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Project Title: Effect of Dietary Fiber on in vitro Bioavailability of Minerals in Fiber-enriched Pasta Products

Synopsis: Food fortification is an effective means to deliver vitamins and minerals to the human body. Similarly, functional foods have been identified as effective delivery systems for various nutraceuticals including dietary fiber. However, there is a concern that increased intake of dietary fiber may cause a potentially negative effect on mineral absorption. Hence, it is necessary to investigate the potential interactions between dietary fiber and minerals when both are added in same food matrices such as pasta. Better understanding of this mechanism would warrant proper utilization and application of dietary fiber in new product development.

Abstract: Microencapsulation could be a solution to prevent the interaction between fiber and iron, which enables the development of novel functional foods that provide enhanced nutritional value from high dietary fiber content without sacrificing mineral bioavailability. Hence, the objective of this research is to investigate the potential interactions between dietary fiber and minerals when both are added in same food matrices such as pasta. The selected dietary fiber sources and two forms of ferrous fumarate were added to cereal grain flours based on a formulation design. Using a pasta extruder, the shaped pasta was collected and dried to be with shelf-stable moisture content. The total dietary fiber measurements were taken using an automated Ankom Dietary Fiber Analyzer. A Thermo GFS Atomic Absorption Spectrometer was used to quantify the total iron content and iron dissolution profile via a simulated iron in vitro bioavailability test. The results of total iron analysis suggested cooking might cause iron loss for samples fortified with powder ferrous fumarate, but not for samples made with microencapsulated iron premix. Similarly, iron in vitro bioavailability tests suggested the addition of various fiber sources did impede the iron release in pH 1 HCl solution for all uncooked pasta samples made with iron powder; however, there is no difference for iron release in cooked samples between samples made with iron powder versus encapsulated iron premix, suggesting cooking may offset the potential blocking effect from fibers on iron.