2019 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™

Lipid Oxidation and Color Stability of Spiced and Unspiced Pork Sausage with a Novel Antioxidant Mixture of Rosemary Extract and Phospholipase A2

J. Whalin[1]*, L. Liu[1], and M. Richards[1]

[1]Meat Science and Muscle Biology Laboratory, Department of Animal Sciences, University of Wisconsin-Madison, Madison, WI, USA

*Corresponding author. Email: whalin@wisc.edu (J. Whalin)

Keywords: antioxidants, color, lipid oxidation, pork sausage

Meat and Muscle Biology 3(2):77

Objectives

The objective of this study was to measure the loss of redness and onset of lipid oxidation in pre-rigor pork sausage containing synthetic antioxidants (Syn) compared to rosemary extract (*R*), and a combination of R with different concentrations of phospholipase A2 (R+P) over both light display and frozen storage.

Materials and Methods

Our work examined pre-rigor spiced and unspiced pork sausage. Tissue from sows for both spiced and unspiced sausage was coarse ground and cooled to 1–3°C with dry ice within 1-h post-exsanguination. Water, treatments and seasonings were added, and the sausage stuffed within 2 h post-exsanguination for spiced sausages. Water and treatments were added 24 h post-exsanguination for the unspiced sausage. Sausages were stored in the dark at –20°C (to 110 and 245 d for unspiced and spiced, respectively) prior to light display. Sausages were sampled for color and lipid oxidation on approximately 40-d intervals of –20°C dark storage and 7–9 d of light display (5°C). In spiced sausage, R (type HT-P) was added at 200 ppm, PLA2 was added at 0.4 ppm. Butylated hydroxyanisole (BHA), propyl gallate (PG) and citric acid (CA) were each added at 0.01% of the estimated fat and collectively formed the Syn treatment. Spices consisted of sucrose, ginger, coriander, nutmeg, white pepper, and MSG. In unspiced sausage R was added at 200 ppm, PLA2 added at 0.4 ppm and 10 ppm, and BHA, CA and PG added at the same levels as in spiced sausage. Color stability was measured based on redness (a*). Peroxide values (PVs) were measured spectrophotometrically, headspace hexanal was measured via gas chromatography (GC) and α tocopherol depletion was measured with HPLC fluorescence detection as markers of lipid oxidation. Total lipids were fractionated to gravimetrically quantify neutral lipids, free fatty acids and polar lipids and to measure PVs in the aforesaid fractions. Unspiced sausages were only stored for 110 d because of rampant lipid oxidation and loss of color.

Results

In spiced sausage, R and R+P displayed better color stability than both the control (no antioxidant, C) and Syn. Syn displayed the lowest hexanal values. R had the highest PVs and both Syn and R+P were significantly lower. Free fatty acids were the most heavily oxidized fraction on an oil basis, while neutral lipids were the most oxidized lipid on a wet weight basis. Alpha tocopherol did not deplete through 245 d in spiced sausage but was not detected in the unspiced sausage.

In unspiced sausage, R+P was examined at two different levels (0.4 ppm and 10 ppm PLA2). R+P (10 ppm) exhibited lower headspace hexanal than R alone and R+P at both levels performed as well as Syn. In addition, R+P at both levels displayed significantly better color stability than R alone and was as good as Syn.

Conclusion

In conclusion, R+P decreased lipid oxidation (compared to R) and enhanced color stability (compared to R) and offer an alternative to synthetic antioxidants in pre-rigor pork sausage. Furthermore, spiced pork sausage displayed mean redness values above 9 through 245 d, compared to only 75 d in unspiced sausage.