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DIGESTIBILITY OF PROCESSED DURUM WHEAT WITH INCREASED RESISTANT STARCH

Corrado M[1], Cherta Murillo A[2], Chambers E[2], Wood A[4], Plummer A[4], Lovegrove A[4], Frost G[2], Hazard B[1,3]

1) Quadram Institute Bioscience, Norwich Research Park, UK
2) Imperial College London, UK
3) John Innes Centre, Norwich Research Park, UK
4) Rothamsted Research, Harpenden, UK

Refined starchy foods are often seen as unhealthy because of their low dietary fibre content and rapid digestibility; but not all starchy foods are the same. Increased resistant starch wheat can boost dietary fibre intake from refined staple foods, ultimately providing consumers with healthier dietary choices. Thanks to modern breeding and genomics technologies, wheat is an ideal candidate for genetic manipulation and generation of genotypes with increased resistant starch.
In this study, we evaluated starch physicochemical properties of semolina prepared from mutant *sbeIIa/b* wheat with increased levels of resistant starch (Hazard *et al.*, 2014) during gelatinization and retrogradation. A retrograded wheat test meal (pudding) was developed to deliver 50g of total starch, for *sbeIIa/b* and wild-type control semolina. The puddings were used to study starch resistance to digestion in the upper gastrointestinal tract *in vitro* and *in vivo*. We measured glycaemic response to *sbeIIa/b* pudding in a randomized cross-over study with 10 heathy volunteers measuring postprandial blood glucose over a 2-hour period. Unprocessed *sbeIIa/b* wheat semolina showed a 3-4-fold increase in resistant starch (3.32g/100g) compared to the wild-type control (0.76g/100g) and 43.2% relative increase in apparent amylose content. Resistant starch levels decreased after processing in gelatinized (boiled) and retrograded (boiled and cooled) semolina but still showed a ~1.5-fold increase in resistant starch compared to the wild-type control. *In vitro*, the digestibility of retrograded *sbeIIa/b* starch was 50% lower than the wild-type. *In vivo*, no glycaemic index difference was found between the two genotypes. However, over time blood glucose response to *sbeIIa/b* pudding was significantly lower than the wild-type pudding. The present study highlights the importance of processing in designing functional foods with increased resistant starch. The increase in resistant starch and amylose in retrograded *sbeIIa/b* semolina appears to alter the digestion kinetics and the glucose response to refined wheat foods.