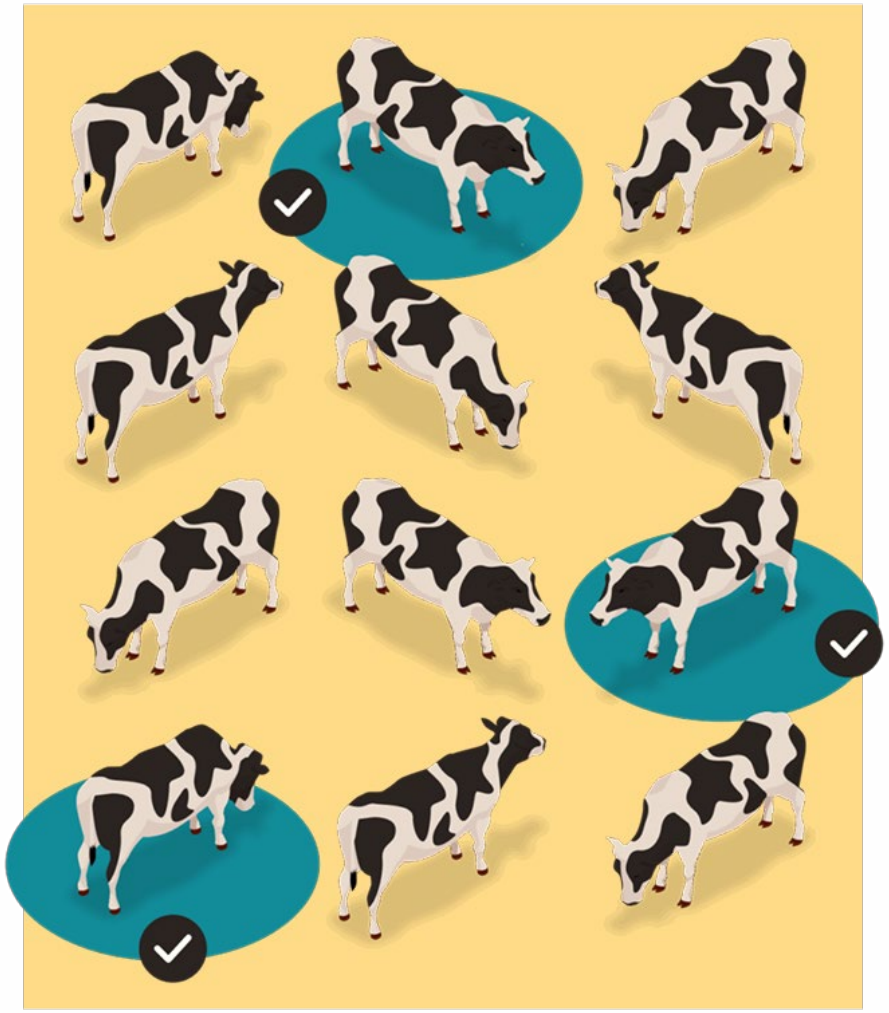
Validation exercise

- Mask0 – ideal world, all synchronisation is reported
- Mask100 – current GE, all synchronisation is masked
- Mask10, 25, 50, 75, 90 & 95% of synchronisation records (randomly)
- Whole herds or seasons within herds



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Genetic trends

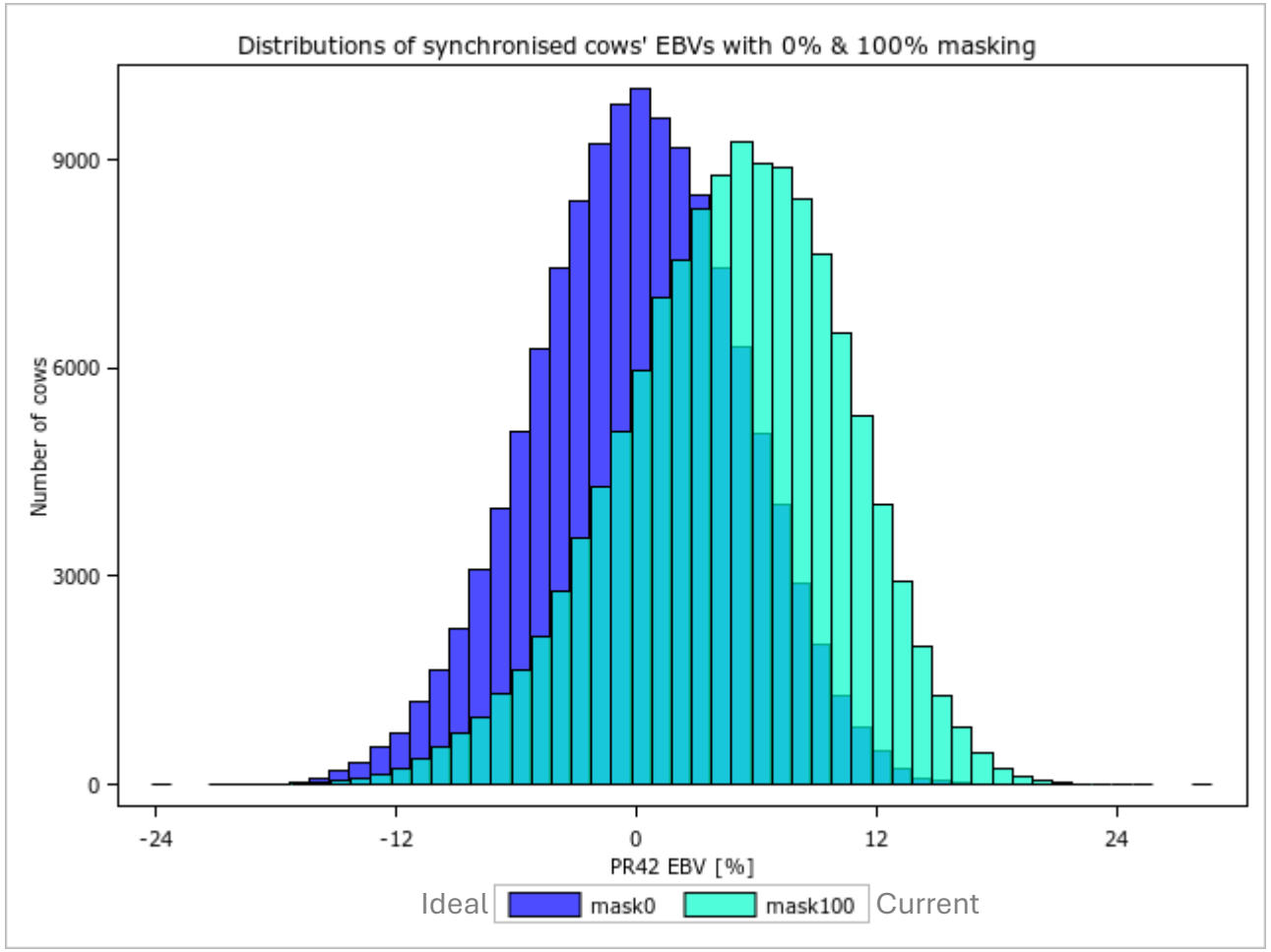
The drop in genetic trend for PR42 may have been hidden by the use of synchrony

1.5-2% difference

How unfair is the current reality? - cows

The mean difference in PR42 EBVs is:

- 4.7% for **synchronised cows** →



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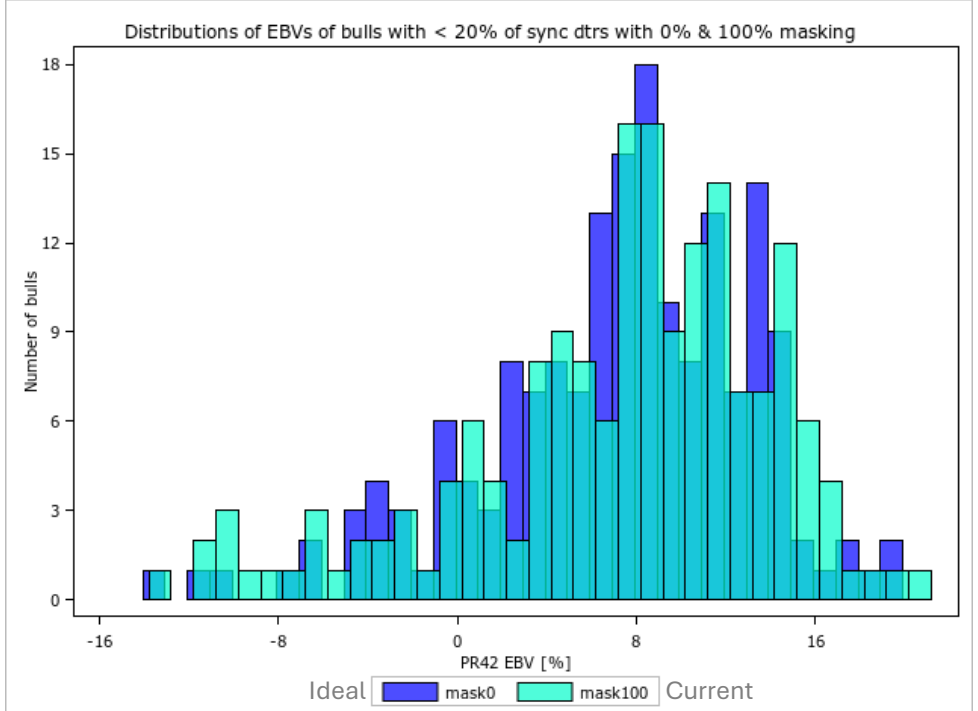
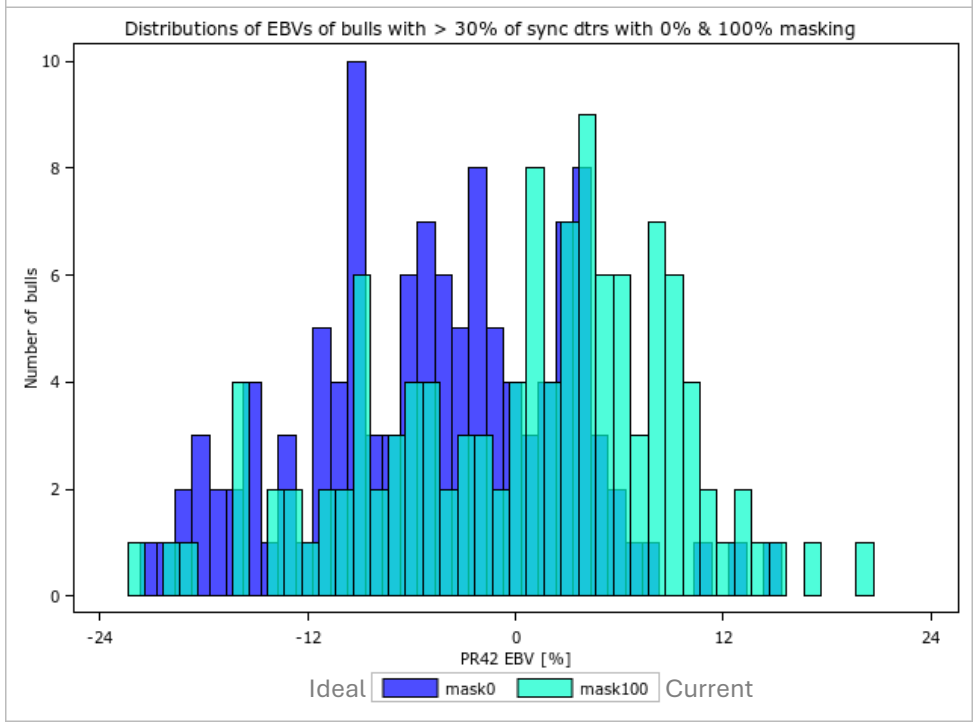
How unfair is the current reality? - bulls

The mean difference in PR42 EBVs is:

- 4.7% for synchronised cows
- 2.5% for **high reliability bulls** →





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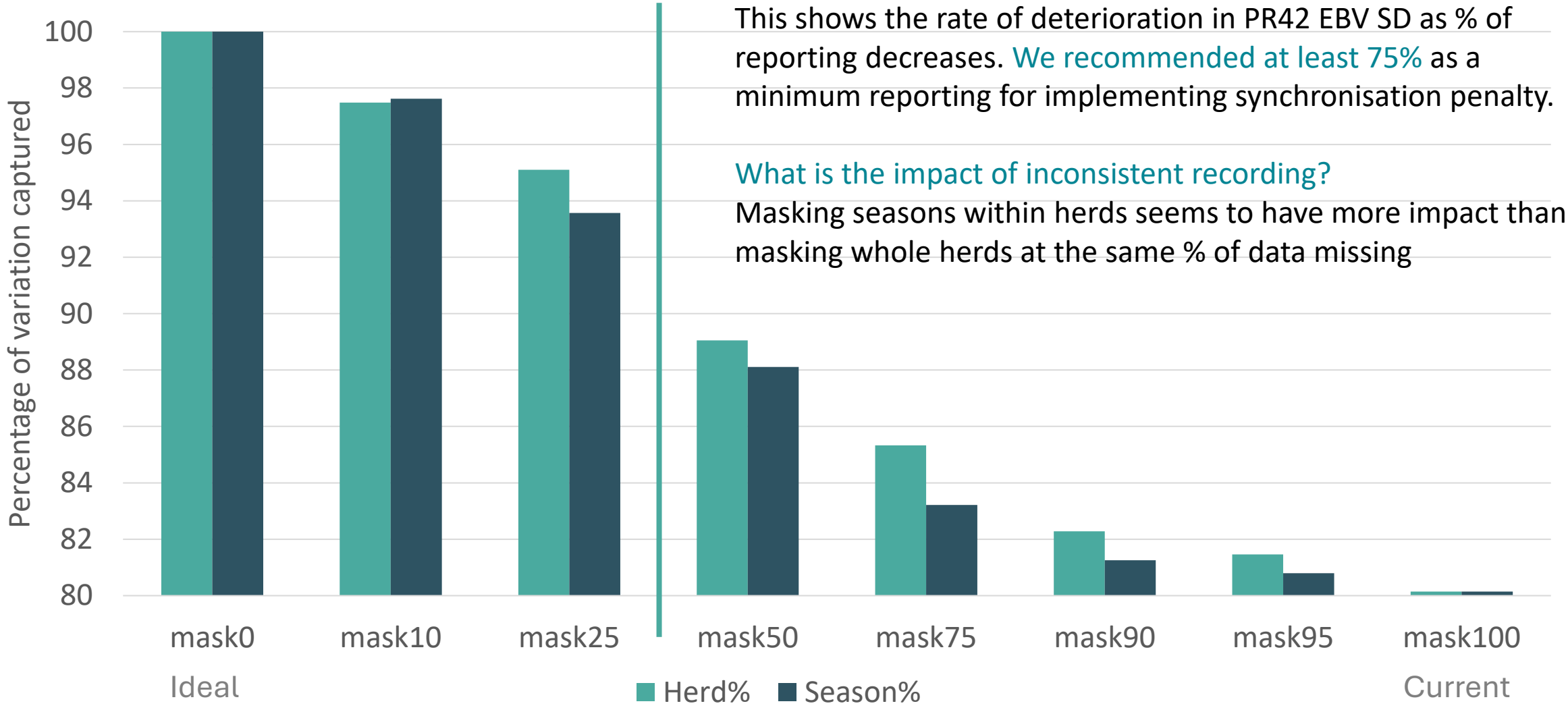
How unfair is the current reality? - herds

The difference in PR42 EBVs is:

Herd	%sync	N	Diff [%]
Herd 1	52%	1598	1.44
Herd 2	59%	2473	1.96
Herd 3	65%	1110	1.87
Herd 4	73%	1329	1.61
Herd 5	60%	3368	1.09
Herd 6	52%	1100	1.95
Herd 7	56%	1151	1.23
Herd 8	52%	1667	1.98

PR42 EBV relative SD difference



This shows the rate of deterioration in PR42 EBV SD as % of reporting decreases. We recommended at least 75% as a minimum reporting for implementing synchronisation penalty.

What is the impact of inconsistent recording?

Masking seasons within herds seems to have more impact than masking whole herds at the same % of data missing

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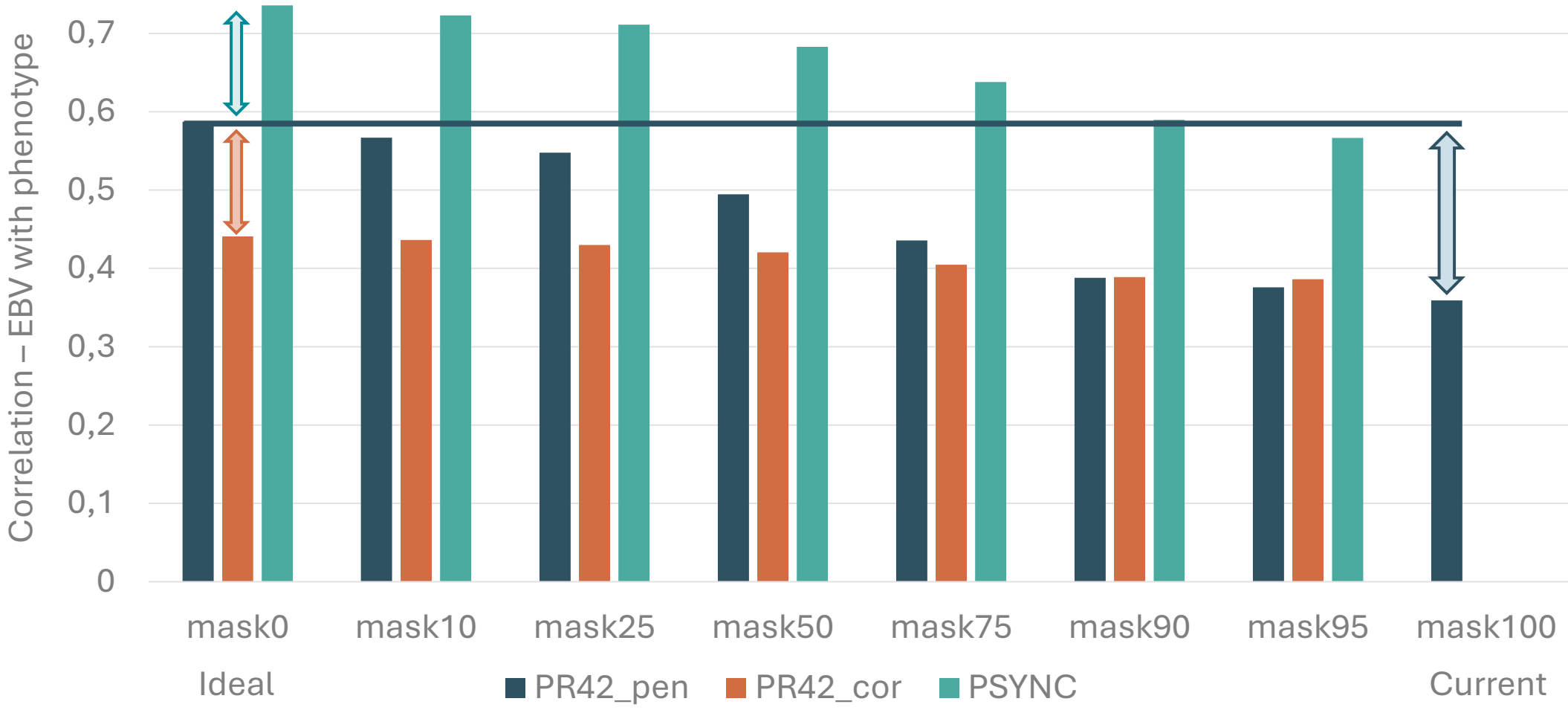
Correlation of EBVs with phenotype "% of synchronised daughters" - bulls



PR42_pen:
In ideal world, the correlation between PR42 EBV and %sync_dtrs increases by 23%

PSYNC:
Information is captured in the PSYNC EBV instead of PR42_cor

PSYNC is more robust to masking than PR42_pen **even at 95%.**

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Summary

- For synchronised cows, the difference in mean PR42 EBV between ideal and current world is 4.7%
- When farmers report synchrony use, their herd average PR42 EBV drops by 1-2% comparing to not reporting
- Genetic trends may be artificially high with synchronisation not accounted for
- Not accounting for synchronisation use masks portion of genetic variance, reduces trait emphasis in the index (BW) and slows genetic progress

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Considerations for implementation

- Data completeness recommendations:
  - PR42 with penalty– 75% of herds to report synchrony use
  - Additional trait – even at 5% reporting, the PSYNC EBV seems useful with no negative effects on the PR42 EBV
- Explore including synchrony as a correlated trait and keep PR42 unchanged
- Explore additional data sources (providers, wearables, etc.)
- Potential to account for the cost of synchronisations in the economic value of fertility or/and to create fertility sub-index
- Increase of relative emphasis of fertility in the index and accelerated genetic progress

Thank you!

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Photograph by Mark Mitchell