COW SLAUGHTER DATA
A source to improve the genetic evaluation for maintenance efficiency

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Outline

- Current evaluation for maintenance efficiency
- Why using carcass weight
- Updating the current model

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Feed requirement for maintenance

- about 30% of the feed intake of high yielding dairy cows
- almost linear relationship with metabolic body weight

  metabolic body weight (mBW) = (body weight) $^{0.75}$

- metabolic body weight is the core trait for genetic evaluation of maintenance efficiency

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NAV - metabolic body weight evaluation

- development work started in 2017
  - Luke, SEGES, Faba, Växa, NAV
- since 2019 included in NAV evaluations
- evaluation is based one core trait and indicator traits
- for each breed an own evaluation
- high reliabilities of genomic breeding values

Metabolic body weight evaluation

- multiple trait animal model
- 1 core trait

  metabolic body weight (mBW) in 1st, 2nd and 3rd parity
  - body weight tape measurements from Finland
  - body weight scale measurements from Denmark
- 3 correlated indicator traits
  - stature (STA), chest width (CW) and body depth (BD)
  - measurements from NAV conformation evaluation
- reference

  Lidauer, M.H., Leino, A.-M., Stephansen, R.S., Pösö, J., Nielsen, U.S., Fikse, W.F., Aamand, G.P. 2019. Interbull Bulletin 55:21-25

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NAV metabolic body weight evaluations

Reliability of genomic prediction

Genomic breeding values of bull candidates

- validation reliabilities in the same range as for yield traits

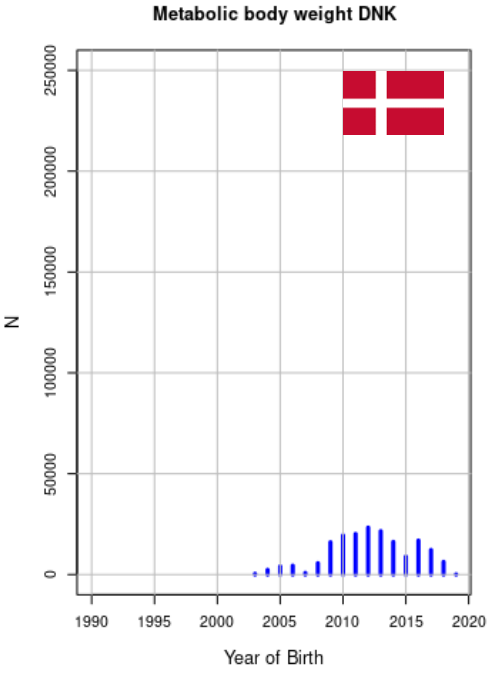
Breed	Candidates	$R^2_{validation}$
Holstein	584	0.59
Nordic Red	519	0.74
Jersey	188	0.65

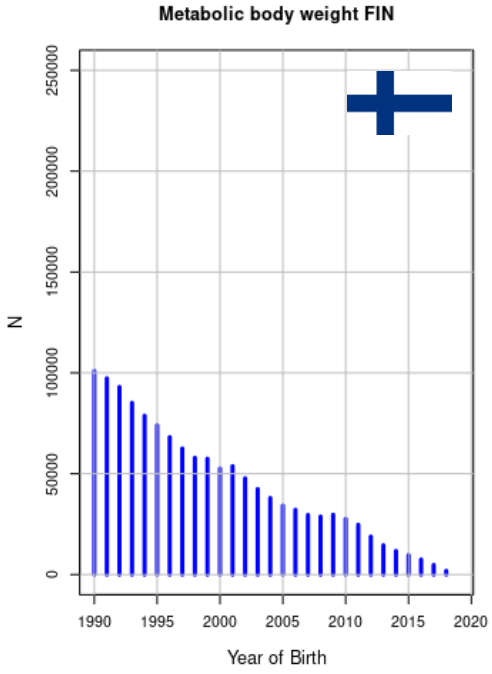
Correlation with other index traits

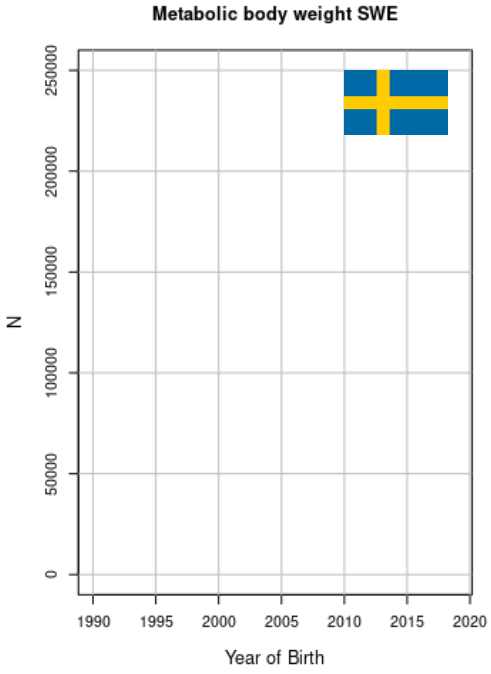
Traits	HOL	RDC
Frame	-0.78	-0.72
Beef production	-0.12	-0.29
Milk production	-0.01	0.05
Mastitis	0.06	0.06
Female fertility	0.06	0.03
Claw health	0.14	0.18
Calving traits	0.10	0.35
Longevity	0.18	0.20
Nordic Total Merit (NTM)	0.04	0.11

Why using carcass weight?

- the number of new body weight measurements is decreasing
- routine on-farm body weight measuring is not available yet







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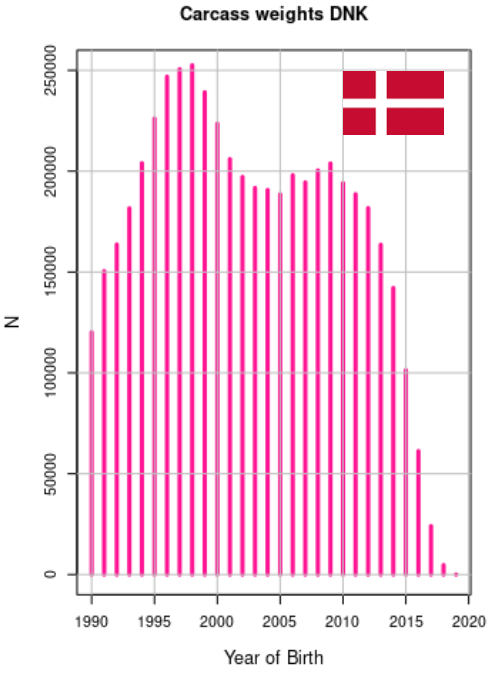
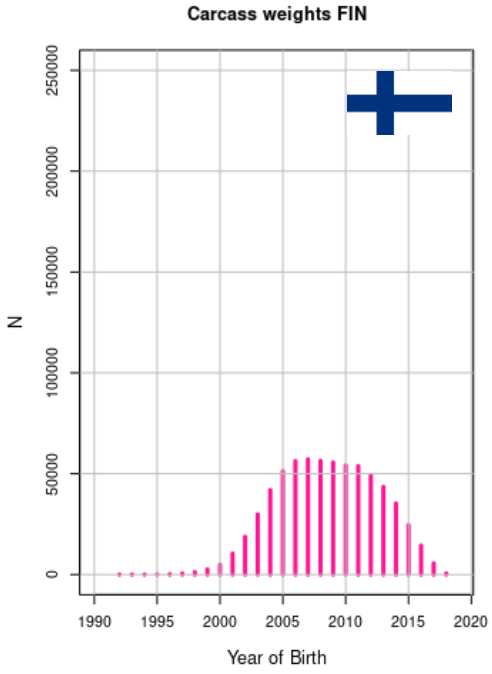
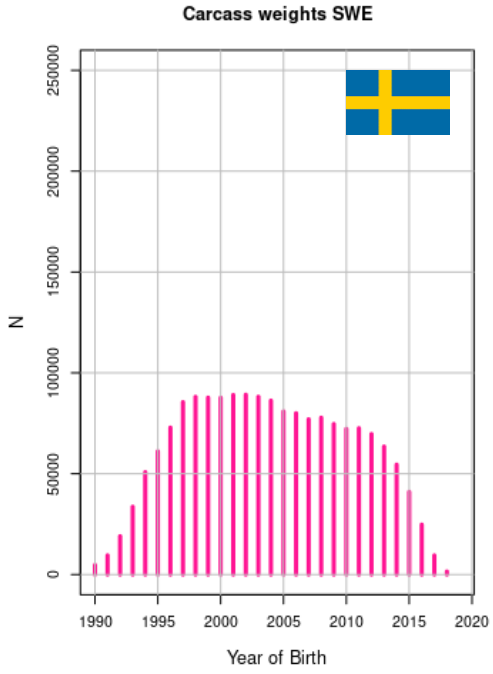
Carcass weight is available in all countries

- could it be used as correlated indicator trait?
- how high is the correlation between carcass weight and mBW?







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Study of genetic correlations with current traits

- current traits for metabolic body weight evaluation:
  - **mBW1**, **mBW2**, **mBW3**, **STA**, **CW**, **BD**
- new trait we studied:
  - carcass weight (**CARW**)
- data
  - suitable data from Finnish RDC and HOL cows
  - multiple-trait (7 traits) variance component analysis included records from 31 000 cows

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Results

Heritabilities (diagonal) and **genetic correlations** (upper triangle)

	mBW1	mBW2	mBW3	STA	CW	BD	CARW
mBW1	0.46	0.97	0.95	0.65	0.59	0.52	0.78 (0.04)
mBW2		0.54	0.98	0.70	0.55	0.47	0.84 (0.03)
mBW3			0.56	0.68	0.53	0.53	0.86 (0.03)
STA				0.60			0.59 (0.06)
CW					0.18		0.58 (0.29)
BD						0.25	0.41 (0.30)
CARW							0.53

Conclusions from the correlations study

- current model should be upgraded
- carcass weight should be included as correlated information
- chest width and body depth can be removed
- proposed traits for the new model

  mBW1, **mBW2**, **mBW3**, **CARW**, **STA**
- positive side effect to be considered:

  CARW breeding values could be utilized for the growth index

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Implementation steps planned in 2021

- inclusion of carcass weight data to current evaluation
  - ongoing
- building and validating the new model
  - for each breed an own model
- upgrading to single-step genomic evaluation

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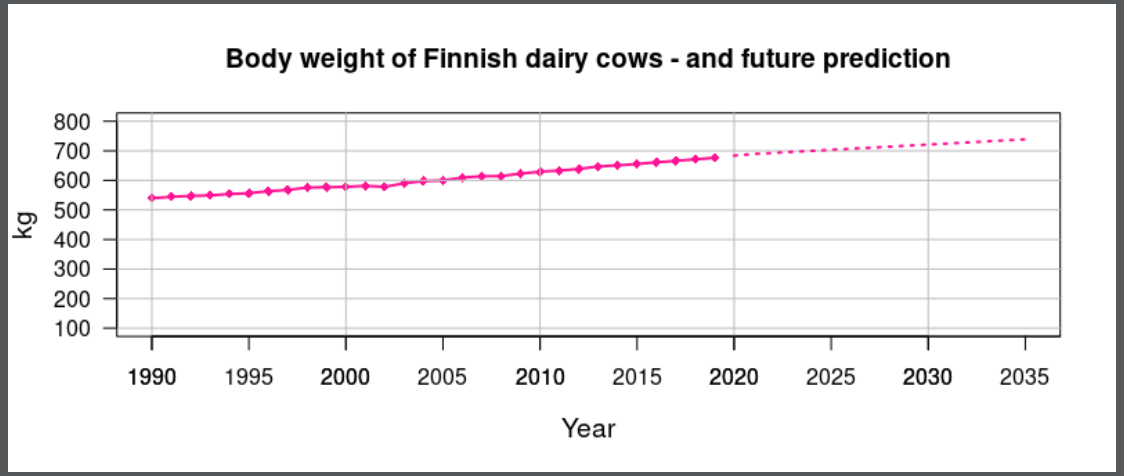
Thank you!



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