FILE PHOTO: NICK WIEBE

SWEET TOOTH AND A BEER BELLY U of A researchers now have a way to turn brewing leftovers in sweet, sweet sugar.

U of A brewing up new ways to make artifical sweeteners

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University of Alberta researchers are in the process of developing a way to reap all the benefits from your favourite beer by converting "beer sludge," the once-useless leftovers of the brewing process, into the low-calorie sugar-substitute xylitol.

Assistant professor of bio-food engineering Dr David Bressler and counterpart Dr Michael Gänzle, assistant professor of food microbiology and probiotics, are combining their different areas of expertise in the study.

Xylitol is five-carbon sugar alcohol used to sweeten food products. Hailed for its low calorific value, which, as Bressler explained, is considered to be lower than sucrose or glucose, it also boasts the ability to fight cavities as well as increase the flow of saliva, thereby strengthening the protective factors that the compound has inside the mouth.

Found naturally in fruits and vegetables, the compound xylitol is already substituted for other sweeteners in chewing gums and toothpaste, as it doesn't contribute to tooth decay. Since xylitol is low on the Glycemic Index, which measures how quickly food raises a person's blood sugar, it's considered safe for diabetics.

"The only side effect attributed to it is if you eat a huge amount of it, you get osmotic diarrhea problems—but that's different. That's at *very* high levels," Bressler said.

Gänzle and Bressler are currently experimenting in the lab with hemicellulose, a plant-cell material and major component of distiller grains.

"As we get more and more of these ethanol plants popping up all over North America, hundreds across the US, each one of them produces distiller grains as a by-product of almost no nutritional value," Bressler said.

Gänzle explained that any operation that creates either starch or ethanol will have by-products left over, which are presently used as animal feed.

Hemicellulose doesn't nutritionally benefit animals, but by removing it the feed value is enriched, Bressler added.

Gänzle explained the original approach to producing xylitol has its limitations.

"We try to genetically modify lactic acid bacteria into producing large amounts of xylitol."

Their process of isolating xylitol from distiller grains is environmentally friendly and differs from current processes involving chemical production. It entails isolating hemicellulose and further breaking it down into simple sugars. This is followed by fermentation of one of those sugars resulting in xylitol.

"Our approach revolves around using food grade micro-organisms like lactic acid bacteria to do the fermentation as opposed to using a chemical means ... which has chemical by-product streams and waste products which can be potentially damaging to the environment," Bressler said.

Bressler and Gänzle took the idea of converting a grain waste product into something useful and localized it based on what is grown locally in Alberta.

"If you read the newspaper you will see that the production of ethanol from grains is something which is increasing in North America; everyone talks about biofuels," Gänzle said. "We specifically target the spent brewer's grain or what is left after cereal fermentation—barley, wheat, corn—because that is done in this province."

Gänzle described that their undertaking can potentially turn a product without value into something constructive.

"If we establish such a process we will benefit the brewery or whoever produces spent brewer's grains because it makes their waste product more valuable," he said.

Not only will farmers, nationwide breweries and refineries have an advantage, but industries producing xylitol will also have a cheaper way of producing their ingredient he continued.

Gänzle and Bressler are working on incorporating their findings on xylitol and the process of isolating it into their lectures at the U of A.