SUPPLEMENTAL FIGURE 1: (A) The mixed solid/liquid meal as it was served to the volunteers in Study 1 and Study 2, consisting of 75g chargrilled chicken, 62.5g roasted vegetables, 62.5g mushrooms and 250 mL of still bottled water (total energy 1008 kJ). (B) The soup meal as it was served to the volunteers in Study 1 and Study 2, consisting of the same meal as in (A) but homogenized using a kitchen blender.
In vitro physical measurements

Materials and Methods. The viscosity of the soup meal was assessed relative to water using a Rapid Visco Analyser (RVA) (Newport Scientific. Warriewood, Australia). Viscosity was measured once on a 20 g sample of the soup meal at 37 °C, 50 rpm for 30 min. The measurement was repeated once for a sample diluted 20% w/w in order to estimate changes in viscosity that could occur with intragastric dilution by secretion.

A Leitz Diaplan (Germany) optical microscope was used to obtain images of the soup meal. Images were captured using a PixeLINK megapixel firewire camera (model PLA662). Image scale was calibrated using a glass mounted graticule (1 mm, 0.01 divisions; Graticules Ltd, Tonbridge, Kent, UK).

Particle size analysis was carried out using a laser diffraction particle size analyzer (Beckman Coulter LS 13320, Miami, USA). The instrument is able to measure particle diameter in the range from 0.4-2000 µm. The diffraction data were analyzed using the Fraunhofer diffraction method. This method assumes that the particles shape is spherical, but it has also been adequately used to describe the particle size of non-spherical material with a diameter greater than 8 µm (1,2). Measurements were performed in triplicate and a mean particle size is presented based on the volume weighted mean diameter D4,3.

Results. The laser diffraction measurements showed that the median particle size of the blended soup was 76 µm, ranging from 0.4 µm to 373 µm (Supplemental Fig. 2A). The optical microscopy images (Supplemental Fig. 2B) corroborated the particle size measurements, and also clearly indicated that the particles were irregular in shape. The viscosity of the soup meal (Supplemental Fig. 2C) showed that the particles were effective at providing the soup meal with a viscosity that was 400 times higher than the viscosity of water. Upon a 20% w/w dilution, the soup meal showed a marked decrease in viscosity, but still remained 150 times higher than the viscosity of water.

Supplemental Literature Cited

SUPPLEMENTAL FIGURE 2: The physics bench measurements carried out to characterize the soup meal. (A) Laser diffractometry particle size distribution of the soup meal. Values are mean (±SEM), n=3. (B) An example of optical microscopy image of the soup meal. (C) The viscosity values of the soup meal measured at a constant shear rate and plotted as a function of time of measurement.
SUPPLEMENTAL FIGURE 3: An example of axial balanced turbo field echo magnetic resonance images of the appearance of the full gallbladder of a healthy human participant in Study 2 at fasting baseline (A) and the contracted gallbladder postprandially at t=75 min (B). (C): Percentage (%) gallbladder volumes with time for healthy men and women after they consumed the solid/liquid and soup meal (Study 2). Values are mean (±SEM), n=18. Given the wide range of the individuals’ fasting gallbladder volumes, the data were normalized to each individual’s fasting volume and expressed as percentage (%) volume from the fasting state. The arrow indicates the meal time. * Different from solid/liquid at that time, P < 0.01.
SUPPLEMENTAL FIGURE 4: An example of Maximum Intensity Projection of the small bowel water contents segmented from the turbo spin echo magnetic resonance images taken at time $t=180$ min from a healthy human participant in Study 2 who consumed (A) the soup meal and (B) the solid/liquid meal. (C) Small bowel water content volumes with time for healthy men and women after they consumed the solid/liquid and soup meal (Study 2). Values are mean (±SEM), $n=18$. The arrow indicates the meal time.). There was a biphasic response in small bowel water content with time with an initial ‘gastric’ phase and a later ‘small bowel’ phase.