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Have Your Cake and Eat It, Too

Sarah Caldwell Hancock
Kansas State University

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The old saying is confusing, because why would anyone who has cake elect not to eat it? Some have argued that the order should be reversed to clarify the relationship: After you eat your cake, you can no longer have it, because it’s gone.

But regardless of order, afterward, the real problem begins: Your blood sugar rises rapidly because of the easily digestible starches that cake and other processed foods contain. These starches contribute to obesity, diabetes and colon cancer.

Kansas State University researchers have found a way to make processed foods healthier by producing resistant starch, or starch that can’t be digested by the stomach and small intestine.

“We are trying to understand the structure of starch and how it’s related to digestibility, and then use technology to manipulate the structure and change digestibility,” said Yong-Cheng Shi, professor of grain science and industry.

Postdoctoral researcher Michael Sweedman said the starches have many applications in foods like white bread and cookies and “anything where you want functional fiber in products, but you don’t want the textural properties that come with more traditional forms of fiber.”

A patent is pending on the process that creates resistant starches. Commercial food ingredient companies are interested in licensing the technology, which requires no nonfood chemical additives and meets niche dietary requirements, such as vegan, vegetarian, kosher and halal.

“We are carefully controlling crystallization conditions,” Shi said.

Water, enzymes, and heating and cooling are all that’s required to manipulate the starches, and the process is high-yielding. Increasing the proportion of resistant starches results in foods with a lower glycemic index. An additional benefit is that because resistant starch escapes digestion in the small intestine, it is fermented in large intestine.

“The colon is like a large fermentation tank,” Sweedman said, “and bacteria need to be fed.”

When we eat high glycemic index food, it is digested and absorbed in the bloodstream before it gets to the large intestine, and bacteria don’t get the food they need. That means bad bacteria proliferate.

“We fermentable material needs to get through,” Sweedman said.

Human clinical trials demonstrated a positive glycemic response, and results raised questions about measuring the glycemic index that will ripple through the human nutrition community. An additional application for the product may be as a coating on pills that ensures ingredients survive long enough to be absorbed. Shi and Sweedman are also working on ways to scale up production to make it suitable for a commercial environment, which may entail another patent.

So should we be encouraged to eat the cake?

“People should eat better food, but the fact remains that many of us still choose for whatever reason — price, shelf life or just texture-flavor profile — processed foods over the more fresh traditionally healthy foods,” Sweedman said. “If people are going to make the less healthy decision, why not make those things healthier? You can make those sweet, processed foods healthier for people, and you get the best of both worlds.”

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By Sarah Caldwell Hancock, Office of the Vice President for Research
As the nation’s first operational land-grant university, Kansas State University has more than 150 years of expertise in animal health, plant science, food safety and food security. More than $192 million in active funding has been awarded to Kansas State University for research related to global food systems since 2012.

Kansas State University is home to the four newest Feed the Future Innovation Labs from USAID. In 2014, Kansas State University helped produce 15 wheat varieties for Kansas’ more than 9 million acres of wheat fields.

Kansas State University is the only U.S. university invited to join the Plant Biosecurity Cooperative Research Center. The center is a consortium of several of Australia and New Zealand’s leading governmental research institutions and universities. Kansas State University and Australia share similar agricultural systems and concerns about emerging diseases and insect pests.

The U.S. National Research Council ranks Kansas State University’s department of plant pathology and its program as No. 1 in the nation among 162 plant pathology departments.