Genetic evaluation for heat tolerance in Angus cattle

Heather Bradford
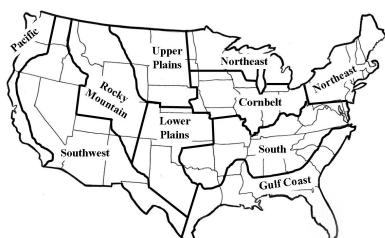
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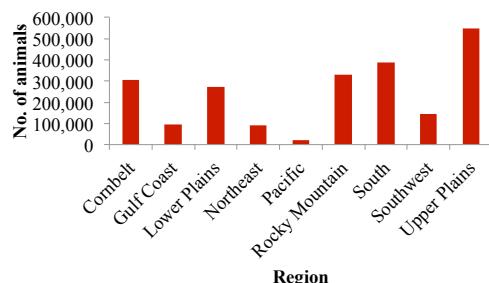
Background

- Annual economic losses from heat stress
  - $87 million for beef cows
  - $282 million for finishing cattle

- Affects pregnancy, milk production, feed intake, and weight gain

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Region Definitions

Regional Distribution
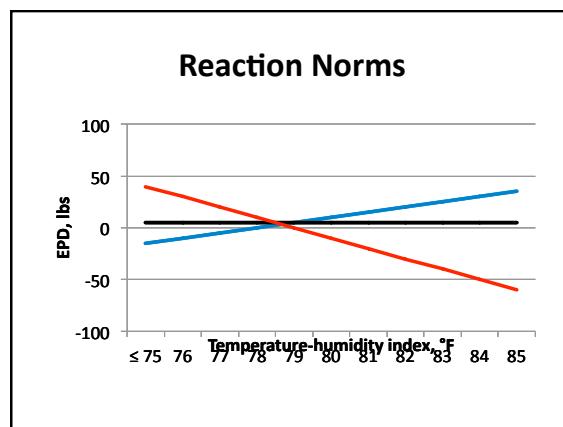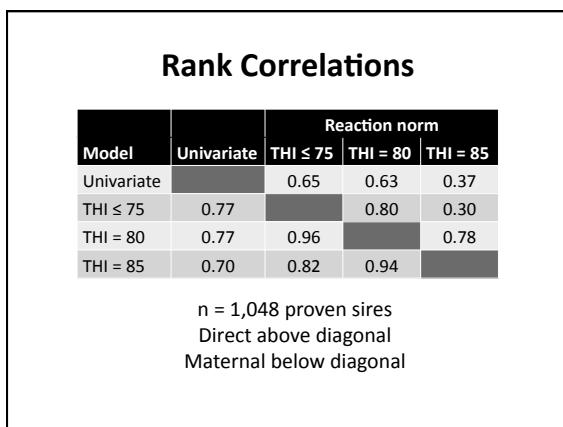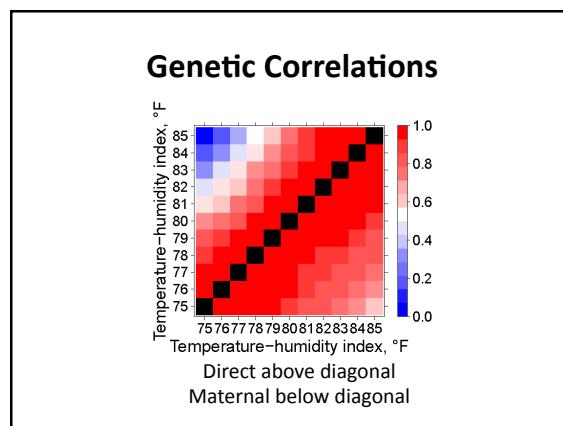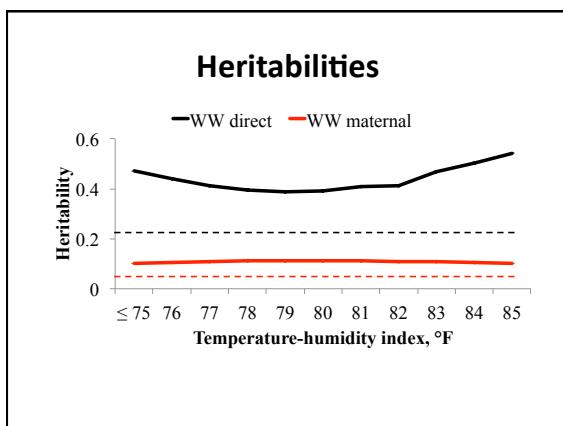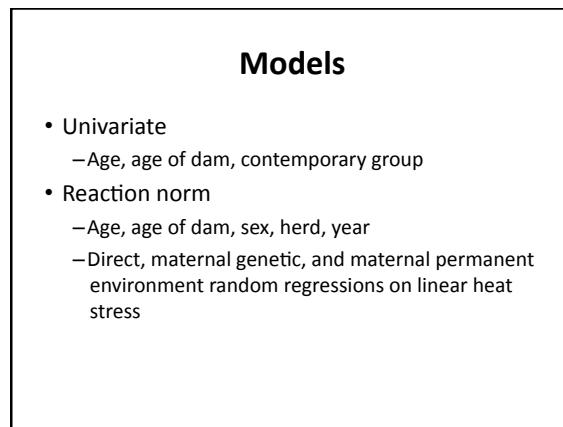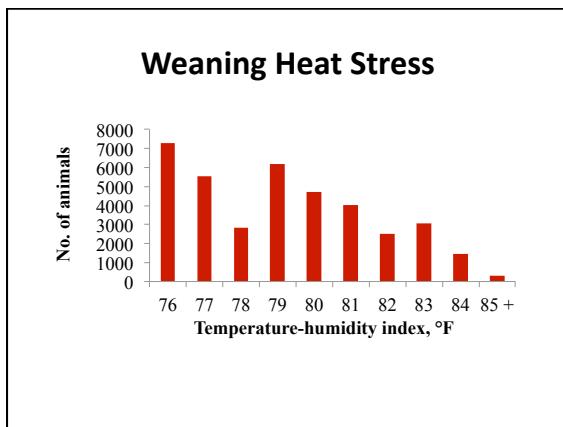
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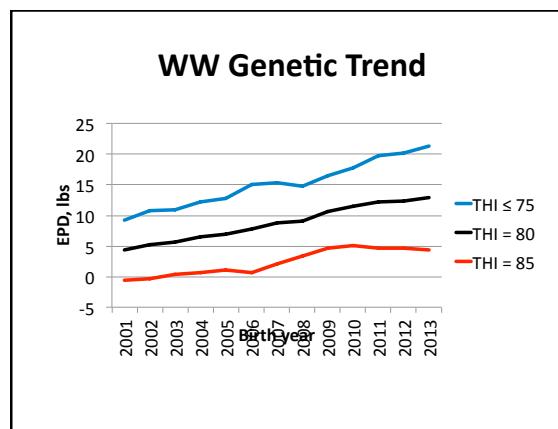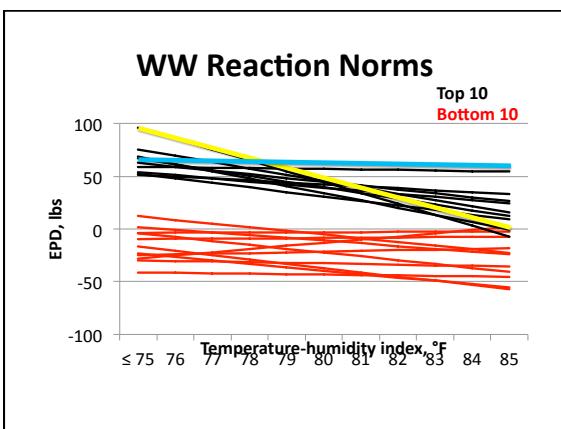
Item	WW
Mean (lb)	562
SD (lb)	106
Animals	82,669
Heat stress	37,922
No heat stress	44,747
Pedigree animals	169,291

Measuring Heat Stress

Average temperature-humidity index (THI) = 77


Weaning Heat Stress

Models

- Univariate
  - Age, age of dam, contemporary group
- Reaction norm
  - Age, age of dam, sex, herd, year
  - Direct, maternal genetic, and maternal permanent environment random regressions on linear heat stress

Heritabilities

Genetic Correlations

Direct above diagonal
Maternal below diagonal

Rank Correlations

| Model | Univariate | Reaction norm | | |
		THI ≤ 75	THI = 80	THI = 85
Univariate		0.65	0.63	0.37
THI ≤ 75	0.77		0.80	0.30
THI = 80	0.77	0.96		0.78
THI = 85	0.70	0.82	0.94	

n = 1,048 proven sires
Direct above diagonal
Maternal below diagonal

Reaction Norms

WW Reaction Norms

WW Genetic Trend

Implementation

- Reaction norm slope
- EPD for specific THI value(s)
- Index for region-specific production

Conclusions

- Evidence of genotype x environment interaction for direct but not maternal genetic effects
- Heat tolerance could be incorporated in selection schemes

Acknowledgment

- American Angus Association