Eating less meat won't save the planet. Here's why.

Note: *This topic was heavily researched by myself before and after the interview with Dr. Mitloehner. The links to all sources below were found myself* during the course of my own research and while double checking what he had said. Of course the interview with Dr. Mitloehner was greatly valuable and illuminating, I'm only clarifying because some people in the video comments were concerned that I just went with what Dr. Mitloehner had to say and didn't investigate outside of that.*

**He specifically mentioned the 2017 Hall and White study in PNAS.*

[VIDEO TRANSCRIPT WITH LINKS]
Recently, it seems like cows can't catch a break.

"Our meaty diet is literally eating up the planet."[Kurzgesagt]

"It's the worst thing we eat when it comes to global warming - Beef."[Vox]

People say we need to eat less beef to save the planet, that cows are polluting the air with their methane rich burps, they're eating all our food, drinking all our water and taking all our land that we could be using to grow human food on!

When you hear the specifics it sounds like cows **must** be bad:
"To create 1Kg of steak, a cow needs to eat up to 25kg of grain. We could nourish an additional 3.5 billion if we just ate the stuff we feed to animals."[Kurzgesagt]

"About three quarters of all the agricultural land in the world is used for livestock." [The Game Changers]

"I found out that one quarter pound hamburger requires over 660 gallons of water to produce." [Cowspiracy]

"The livestock sector is responsible for 15% of global man made emissions."[The Game Changers]

"Another solution to climate change is we could stop eating animals, and it could be done today."[Cowspiracy]

But are they really giving us the full story? We'll talk about each of these points ... But first let's cut to the chase:

What's the environmental impact of not eating meat? Veganism is on the rise, but **Getting 100% of Americans to go plant based is unrealistic**, so let's be optimistic and say we got 10% of the United States - 33 million people to stop eating meat. Accounting for everything - the methane from cow burps, the emissions from animal manure, emissions from transporting and processing meat and so on… What would be the actual reduction of the United States planet warming greenhouse gases if 33 million people went totally plant-based?

To discuss this, I'm joined here with professor of Animal Science and Air Quality Specialist at the UC Davis - Dr. Frank Mitloehner. By the way, Dr. Mitloehner says of course livestock have an environmental impact, in fact his *job* is to research ways to reduce livestock's environmental impact.

Joseph: "This is reminding me of something you said that was really surprising to me when I first heard it - that if the entirety of the U.S. was to go vegan for a year, then the reduction in emissions would be like…"

Dr. Mitloehner: "The entire U.S. going vegan would be 2.6 percent.* So if everybody were to do it, 2.6%, if one tenth of that would do it, then it would be 0.26%. That's not even measurable, okay? We're talking about changes here that are not even measurable. And take it from a person who measures these things. I measure methane. On the ground, I measure it in the air, I measure it from space. I can tell you - any change less that 1 percent is not measurable. Not measurable."
**Dr. Mitloehner referenced this paper specifically in our interview.*

Now hold up, how could the reduction be so low? Well, there's a lot to break down.

"And it's not just land resources, but water as well. To end up with 24 hamburger patties, it requires the amount of water you see in this pool." [Mark Rober]

DO COWS REALLY TAKE ALL OUR WATER?
Let's start here: Do cows really take all our water?

Joseph: "So this big water footprint that everyone talks about with cows and livestock, where does that water come from?"

Dr. Mitloehner: "So the water input that people assign to beef includes, and that's the majority, the so called green water. And the green water is rain water.* That rain water would fall on that land where the animals graze with cattle present and without cattle present. Now the vast majority of the water that goes into a beef animal will go into the beef animal in the form of feed - not in the form of water that they drink. And guess what happens to that water a few hours after its ingested? It's urinated out. It's not staying in the animal. It stays in the animal as long as the tea that you drank this morning stayed into your body, or inside your body. So that water is not all of a sudden miraculously gone, okay. It is going in and it's coming out - the vast majority

of that is rain water. So, to me, it is disingenuous to say 'oh look at all that water that goes into growing cattle!' would we say the same thing about all the water that goes into trees to grow?" **Showed on screen: "Typical cow's water footprint is 94% green water."*

"Just one quarter pound hamburger takes 1,650 liters of water to produce." [Vox]

Dr. Mitloehner: "So, so but these people who come up with these statistics of these enormous amounts of water going into beef, they're counting rainwater, they're counting green water. And that's just not right."

…The real worry we have is overusing our *freshwater reserve*s for irrigation and 70% of the world's freshwater reserves go to irrigating crops. 53% of the groundwater for crops goes to rice, wheat and cotton.

Sure, at 122 liters of non-green water per quarter pound, beef uses more than say rice which is 90 liters or bread which is 55 liters.* But, think about this: 94.5% of Californian Almonds water usage is not green water. That's 1097 liters per quarter pound - almost ten times more than beef. Think about that the next time you're ordering an almond milk latte.
**waterfootprint.org has a fun resource for exploring water footprints of different products based on Mekonnen, Hoekstra, Hydrology and Earth System Sciences, 2011 and Mekonnen, Hoekstra, UNESCO-IHE, 2010.*

In the midst of the drought in California, the massively irrigated **almond counties** are the driest and have seen the biggest decreases in groundwater reserves.

"In Chile, the avocado thrives, but only by drinking up the country's scarce water resources."[Rotten - The Avocado War]

Also consider that Nutritionists don't say "a human needs precisely two pounds general food material per day."

We need to think about nutritional requirements when we eat and beef is way more nutrient dense, so yea, 122 liters used to make a quarter pound of beef is not nothing, but you can't compare that to a quarter pound of rice which uses only 90 liters but …provides only 1/5th the protein and much less vitamins and minerals.

Also rarely mentioned is that cows also provide **highly** nutrient dense organ meats like liver.

I'm not saying that we should stop eating rice or almonds to save the planet. Everybody needs to eat, and different people like eating different things. Just if we're gonna talk about water, let's look at the full picture.

DO COWS REALLY TAKE ALL OUR FOOD?

Now what about resources, aren't we wasting so much food on cows that hungry people could eat instead?

Dr. Mitloehner: "In the world, take this, in the world, 84 percent of all livestock feed across all species, 84% is non-human edible. 16, one six, sixteen percent of all feed is human edible, but the vast majority of that goes into poultry and pigs because they are monogastric animals, similarly to humans, okay? The vast majority of what we feed to ruminant livestock throughout the world, the vast majority, well over 90% is non-human edible. They are upcycling nutrients and they are making available feed that would normally be wasted."*
**Shown on screen: Anne Mottet (FAO), "Livestock: on our plates or eating at our table? A new analysis of the feed/food debate" Journal of Global Food Security, 2017 . I am not sure if this is the specific paper Dr. Mitloehner had in mind. While double checking his claims, I found this paper and it matched what he was saying.*

The thing is Animal agriculture doesn't just take resources, pump out meat and methane and that's it. Animal agriculture is part of a huge ecosystem.

For example, a ton of otherwise useless crop byproducts produced when growing food for people can be made use of by livestock. When you grow corn, what do you do with the husks and the other stuff that comes out of the ground? You can feed it to cows. When you buy a package of almonds, a ton of resources were used creating things you can't eat like millions and millions of almond hulls. These can be fed to cattle.

Just this week I went to a Japanese dairy ranch. Plenty of soy is consumed in this country and these cows are eating kilos and kilos of the leftover soybean skins.

Do you eat oatmeal? Well, livestock are eating the otherwise useless oat hulls and straw. Even things like scraps from bakeries, corn cobs, cottonseed, brewers grains left over from making beer and tons of other things are fed to livestock. For every 100lb of food we make for humans from crops, 37lbs of human inedible by products are created. Livestock take 43.2 Billion kilograms of stuff that we can't eat and turn that into edible animal foods like meat and dairy.

So no, it doesn't take 25kilograms of grain to make 1 kilogram of beef. A 2017 paper by Anne Mottet from the FAO took into account the fact that we can't eat most of what cows eat so the number becomes just 2.8 kilograms of human edible stuff to make 1 kilogram of beef. For pork and chicken it's a little higher at 3.2 kilograms of stuff we can eat per kilogram of meat.
In any case, the obesity epidemic is not showing that we need more general calories. Animals take excess grain calories and turn them into a high quality *efficient* source of protein. Animal foods currently provide 48% of our protein, but only 24% of our calories.

By the way, if we want to feed more people there's a simpler way to do that which I'll talk about later.

DO COWS REALLY TAKE ALL OUR LAND?

You might be thinking I'm missing the point - if we freed up all that land the cows are using, we could grow plenty of plant sources of protein and healthy fruits and vegetables.

"If you combined all the land in the U.S. dedicated to raising animals, you would get an area like this. Now compare that to the amount of land needed for crops we actually eat ourselves directly." [Mark Rober]

So, do cows really take all our land that we could be using to grow food for people? Here's Dr. Mitloehner explaining that without ruminants, 2/3rds of our food producing land would actually go to waste.

Dr. Mitloehner: "Now take this, now take this. Of all agricultural land in the world, 2.3rds of that agricultural land is what we call marginal - meaning you cannot grow crops there. The reason why you cannot grow crops there is it's too rocky, it's too hilly, the soil is not good enough or there's not enough water. Marginal land. 2/3rds of all agricultural lands are marginal. The only food producing land use for these 2/3rds of all agricultural lands are ruminant livestock. Only they can make use of that land because they can eat grass, that grass is high in cellulose, and that cellulose they can digest, and they can convert because they have microbes in their digestive tract that can make that conversion. And so, 1/3rd of all agricultural land in the world, that's the remaining 1/3rd, is the arable land. And the arable land is the land where we can grow crops. So, particularly our ruminant livestock is really unique in so far that these animals upcycle, upcycle, non-human edible feed into highly digestible and highly nutritious animal source food such as beef or dairy."

So when you hear shocking soundbytes like this:

"A vast majority is for agriculture, and when you divide that up, you see that land for grazing animals far surpasses land for growing crops."[Vox]

they're technically right… but they don't say Why. The reason is mostly because you can't just grow whatever you want wherever you want - Just in the United States, the soil conditions across regions are quite different. There is a reason California produces a huge amount of the United States' food - over **90%** of all the walnuts, almonds, pistachios, broccoli, strawberries, grapes, kiwis, celery, garlic, artichoke, tomatoes and other food comes from California with its warm climate and good soil conditions. On the other hand, there are tons of areas in the world where the main thing that easily grows is grass and other things that ruminants like cows, sheep and goats can eat. If you don't put ruminants on that land, it will go to waste.

Speaking of making use of our lands, Livestock also contribute a very valuable resource for growing fruits and vegetables - natural fertilizer, manure.

Dr. Mitloehner: "Yea, half of all fertilizers used in the world are animal manure. Half of all fertilizers used are animal manure, the other half are chemical fertilizers. And all fertilizers going onto organic crops are animal manure or other animal products."

So while livestock take a little bit of grain from humans, 50% of the fertilizer that makes crops like these grains possible come from livestock.

“To make our favorite food group even more unsustainable, about 15% of all greenhouse gas emissions caused by humans are created by the meat industry.”[Kurzgesagt]

WHY GLOBAL NUMBERS ARE MISLEADING.

Lastly, yes. **Globally** livestock make up 14.5% of emissions. But this number is misleading and mostly irrelevant. Why?

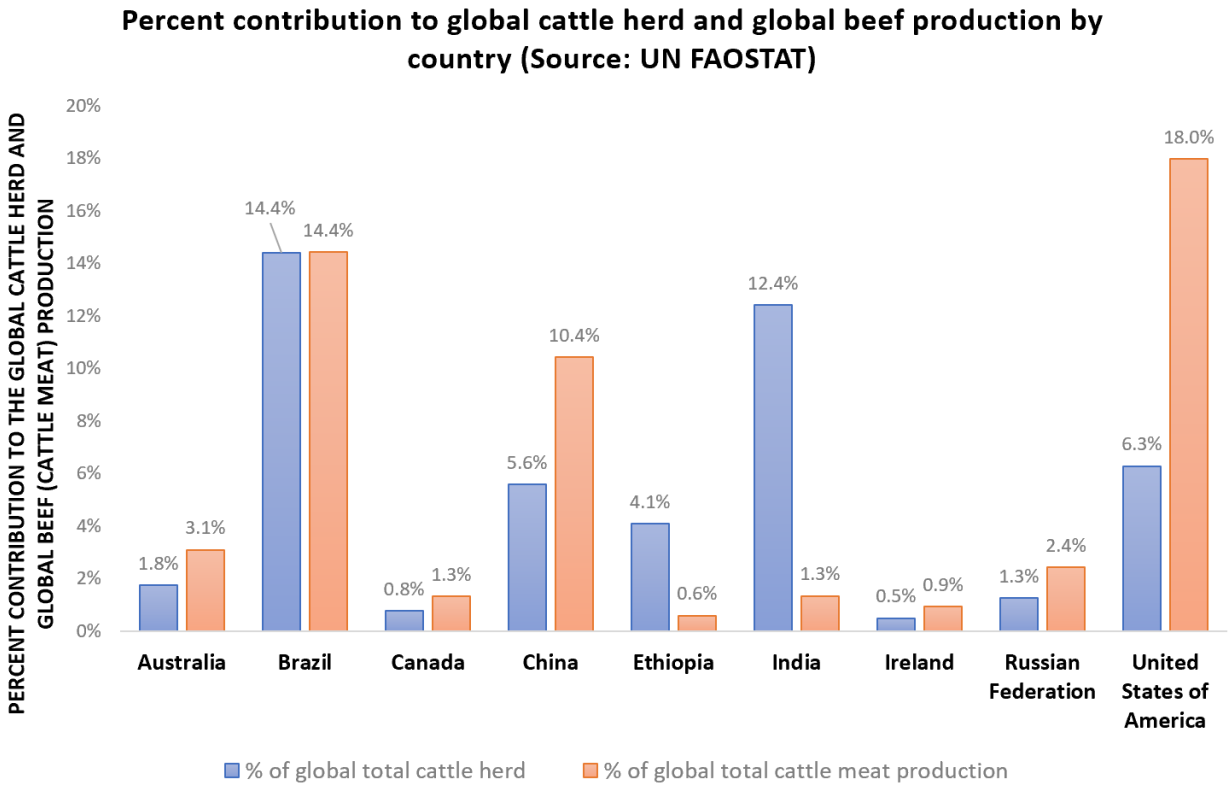
Dr. Mitloehner: “It is important to higlight that there are huge regional differences and they have to be accounted for because otherwise we’re going on a wrong path to solutions… because the world average doesn’t matter. The world average doesn’t matter. The world average emissions don’t matter in Paraguay, they don’t matter in the United States, they don’t matter in Japan! Because they are just a world average. So this is not finger pointing here, this is not about saying we do things right in the developed world, they do things wrong in the developing world, we’re not saying that at all. But, if you now have to come up with a global average number, then that global average number is heavily titled towards being high because most countries in the world are developing countries and 80% of all livestock emissions in the world, eight zero, eighty percent, occur in developing countries.”

“We are now announcing today, that in 15 public schools in brooklyn, we will be instituting meatless mondays. There is a climate crisis and the decisions we make have an impact on that crisis.”

So when people in the United States say we should replace animal food with more plant food, think about the fact that crop agriculture accounts for **more** emissions than livestock. Where crop agriculture accounts for 4.7% of emissions… livestock only accounts for 3.9% of emissions and everyone is talking about the environmental impact of beef, but cows are only 2% of emissions.
So even if we were to cut out livestock in order to reduce those emissions, you have to remember the emissions from growing more crops for food would rise.

Dr. Mitloehner: “So let me tell you this, so if you were a citizen in the U.S. eating beef, then you’d be in a country that produces 18% of the world’s beef with 6% of the world’s beef herd.* So we have a very efficient beef production here, and when I say efficient, I don’t mean CAFO, I mean you can be efficient with a grazing system, you can be efficient with a more commercial system particularly the beef and the dairy sector are extremely efficient here, while we for example have 9 million dairy cows in the United States, India has 300 million dairy animals. And they could produce the same amount of milk as they do currently with their 300 with 10 times fewer cows, 10 times fewer cows. Without even a major effort.”

*See image:



You can crunch the numbers here: http://www.fao.org/faostat/en/#data/QL

Wait, but what *about* methane? Yes, methane does warm the earth much more than carbon dioxide, but the amount of methane is of course important. When we measure methane in carbon dioxide equivalent, methane emissions only account for 10% of greenhouse gas emissions in the US. Of that 10%, only 27% is enteric fermentation - that is methane from livestock burps. That's only 2.7% total - and that's from all livestock, not just cows.

Methane from cows and other animals is part of a natural cycle and is much different from the carbon dioxide coming out of cars or airplanes. Grass takes up carbon from the air by photosynthesis, cows eat the plant and its carbon, in the cow, that carbon is then turned into methane - which is carbon and four hydrogens - CH4, methane is released into the air when the cow burps. Then in about 10 years it's broken down into water and carbon dioxide. What this means is that the cow not adding new carbon to the atmosphere. The it emits is made out of the carbon the grass got from the air in the first place. What this cycle means is if you maintain the same amount of cows they won't add additional warming to the earth.* And over the past 20 years, the number of cows in the United States has mostly remained the same.

**This phenomenon is known as the "biogenic carbon cycle." Also, two important points are lacking from this methane part: (1) CO2 equivalents are not an accurate way to talk about*

methane. (2) Methane is what's called a "flow" gas whereas CO2 is a "stock" gas. Learn more about this here.

On the other hand, when you rip fossil fuels out of the ground and burn them as fuel, you add totally new carbon dioxide to the environment every time you drive your car or ride an airplane... and that just builds up and stays in the atmosphere.

By the way, Ruminants adding methane to the environment is not anything new at all. A 2011 study estimated that hundreds of years ago before Europeans settled the United States, 50 million wild bison as well as elk and deer produced an amount of methane equal to 86% of that of present day farmed animals' methane emissions.

"The single biggest thing you can do is to cut out meat by one day a week. It will save you a ton of carbon a year and that is the equivalent of not driving for 6 months."[Good Morning Britain]

Dr. Mitloehner: "In fact, the way they describe the impact of livestock on the environment in my opinion, is dangerous. Why do I say it's dangerous? I say it's dangerous because we know that in places like the U.S. or Japan or many other developed countries, by far, the most impactful human activity on climate is the use of fossil fuel: Oil, Coal and Gas. That's the transportation sector, the power sector, it's the cement industry and so on. These three alone produce 80% of all gases. These three fossil fuel consuming sectors emit 80% of all greenhouse gases. Livestock, approximately four or five percent. That's not nothing, it's something and it needs to be reduced. But to suggest that what you eat, whether you eat a burger this week or not or if you eat sushi, whatever you eat - that that will make a difference on our climate is irresponsible. Why? Because it is a smokescreen deflecting off the 800 pound gorilla, some people call it the elephant in the room. And that is our use of fossil fuel. That is why this discussion can be even dangerous."

"No other lifestyle choice has a farther reaching and more profoundly positive impact on the planet than choosing to stop consuming animals and live a vegan lifestyle."[Cowspiracy]
Graphic on screen: 75% of emissions in 2018 came from fossil fuels burning

FOOD WASTE
Speaking of methane, plenty of things emit methane. One big source of methane is organic matter decomposing in landfills. What's in the landfills? Wasted food.

"This is about 6 tons of food waste. They'll get 30 deliveries just like this one every single day."

When it comes to food, there is something much more worth talking about than meat. 1/3rd of all food produced in the world ends up wasted. The FAO says that "If food wastage were a country, it would be the third largest emitting country in the world."

Food gets wasted for different reasons - in developed countries, waste happens mostly at the retailer and consumer end. In the United States, 40% of all food does not get eaten.

Another thing in that study that calculated the emission reduction of everyone going plant-based didn't take into account was food waste. This is important, because what is getting wasted? Meat and dairy makes up 14% of our food waste. But the non-animal foods make up the *majority of our food waste.* Fruits and vegetables make up 42%, cereal grains including bread and rice make up 22% and roots and tubers like potatoes make up 18% of our food waste meaning non-animal foods make up 82% of our food waste.

On screen: "These are global numbers. Collectively in the USA, Canada, Australia and New Zealand, 38% of grain products and 52% of fruits and vegetables are wasted, but only 22% of meat and 20% of milk is wasted.(S)

So while animal agriculture isn't perfect, another side effect of giving it up would probably be more food waste. Now whether it's meat or vegetables, all food waste in general is a huge problem first and foremost - all the resources that went into making all these foods get wasted along with the food.And animals could be a part of the solution, because the old bakery goods or bruised fruit and vegetables that won't sell could be sold to livestock.

The point is if we're going to talk about the environmental impact of our food, let's be real and acknowledge that instead of meatless Mondays, something like …no-food-waste Wednesdays might be a lot more worth our time.

Dr. Mitloehner: "The main issues on the environmental front are our use of fossil fuels. The main issues on our food side is the enormous food waste we generate. We are not using the vast majority of the food we use in this country and in the world and we can do much better."