FOOD SCIENCE AND BIORESOURCE TECHNOLOGY

Team Members

MARLENY ARANDA-SALDAÑA Food/Bio Engineering Processing

MIRKO BETTI Muscle Food Science & Processing

DAVID BRESSLER Fermentation & Bio/Food Engineering

HEATHER BRUCE Carcass & Meat Science

LINGYUN CHEN Canada Research Chair, Plant Protein Chemistry & Technology

JONATHAN CURTIS Lipids & Analytical Chemistry

MICHAEL GÄNZLE Canada Research Chair, Microbiology & Probiotics

LYNN MCMULLEN Food Microbiology

LECH OZIMEK Dairy Processing Technology & Food Product Development

FERAL TEMELLI Food Process Engineering

AMAN ULLAH Utilization of Lipids, Polymer / Material Chemistry

THAVA VASANTHAN Grain Science & Technology

WENDY WISMER Sensory & Consumer Science

JIANPING WU Food Protein Chemistry

AFNS team finds key to tasty salt-reduced bread

Sourdough made from specific bacteria does the trick

AFNS food scientists discovered how to reduce salt in sourdough bread by half without compromising its taste or texture.

The trick, revealed food microbiologist **Michael Gänzle**, is to add bacteria that produce a taste-compound called glutamate.

Ganzle, along with sensory and consumer scientist **Wendy Wismer** and PhD candidate **Cindy Zhao**, compared two strains of *Lactobacillus reuteri* that differ only with respect to glutamate accumulation. They confirmed what had long been suspected: the product of bacterial fermentation that produces savoury taste is glutamate.

> "What consumers told us is that there is a difference when there's glutamate present."

The team also found it's possible to reduce salt levels from two to one per cent without harming the taste or texture of the bread.

"What consumers told us is that there is a difference when there's glutamate present, and if the glutamate is present they thought the intensity of the salty taste is higher," said Gänzle. "That confused us, because glutamate is a savoury taste, not a salty one."

Zhao worked with a panel of trained tasters who can discriminate and measure minute differences in taste. They discovered that sourdough with the same salt levels as regular bread actually tasted saltier.

"So it means that the sourdough bread with glutamates does enhance the salty, because it tasted saltier," said Zhao.

Therefore, reducing the salt would not unduly affect the taste. As for the texture, it was maintained because the sourdough can decrease the pH and also produce the sugar residues that contribute to the texture.

For consumers, the research means that they can have healthier bread without sacrificing taste or texture. A bread industry firm in Europe is now testing the *L. reuteri* bacteria for that purpose.

Meanwhile, Zhao is conducting more research on *L. reuteri* and the ability of sourdough bacteria to produce taste-active peptides, including recently discovered peptides with taste-enhancing properties called kokumi. Its properties may allow her to bake bread with further improved taste.

PhD candidate Cindy Zhao

Potato by-products produce eco-friendly plastic films

Using potato peels and culls considered waste by Alberta's potato-processing industry, AFNS researchers have created a starch-based bioactive film that is both eco-friendly and rich in antioxidants.

With applications for both the food packaging and cosmetic industries, the new bioactive film is a green alternative to traditional petroleum-based plastics and possesses added advantages, said AFNS researcher **Marleny Aranda Saldaña**.

"Development of antioxidant and antimicrobial bioactive films can improve product shelf life and safety," she said.

"Potato peels have high phenolic content, a natural compound for plant protection, which you also find in apple peels and grape peels, among others."

Saldaña and her team, which includes food microbiologist **Michael Gänzle** and cereal scientist **Thava Vasanthan**, used subcritical fluid technology to extract phenolic compounds from the potato biomass.

Marleny Aranda Saldaña, PhD candidate Yujia Zhao and MSc student Carla Sofia Valdivieso Ramirez

"Development of antioxidant and antimicrobial bioactive films can improve product shelf life..."

In subcritical water medium, starch can be modified to influence the film's properties, such as its tensile strength, elongation, antioxidant and antimicrobial activity.

Saldaña's team has obtained an international Patent Cooperation Treaty application for the processing method and is commercializing the process.

Since there's international interest on whether the subcritical method would also work on cassava, her team is studying that too.

Saldaña's research is being funded by Alberta Innovates – Bio Solutions and NSERC.

ALUMNI PROFILE

Bernhard Seifried

'10 PhD
Food and Bioresource Engineering

CURRENT POSITION:

Senior Research Scientist, Ceapro Inc.

Bernhard is the co-inventor of a novel platform processing technology called Pressurized Gas eXpanded Liquid Technology, or PGX. It is a unique technology that can be used to process biopolymers into high-value, nano-sized polymer structures and novel bio-nanocomposites.

Local biotechnology company Ceapro has already used PGX to produce a high-purity dry oat beta glucan that can be developed to act as a delivery system for the cosmetic and healthcare markets, and as a systemic active ingredient with potential health benefits such as cholesterol reduction.

HOW HE GOT THERE FROM HERE:

Bernhard earned his PhD in Food and Bioresource Engineering from the University of Alberta. His doctoral advisor was AFNS researcher Feral Temelli, with whom he developed PGX. With his thesis work as its basis, they applied for a patent which was recently approved. He joined Ceapro in 2010, where he has since designed all the equipment and modifications required to scale-up PGX for commercial applications.

THE ROLE OF AFNS IN HIS SUCCESS:

"Dr. Temelli is a wonderful mentor who had faith in me exploring and developing novel methods and technologies, providing the right balance of guidance and freedom." Additionally, "I learned not only from AFNS's many skilled professors, but from my opportunity to teach students. AFNS has been a great environment for me to grow, start a great professional career and establish a lifelong relationship with the researchers in the department."

PhD candidates Lihui Du, Meng Meng Feng and Henan Wang, and postdoctoral fellow Abhishek Bhattacherjee, second from left.

Researchers perfecting new methods to reclaim animal collagen for skin, bone and food care

Meat scientist **Mirko Betti** and his research team are developing a new, more efficient way to extract collagen from bovine hides and poultry byproducts.

"Collagen is an important protein that can be recovered and modified to something that can be beneficial to us in terms of skin regeneration and to alleviate joint pains," said Betti. "It can also be used as a natural health product and eventually a food ingredient."

Betti and his team are trying to bind natural chemical compounds to collagen through a unique functionalization process. It would allow the collagen to move from the blood stream to the target tissue.

As far as Betti knows, his team is the only one attempting this functionalization of collagen peptides. And his team is also examining other potential uses for collagen including examining the anti-freezing capabilities of collagen peptides, which might allow it to protect food from freezing damage. It's also researching whether iron can bind to the peptides, so that it can be delivered more efficiently to target populations such as anemics or pregnant women.

"This potentially represents an extra source of profit for the meat industry," he said. "From something that's low-value."

The research is being funded by the Alberta Livestock and Meat Agency, and Alberta Innovates Bio Solutions.

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