

For growing numbers, eating insects is Bugsolutely fine

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Barbeque and cheese-flavored crispy silkworms now come in handy snack packs on Thai store shelves. (Courtesy of HiSo Snack)

BANGKOK -- Barbeque and cheese-flavored crispy silk worms now come in handy snack packs on supermarket and 7-Eleven shelves in Thailand. Hungry anyone?

Eating insects -- an activity known as entomophagy -- may be a stretch for many Western palates, but growing numbers of "entopreneurs" are banking on product innovation and marketing to win converts for a superfood with highly persuasive sustainability arguments.

Human consumption of insects is not new. Indigenous populations in South America and Australia eat bugs. So do cultures in Africa and throughout Asia. A 2013 study by the Food and Agriculture Organization of the United Nations titled "Six Legged Livestock: edible insect farming, collecting and marketing in Thailand"



Crickets are one of the most commonly bred edible insects in Thailand. (Courtesy of HiSo Snack)

reported that the edible insect sector was active in 26 provinces of the country.

It cited other reports that 200 edible species were known in Thailand, but crickets and palm weevil larvae were most commonly bred for consumption, with approximately 20,000 cricket farms on record.

Entomophagy is very common in the northeastern province of Isaan, where crispy insects can be found in street carts, markets and on menus. HiSo Snack, the cricket and silkworm snack pack brand, offers a healthy take on a traditionally deep fried food by baking instead.



Snack attack -- a tray of silkworms on the HiSo Snack production line (Courtesy of HiSo Snack)

"The Thai love of insects has always been about the taste," said brand manager Surawat Rungtao. "When purchasing from the street you don't know how long the insect has been fried for, or what quality of oil was used." It is also infinitely more convenient for the teen and young adult target market to buy snack packs off the shelf than to wait for

the next street cart to go by.

Massimo Reverberi first sampled a cricket on Bangkok's Khao San Road while guiding his visiting nephews around the city. "Kids are okay [with bug consumption] but adults are prejudiced," said Reverberi. He has since become a convert, and has developed a cricket pasta sold by Bugsolutely, his Thai-based company. Thailand is the world's largest producer of human-grade crickets.

On a recent Friday afternoon in his Bangkok office Reverberi offered a taster of cricket flour, as the ground cricket product is commonly known. "It's the gateway bug," he quipped of the mild, roasted nut flavor.

Crickets are 70% protein and are often referred to as the protein of the future. They are also sustainable to raise compared to traditional protein sources, requiring 1,000 times less water than a cow -- not to mention a lot less food and space.

Bugsolutely's pasta contains 20% cricket flour, and is set to boost the nutritional value of pasta dishes. The innovation is presenting crickets in a familiar food form that needs to be boiled, overcoming preconceived notions about the insect ingredients being dirty.



Massimo Reverberi, the entrepreneur behind Bugsolutely (Courtesy of Bugsolutely)



Pasta with a difference - Bugsolutely's cricket pasta (Courtesy of Bugsolutely)

Reverberi said his biggest challenge was overcoming consumers' initial revulsion at the idea of eating bugs -- "taking them from yuck to yum," as he put it. Pasta is typically covered in a sauce, further normalizing this insect-eating experience.

Branding and marketing is a problem for most insect entrepreneurs. Bugsolutely's packaging is devoid of insect graphics, and crickets are mentioned by name only -- an approach also taken by Gabi Lewis, co-founder of U.S.-based Exo cricket protein bars.

Lewis recently explained his company's ongoing exploration of how to avoid this "disgust reflex" in an interview on Monocle 24's program The Entrepreneurs. "If you're having a Big Mac you don't want a picture of a cow on it, so why would you want a picture of a cricket when you're eating a cricket bar?" he said.

In-houseproduction

For those who want to raise their own insect protein, Livin Farms, a Hong Kong startup, has just begun shipping Hive units that will enable protein farming on kitchen countertops. The hive is a mealworm farm that makes it possible to know exactly where food comes from.

Industrial designer and founder Katharina Unger began exploring alternative food sources after moving to Hong Kong in late 2012 and discovering that most of the food there is imported. "Almost no one knew where it came from," she said. It was a far cry from her childhood on a farm in Austria, where she knew the sources of all her food.

Insects were one of the future proteins Unger investigated by growing and eating them at home. This sparked a series of prototypes for domestic insect farming, one of which was called "Farm 432" and used Black Soldier Flies.

"Mealworms taste really nice!"

Unger said, explaining Livin Farms' ultimate insect choice. "They are

also very nice to keep in your home as they don't make any sounds, don't escape (no flying) and if you feed them cereal they kind of smell like that too."



Livin Farms' Hive produces mealworms on kitchen countertops (Courtesy of Livin Farms)

Unger's friend, design partner and fellow Austrian Julia Kaisinger formally joined the venture as a co-founder in mid-2015, having previously provided input in the design process. A series of redesigns resulted in the Hive, which has the appearance of a high technology appliance and looks at home in modern kitchens.

Environmental engineer and passionate bugs-for-food advocate Florian Nock joined the team in April 2016 after his blog on the subject attracted the founders' attention. He had long been breeding mealworms and brought entomology, nutrition and marketing skills to the project.

"Mealworms are quite neutral," said Nock of the insect's flavor. "Slightly nutty with a nice texture. This makes them ideal to mix into a great variety of recipes." Livin Farms is working with chefs to create novel mealworm dishes, but for the most part the team encourages personal experimentation.



A fresh crop of mealworms being removed from the Hive.
(Courtesy of Livin Farms)

"Start a food revolution straight out of your kitchen" is the Livin Farms' call to action. "We got worldwide attention," said Nock of their Kickstarter campaign, launched before he joined the company in November 2015. "There will soon be more than 250 people from all around the world who will start this food revolution with us."

The team reached out to all their backers to discover more about them, their needs and expectations. "They're open-minded young families [mainly] from Europe and the United States," said Nock. "They want to know exactly what they eat and what is in their food. They are excited to explore a food in which they fully believe and trust, and they want to show their kids how to grow it!" said Unger.

The Hive can produce up to 500 grams of mealworms a week, but it comes at a substantial price, currently above \$600. "Is a Tesla expensive?" asked Unger, referring to the electric car brand. "New technology and innovative products need lots of investment to develop. The Hive lets you grow sustainable, healthy and delicious food. What to invest in if not in what you and your family eat?"

Fly food

In Malaysia, Entofood is using the Black Soldier Fly to convert organic waste into animal and plant nutrition. It has a fast growth rate, short life cycle, high fecundity and is not a carrier of disease for animals or humans. Resulting feed products contain up to 54% protein content.



Dried Black Soldier Fly larvae (Photo by Cheryl J. Hoffman, Courtesy of Entofood)

The award-winning company moved from Madagascar to Malaysia in 2011 to focus primarily on feed for the burgeoning aquaculture market -- Asia is the only global region that produces more farmed than wild fish, according to Anne Deguerry, an Entofood manager. The company said its Malaysian base is an ideal hub to service the major Southeast Asia markets in Indonesia, Vietnam, the Philippines and Myanmar.

Entofood's pilot farm began in 2012 and uses the Black Soldier Fly to convert organic waste into high protein animal feed as well as bio-fertilizer, making it a zero waste process. It is also very quick, taking seven days compared to three to six months for vermi-compost [methods] that convert only plant



Defatted Black Soldier fly meal (Photo by Cheryl J.

waste, said Deguerry. She added:

Hoffman, Courtesy of Entofood)

"100 tons of biowaste gives 16 tons of fertilizer and 25 tons of live larvae, which gives eight tons of insect meal."

The Black Soldier Fly has low land, water and carbon footprints when compared with regular protein sources. It also offers a cheaper alternative to the rising cost of the fishmeal traditionally used in aquaculture. The non-pest and non-invasive species is present worldwide, making it easy to roll out breeding programs in other territories.

It takes a mere six months from catching wild samples to a fully operational facility. For the moment, however, Entofood has no plans to expand into the human nutrition market. Deguerry cites the need for more fieldwork and documented trials before that becomes a possibility.

The powerful sustainability and food security benefits of using insects for animal feed and plant nutrition are a marketer's dream, and the same benefits exist for insect products in the consumer food industry.

Consumer perceptions remain a key issue, but the case for insects on our dinner tables will surely be easier to make as food quality and sourcing issues become increasingly important. Entrepreneurs and taste-makers will play a vital role in leading the way to menu changes.