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Sorghum Bran as an Antioxidant in Pork and Poultry Products

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Objectives

Synthetic, BHA and BHT, and natural substances such as rosemary are common antioxidants used in meat products to slow lipid oxidation. Sorghum bran, an important cereal in the world, contains either tannins or anthocyanins (high tannin and onyx, respectively) and have antioxidant properties that can be used in food products, including meat. Objective was to evaluate antioxidant properties, pH, color, and sensory attributes of high tannin and onyx sorghum bran in frozen ground pork and ground dark meat chicken products.

Materials and Methods

Pork trimmings (35% lipid) and dark meat chicken (8% lipid) were separated ground (4.8 mm) and mixed with water and salt at Tyson Foods into 4 treatments: 1) Control– no antioxidant; 2) 0.2% of rosemary plus green tea extract; 3) 0.5% high tannin sorghum bran; and 4) 0.5% of onyx sorghum bran. Pork pizza toppings (ground pork) and ground chicken were cooked, frozen, packaged using oxygen permeable package and stored for 0, 3, 6, 9, and 12 mo at –23°C. At 0, 3, 6, 9, and 12 mo of storage, frozen pre-cooked pork pizza toppings and ground chicken were heated in a microwave until the internal temperature reached 74°C. Samples were used for sensory panel, TBARS, pH, and objective and subjective color were determined. Cooked pork pizza toppings and ground chicken were used for a trained meat descriptive flavor attribute panel to determine the treatment effects. Data were analyzed using Proc GLM of SAS (SAS Inst. Inc., Cary, NC) at $P \leq 0.05$, using the STDERR PDIF function. Antioxidant treatment and storage time was used as main effects, and their interactions were also included in the model.

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Results

Pork pizza toppings TBARS values increased linearly with increased storage. Rosemary and both sorghum bran treatments resulted in similar TBARS values, lower than control. Onyx sorghum addition to pork toppings resulted in darker, redder color compared to other treatments ($P < 0.0001$). Increase of storage time decreased objective red color up to 6 mo and did not change with additional storage. Subjective color was not affected ($P = 0.09$) by treatment. Both treatments with sorghum had darker objective color. Control pork pizza toppings had higher rancid flavor across treatments ($P < 0.001$), and rancid flavor was low for up to 6 mo of storage then slightly increased with 9 and 12 mo of storage ($P < 0.001$). Onyx sorghum bran had the highest level of sorghum flavor in the pork pizza toppings followed by high tannin sorghum, rosemary and control. TBARS values were higher ($P < 0.0001$) for control ground chicken compared to treated products, and TBARS values for storage time did not change ($P < 0.01$). Onyx sorghum bran addition to ground chicken resulted in darker subjective and objective color, and redder objective color. Control chicken had slightly higher refrigerator stale and warmed-over flavor than treatments ($P < 0.001$). In the ground chicken, onyx sorghum bran had the highest amount of sorghum flavor, followed by high tannin sorghum, rosemary and control.

Conclusion

In conclusion, high tannin sorghum or onyx sorghum can be added to pork pizza toppings and dark chicken meat as a natural antioxidant. Their addition decreases rancid flavor and minimizes lipid oxidation. It is recommended that either high tannin or onyx sorghum bran to be added to control lipid oxidation. However, the addition of sorghum bran, especially onyx sorghum bran, resulted in products with slightly darker color, and sorghum flavor.

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