

Researcher studies impact of eating crickets on gut health

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Valerie Stull, left, pours a test batch of milkshakes into glasses. Credit: Colorado State University

Tiffany Weir, associate professor in the Colorado State University Department of Food Science and Human Nutrition, has been working on a project that has crawled into the public sphere in recent years: cricket

consumption.

Valerie Stull, doctoral graduate from the University of Wisconsin – Madison Nelson Institute for Environmental Studies, worked with Weir as an undergraduate, and has become very interested in the sustainability of insect farming. When she contacted Weir about doing a project together, she pointed out that, while the academic community knew of many great nutritional benefits in eating insects, they weren't sure what effects it has on microbiota in the gut.

The research was funded in part by Karen Morris-Fine, donor and three-time CSU [food science](#) and nutrition alumna, who is committed to learning more about how the [food](#) we eat impacts our bodies.

Designing a recipe with crickets

"The pair of us designed the study, which involved eating [cricket](#) powder that had been cooked into meals," said Weir. Students here at CSU helped design and test the recipes that were later used in the study and had to overcome the distinct flavor and texture of the cricket powder in the blind study.

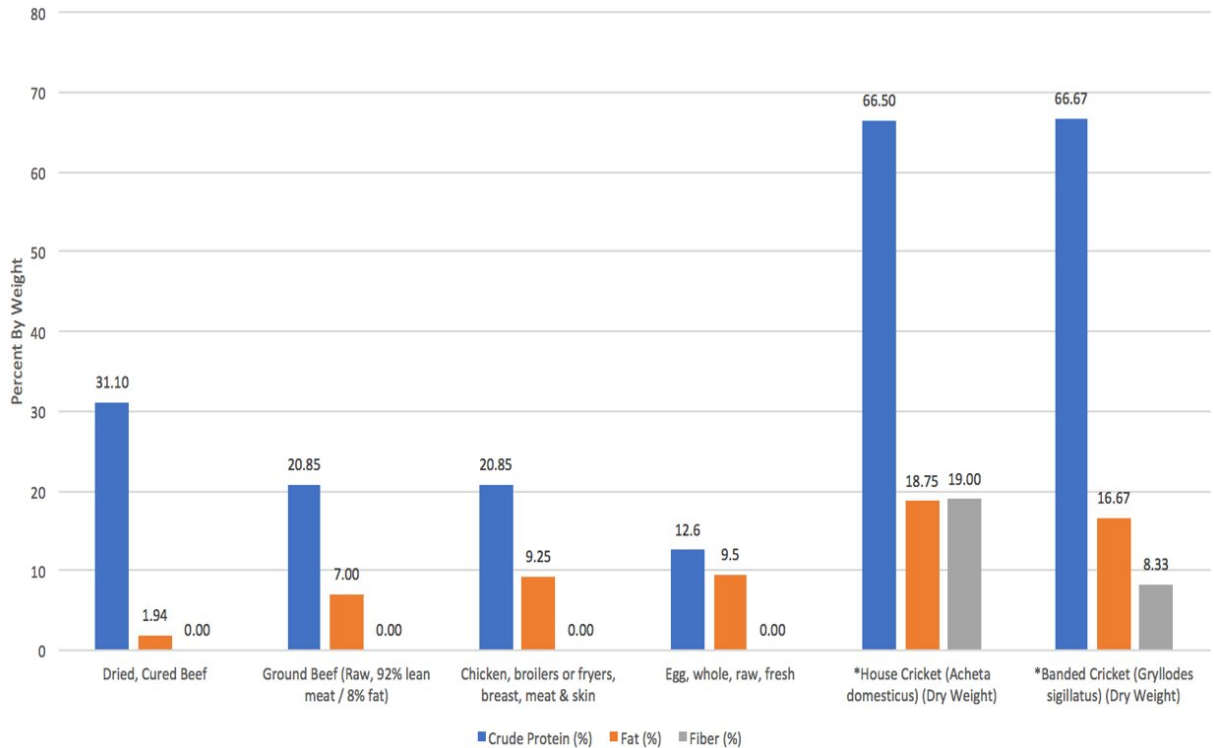
The whole crickets are roasted then ground, and the resulting powder has an earthy flavor that some people think tastes like a tea and others say is similar to dirt. The texture of the cricket powder used in the study was slightly gritty and coarse, but Weir added that there are finer powders on the market. Any cricket powder can be used in recipes either as a supplemental powder or as a substitute for other powder ingredients such as flour.

For the study, Stull and Weir received the cricket powder as a donation from Entomo Farms. Insect farms are increasing in popularity around the world, including in the U.S.

To completely hide the cricket powder and make the cricket-supplemented foods indiscernible from the control foods, Weir and her team had to do a few specific things. The two recipes they used for during the study were a malt milkshake and a pumpkin spice muffin. The pumpkin spice flavor and the sweetness of the malt were strong enough to cover the flavor of the cricket powder, but the researchers still had to add cornmeal to the control smoothies to reliably simulate the grittiness of the cricket powder.

"The foods we put the cricket in weren't exactly the healthiest foods," said Weir, "We didn't have the ability to produce pre-made bars or anything like that so the muffins and milkshakes were what was accessible to us."

While perfecting these recipes, the research team had to conduct a lot of taste tests. That meant recruiting people around campus to try their cricket laden creations. "Knowing that they were going to eat a bite of something with cricket in it, people were surprisingly willing. Some people were even really excited," said Weir, "There are even restaurants that are centered around eating insects now. So, it's a growing concept."



Graphic depicting Protein% (blue), Fat% (orange), and Fiber% (gray). Credit: Valerie Stull

Two major health improvements

During the six week crossover study, participants were initially placed in one of two blind intervention groups. The first group were given muffins and milkshakes with the cricket powder, and the second were given plain muffins and milkshakes. For two weeks, participants ate the meals the researchers provided in place of their normal breakfasts. After giving everyone two weeks off, they switched who was on the control and cricket groups and then repeated the process for another two weeks.

"We did the study in our convenience population, which is predominantly made up of college students. For the most part, that

meant we were looking at young, healthy individuals," explained Weir, "We didn't know if we would see any benefits because the population is generally low risk."

However, Weir and Stull did see two major improvements. There was an increase in a species of bifidobacterium and a decrease in an [inflammatory marker](#) in the blood called TNF-alpha. Weir pointed out that this is especially interesting because the study population was low risk for problems in either of these areas.

The species of bifidobacterium that increased during the study is known for colonizing the gut of infants. It's one of the first colonizers and helps to shape our immune systems. While everyone maintains populations of bifidobacterium throughout our lives, the number tends to drop off as we get older. This is especially true in older individuals, and there are people who believe this might be part of the reason for decreased immunity in this population. In fact, the bifidobacterium is so desirable that it's commonly supplemented as a probiotic in foods.

The inflammatory marker TNF-alpha is associated with the type of inflammation that drives chronic diseases like Type 2 diabetes and cardiovascular disease. Seeing the decrease in TNF-alpha suggests that chronic inflammation might be reduced by eating cricket powder. Weir explained that it would be interesting to look at people who have had exposure to factors that would increase their risk of chronic inflammation, like poor diet, carrying excess weight, and advanced age.

Future in cricket consumption

Stull is interested in promoting insect farming in Africa among populations that she has worked with during her previous research. She hopes that by farming insects, such as crickets, they'll be able to establish a reliable food source. In the future, she and Weir would love to conduct

a similar study in mother-child pairs, where the development of bifidobacterium could affect how the child responds to pathogenic diseases later in life.

Crickets are an exceptional source of fiber when compared to other livestock protein sources, such as chicken, pork, beef, eggs, and fish. In addition, the type of fiber found in crickets and other insects is not common in our diets. Called chitin, it is only present in mushrooms and the shells of seafood, which most people don't eat. Weir added that it would be interesting to see if chitin is driving the changes they observed during their study and has begun doing follow-up experiments with chitin in the lab.

By comparing crickets per-dry-weight, we can see the economic and environmental sustainability that this food source could create. The sustainability of this project makes it exceptional because while there are many projects looking at the health benefits of various foods, cricket consumption has the potential to impact both our bodies and the environment in a positive way.

"We're going to have to feed a growing population and this is a way to reduce the impacts on the environment while continuing to feed people and help with food security," said Weir, "The inputs required for insects are much lower than what is required for other livestock protein sources."

Provided by Colorado State University

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