



Effects of antimicrobials on shelf life characteristics of ground beef

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BACKGROUND

- Over 50% of beef purchased by consumers at the retail level is of the ground beef variety
- In 1993 there was an outbreak of E. coli from hamburgers at Jack in the Box restaurants
- The control of shiga toxin-producing E. coli is of major concern for non-intact beef products such as ground beef
- Today there are 6 additional non-O157 STEC strains that are of concern
- As novel antimicrobials are developed to reduce these pathogens, it is critical to understand their impact on meat quality

OBJECTIVE

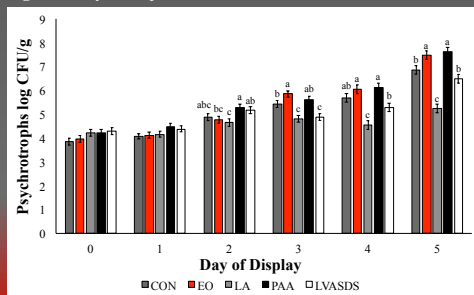
- To determine the effects of two novel pathogen interventions on ground beef quality and shelf life characteristics as compared to two industry standard interventions

MATERIALS AND METHODS

- Whole boneless chuck rolls were portioned to produce beef trim (85/15)
- Beef trim was treated with 1) 4.5% lactic acid (LA), 2) 50 ppm electrolyzed oxidizing water (EO), 3) 200ppm peroxyacetic acid (PAA), or 4) 2.0% levulinic acid plus 0.2% sodium dodecyl sulfate (LVASDS), and 5) an untreated control (CON)
- 15 kg of trim was placed on a spray cabinet conveyor for treatment application
- Beef trim was ground and 100, 150 g patties were made per treatment
- 30 patties per treatment were randomly selected and placed in PVC overwrap Styrofoam trays
- Patties were assigned to retail display for 0, 1, 2, 3, 4, or 5d in a coffin style display case at 3±2° C under 24 h fluorescent warm white light at 1861 lux
- On the respective day, patties were collected for psychotropic bacteria, purge, and lipid oxidation
- Objective and subjective color was measured daily on d 5 patties
- 5 additional patties per treatment were collected for Kramer shear analysis
- Experiment was replicated three times
- Data was analyzed by PROC MIXED (SAS Inc). If a treatment by day interaction occurred, the model was reanalyzed by day

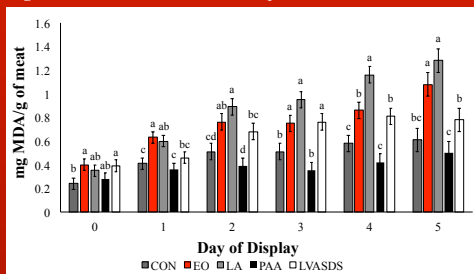
RESULTS

Figure 1. Psychotropic Bacteria Counts



^{abc}Denotes differences within a day of display ($P < 0.05$).

Figure 2. Effects of Treatment on Lipid Oxidation



^{abc}Denotes differences within a day of display ($P < 0.05$).

Table 1. Treatment Main Effects for pH, Percent Purge, Kramer shear force and Thaw and Cook Loss

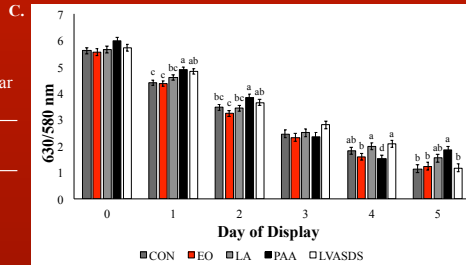
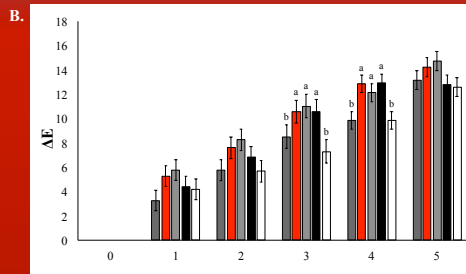
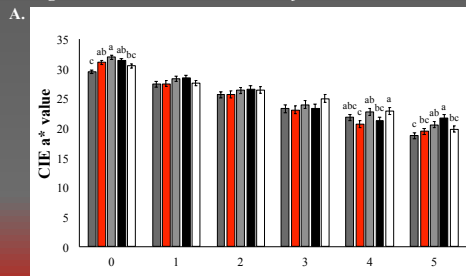
	Treatments					SE
	CON	EO	LA	PAA	LVASDS	
pH	5.67 ^a	5.70 ^a	5.16 ^d	5.71 ^a	5.50 ^b	0.03
Purge ¹ , %	1.69 ^a	1.77 ^a	2.43 ^b	1.77 ^a	2.01 ^b	0.08
Kramer, kgf	2.52	2.38	2.43	2.26	2.42	0.09
Thaw Loss, %	0.99 ^a	0.19 ^b	0.13 ^b	0.04 ^b	0.03 ^b	0.18
Cook Loss, %	24.26	25.47	27.53	25.86	25.77	0.79

^{abc}Denotes differences within a day of display ($P < 0.05$).

¹Percent purge increased ($P < 0.05$) with days of display.

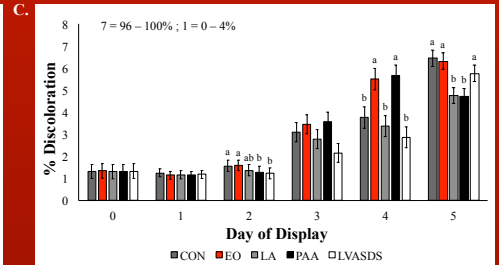
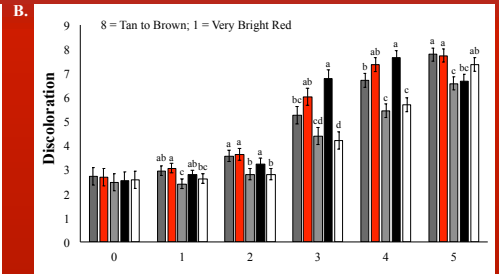
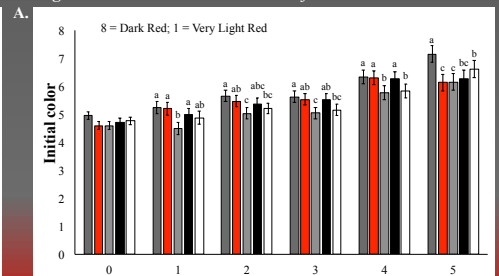
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Figure 3: Effect of Treatment on Objective Color



^{abc}Denotes differences within a day of display ($P < 0.05$).

Figure 4. Effect of Treatment on Subjective Color



^{abc}Denotes differences within a day of display ($P < 0.05$).

CONCLUSION

- All treatments decreased in redness over time of display
- The use of EO and LVASDS can be used without negatively affecting quality compared to the industry standards



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