
Effect of egg yolk components on the glassy state of sugar and gluten formation in cookies

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This study, focusing on egg yolk plasma and egg yolk granules, investigated the effects of egg yolk components on the glassy state of sugar in cookies and the formation of gluten in the dough, and their effects on the *kuchidoke* of cookies. *Kuchidoke* refers to the “melt-in-the-mouth” sensation. Four kinds of cookie were prepared using different mass ratios of egg yolk to egg white (0.2 to 3.1) then their *kuchidoke* scores were determined by sensory evaluation. The amount of sugar in the glassy state was estimated from the heat difference before and after the glass transition of sugar measured by differential scanning calorimetry (DSC). Cookies to which egg yolk plasma and egg yolk granules had been added instead of whole eggs were also prepared to investigate their influences on gluten formation, and then their *kuchidoke* scores were also evaluated. Dough sections were immunostained for gliadin in raw wheat then observed under a fluorescence microscope. The fragment lengths of the gluten were calculated by image processing.

The results of sensory evaluation tests showed that the cookie contained the larger amount of egg yolk in cookie was rated higher for *kuchidoke* score. It was also confirmed that the cookies with egg yolk plasma added had better *kuchidoke* than those with egg yolk granules. No correlation was found between the heat difference before and after the transition and the egg yolk to egg white mass ratios. When comparing the degree of gluten formation, of the egg yolk components studied, those samples with egg yolk plasma exhibited the longest fragment length of gluten. These results suggested that the type of egg yolk component does not affect the glassy state of sugar. Kuragano et al. (2005) previously reported that the yolk or the emulsifier accelerated the homogeneous dispersion of fat in the dough and the binding of wheat protein with water in the dough. The emulsifiability of low-density lipoprotein in egg yolk plasma might thus enhance the adsorption of water by wheat protein and promote gluten formation and increase the *kuchidoke* sensation.