Food Product Shelf-Life Evaluation and Extension

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AGRICULTURE AND NATURAL RESOURCES

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Influence of sucrose and cooling rate on pasting properties and freeze-thaw stability of tapioca starch pastes with and without xanthan gum

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Abstract

The pasting properties and storage stability of starch play important roles in food quality and can be modified using food ingredients or by changing processing conditions or both. The effects were investigated of sucrose (0–30%) and different cooling rates (2°C/min, 6°C/min and 10°C/min) on the rapid visco-analyzer (RVA) cooling profile regarding the pasting properties and freeze-thaw stability of 10% tapioca starch (TS) pastes with and without xanthan gum (Xan) for TS/Xan = 10/0 and 9.75/0.25. The RVA peak and final viscosity values increased with increasing sucrose content. A higher cooling rate (10°C/min) resulted in higher final viscosities in both the TS (7,984±63) and TS/Xan (8,308±82) pastes containing 30% sucrose. The setback values of TS alone were higher than those of the TS/Xan mixtures, indicating that retrogradation could be retarded by Xan addition. However, sucrose addition enhanced the final viscosity, resulting in a higher setback value. Repeated freeze-thaw treatments were carried out using the TS and TS/Xan pastes based on the RVA measurements to evaluate the freeze-thaw stability of the starch gels. Water separation of the TS/Xan gels was lower than that of TS alone. Sucrose addition and a rapid cooling rate decreased the water separation in the TS and TS/Xan pastes even though high RVA setback values were observed, indicating that the interaction among the sucrose and polysaccharide molecules played an essential role in water separation. The relationships between final viscosity and water separation were logarithmic functions with Pearson's correlation coefficient > 0.78. The information gained could be further applied in starch-based product development.

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Research article

Effect of thermosonication or microwave heating for post pasteurization on chemical, physical, and sensory characteristics of prototype sausage

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Microwave heating,
Quality,
Sausage,
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Abstract

Thermosonication or microwave techniques were applied to sausage samples as post pasteurization methods. The pasteurization was performed either in an ultrasonic bath at 80°C for 20 min, 30 min and 40 min or in a microwave at power levels of 400 W, 600 W and 800 W for 15 s or 30 s and compared to conventional pasteurization (75°C for 15 min) and the control (without pasteurization). The results showed that thermosonication and microwaves effectively inhibited microbial growth during storage. However, these techniques significantly ($p < 0.05$) affected the hardness, springiness, cohesiveness and chewiness of the treated sausages. There were no significant ($p > 0.05$) differences in the sensory characteristics of the treated samples from those of the conventional pasteurization samples. The optimal thermosonication conditions were 80°C for 20 min and maintained the quality and extended the shelf life, while microwave heating at a power level of 400 W for 30 s produced similar inhibition results. Hence, thermosonication or microwave heating have potential for application in sausage production to extend the shelf life of sausage products and to maintain overall quality with greater energy efficiency.

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Ohmic heating effects on *Listeria monocytogenes* inactivation, and chemical, physical, and sensory characteristic alterations for vacuum packaged sausage during post pasteurization

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ABSTRACT

Listeria monocytogenes contamination of processed sausage occurs primarily after cooking and during packaging, causing significant annual economic loss throughout the industry. Post pasteurization ohmic heating of vacuum packed sausages was proposed for effective post packaging decontamination. Ohmic heating of 75 °C for 30 s (OH) was investigated and compared to conventional heating at 75 °C for 30 s (CT (30 s)) and for 2 min (CT (2 min)) regarding *L. monocytogenes* inactivation, product properties, and sensorial attributes. OH, having a shorter come up time, completely inactivated *L. monocytogenes* with more than a 5-log reduction, whereas CT (30 s) and CT (2 min) achieved 3- and 4-log reductions, respectively. Ohmic heating did not statistically change sausage chemical composition, pH, lipid oxidation, cooking loss, or water holding capacity and only minimally altered color and texture. Regarding CT (2 min), the longer heating time increased cooking loss and decreased tenderness. Despite color and texture changes after both ohmic and conventional heating being detected by instrumental analysis, consumers were unable to detect any sensory differences between the methods. In conclusion, OH shows potential in sausage production, for both food safety and process efficiency, with minimal effect on sausage quality.

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ELSEVIER

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Synergetic effects of ultrasound and sodium alginate coating on mass transfer and qualities of osmotic dehydrated pumpkin

Supawadee Jansrimanee, Saowanee Lertworasirikul

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Highlights

- The effects of ultrasound with Sodium alginate coating (US + Coat) were investigated.
- The US + Coat pretreatment was applied for osmotic dehydration (OD) of pumpkin.
- The US + Coat pretreatment can preserve cell structure of osmotic dehydrated pumpkin.
- The US + Coat pretreatment improves process efficiency index and reduces OD time.

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REGULAR ARTICLE

Enhancement of thermal stability of soybean oil by blending with tea seed oil

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ABSTRACT

Frying accelerates oil deterioration through several chemical reactions, particularly lipid oxidation. Soybean oil (SBO), the polyunsaturated fatty acid (PUFA) rich oil, is prone to thermal degradation. Nevertheless, tea seed oil (TSO), mainly consisting of monounsaturated fatty acids (MUFA), is quite stable. This work aimed to elucidate thermal stability of SBO as affected by TSO blending at varying volume ratios. After frying for several repeated cycles, SBO/TSO blends with the ratios of 70:30, 60:40 and 50:50 showed lower total oxidative degree than SBO alone. FTIR spectra suggested less *cis* C=C deformation of the SBO blended with TSO, and the 60:40 SBO/TSO blend contained the lowest secondary oxidation products. Along frying, less change in viscosity (color) was found for the 60:40 and 50:50 (60:40) SBO/TSO blends. Improved thermal stability of the blended oils was expected due to the decrease in PUFA and increase in phenolic content, and this study suggested that the 60:40 SBO/TSO blend showed the highest stability.

Keywords: Deep-frying; Oil blending; Soybean oil; Tea seed oil; Thermal stability; Oxidation

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Research article

Effect of palm sugar concentration and mixing order on physical properties of coconut milk

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Coconut milk,
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Abstract

The effects were investigated of the palm sugar concentration (10–50 wt%) and mixing order of added sugar (before or after homogenization) on the physical properties of coconut milk (10 wt% fat). The fat droplet size, microstructure, viscosity and creaming index of coconut milk samples were determined after being pasteurized at 72°C for 20 min and then kept overnight. The results showed that the sugar concentration affected the physical properties of the coconut milk. An increase in the palm sugar concentration increased the fat droplet size and viscosity, while the creaming index decreased. The mixing order affected the coconut milk properties. The addition of palm sugar before homogenization resulted in higher stability of the coconut milk than from addition after homogenization. Overall, this study has important implications for the formulation and production of coconut milk products.

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Effect of sucrose ester and carboxymethyl cellulose on physical properties of coconut milk

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Abstracts

The influence of sucrose ester (SE) and carboxymethyl cellulose (CMC) on the physical properties of coconut milk was determined using response surface methodology based on central composite design. The R^2 of all response variables was more than 0.80 which indicated a high proportion of variability was explained by the model and showed that increasing the amount of SE decreased the droplet size of coconut milk. The viscosity and creaming index were dependent on the SE and CMC concentration. Increasing the SE and CMC concentration increased viscosity but creaming index was decreased. The results suggested that suitable amount of SE and CMC should be specified in order to obtain a high quality of coconut milk products.

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Original Article

Effect of carboxymethyl cellulose on properties of wheat flour-tapioca starch-based batter and fried, battered chicken product

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ABSTRACT

Hydrocolloid is widely used to improve the quality of food. In this study, the effect of carboxymethyl cellulose (CMC) on the properties of batter and fried, battered product prepared from wheat flour (WF)-tapioca starch (TS) blends was investigated. The dry-mixes were prepared from the flour blends of 91.4% flour blend [WF/TS (1:1) and CMC (0%, 0.25%, 0.5%, 0.75% or 1.0%)], 5.5% salt and 3.1% leavening agent and then mixed with water (1:1.3) for batter preparation. The batters had a significant increase in consistency coefficient, yield stress and batter pickup with increasing CMC replacement in the dry mix. However, CMC did not significantly ($p > 0.05$) alter either the differential scanning calorimetry thermal properties of the batters or the rapid visco-analyzer viscosity after holding at 95 °C for 4 min. The substitution of CMC decreased the oil content but increased the moisture content in the pre-fried chicken wing sticks. After final frying at 180 °C, the oil content of the fried product was significantly ($p < 0.05$) reduced in the samples containing CMC (equal to or more than 0.5% in dry-mix). There were no significant ($p > 0.05$) differences in the overall liking scores in the fried products without and with 0.5% CMC replacement in the flour blend. The results indicated that CMC could be used in WF/TS batter preparation, enhancing the batter pickup and quality and especially acting as an oil barrier-forming ingredient for fried, battered foods.

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