

DON'T BET ON FARMED INSECTS

As our food system shifts away from reliance on animal protein, there's a lot of buzz about farmed insects. But the harms associated with industrial meat production require a comprehensive solution.

We see plant-based and cultivated products as the solution: They are more likely to give consumers what they love about meat while being cheaper, more convenient, and more attractive than insect products.

THERE ARE TWO WAYS TO USE INSECTS IN A GLOBAL FOOD SYSTEM: AS FEED AND AS FOOD

FEED: Powdered insects are added to existing feed sources for livestock, like chickens or fish, or to cat and dog food to increase protein profiles. Companies most commonly use insects to replace fish meal in fish feed.¹

FOOD: Some insects are eaten whole, like roasted crickets; processed into chips or other common snack foods; or ground into powder and used to supplement products like flour. A few companies are using insects to recreate meat dishes, like burgers or meatballs.

INSECTS VS. PLANTS

By weight, insects convert the food they eat to edible protein at a food conversion ratio (FCR) of between 4:1 and 9:1. Insects intended for human consumption often have an FCR comparable to that of poultry. At absolute best, and usually when reared as livestock feed, insects have FCRs of about 2:1; that is, it takes 2 kg of feed to produce 1 kg of insect mass.^{1,2} But again, these are not insects for human consumption; they are insects for farm animal consumption.

Feeding plants and cells directly to humans removes this inefficiency from our food system.

A common misconception is that insects are more protein-rich than plants. However, for many edible insect species, the protein-digestibility corrected amino acid score, a way of tracking how bioavailable protein is in a given food, is lower than for certain non-animal protein sources, like soy and mycoprotein, and production cost per pound of protein can be up to four times as high for insects as for plants and mycoprotein.³

Plants and mycoprotein are inexpensive, high-quality sources of protein.

INSECTS ON MODERN INDUSTRIAL FARMS: NEW RISKS TO OUR FOOD SYSTEM

Modern insect rearing operations typically occupy a large warehouse. Insects are often grown on stacks of shelves lined with substrates like egg cartons or cardboard. Food is interspersed throughout the shelves. Most of the energy used in rearing insects goes into maintaining consistent facility temperatures. Depending on their intended use, insects are killed by freezing, freeze-drying, or microwaving. Some insects, such as crickets, are shipped live.⁴

A major concern of industrial insect farming is the effect escaped insects might have on the surrounding



environment. Farmed insects can escape their facilities during natural disasters or other unforeseen events and swarm local ecosystems, consume produce from local farms, or breed in environments where they are not native. Farmers cannot always isolate industrial food operations from the surrounding environments. We have seen multiple instances where farmed animals have escaped from confined animal feeding operations during natural disasters.⁵ Because it would be impossible to capture escaped insects, a farm-level breach could pose devastating risks to a region's environment.

INSECT PROFITS DEPEND ON CONVENTIONAL ANIMAL AGRICULTURE

Many insect-protein advocates claim that insects are cheap to raise because they can be fed using waste streams. But that's currently only true if the insects are intended for feed. Insects raised to be food need to be fed more specialized, expensive, and controlled diets. Insects who eat food from waste streams often consume different foods, leading to inconsistent nutritional consistency in end products.⁶ One study found that feeding crickets minimally processed municipal food waste led to >99% mortality before crickets reached a slaughter size.⁷

Processing waste to make it nutritionally consistent enough for insects intended for human consumption is expensive and would raise the price of the final product. Instead of using waste for feed, farms raising crickets as human food use consistent feeds composed of grain-based meals, fruits, and vegetables.^{8,9} Feed and food insects are also often different species (see side box) with different feed requirements.

Because it is more profitable to farm insects for feed than for food, insect farming profits depend on conventional animal agriculture remaining the status quo. To feed a growing population, we need innovative and sustainable forms of protein. Feeding insects to animals and then feeding those animals to people isn't the answer.

THERE ARE BETTER SOLUTIONS

Advocates say that insect food products are in early stages and just need more innovation. But better options already exist, and they don't have to overcome the problems associated with insects.

Which insects are most frequently reared on industrial farms?

- Mealworms
- Crickets
- Black soldier flies
- Grasshoppers
- Mediterranean fruit flies

What are insects typically used for?

- Fishmeal replacement
- Poultry feed
- Pet food
- Powdered protein fortification in pastas and other processed foods
- Premium snacks

Plant-based meat is a proven concept. Meat eaters, not just vegetarians, order plant-based meat entrees. The Beyond Burger has launched at Carl's Jr.,¹⁰ and it was TGI Fridays' fastest test-to-table menu offering ever.¹¹ The Impossible Burger is available nationwide at White Castle and Burger King.¹²

Cultivated meat is also an excellent and innovative solution. Both Tyson Foods,⁶ the largest meat company in North America, and meat conglomerate Cargill,⁷ the largest private company in the United States, have invested in cultivated meat. So has PHW Group,⁸ Germany's largest producer of chicken. Cultivated meat products are not alternatives to meat—they are meat without the traditional negative impacts.

Why create a new industrial farming system when plant-based and cultivated solutions exist?

WANT TO LEARN MORE?

Interest in insect protein has led to innovative research and sparked ethical debates. **If you're curious about some of the different ideas being discussed, you might want to check out these papers and essays:**

[Could insects have a role to play in cellular agriculture research?](#)

[A question of pain in invertebrates](#)

[Crickets are not a free lunch](#)

REFERENCES

- ¹Ooninx, D. G. A. B., van Broekhoven, S., van Huis, A., & van Loon, J. J. A. (2015). Feed conversion, survival and development, and composition of four insect species on diets composed of food by-products. *PLOS One*, 10(12). doi:10.1371/journal.pone.0144601
- ²Lundy, M. E., & Parrella, M. P. (2015). Crickets are not a free lunch: Protein capture from scalable organic side-streams via high-density populations of *Acheta domesticus*. *PLOS One*, 10(4). Retrieved from <https://doi.org/10.1371/journal.pone.0118785>
- ³McKinsey & Company. (2019). Alternative proteins: The race for market share is on. Retrieved from <https://www.mckinsey.com/~/media/McKinsey/Industries/Agriculture/Our%20Insights/Alternative%20proteins%20The%20race%20for%20market%20share%20is%20on/Alternative-proteins-The-race-for-market-share-is-on.ashx>
- ⁴Cortes Ortiz, J. A., Ruiz, A. T., Morales-Ramos, J. A., Thomas, M., Rojas, M. G., Tomberlin, J. K., ... Jullien, R. L. (2016). Insect mass production technologies. In A. T. Dossey, J. A. Morales-Ramos, & M. G. Rojas (Eds.), *Insects as sustainable food ingredients: Production, processing and food applications* (pp.153-201). Amsterdam, NL: Elsevier Inc.
- ⁵Sanderson Farms. (2018, September 17). Sanderson Farms, Inc. provides update on Hurricane Florence damage [News release]. Retrieved from <http://ir.sandersonfarms.com/news-releases/news-release-details/sanderson-farms-inc-provides-update-hurricane-florence-damage>; Charles, D. (2018, September 18). Florence engulfs hog farms and chicken houses, thrashing North Carolina agriculture [Web log post]. Retrieved from <https://www.npr.org/sections/thesalt/2018/09/18/649132289/florence-engulfs-hog-farms-and-chicken-houses-thrashing-north-carolina-agricultu>
- ⁶Cortes Ortiz, J. A., Ruiz, A. T., Morales-Ramos, J. A., Thomas, M., Rojas, M. G., Tomberlin, J. K., ... Jullien, R. L. (2016). Insect mass production technologies. In A. T. Dossey, J. A. Morales-Ramos, & M. G. Rojas (Eds.), *Insects as sustainable food ingredients: Production, processing and food applications* (pp.153-201). Amsterdam, NL: Elsevier Inc. Interested readers should also consult chapters 2, 4, 5, and 10 for more information about modern industrial insect farming practices.
- ⁷Lundy, M. E., & Parrella, M. P. (2015). Crickets are not a free lunch: Protein capture from scalable organic side-streams via high-density populations of *Acheta domesticus*. *PLOS One*, 10(4). Retrieved from <https://doi.org/10.1371/journal.pone.0118785>
- ⁸Bachhuber, K. (2015, February 9). Alternative protein | Kevin Bachhuber | TEDxYoungstown [Video file]. Retrieved from https://www.youtube.com/watch?v=tq52cQ4R_20
- ⁹EIF Thailand. (n.d.). Cricket powder: Sustainable protein [Web page]. Retrieved from <http://eif-th.com/>
- ¹⁰Carl's Jr. (n.d.). It tastes beyond belief [Web page]. Retrieved from <https://www.carlsjr.com/beyondburger>
- ¹¹Beyond Meat. (2018, January 2). The Beyond Burger is officially joining TGI Fridays menus nationwide! [Web log post]. Retrieved from <https://www.beyondmeat.com/whats-new/the-beyond-burger-is-officially-joining-tgi-fridays-menus-nationwide/>
- ¹²Wiener-Bronner, D. (2019, April 29). Burger King plans to roll out Impossible Whopper across the United States [Web log post]. Retrieved from <https://www.cnn.com/2019/04/29/business/burger-king-impossible-rollout/index.html>
- ¹³Rubio, N. R., Fish, K. D., Trimmer B. A., & Kaplan, D. L. (2019). Possibilities for engineered insect tissue as a food source. *Frontiers in Sustainable Food Systems*, 3(24). doi:10.3389/fsufs.2019.00024