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Abstracts

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Title Evaluation of Color Changes in Various Edible Coated Eggs during Storage

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Abstract Text Eggs, versatile food, are high quality complete proteins that contain essential amino acids including vitamins and minerals essential for human health. Eggs are widely used in the food industry due to their multifunctional properties. However, interior quality of eggs change during storage based on incereasing air-cell size, weight loss, albumen pH increase, and decrease in albumen viscosity. Development of novel practices is necessary for extending shelf life of egg, such as edible coating that that seals its pores while reduce cracked egg numbers as well. Various edible coating materials suitable for use, protein (corn zein, whey protein isolate-WPI and whey protein concentrate-WPC) and lipids (shellac) used as a barrier and mechanical coating films in this study. The research was preformed to investigate the effectiveness of WPC, WPI, corn zein and shellac coatings on the quality attributes such as color changes and stability in egg yolk and albumen of fresh eggs during storage at 24°C for 4 weeks. For the study clean, white shell and freshly laid unwashed eggs supplied from local producer and treatments consisted of eggs coated with WPI, WPC, zein and shellac as well as uncoated eggs as control. Whey protein films were prepared at 10% (w/w protein) using WPI and also WPC in 100 ml of water. Shellac and Zein were mixed with ethyl alcohol (10:90 v/v). Glycerol was then added to give protein: plasticizer ratios of 2.5:1 w/w in solution while the solution was stirred continuously on a magnetic stirrer at 80 °C for 30 min. After immerse washing with water at 24°C, clean eggs were immersed individually by hand in the coating solutions for 1 min, then immersed again for 1 min and then dried at ambient. The eggs were subsequently placed in open moulded plastic egg trays in storage at 24°C until testing. The color values of shell egg, albumen and yolk samples were measured with Konica Minolta Chroma Meter CR-400 and results were recorded as L*, a*, b* where L* describes lightness, a* redness and b* yellowness. Lightness of egg albumens significantly ($p<0.05$) increased from 78.73±2.40 in week 0 to 83.25±3.17 at the end of storage (week 4), while b* values (yellowness), decreased from 13.40±0.94 to 9.63±2.04 (control), 11.12±1.26 (WPI), 11.97±1.02 (WPC), 10.92±0.58 (zein) and 9.34±1.07 for shellac coated samples in time. For color component b* there were no significant interaction among protein based coatings after storage. Lightness of egg yolk decreased significantly from 64.56±2.05 to 58.58±1.88 that shows destruction of carotenoids in the egg yolk and formation of brown lipid amine-aldehyde products with protein discoloration were observed in eggs during storage. Redness of shellac coated eggs decreased significantly from -3.49±0.25 to -1.86±0.52, while other samples ranged between -2.58±0.23 and -2.98±0.37, shellac coated egg albumens “a*” values significantly increased during storage. We can conclude from the present study that WPI, WPC and zein coatings is effective in preserving the color stability of fresh eggs without affecting color component during storage for 4 weeks at ambient temperature.

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Keywords Egg freshness, edible coating, whey protein isolate, whey protein concentrate, shellac, zein, color, and storage.