Graduate Student Research Poster Competition

Ph.D. DIVISION

Evaluation of konjac blend and soy protein isolate (SPI) as fat replacements in low-fat bologna.

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Dietary health concerns of consumers prompted meat companies to develop a variety of fat substitutes. Konjac blends (KB) consisting of konjac flour, carrageenan and starch offer potential as fat replacements. Substitution of a portion of the meat protein with SPI without detrimental effects on quality could result in reduced cost. Thus, the objective of this study was to evaluate the effects of levels (0.5 and 1.0%) of KB (KSS and KNC) and SPI (0 and 2%) on the characteristics of low-fat bologna (LFB, <2%, fat). Control bologna (30% fat) had higher pH, less moisture and protein (%), expressible moisture (EM,%), and more fat (%). All KB samples were darker and more red (P<.05) than the control, while those with 2% SPI had similar Hunter yellowness. Compared to the control, LFB samples with 0.5% KB were harder, springier and more cohesive, while 1% KB were lower in fracturability. No differences (P>.05) in textural properties were observed with addition of 2% SPI. Comparisons between levels found 0.5% to be lighter, more yellow, harder and gummier than the 1% level. LFBs containing KSS had more EM and vacuum purge, and were lighter and more yellow as compared to those with KNC, but no differences in TPA parameters were apparent. Sensory comparisons with the control indicated only small variations in flavor, taste and texural attributes, however KB combinations were saltier (P<.05) than the control.

Effects of irradiation on fresh meat color.

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Changes in color of irradiated meat were observed, in this study, to be species and package type dependent. Irradiated vacuum packaged (VP) pork and turkey became redder (P<0.001) due to irradiation relative to unirradiated controls. However, irradiated VP beef redness values decreased (P<0.001) as compared to unirradiated controls. In contrast, irradiated aerobically packaged (AP) pork and beef became less red as a result of irradiation compared to unirradiated controls. Whereas, redness values of irradiated AP turkey increased (P<0.01) due to irradiation. The amount of color change in both package types was irradiation dose-dependent and was not dependent on myoglobin concentration. The a* values of the VP pork and turkey were unchanged (P>0.05) during illuminated display. Whereas, the a* values of VP beef and AP samples decreased (P<0.01) during display. Visual evaluation also indicated that VP pork and turkey and AP Turkey increased (P<0.001) in redness as does levels increased. Visual redness scores for VP beef and AP pork and beef decreased as dose levels increased. The surface color of irradiated VP and AP pork became less uniform (P<0.001) at 3.0 kGy and 4.5 kGy than unirradiated pork. The reflectance spectra showed that irradiation induced an oxymyoglobin-like pigment in VP pork. Reflectance data of VP beef suggest that both oxymyoglobin and metmyoglobin pigments developed as a result of irradiation. In contrast, reflectance spectra showed that irradiation induced a metmyoglobin-like pigment in AP pork and beef.

Incorporation of extended, pork skin, fat emulsions in lowfat/high added water bologna.

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Incorporation of pork skin into comminuted meat products improves sensory characteristics and water binding properties. Pork skin (6%) fat emulsion gels (developed by extending reduced-lean pork trimmings; 70% fat, 30% lean) with (1) the best emulsion stability (30% fat, 25% added water(AW)), (2) the best hydration/softest texture (30% fat, 50% AW) and (3) the most economical (40% fat, 50% AW) were selected from a previous study to determine how FG with known characteristics would impact low fat/high added water bologna. Each FG (except for control) was mixed for five minutes with ground pork trimmings (96% lean) and water to contain 10% fat and 30% AW and then passed through an emulsifier. There were minimal differ-

ences among low fat high added water bologna containing different FG. Addition of FG to bologna did not improve (P>0.05) cook yield, purge or emulsion stability or alter objective texture measurements when compared to control bologna. In general, sensory panel found that incorporation of FG made low fat/high added water bologna lighter (P<0.05) in color, with a more springy and firm texture. Bologna containing FG expressed less moisture than control bologna, and the difference increased (P<0.05) from about 3% to 5% as storage increased from 0 to 42 days. Peak force and total energy to extrude was higher (P<0.05) in bologna batter containing FG (~120 N, 3.9 J) than in control bologna (88.1 N, 2.95 J). Incorporation of FG into low fat/high added water reduced the amount of expressible moisture and modified texture attributes. The value of reduced-lean trimmings may be increased by production and incorporation of fat emulsion gels into comminuted meat products.

COMPETITION POSTER

Graduate Student Research Poster Competition

M. S. DIVISION

Surface characteristics of bacterial cell after anti-microbial wash treatment.

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Beef muscle tissues were innoculated with 10^7-10^9 colony forming units of *E. coli* O157: H7 and washed with hot water (75°C) and 8% TSP (55°C). Contact times of 15, 60, 180 and 300 seconds were used with 180 seconds being the most effective for both treatments. Reduction of 1 log cycle was obtained for the hot water treatment and 1.4 (-) 2.0 log cycles was obtained with the TSP treatment. There was no recovery of *E. coli* O157:H7 in the TSP wash collected and plated after the wash treatment. This observation could be that TSP exerts its bactericidal effect on the attached bacteria and does not physically remove the cells when the wash is applied or it kills the cells. The surface characteristics of *E. coli* O157:H7 treated with 8% TSP followed by various rinses with phosphate-buffered saline (PBS), pH 7.4 was studied by measuring the electrophoretic mobility of the bacterial cells. The electrophoretic mobility increased sharply after the first rinse with PBS, pH 7.4 and the subsequent washes were gradual. TSP has an influence upon bacterial surface charge.

Identification of optimal ranges in ribeye area portion cutting of beef steaks.

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Restaurant ready (21 d aged, needle tenderized) loin steaks (strip, S, and T-bone, TB) Representing 3 portion sizes (227, 284, and 340 g for S; 397, 454, and 510 g for TB) were portion from 71 low Choice beef carcasses representing seven ribeye size groups (70.9 cm^2 and less to 103.2 cm^2 and greater, in 6.3 cm^2 increments). Steaks (n=568) were cooked on a grooved grill to end point temperatures of either 67 or 77°C and evaluated for cooking time, initial tenderness (n=284) and shear force (n=284) to identify optimal ribeye areas for portioned steaks. The TB cooked faster (P<.05) than S for ribeye areas 77.4 to 83.8 cm^2 in the average portion sizes and for ribeye areas 71.0 to 96.9 cm^2 in the large portion sizes. However, S cooked significantly faster than TB for ribeye less than 70.9cm2 in the average portion sizes. The S had higher (P<.05) initial tenderness scores and lower (P<.05) shear values than TB. Initial tenderness scores were lower (P<.05) for ribeye areas greater than103.2 cm^2 compared to ribeye areas less than 83.8 cm^2 and 90.3 to 96.6 cm^2, with all others being intermediate. Shear force tended (P=.08) to follow the initial tenderness results. The S cooked to both end point temperatures and TB cooked to 67°C had higher (P<.05) initial tenderness scores than TB cooked to 77°C. Tenderness was reduced in TB cooked to higher temperatures as well as in S and TB portion from ribeye areas greater than 103.2 cm^2.