

46. Effects of replacing vitamin E by an extract rich in hydroxytyrosol, from the olive oil by-product “alperujo”, on antioxidant, autophagy, and apoptosis related biomarkers in broiler breast meat samples

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The induction of apoptosis and autophagy in the early post-mortem appears to correlate positively with myofibrillar degradation and tenderness of meat which might also affect color. Polyphenols like quercetin seem to improve broiler chicken meat tenderization during post-mortem ageing by activating above mentioned processes. In a recent study the use of an extract rich in hydroxytyrosol (HT) obtained from the olive oil by-product alperujo, spared vitamin E as antioxidant in broiler feeds without affecting meat lipid oxidation and even improving meat color. The hypothesis of the present study is that the positive effects on color observed in the HT supplemented diet could be related to its effects on antioxidant enzymes and/or the induction of apoptosis and autophagy. Broilers were fed a control diet with 40 ppm of added vitamin E (C) or a diet supplemented with 30 ppm of vitamin E and 824 ppm of olive oil by-product extract that provided 7.5 ppm of HT (HT7.5). The feeding program consisted of two phases, starter (0 to 21 d) and finisher (22 to 39 d) and each diet was replicated 7 times (a floor pen with 16 chicks). After 39 days of feeding the experimental diets, birds were euthanized by CO₂ asphyxiation, and immediately exsanguinated. The samples for this study were obtained from the right breast at 4h post-mortem once meat temperature was stabilized at 4°C. Approximately 1g of sample was placed on liquid nitrogen and stored at -80°C. The expression of genes encoding the antioxidant enzymes superoxide dismutase (SOD1), glutathione peroxidase (GPx1) and catalase (CAT), and apoptosis/autophagy regulatory genes including the mechanistic target of rapamycin (mTOR), hypoxia inducible factor 1 (HIF1), Beclin-1 and autophagy-related protein 7 (ATG7) were analyzed by real time PCR. No significant differences ($P>0,05$) were observed in the expression of selected target genes among broilers fed the C and the HT7.5 diets. However, the expression of Beclin-1 tended ($P=0,09$) to be higher in the muscle of birds fed the H7.5 diet. It is concluded that under our experimental conditions in the immediate post-mortem both experimental diets produce similar effects on selected antioxidant enzymes, apoptosis, and autophagy biomarkers. The observed trend of increased Beclin-1 expression at 4h post-mortem in the meat of birds fed the HT7.5 diet merits future studies of this autophagy marker along the meat aging period.

Keywords: alperujo; vitamin E; meat quality; autophagy; apoptosis