Warsaw, Poland
1st September 2015

Ane Marie Closter, Elise Norberg, Jørn Pedersen and Morten Kargo

POSSIBILITY TO IMPROVE GENETIC EVALUATION FOR CARCASS TRAITS USING DATA FROM DAIRY COWS

SEGES

MEAT PRODUCTION FROM DAIRY CATTLE

At present are there slaughtered

~200,000 dairy cows

~120,000 bull calves

annually from Danish herds

ESTIMATIONS OF EBV FOR CARCASS TRAIT

- Beef production is based on both dairy cows, bull calves and beef cattle
- Carcass traits = carcass weight and carcass conformation score
- Carcass trait EBV for dairy cows are based on bull calves
  - No EBV from dairy cows
  - 9 – 15% of dairy farmers income is from meat production

AIM

- To improve breeding values for beef production from dairy cows and bull calves
  - Estimate genetic parameters for beef production for dairy cows
  - Estimate genetic correlations for beef production between slaughtered dairy cows and bull calves

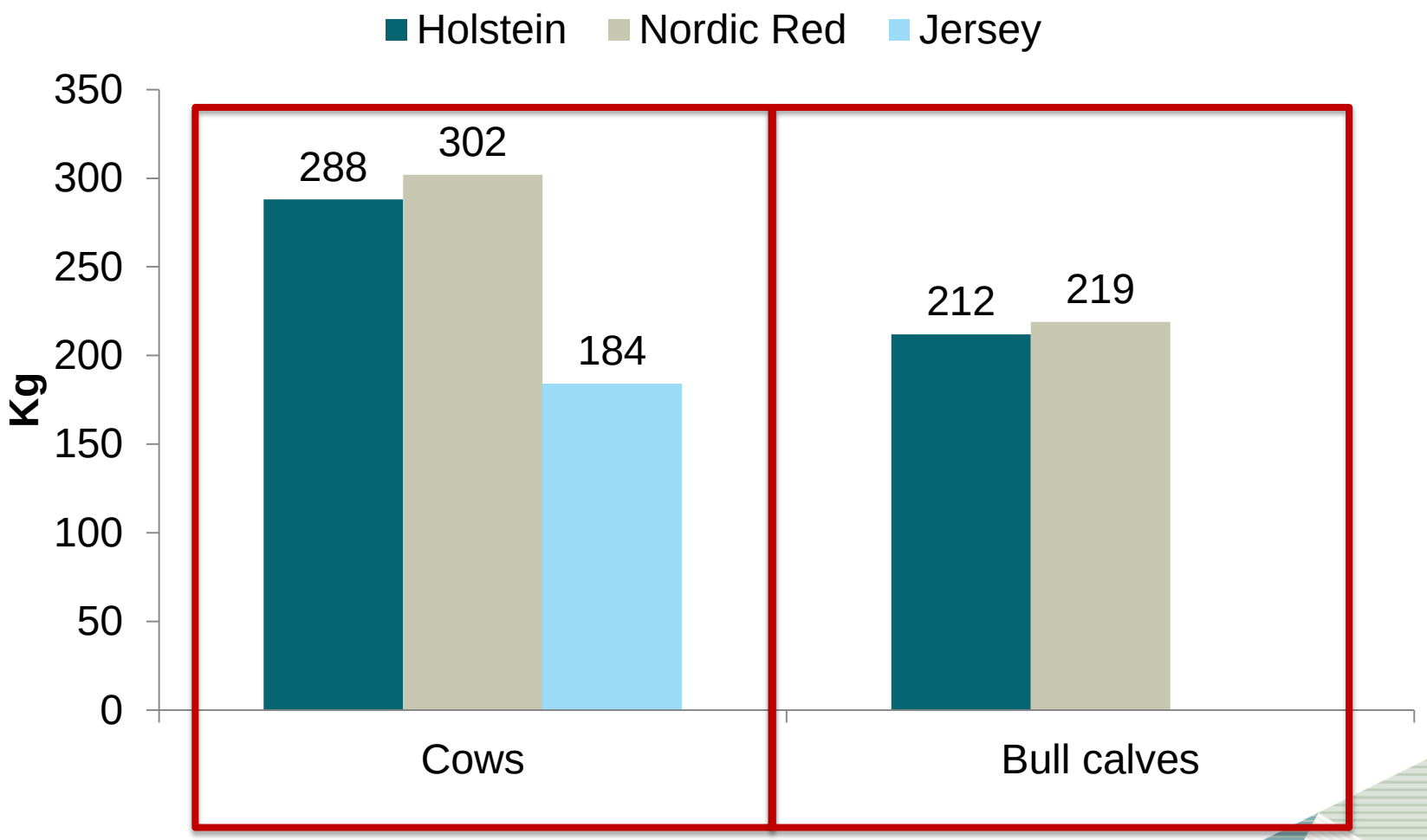
DATA: DAIRY COWS

- Slaughtered between 2010 to 2014
- Older than 18 months at first calving
- Maximum 2 years from last calving to slaughter
- Herd size: Data from minimum 100 cows in period
- Parity: 1 – 6
- Minimum 30/10 cows per sire
- Number of cows after editing
  - Holstein ~350,000
  - Nordic Red ~ 34,000
  - Jersey ~ 40,000

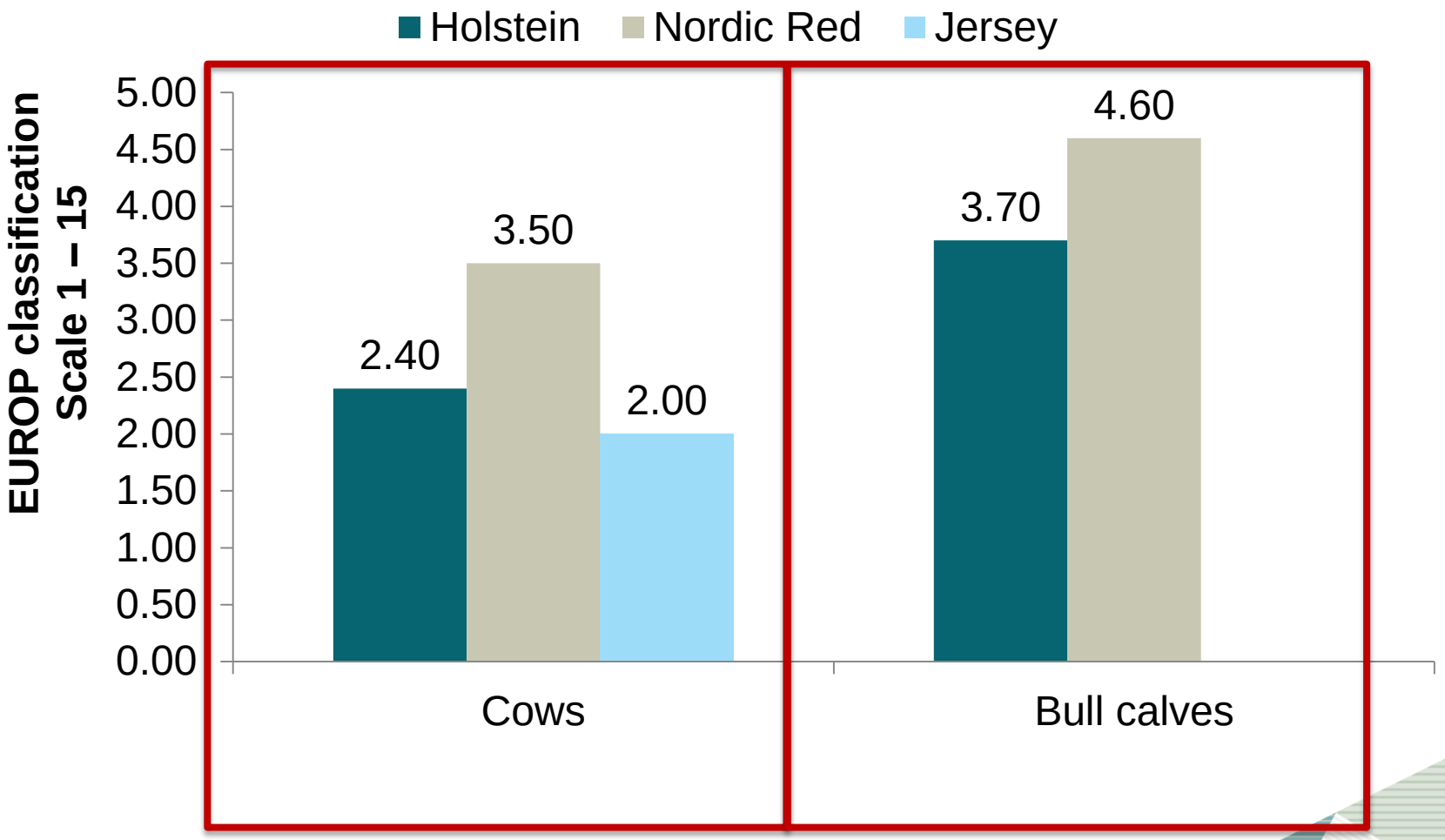
DATA: BULL CALVES

- Slaughtered between 2004 – 2014
- Slaughtered between 9 – 19 months
  - Half are slaughtered at average of 9.5 months
  - Other half are slaughtered at an average of 12.5 months
- Herd size: Data from minimum 100 calves in period
- Minimum 30/10 calves per sire
- Number of bull calves after editing
  - Holstein ~ 580,000
  - Nordic Red ~ 57,000
  - No data for Jersey calves

MEAN CARCASS WEIGHT



MEAN CARCASS CONFORMATION SCORE



GENETIC ANALYSIS – ANIMAL MODEL

y cows	
Birth year*month	F
Herd	F
Parity	F
Calving year*month	F
Slaughter year*month	F
Age at first calving	F
Month btw first calving and slaughter	F
Breed effect (only Nordic Red)	FR
Heterosis effect between breeds (only Nordic Red)	FR
Month btw 1st calving & slaughter (nested within parity)	FR
Herd * year	R
Additive genetic effect	R
Residual genetic effect	R

Breed effect for Nordic Red: Holstein, RDM, Brown Swiss, SRB, and other small breeds

GENETIC ANALYSIS – ANIMAL MODEL

y bull calves	
Birth year*month	F
Herd – birth	F
Herd – slaughter	F
Slaughter year*month	F
Age at mother at calving	F
Moving age	F
Breed effect (only Nordic Red)	FR
Heterosis effect between breeds (only Nordic Red)	FR
Age at slaughter (nested within month of slaugther)	FR
Herd – birth * year	R
Herd – slaughter year	R
Additive genetic effect	R
Residual genetic effect	R

Breed effect for Nordic Red: Holstein, RDM, Brown Swiss, SRB, and other small breeds

GENETIC PARAMETERS CARCASS WEIGHT

Parameter	Holstein		Nordic Red		Jersey	
	Cow	Calf	Cow	Calf	Cow	Calf
Genetic variation	594	35	757	97	321	-
Residual variation	1126	168	1125	179	476	-
Heritability	0.35	0.17	0.40	0.35	0.40	-
Correlation	$0.52_{0.02}$		$0.51_{0.05}$		-	

SEGES

SEGES

BULL CALVES: RESULTS FROM EXPENDED DATA

Parameter	Holstein		Nordic Red	
	2004-2014	1992-2014	2004-2014	1992-2014
Genetic variation	35	165	97	99
Residual variation	168	218	179	253
Heritability	0.17	0.25	0.35	0.28

SUMMARY OF CARCASS WEIGHT RESULT

h^2 : Higher for cows than for bull calves

r_g : Moderate between cows and calves

- Suggesting that carcass weight in cows and calves are to some extent under different genetic control
- Calves: Depends on the growth rate from birth to 10-12 months of age
- Cows depends largely on genetic disposition for mature size and to a lesser extends on growth rate.

GENETIC PARAMETERS CARCASS CONFORMATION SCORE

Parameter	Holstein		Nordic Red		Jersey	
	Cow	Calf	Cow	Calf	Cow	Calf
Genetic variation	0.17	0.14	0.28	0.25	0.13	-
Residual variation	0.57	0.27	0.82	0.39	0.43	-
Heritability	0.23	0.35	0.25	0.39	0.23	-
Correlation	0.53 $_{0.02}$		0.62 $_{0.05}$		-	

SEGES

SEGES

SUMMARY OF CARCASS CONFORMATION SCORE RESULTS

h^2 : Smaller for cows than for bull calves

r_g : Moderate between cows and calves

- Bit higher for Nordic Red compared to Holstein
- Parturition of energy resources in cow largely benefits milk production instead of growth
- Bull calves only use energy for growth

CONCLUSION

- Carcass weight and carcass conformation score are to some extent different traits in cows and bull calves
  - But have some positive relationship

- If we want genetic progress for both carcass traits in cows and calves
  - Data from both cows and calves should be included in the breeding goal