The goal of the study is to investigate the effect of alginate on in vitro gastric digestion and sucrose release of soy protein isolate (SPI) in model beverages as well as to determine whether consumption of the model beverages would affect postprandial blood glucose response and appetite in healthy adults. We demonstrated the possible formation of intragastric gel resulted from the SPI and alginate mixture under certain conditions, which subsequently delayed protein digestion and sucrose release from the matrix. Consumption of beverages that formed intragastric gel attenuated the postprandial glycemic excursion in healthy adult subjects. These results could potentially lead to the formulation of SPI beverage with functionality to lower postprandial glycemic response.