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Functional Beef Product Containing Rice Bran Extracts Influences Cholesterol Oxidation and Nutritional Profile

Joo-Shin Kim
Agricultural and Mechanical College, Louisiana State University

Beef has been criticized for processing anti-nutritional factors such as saturated fat and cholesterol. Yet, it is a highly nutrient dense food, consumption of which assures adequate intakes of many essential nutrients such as protein, iron and vitamin B_{12}. Including antioxidant nutrients such as vitamin E, γ-oryzanol and inositol phosphates in beef products would accentuate further the nutritional value of beef and also provide stability against oxidative degradation. This would be especially important with regards to the prevention of cholesterol oxidation, which dietary cholesterol becomes detrimental to health. Objectives of this study were to investigate oxidative stability of restructured beef roasts containing rice bran extracts, to establish the functional potential of this product, and to determine the efficacy of natural antioxidants from rice bran in inhibiting cholesterol autoxidation in a model system.

At phase 1, crude rice bran oil (RBO) at 0, 1, and 2% (w/w) was added to restructured beef roasts that were stored at 4°C and analyzed at 0, 7, and 14 d. The measured parameters included total lipid, fatty acid profiles, vitamin E vitamers, γ-oryzanol, cholesterol, and cholesterol oxide product (7-ketocholesterol). The addition of 2% RBO was effective in increasing nutritional value and reducing the level of oxidative degradation. At phase 2, beef roasts containing 3% rice fiber (RF) or 3%RF/ 2%RBO had higher oxidative stability ($p<0.05$) during storage (0, 4, and 8 d) compared to roasts with no additive. Beef roast containing RF and RBO were acceptable to consumers in sensory attributes. At phase 3, cholesterol autoxidation was examined in an aqueous meat model system with different levels of nonsaponifiable fraction from rice bran (0, 700, 1400, and 2100 ppm) for 16 h at pH 5.5 and 80°C. The highest level of additive (2,100 ppm) was the most effective in inhibiting cholesterol autoxidation; the order of 91.7% (2,100 ppm)> 81.8%(1,400 ppm)> 63.1% (700 ppm).