RMC 2025 RECIPROCAL MEAT CONFERENCE

#19

Effects of Chronic Heat Stress Mitigation on Finishing Beef Performance, Blood Cortisol, Microbiome, and Carcass Measures in the Southeastern United States

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GEORGIA 1785

Introduction

- Cattle experiencing heat stress are a growing problem in the Southeastern US due to subtropical climates and effects are economically devastating
- Mitigation strategies such as fans, cover, shade, and diet need to be explored to alleviate heat loads in finishing cattle and increase productivity

Objective

- To evaluate chronic heat stress impact on finishing cattle performance, microbiome, blood parameters, and carcass data for beef cattle the Southeast
- To assess heat stress mitigation strategies effectiveness, including barns, covered shelters, and fans, in improving cattle performance

Materials and Methods

- Sixty Angus crossbred beef steers (N = 60) from UGA Beef Research Unit were blocked by weight and previous treatment
- Steers were randomly assigned to 1 of 4 treatments (n = 15):
  - CWF: Covered with fans
  - CNF: Covered without fans
  - SHD: outside drylot with access to shade
  - OUT: outside drylot without access to shade
- Steers harvested when treatment averaged the target finishing weight (545.5 kg)
- Weights and fecal collected every 21 d
- Carcasses were ribbed and carcass data was collected following a 30-minute bloom
- Blood serum collected for cortisol testing on d -22, d 0, d 1, d 3 , d 7, and d 21
- Microbiome analysis was performed on a subset of steers (n = 12/ treatment)
- Data was analyzed utilizing a random complete block design
  - Finishing environment and day were fixed effects
  - Steer within finishing environment was the random term

Performance Results

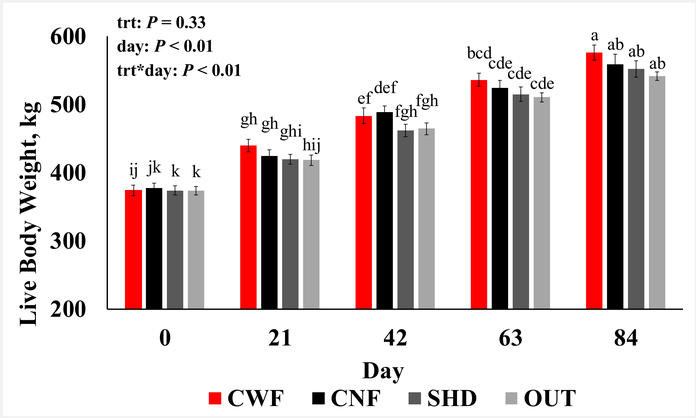

Figure 1: Effects of treatment on live body weight. [a-k]Bars with different superscripts differ ($P < 0.05$).

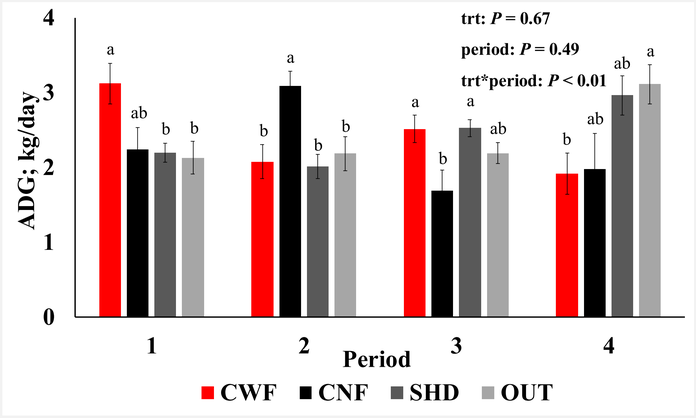

Figure 2: Effects of treatment on average daily gain (**ADG**). Period is defined a 21d between collection dates. Significance is described [abcd] within period ($P < 0.05$).

Table 1: Least Square Means for main effect of management treatments on carcass yield and quality

	Treatment					
Trait	**CWF**	**CNF**	**SHD**	**OUT**	**SEM**	***P* - Value**
n	15	12	15	15		
Live Weight, kg	544	535	532	532	10.3	0.80
HCW, kg	334	331	326	332	7.1	0.89
DP, %	61.35	61.79	61.33	62.36	0.43	0.29
12th Rib BF, cm	1.32	1.42	1.21	1.30	0.09	0.28
REA, cm²	80.82^{ab}	79.14^{ab}	77.47^{b}	84.95^{a}	1.90	0.05
KPH, %	2.1	2.0	2.0	2.1	0.11	0.86
Yield Grade	3.0	3.1	2.9	2.7	0.15	0.42
Marbling Score	Sm^{00}	Sl^{65}	Sm^{00}	Sl^{90}	13.5	0.28
Lean Maturity	A^{32}	A^{52}	B^{05}	A^{44}	34.8	0.47
Overall Maturity	A^{14}	A^{18}	A^{15}	A^{18}	1.2	0.06

Conclusions

Steers with access to greater access to heat mitigation reached target finishing weight with less days on feed, but did not differ in terms of carcass quality

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Microbiome Results

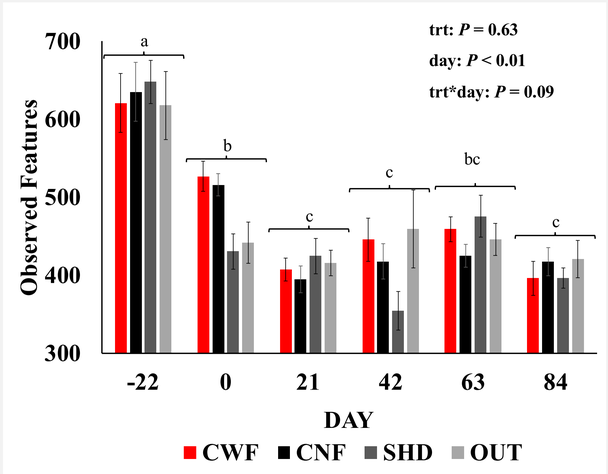

Figure 3: Effects of treatment on fecal microbial observed features. [a-c]Days with different superscripts differ ($P < 0.05$).

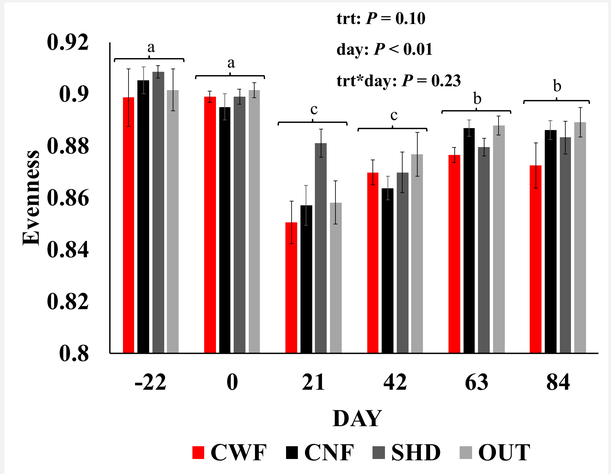

Figure 4: Effects of treatment on fecal microbial evenness. [a-c]Days with different superscripts differ ($P < 0.05$).

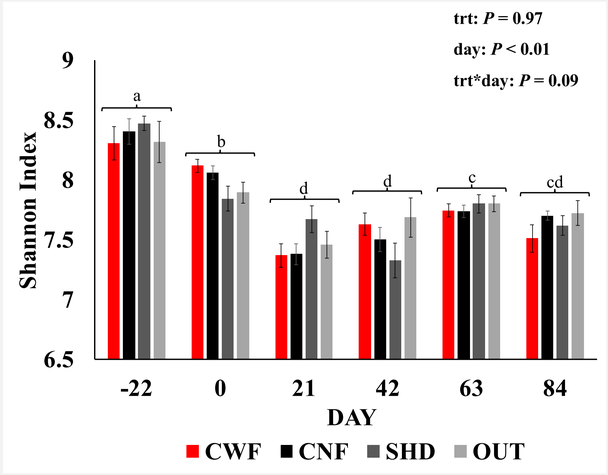

Figure 5: Effects of treatment on fecal microbial Shannon Index diversity. [a-d]Days with different superscripts differ ($P < 0.05$).

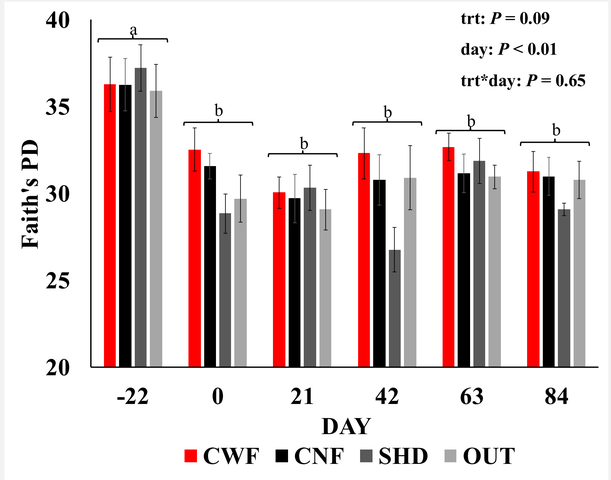

Figure 6: Effects of treatment on fecal microbial Faith's Phylogenetic Diversity. [a-b]Days with different superscripts differ ($P < 0.05$).

Supplemental Heat Indices Data

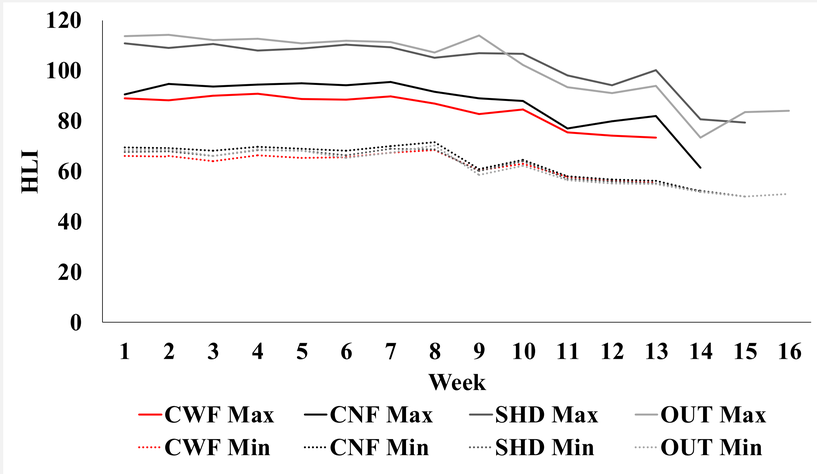

Figure 7: Effects of treatment on Heat Load Index (HLI) averages. Solid lines refer to weekly average maximum HLI, while dotted line refers to weekly average minimum HLI. The HLI values were quantified by Kestrel 5400AG cattle heat stress trackers. Each treatment was assigned a Kestrel unit centralized to treatment area.

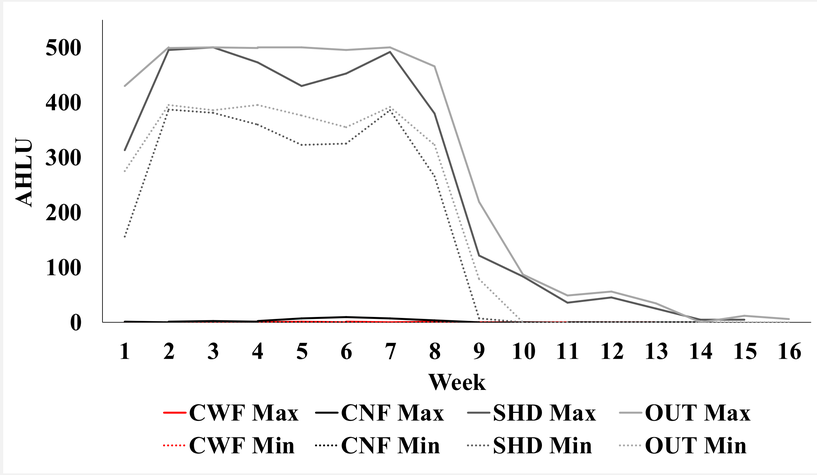

Figure 8: Effects of treatment on Accumulated Heat Load Unit (AHLU) averages. Solid lines refer to weekly average maximum AHLU, while dotted line refers to weekly average minimum AHLU. The AHLU value were quantified by Kestrel 5400AG cattle heat stress trackers. Each treatment was assigned a Kestrel unit centralized to treatment area.

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