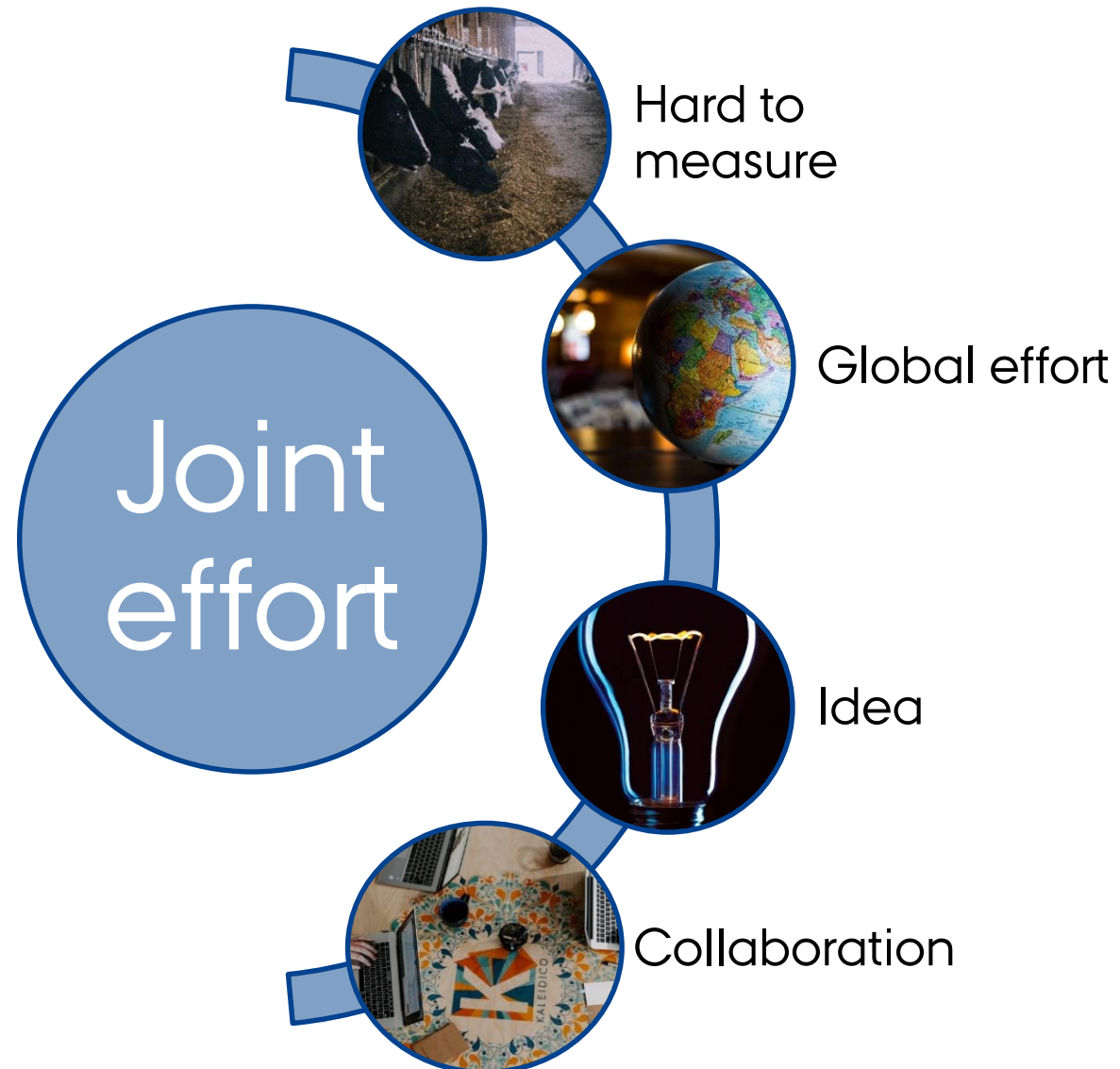


Reliability of genomic prediction for feed and residual feed intake in Holstein cows

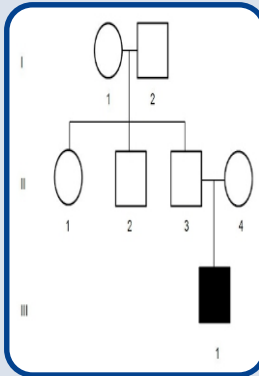
Daniel Mansan Gordo, Coralia I. V. Manzanilla-Pech, Guosheng Su,
Mogens Sandø Lund, and Jan Lassen

August 29, 2019

The EDGP database



The EDGP database



Pedigree



Calving



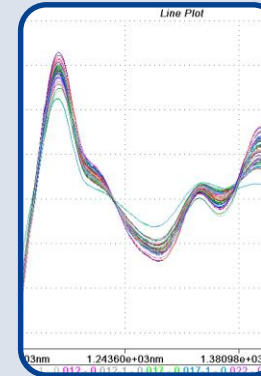
Production



DMI & CH4



Genotypes



Milk MIR

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➤ **University of Guelph**

✓ Luiz Brito

✓ Filippo Miglior

✓ Tatiane Chud

✓ Flavio Schenkel

➤ **University of Alberta**

✓ D. Hailemariam

✓ J. Crowley

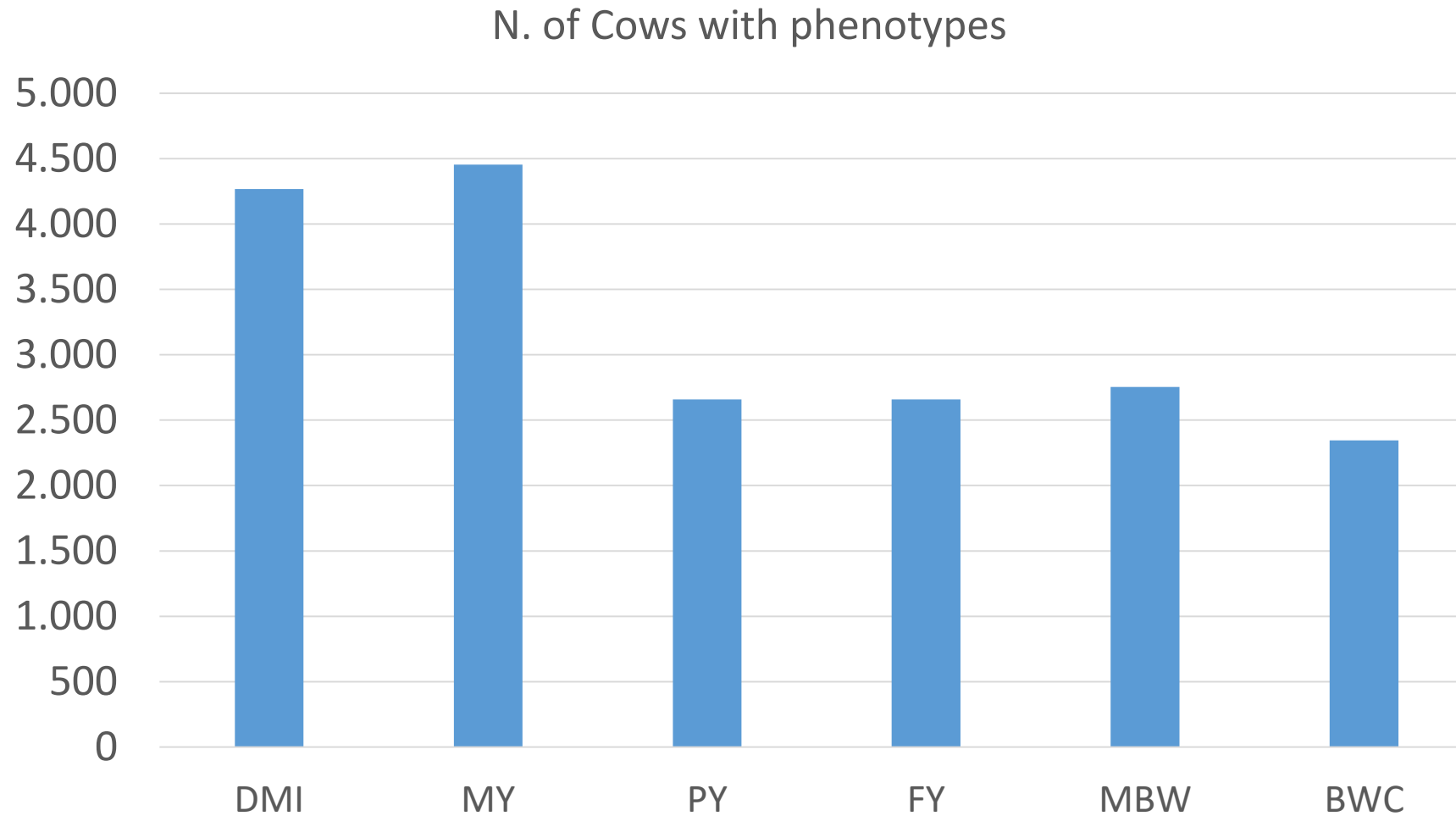
➤ **Scotland's Rural College**

✓ Eileen Wall

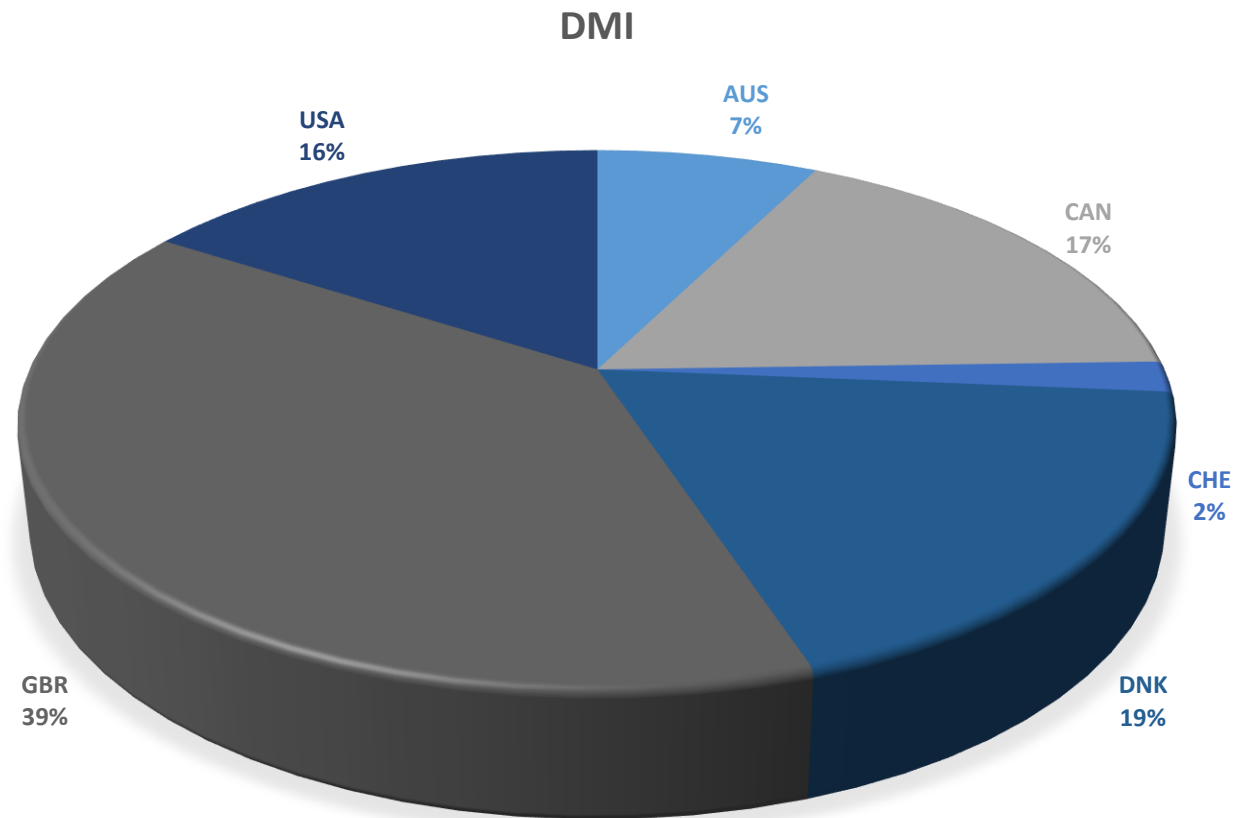
➤ **USDA**

✓ Erin Connor

The EDGP database



The EDGP database



Objectives

- Investigate the reliability of GEBV for DMI and RFI in Holstein cows using a joint international reference population
- Examining the use of the EDGP to improve the reliability of GEBV in DNK.

Genotypes

3,901 genotypes
50k

Lower density
imputed to 50k

Within country definition of RFI

$$DMI = HYS + PARITY + LACP + b_1.aoc + b_2.aoc^2 + b_3.MY + b_4.MBW + RFI_1$$

$$DMI = HYS + PARITY + LACP + b_1.aoc + b_2.aoc^2 + b_3.ECM + b_4.MBW + RFI_2$$

$$DMI = HYS + PARITY + LACP + b_1.aoc + b_2.aoc^2 + b_3.ECM + b_4.MBW + b_5.\Delta BW + RFI_3$$

GBR

CAN

DNK + USA

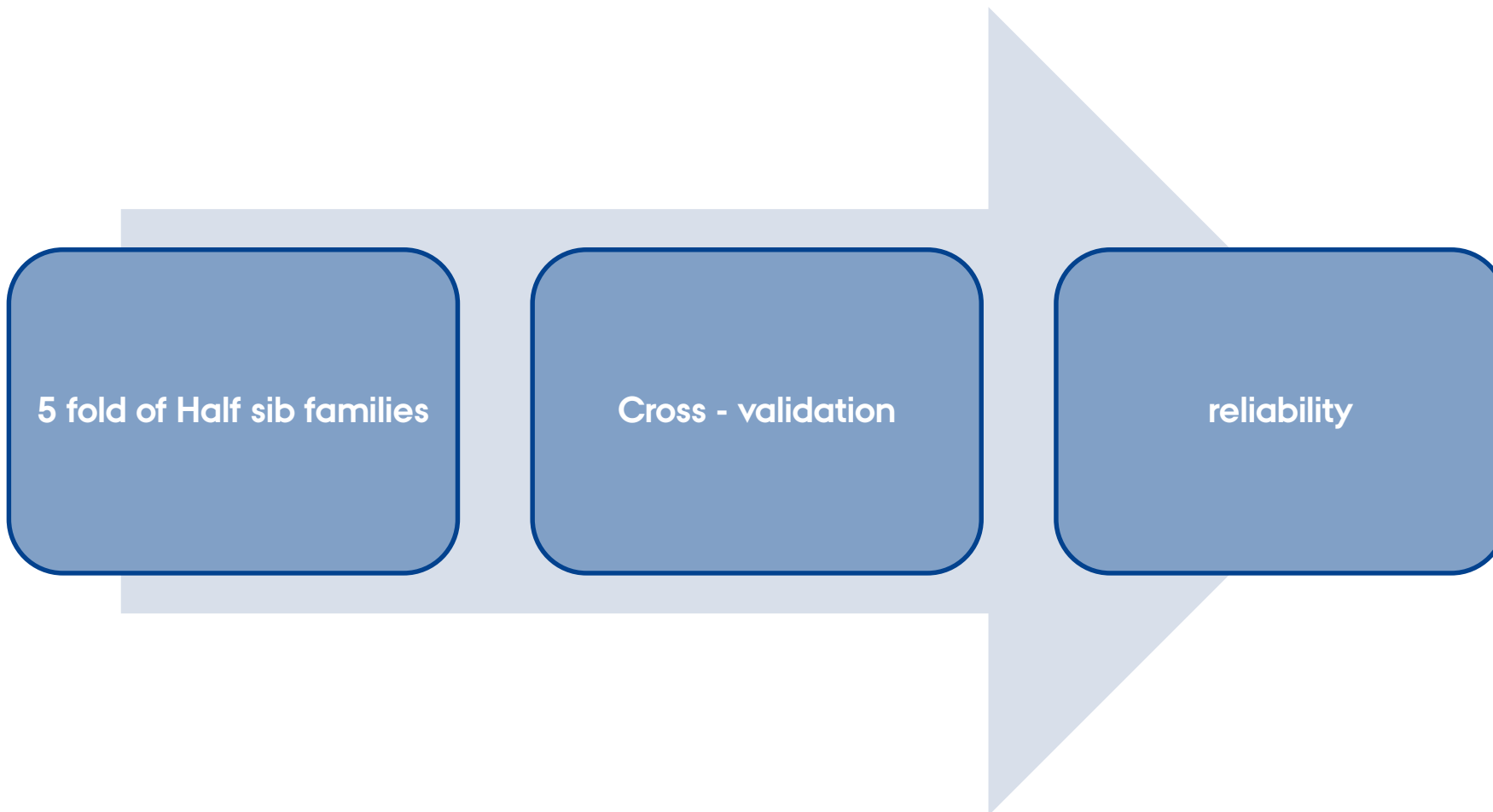
Variance components estimation

$$DMI = HYS + PARITY + LACP + b_1 \cdot aoc + b_2 \cdot aoc^2 + a + pe + e$$

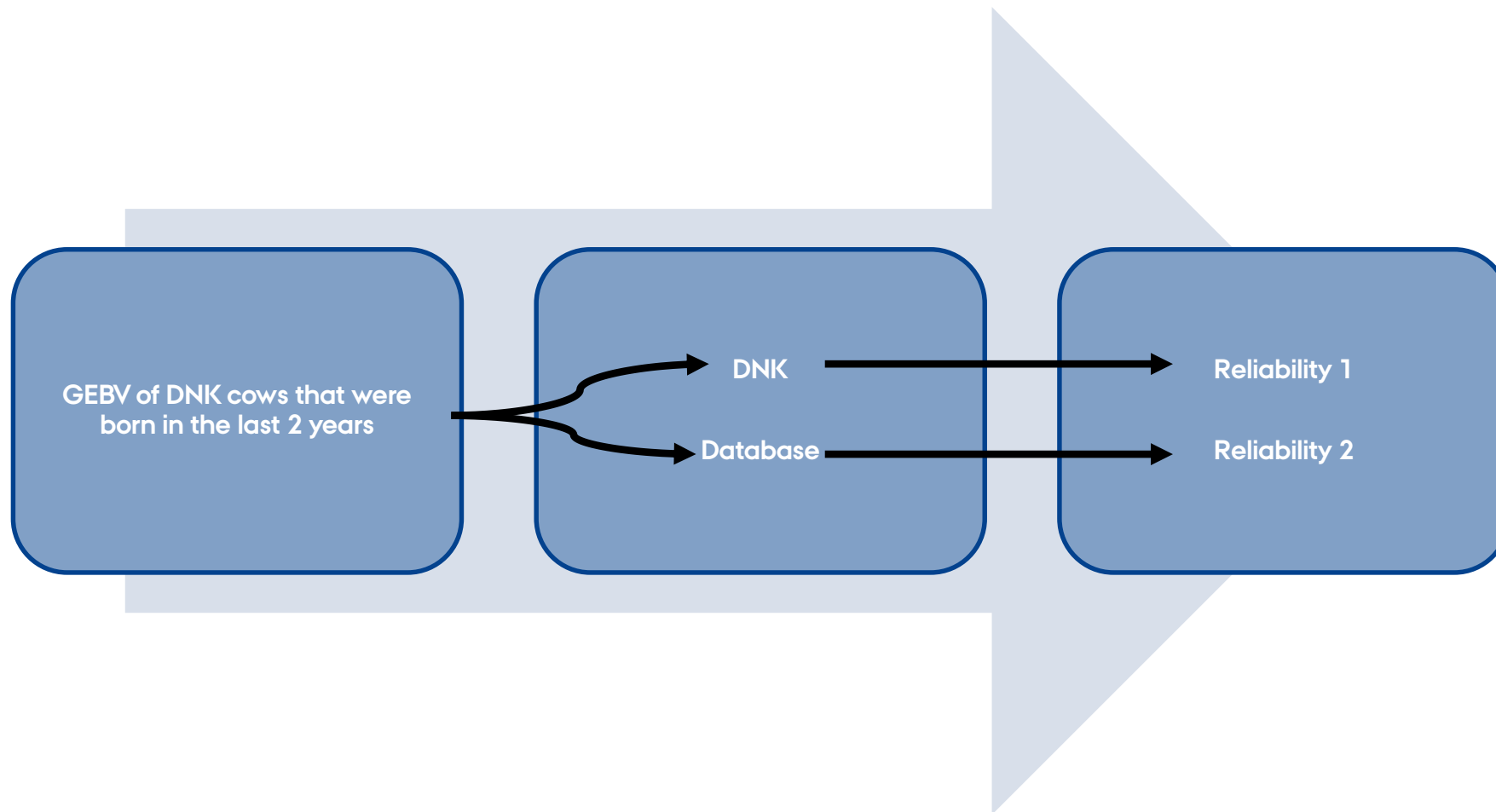
$$RFI_i = \mu + a + pe + e$$

Where: HYS = herd.year.season; LACP = lactation period (every 4 wk is a class); aoc = age of cow at calving.

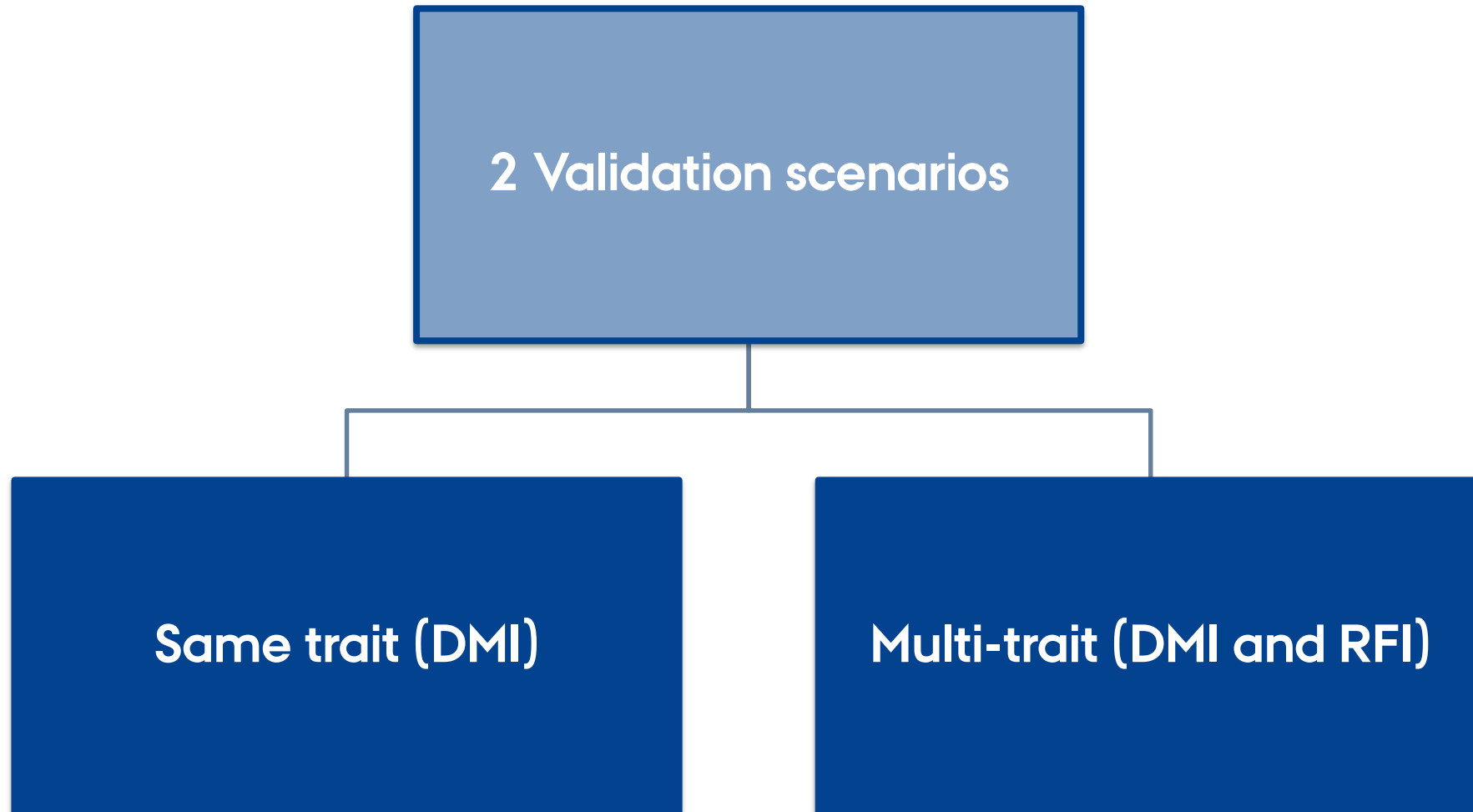
Half sib scenario



Straightforward scenario



Trait definition



Reliability

- Reliability

$$r^2 = \frac{r(GEBV, Y_{adj})^2}{r_p^2}$$

➤ where:

$$r_p^2 = \frac{n * h^2}{1 + (1 - n) * rep}$$

➤ ssGBLUP (DMU, Madsen & Jensen 2013)

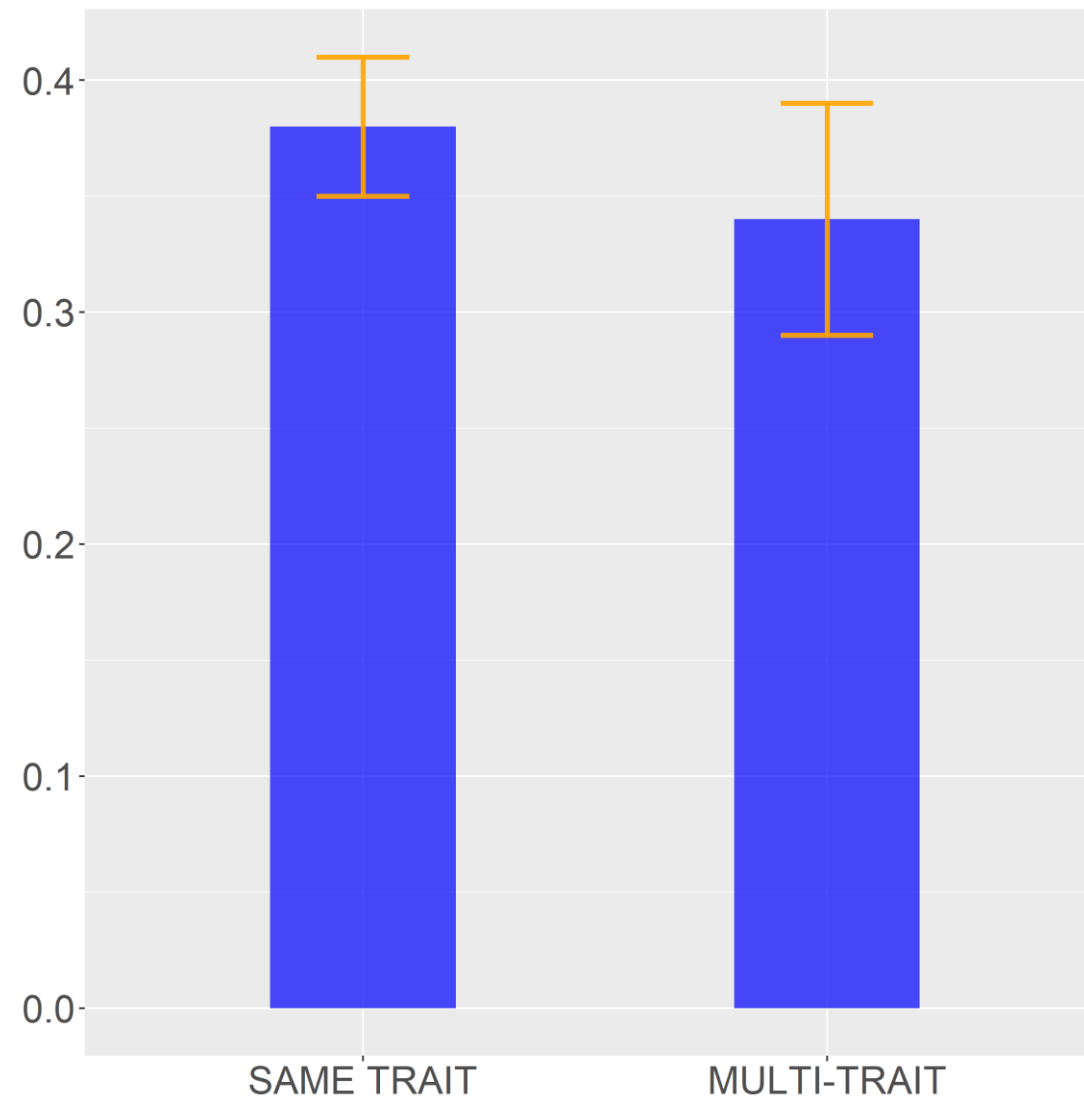
Genetic parameter estimates

	h² (SE)	rep
DMI	0.29 (0.02)	0.56
MY	0.37 (0.02)	0.63
ECM	0.34 (0.03)	0.58
MBW	0.51 (0.03)	0.85
RFI₁	0.15 (0.02)	0.35
RFI₂	0.14 (0.02)	0.30
RFI₃	0.15 (0.02)	0.31

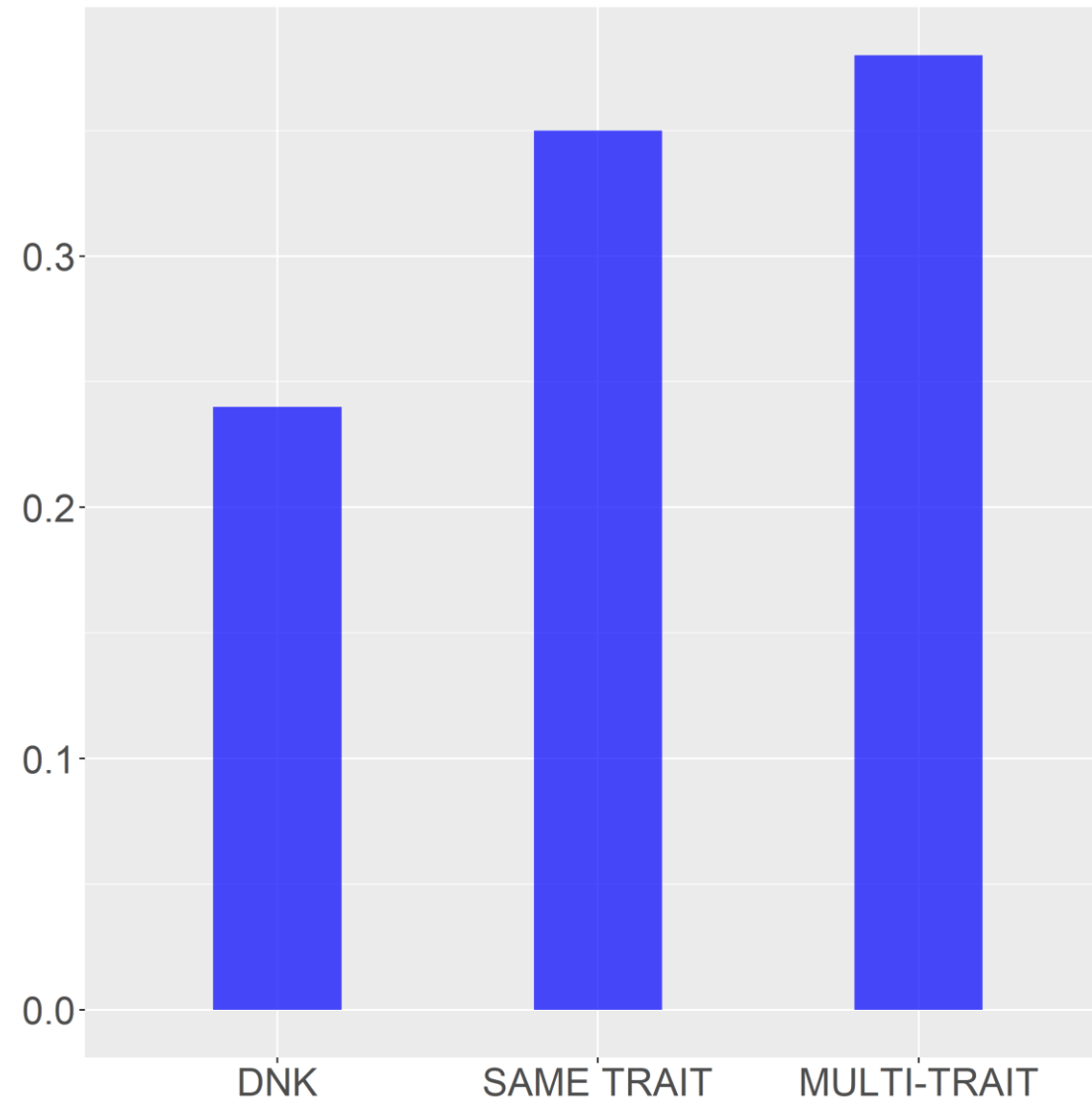
Genetic parameter estimates

DMI				
	CAN	DNK	GBR	USA
CAN	0.13 (0.03)	0.81 (0.53)	0.35 (0.69)	0.60 (0.66)
DNK		0.51 (0.04)	0.55 (0.45)	0.72 (0.54)
GBR			0.16 (0.03)	0.62 (0.63)
USA				0.40 (0.05)

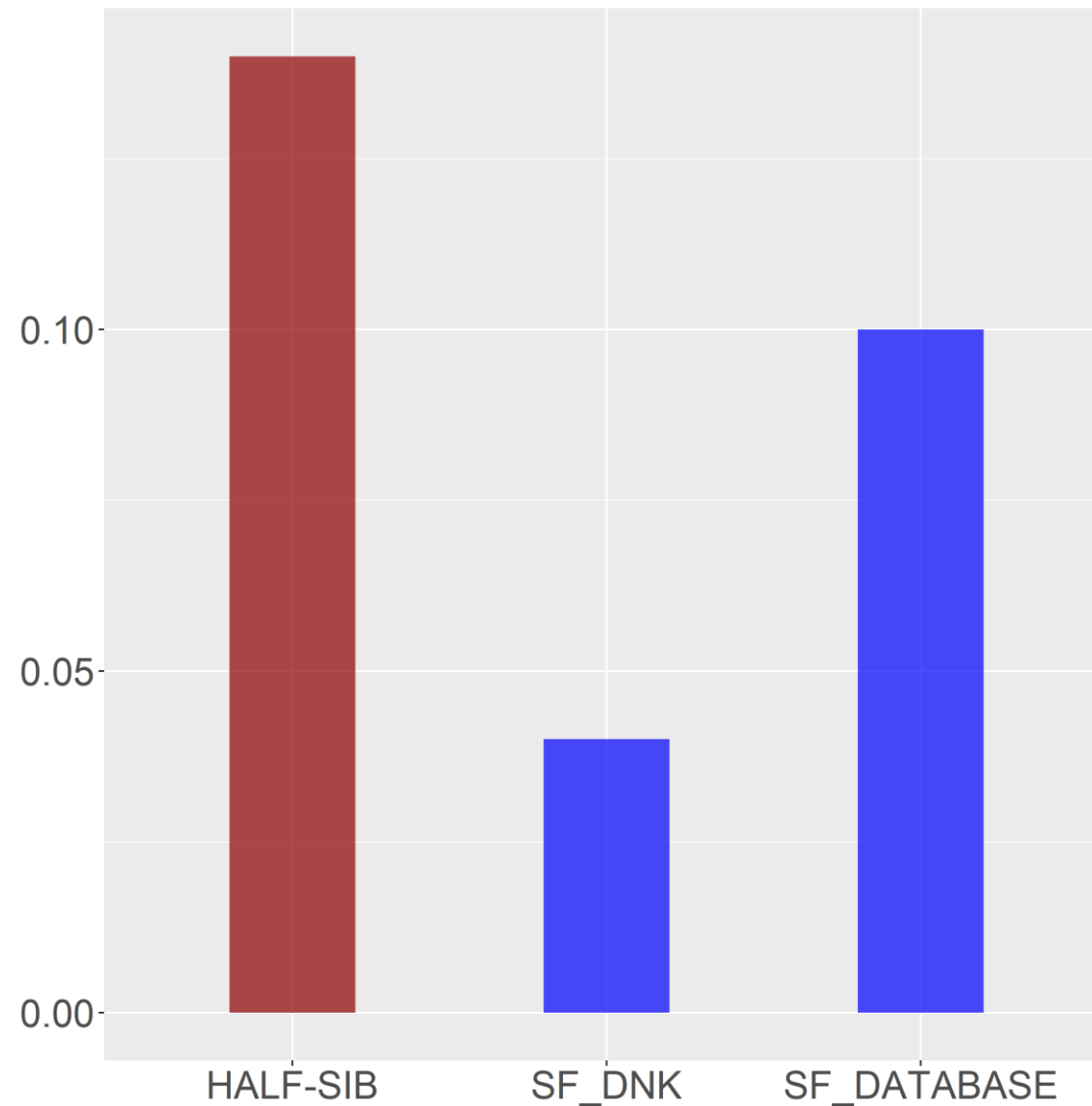
Prediction reliability for DMI – Half Sib Scenario



Prediction reliability for DMI – Straightforward Scenario



Prediction reliability (RFI)



Final Comments

- Low and moderated prediction reliability for RFI and DMI
- An international reference population can improve the prediction reliabilities for DMI and RFI in Danish Holstein