Engineering wheat arabinoxylan for new applications

May 5 2010

Arabinoxylan, the major dietary fibre component of wheat bran, is important both from the technological and nutritional point of view. New enzymatic technologies were developed in the HEALTHGRAIN project to partly and selectively degrade arabinoxylan. The results offer potential for a new soluble fibre ingredient based on wheat bran.

The health benefits of cereal fibre, in particular in the prevention of lifestyle diseases such as diabetes, obesity, cardiovascular diseases, and cancer, are today generally recognized. Authoritative dietetic associations all around the world recommend consumption of cereal based products containing bran and fibre over products prepared from refined cereals. Arabinoxylan is the major dietary fibre component of both wheat and rye. It thus offers many possibilities for new ingredient manufacture.

Xylanase enzymes offer an efficient and specific tool to solubilise arabinoxylan polymers, and further to produce short-chain arabinoxylan oligosaccharides (AXOs). New xylanase enzymes were identified and characterized to have specific activities, and also to operate in the high temperature conditions during baking. One approach was to enzymatically solubilize AXOs in situ during the breadmaking process. An enzymatic process for AXOs production has already been developed (www.fugeia.be). Furthermore, extensive ball milling was shown to degrade arabinoxylans, offering tentative new possibilities for AXOs design.

A major feature of AXOs is that, in the colon, they are fermented to short chain fatty acids in general and butyric acid in particular. Butyric acid is important for the large intestinal mucosa cells. Arabinoxylan and AXOs are also known to be bifidogenic, ie they promote the growth of Bifidobacterium in the gut. The potential antioxidant power of AXOS deserves further studies.

More information: Swennen, K, Courtin, CM, Lindemans, GCJE, Delcour, JA, Large scale production and charac-terisation of wheat bran arabinoxylooligosaccharides, 2006, Journal of the Science of Food and Agriculture, 86, 1722-1731.

Eeckhaut, V, Van Immerseel, F, Dewulf, J, Pasmans, F, Haesebrouck, F, Ducatelle, R, Courtin, CM, Delcour, JA, Broekaert, WF, Arabinoxylooligosaccharides from wheat bran inhibit Salmonella colonization in broiler chickens, 2008, Poultry Science, 87, 2329-2334.

Courtin, CM, Swennen, K, Verjans, P, Delcour, JA, Stability of arabinoxylo-oligosaccharides, xylooligosaccharides and fructooligosaccharides, 2009, Food Chemistry, 112, 831-837.

Provided by VTT Technical Research Centre of Finland