**Effects of stabiliser and accelerated storage on rheological, textural and physiochemical properties of high-protein peanut butter.**

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Peanut butter is a water-in-oil emulsion, when if not stabilised can show undesirable phase separation. Product stability is one of the main concerns for consumer acceptability, therefore maintaining a homogenous dispersion of oil within the peanut butter matrix is crucial. However, upon storage, a series of destabilisation phenomena occur leading to thermodynamic instability. Preventing an increase in interfacial tension is crucial in achieving oil phase stability as this will inhibit oil droplet formation and coalescence1. The effects of stabiliser at different concentrations in high-protein peanut butter were investigated in accelerated storage conditions: monoglycerides (1.2% and 1.5%) and coconut/shea saturated fat blend (1.65% and 3.65%). Changes in apparent viscosity, accelerated oil separation, viscoelastic properties and textural quality (firmness and work of shear) were evaluated. The accelerated storage conditions were applied during 5weeks at 40±1°C. Analysis of apparent viscosity showed that all formulations of peanut butter exhibited non-Newtonian thixotropic behaviour. The storage (G’) modulus remained higher than loss (G’’) modulus showing consistent viscoelastic behaviour. Monoglyceride formulations retained viscoelastic behaviour better throughout storage, whilst coconut/shea blend formulations had a significant (P<0.05) reduction in G’ and G’’ moduli, shifting to a more viscous state. Addition of stabilisers did not have any significant affect (P>0.05) in firmness and work of shear suggesting low stability to phase separation. Generally, monoglyceride formulations proved to have greatest overall stabilising effect under these accelerated conditions, by maintaining viscoelastic properties. The ability to reduce interfacial tension across oil droplets enhanced stability compared with the fat crystal network. From all results in this project, it would be recommended to stabilise a high-protein peanut butter matrix using a monoglyceride emulsifier at a final product concentration of 1.5%.

References:

1 Rivas, J., Schneider, Y. & Rohm, H., 2016. Effect of emulsifier type on physiochemical properties of water-in-oil emulsions for confectionery applications. International Journal of Food Science and Technology, Volume 51, pp. 1026-1033.