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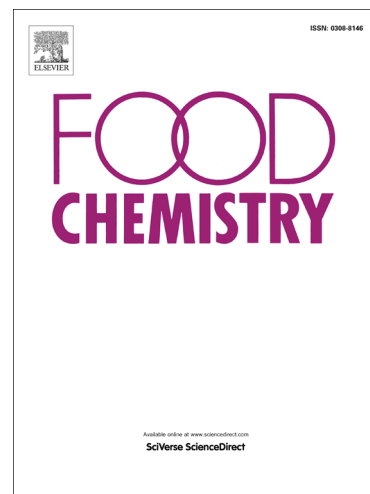
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Stability of Vitamin B12 with the Protection of Whey Proteins and Their Effects on the Gut Microbiome

Running title: Stability and Effect of Vitamin B12/Whey Complexes

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Abstract

Cobalamin degrades in the presence of light and heat, which causes spectral changes and loss of coenzyme activity. In the presence of beta-lactoglobulin or alpha-lactalbumin, the thermal- and photostabilities of adenosylcobalamin (ADCBL) and cyanocobalamin (CNCBL) are increased by 10-30%. Similarly, the stabilities of ADCBL and CNCBL are increased in the presence of whey proteins by 19.7% and 2.2%, respectively, when tested in gastric juice for 2 h. Due to the limited absorption of cobalamin during digestion, excess cobalamin can enter the colon and modulate the gut microbiome. In a colonic model *in vitro*, supplementation with cobalamin and whey enhanced the proportions of *Firmicutes* and *Bacteroidetes* spp. and reduced those of *Proteobacteria* spp., which includes pathogens such as *Escherichia* and *Shigella* spp., and *Pseudomonas* spp. Thus, while complex formation could improve the stability and bioavailability of cobalamin, these complexes might also mediate gut microecology to influence human nutrition and health.

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