

Açaí processing residue extract as a potential antioxidant in beef patties at frozen storage

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I. INTRODUCTION

Antioxidants are added to processed meats to reduce the oxidative process, and many natural plant extracts can contribute to this [1]. Within this context, açaí (*Euterpe oleraceae* Mart) has become an alternative source of these antioxidant compounds. Given these considerations, the present study evaluated the antioxidant potential of açaí processing residue extract, applied to beef patties stored under freezing temperature.

II. MATERIALS AND METHODS

The residue was collected, and distilled water was added to obtain the mixture which was homogenized for 10 min., with the use of a propeller stirrer. At that point, water associated with the extracted compounds was obtained. This content was centrifuged, and the supernatant was filtered and freeze-dried. Five treatments were tested: a control with no antioxidant (CON), sodium erythorbate added (ERY), and three more with açaí residue extract (AR): low (L-AR; 750 mg/kg), medium (M-AR; 1000 mg/kg) and high (H-AR; 1500 mg/kg) concentrations, with three analysis points (30, 60 and 90 days). A ColorFlex45/0 spectrophotometer was used to determine the color parameters. For lipid oxidation, the TBARS index was determined by the reaction between oxidation products and thiobarbituric acid (TBA), forming compounds that can be measured in a spectrophotometer at 532 nm [2].

III. RESULTS AND DISCUSSION

The frozen beef patties presented an increase in malonaldehyde concentration over the storage days (Figure 1). The control treatment (CON) showed the highest TBARS values for all days (0.233, 0.367, 0.413, and 0.568 mg MDA/kg of sample for 0, 30, 60, and 90, respectively). At day 0, CON showed the highest value for mg MDA/kg of the sample, statistically similar to the treatments with low and high concentrations of açaí residue extract (L-AR and H-AR). For the other sampling points (30, 60, and 90 days), ERY and the three different concentrations of açaí residue extract (L-AR, M-AR, and H-AR) were statistically similar, regarding the amount of mg MDA/kg of sample. Regarding the color parameter, the lightness (*L*) was not significantly affected after 30 and 60 days when comparing the five different treatments (Table 1). The lowest values were obtained at 90 days of storage for the M-AR and H-AR treatments (40.1 and 41.5 respectively). The *a** parameter changed only at day 0, with CON treatment obtaining the lowest value (14.8). The other treatments were statistically similar at that same time. The treatments had no significant difference at 30 days for the *b** parameter ($P>0.05$). At 90 days, L-AR and M-AR were statistically similar to ERY. Thus, the three different concentrations of açaí residue extract made a positive contribution to the *b** parameter.

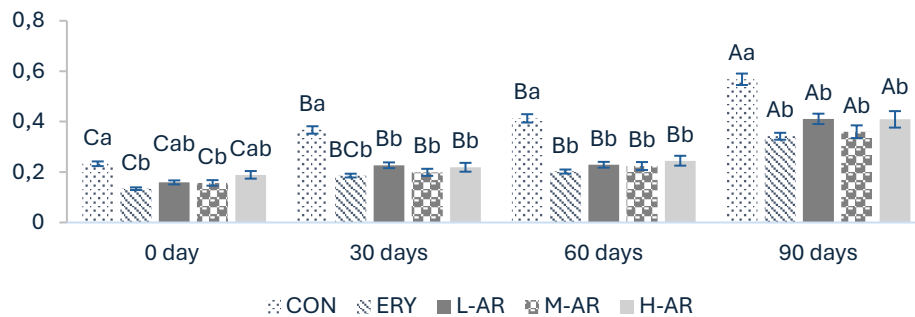


Figure 1. TBARS of beef patties of all treatments.

^{a-b} Mean values on the same day for different treatments, with different letters indicating significant difference ($P < 0.05$); ^{A-}

^B Mean values for the same treatment on different days with different letters indicating significant difference ($P < 0.05$).

Errors bars corresponding to standard error (S.E.).

Table 1. Color parameters of beef patties stored at -18°C .

Parameters	Days	CON	ERY	L-AR	M-AR	H-AR	SEM	Sig
L^*	0	45.5 ^{Aab}	46.7 ^{Aab}	45.0 ^{Ab}	44.1 ^{Ab}	46.6 ^{Aa}	0.25	<0.01
	30	44.1 ^{AB}	45.0 ^A	43.1 ^B	43.0 ^A	42.1 ^B	0.28	n.s.
	60	42.3 ^B	44.1 ^{AB}	43.0 ^B	43.5 ^A	42.6 ^B	0.33	n.s.
	90	43.0 ^{ABa}	42.3 ^{Bab}	43.0 ^{Ba}	40.1 ^{Bb}	41.5 ^{Bb}	0.31	<0.01
	SEM	0.37	0.35	0.21	0.37	0.36		
	Sig	0.04	0.01	0.00	0.00	0.00		
a^*	0	14.8 ^b	16.5 ^{Aa}	15.3 ^{ab}	15.4 ^{ab}	15.3 ^{ab}	0.22	<0.01
	30	14.4	14.3 ^{AB}	15.1	14.4	13.7	0.32	n.s.
	60	14.0	12.6 ^B	14.6	14.0	13.8	0.36	n.s.
	90	12.7	12.2 ^B	13.6	12.9	13.5	0.35	n.s.
	SEM	0.36	0.40	0.34	0.39	0.33		
	Sig	n.s.	0.00	n.s.	n.s.	n.s.		
b^*	0	16.2 ^A	16.3 ^A	16.9 ^A	16.5 ^A	16.8	0.10	n.s.
	30	16.0 ^A	16.0 ^{AB}	16.1 ^{AB}	16.2 ^{AB}	16.3	0.11	n.s.
	60	15.4 ^{Ab}	16.0 ^{Ba}	15.3 ^{Bb}	15.5 ^{ABab}	15.5 ^{ab}	0.13	<0.01
	90	14.7 ^{Bb}	14.2 ^{Cb}	15.9 ^{Ba}	15.4 ^{Ba}	14.5 ^b	0.13	<0.01
	SEM	0.14	0.13	0.14	0.15	0.15		
	Sig	0.00	0.00	0.00	0.01	0.00		

a-b Mean values in the same row (for different treatments, on the same day), with different letters indicating significant difference. ($P < 0.05$); A-B Mean values in the same column (on different days, for same treatment) with different letters indicating significant difference. ($P < 0.05$). SEM: Standard error of the mean; Sig: Significance; n.s.: Not significant ($P > 0.05$).

IV. CONCLUSION

The addition of açai residue extract in beef patties reduced lipid oxidation, indicating its antioxidant potential in meat products. For the color parameters, the low concentration (750 mg/kg) of açai residue extract proved to be more effective at the storage temperature.

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