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Health Traits
 Health can have a large impact on overall productivity and profitability Dairy cattle: milk production, fertility, etc. Beef cattle: milk production, fertility, etc.
 We need to focus attention on improving the health and welfare of cows, as well as production, in order to remain competitive with other countries
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Part 2: Genetic Analyses

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- Do health traits have a genetic component?
- · Would genetic selection be possible?
- What are the heritabilities of diseases calculated using producer-recorded data?

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Genetic Analyses

- Estimate heritabilities for common health events occurring from 1996 to 2012
- · Similar editing was applied
 - US records
 - Parities 1 through 5
 - Minimum/maximum constraints

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NC STATE UNIVERSITY Genomic Analyses • 50K SNP data available for 7,883 bulls • Single-step methodology was employed to include genomic information using thrgibbs1f90 Tsuruta & Misztal, 2006

Kristin Gaddis • Emerging Technologies Committee Breakout

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Genomic Analyses	Genomic Analyses				
 Multiple trait analysis using a threshold sire model 	• Prelir	Preliminary results:			
$\lambda = X\beta + Z_h h + Z_s s$		Mastitis	Metritis	Lameness	
λ = unobserved liabilities to the diseases	Mastitis	0.09 (0.07, 0.10)			
β = vector of fixed effects (parity year-season)	Metritis	-0.27 (-0.38, -0.11)	0.04 (0.039, 0.05)		
V = incidence matrix of fixed effects	Lameness	-0.15 (-0.33, 0.14)	-0.02 (-0.21, 0.14)	0.01 (0.004, 0.014)	
h = random herd-year effect $h = \text{random sire effect} \left(s \sim N(0, H\sigma_s^2)\right)$ $Z_h, Z_s = \text{incidence matrix of corresponding random effect}$	Select estim correlations	Select estimated heritabilities (95% HPD) on diagonal and estimated genetic correlations (95% HPD) below diagonal.			



Genomic Analyses

Comparison of reliability calculated with and without genomic information

Event	EBV Boliobility	CERV Poliability	Porcont Incrosco
Event	EBV Kellability	GEBV Kellability	Fercent increase
Displaced abomasum	0.30	0.40	33%
Ketosis	0.28	0.35	25%
Lameness	0.28	0.37	32%
Mastitis	0.30	0.41	37%
Metritis	0.30	0.41	37%
Retained placenta	0.29	0.38	31%

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Discussion & Conclusions

- Data Editing & Validation
 - Evidence for the usefulness of on-farm recorded health information
 - Incidence rates were similar to those in literature
 - Improvements could be made with more complete data recording and standardized event definitions

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Discussions & Conclusions

- · Genetic Analyses
 - Health events do have a genetic component
 - Low heritabilities
 - Reasonable improvements must be expected
 - Also largely influenced by environmental factors
 - Focus on long-term results

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