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Effect of *in vitro* digestion on antioxidant status of pork patties formulated with *Pleurotus ostreatus*(#592)

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Introduction

Since ancient times edible mushrooms have been used either as a food or medicine, because their great potential for both nutritional and therapeutic use (Nowacka et al. 2014). *Pleurotus ostreatus* (PO), an edible mushroom known as oyster mushroom, has potential beneficial effects on human health because its antioxidant-driven therapeutic properties, which are associated with their bioactive compounds including lectins, nucleotides, alkalodis, terpenoids, steroids and phenols (Deepalakshmi & Sankaran, 2014). In a previous work, PO by-products were used during the finished period to improve growth performance and carcass quality traits of Berkshire pigs. Also, it has been reported that dietary supplementation of PO in Japanese quail diets during 35 days, increased meat quality parameters such as pH, color (L*, a* and b*), water holding capacity, texture whilst reducing cooking losses, lipid oxidation and total antioxidant activity (total phenolic composition and antiradical DPPH$^{\bullet}$ and ABTS$^{\bullet+}$ activity) (Vargas-Sánchez et al. 2018). However, despite the alleged benefits of its human consumption, there are limited studies about the PO functionality in meat foods, their changes during the digestion process, and particularly their fate in the food matrix under the gastric and intestinal conditions. The aim of this study was to evaluate the PO antioxidant activity in pork patties before and after *in vitro* gastrointestinal digestion (*iv*GID).

Methods

Pork meat (M. *semimembranosus*, 24 h *postmortem*) was purchased from a local processor, trimmed of all visible extramuscular fat, and minced using a conventional meat grinder (4.5-mm orifice plate). Minced meat was homogenized with fat (10% in final formulation, w/w), salt (1.5%, w/w) and water (5%, v/w). The pork patties (120 g each) were formulated to represent the following treatments: untreated pork (control), 2% and 5% of PO powder (P2 and P5, respectively) and synthetic antioxidant (BHT, butylated hydroxytoluene). Patties were cooked to reach 72 °C (internal temperature), and vacuum-packaged for further analyses. The *iv*GID (González-Ávila et al. 2017; Tarko et al. 2013) proceeded during 2 h in a flask with pepsin at 2.0-2.5 pH and 150 rpm. Thereafter, the pH was adjusted to 5.0-5.5 and a solution of pancreatin, lipase and bile bovine was added. The conditions (37°C, 150 rpm) were maintained for 4 h. Samples of 50 mL were collected in a tube for further analysis of total phenolic content (TPC) by the Folin-Ciocalteu method, and antiradical activity {as measured by ABTS$^{\bullet+}$ and ferric reducing antioxidant power (FRAP)] (Vargas-Sánchez et al. 2018). Data were subjected to a one-way ANOVA and the Tukey's mean comparison test ($P<0.05$).

Results

The TPC and antioxidant activity are showed in Figure 1. Treatments of pork patties with PO powder (P2 and P5) resulted in the highest ($P<0.05$) amount of phenolic content, before and after the *iv*GID. PO treatments elicit a similar response in the antiradical activity as measured by both ABTS$^{\bullet+}$ and FRAP assays (Figures 2 and 3).

Conclusion

In the past few years, in vitro digestion models provide a useful alternative to animal and human models by rapidly screening food ingredients (Hur et al. 2011). The *iv*GID brought about an increment of the TPC, which could be attributed to the fact of native polyphenols in foods are mainly present as esters, glycosides and polymers which cannot be readily absorbed and thus require hydrolysis by digestive system enzymes or intestinal microflora (González-Ávila et al. 2017; Tarko et al. 2013). The observed increase of the antiradical activity (ABTS$^{\bullet+}$ and FRAP), could be attributed to the addition of PO powder as it has been reported that PO possesses a high content of compounds with antioxidant activity (Carrasco-González et al. 2017). A previous study also reported an increment in phenolic compounds and antioxidant activity after *in vitro* digestion of cooked PO (Brugnari et al. 2018). Also, it has been reported that total phenolic antioxidant activity after *iv*GID was increased in turkey and pork meat emulsions treated with natural plant sources (Martínez et al. 2014). In conclusion, the presence of phenolic composition and antioxidant activity of pork patties treated with PO powder were increased by *iv*GID, which will likely benefit the consumer's health.

References

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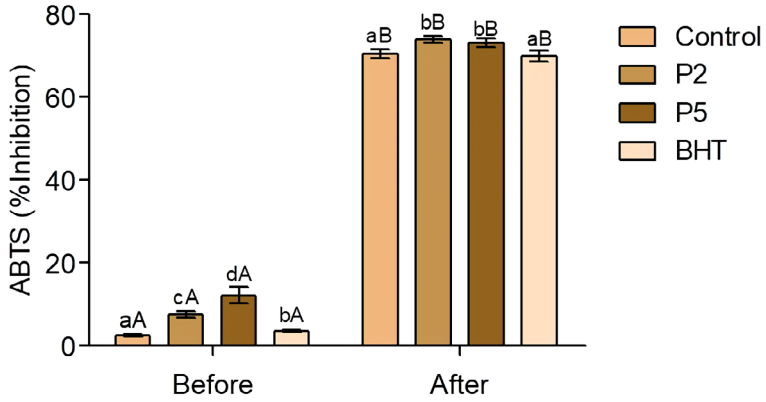

Figure 2 Figure 2. *In vitro* digestion effect on ABTS$^{\bullet+}$ of pork patties formulated with PO. Means bearing different superscripts within the same treatment (a-c) or across treatments (A-B) indicate differences ($P<0.05$).

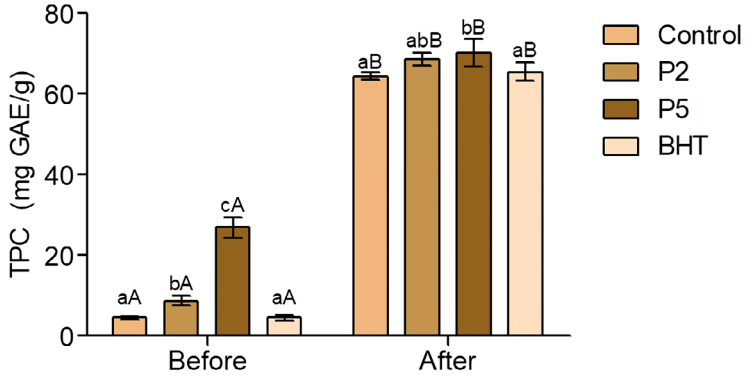

Figure 1 Figure 1. *In vitro* digestion effect on TPC of pork patties formulated with PO. Means bearing different superscripts within the same treatment (a-c) or across treatments (A-B) indicate differences ($P<0.05$).

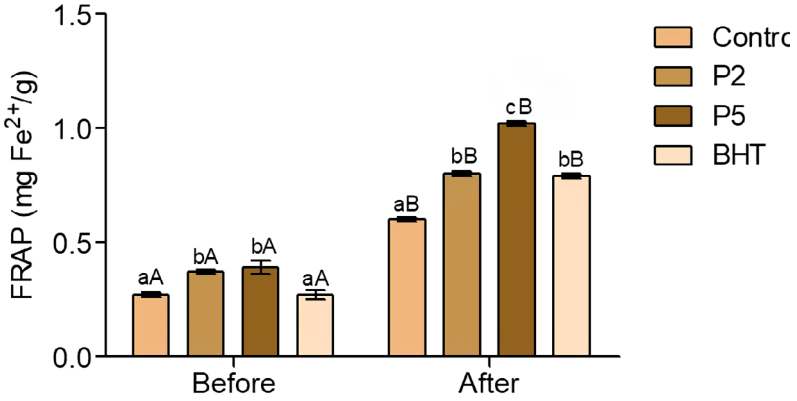

Figure 3 Figure 3. *In vitro* digestion effect on FRAP of pork patties formulated with PO. Means bearing different superscripts within the same treatment (a-c) or across treatments (A-B) indicate differences ($P<0.05$).

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