

Hello,

I read with great interest Ezra Klein's story, "Let's Launch a Moonshot for Meatless Meat." I appreciate and agree with the goal, but there are several problematic statements in the article. About 20 years ago I wrote one of the first big stories on invasive disease as a special report BusinessWeek so have been following these issues for a while.

I actually would prefer this letter *not* be published in the Times, but rather forwarded to Mr. Klein, who is wonderful journalist and needs to know what he's missed.

1) The medical definitions of zoonotic disease—an animal disease that “jumps” into humans—is at best a half truth. Humans are animals, so a more accurate definition is a disease that affects many species, including humans. The majority of diseases fall under this umbrella. Pathogens jump in all directions. Mountain gorillas picked up measles from us—and there are lots of similar examples. The medical definition sets up a barrier of “them” versus “us,” which isn't helpful.

2) CAFOs (formerly known as stockyards...) are bad, bad, bad news, but it's a nuanced, layered badness. For example, methane: For tens of millions of years atmospheric methane levels remained steady at roughly 700 parts per billion. The curve began to go up around 1800 and started to spike a century later. Today the level is just shy of 1,900 ppb (<https://www.methanelevels.org/>). So what happened? It's not that complicated: the wholesale destruction of a delicately balanced ecosystem. Biodiverse, deep-rooted, carbon-sequestering prairies were plowed under and turned into monocrop corn and soy bean fields. Migratory bison herds were replaced by confined, corn-fed cattle herds. Ruminants have been belching methane since long before modern humans first waved hello. Grasslands and ruminants co-evolved over millions of years. Due to evaporation, transpiration and all those good things we learned about in high school biology, most of the belched methane broke down into CO₂ and water and never ever came close to the upper atmosphere. In fact, the CO₂ byproduct was important for climate stability. So it's not cows that are to blame for methane pollution exactly, but rather the modern meat production system where cows are fed corn, which they can't easily digest, and crammed into feedlots, which cannot mimic the ecological services of grasslands. It is really important to assign blame properly, otherwise it obscures the bigger issue: an ag system at odds with Nature writ large. It's not the cows. It's what we've done to them.

3) Feedlot cows are sick for all kinds of reasons. It's the corn they're fed, the antibiotics they're stuffed full of (some as "growth promoters" - a classic bit of Ag Newspeak), but also the diseases they are prone to simply by being crammed together. The euphemistically named "shipping fever" is a bovine coronavirus that isn't all that different from Covid. It first showed up in the US the 1970s and causes a range of symptoms depending on the age of the animal: pulmonary problems, gastrointestinal disasters and even, as reported by farmers, depression, which suggests a neurological component. Yikes! USDA spent a lot of money developing a vaccine, which basically no one uses because it requires injection up a nostril. If you don't give it to a calf, you've missed the moment. If a cow hasn't already been exposed to shipping fever before it gets to a CAFO, it'll pick it up at a CAFO. (A retired veterinary virologist who has been a long-time source / resource turned me on to this. The person who knows more about various animal coronaviruses than anyone else is Dr. Linda Saif at The OSU —she has given several lectures on coronaviruses, many of which are on YouTube.)

4) Impossible Burgers and such actually are not all that good for the planet. Just because something is plant-based doesn't mean it's good. Right now most of the protein is sourced from conventionally grown, commodity (fence row to fence row) crops that use lots of fertilizer, pesticides, herbicides, fungicides and every other kind of -cide you can think of. In fact, seeds are often coated with neonicotinoids, which have been linked to Colony Collapse Disorder in bees. And glyphosate is commonly used as a desiccant to dry out crops such a soy for easier harvesting. Unless crops are grown as "regenerative organic," it's a problem. (Notably, General Mills, Danone, Unilever and Pepsico are now working to convert their supply chains to regenerative, which will also improve carbon sequestration and water retention.) CAFOs cause all kinds of localized water pollution and, of course, carbon pollution via methane, but they don't cause giant marine dead zones in the Gulf of Mexico. That's a commodity arable crop issue.

5) Almost no one talks about the food safety implications of cell-based meat. The closest ag equivalent would be a dairy, where a lot of attention is paid to bacterial contamination. A bioreactor is basically a vat with a lot of tubes—lots of nooks and crannies for biofilms to establish. Whether or not this presents a significant risk, who knows? I doubt anyone at USDA or FDA would know how to inspect a cell-based meat plant. This, along with health claims, really requires some major tire-kicking. Re health claims, the nutritional value of food is complex. For

example, a modern, giant ear of petrochemical corn has a fraction of the nutritional value of typical ear of corn grown 75 years ago. This has everything to do with the soil microbiome, which has basically been annihilated by decades of fertilizer and -cide applications. No microbes, no micronutrients.

We are at a critical juncture where tipping points are colliding on a daily basis. Inventing a better, more equitable food system is as essential as designing a better energy system if we are to have any hope of navigating our way to a more promising future.

Best,

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(Notnotnot required reading but might enjoy - this is something I recently posted - "All of a Piece" <https://link.medium.com/RRmgZQE6Lfb>)