Meat Science and Technology Center
College of Agricultural & Environmental Sciences
UNIVERSITY OF GEORGIA

Influence of Heat Mitigation Strategies in Southern Beef Finishing Systems on Carcass and Meat Quality Attributes

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Abstract # 71

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Introduction

- Beef feedlot systems are sparse in the Southeastern United States
- Summer months exhibit extended periods of heat and humidity
  - Chronic heat stress and elevated HLI and AHLU
  - May lead to decreased efficiency and quality
- Feedlot cattle are more susceptible to heat stress due greater energy in feed and greater metabolic heat load
- Simple mitigation strategies may alleviate heat load and improve performance

Objective

- Determine the effects of heat mitigation for beef finishing systems in the Southeastern US on carcass and meat characteristics

Methods

- Sixty Angus crossbred steers (374±57 kg) stratified by weight, randomly assigned finishing environment
  1. Covered barn with fans (**CWF**)
  2. Covered barn without fans (**CNF**)
  3. Outside with shade (**SHD**)
  4. Outside without shade (**OUT**)
- *Ad libitum* access to water and feedlot ration
- Slaughtered when treatment reached target weight (590 kg), July 8 to October 26, 2023
- Carcass data were collected 24 h postmortem
- Strip loins from the right side were fabricated into steaks (2.5 cm):
  - Proximate analysis,
  - Slice shear force (7, 14, 21 d aging),
  - Color panel (0, 1, 3, 5, 7 d of display)

Results

Environmental Data

- Figure 1 – Heat load index and Unbound accumulated heat load units
- Figure 2 – Historical weather data

Carcass Data (Table 1)

- Days to finish: CWF – 90, CNF – 97, SHD – 104, OUT - 111
- No differences for carcass traits ($P \geq 0.06$) except, OUT had a larger REA than SHD ($P = 0.04$)

Proximate Analysis

- CWF had greater percent protein than CNF ($P = 0.02$)
- Percent moisture ($P = 0.83$), lipid ($P = 0.74$), or ash ($P = 0.73$) did not differ

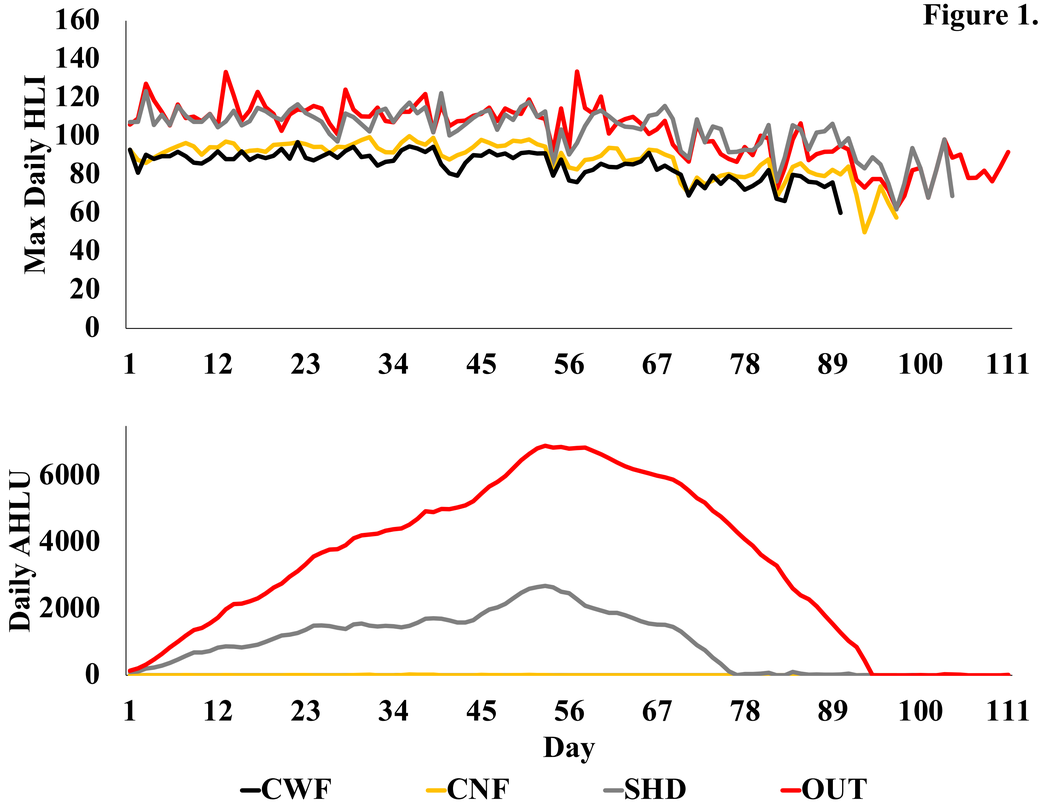
Slice Shear Force

- Percent thaw loss was greater for CWF than CNF ($P = 0.04$; Table 2)
- SHD day 7 steaks had greater SSF than SHD day 14 and 21 ($P < 0.01$; Figure 3); All others were similar ($P \geq 0.11$)

Color Panel (Figure 4)

- CWF and OUT trended to be less vivid, darker red, and have greater Delta E than CNF and SHD
- After 4 days OUT had more discoloration than SHD ($P \leq 0.02$)

Figure 1.



Conclusion

- Heat mitigation hastened the time for steers to achieve target market weight
- Taken to a similar market weight, steers were able to adapt to prolonged heat stress and did not differ for most carcass traits of economic importance
- Prolonged exposure to chronic heat stress did not impact strip loin tenderness or greatly influence color stability
- Further research is needed to understand the impact of chronic heat stress and mitigation on finishing efficiency and economic viability

Georgia Beef BEEF Commission

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Figure 2.

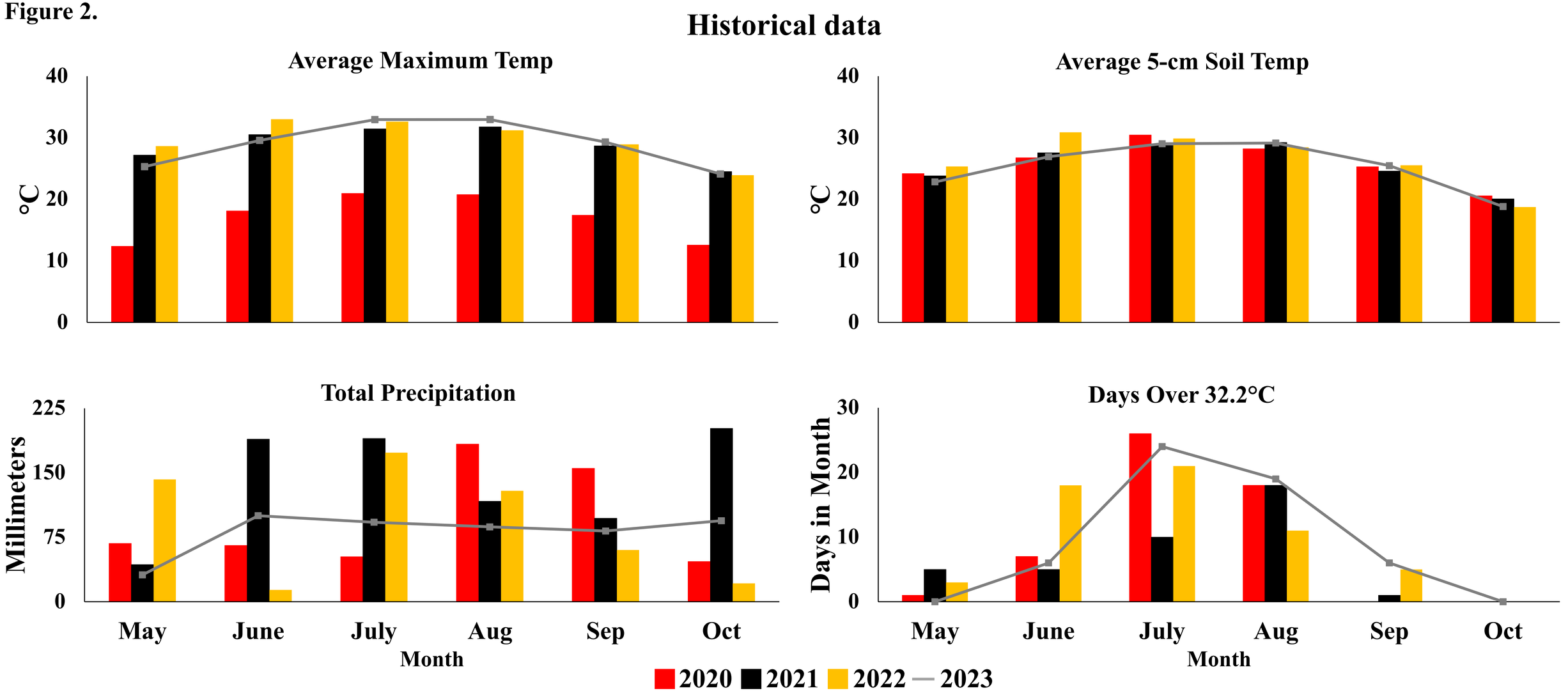

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Table 1. Carcass data least squares means values for steers kept under different housings, covered with fans (CWF), covered no fans (CNF), outdoor with shade (SHD), and outdoor without shade (OUT).

Trait	CWF	CNF	SHD	OUT	SEM	P-value
Live weight, kg	544	534	532	532	10.3	0.80
Hot carcass weight, kg	334	331	326	332	7.2	0.89
Dressing percent, %	61.3	61.8	61.3	62.4	0.43	0.29
Adjusted fat thickness, cm	1.3	1.4	1.2	1.3	0.09	0.52
Ribeye area, cm^2	80.8^{ab}	79.1^{ab}	77.5^{b}	85.0^{a}	1.90	0.05
Kidney, pelvic, heart fat, %	2.1	2.0	2.0	2.1	0.11	0.86
Yield grade	3.0	3.1	3.0	2.8	0.15	0.42
Marbling score[1]	401	365	400	393	13.5	0.28
Overall maturity[2]	114	119	115	118	1.2	0.06

[1]300 = Slight, 400 = Small, 500 = Modest
[2]100 = A-maturity, 500 = E-maturity

Table 2. Cooking characteristics and slice shear force (SFF) least squares means values for steers kept under different housings, covered with fans (CWF), covered no fans (CNF), outdoor with shade (SHD), and outdoor without shade (OUT).

Trait	CWF	CNF	SHD	OUT	SEM	P-value
Thaw Loss, %	3.2^{a}	2.1^{b}	2.4^{ab}	2.8^{ab}	0.33	0.04
Cook Loss, %	13.3	12.7	13.0	13.5	0.66	0.82

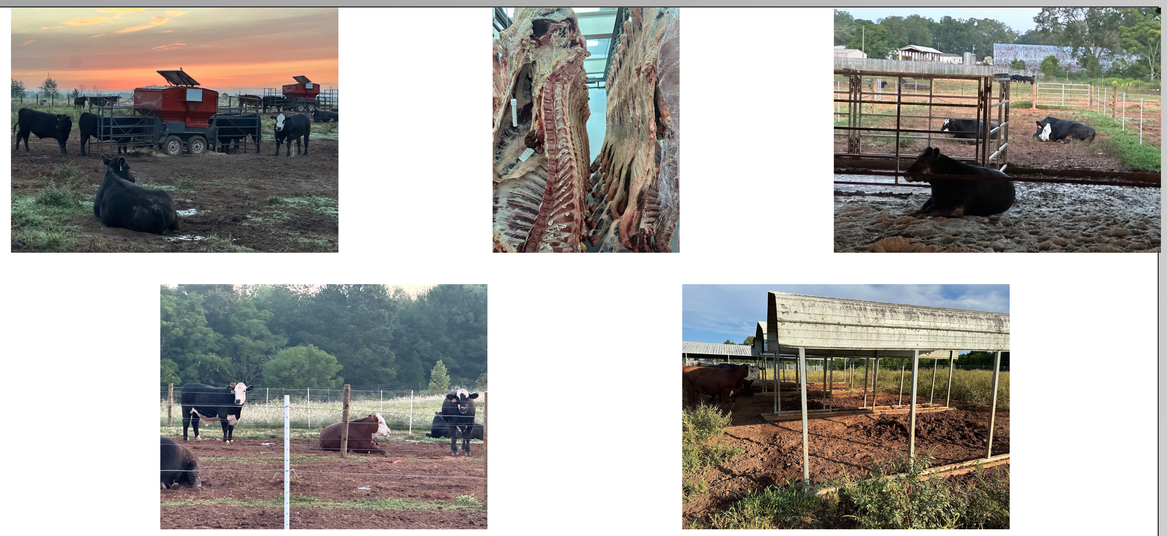

Figure 3.

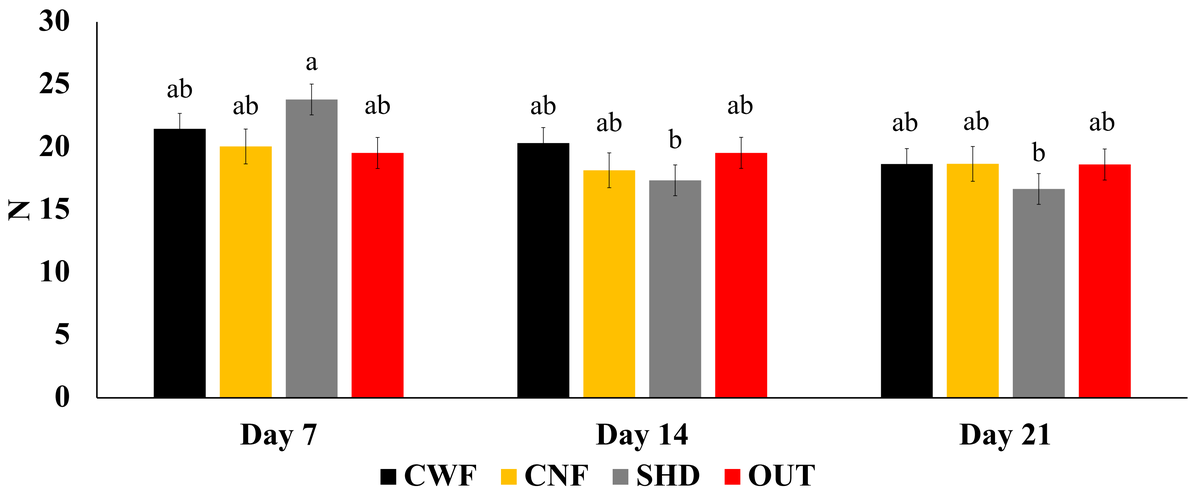

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Figure 4.