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# The Promise and Perils of Insect Farming

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## The Promise and Perils of Insect Farming

Insect farming is on the rise. Recent news stories have touted insects as “a six-legged solution to world hunger” ([Time](#)), “the next sustainable food revolution” ([The Independent](#)), and “the future of food” ([NY Times](#)). Insect protein is increasingly promoted alongside plant-based and cultivated meat as a green alternative to conventional meat.

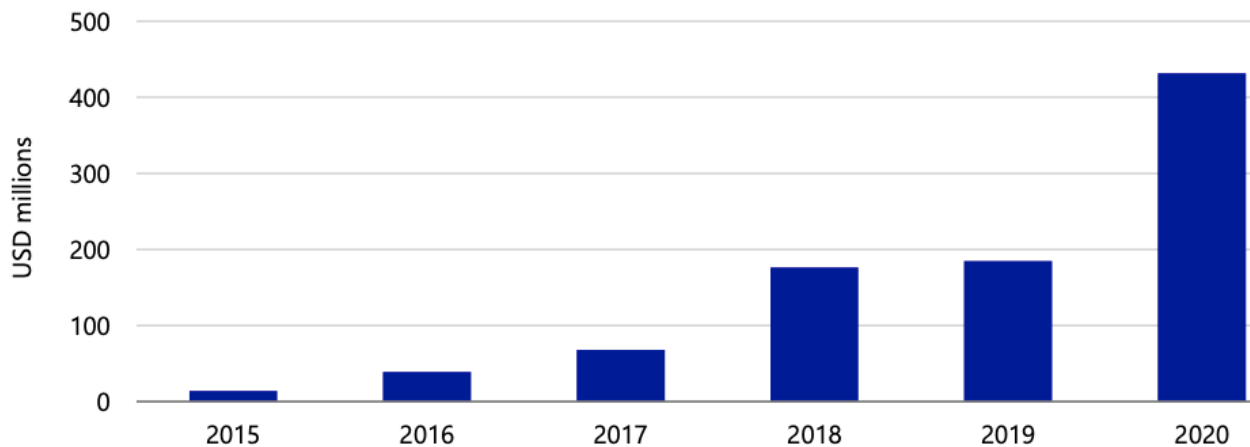
Investors have noticed. In just the last year, French insect farming startups Ynsect and InnovaFeed raised \$372M and \$165M respectively, more than the whole sector had raised in all prior years combined. The UK’s first industrial-scale insect farm recently secured [backing](#) from retailer Tesco, startup incubator Y Combinator, and even the British government.

The industry is now building insect farms on a huge new scale. Most existing farms can only produce a few metric tonnes of insects annually, and the whole global industry produces [10K](#) - [67K](#) tonnes. But just [two new](#) mega-farms under construction could produce 80K tonnes annually, and Ynsect [says](#) it alone will soon be producing 230K tonnes of insects every year.

Growth forecasts are even more ambitious. The industry expects to grow 10X - 300X bigger in the next decade: to 500K tonnes of insects by 2030 ([Rabobank](#)), 1M tonnes by 2027 ([ADM](#)), or even 3M tonnes in Europe by 2030 (industry [survey](#)).

So is the coming of insect farming a solution to factory farming — or an extension of it?

**Figure 4: The exponential increase in capital flowing to insect farming companies**



Source: Crunchbase, Dealroom, Rabobank 2021

More funds were invested in insect farming startups in 2020 than in all prior years combined. Note: the 2020 tally excludes some year-end deals, which bring the total to >\$600M. Source: [Rabobank](#).

### **Not a Solution**

The primary argument for insect farming is environmental: promoters argue that insects have a smaller resource and carbon footprint than other animals raised for meat. This argument rests on insects' incredible efficiency: in theory, they can convert just [2.3 pounds](#) of dry food waste into a pound of edible meat.

But this isn't what the industry is actually doing. Most insect farms [use grains](#), not food waste, likely for the same reasons most chicken and pig farms do: grains are cheaper, safer, easier to source, and spur faster growth. The few large insect farms marketing their use of "food waste" seem to actually be using high-quality agricultural byproducts, like corn meal and distillers grain, which would otherwise be fed to farm animals.

Nor are large insect farms producing meat for human consumption. A new Rabobank [report](#) on the industry dismisses this use in one line: "the current potential of insect-based foods for human consumption is limited." Instead, most farmed insects are fed to other animals — mostly farmed fish and chickens, though also pets. This is reflected in the industry's actions: it's currently lobbying the European Union to allow it to sell insects to chicken and pig factory farms, a move the industry lobby [calls](#) a "milestone."

This point is often lost in the breathless media stories about insects' potential to

displace meat. Insect farming isn't an alternative to factory farming — it's a supplier. The fabled efficiency of insects is thus a red herring. Feeding corn to insects, then feeding them to chickens, is inherently less efficient than just feeding the corn to chickens.

The industry replies that insects are still a greener alternative to meat in pet food and fishmeal in fish feed. The pet food claim might be true if insects were replacing human-grade meat. But the “meat” in pet food is already mostly byproducts — exactly the sort of “food waste” that insect farmers want to feed to their insects. (I explore pet food's environmental impact more [here](#).)

Insects are also unlikely to reduce the number of fish caught for fishmeal, because demand vastly outstrips supply. Depleted fisheries have capped fishmeal supply at 6-7M tonnes/year for decades, even as demand from aquaculture has soared. So insects will likely just fulfill some of the huge unmet demand for fishmeal, enabling aquaculture to expand faster. In fact, that's what the EU predicts: it thinks that if insect farming takes off, “aquaculture production [will] increase by 1.1%, driven by the increased supply of insect meal...”

**Figure 5: A market potential of half a million metric tons for insect protein is possible by 2030**

		Animal feed					
		Total	Pet food	Aquaculture	Poultry - Layers	Poultry - Broilers	Piglets
Estimated market size (metric tons)	Scale-up phase: EUR 3,500–EUR 5,500/metric ton	120,000	65,000	20,000	20,000	10,000	5,000
	Wider-use period: EUR 2,500–EUR 3,500/metric ton	200,000	85,000	55,000	30,000	20,000	10,000
	Maturity phase: EUR 1,500–EUR 2,500/metric ton	500,000	150,000	200,000	70,000	50,000	30,000

Rabobank predicts most growth in insect farming will be for feeding to pets and farmed fish and chickens. Source: [Rabobank](#).

## Consider the Bug

Insect farming's greatest effects, though, will be felt on the insects' themselves. I hesitated on whether to write about this. We have enough trouble convincing people to care about the suffering of chickens and fish. The prospect of insect suffering has long been wielded as a *reductio ad absurdum* against efforts to help other animals. And *I don't even know whether insects can suffer*.

The problem is that no one else does either — and we likely won't know until it's far too late to stop insect farming. And there's a growing body of evidence that at least some insects may be capable of consciously suffering. I can't do justice to that evidence here, so I recommend this excellent [series of articles](#) on invertebrate sentience by Rethink Priorities researchers Daniela R. Waldhorn and Jason Schukraft.

Consider just one [study](#) they cite, in which researchers induced “a depression-like state” in flies through unavoidable punishment — and then found that the human antidepressant lithium alleviated it. This doesn't prove that flies can suffer; it's hard to imagine how we could ever prove that. But I think this study, and the many others that Waldhorn and Schukraft discuss, should at least make us question confident assertions that insects can't suffer.

Of course, even if insects can suffer, we don't know that they'll suffer in farms. Factory farms more closely resemble insects' natural habitats — crowded, damp, and dark — than the forest habitats pigs and chickens evolved in. And given our vast uncertainty about insects' minds, I think we should also be wary of confident assertions about farmed insects' lives.

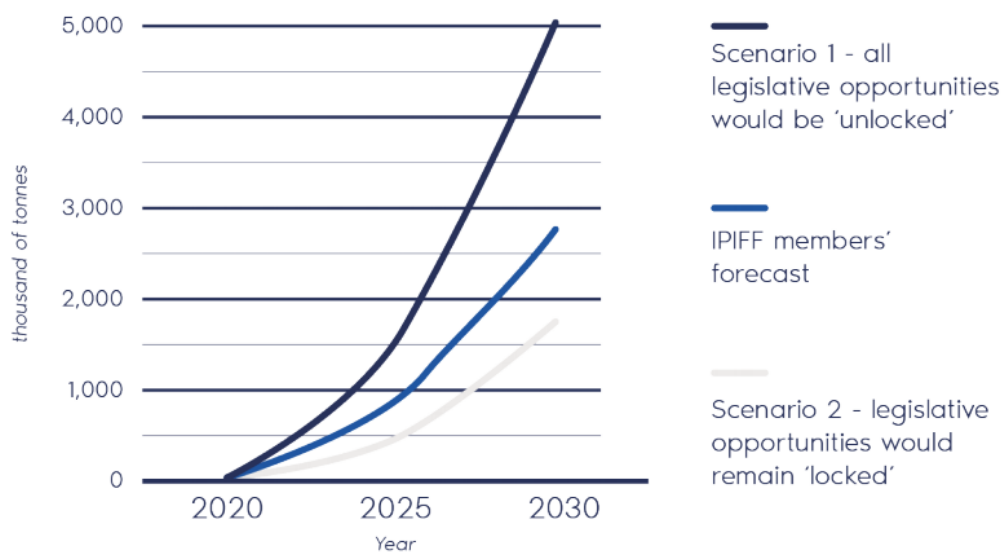
But there are [reasons](#) to worry, chief among them the industry's seeming lack of interest in, or understanding of, animal welfare. Take Ynsect, the world's largest insect farming company. One of its website's few mentions of animal welfare is an uncited [assertion](#) that its method of slaughter, boiling insects in water vapor, “causes a very quick and unstressed death.” In fact, boiling is one of the few methods that the American Veterinary Medical Association has specifically [concluded](#) is not a humane way to kill invertebrates.

And the number of individuals who could suffer on insect farms is staggering. Rethink Priorities' Abraham Rowe estimates that we already farm about a [trillion](#) cricket,

mealworms, and flies annually. Just one new Canadian cricket farm could have 20B - 29B insects alive at any time — about the same as the total of all chickens, pigs, cows, and other vertebrate land animals alive, on all farms, globally. If the industry's growth forecasts come true, it could soon farm more individuals in one year than all cattle and pig farmers have farmed across human history.

The rise of industrial insect farming reminds me a bit of the rise of industrial chicken farming in the 1930s and industrial fish farming in the 1980s. In both cases, proponents touted the incredible efficiencies of their new systems, and gave little regard to the apparently dumb creatures they would be farming. As a result, new industrial farming systems expanded almost unopposed — until they were far too powerful to unwind.

## Estimated volumes of production of insect protein until 2030 in Europe (in thousands of tonnes)



Source: IPIFF internal questionnaire September 2019

The insect industry predicts rapid growth in Europe — especially if they can “unlock” all legislative opportunities, i.e. remove all regulation. Source: [IPIFF](#) (insect industry association).

### So What?

It's hard to know what to do with this information. Even if insects can suffer, I don't know how we should weigh their lives against those of farmed mammals, birds, and fish. I certainly don't think we should all switch to helping insects from proven strategies to

help other animals. But I do think there are a few things we can consider doing alongside our current efforts.

First, advocates can oppose new regulatory approvals for insect farming. The European insect industry [thinks](#) legislation will be the key factor in future growth, and Rabobank expects both Europe and North America to deregulate insect farming in 2021. This presents a unique opportunity for advocates: it's easier to oppose deregulation than to secure new regulations. I was happy to see 13 animal groups oppose the recent EU proposal to allow insect feed for chickens and pigs; it would be great to see more join them.

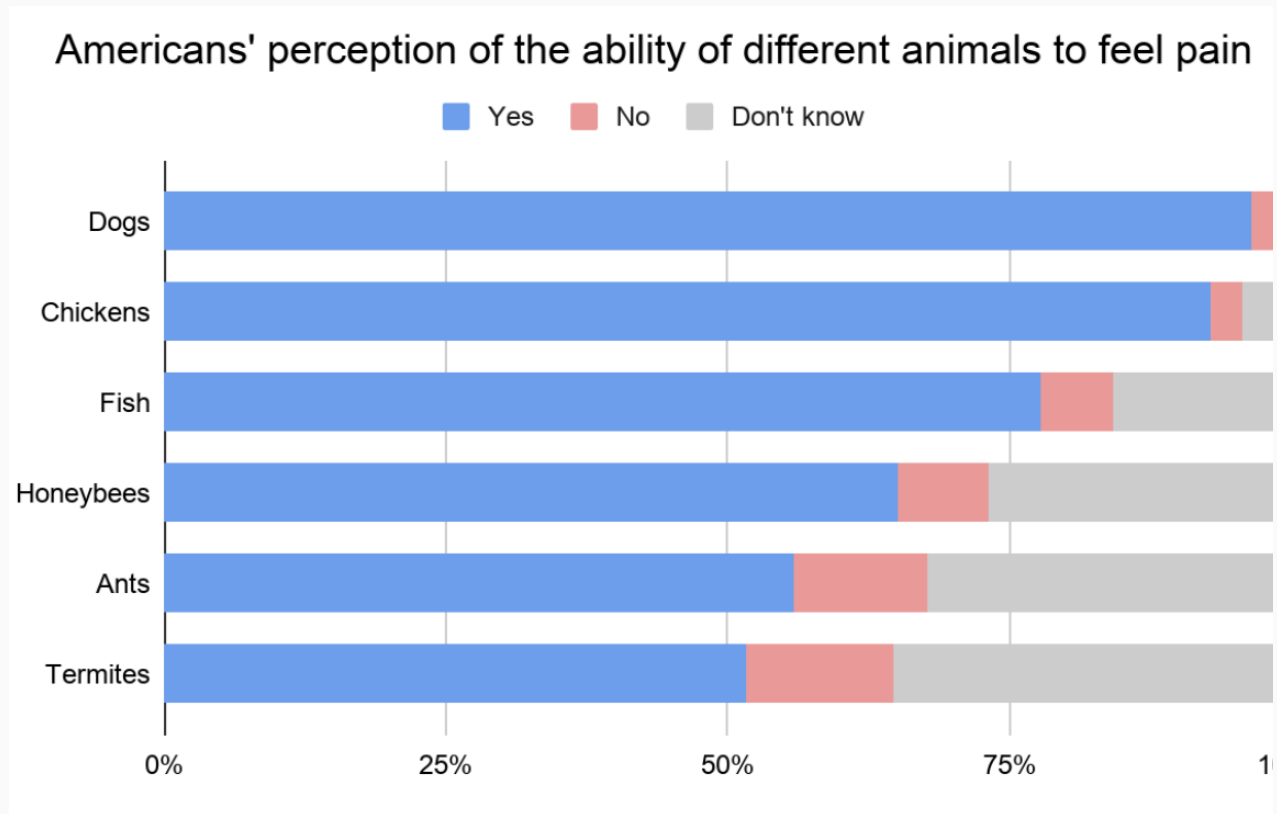
Second, advocates can oppose new investments in insect farming. The industry is reliant on generous investment terms from socially-motivated impact investors and grants from governments in [Canada](#), [the UK](#), and [the EU](#). (I'm generally skeptical of divestment campaigns, since other investors can just replace those who divest. But other investors are unlikely to offer insect farms the generous terms that impact investors and governments currently are.)

Third, advocates can push companies to replace existing insect ingredients. In 2012, a vegan blog reported that Starbucks was using carmine, a red coloring made from crushed cochineal bugs, to color its strawberry Frappuccinos. An outcry ensued, and within a month Starbucks [removed](#) the carmine — a move that may have spared a few billion bugs. Carmine may not be the best target, since cochineal bugs are mostly not farmed. But there are plenty of other farmed insect products on the market.

Fourth, entrepreneurs and investors can hasten this progress through innovation. Unilever recently [launched](#) a vegan alternative to carmine-based lipstick, noting in its promotion that “one red lipstick typically contains up to 1,000 crushed female insects.” Bolt Threads has created a synthetic spider-like silk and a Berkeley startup just raised a funding round to create vegan honey. There's a lot more scope for similar startups and innovation.

Fifth, we can all be more conscious of insects in our advocacy. The most important thing is probably to do no harm. For instance, in lobbying for alternative protein funds we should ensure that insect farming isn't included, and in campaigning against fishmeal rule out insects as a replacement. We may even want to start socializing the idea that insects may be able to suffer. This might not be as badly received as you'd expect: a new

Rethink Priorities poll finds that most Americans already agree that bees, ants, and even termites can feel pain (many others are uncertain — including me).



Question: “How much do you agree or disagree with the following?: {Animal} are capable of feeling pain”. Source: Rethink Priorities national poll of 4,933 Americans, adjusted to match a US nationally representative sample, conducted in October 2020.

More broadly, I think this is a reminder of the importance of talking about animals' capacity to suffer, and not just the climate, health, or other harms of meat. Those latter arguments might get people to ditch meat, but they don't set the basis for us to expand our moral circle. The history of animal advocacy, and perhaps of most moral progress, has been one of expanding our moral circle to include more sentient beings. We may need to expand it a bit further.