TOTAL ANTIOXIDANT ACTIVITY OF PORK MEAT TREATED WITH EDIBLE MUSHROOM EXTRACTS

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I. INTRODUCTION

Pork meat possesses a chemical composition that is very susceptible to an oxidation process. Oxidative stability is a central parameter in the estimation of pork meat quality because of the susceptibility of this food product to oxidative degeneration, which is one of the leading causes of spoilage. The oxidative stability depends upon the balance and interaction between endogenous antioxidant system composed by non-enzymatic hydrophilic and lipophilic compounds such as vitamins, carotenoids, polyphenols, among others, as well as enzymes like superoxide dismutase, catalase, and glutathione peroxidase. However, oxidative stability could be enhanced by modifying the diet of the animal or adding the use of synthetic and natural additives [1,2]. The objective of this work was to evaluate the total antioxidant activity of pork meat treated with *Agaricus brasiliensis* and *Pleurotus ostreatus* extracts.

II. MATERIALS AND METHODS

Total phenolic content (TPC), reducing power (RP) and the antiradical activity (DPPH• and ABTS•+) of *A. brasiliensis* and *P. ostreatus* aqueous-ethanolic extract (AE and PE, respectively) were determined [3]. Raw pork patties were prepared depending on the addition of edible mushroom extracts (0.5 and 1.0%) and following the basic formulation: meat (M. *semimembranosus*) 24 h *postmortem* (83.5%), fat (10%), salt (1.5%) and water (5%). The formed raw patties were dispensed in polypropylene trays and wrapped with polyvinyl chloride film (17,400 cm^3 O_2/m^2/24 h at 23 °C). The patties were subjected to refrigerated storage at 2 °C in the dark for 0, and 9 days and two packs of each formulation opened for subsequent analysis of the total antioxidant activity of meat (i.e., TPC, RP, as well as DPPH• and ABTS•+ antiradical activity) [3,4]. Data were subjected to ANOVA, as well as to a Tukey-Kramer comparison test $\alpha = 0.05$.

III. RESULTS AND DISCUSSION

The results show that PE had acceptable values of TPC, and according to the antioxidant tests, this extract showed RP values >15%. The concentration of obtained 50% of antiradical inhibition was approximately 19 and 93 µg/mL for DPPH• and ABTS•+ assays ($P<0.05$), respectively, in comparison with AE. A positive correlation found between TPC and antioxidant parameters (>0.90). These results agree with previous research on the antioxidant activity of natural extracts that suggested a relationship between antioxidant activity and phenolic compound content [5].

The TPC, RP, DPPH• and ABTS•+ assays can be used to provide additional information regarding changes that occur in meat samples during chill. At day 0 of storage, results from phenolic components and total antioxidant activity showed that pork patties treated with PE1.0 extract increased TPC (66.7%) and RP values (75%, i.e., higher absorbance) ($P<0.05$) significantly. When compared with control samples, while DPPH• and ABTS•+ activity were improved (23.7 and 20.0%, respectively), i.e., lower absorbance ($P<0.05$). At the end of the storage, PE1.0 showed the highest TPC and RP respect to the control. While antiradical activity DPPH• and ABTS•+ was significantly enhanced at the same percentage by PE0.5 and PE1.0 (i.e., lower absorbance) 64.5 and 33.3%, respectively, when compared with the control ($P<0.05$). These results agree

with Huang et al. [3] who found that natural extracts increased the TPC, RP and antiradical properties of pork samples during storage time.

Table 1 Phenolic constituents and antioxidant properties of edible mushroom extracts.

Chemical composition	AE	PE
TPC, mg gallic acid equivalents/g	4.9±0.6^{a}	43.8±0.5^{b}
Reducing power		
Ferricyanide/Prussian blue (abs at 700 nm)	0.08±0.01^{a}	0.18±0.01^{b}
Radical scavenging activity		
2,2-diphenyl-1-picrylhydrazyl-[DPPH•] (IC_{50}, µg/mL)	77.2±0.6^{b}	19.3±0.5^{a}
2,2′-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid-[$ABTS^{\bullet+}$] (IC_{50}, µg/mL)	200.3±2.0^{b}	93.0±0.8^{a}

TPC, total phenolic content; Data are expressed as mean ± deviation standard.
Different letters in the same row (a-b) indicate significant differences (P<0.05).

Table 2. Effect of edible mushroom extracts addition on meat total antioxidant activity.

Item	Day	Treatments				
		Control	AE0.5	AE1.0	PE0.5	PE1.0
TPC, mg gallic acid equivalents/g	0	14.9±1.1^{aB}	27.4±0.4^{bB}	28.4±1.5^{bB}	29.5±2.0^{bB}	45.0±0.5^{cB}
	9	3.6±0.5^{aA}	13.6±2.0^{bA}	20.1±1.0^{dA}	17.8±1.0^{cA}	29.1±1.2^{eA}
Reducing power, abs at 700 nm	0	0.04±0.01^{aA}	0.07±0.01^{bA}	0.11±0.01^{cA}	0.12±0.03^{cA}	0.16±0.01^{dA}
	9	0.15±0.01^{aB}	0.25±0.02^{bB}	0.27±0.01^{bB}	0.25±0.02^{bB}	0.29±0.01^{cB}
DPPH•, abs at 517 nm	0	0.38±0.03^{cA}	0.30±0.02^{bA}	0.26±0.01^{aA}	0.24±0.04^{aA}	0.25±0.01^{aA}
	9	0.79±0.05^{dB}	0.36±0.04^{cB}	0.30±0.03^{bB}	0.25±0.01^{aA}	0.26±0.02^{aA}
$ABTS^{\bullet+}$, abs at 734 nm	0	0.05±0.01^{bA}	0.05±0.01^{bA}	0.05±0.01^{bA}	0.07±0.01^{cA}	0.04±0.01^{aA}
	9	0.12±0.01^{cB}	0.10±0.01^{bB}	0.09±0.01^{aB}	0.08±0.01^{aA}	0.08±0.01^{aA}

Different letters in the same row (a-e) and column (A-B) indicate significant differences (P<0.05).

IV. CONCLUSION

Extracts from *Pleurotus ostreatus* are effective antioxidants and increase the total antioxidant activity in meat products during chilled storage.

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