The Price We All Pay

An Examination of One of Humanity's Greatest Blind Spots



Some of the greatest threats facing humanity appear unrelated. Climate change. Biodiversity loss. Water scarcity. Hunger. Disease. Environmental degradation.

But what if they are connected by a single, largely overlooked institution?

The Price We All Pay examines the far-reaching consequences of one of the most deeply embedded yet least questioned features of modern civilisation. Drawing on science, economics, environmental research, and ethics, this book shows how a single human institution contributes to problems that are usually discussed in isolation.

> “Logical consequences are the scarecrows of fools and the beacons of wise men” – Thomas Henry Huxley

The ethical case against animal exploitation is compelling in its own right. Yet beyond the moral argument lies an empirical reality: the consequences of animal agriculture extend far beyond animal suffering. They permeate multiple domains that threaten the well-being of humans, non-human animals, and the ecosystems upon which they all depend. What follows is an overview of that interconnected damage.

> “There is no greater wrecking ball to the planet than the industries that turn animals into food. No single choice that we make will have a bigger or more positive impact than avoiding these industries.” - David Agranoff, author and screenwriter

Of all forms of animal exploitation, the production, killing, and consumption of non-human animals is the most destructive. It is also the most final, for every animal subjected to it. It’s the most extreme form of instrumentalism, in which other species' value begins when they are dead. It is environmentally, ecologically, economically, and ethically destructive.

Eight Evils of Animal Agriculture

> “People often argue with me by saying, ‘There's nothing wrong with eating meat’. They're right. Apart from stabbing, electrocution, force feeding, branding, castration, forced impregnation, gestation crates, debeaking, dehorning, confinement, mother/infant separation, greenhouse gas emissions, deforestation, climate change, ear punching, tail docking, mulesing, excessive water usage, soil erosion, killing millions of infants on a daily basis because they are not deemed to be profitable for the industry, live export, poverty and starvation while we use half the world's crops and a third of the world's freshwater supply to raise livestock, rates of rape and violent crime rising in particular areas as a direct result of slaughterhouse employment, grinding machines, habitat destruction, species extinction, culling wild animals to protect livestock, supporting unnecessary violence, gassing, suffocation, ocean dead zones, pollution, systematic violence and oppression, excessive land usage, and paying the wages of animal abusers on a daily basis, there's absolutely nothing wrong with eating meat.” - George Martin

I have been accused of 'moralising' and 'virtue signalling' because I argue that the effects of animal agriculture are a moral issue. I am not alone. Here’s what historian and philosopher Yuval Noah Harari thinks:

> “Animals are the main victims of history, and the treatment of domesticated animals in industrial farms is perhaps the worst crime in history” - Yuval Noah Harari, *Guardian Article,* Sep 2015

It most certainly is a moral issue, not only because of the cruelty to non-human animals, which cannot be set aside purely because they are not human; that is the very essence of speciesism. They suffer enormously and they are not different enough in the aspects that matter, in that their capacity is very much like ours with respect to their ability to feel pain and/or experience emotion.

It is also a moral issue because animal agriculture has effects that impact on other humans. Morality requires consideration of all affected parties.

There are millions of children suffering from hunger, many in countries where crops are grown and exported to feed livestock elsewhere. This is impossible to justify once all the consequences are considered, given that the same land and water employed in the growing of vegetables and fruit could feed the entire world. The extravagance of meat has other trade-offs: livestock is still the largest contributor to climate change, creates significant pollution which poisons waterways and soil in areas close to factory farms, and creates dead zones when these waterways enter the sea.

Meat also impacts human health. Processed meats contain carcinogens and red meat is not far behind; meat and dairy include saturated fats which are a significant factor in diabetes and heart disease.

There are several domains in which animal agriculture has negative impacts. The consequences of animal agriculture are so extensive that no single volume could examine every aspect in exhaustive detail. The aim of this book is to present the principal domains of harm, supported by representative evidence, and to show how they combine into one of the most destructive human enterprises in history.

No single consequence of animal agriculture establishes the moral case on its own. The ethical force emerges from the convergence of many independent consequences. Resource inefficiency, environmental degradation, climate change, biodiversity loss, human health, human suffering, psychological effects, and direct animal suffering all point in the same direction. Taken individually, each of these domains raises serious concerns. Taken together, they present a cumulative case that is difficult to ignore.

Domain 1: The Price of Flesh: Indulgence and Waste

The Profligacy of Meat

Farm animals consume large amounts of feed, including grains, soy, and other crops, which require significant resources (land, water, and energy) to produce.

Globally, approximately 36% of the calories produced by the world's crops are used for animal feed, yet only 12% of those feed calories ultimately contribute to the human diet as meat and other animal products.

Animal agriculture is resource-intensive and inefficient compared to plant-based food production. Whether we are talking about land use, water use, protein yield, calories yield, meat and dairy must be considered a waste of everything used to produce it. This is due to the significant inputs required to raise animals for meat, dairy, and eggs compared to the direct production of plant-based foods. Here is a comparative analysis based on various resources:

1. Land Use

> "If we shift away from eating meat and dairy…we could still produce enough to feed us but do so using a quarter of the land. This could free up an area the size of the United States, China, the European Union and Australia combined – a space that could then be given back to nature." – Sir David Attenborough

The livestock sector is by far the single largest anthropogenic user of land. The total area occupied by grazing is equivalent to 26 percent of the ice-free terrestrial surface of the planet. In addition, the total area dedicated to feed crop production amounts to 33 percent of total arable land. In all, livestock production accounts for 77 percent of all agricultural land and 30 percent of the land surface of the planet.

Animal Agriculture requires large amounts of land for grazing and growing feed crops (e.g., soy, corn). About 77% of global agricultural land is used for livestock production, but it provides only 18% of global calories or 37% of protein.

Meat & animal products land footprint (square meters per kilogram):

Beef: between 27 and 40 m^2/kg

Lamb: about 25 m^2/kg

Pork between 7 and 12 m^2/kg

Chicken between 5 and 7 m^2/kg

Eggs use about 4–5 m^2/kg

Cheese about 10–15 m^2/kg

Milk about 1–2 m^2/kg.

Plant-based foods:

Nuts use between 7 and 10 m^2/kg

Rice between 1.5 and 3 m^2/kg

Wheat between 0.8 and 2 m^2/kg

Corn between 0.5 and 1.5 m^2/kg

Soy beans between 1 and 2 m^2/kg

Potatoes between 0.3 and 0.6 m^2/kg

Vegetables between 0.2 and 1 m^2/kg

Fruits between 0.5 and 1.5 m^2/kg. (Our World in Data)

Plant-based agriculture produces more calories and protein per unit area. Crops like potatoes, rice, and wheat can deliver 4–20 times more calories per hectare than beef. Plant-based food is the better option, in the case of land, by a LONG way.

1.5 acres can produce 375 lbs. of beef or 37,000 lbs. of plant foods. (Schwab, Denise, et al. *Grass-fed and Organic Beef: Production Costs and Breakeven Market Prices*, 2008-2009. Iowa State University 2012)

From Our World in Data:

> "The 11 million square kilometres used for crops supply more calories and protein for the global population than the almost four-times larger area used for livestock."
>
> "In the hypothetical scenario in which the entire world adopted a vegan diet the researchers estimate that our total agricultural land use would shrink from 4.1 billion hectares to 1 billion hectares. A reduction of 75%. That's equal to an area the size of North America and Brazil combined."

As noted by the UN, we could feed an additional 3.5 billion people simply by growing crops for human consumption on land currently used to grow feed for livestock. A global shift to plant-based food production could reduce global farmland use by up to 75%, drastically decreasing deforestation and habitat loss, and cutting emissions from the food system by up to 70%.

There is a simplistic argument that has gained traction among carnists: it is the notion that only animals can produce food from marginal lands. It's true but misleading. The claim that 86% of livestock feed comes from land that cannot be used to grow food for humans is partially accurate, but it requires context to understand its implications.

A significant portion of livestock (particularly ruminants like cattle, sheep, and goats) grazes on marginal lands that are not suitable for crop production due to poor soil, steep slopes, or lack of water. These lands often support grasslands or shrublands, which are better suited for grazing than farming. This claim relies on an implicit normative assumption: that land unsuitable for crop production must, by default, be used for grazing. In reality, such land has multiple potential states, including rewilding, carbon sequestration, and biodiversity restoration. The framing of livestock as the inevitable or "productive" use reflects an anthropocentric bias toward exploitation rather than an objective assessment of ecological value.

If we were using land to grow food for humans instead of livestock, we wouldn't need the marginal land because we need less than 25% of the land to do so. We would also encroach less on land where wild animals live, and reduce our significant effect on reduction of biodiversity. When fine croplands are used to produce other foods for direct human consumption instead of cattle, they provide 10 times more of the most well-known preventive micronutrients per unit resource utilised, enhance public health, and provide 3-7 times more protein - including all essential amino acids - per kg CO2e (CO2 equivalent) emitted, hectare occupied, or kilogram reactive nitrogen used.

Marginal land grazing is not nutritionally efficient: The feed conversion ratio (FCR) is still very poor for ruminants. Even on marginal land, calories and protein derived from animal products are highly inefficient compared to direct plant consumption. You're producing fewer calories per hectare than if the land were used for wild regeneration or more innovative plant-based production.

In industrial systems, a significant portion of livestock (especially poultry, pigs, and feedlot-finished cattle) is fed grains like corn and soy, which are grown on arable land suitable for human crops. For example, about 40% of U.S. corn production is used for livestock feed, and much of it could theoretically be redirected to human consumption.

The claim is technically correct but oversimplified. While much of the feed for livestock comes from marginal land or non-human-edible sources, intensive livestock systems still rely heavily on grains grown on prime agricultural land. This complicates the narrative, as the use of such grains raises concerns about resource efficiency and food security.

Bottom line: Animal agriculture uses far more land than necessary to produce the same amount of nutrition that could be produced growing plants.

2. Water: A Finite Resource, Inefficiently Used

Water scarcity is an increasing global constraint, and agriculture already accounts for around 70% of freshwater withdrawals worldwide, according to the Food and Agriculture Organization.

Comparisons of water use can be striking. Estimates from the Water Footprint Network:

Beef: ~15 000 litres per kilogram

Pork: ~6 000 litres per kilogram

Chicken: ~4 000 litres per kilogram

Milk: between 628 and 1 020 litres of water to produce ONE litre of milk.

Compared to:

Potatoes: ~300 litres per kilogram

Wheat: ~1 500 – 1 800 litres per kilogram

Lentils: ~1 000 – 1 500 litres per kilogram

Vegetables: ~300 – 600 litres per kilogram

Soy milk: ~28 litres of water per litre of milk

Oat milk: ~48 litres of water per litre of milk

Almond milk: ~371 litres of water per litre of milk

At face value, these differences are substantial. However, these figures include rainfall as well as irrigation, and are often misunderstood. What matters is not just the total, but the pattern they reveal. Producing animal-based food typically requires more water per unit of nutrition than producing plant-based food. The reason is structural. Animals must be fed, and in converting crops into meat, much of the original energy and protein is lost. The result is a system that multiplies water demand relative to direct plant consumption.

Even when focusing only on irrigation - the form of water most directly linked to scarcity - the same relationship holds: animal products, particularly beef, tend to require several times more water per unit of protein than plant-based foods such as legumes.

Producing animal-based food generally requires more water per unit of nutrition than producing plant-based food.

The reason is structural. Animals do not create calories - they convert them, inefficiently. Crops are grown, water is used, and much of that energy is lost before it ever reaches the plate. The result is a system that amplifies water demand rather than minimises it.

This becomes critical in regions where water is scarce. Irrigated feed production draws on rivers and aquifers that are already under strain, contributing to groundwater depletion, river depletion, and competition with human needs. At the same time, intensive livestock farming degrades water quality through runoff - polluting freshwater systems with waste, chemicals, and pathogens, and reducing the amount of water that is actually usable.

Water, unlike many other resources, is not easily substituted. It is local, finite, and essential to all life. Yet vast quantities are directed toward one of the least efficient ways of producing food - often to supply diets that are not nutritionally necessary, and primarily consumed by the most affluent populations.

The ethical tension is difficult to ignore: billions of people lack reliable access to clean water, while water is systematically channelled into resource-intensive systems that produce less food, more pollution, and significant animal suffering.

This is not simply a question of consumption, but of allocation. A system that uses more water to produce less food - while degrading the very resource it depends on - raises fundamental questions about responsibility, sustainability, and moral priority.

Shifting toward more plant-based diets would not solve water scarcity on its own. But it would reduce pressure on freshwater systems, improve efficiency, and align resource use more closely with human need.

In a water-constrained world, how we produce food is no longer just a matter of preference - it is a matter of consequence.

Bottom line: It’s not about high water consumption, but low nutritional return for that consumption in comparison to plants.

3. Energy Use

Animals occupy a higher trophic level than plants. Every time energy moves from one trophic level to the next, most of it is lost through metabolism, heat, movement, and maintenance.

For example, cattle typically convert only a small fraction of feed calories into edible beef. Chickens and pigs are more efficient than cattle but still require substantially more plant calories than they ultimately provide as food. In effect, humans can obtain far more nutrition by consuming many of those crops directly.

This is fundamentally an application of the Second Law of Thermodynamics to biological systems.

Animals consume more calories than they produce as meat, milk, or eggs. For every 100 calories fed to livestock, we get 1.9 calories from beef, 4.4 calories from lamb, 8.6 calories from pork, 13 calories from chicken, 19 calories from eggs, and 24 calories from dairy milk. (Our World in Data)

We lose those calories just keeping animals alive. Much of the energy from feed is lost to metabolism, movement, and maintaining body heat. Producing animal-based foods requires significantly more plant calories than it returns. For example, feeding grain to livestock results in a loss of 76–90% of the calories that could have been directly consumed by humans.

This does not rise to the level of 'wasteful' or 'extravagant'; it is fundamentally irrational, whether one examines it from an economic or resource utilisation perspective. The BEST we do is a 76% LOSS. We could just have consumed the calories we fed to the livestock. And we can better utilise the land and water to grow crops.

Animal Agriculture consumes more energy due to feed production, animal maintenance, and processing. For example, producing 1 calorie of beef requires 25 calories of feed energy, while 1 calorie of chicken requires 9 calories of feed.

Plant-based foods are much more energy-efficient; producing plant-based calories (e.g., grains and vegetables) requires far fewer energy inputs. The entire process of growing animals is unnecessary - we can eat the crops…

Bottom line: Animal Agriculture consumes far more energy than it delivers.

4. Protein Inefficiency

The conversion of feed to edible protein by Animal Agriculture is inefficient. For every 100 g of protein we feed to livestock, we get 3.8 g protein from beef, 6.3 g protein from lamb, 8.5 g protein from pork, 19.6 g protein from chicken, 25 g protein from eggs, and 24 g protein from dairy milk. (Our World in Data) This is too expensive, no matter how one tries to justify it.

Cattle convert only about 3-5% of feed protein into edible protein.

Pigs convert about 9-12%, and chickens about 13-20%.

Livestock consume more protein than they produce. It takes about 6 kg of plant protein to produce 1 kg of animal protein, making animal agriculture a hopelessly inefficient way to nourish people.

Plant-based foods directly provide protein with minimal loss. Pulses, legumes, and grains are highly efficient protein sources.

Despite consuming such a high percentage of agricultural resources, animal products (meat, dairy, eggs) contribute only 17-18% of global calorie intake and around 25-37% of protein intake for humans.

This imbalance highlights the inefficiency of the livestock system when it comes to converting plant-based resources into animal-based foods. It has led to growing discussions about the environmental impact of livestock farming, including greenhouse gas emissions, deforestation, and water usage.

Animal agriculture’s inefficiencies stem from converting plant calories into animal products with significant resource losses. Alternatives, including plant-based diets, lab-grown meat, and regenerative agriculture, offer

pathways to reduce the environmental and resource footprint of food production while addressing global food security.

Bottom line: Animal Agriculture loses most of the protein it begins with from plants.

Crops grown for animal feed

The United Nations Food and Agriculture Organization (FAO) has published numerous reports highlighting the inefficiencies in the global food system. For instance, their studies show that a large proportion of cereal crops, such as maize, wheat, and soybeans, is used as animal feed rather than for direct human consumption. This is particularly common in industrialized countries where livestock farming is intensive.

About 15% of the food (including 'seafood') that people eat comes from our 'livestock,' or farmed animals, which consume almost 80% of the food that we take from the world in terms of dry matter biomass. Thus, in terms of dry weight, 85% of the food we eat is plant-based. 82% of our calories and 63% of our protein come from plant-based meals.

A study published in *Science* in 2018 by Poore and Nemecek quantified the environmental impact of livestock farming, noting that livestock feed production constitutes a major portion of agricultural resource use. Groups like the Worldwatch Institute, Our World in Data, and The Good Food Institute highlight that feeding crops to animals instead of directly to humans represents an inefficient use of land, water, and energy resources. The World Resources Institute (WRI) has released reports showing that about 60–70% of global agricultural land is used to grow feed for animals or for grazing, emphasizing the inefficiency in converting plant calories into animal calories.

Crops like soybeans and maize are heavily utilised for livestock feed rather than direct human consumption. In the United States, 47% of soy and 40% of corn are used for animal feed. Globally, more than 75% of soy production serves as feed.

Although soybeans are widely associated with human foods such as tofu or soy milk, the global soybean industry is overwhelmingly driven by demand for livestock feed. Around three-quarters of the world's soybean crop is crushed into oil and protein-rich soybean meal, and it is this meal - not the oil - that constitutes the economic backbone of the industry. Soybean meal is the primary protein source for industrial poultry and pig production worldwide, and its market value and volume far exceed that of soy oil, which is effectively a co-product of the crushing process. Thus, while soy oil enters human food and industrial supply chains, the primary purpose of global soybean cultivation is to supply high-protein feed for livestock, with human foods representing only a minor share of total use.

From the American Soybean Association:

> "Animal agriculture is the soybean industry's largest customer, and more than 90% of U.S. soybeans produced are used as a high-quality protein source for animal feed. About 70% of the soybean's value comes from the meal, and 97% of U.S. soybean meal goes to feed livestock and poultry."

It is sometimes claimed that livestock do not eat soybeans but only the "waste" left over after oil extraction. This is misleading. When soybeans are crushed, the process intentionally produces two valuable co-products: soy oil and soybean meal. Far from being waste, soybean meal is the *primary economic driver* of global soy cultivation, representing roughly 70–80% of the bean's mass and supplying the dominant protein source for industrial livestock production worldwide. In many major producing regions, including the United States and Brazil, meal demand for animal feed is what sustains the soybean industry, with oil functioning as a secondary output. The meal is therefore not a low-value by-product but a purposefully produced, high-value commodity central to modern animal agriculture.

It is inconceivable that anyone could think that producing crops to feed eight billion people would be more harmful than the current situation, which provides plants to feed 90 billion farmed animals. Even accounting for the fact that much livestock feed is not edible by humans, the human-edible crops diverted to animal agriculture alone could nourish roughly three to four billion additional people. The issue is not simply one of food production, but of biological inefficiency: converting plants into animal products sacrifices a large proportion of the available calories.

Approximately 35-40% of the world's livestock are grain-fed, with significant variation depending on the type of livestock and regional agricultural practices. Many cattle are raised on pasture initially but are often ‘finished’ on grain in feedlots, particularly in the U.S. and other industrialized countries. Pigs and poultry are predominantly grain-fed globally, as their diets rely heavily on cereals like corn and soybeans for efficient growth and production. Sheep and goats are more commonly raised on forage and pastures but may receive supplemental grain in intensive systems.

Grain feeding is more common in industrialized farming systems, while livestock in developing countries often rely more on forage and crop residues. The percentage of a livestock animal's life spent on pasture depends on the species, production system, and region. The time spent on pasture varies based on regional agricultural practices, consumer demand, and the availability of resources. For example, in countries with abundant grazing land like New Zealand, livestock spends more time on pasture compared to regions with intensive farming systems.

Defenders of livestock often argue that cattle are efficient because ‘they eat grass’, implying that grazing simply converts an otherwise unused resource into food. This is misleading. Only a minority of cattle are truly grass-fed throughout their lives; most receive high-energy feed such as maize and soy to accelerate growth. More importantly, grass is not a high-yield food source but a low-density fodder that requires vast expanses of land and water, and grass-fed cattle live much longer, emitting substantially more methane over their extended lifespans. When the full lifecycle is considered, grass-based beef systems typically use far more land and water per unit of protein, generate higher greenhouse-gas emissions than feedlot systems, and carry enormous opportunity costs: the same land could support rewilding, restore biodiversity, or produce dramatically more human food. The claim that cattle are efficient because they ‘just eat grass’ collapses under ecological scrutiny.

Subsidies

The meat industry is subsidized in many countries to support food security, rural economies, and farming livelihoods. Subsidies aim to make meat products affordable for consumers, ensure stable prices, and maintain the competitiveness of domestic producers in global markets. However, these subsidies have significant implications for meat prices and the broader economy.

Subsidies significantly lower the cost of meat production, allowing producers to sell meat at prices that do not reflect the true cost of production.

The extent of impact varies: Without subsidies, meat prices would be significantly higher. For example, studies estimate that U.S. beef, pork, and chicken prices would increase by 25–50% if subsidies and externalized costs (e.g., environmental harm) were included. Low meat prices make plant-based foods appear more expensive, even though they are often less resource-intensive to produce. Subsidies shield the industry from the costs of environmental damage (e.g., greenhouse gas emissions, water pollution), passing these costs to taxpayers rather than consumers.

The U.S. government provides billions annually to subsidize corn and soy, which are key components of livestock feed. In 2021, U.S. agricultural subsidies totalled about $38 billion, a significant portion of which indirectly supported meat production.

The EU's Common Agricultural Policy (CAP) allocates subsidies for livestock farmers, accounting for about 18% of the CAP’s total budget.

Livestock farmers benefit from drought relief, tax breaks, and direct payments, enabling the country to remain one of the world's largest meat exporters.

Criticism of Meat Industry Subsidies

From a Guardian article: “For half the world's population the brutal reality is this: you'd be better off as a cow. The average European cow receives $2.20 (£1.40) a day from the taxpayer in subsidies and other aid. Meanwhile, 2.8 billion people in developing countries around the world live on less than $2 a day.”

This is an unjustifiable trade-off.

Meat industry subsidies significantly reduce meat prices, benefiting consumers but creating hidden economic, environmental, and health costs. Reforming subsidies to better reflect the true costs of meat production could incentivise more sustainable and plant-based food systems. Subsidies make meat cheaper, promoting overconsumption and contributing to health problems.

High meat consumption is linked to heart disease, obesity, and certain cancers. Subsidies could instead promote healthier diets by supporting fruits, vegetables, and plant-based proteins. The public health burden of meat-related diseases increases healthcare spending. Redirecting subsidies to preventive health measures could reduce long-term costs.

Subsidizing the meat industry encourages resource-intensive practices that contribute to environmental degradation. Redirecting these funds would mitigate environmental harm, which is detailed under Domain 2: Environmental Degradation.

Government funds used for meat subsidies could drive economic growth and innovation in other sectors. Investing in plant-based food technologies or lab-grown meat could create jobs, foster innovation, and meet growing consumer demand for sustainable alternatives. Supporting diverse, regenerative farming practices could enhance soil health, increase resilience to climate change, and boost food security. Redirecting funds to education for farmers on sustainable practices or transitioning to alternative livelihoods could improve rural economies.

Subsidies perpetuate inequities and ethical concerns. By diverting vast amounts of grain and soy to feed livestock instead of humans, meat subsidies reduce the availability of affordable plant-based food for global populations. Subsidies sustain intensive factory farming, which is often associated with poor animal welfare standards. These funds could support higher welfare systems or alternative agricultural models.

Public funds used for meat subsidies could be allocated to other pressing societal needs: increased funding for schools and public education systems, investment in public health infrastructure and access to care, and investment in transportation, housing, and renewable energy systems. Governments pour billions in subsidies into meat and dairy, more than they invest in renewable energy, shaping diets and economies like a hidden hand.

By artificially lowering meat prices, subsidies discourage competition and innovation in alternative food systems. Subsidies misallocate resources toward less efficient systems (e.g., animal agriculture) instead of supporting high-yield, low-impact crops. Cheaper meat prices make plant-based and sustainable alternatives less competitive, slowing innovation and adoption of these products.

A 2021 study estimated that redirecting global agricultural subsidies (around $540 billion annually) to sustainable practices could significantly reduce greenhouse gas emissions and improve food security. Shifting subsidies to plant-based diets could reduce public health costs by $1.5 trillion annually, according to the World Economic Forum. Subsidies support livestock farming, often at the expense of forested land and biodiversity. Funds could instead support reforestation or sustainable agricultural practices.

Subsidies enable water-intensive meat production. Investments in water-saving technologies or drought-resistant crops could better address water shortages. Redirecting subsidies to renewable energy or carbon sequestration initiatives could significantly lower emissions.

Opportunities Lost

The utilisation of scarce resources like land, water, and feed inputs in animal agriculture has profound impacts on humans, affecting food security, environmental sustainability, public health, and economic stability.

The opportunity costs of meat subsidies are vast, spanning environmental, economic, social, and ethical domains. Redirecting these subsidies toward sustainable, health-promoting, and innovative practices could yield far greater long-term benefits for society and the planet.

> “This, then, becomes a matter of ethics, it becomes a matter of social justice. The person sitting next to you who is eating a steak, pork, chicken, cheese, or fish is taking away resources that could be spread more evenly, more efficiently, and used to support the life of perhaps 20 other people and thousands of other species, while helping to mitigate climate change rather than causing it.” - Dr Oppenlander

Meat has the highest water and land footprint, especially beef and lamb. This is due to the inefficiency of converting plant calories into animal protein and the land required for grazing and feed crops. Dairy products have a lower footprint than meat but still require significant resources.

Nuts have a high water footprint but a relatively lower land footprint compared to meat. Staple grains like rice, wheat, and corn have lower land and water use per kilogram than animal products. Vegetables, fruits, and tubers have the lowest footprints overall.

Then there are the greenhouse gas emissions per food type. For every kg of beef produced, 100 kg of carbon dioxide equivalent emissions are produced. For every kg of lamb, 40 kg; cheese 24 kg, dairy milk 20 kg, pork 12 kg, Chicken 10 kg.

Compare these to tofu and corn at 2 kg, Rice 1.22 kg. Wheat 0.66 kg, Maize (Corn) 0.45 kg, Peas 0.98 kg, Potatoes 0.27 kg, Tomatoes 0.15 kg and Carrots 0.06 kg.

No economist or environmentalist or efficiency expert who is actually applying their mind would consider meat and dairy to be optimal use of resources.

Let me put it another way: To grow food, using land and water which are becoming more and more scarce, then feeding it to animals for at least 18 months (beef cattle and chickens) and 5-7 months (pigs), which after killing them produces LESS calories and protein than what you fed them, seems insane. What cannot be argued is that it is 'efficient', particularly once we add all the other effects, which include soil degradation, environmental pollution, global warming, and loss of biological diversity.

The system is not merely ethically troubling - it is structurally irrational. Humanity allocates vast resources to producing animal products even when doing so destroys a majority of the food energy originally produced.

Business models talk about 'cutting out the middle man' (the animals) to enhance market efficiency, but in this case we seem addicted to this hopelessly incompetent approach. To refer to this as 'wasteful' is an understatement. This is reckless extravagance. Only elitists, addicted to indulgence, think this is a good idea.

> "A meat-fed world now appears a chimera. World grain production has grown more slowly than population since 1984, and farmers lack new methods for repeating the gains of the green revolution. Supporting the world's current population of 5.4 billion people on an American-style diet would require two-and-a-half times as much grain as the world's farmers produce for all purposes. A future world of 8 billion to 14 billion people eating the American ration of 220 grams of grain-fed meat a day can be nothing but a flight of fancy."
> - Durning, Alan B. & Brough, Holly, Worldwatch Institute

In addition, there is the significant influence of Agribusiness interests.

Agribusiness – Power through Financial Leverage

> "Money doesn't talk, it swears." - Bob Dylan

Agribusiness today is not just a producer of food - it is one of the most powerful political forces on earth. Its immense financial resources allow it to shape public policy, not only in the countries where it is based, but across the globe. Through lobbying, campaign donations, marketing, and control of research funding, it influences what laws are written, what science is published, and what the public is told about food, health, and the environment.

Neoliberal capitalism is not aligned with sustainability - it is selfishness codified into economic policy, rewarding extraction and profit while externalizing the costs to people, animals, and the planet. Agribusiness thrives within this framework precisely because it can extract the most while giving back the least.

The complexity and reach of these networks make their influence largely invisible to ordinary people, who rarely see how their governments' decisions about trade, subsidies, or dietary guidelines are steered by private interests. And that invisibility is dangerous: as long as the public remains unaware, agribusiness will go on undermining nutrition, eroding ecosystems, and sacrificing animal welfare - securing profits today while bankrupting the future of food itself.

It just isn't sustainable.

Domain 2: Environmental Degradation

> "...as environmental science has advanced, it has become apparent that the human appetite for animal flesh is a driving force behind virtually every major category of environmental damage now threatening the human future - deforestation, erosion, fresh water scarcity, air and water pollution, climate change, biodiversity loss, social injustice, the destabilization of communities, and the spread of disease." - Worldwatch Institute

Animal Agriculture is a major driver of environmental degradation, affecting land, air, water, and biodiversity. Addressing its impact requires systemic changes in agricultural practices, consumer behaviour, and policies to promote sustainability.

Water Consumption, Pollution, and Ocean Dead Zones

Livestock farming and dairy are water-intensive, consuming vast amounts of freshwater for drinking, feed crops, and cleaning operations. Dairy farms generate large amounts of manure, leading to water contamination and algae blooms that harm aquatic life. Water supplies are depleted for irrigation of animal feed crops, worsening droughts and water scarcity. Animal waste, fertilizers, and pesticides from feed crops contribute to water pollution, leading to eutrophication, a process where water bodies become overly enriched with minerals and nutrients, leading to excessive growth of algae and depletion of oxygen. Animal waste and runoff from fields treated with manure and inorganic fertilizers are rich in nitrogen and phosphorus, the primary culprits behind eutrophication, leading to dead zones in water bodies and contamination of drinking water. Runoff from factory farms can introduce harmful bacteria, antibiotics, and hormones into waterways, affecting ecosystems and human health.

The Gulf of Mexico dead zone (linked to U.S. Midwest farming) is one of the largest, fuelled by livestock waste and fertilizer runoff. In China, the Huai River Basin experiences severe eutrophication due largely to pig and poultry farming. This process not only affects aquatic life, causing dead zones and fish kills, but also compromises water quality, affecting ecosystems and human health.

A farm with 2 500 dairy cows produces the same amount of waste as a city of 411 000 people. (Risk Assessment Evaluation for Concentrated Animal Feeding Operations. Environmental Protection Agency. 2004)

Soil Degradation and Desertification

Overgrazing by livestock can lead to soil erosion, loss of soil fertility, and desertification, particularly in arid and semi-arid regions. Livestock like cattle, sheep, and goats eat grasses and plants faster than they can regenerate. This weakens the soil structure, making it vulnerable to erosion. An example is the Sahel Region in Africa, where overgrazing has contributed to severe land degradation in countries like Niger, Chad, and Sudan, pushing communities into food crises. The excessive use of synthetic fertilizers for feed crops depletes soil nutrients and contributes to soil acidification. Intensive monocropping for animal feed erodes soil, reducing fertility and increasing dependence on chemical fertilizers.

Large areas of forests are also cleared to create grazing land or grow animal feed (e.g., soy, corn). This removes tree roots that help hold soil in place, accelerating desertification.

Heavy livestock trampling compacts the ground, making it harder for water to penetrate, leading to drought-like conditions.

Consequences of desertification include food insecurity and malnutrition – reduced agricultural productivity means less food for local populations; forced migration – farmers and herders are pushed to cities or other regions, leading to conflicts over resources; increased poverty – the loss of fertile land affects livelihoods, pushing people deeper into poverty.

A recent study of the whole Amazon Basin found that indigenous territories avoid deforestation more effectively than forest degradation, and in some countries forest degradation (the forest remains a forest, but

its internal structural, health, and ecological functions are severely diminished) in indigenous territories has reached worrisome levels (Walker et al., 2020).

Pollution of water bodies and soil degradation reduce the availability of clean water and fertile land, essential for both agriculture and human consumption.

Air Pollution

Livestock operations release ammonia (NH_3), which contributes to acid rain and particulate matter formation, affecting air quality and human health. Hydrogen sulphide (H_2S) and other volatile organic compounds from manure and waste lagoons can cause respiratory problems and other health issues for nearby communities.

Overfishing and Ocean Destruction

The livestock industry depends on fishmeal to feed farmed animals, contributing to overfishing. Trawling and by-catch from commercial fishing destroy marine ecosystems and disrupt food chains. Aquaculture (fish farming) pollutes coastal waters with waste, antibiotics, and chemicals.

In addition, there is ‘by-catch’.

‘By-catch’ refers to all the marine animals that are unintentionally caught in fishing gear while targeting other species. For example, a trawler seeking shrimp or tuna may also trap dolphins, sea turtles, sharks, seabirds, and non-target fish. This happens with nets (trawls, purse seines, drift nets), longlines, pots, and traps. The FAO defines by-catch as both the retained non-target species and the discarded catch that is thrown back - often dead or dying - because it has no market value, is the wrong size, or is legally protected.

Many air-breathing animals such as dolphins, porpoises, and turtles drown in nets because they cannot surface for air. Even for fish and invertebrates, capture causes crushing, fin loss, or decompression injuries when hauled up from depth. Capture triggers acute stress responses: elevated cortisol, frantic escape behaviour, and injuries from thrashing against nets or hooks.

By-catch is not just an economic or ecological issue. For sentient marine animals, it represents large-scale, largely unacknowledged suffering caused by fishing practices designed for other species. Because by-catch occurs at sea, its scale is largely hidden from public view - yet tens of millions of animals are affected annually. Treating non-target animals as collateral damage conflicts with growing recognition of animal sentience and welfare.

> “More than 300 000 small whales, dolphins, and porpoises die excruciating deaths each year from entanglement in fishing gear, making "by-catch" the single-largest cause of death for small cetaceans. Longline fishing alone is estimated to hook and kill more than 300,000 seabirds annually, including at least 100 000 albatross (many estimates are much higher), who mate for life, have very low reproductive rates, and often do not begin breeding until they are 10 years old. 15 of the 22 known albatross species are currently threatened with extinction, and longline fishing is considered their greatest threat. Like albatross, hundreds of thousands of critically endangered loggerhead and leatherback turtles drown each year on longlines. The WWF says capture by longlines, trawls and gillnets is the gravest threat to most populations of marine turtles.” - Ashley Capps, *How Our Food Choices Impact Our Oceans*

Gillnets are walls of netting suspended vertically in the water that trap animals when they try to swim through them. Gillnets are difficult for animals to detect underwater because the monofilament nylon is nearly transparent. Many marine animals rely on speed or surfacing for oxygen. Once entangled, they may drown, suffocate, sustain severe injuries, lose fins or limbs. Or die from exhaustion or infection.

WWF and other marine conservation organizations identify gillnets as one of the deadliest fishing methods for non-target marine wildlife. Lost or abandoned gillnets continue killing animals for years; these ‘ghost nets’ drift through oceans or remain snagged on reefs and seabeds, continuously trapping marine life. Ghost nets contribute substantially to marine plastic pollution and long-term ecosystem damage.

Unlike traditional fishing, where an individual animal is directly seen and killed, gillnets function as passive mass-capture systems. Animals drown, suffocate, panic, or tear themselves apart in nets that may stretch for kilometres, often completely outside human observation. The great majority of the public have no idea that they even exist. Some regional dolphin and porpoise populations have collapsed largely because of gillnet mortality.

Removing large predators such as tuna, sharks, and cod alters entire marine ecosystems. Fewer sharks leads to more mid-level predators. More mid-level predators leads to fewer herbivorous fish. Fewer herbivorous fish results in more algae growth. More algae causes degraded coral reefs. This phenomenon is known as a trophic cascade.

Bottom trawling drags massive weighted nets across the seabed. This can crush coral reefs, destroy sponge communities, eliminate nursery habitats, and release carbon stored in marine sediments. Some deep-sea ecosystems may require decades or centuries to recover, if they recover at all.

Ghost gear (abandoned, lost, or discarded fishing equipment that continues trapping and killing marine life after it is no longer being used) is now considered one of the largest sources of large plastic debris in the oceans. Some studies suggest fishing gear constitutes a substantial proportion of the plastic mass in major ocean gyres, including the so-called ‘Great Pacific Garbage Patch’.

Over time, ultraviolet radiation and wave action fragment ghost gear into microplastics. These particles enter marine food webs, accumulate in fish and shellfish, transport toxins through ecosystems, and potentially enter human food systems.

Ghost gear is a powerful example of industrial harm becoming detached from human perception and responsibility. The killing continues without direct human supervision, without immediate economic awareness, and often without consumers even knowing it exists. It represents a form of mechanized, residual violence embedded into industrial extraction systems.

> “Sometimes I think we live in a such bizarre world where advocates for life are considered radical and proponents of death are considered normal, where violence is considered acceptable and non-violence is dismissed as unpatriotic or cowardly.” - Captain Paul Watson

Environmental Damage

As environmental science has advanced, it has become evident that the primary cause of nearly all of the major environmental damage categories that are currently threatening the future of humanity - deforestation, erosion, freshwater scarcity, air and water pollution, climate change, biodiversity loss, social injustice, community instability, and disease spread - is human desire for animal flesh.

Over the past 50 years, per capita meat consumption has more than doubled. As a result, the demand for beef has increased fivefold. The planet's limited resources - including water, land, feed, fuel, fertiliser, and the ability to dispose of waste - have been increasingly strained.

> “…the undeniable scientific and informed consensus is that if western civilization continues its reckless policies and practices toward the earth we are headed toward ecocide. I need not belabour the point. The threat is real and well recognized. Fourteen years ago the Union of Concerned Scientists, in a statement endorsed by seventeen hundred members of various national academies of science around the globe, issued a ‘World Scientists' Warning to Humanity,’ stating that if present rates of environmental assault were not halted the planet would be so ‘irretrievably mutilated’ as to ‘be unable to sustain life in the manner that we know it.’ In the years since then, the assault has gotten far worse: according to a landmark Ecosystem Millennium Assessment issued by 1,360 scientists in March 2005, the most comprehensive environmental review ever done, two thirds of the natural world that supports life on earth is being degraded by human pressure, and ‘human activity is putting such a strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted.’ This is serious stuff: our domination threatens our survival. As the eminent biologist Edward 0.Wilson, no alarmist, has asserted, ‘the appropriation of productive land – the

ecological footprint - is already too large for the planet to sustain' and has likely stressed the earth beyond its ability to regenerate'." – Kirkpatrick Sale, *After Eden*

The extinction of plant and animal species as a result of habitat loss is one of the most frightening and deadly consequences of deforestation. Forests are home to 70% of all land animal and plant species. Deforestation not only endangers species that we are familiar with, but also species that we are not.

The canopy that controls the temperature is provided by the rainforest's trees, which also provide a refuge for many species. Similar to a desert, deforestation causes a more extreme day-to-night temperature fluctuation that could be lethal for many residents.

A larger quantity of greenhouse gases is released into the atmosphere due to the absence of trees, in addition to the loss of habitat. As beneficial carbon sinks, healthy forests remove carbon dioxide from the atmosphere. Deforested places emit more carbon and lose that ability.

Trees also aid in controlling atmospheric water levels by helping to regulate the water cycle. One of the most important forests in the world for regulating water cycles is the Amazon rainforest. Its millions of trees work together to form atmospheric 'rivers' that regulate Earth's weather patterns and release moisture into the atmosphere.

There is less water in the air to return to the soil in deforested areas. Dryer soil results from this, making it unable to cultivate crops.

Coastal floods and soil erosion are additional consequences of deforestation. Trees aid in the retention of topsoil and water, which supply the abundant nutrients needed to support more forest life.

The Centre for International Forestry Research reports that rapid growth in the sales of Brazilian beef has led to accelerated destruction of the Amazon rainforest. 'In a nutshell, cattle ranchers are making mincemeat out of Brazil's Amazon rainforests,' says the Centre's director-general, David Kaimowitz of the Environmental News Service.

Another consequence of deforestation is the impact on the world's pollinators. Deforestation is a major driver of bee population decline, and its effects ripple through ecosystems with significant implications for food security. Here's a detailed look at the connections:

Deforestation's Impact on Bee Populations

Forests provide critical nesting sites, diverse floral resources, and sheltered microclimates for many bee species. When forests are cleared or fragmented, bees lose not only the physical space they rely on but also the complex mosaic of flowering plants that provide nutrition throughout their life cycles. This reduction in habitat quality and continuity makes it harder for many bee species to thrive, reproduce, and maintain genetic diversity.

Many bees are adapted to forage on the rich and varied blooms found in forest ecosystems. Deforestation reduces the abundance and variety of these food sources, leading to nutritional stress. Even species that can adapt to agricultural landscapes may suffer if natural wildflowers are displaced by monocultures.

Without the buffering effects of forest canopies, bees in cleared areas are more exposed to temperature extremes, wind, and other climatic stresses. These changes can disrupt bee behaviour, reduce their lifespans, and increase vulnerability to diseases and predators.

How Declining Bee Populations Affect Food Security

Bees are among the most important pollinators for both wild plants and agricultural crops. An estimated 75% of the world's food crops depend, at least in part, on animal pollination. When bee populations decline due to deforestation, the natural pollination of fruits, vegetables, and nuts is impaired, leading to reduced crop yields and quality.

Lower yields mean less availability of a variety of nutrient-rich foods, which can drive up prices and limit access - especially in regions heavily dependent on small-scale agriculture. This creates a feedback loop where reduced food availability and increased costs undermine food security and nutritional outcomes, particularly for vulnerable populations.

While some managed species like the European honeybee (Apis mellifera) can sometimes buffer the loss of wild pollinators, they are not a complete substitute. Wild bees often contribute to the pollination of crops in ways that enhance fruit set and quality, and their decline can lead to a loss of ecosystem resilience. This vulnerability is particularly pronounced in tropical and subtropical regions where both deforestation and agricultural reliance are high.

Deforestation significantly undermines bee populations by stripping away essential habitats and foraging resources, thereby reducing their numbers and diversity. This decline directly threatens food security, as many crops rely on bee pollination for successful fruit and seed production. Deforestation doesn't only affect bees - it disrupts entire ecosystems. The loss of bee diversity can have cascading effects on plant reproduction and overall ecosystem stability, further compromising natural resources that communities depend on. Addressing deforestation through sustainable practices is therefore not just an environmental imperative - it is also critical for maintaining global food supplies and the economic well-being of communities worldwide.

To counter these trends, sustainable land-use practices such as reforestation, conservation of remnant forest patches, and the integration of agroforestry into farming systems are crucial. These measures can help preserve the habitats needed for bee populations while maintaining the ecosystem services vital for food production.

In 1969, Desmond Morris's 'brutally objective' look at the human animal 'The Human Zoo', ended with this sentence:

> "For our children, however, it will be more than merely interesting. By the time they are in charge of the situation, the human species will no doubt be facing problems of such magnitude that it will be a matter of living or dying."

Indeed.

Domain 3: Hot Planet, Cold Logic: Climate Collapse

There is a quote I often refer to, that nobody seems to know the origin of: 'There are three types of people: those who make things happen, those who watch things happen, and those who wonder what happened.'

You may not be aware of the fact that we face an existential threat of our own design, and however inconvenient that may be, the consequences will impact everyone. No Ivory Tower can protect you; not Wealth, not Class, not Nationality, not Religion. If you don't know about the threat of global warming, you're going to fall into the 'wonder what happened' category and by the time you realise there is a problem (it's not something you can 'see' unless you are willing to learn) it will be too late. If you know about it and are doing nothing to avert it (the 'watch things happen' type) you are abdicating responsibility. This is the attitude of a child. Time to grow up.

For those who doubt that this threat is real or that it is debatable, the science has been settled for some time and new studies are painting the picture as worse, not better, than the original scenarios. And some of them are changing exponentially; in other words, the worse they get the more they accelerate. If you have children, your concern should be significantly heightened; they will face enormous challenges unless we adopt revolutionary measures. Or you could continue to use fossil fuels and eat meat. Survival is not mandatory. There are multiple environmental tipping points threatening, and together they are unprecedented.

According to the IPCC (Intergovernmental Panel on Climate Change) 6th assessment report, Animal Agriculture contributes 14.8 % of greenhouse gases. This is arguably conservative to say the least, and excludes the carbon sequestration opportunity cost arising from deforestation for livestock production.

It's important to review the history and how certain influences have modified this figure.

According to Livestock's Long Shadow (LLS), released by the Food and Agriculture Organisation of the United Nations in 2006, lifecycle emissions from the 'Livestock' sector are 7.5 Gt CO2e, or 18% of overall emissions.

After fixing mistakes in LLS, two World Bank Environmental Assessment (EA) professionals, Goodland and Anhang, released the WorldWatch report in 2009. They calculated that the 'Livestock' sector's lifecycle

emissions were 32.6 Gt CO2e, or 51% of the total. This 32.6 Gt CO2e can be divided into 21.1 Gt CO2e in actual emissions and 11.5 Gt CO2e in prevented carbon sequestration on the land that would be available if animal agriculture were to be abolished. According to Searchinger et al., the latter is their estimate of the 'Carbon Opportunity Cost (COC)' of animal husbandry. Rather than using the 100-year time frame employed in the FAO's analysis, Goodland and Anhang averaged the impact of methane over a 20-year period. More about methane below.

Without correcting any of the mistakes noted in Goodland and Anhang's report or in the peer-reviewed discussion that followed, FAO publicly collaborated with the International Meat Secretariat and the International Dairy Federation in 2013 and released an update to LLS that calculated lifecycle emissions of the 'Livestock' sector to be 7.1 Gt CO2e, or 14.5% of total. It's clear that these organisations had an agenda: making meat and dairy emissions look less significant. When the FAO is married to livestock industry interests, how trustworthy can its analysis be?

One of the arguments for reducing the Goodland and Anhang figure was that they had double counted plant respiration. Their inclusion of livestock-produced CO2 in global greenhouse gas emissions supposedly overlooks a straightforward yet important fact: plants also breathe (they perform both of the basic functions, including respiration and photosynthetic activity).

Plants obtain the energy required for self-maintenance, absorbing nutrients and water, and performing all other chemical reactions necessary for survival through respiration. They exhale the majority of the CO2 they have consumed during this procedure. And nearly everything they don't is expelled after they die, through respiration by bacteria and fungi, which are decomposers.

Therefore, by this logic, whether or not they are consumed by animals, the CO2 that plants absorb from the atmosphere returns to the atmosphere; the quantity of CO2 released into the atmosphere is not increased by livestock (or other animals, including both wild and domesticated ones).

The problem with this argument is that plant respiration and animal respiration are not equivalent when it comes to greenhouse gas emissions, particularly in their impact on climate change.

Plant respiration releases CO2, but it is part of a short-term carbon cycle. Plants absorb CO2 during photosynthesis and release it through respiration, maintaining a natural balance. Animals, particularly in large-scale agriculture, contribute extra greenhouse gas emissions beyond their respiration through feed production, land use, and manure management.

Plant respiration is part of a balanced system, while animal respiration - especially from livestock - contributes to additional greenhouse gas emissions, primarily through methane and nitrous oxide. This makes animal agriculture a significant driver of climate change, whereas plant respiration does not contribute in the same way.

According to a peer-reviewed position paper written by Sailesh Rao, Ph.D., published in the Journal of Ecological Society in 2019, 'this strategy of focusing exclusively on the reduction of fossil fuel burning will accelerate climate change, potentially to the point of no return.' Using a Global Sensitivity Analysis (GSA) method, he shows that the UN FAO's 14.5% estimate for the lifecycle emissions of animal agriculture is incorrect and that the correct estimate is at least 51% as calculated by Goodland and Anhang and their lower bound can be tightened to at least 87% of global greenhouse gas emissions. Therefore, animal agriculture is the leading cause of climate change.'

He uses the logic that livestock produce vast methane emissions (enteric fermentation), that they require large land areas (causing deforestation and soil-carbon loss), and that the 'opportunity cost' of that land (i.e., if it were rewilded) is large. He claims the standard accounting undervalues those land-/carbon-opportunity costs.

Effectively, this means that using emissions alone, without the carbon sequestration opportunity cost, livestock accounts for more than 50% of greenhouse gas emissions. Burning 1 kg of Coal produces 2.5 kg of Co2; The Co2 embodied in 1 Kg of meat is between 20 and more than 40 times as much: 100 Kg.

While fossil-fuel CO_2 emissions are clearly the dominant driver, Rao's argument invites us to consider whether the food industry's land-use and animal-welfare dimensions deserve far more moral and policy attention than they currently receive.

More about greenhouse gases:

Methane (CH_4) from livestock: Ruminant animals (cows, sheep, goats) produce methane through digestion (enteric fermentation), which is 25 times more potent than CO_2 in trapping heat.

Because of the peculiar physiology of their digestive tracts, ruminants - cattle, goats, and sheep - produce more methane than other types of livestock. The rumen, or fore stomach, is the source of the name for ruminants. The rumen is a sizable space that is home to a wide variety of microorganisms that break down roughage, including bacteria, fungi, protozoa, and archaea. Methanogens are single-celled bacteria that manufacture methane by using the products of other microbes' metabolism in the rumen to make the materials and energy they require to thrive. Methane is produced by this technique.

It is often argued that methane emitted by cattle is part of a ‘natural carbon cycle’, since it originates from atmospheric carbon fixed by plants and is eventually broken down back into carbon dioxide. While this description is chemically accurate, it omits the critical variable of radiative forcing over time. Methane is a far more potent greenhouse gas than carbon dioxide during its atmospheric lifetime. Continuous emissions therefore maintain an elevated level of warming, even if the underlying carbon is recycled. The argument substitutes carbon origin for climate impact, treating cyclical movement as equivalent to neutrality.

The IPCC continues to convert methane emissions to CO2e using a Global Warming Potential (GWP100) of 28. In relation to the reference gas, CO2, the radiative forcing impact over a given time horizon of a unit mass of gas is converted by the Global Warming Potential (GWP). With cloud impacts excluded, the GWP for methane over a 100-year time horizon is 28. It is 34 when cloud effects are taken into account. With cloud impacts included, the methane GWP over a ten-year period is 130.

It is crucial to note that, although warning that catastrophic climate change is imminent within the next 11 years, not 100, the IPCC has continuously underestimated the impact of our annual methane emissions by averaging its influence over a 100-year timeframe. Methane's CO2 equivalency is calculated over a 100-year period, which undercounts its more significant 10-year impact by almost a factor of 5. Reducing methane seems critical, given that climate change is accelerating. We don’t have 100 years. The latest figures show that global warming is accelerating...

In a very recent paper, Wedderburn-Bisshop of the World Preservation Foundation argues that instead of GWP, Effective Radiative Forcing (ERF) should be used. Imagine Earth as a bank account where energy is deposited by the sun and withdrawn by space. When activities like burning fossil fuels add extra greenhouse gases, they cause an ‘energy surplus’ that warms the planet. ERF quantifies this surplus in watts per square meter (W/m^2). Traditional radiative forcing only looks at the direct impact of these emissions. ERF goes a step further - it also includes quick responses in the atmosphere (such as changes in cloud cover and water vapour) that happen almost immediately after the emissions occur. These adjustments can either amplify or reduce the warming effect.

By considering both the initial impact and these fast adjustments, ERF gives a more complete picture of how much warming a specific emission is likely to cause. This makes it a more reliable measure when comparing different types of emissions and understanding their long-term effects on climate. In short, ERF is a refined way to measure the warming power of different emissions because it accounts for the complex, rapid changes in the atmosphere that influence global temperature.

Using ERF to measure the climate impact of different gases reveals that methane’s impact, understood cumulatively, has been vastly underestimated.

According to the report, animal agriculture, the primary driver of land use change and deforestation, has contributed 19 percent more carbon than fossil fuels since 1750 when gross emissions accounting is consistently applied across sectors.

> “Normalizing and adopting gross deforestation emissions accounting would support policies aimed at reducing deforestation and preserving forests … Knowing that clearing and re-clearing re-release an increasing proportion of fossil carbon informs policy that destruction of forest of any age could be seen in the same way as burning coal.” says Wedderburn-Bisshop.

Animal waste releases 65% of all human-related emissions of nitrous oxide (N_2O), a potent greenhouse gas with a global warming potential roughly 300 times that of carbon dioxide over a 100-year period. Although it represents a smaller fraction of total greenhouse gas emissions compared to CO_2, its high potency makes it a critical contributor to climate change. In addition to warming the planet, nitrous oxide contributes to the

destruction of stratospheric ozone. When N_2O reaches the stratosphere, it undergoes chemical reactions that generate reactive nitrogen species, which catalyse ozone depletion.

With an atmospheric lifetime of around 100–114 years, nitrous oxide persists in the atmosphere for a long time, meaning that current emissions will affect the climate and ozone layer for many decades.

Another critical factor in the Climate Change scenario is sequestration.

Carbon Sequestration

Carbon sequestration refers to the process of capturing and storing atmospheric carbon dioxide (CO_2) to help mitigate climate change. This storage can occur naturally - through forests, soils, and oceans - or be engineered via technologies designed to capture and permanently store CO_2 underground or in other stable forms. Trees absorb CO_2 during photosynthesis and store carbon in their biomass.

Organic matter in soils, especially when managed sustainably, can lock carbon away for decades or even centuries. Marine plants (like phytoplankton) and the biological processes in the ocean can sequester carbon, although this storage can be more transient.

Deforestation is one of the most direct and significant negative impacts on carbon sequestration. Trees and forests act as major carbon sinks by absorbing CO_2 from the atmosphere through photosynthesis. When forests are cleared - whether for agriculture, logging, or urban expansion - their ability to sequester carbon is lost. Additionally, deforestation often leads to carbon emissions as trees are burned or left to decay, releasing stored carbon back into the atmosphere. Loss of biodiversity, increased CO_2 emissions, and reduced capacity for natural ecosystems to regulate the climate are other effects.

Emissions from land cleared specifically for animal grazing or growing feed crops like soy and corn should be attributed directly to animal agriculture. Emissions from land cleared for crops that are largely exported or used for livestock feed elsewhere should also be considered, using lifecycle analysis.

> “In 1990… …the World Hunger Program at Brown University calculated that recent world harvests, if equitably distributed with no diversion of grain to feeding livestock, could provide a vegetarian diet to 6 billion people, whereas a meat-rich diet like that of people in the wealthier nations could support only 2.6 billion. In other words, with a present population over 6 billion, that would mean we are already into deficit consumption of land, with the deficit being made up by hauling more fish from the oceans, which are in turn being rapidly fished out. In the near term, the only way to feed all the world’s people, if we continue to eat meat at the same rate or if the population continues to grow as projected, is to clear more forest. From now on, the question of whether we get our protein from animals or plants has direct implications for how much more of the world’s remaining forest we have to raze.
>
> In Central America, 40 percent of all the rainforests have been cleared or burned down in the last 40 years, mostly for cattle pasture to feed the export market - often for U.S. beef burgers… Meat is too expensive for the poor in these beef-exporting countries, yet in some cases cattle have ousted highly productive traditional agriculture.” - John Revington in *World Rainforest Report*

Since deforestation has long-term impacts, emissions should account for the cumulative effect of carbon loss over time, not just the immediate release. Deforestation emissions can be included in the lifecycle analysis of livestock products (e.g., per kilogram of beef or litre of milk). This ensures the full environmental cost of production is considered.

For example, beef from regions where deforestation is prevalent (like the Amazon) typically has a significantly higher carbon footprint. Measurements should reflect regional practices, as deforestation varies widely by geography. For instance, emissions from animal agriculture in regions like the Amazon will likely be higher due to deforestation than in areas where pastureland has long been established.

Satellite data and ground surveys can be used to track deforestation and link it to agricultural activities. Tools like the Global Forest Watch and emissions inventories can help quantify deforestation's contribution to agricultural emissions.

Deforestation emissions tied to animal agriculture should be included in national GHG inventories and global climate models to provide a comprehensive understanding of agriculture's environmental impact.

By including deforestation in emissions measurements, policymakers, industries, and consumers can make more informed decisions to mitigate climate impacts, prioritize sustainable practices, and support reforestation efforts.

The IPCC separates emissions into distinct sectors, such as Agriculture, which includes emissions from enteric fermentation, manure management, rice cultivation, and agricultural soil management, and LUCF, which covers deforestation, land clearing, and land-use changes, which are major contributors to emissions but are not explicitly tied to specific sectors like animal agriculture. This separation means that while the emissions from clearing forests for pasture or feed crops are measured, they are not always attributed to livestock in the IPCC's agricultural emissions assessments. This methodological choice can result in underestimating the full climate impact of animal agriculture, which is a significant driver of deforestation, especially in regions like South America.

Including deforestation would significantly increase the estimated emissions from animal agriculture. Studies estimate that when deforestation and land-use change are included, the emissions associated with livestock can increase by 20-50% or more compared to assessments that exclude these factors.

A 2018 study published in Nature Climate Change found that beef production in regions with high deforestation, such as the Amazon, has carbon footprints up to 12 times higher than beef produced in non-deforested areas. Plant-based foods emit far less greenhouse gases. Producing 1 kg of lentils emits about 0.9 kg CO_2, whereas 1 kg of beef emits 60 kg CO_2. From a climate perspective the solution seems obvious.

Including deforestation in emissions assessments fundamentally reshapes our understanding of the climate impact of animal agriculture. It underscores the urgency of addressing deforestation and integrating it into sector-specific mitigation strategies. By doing so, the global carbon footprint of livestock is recognized more accurately, enhancing efforts to combat climate change.

According to another new study, phase-outs of animal agriculture would also generate significant 'negative emissions,' would assist in reducing greenhouse gas emissions in the atmosphere to such a degree that, even in the event that other pollution remained unchecked, the globe might achieve net zero emissions for decades. The study, which was conducted by Michael Eisen, a professor of genetics and development at UC Berkeley, and Patrick Brown, an emeritus professor of biochemistry at Stanford University, estimates the climate impacts of various food system scenarios, including what would occur if animal agriculture were phased out globally over the course of the next 15 years.

Allowing grazing area and land currently utilised for cow feed and other crops for animal husbandry to revert to their original condition as a forest, prairie, or grassland could also remove an estimated 800 gigatons of carbon from the atmosphere.

Other factors affecting sequestration include:

Soil Degradation: Intensive farming practices, overgrazing, and improper land management can deplete soil organic matter, reducing its ability to store carbon. Erosion, decreased soil fertility, and additional CO_2 emissions from degraded soils are additional impacts.

Wetland and Peatland Destruction: Draining or converting wetlands and peatlands for development or agriculture disturbs these ecosystems. This also leads to the release of large amounts of stored carbon, loss of critical habitats, and reduced natural resilience against climate change.

Inconsistent policies, lack of standardized measurement protocols, and insufficient financial incentives hinder widespread adoption of carbon sequestration practices. They slow progress in both natural and technological carbon sequestration initiatives and result in missed opportunities to mitigate climate change effectively.

As the climate warms, natural carbon sinks (like forests and soils) can become less efficient. For example, increased wildfires, droughts, and pest outbreaks reduce the health of forests. Reduced sequestration capacity leads to higher atmospheric CO_2, further accelerating climate change.

Enhancing Natural Sequestration

Planting trees in deforested areas (reforestation) or establishing new forests (afforestation) increases carbon uptake. It also restores biodiversity and ecosystem services while providing long-term carbon storage.

Practices such as no-till farming, cover cropping, crop rotation, and agroforestry help rebuild soil organic matter. They increase soil carbon storage, improve soil health, and enhance resilience to climate impacts.

Protecting and restoring mangroves, salt marshes, and seagrass beds, which are exceptionally efficient at storing carbon, provide coastal protection and store carbon for extended periods.

Investing in research to improve the efficiency, cost-effectiveness, and scalability of both natural and technological sequestration methods can overcome current limitations and reduce the energy and cost barriers associated with advanced technologies.

Coordinated planning that considers carbon sequestration as part of broader environmental, social, and economic goals balances development with conservation, ensuring that land-use decisions contribute to long-term carbon management and climate resilience.

Carbon sequestration is a critical tool in the fight against climate change, whether through preserving natural ecosystems or deploying technological solutions. Overcoming obstacles - ranging from deforestation and soil degradation to technological and policy challenges - is essential. Enhancing sequestration in the future will likely involve a combination of natural ecosystem restoration, technological advancements, and supportive policy frameworks, creating a multi-pronged approach to reducing atmospheric CO_2 and mitigating global warming.

Alan Savory, in his TED talk in 2013, 'How to fight desertification and reverse climate change,' made claims for regenerative (or 'holistic') grazing, which included the claim that his grazing method can reduce atmospheric carbon dioxide levels to pre-industrial levels. He said that grasslands can store enough carbon dioxide to reverse climate change.

Written by an international group of experts led by FCRN's Tara Garnett, a report entitled **'Grazed and Confused?'** added clarity to the debate around livestock farming and meat and dairy consumption. The paper found that the amount of carbon that can realistically be stored through these practices is modest, and that any gains in soil carbon would be offset by methane emissions from the grazing animals, undermining the net climate benefit.

The paper argues that Savory's broad claims - that well-managed grazing can reverse desertification and mitigate climate change by sequestering large amounts of carbon - are not backed by rigorous, replicated scientific studies. Many of the studies Savory cites are anecdotal or based on short-term observations rather than controlled, long-term experiments.

Savory's approach is critiqued for assuming that mimicking 'natural' grazing patterns will reliably restore degraded landscapes. In reality, ecosystems are highly complex and context-dependent. Factors such as local climate, soil characteristics, plant community structure, and historical land use all influence how an ecosystem responds to grazing. There is no one-size-fits-all grazing management strategy that can be universally applied to reverse desertification.

The paper stresses that even if holistic grazing can yield benefits in some situations, its success is not guaranteed everywhere. Positive outcomes seen in certain regions may be the result of favourable conditions or coincidental factors rather than the grazing strategy itself. Thus, promoting it as a global solution is premature and potentially misleading. The fact is, regenerative grazing uses up to 2.5 times more land than conventional animal agriculture, the carbon intensity of most grass-fed beef operations is in most cases higher than that of industrial beef, and much higher than that of non-beef alternatives.

Soil carbon sequestration from regenerative grazing is overstated. Advocates often claim regenerative grazing offsets livestock emissions via soil carbon capture. The problems with this claim are that gains are often small and plateau after ~10–20 years; carbon can be lost again if management changes or drought/fire occurs; sequestration rates are often overestimated in promotional studies, which may not account for methane and nitrous oxide emissions. Peer-reviewed life-cycle analyses generally find net emissions remain positive.

Eshel et al, in their paper, 'US grass-fed beef is as carbon intensive as industrial beef…' (2025), stated that "…even with maximal credit for putative sequestration enhancement, grass-fed beef is still no less carbon

intensive than industrial beef, and several fold more intensive than non-beef alternatives". They also show that:

> "…it is not clear that cattle grazing indeed enhances average soil carbon sequestration, and - even if it does - that this is impactful enough to reverse beef's carbon intensity. The reason is that grazing raises required emissions per kg weight gain. For one thing, the elevated cellulose and lignin content of grazed forage increases methane emissions per kg protein produced. In addition, grazing is seasonal in most geographies, which requires fossil fuel-based, CO2-intensive supplemental off-season feed - grain, hay, or silage - that elevates production emissions. Beyond emissions, these feeds also compete with human food production for high-quality cropland and often also for irrigation water and agrochemicals."

Ruminants (cattle, sheep, goats) produce methane during digestion via enteric fermentation. Methane's global warming potential is ~28–34× stronger than CO_2 over 100 years, ~80× over 20 years. Even well-managed grazing doesn't eliminate methane - cows still burp it out daily. Per unit of protein, beef from grass-fed systems often emits more methane than feedlot beef because animals grow more slowly on pasture and because they live longer before slaughter, giving them more time to emit methane.

Nitrous oxide from manure and soils is ~265 - 298 times more potent than CO_2 over 100 years. In grazing systems, manure is deposited directly on fields, leading to N_2O release during decomposition, N_2O from urine patches where nitrogen is concentrated and soil disturbance from hoof impact can accelerate microbial processes that produce N_2O.

Regenerative grazing often requires large areas of land. If that land is converted from forest, shrubland, or native grassland, there is a net carbon release from clearing vegetation and oxidation of soil organic matter. That same land could have sequestered much more carbon if rewilded or reforested instead of kept as pasture.

George Monbiot, in his debate with Alan Savory, delivers the coup de grâce:

> "There is no empirical evidence whatsoever for the proposition that livestock grazing can mitigate climate change. In fact, there's no evidence that it can even wash its own face in terms of greenhouse gas emissions — let alone be net negative… It's not just that there's no evidence for the proposition. It's not even plausible. There's no mechanism for the proposition either. In order for this proposition to be true you have to rely not on natural processes but on Magic. In fact, there's loads of contradictory evidence showing that grazing livestock systems are a major net loss of carbon into the atmosphere."

Regenerative grazing can reduce some environmental harms compared to industrial systems, but it cannot make ruminant meat climate-neutral because methane and nitrous oxide emissions outweigh realistic sequestration gains. If climate mitigation is the goal, replacing livestock entirely with plant-based systems or rewilding land provides far greater net climate benefits.

The 'Great Plains' Argument

It is sometimes argued that modern livestock simply replace the great herds of bison, antelope, or other wild herbivores that once roamed the plains, and therefore the climate impact should be the same. But this is a false equivalence. Wild herds lived in ecological balance: their numbers were regulated by predators, disease, and seasonal limits; they grazed natural grasslands; and their manure fertilised soils in thin layers across vast landscapes.

By contrast, today's livestock exist only through intensive human intervention. We breed them in vastly greater numbers than any ecosystem would allow, feed them crops grown with fossil fuels and fertilizers, and clear forests to make space for pasture and feed. Their waste is concentrated in lagoons that emit methane and nitrous oxide, rather than recycling naturally into soils. In short, wild herbivores were part of balanced cycles; domesticated herds are part of an industrial system that amplifies greenhouse gases far beyond anything seen in nature.

Domain 4: Eating Illness

> "What we have come to consider as 'normal' illnesses of ageing are really not normal. In fact, the vast majority, perhaps 80% to 90% of all cancers, cardiovascular diseases, and other forms of degenerative illness can be prevented, at least until very old age, simply by adopting a plant-based diet." - T. Colin Campbell, Prof. of Nutrition, Cornell Univ. 1998

Humans do not need to eat meat or consume dairy products. All the nutrition the human body needs is available from plants; in fact, all nutrition has its source in plants, so why exactly do humans still eat meat? Because they have been conditioned by culture and parents, and lied to by the meat and dairy industry, but slowly and surely the truth is coming out, much like it did with tobacco.

Poor Diet and Non-Communicable Diseases (NCDs)

According to the Global Burden of Disease Study (2019), poor diet is the leading risk factor for death globally. A Western diet heavy in animal products - especially processed meats - is one of the primary contributors.

Diets high in animal products, especially red and processed meats, have been associated with increased risks of diseases like heart disease, certain cancers, and type 2 diabetes.

Atherosclerosis is a chronic disease that occurs when plaque builds up in the walls of your arteries. Plaque is made up of cholesterol, calcium, and other fatty substances. As plaque builds up, arteries narrow, which can reduce blood flow and oxygen supply to organs and tissues. It increases the risk of heart attack and stroke.

The European Atherosclerosis Society came to the conclusion in a 2017 consensus statement that 'consistent evidence from numerous and multiple different types of clinical and genetic studies unequivocally establishes that LDL (Low Density Lipoprotein) causes ASCVD (Atherosclerotic Cardiovascular Disease).' The consensus statement also stated:

> "Most publications that question the causal effect of LDL on the development of ASCVD tend to cite evidence from individual studies or a small group of highly selected studies, often without a quantitative synthesis of the presented evidence. Therefore, to avoid this type of selection bias, we have based our conclusions on the totality of evidence from separate meta-analyses of genetic studies, prospective epidemiologic studies, Mendelian randomization studies, and randomized clinical trials. This evidence base includes over 200 studies involving over 2 million participants with over 20 million person-years of follow-up and more than 150 000 cardiovascular events. Together these studies provide remarkably consistent and unequivocal evidence that LDL causes ASCVD".

LDL cholesterol, or 'bad' cholesterol, comes from foods high in saturated and trans fats. These fats are found in many foods, including red meat (fatty cuts of beef, pork, and lamb, like ribs, chops, and roasts), full fat dairy (butter, cheese, and whole milk), fried foods (chicken fingers, french fries, and mozzarella sticks), baked goods (pies, biscuits, donuts, and cakes), processed meats (meats that have been preserved or modified to improve their taste or shelf life. They are often cured, salted, smoked, or have chemical preservatives added. Examples are bacon, ham, hot dogs, deli meats like salami, pepperoni, and chorizo, canned meats like corned beef and spam, sliced luncheon meats, and pâté), tropical oils (coconut and palm oil) and sweets (ice cream and doughnuts).

Apolipoprotein B (ApoB) is often considered a better marker of cardiovascular risk than LDL cholesterol alone. Each LDL particle contains one ApoB molecule, so ApoB gives a direct count of LDL particles (LDL-P). Standard LDL-C tests measure the amount of cholesterol in these particles, which doesn't always correlate with the number of particles.

Small, dense LDL particles (which are more atherogenic) may not be reflected well in LDL-C levels, but ApoB accounts for them. ApoB also includes other atherogenic lipoproteins, such as VLDL and IDL, giving a more comprehensive picture of cardiovascular risk.

Atherosclerosis and Herbivores

Atherosclerosis is much more common in herbivorous and omnivorous species, while strict carnivores rarely develop it naturally. Carnivores, especially obligate carnivores like cats and ferrets, have highly efficient lipid metabolism. Their bodies are adapted to process high amounts of dietary cholesterol and fat without accumulating arterial plaques. They tend to have high levels of HDL (high-density lipoprotein, the ‘good’ cholesterol), which helps clear cholesterol from blood vessels.

Omnivore doesn’t mean 'must consume animal products'; it means 'capable of obtaining nutrients from plants and animals'. While humans are omnivores, we do not require animal products for health. Omnivory evolved as an opportunistic strategy when food was scarce.

Studies have shown that most carnivores do not develop atherosclerosis even when fed high-cholesterol diets, unlike humans and herbivores. However, some animals (like rabbits, which are herbivores) develop severe atherosclerosis when exposed to high dietary cholesterol, indicating a fundamental metabolic difference.

Since carnivores evolved to eat high-fat, high-cholesterol diets, their bodies are equipped to handle such nutrients without suffering from cardiovascular disease. In contrast, herbivores (and humans, who are omnivores but evolved on relatively low-cholesterol diets) are more prone to lipid-related artery damage. That being said, some carnivores c*an* develop atherosclerosis under unnatural conditions, such as in captivity, when fed processed or carbohydrate-heavy diets, or if they have certain medical conditions (e.g., hypothyroidism in dogs).

Cancer

The WHO (World Health Organisation) classifies red meat as a Group 2A carcinogen, meaning it is probably carcinogenic. Red meat includes beef, lamb, pork, veal, mutton, horse, and goat meat.

The development of colorectal cancer is accelerated by iron from red meat, which reactivates telomerase, an enzyme that lengthens the ends of DNA chromosomes.

The WHO's International Agency for Research on Cancer (IARC) classifies processed meats as Group 1 carcinogens, meaning they are known to cause cancer. Processed meats include bacon, ham, salami, and frankfurts. They are made by salting, curing, smoking, or fermenting meat to improve preservation or enhance flavour.

Chemical preservatives called nitrates and nitrites are used to extend the shelf life of processed meat. Nitrates and nitrites have the potential to transform into N-nitroso compounds (NOCs) when consumed. Bowel cancer can result from these because they harm the cells lining our intestines. Processed meat may have a higher risk of colon cancer than red meat because of added nitrates.

Diabetes

Diabetes develops when the body can’t properly regulate blood sugar levels. There are two primary forms, Type 1 Diabetes, which is an autoimmune condition where the immune system attacks the insulin-producing beta cells in the pancreas, leading to little or no insulin production, and Type 2 Diabetes, a condition often driven by insulin resistance - where the body’s cells don’t respond well to insulin - and eventually, the pancreas may not produce enough insulin to compensate.

Diets high in saturated fats (commonly found in red and processed meats) have been linked to increased inflammation. This inflammation can contribute to insulin resistance, a key factor in developing Type 2 diabetes. High intake of saturated fat can contribute to weight gain and obesity, which further increases the risk of insulin resistance and Type 2 diabetes. It’s important to note that while saturated fats are one part of the picture, the overall dietary pattern matters. Diets rich in whole foods (like fruits, vegetables, whole grains, and healthy fats) tend to be protective, whereas diets high in processed foods can elevate risk.

Alzheimer’s

Too much cholesterol in your blood is not only considered the primary risk factor for heart disease but is also unanimously recognized as a risk factor for Alzheimer’s disease.

Autopsies have consistently demonstrated that Alzheimer's patients typically have a markedly higher accumulation of atherosclerotic plaque and vascular constriction in the brain. Some specialists have even proposed reclassifying Alzheimer's as a vascular condition in light of these discoveries.

Atherosclerosis leads to the narrowing and stiffening of arteries, including those supplying the brain (e.g., carotid and cerebral arteries). This reduces oxygen and nutrient delivery, leading to chronic hypoxia, which can damage neurons and promote cognitive decline.

Atherosclerosis also increases the likelihood of strokes, both large and small (silent strokes). Microinfarcts (tiny, undetectable strokes) can accumulate over time, damaging brain regions critical for memory and cognition.

Osteoporosis

Large-scale studies have found that high dairy intake does not necessarily reduce the risk of fractures. Some research even suggests that countries with the highest dairy consumption (e.g., the U.S. and Sweden) have higher osteoporosis rates than countries with lower dairy intake.

Some studies suggest that excessive dairy consumption may increase fracture risk. This may be due to high levels of galactose, a sugar in milk, which has been linked to oxidative stress and inflammation.

Some researchers argue that animal proteins (including those from dairy) create an acidic environment in the body, leading to calcium being pulled from bones to neutralize acidity. However, this ‘acid-ash hypothesis’ remains controversial.

Many non-dairy foods (leafy greens, almonds, tofu, beans, fortified plant milks) provide calcium without potential risks associated with dairy. Some populations that consume little to no dairy (e.g., traditional Asian diets) have lower osteoporosis rates, possibly due to other lifestyle and dietary factors.

Ageing

Meat consumption, especially processed and red meat, has been linked to inflammation, telomere shortening, and accelerated ageing through several biological mechanisms. Telomeres are protective caps on chromosomes that naturally shorten with age. Chronic inflammation activates immune cells and increases oxidative stress, which accelerates telomere shortening. Shorter telomeres reduce cellular lifespan and contribute to ageing-related diseases like cardiovascular disease, cancer, and neurodegeneration.

Cooking meat at high temperatures (grilling, frying, roasting) produces Advanced Glycation End Products (AGEs), which cause inflammation and oxidative damage. AGEs bind to receptors (RAGEs) on cells, activating inflammatory pathways that accelerate cellular aging and shorten telomeres.

Red meat is rich in L-carnitine, which gut bacteria convert into Trimethylamine-N-Oxide (TMAO). High TMAO levels promote systemic inflammation, vascular dysfunction, and oxidative stress, all of which accelerate telomere shortening. Red meat also contains heme iron, which can generate free radicals that damage DNA. Iron overload is linked to oxidative stress, inflammation, and shorter telomeres.

Meat is high in saturated fat, which can trigger inflammatory cytokines (like IL-6 and TNF-α). Additionally, bacterial endotoxins from meat can enter the bloodstream, causing low-grade chronic inflammation.

A 2017 study in the American Journal of Clinical Nutrition found a negative correlation between high meat consumption and telomere length. In contrast, plant-based diets rich in antioxidants and fibre have been associated with longer telomeres and slower ageing.

The effects of the transition to meat

> “In the next 10 to 15 years, one of the things you’re bound to hear is that animal protein is one of the most toxic nutrients of all that can be considered. Risk for disease goes up

> dramatically when even a little animal protein is added to the diet." - T. Colin Campbell, Prof. of Nutrition, Cornell University 1998

There is evidence suggesting that as regions with historically low meat and dairy consumption due to financial constraints experience economic growth and increased access to these foods, rates of cancer and heart disease tend to rise. This phenomenon is part of a broader trend known as the 'nutrition transition', where diets shift from traditional, plant-based foods to more processed foods high in animal products, refined sugars, and unhealthy fats.

Japan and China had low rates of heart disease and certain cancers when their diets were largely plant-based, centred around rice, vegetables, and fish. As Western dietary patterns (high in red meat, dairy, and processed foods) became more common, rates of obesity, cardiovascular disease, and colorectal cancer increased significantly.

In India, despite a traditionally high prevalence of vegetarian diets, economic growth has led to increased meat and dairy consumption. Concurrently, heart disease has overtaken infectious diseases as the leading cause of death.

Many sub-Saharan African countries have traditionally had low rates of cancer and heart disease due to diets rich in whole grains, legumes, and vegetables. As processed foods and animal products become more accessible, there has been a rise in obesity, diabetes, and heart disease.

The most probable reasons for this are increased saturated fat and cholesterol, in which high consumption of red meat and full-fat dairy is linked to higher LDL cholesterol levels and cardiovascular disease; a rise in processed food consumption, which often coincides with increased meat and dairy intake, worsening health outcomes; and reduced fibre intake - traditional diets high in fibre help regulate cholesterol and maintain gut health, reducing the risk of colorectal cancer and heart disease.

> "All protein is not created equal. Animal protein has a detrimental effect on our health in that it brings a package of fat, cholesterol, hormones, endotoxins, and pathogens, as well as lacks any fibre or phytonutrients - substances preventing and fighting diseases while improving longevity by increasing immunity and providing antioxidants and anti-inflammatory properties, which can be found in plants. Animal protein is also, in itself, damaging to your health by causing inflammation, an excessive loading of kidneys, liver, and pancreas, as well as metabolic acidosis, while creating imbalances in calcium and other minerals. Protein found in plants has no damaging effects and comes with no detrimental package." - Dr. Oppenlander, *Food Choice and Sustainability*

The data for vegan protein has unintentionally been reinforced by a scientific study that was sponsored by the cattle industry. The study found that plant protein can have all the same benefits as animal protein for muscle and health, despite the claimed theory that plant proteins are inferior.

Comparisons are in any case redundant and pointless; animal protein necessitates unnecessary harm.

The Inuit Exception

Advocates of animal-heavy diets sometimes point to traditional Inuit populations as evidence that humans can thrive on meat-centric diets. However, the Inuit case represents a unique ecological adaptation under conditions where agriculture was largely impossible, rather than evidence that high meat consumption is universally health-promoting.

More comprehensive and modern analyses challenge the claim that Inuits who have maintained their traditional diets have a low percentage of heart disease. The evidence for low heart disease is weak. A major review concluded the belief has attained axiomatic status but rests on uncertain mortality statistics. In other words, it became widely accepted without strong data. Total Inuit cardiovascular mortality is not lower than in Western populations.

Traditional marine diets high in omega-3 fats are associated with higher HDL ('good cholesterol') and lower triglycerides. Some studies find lower coronary heart disease risk markers among those eating more traditional foods.

The original claim suffers from several confounders: Poor historical data, incomplete death records, and misclassification of causes of death. The short life expectancy of Inuit people meant that fewer people lived

long enough to develop heart disease which had the effect of artificially low rates. Additionally, higher rates of infection, injury, and other causes of death made inferences sketchy.

But Inuit populations show higher mortality from stroke than comparison populations. Modern Inuit populations show cardiovascular disease rates similar to Western populations.

The Inuit case is not evidence that a high-fat animal-based diet prevents cardiovascular disease; it is an example of how weak epidemiology, confounders, and narrative bias can produce a compelling but misleading ‘paradox.’

Zoonotic Diseases

Around 60-70% of emerging infectious diseases in humans come from animals, according to organizations like the CDC and WHO. Animal agriculture provides environments where diseases can jump from animals to humans, especially with intensive farming, which brings large populations of animals together in close quarters. Examples include swine flu, avian flu, and, most notably, COVID-19, which is suspected to have originated from animal sources.

Unsustainable and unlimited consumption patterns and consequent destruction of the natural environment is a global factor in zoonotic disease. Human expansion over land is a major factor. Humans have directly altered 75% of the earth’s habitable land surface. Natural ecosystems are buffers between humans, livestock, and wild animals. They are continually degraded and bypassed. Humans and livestock invade and occupy wild animal habitats.

Pathogens flow between wild animals, livestock, and humans in all directions (Not only flowing from wild animals to livestock and then to humans).

In 2003, an editorial in the American Journal of Public Health advocated for an end to factory farming, explicitly acknowledging that killing animals for food - especially via intensive animal agriculture - increases the likelihood of epidemics. The author of that prescient article, Dr. David Benatar, wrote: ‘Those who consume animals not only harm those animals and endanger themselves, but they also threaten the well-being of other humans who currently or will later inhabit the planet…It is time for humans to remove their heads from the sand and recognize the risk to themselves that can arise from their maltreatment of other species.’

Where diseases originated: via Florian Wüest:

1. Influenza (flu) - domesticated ducks.
2. Smallpox - domesticated camels.
3. Measles - domesticated cattle.
4. Typhoid fever - domesticated chicken.
5. Leprosy - domesticated water buffalo.
6. Common cold - domesticated horses.
7. SARS - domesticated Asian palm civet.
8. Ebola - from bushmeat (eating wild primates).
9. HIV - from bushmeat (eating wild primates).

> “Perhaps in the back of our minds we already understand, without all the science I've discussed, that something terribly wrong is happening. Our sustenance now comes from misery. We know that if someone offers to show us a film on how our meat is produced, it will be a horror film. We perhaps know more than we care to admit, keeping it down in the dark places of our memory - disavowed. When we eat factory-farmed meat we live, literally, on tortured flesh. Increasingly, that tortured flesh is becoming our own.” - Jonathan Safran Foer, *Eating Animals*

How Animal Agriculture Contributes to Antibiotic Resistance

In many farming systems, antibiotics are routinely administered - not only to treat sick animals but also at subtherapeutic doses to promote growth and prevent disease in densely populated conditions. This non-therapeutic use creates an environment where bacteria are regularly exposed to low doses of antibiotics.

The continual exposure to antibiotics selects for bacteria that carry resistance mechanisms. Over time, susceptible bacteria are killed off, while resistant strains survive and multiply. Bacteria can acquire resistance through mutations or by obtaining resistance genes from other bacteria via horizontal gene transfer. This means that once resistance develops, it can quickly spread within the bacterial population. Animal guts, waste, and even the environment around farms (soil, water) can become reservoirs of resistant bacteria, which can persist and spread.

Resistant bacteria present in animals can contaminate meat and other animal products during slaughter and processing. If these foods are not properly cooked or handled, they can be a direct source of resistant infections in humans.

Manure used as fertilizer or improperly managed farm runoff can spread resistant bacteria into the environment. These bacteria can contaminate water supplies and crops, providing additional routes for human exposure. Farm workers and others who have close contact with animals can become carriers of resistant bacteria, potentially transmitting them to the broader community.

Known Impacts on Human Health

When infections in humans are caused by antibiotic-resistant bacteria, standard treatments may fail, leading to prolonged illness and higher risk of complications. Resistant infections can limit the available antibiotic options, forcing healthcare providers to use less effective or more toxic alternatives.

Resistant infections, such as those caused by resistant strains of Salmonella, Campylobacter, or Escherichia coli, can result in more severe and difficult-to-treat illnesses. Studies have shown that antibiotic-resistant infections contribute to higher rates of hospitalizations, longer hospital stays, and increased mortality. This poses a significant burden on healthcare systems.

The treatment of resistant infections often requires more expensive and prolonged therapies. Additionally, there are costs associated with increased hospital stays and more complex care needs. Beyond direct healthcare expenses, antibiotic resistance can impact productivity due to longer recovery times and increased absenteeism, as well as the broader economic impacts of a sicker population.

The spread of resistance is not confined by borders. Resistant bacteria can spread globally through travel and trade, making antibiotic resistance a worldwide health challenge. In the worst-case scenario, widespread resistance could lead to infections for which there are no effective treatments, echoing a pre-antibiotic era where routine infections could become life-threatening.

The use of antibiotics in animal agriculture is a significant driver of antibiotic resistance. By creating conditions that favour the survival and proliferation of resistant bacteria, these practices can lead to the spread of resistance through the food chain, the environment, and direct contact. The impact on human health is profound - ranging from increased treatment failures and higher healthcare costs to severe public health challenges on a global scale. Addressing this issue requires coordinated efforts in antibiotic stewardship, improved agricultural practices, and robust surveillance to mitigate the development and spread of resistance.

Blue Zones

Several regions around the world - often called ‘Blue Zones’ - consistently exhibit exceptional longevity, low rates of chronic disease, and robust overall health. Researchers have identified five key populations whose lifestyles and diets appear to promote both long life and low disease incidence:

Below is an overview of each population’s characteristics and typical dietary patterns.

1. Okinawa, Japan: Okinawa has one of the highest proportions of centenarians worldwide and very low rates of heart disease and cancer. Diet is plant-centred: Sweet potatoes, green leafy vegetables (e.g., bitter

melon), seaweed. Tofu and miso are soy staples, providing isoflavones linked to reduced cancer risk. Small, oily fish for omega 3s. Minimal dairy, and meat mostly consumed only on special occasions.

2. Sardinia, Italy (Nuoro Province): Particularly high male centenarian ratio; low cardiovascular disease.

Diet: Whole grains - Barley-based breads and flatbreads. Legumes: Fava beans, chickpeas, and lentils. Pecorino cheese in moderation. Wild greens, garden vegetables, figs. Red wine in moderation, rich in polyphenols.

3. Nicoya Peninsula, Costa Rica: Remarkable rates of male centenarians and very low rates of middle age mortality.

Diet: Corn tortillas: A daily staple, source of complex carbohydrates. Black beans for protein and fibre. Pumpkins and other squash varieties. Papaya, mango, bananas. Fresh cheese in small amounts.

4. Ikaria, Greece: One of the world's lowest rates of dementia and chronic diseases; half the rate of heart disease seen in the U.S.

Diet: Mediterranean staples: Olive oil, wild greens (dandelion, chicory), beans. Herbal teas: Sage, rosemary, mountain tea. Mostly goat or fish, a few times per month. Red wine: A small glass daily. Local honey and walnuts as snacks.

5. Loma Linda, California (Seventh-day Adventists): Longevity & Health Profile: Adventists live on average 10 years longer than other North Americans, with lower rates of cancer and cardiovascular disease.

Diet: Roughly 50% are vegetarian; many are vegan. Legumes & nuts: Beans, lentils, almonds, walnuts. Whole grains: Oats, brown rice, whole wheat products. Fruits & vegetables: Abundant daily servings. Low alcohol & caffeine: Generally abstain from both.

Common Dietary Patterns Across All Five Populations

1. Predominantly Plant Based: Emphasis on vegetables, fruits, legumes, and whole grains.

2. Limited Processed Foods & Refined Sugars: Sweets are eaten sparingly, often homemade.

3. Healthy Fats: Olive oil (Mediterranean), nuts, and fatty fish provide unsaturated fats.

4. Moderate Animal Products: When consumed, they are usually fish, dairy, or small amounts of meat.

5. Mindful Eating Practices: Portion control (e.g., hara hachi bu), communal meals, slow eating.

The World Health Organisation views plant-based diets, which emphasize plant foods and reduce or exclude animal products, as beneficial for both human health and the environment, with potential benefits including reduced risk of chronic diseases and lower environmental impact. (WHO)

From the Physicians Committee for Responsible Medicine: "Plant-based foods are full of fibre, rich in vitamins and minerals, free of cholesterol, and low in calories and saturated fat. Eating a variety of these foods provides all the protein, calcium, and other essential nutrients your body needs. It's important to include a reliable source of vitamin B12 in your diet. You can easily meet your vitamin B12 needs with a daily supplement or fortified foods, such as vitamin B12-fortified breakfast cereals, plant milks, and nutritional yeast. Those who eat a plant-based diet lower their risk for heart disease, Type 2 diabetes, obesity, and other health conditions. Research also shows that a plant-based diet can be less expensive than an omnivorous diet".

> "It is the position of the **American Dietetic Association** that appropriately planned vegetarian diets, including total vegetarian or vegan diets, are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases. Well-planned vegetarian diets are appropriate for individuals during all stages of the life cycle, including pregnancy, lactation, infancy, childhood, and adolescence, and for athletes. A vegetarian diet is defined as one that does not include meat (including fowl) or seafood, or products containing those foods." – *Position of the American Dietetic Association: Vegetarian Diets*

Biological Constraints and Dietary Myths

One of the more persistent modern myths is the claim that certain people are ‘genetically unable’ to follow a plant-based diet. It is presented as biological fatalism - a kind of nutritional predestination - yet it has no basis in the scientific literature. What exists instead are familiar patterns of human variation: small genetic differences that influence the efficiency with which we convert or synthesise particular nutrients. These differences do not amount to categorical limitations. They are constraints in the same sense that all biological traits are constraints - parameters within which adaptation and choice operate, not bars on the cage.

The rhetoric of genetic necessity functions as a defence of inherited dietary norms. It reassures people that their consumption of animals is not merely habitual or cultural but somehow biologically ordained. Yet the overwhelming consensus in nutritional science is that no human genotype discovered to date makes veganism intrinsically unsafe or unviable. Variants in enzymes such as FADS1/2, which affect omega-3 conversion, or BCMO1, which influences the conversion of beta-carotene into vitamin A, simply shift where supplementation or dietary attention becomes important. They are differences of degree, not kind. A person with lower conversion efficiency may require algae-derived omega-3s or higher carotenoid intake - not the flesh of another animal.

These misconceptions reveal more about human psychology than human physiology. They reflect our tendency to naturalise our preferences, to cast cultural habits as biological imperatives. This is the same cognitive reflex that has historically justified the treatment of other species as resources: if our practices are ‘natural’, then they are beyond scrutiny. But once the myth is removed, the biological picture is straightforward. Humans are metabolically flexible omnivores with the capacity to thrive on a wide range of diets, provided essential nutrients are obtained - by food, fortification, or supplementation. The limits are not written in our DNA; they are written in our assumptions.

In this sense, dietary myths offer a microcosm of a much broader pattern. They show how easily we mistake constraint for destiny and how willingly we transform biological variation into moral or cultural justification. Recognising this allows us to see our diets, and our treatment of other animals, not as dictated by nature but as choices - choices that carry moral weight once we acknowledge the sentience of the beings affected by them.

Domain 5: Biodiversity Loss

> “Few problems are less recognized, but more important than, the accelerating disappearance of the earth's biological resources. In pushing other species to extinction, humanity is busy sawing off the limb on which it is perched.” - Paul Ehrlich

Animal agriculture has a significant impact on biodiversity, affecting ecosystems at multiple levels. The extent of its impact depends on factors like the scale of production, management practices, and local environmental conditions.

From a 2024 Study of the effects of food production on biodiversity:

> “Animal products generally have substantially greater impacts on species extinction risk than staple vegetable products. This is a result of the inherently inefficient nature of these products. Producing a unit of animal product requires grazing land and/or cropland for feed production, which when combined with the intrinsic feed conversion efficiency of animals leads to high land use and hence extinction impacts. Ruminant meat, for example, has a weighted global median opportunity cost on species’ extinctions ~340 times greater than that of grains, by mass, and around 100 times greater than plant derived proteins such as soybeans and other legumes” - *Food impacts on species extinction risks can vary by three orders of magnitud*e (Thomas S. Ball, Michael Dales, Alison Eyres, Jonathan M.H. Green, Anil Madhavapeddy, David R. Williams & Andrew Balmford)

The mammal kingdom has undergone a dramatic transformation due to human expansion. Once teeming with diverse wild species, the total biomass of wild land mammals has plummeted by an estimated 85%

since the arrival of humans. Today, wild mammals make up just 4% of the world's mammal biomass, while humans account for 34% and livestock - primarily cattle - dominate at 62%. This shift illustrates not only the decline of wild species but also the overwhelming presence of domesticated animals raised for human consumption. A similar trend is observed in birds, where poultry biomass is more than double that of wild birds, highlighting the extent of human-driven change in global ecosystems. Despite this loss in wild mammal diversity, the total mammal biomass has surged nearly tenfold in the last 10 000 years. As human populations grew, so did the number of livestock, leading to an overall increase in mammal mass.

The balance of the natural world has shifted, with human activity shaping the planet's biological productivity. This raises concerns about biodiversity loss and the long-term stability of ecosystems. (Our World In Data)

Habitat Destruction

Large areas of forests, especially in the Amazon, are cleared for pasture or to grow feed crops like soybeans. This leads to habitat loss for countless species. Overgrazing by livestock can degrade natural grasslands, leading to soil erosion, desertification, and loss of plant diversity. Conversion of wetlands into pastureland reduces habitats for aquatic and amphibious species.

Pollution

Runoff from manure and fertilizers used in feed crop production can cause eutrophication in water bodies, leading to dead zones that kill fish and aquatic life. Livestock operations release methane, ammonia, and particulate matter, which can degrade air quality and affect plant and animal health. Excessive manure application can lead to nutrient imbalances and heavy metal accumulation in soil.

Competition with Wildlife

Farmers often kill or relocate predators (e.g., wolves, big cats) to protect livestock, reducing predator populations. Livestock can transmit diseases to wild animals, such as brucellosis and bovine tuberculosis.

Overuse of Resources

Livestock production is highly water-intensive, depleting freshwater resources and reducing availability for wild species. Growing feed crops for livestock consumes vast amounts of land that could otherwise support natural ecosystems.

Regenerative Grazing is even worse: Regenerative grazing is often promoted as increasing biodiversity, but under certain circumstances it can do the opposite.

The main mechanisms for biodiversity loss rather than gain come down to ecological oversimplification, species displacement, and habitat alteration.

Habitat homogenisation: Even 'managed' grazing systems often replace complex, varied habitats (e.g., wetlands, shrublands, native grasslands) with pasture optimised for livestock. When paddocks are reseeded with a narrow set of 'improved' pasture species (often high-yield exotic grasses and legumes), the diversity of native plants drops sharply. Native plant specialists are replaced by a few dominant, grazing-tolerant species, which leads to fewer niches for insects, birds, and small mammals.

Suppression of natural succession: In natural systems, some areas would transition into shrubland or forest, others remain grassland, depending on disturbance patterns. Regenerative grazing tends to maintain everything in a perpetual 'early successional' state to optimise forage. This removes later-successional habitats needed by many species (e.g., woodland birds, shade-loving plants, larger predators).

Introduction and spread of non-native species: Pasture improvement often involves planting non-native forage species, which can escape into surrounding landscapes and outcompete native flora. Livestock can carry seeds of invasive species in their fur or dung, accelerating spread.

Pressure on sensitive species: Even with rotational rest periods, livestock can trample nests, compact soil, and disturb ground-dwelling fauna (e.g., reptiles, invertebrates). Riparian zones, wetlands, and other fragile

microhabitats are often degraded unless strictly fenced off, leading to loss of aquatic and amphibious biodiversity.

Reduction in trophic complexity: Predators are often excluded to protect livestock, disrupting natural food webs. This can cause mesopredator release (e.g., boom in fox or coyote populations) and declines in prey species diversity. The system becomes livestock-centred rather than multi-trophic, limiting diversity at higher trophic levels.

Nutrient cycling changes: Manure concentration in grazing areas can lead to eutrophication, altering soil chemistry and favouring nutrient-loving plants over slow-growing natives adapted to lean soils. This can reduce plant diversity and cascade into losses in insect and bird communities dependent on those plants.

Edge effects and fragmentation: When grazing land is carved into paddocks with fencing, remaining native habitat patches become fragmented. Species that need larger continuous areas (e.g., some grassland birds, migratory mammals) lose viable habitat.

Extinction events

When species go extinct, the process often involves significant suffering for individual animals, populations, and ecosystems. This suffering can occur in various forms, depending on the factors leading to extinction.

Habitat destruction, climate change, or resource competition can lead to a lack of food. Animals may experience prolonged starvation, weakness, and death over weeks or months.

Emerging pathogens, often exacerbated by habitat fragmentation or invasive species, can decimate populations. Infected individuals experience prolonged illness, pain, and reduced quality of life.

Habitat loss, noise pollution, and human interference can disrupt behaviour and induce chronic stress. Stress affects reproduction, immune function, and overall well-being.

Hunting, fishing, deforestation, and pollution often directly harm individuals. Animals are injured, trapped, or killed in slow, agonising ways. Marine animals entangled in fishing nets endure prolonged suffering before dying.

Habitat fragmentation forces animals to move, often into unsuitable environments. Displacement leads to exhaustion, starvation, and difficulty finding mates.

Small, isolated populations suffer from reduced genetic diversity, increasing vulnerability to disease and deformities. Individuals may be born with painful genetic disorders or reduced fitness.

Gradual loss of individuals occurs due to cumulative pressures like resource scarcity or predation. Remaining individuals may experience loneliness, stress, and reduced ability to thrive.

Extinction of key species disrupts food webs and ecological balance, affecting other species. Dependent species may experience starvation, stress, or disease.

Many argue that extinction involves not just physical suffering but also a loss of intrinsic value and the potential for species to thrive. Preventing extinction is seen as a way to reduce suffering and maintain ecological and ethical harmony.

Are wild animals, being sentient, also not worthy of moral consideration? To argue that wild animals suffer in the natural world and that this somehow makes their suffering okay is to invoke the naturalistic fallacy on behalf of some *'laissez-faire'* principle which amounts to abdication.

Domain 6: Human Suffering and Starvation: Deprivation on Behalf of Livestock

The meat industry has never been about nutrition; it has always, since its earliest days, been about profit. Humanity's lengthy history of devaluing, oppressing, and exploiting both humans and non-humans has been mostly driven by economic interests.

> “In 1845, the potato crop on which so many exploited people in Ireland depended was struck by disease. The suffering of the native Irish turned calamitous; ‘most historians placed the number of those who died at over one million and those who emigrated at about two million.’
>
> Without the nutritious potato, the Irish people suffered from malnutrition which reduced their body’s resistance to viruses and bacteria. It is estimated that ten times as many people died from disease than from hunger during the famine years. The exact number will never be known, since whole families disappeared and thousands lie buried in unmarked graves….
>
> While the people were starving, ships filled with Irish grain and livestock headed to England and other markets. This tragedy for millions in fact led to more profits for ranchers and their associates, as abandoned land was converted into pasture. ‘Between 1846 and 1874 the number of cattle exported from Ireland to England more than doubled, from 202,000 to 558,000,’ and more than 50 percent of the land was used to raise cows.” - David Nibert, *Animal Oppression and Human Violence: Domesecration, Capitalism and Global Conflict.*

It’s still the same: In sub-Saharan Africa, large portions of land are used to grow crops like maize and soy for export or as livestock feed, rather than for local food production.

Small farmers in developing nations are often pushed off their land to make way for large-scale livestock operations or feed crop plantations, reducing their ability to grow their own food. In Brazil, the expansion of soy plantations (used for livestock feed) has led to deforestation and displacement of indigenous communities, increasing food insecurity.

Most of the food we grow is used to feed animals.

The FAO (United Nations Food and Agriculture Organisation) has published numerous reports highlighting the inefficiencies in the global food system. For instance, their studies show that a large proportion of cereal crops, such as maize, wheat, and soybeans, is used as animal feed rather than for direct human consumption. This is particularly common in industrialized countries where livestock farming is intensive.

The WRI (World Resources Institute) has released reports showing that about 60–70% of global agricultural land is used to grow feed for animals or for grazing, emphasizing the inefficiency in converting plant calories into animal calories.

Groups like the Worldwatch Institute, Our World in Data, and The Good Food Institute highlight that feeding crops to animals instead of directly to humans represents an inefficient use of land, water, and energy resources.

Demand for animal feed increases the cost of staple grains, making them less affordable for impoverished populations. Wealthy nations and large agribusinesses control vast amounts of agricultural land and water resources, reducing food availability for vulnerable populations.

Animal agriculture is a leading contributor to greenhouse gas emissions (methane, nitrous oxide, CO_2), which exacerbates climate change. This leads to extreme weather events, droughts, and desertification, reducing crop yields and increasing food insecurity. Overgrazing and industrial livestock farming contribute to soil erosion, reducing agricultural productivity. Livestock farming leads to water contamination from manure runoff, making water sources unsafe and reducing access to clean drinking water. In the Sahel region of Africa, livestock overgrazing and climate change have led to desertification, reducing arable land and worsening malnutrition.

Many developing nations prioritize meat exports over feeding their own populations, leading to a paradox where malnourishment exists despite abundant food production. Ethiopia produces large quantities of meat and dairy for export while millions suffer from food insecurity.

> “Realize that 82% of the world’s starving children live in countries where food is fed to animals that are then killed and eaten by more well-off individuals in developed countries like the US, UK, and in Europe. One fourth of all grain produced by third world countries is now given to livestock, in their own country and out.

> On a local basis, specific animal-based agriculture simply perpetuates both poverty and hunger. This is true whether in urban, industrialized countries, which are affected by all those factors mentioned above, or in rural developing countries. As an example, in Ethiopia, over 60% of their population is considered hungry or starving, and yet they have 50 million cattle in that country (one of the largest herds in the world), unnecessarily consuming their food, land, and water.” - Dr Richard Oppenlander, *Comfortably Unaware*

A major factor in this scenario is Soy.

Soy

The allocation of soy crops varies based on global demand and production trends. On average, the percentages of soy usage are approximately distributed as follows:

1. Animal Feed (about 77-80%)

The majority of soymeal is used as high-protein feed for livestock, particularly poultry, pigs, cattle, and aquaculture. This sector drives the largest share of global soy production.

2. Soybean Oil (about 18-20%)

Soybeans are crushed to extract oil, which is widely used for cooking and food products: about 90% of soy oil is used in the food industry. Roughly 10-15% of global soy oil is diverted to biodiesel.

3. Direct Human Consumption (about 6-7%)

Includes food products like tofu, soy milk, tempeh, edamame, soy protein, and soy flour. This share is small compared to animal feed but growing due to increasing interest in plant-based diets.

4. Industrial Uses (about 2-3%)

Soy oil and by-products are used in non-food applications such as plastics, paints, adhesives, lubricants, and cosmetics. Emerging uses include biodegradable packaging and textiles.

5. Other Uses (about 1%)

Includes seed production, soil improvement (via crop rotation), and experimental or emerging uses like pharmaceutical applications. These percentages can vary by year and region based on market trends, consumer demand, and policy changes (e.g., subsidies for biodiesel or plant-based products).

> “There can be no question that more hunger can be alleviated with a given quantity of grain by completely eliminating animals from the food production process. About 2 000 pounds of concentrated grains must be supplied to livestock in order to produce enough meat and other livestock products to support a person for a year, whereas 400 pounds of grain (corn, wheat, rice, soybeans, etc.) eaten directly will support a person for a year. Thus, a given quantity of grain eaten directly will feed five times as many people as it will if it is first fed to livestock and then is eaten indirectly by humans in the form of livestock products.” - M. E. Ensminger, President of Consultants – Agriservices

Hunger

Around 733 million people worldwide - roughly 9.1% of the world's population - struggle with chronic hunger as of 2023. The fact that this number hasn't changed much in recent years suggests that efforts to end world hunger have stalled.

A comprehensive assessment of food insecurity shows that, in 2023, 2.33 billion people had moderate to severe food insecurity, in addition to those who are chronically hungry. This indicates that about 30% of people on the planet lacked regular access to enough food. Every year, millions of children suffer from stunted growth and developmental problems as a result of undernutrition, which accounts for almost half of all child fatalities.

Yet we are happy to feed huge numbers of animals raised primarily for meat, dairy, and eggs: roughly 23–25 billion chickens, about 1.4–1.5 billion cattle, around 1 billion pigs, approximately 1.1–1.2 billion sheep, and nearly 1 billion goats.

It really amounts to feeding third world grains to first world livestock so that elites can eat a luxury food, using resources from the back yards of poor people. It's an obvious and reprehensible trade-off; the impoverishment of the poor is an opportunity cost of the indulgences of the rich.

> "It seems disingenuous for the intellectual elite of the first world to dwell on the subject of too many babies being born in the second - and third world nations while virtually ignoring the over-population of cattle and the realities of a food chain that robs the poor of sustenance to feed the rich a steady diet of grain-fed meat." - Jeremy Rifkin, *Beyond Beef, The Rise and Fall of the Cattle Culture*

Encouraging plant-based food systems could free up resources to feed more people. By prioritizing food systems that maximize nutrition while minimizing waste and environmental harm, we can move toward a more equitable global food system.

The Elitism of Meat

In many low-income regions, meat is considered a luxury due to its relatively high cost compared to plant-based staples like rice, beans, or lentils. Per capita meat consumption is often much lower in these areas. For example, in sub-Saharan Africa and parts of South Asia, meat consumption is as low as 5-10 kilograms per person per year, compared to over 100 kilograms in high-income countries.

Meat is more accessible and affordable in high-income countries due to industrialized production systems. However, premium meats (e.g., grass-fed beef, organic poultry) are often marketed as luxury products.

Meat production is resource-intensive, requiring land, water, feed, and energy. These costs are reflected in the price, making meat more expensive than plant-based foods. Rising global demand for meat, along with supply chain disruptions (e.g., pandemics, wars, climate events), has led to price increases in recent years.

In wealthier nations, processed and lower-grade meats are relatively affordable, but sustainably produced or specialty meats are priced higher, catering to affluent consumers. For low-income households, meat can be a significant portion of the food budget, making it less accessible.

In some cultures, meat consumption is tied to social status or celebrations, reinforcing its association with wealth and privilege. Historically, access to meat was often limited to the upper classes, while plant-based diets were more common among the poor. Diets emphasizing plant-based or alternative proteins are sometimes perceived as elitist in reverse, as these options (e.g., Beyond Meat, almond milk) can also be expensive and marketed to affluent, health-conscious consumers.

Critics argue that large-scale meat production contributes to deforestation, greenhouse gas emissions, and water consumption, making its environmental costs disproportionately high.

Advocacy for reducing meat consumption, often tied to environmental or animal welfare concerns, may appear elitist if alternatives are not made affordable or culturally inclusive.

Famines

Famines demonstrate baseline vulnerability. Animal agriculture demonstrates systemic amplification of that vulnerability. A large proportion of global crops (especially maize and soy) is diverted to livestock feed rather than direct human consumption. "A large share of global crops is used as animal feed; redirecting this could feed billions more people." - Emily Cassidy et al. (2013, Environmental Research Letters)

Conversion is inefficient: ~6–25 kg of plant input produces 1 kg of animal product (varies by species). This creates a structural bottleneck: calories are lost in translation. From a systems perspective, this is a thermodynamic inefficiency applied at civilizational scale. "Shifting diets away from animal products could increase available food calories by up to ~70% in the U.S. system." - David Tilman & Michael Clark (2014, PNAS)

There is also resource competition: humans vs. livestock - famine is not just humans vs nature - it is also humans vs their own allocation choices. Land: ~75–80% of agricultural land is used for livestock (grazing +

feed crops), while producing a minority of global calories. Water: Animal products are among the most water-intensive foods. Crops: Edible grains are routed through animals instead of directly feeding humans.

During scarcity conditions, this matters enormously: systems optimized for livestock become fragile under stress, and price shocks propagate faster. Societies avoid famine when they maintain robust entitlements (access systems). Animal agriculture, at scale, can act as a burden on those entitlements by increasing food prices, concentrating resources, and reducing caloric efficiency. So instead of buffering against famine, parts of the system erode resilience.

Anthropocentrism claims (implicitly or explicitly) that human systems are oriented toward human flourishing, but the empirical reality is that we allocate food in ways that reduce total human-edible output; we maintain those systems despite known inefficiencies; and we prioritise preference (taste, culture, identity) over resilience.

That exposes a contradiction: human exceptionalism coexists with self-imposed vulnerability. Behaviour is not optimised for survival or rational outcomes; it is stabilised by norms, identity, and inherited practice via the cultural cloning process.

Now the argument extends beyond efficiency: there is an ethical escalation to dual harm.

Animal agriculture simultaneously consumes resources that could mitigate human hunger while imposing suffering on non-human animals, so you get a convergence: human vulnerability (famines, food insecurity) and non-human exploitation (systematic commodification).

The same system that denies moral consideration to animals also misallocates the conditions of human survival.

Famines reveal that human survival is conditional, governed by access rather than entitlement. Yet within these constraints, we allocate vast quantities of edible crops to livestock, introducing predictable losses in energy and protein. This is not a neutral feature of the system but a structural inefficiency - one that reduces total food availability while remaining insulated by culture, preference, and economic inertia.

Even within an indifferent universe, humans have built systems that increase unnecessary suffering.

Domain 7: Losing our Minds

> “Alas, what wickedness to swallow flesh into our own flesh, to fatten our greedy bodies by cramming in other bodies, to have one living creature fed by the death of another! ... As long as man continues to be the ruthless destroyer of lower living beings, he will never know health or peace. For as long as men massacre animals, they will kill each other.” - Pythagoras

The Decline of Human Mental and Moral Health

A society cannot normalize large-scale violence toward sentient beings without psychological consequences.

1. Mental Health

Workers in slaughterhouses and intensive animal farming operations often face harsh conditions. Repeated exposure to killing animals can lead to severe psychological stress, including post-traumatic stress disorder (PTSD), anxiety, depression, and what’s known as perpetration-induced traumatic stress (PITS). Studies have documented that slaughterhouse workers experience higher rates of mental health distress and even increased incidences of violent behaviour outside of work. These outcomes are attributed to the emotional dissonance required to disconnect from the suffering of animals in order to perform their jobs.

Farmers and residents living near large-scale factory farms often experience chronic stress due to environmental pollution, economic uncertainty, and social isolation. For example, exposure to noxious air pollutants (like ammonia and hydrogen sulphide) from concentrated animal feeding operations has been linked to respiratory problems, which in turn can contribute to broader mental health issues such as anxiety

and depression. In many rural communities, the higher-than-average rates of depression and even suicide among agricultural workers point to a mental health burden that goes beyond the immediate physical risks.

Multiple studies suggest a correlation between the presence of slaughterhouses and increased rates of violent crime, including rape and homicide. One of the most well-known studies on this topic, conducted by criminologists Amy Fitzgerald, Linda Kalof, and Thomas Dietz (2009), found that U.S. counties with slaughterhouses experienced higher violent crime rates than those with other industrial facilities. The study controlled for factors like socioeconomic status and population density, suggesting that the slaughterhouse itself played a role.

The psychological cause-and-effect relationship between slaughterhouse work and increased violent crime can be understood through several key psychological mechanisms.

Repeated exposure to violence, especially when inflicted by one's own hands, reduces emotional responsiveness. Initially, workers may feel distress when killing animals. Over time, to cope with the discomfort, they suppress empathy and emotional reactions. Desensitization extends beyond the workplace, making aggressive or violent responses seem more acceptable in daily life. Studies show that prolonged exposure to violent stimuli can lower physiological and emotional responses to distress, potentially making acts of violence against humans easier to commit.

When individuals engage in harmful actions that conflict with moral values, they often develop mental justifications to ease cognitive dissonance. Workers may reframe their actions as necessary, trivial, or even humorous to detach themselves from the moral weight of killing. Psychological studies show that when people are required to repeatedly harm others (even animals), they often reduce empathy by viewing the victims as ‘less than’ or non-sentient. Over time, this dehumanization of animals can generalize to humans, particularly marginalized or vulnerable groups, increasing the likelihood of violent crime.

Exposure to traumatic experiences without adequate coping mechanisms leads to emotional numbing, dissociation, and increased aggression. The repetitive nature of killing can create perpetration-induced traumatic stress (PITS) - a form of PTSD experienced by those who commit violence. Symptoms include emotional detachment, anger, nightmares, and intrusive thoughts. Suppressed emotions can lead to displaced aggression, where stress manifests as domestic violence, sexual aggression, or other violent behaviour. Studies suggest that PTSD is correlated with heightened impulsivity and reduced emotional regulation, both of which are risk factors for violent crime.

Slaughterhouses tend to hire transient, low-income workers, often under poor working conditions. High-stress jobs with long hours increase frustration, substance abuse, and domestic violence, contributing to crime. Slaughterhouse workers may live in impoverished areas where economic instability and lack of social cohesion make crime more likely.

Studies in social psychology indicate that moral compartmentalization is difficult - if someone normalizes violence in one context, it is more likely to leak into others. When individuals become accustomed to inflicting harm in one domain (e.g., killing animals), it lowers psychological barriers to violence in general, known as the Spillover Hypothesis.

Alzheimer’s disease is a progressive, neurodegenerative disorder that destroys brain cells, causing lasting memory loss, cognitive decline, and changes in behaviour. It is the most common cause of dementia, accounting for the vast majority of cases.

Processed meat consumption is heavily linked to an increased risk of Alzheimer's disease and cognitive decline, primarily through biological mechanisms like systemic inflammation, oxidative stress, and vascular damage. Large-scale observational data, including a prominent study published in Neurology, demonstrate that consuming as little as a quarter-serving of processed red meat daily correlates with a 14% to 15% increase in dementia risk. Conversely, researchers distinguish between types of meat, noting that unprocessed red meat does not carry the same strong correlation and may even interact differently with a person's genetics.

Processed meats like bacon, hot dogs, sausages, and deli meats are loaded with chemical preservatives: Nitrites and Nitrates generate advanced glycation end-products and nitrosamines. They directly damage brain cells and promote neurodegeneration. Processed meat contains excessive salt. This elevates blood pressure, damaging the brain's microvasculature over time.

Red and processed meats are high in saturated fats, which alter the body's metabolic profile. High saturated fat intake impairs how the body processes cholesterol. This can increase low-density lipoprotein (LDL) levels, a known risk factor for Alzheimer's. Saturated fats induce insulin resistance, which directly starves brain cells of required glucose energy and impairs overall brain health.

The digestion of red meat heavily alters the gut microbiome. Gut bacteria metabolize the L-carnitine found in red meat into a compound called trimethylamine N-oxide (TMAO). Emerging studies suggest that elevated TMAO levels accelerate the aggregation of amyloid-beta plaques and tau tangles, the hallmark pathological signs of Alzheimer's disease.

Processed red meat is rich in methionine, an essential sulphur-containing amino acid. Excessive methionine metabolism produces a toxic byproduct called homocysteine. High homocysteine triggers oxidative stress, breaks down the blood-brain barrier, and prompts mitochondrial DNA damage in neurons.

2. Moral Health Impacts

> "A universe is, indeed, to be pitied whose dominating inhabitants are so unconscious and so ethically embryonic that they make life a commodity, mercy a disease, and systematic massacre a pastime and a profession." - J. Howard Moore

Many people care deeply about animal welfare yet continue to consume meat - a conflict known as the 'meat paradox.' To resolve this cognitive dissonance, individuals often downplay the capacity of animals to suffer or rationalize meat consumption by categorizing animals into 'food' versus 'non-food' groups. This process of moral disengagement not only makes it easier to justify participation in an industry that inflicts animal suffering but may also erode broader moral sensibilities by normalizing harm as acceptable when it is hidden behind industrial processes.

When animal agriculture becomes so industrialized that its harmful practices are hidden or downplayed by marketing and policy exemptions, it can subtly shift public perceptions about what is morally acceptable. Over time, this may reduce empathy and the willingness to advocate for both animal and human welfare. In effect, the system creates a 'moral blind spot' in which the ethical costs of intensive farming - such as animal cruelty, environmental degradation, and public health risks - are externalized rather than reflected in everyday choices.

Both workers and consumers are forced to adopt coping strategies to reconcile their actions (whether it's killing animals or eating meat) with their moral beliefs. For workers, this can result in long-term psychological damage. For consumers, the need to rationalize meat-eating can lead to a diminished perception of the moral value of animals and an erosion of empathy.

The regulatory and cultural frameworks that allow factory farms to operate with minimal oversight contribute to these impacts. For instance, laws that exempt animal agriculture from many standard labour, environmental, and animal welfare regulations create an environment where harmful practices are normalized. This not only affects the mental well-being of those working in or living near these facilities but also reinforces moral justifications for continuing to participate in a system that many would otherwise find ethically troubling.

These interconnected mental and moral health impacts underscore how deeply the practices of intensive animal agriculture can affect human well-being on multiple levels.

There are several interrelated ways in which scholars and scientists have argued that animal agriculture - especially its modern, industrialized forms - can affect human moral attitudes.

Some ethicists and social theorists argue that the systematic treatment of animals as mere production units or commodities can lead to a broader desensitization to suffering. In this view, regularly engaging in or supporting a system that treats sentient beings as objects may erode the capacity for empathy and compassion - not only toward animals but also in how we think about other forms of suffering or injustice.

> "Belief in human superiority over animals is not only empirically correlated with, but also causally connected to, the dehumanization of human outgroups. Social psychologists have shown that inculcating attitudes of human superiority over other animals worsens, rather than alleviates, the dehumanization of minorities, immigrants and other outgroups. For instance, when participants in studies are given a newspaper story reporting on evidence

> for human superiority over animals, the outcome is the expression of greater prejudice against human outgroups. By contrast, those who are given a newspaper story reporting on evidence that animals are continuous with humans in the possession of valued traits and emotions become more likely to accord equality to human outgroups. Reducing the status divide between humans and animals helps to reduce prejudice and to strengthen belief in equality amongst human groups (Costello and Hodson 2010, 2012, 2014b). Multiple psychological mechanisms link negative attitudes towards animals to the dehumanization of human outgroups (Bastian et al. 2012; Dhont et al. 2014; Dhont, Hodson, and Leite 2016).” - Will Kymlicka, *Human rights without human supremacism*

The practices and narratives surrounding animal agriculture can reinforce a worldview in which species membership (the ‘us versus them’ mentality) justifies differential moral treatment. This may contribute to a normalization of hierarchical thinking in other domains of social and political life. In short, if society accepts the idea that some beings’ interests count less, that attitude might subtly influence how we judge other ethical issues.

Cruelty has moral costs that outweigh the benefits of animal-based food to humans:

> “The indifference, callousness and contempt that so many people exhibit toward animals is evil first because it results in great suffering in animals, and second because it results in an incalculably great impoverishment of the human spirit. All education should be directed toward the refinement of the individual's sensibilities in relation not only to one's fellow humans everywhere, but to all things whatsoever.” - Ashley Montague

Given that it is the emotional experiences that make human life 'worth living', it is strange that so many people use human intelligence as a differentiator between animals and humans and as a justification for the exploitation and cruelty of animals in sport, entertainment, and as food. It's an inherently weak argument, since the issue is not whether non-human animals' intelligence can be compared to human intelligence. The important comparison to make is with their capacity to suffer, and in that sense, they are our equals.

It thus becomes, not a mere 'preference' or 'choice' to support the use of animals in entertainment, in sport, or as food, since it is a choice that has moral consequences: the effect of our actions on creatures that are much like ourselves in ways that are material to physical pain or emotional suffering. But we don’t think about them as moral subjects, and that is a fault of our moral compass, it is not a fault of theirs.

Anyone who would not do something that would cause pain to another human, should not do it to a non-human animal. It is logically and morally inconsistent to defend human rights without also giving non-human animals rights to some degree.

Replace any use of animals with a human, and test whether that would be ethical. If it would not, then the use of that animal is justified by the fact that they are another species. That, in essence, is speciesism.

There are glaring moral inconsistencies in the attitude humans have toward different species, as if there is something innately different between these species that justifies treating some as personal companions – ‘pets’ – while others are labelled as ‘food’, ‘sports equipment’ or ‘vermin’, making them commodities or instruments or health risks, and most people think no further than the labels. This is partly due to ignorance – most people don’t have a basic understanding of biology, much less a working knowledge of neuroscience and our growth in understanding of animal neurology and their capacity to feel pain and emotion – and partly due to human gullibility coupled with and the inherent human need for comfort and indulgence, satisfied by misleading marketing slogans and labelling.

We do not escape unharmed when we abuse other species. In justifying brutality, we expose our own; in seeking protection from the law and police from experiencing it ourselves, we betray a hopeless double standard, since it seems brutality is okay as long as we are not the ones suffering it. We do not elevate ourselves through this behaviour; we diminish our moral stature firstly in the brutality and secondly in the hypocrisy. There is also the cowardice in looking the other way while others do the dirty work of confinement and slaughter.

The fact is, there is no difference whatsoever between the potential for suffering in a cat, dog, or horse and that of a cow, lamb, pig, chicken or fish. The notion that there are differences that make the pain of food animals irrelevant is a product of scientific illiteracy coupled with human egocentricity. Why are practices that would constitute criminal abuse in one context legally protected in another?

The effect is a massive deficiency in the human moral paradigm, based entirely on anthropocentric mythology.

When reasonably intelligent people are asked to present arguments for why human exploitation of animals is justified, once the usual simplistic arguments from intelligence, animal incapacity to make moral decisions and human superiority are shown to be invalid, they have nothing to offer.

The reasons for this include the fact that most people do not know WHY they think the way that they do about most things - they have never bothered to question their own thinking. People buy into a set of assumptions about the world and by the age of eighteen these are so entrenched that they are regarded as undeniably true.

The idea that one should 'respect one's elders' - the notion that authority figures know better - underpins most of the problems we have inherited and it is a fundamental flaw in our thinking.

The 'truths' handed on to me when I was a child included the notion that hard work makes one successful, that religion was a sound moral guide, and that racism was justified by the poor intelligence of other races. I no longer believe any of these things and I discarded many others along the path of emancipation of my thinking.

I'm still discarding assumptions - it's something I do daily as I learn more about the world, and it seems to me that the most dangerous assumption made by humanity is that it is Important, that the species is somehow so valuable that it is justified in destroying whatever it likes in pursuit of its own interests. If I was a betting man, I would not support a wager based on this position, and would take odds on the opposite consequence: it is more likely to be self-destructive than anything else, given the degree to which humans are dependent on the living system and its other participants.

To not enquire whether one's actions cause pain to others is moral cowardice. Human morality is mostly self-interest; we are good to those who we are dependent upon and who we perceive to be like us. Consideration for kin is something all animals do, and consideration for those with whom we are affiliated is similarly just a socially-conditioned response, whether religious, cultural, national, racial or tribal in nature.

The acid test of morality is how we treat the 'other' - those who do not fall within our domain of moral inclusion. And non-human animals are a significant category, given that they feel pain and in many cases experience emotion. Yet we deem it acceptable to treat them like commodities.

This has been the case in all the historic human blind spots: Slavery. Colonialism, Gender Inequality, Child Labour during the Industrial Evolution, all involved failure to perceive morally relevant facts which would have, had they surfaced now, been ostracised. The Holocaust and the Rwandan Genocide are the most extreme forms of this: the total shutdown of social cognition toward a group. The brain’s capacity for social cognition remains intact but the culture determines where that cognition is deployed. Entire populations can therefore share the same perceptual blind spot.

In factory farming’s blind spot, billions of sentient beings are processed as units of production and linguistically framed as commodity products (‘beef’, ‘pork’).

Using the mechanisms of systemic invisibility (physical and psychological distancing), category insulation (‘food animals’ vs ‘pets’), and perception as objects, this blind spot is, unlike historical cases, ongoing and global.

Domain 8: Unnecessary Evil

> “The exclusion of farmed animals by Animal Welfare Laws means that pigs, cows, chickens, turkeys, and other species raised for food can be lawfully treated in ways that would be illegal under various state anti-cruelty statutes that apply only to companion animals.” - Robert Lucius, *The Oppression of non-human Animals as a Crisis of Social and Ecological Justice*

Several practices in animal agriculture have become normalized and are widely accepted as industry standards, even though they are considered cruel by animal welfare advocates.

Peter Singer makes the point that welfare standards are a function of cost:

> "It is not practically possible to rear animals for food on a large scale without inflicting considerable suffering. Even if intensive methods are not used, traditional farming involves castration, separation of mother and young, breaking up social groups, branding, transportation to the slaughterhouse, and finally slaughter itself. It is difficult to imagine how animals could be reared for food without these forms of suffering. Possibly it could be done on a small scale, but we could never feed today's huge urban populations with meat raised in this manner. If it could be done at all, the animal flesh thus produced would be vastly more expensive than animal flesh is today - and rearing animals is already an expensive and inefficient way of producing protein. The flesh of animals reared and killed with equal consideration for the welfare of animals while they were alive would be a delicacy available only to the rich."

The production of chickens and other birds for meat, eggs, and feathers involves numerous harms, affecting their physical health, psychological well-being, and ability to express natural behaviours. Modern broiler chickens and turkeys are bred to grow unnaturally fast, leading to severe skeletal problems, heart disease, and difficulty walking. Ducks and Geese raised for meat face similar issues. Birds are packed into industrial sheds with tens of thousands of individuals, leaving little room for movement. This leads to stress, aggression, and poor air quality due to ammonia build-up from waste. Chicks, especially in the egg and poultry industries, often have the tips of their beaks removed without anaesthesia to prevent pecking injuries in crowded conditions. Birds are transported in cramped crates, often suffering from dehydration, heat stress, or cold exposure. At slaughter, many are shackled upside down and stunned before their throats are cut, but stunning methods are not always effective, leading to immense suffering.

Though banned in some regions, battery cages still confine millions of hens, ducks, quails, and other species in spaces so small they cannot spread their wings. 'Cage-free' systems may still involve overcrowded barns. Laying hens have been bred to produce unnaturally high numbers of eggs, leading to osteoporosis, prolapsed oviducts, and other painful conditions. Since male chicks of egg-laying breeds do not produce meat, they are killed shortly after hatching - typically by being ground up alive or gassed. This occurs in both conventional and organic egg production. Breeding birds, especially in broiler production, are kept for much longer than their offspring, suffering from chronic hunger because they are deliberately underfed to control weight gain. Professor John Webster has said: "Broilers are the only livestock that are in chronic pain for the last 20% of their lives. They don't move around, not because they are overstocked, but because it hurts their joints so much." Hens are sometimes starved or deprived of light to induce moulting, which can restart their egg-laying cycle but causes extreme stress.

Anyone who treated a budgie or parakeet in this manner would be charged with animal cruelty. Why do we think that some birds should be treated differently? Surely nobody can claim that human labelling as 'food' as opposed to 'companions' changes their sentience or the obligation to avoid causing them suffering?

Geese, ducks, and chickens are still used for feather & down production: Some farms pluck feathers from live birds multiple times before slaughter, causing pain and distress. Ducks and geese used for f*oie gras* endure force-feeding (gavage), where a tube is inserted into their throats to enlarge their livers to an unnatural size. This causes organ damage, difficulty breathing, and extreme suffering.

Pregnant pigs are confined in crates (gestation crates) so small they cannot turn around, leading to physical and psychological suffering. How can this possibly be humane? How distorted must one's perception be that this is deprivation of a natural life and contrary to any standard of animal welfare imaginable? Pigs and dairy cows may have their tails docked (cut off) without pain relief to prevent biting or hygiene issues in unsanitary environments.

Then there is pig 'thumping' - also known as PACing (pounding against concrete). Runt, ill, and non-viable piglets are killed this way: repeated blunt force trauma.

This is common practice - and legal.

The industry has deemed it a 'humane method of euthanasia': blunt trauma can be administered by grasping the hind legs of the piglet and striking the top of the cranium firmly and deliberately against a flat, hard

surface. Alternatively, a sharp, firm blow with a heavy blunt instrument to the top of the head over the brain can be used.

> "Pigs on the kill floor have come up and nuzzled me like a puppy. Two minutes later I had to kill them – beat them to death with a pipe." – Slaughterhouse worker, *Slaughterhouse* by Gail Eisnitz

What is the difference between your beloved dog lying asleep there on the couch, and the pig lying in their own excrement on a concrete floor in a run-down piggery? Intelligence? No. Sentience? No. Awareness? No. Your perception? Yes. Add your personal responsibility for their suffering if you eat pigs.

Veal, a by-product of the dairy industry, raises significant ethical concerns due to the suffering it causes to both calves and their mothers. Veal calves (mostly male because the dairy industry can't use them) are taken from their mothers within hours or days of birth. This separation causes severe distress to both the calf and the mother, as cows have strong maternal bonds. Traditionally, veal calves were kept in individual crates that severely restricted movement. While banned in the EU and some U.S. states, many calves are still housed in small pens, limiting their ability to move naturally. They are fed an iron-deficient diet to produce the pale-coloured meat desired by consumers. This often leads to anaemia and weakness. The unnatural diet and lack of exercise weaken the calves' immune systems, making them more susceptible to diseases. Many suffer from respiratory infections and digestive problems. Veal calves are slaughtered when they are just a few months old (often 16–18 weeks), preventing them from experiencing a natural life.

Dairy cows are repeatedly impregnated to maintain milk production. Calves are taken away within hours or days of birth, causing severe emotional distress for both mother and calf. Given the cruelty of keeping cows pregnant their entire lives and preventing them from ever having a relationship with their offspring, there is no good reason to consume cow's milk, especially given that there are plenty of plant-based alternatives. The bond between mother and offspring is a necessary condition of survival of offspring. It is built into their psyche; all mammals are alike in this respect. When we take away the calf from the mother, we cause distress.

> "That's one sad, unhappy, upset cow. She wants her baby. Bellowing for it, hunting for it. It's like grieving, mourning - not much written about it. People don't like to allow them thoughts or feelings." - Temple Grandin, Ph.D., Board member of U.S. meat industry's Livestock Conservation Institute

Cows have been selectively bred to produce unnaturally high amounts of milk, leading to painful conditions like Mastitis, Lameness (due to standing on hard surfaces for long periods), and reproductive disorders. This cycle leads to physical strain and shortened lifespans. Once dairy cows' milk production declines (typically after 4–6 years, though their natural lifespan is over 20 years), they are sent to slaughter, often suffering from lameness and other health issues due to intensive production demands. Some cows have their tails cut off or their horns removed (often without pain relief) to make handling easier. While common and efficient, the process of artificially inseminating cows and pigs can be invasive and stressful for the animals.

In Parmesan-style cheeses, traditional European cheeses, and some artisanal cheeses, Rennet is a complex of enzymes used to coagulate milk - turning liquid milk into solid curds during the production of cheese. The key enzyme is chymosin, which causes the milk protein casein to clot. The cruelty of rennet lies in its extraction from the stomach linings of slaughtered, unweaned calves, kids, or lambs. Traditional animal rennet, which contains the enzyme chymosin, tethers the cheese industry directly to the slaughter of young animals. The dairy industry necessitates continuous calving to maintain milk flow; the resulting calves are either raised for veal or slaughtered as byproducts.

Will Tuttle talks about a cow's last unborn calf:

> "It is common practice to impregnate her one last time, and send her to slaughter when she is about eight months pregnant or so, for the extra profit that her unborn foetus can bring at the slaughter-plant. So after hanging her upside down and slitting her throat so that she dies by the slow and painful death of being bled out, workers cut her open and perform a late-term abortion, stabbing her unborn calf because of the extra profit this calf brings to the

> industry in three ways. First, the skin of unborn calves can be used to make fine leather that fetches a higher price. Second, the stomachs of these unborn calves have already started to produce rennin, the hormone substance that we don't have that breaks down the main protein in cow milk, casein, and this rennin is used by the cheese industry to coagulate milk to make cheese. Third, the pharmaceutical industry wants to use the 'foetal bovine serum' that is in the calf's heart and circulatory system for their vaccines, and so workers insert a long needle into the beating heart of the calf to extract this substance, before slitting his or her throat."

Goats & Sheep in Dairy Farming endure forced breeding, early separation from offspring, and early slaughter when milk production declines. Male goats and lambs are often killed shortly after birth because they cannot produce milk and are less profitable for meat.

Fish look alien compared to mammals - no expressive eyes, fur, or cries. Humans empathize more readily with creatures that resemble us or display distress in familiar ways. Their suffering is literally out of sight - underwater, on hooks, or in trawler nets. This invisibility makes it easier to deny.

People talk about 'catch,' 'stock,' and 'harvest' rather than 'kill,' 'injure,' or 'slaughter,' reinforcing the idea that fish are commodities rather than sentient beings.

I remember a girlfriend of mine saying once that 'fish are cold-blooded, they don't feel pain'.

> "Contemporary studies over the last 10 years have demonstrated that bony fish possess nociceptors that are similar to those in mammals; that they demonstrate pain-related changes in physiology and behaviour that are reduced by painkillers; that they exhibit higher brain activity when painfully stimulated; and that pain is more important than showing fear or anti-predator behaviour in bony fish. The neurophysiological basis of nociception or pain in fish is demonstrably similar to that in mammals." - Lynne U. Sneddon, Pain in aquatic animals, *Journal of Experimental Biology*

The belief that fish don't feel pain persists because it is historically ingrained, scientifically outdated, culturally reinforced, psychologically convenient, and economically profitable. Even though modern research strongly supports that fish do feel pain, overturning centuries of denial is slow - especially when empathy and ethics threaten powerful interests.

When a fish is taken out of water, it suffers from a prolonged experience of pain and distress due to asphyxiation, which is suffocation from lack of oxygen. The fish's delicate gills collapse, preventing oxygen from entering the blood. This leads to carbon dioxide (CO_2) build-up, which acidifies the blood and brain, triggering a pain response known as nociception. Fish exhibit signs of suffering, such as gasping, thrashing, and attempting to escape, for minutes before losing consciousness.

> "Air asphyxiation is the oldest slaughter method for fish and is considered inhumane because it can take the fish over an hour to die. One Dutch study found that it took 55–250 minutes for various species of fish to become insensible during asphyxiation. Fish that evolved for low-oxygen environments take longer to die. At higher temperatures, fish lose consciousness more quickly." – (Wiki)

Many organisations, including the World Organisation for Animal Health, have deemed certain fish harvesting practices inhumane, including suffocating in air, carbon dioxide stunning, and ice chilling. The dependence of many societies on fish has led to the development of alternate ways of slaughter, such as electrical stunning, pithing, shooting, and percussion stunning. Despite their effectiveness, these techniques are nonetheless criticised by others, who contend that there is no truly humane way to kill fish.

Artificiality of Captivity

The reason we don't think of farm animals as having 'personalities, mind and feelings' is partly due to a socially-conditioned reflex and partly due to our lack of association with them. Were we to spend more time with them, and that in their natural environments, we would observe many behaviours and be able to infer cognitive and emotional states that are invisible to us in the conditions we place animals in after capturing and confining them in zoos, labs, and Concentrated Animal Feeding Operations (CAFOs). Slaughterhouses are even more invisible and we have beliefs about what happens in them that defy common sense. We have

no good reason to regard farm animals as being fundamentally different, whether neurologically or emotionally.

> “Satisfying our curiosity about other creatures doesn’t justify keeping those creatures in captivity - not only will we fail to understand what those animals are truly like in their natural state, but we will have caused them harm for a purpose with limited benefits. While studying other primates may indeed provide important insights into human cognition, it is again the case that our understanding will be at best diminished and at worst misled when we study captive animals, for those animals may well be cognitively impaired by the living conditions of captivity.” - Christophe Boesch, The Human Challenge in Understanding Animal Cognition, 2020.

The belief that animals growing their entire lives in artificial and deprived captive conditions can be considered representative of the entire species implies that cognitive development in non-human animal species follows a rigid course and is only marginally, if at all, influenced by the conditions in which an individual grows up. This is patently absurd. As Boesch argues, this attitude ignores the richness of nature, and the reality is that our in-depth knowledge of human nature comes mainly from observations in the ‘wild’ and not in captivity. Indeed, human psychology would be quite poor if it were reduced to what can be observed in controlled experiments. This is why research based only on captive animals must be treated with caution.

When we do see farm animals in a different context - that of companions of humans - they exhibit all the characteristics of our favourite dog, cat or horse, demonstrating emotional affiliation. We should not be surprised by this: they have all the requisite equipment to do so.

Yet we keep some animals confined and regard them as commodities, 'things' to be consumed. In this respect, we have a relationship with other species unlike that of any predator; we have established ourselves as something more than animal, yet with the same basic drives as any other animal. More about this aspect of our place in a world that becomes less 'natural' with every passing day…

Slaughter

> “Auschwitz begins whenever someone looks at a slaughterhouse and thinks: they're only animals” -Theodor Adorno

Would you choose to be euthanized in a modern slaughterhouse? How about one of your pets? If not, why not if it’s so humane? We know it isn't 'humane' – it’s just a word we use so we can feel better about our complicity, as if we demand that these animals are treated well and wouldn’t eat them if not. We become complicit in the lies of our denial; nobody can argue that they didn’t know.

Many animals experience significant stress and fear during transport and slaughter. Despite regulations, improper stunning methods can result in animals being conscious during slaughter.

Slaughter is inherently violent, and claims of ‘humane slaughter’ are largely a myth. While some methods aim to reduce suffering, all involve fear, pain, and the premature killing of sentient beings. Even in the best conditions, slaughter is traumatic for animals, and in many cases, the process is far from quick or painless.

Stunned slaughter (used in conventional western slaughterhouses) is standard in many countries, requiring animals to be stunned before slaughter to render them unconscious, using methods such as captive bolt gun (for cows, sheep, pigs) – A metal rod is shot into the brain. Sometimes it is ineffective, leading to repeated attempts. In electric stunning (for pigs, sheep, poultry), electrodes shock the brain to induce unconsciousness. Errors can cause paralysis while the animal remains aware.

Gas stunning (mainly for pigs and poultry) using carbon dioxide gas induces unconsciousness but causes panic, suffocation, and severe distress before loss of consciousness.

Stunning often fails, leaving animals conscious when their throats are slit or when they are submerged in scalding tanks, used primarily to loosen hair, feathers, or bristles from the bodies of slaughtered animals, making the removal process easier before further processing. These tanks contain hot water (often around 140–150°F or 60–65°C) and are commonly used for pigs and poultry.

> “I'd estimate that about 10 to 12 hogs an hour go into the scalding tank conscious. If the hog is conscious, ... it takes a long time for him to bleed out. These hogs get up to the scalding tank, hit the water, and start kicking and screaming... There's a rotating arm that

> pushes them under. No chance for them to get out. I am not sure if they burn to death before they drown, but it takes them a couple of minutes to stop thrashing.” – Slaughterhouse worker in *Slaughterhouse* by Gail Eisnitz

Pig skin is so close to human skin and pig nervous systems so similar to ours that only experts can tell them apart. Imagine being boiled alive…

Blood Mares

Blood Mares are horses, typically pregnant mares, who are used in animal agriculture to produce Pregnant Mare Serum Gonadotropin (PMSG), also known as Equine Chorionic Gonadotropin (eCG). This hormone is extracted from the blood of pregnant mares and is used in factory farming to stimulate ovulation and increase fertility in pigs, cows, sheep, and other farmed animals.

A vegan friend of mine’s husband once stated that ‘Cows don’t matter’. He is a meat eater. He is also a horse lover and equestrian and clearly only cares about his own horses, the horses he uses instrumentally to boost his ego. Perhaps he didn’t know about Blood Mares.

Mares are repeatedly impregnated to ensure a continuous supply of PMSG. Large volumes of blood (up to 10 litres per week) are taken during early pregnancy, when the hormone is most concentrated. This process continues for months. Many foals born from these pregnancies are considered by-products and are either slaughtered for meat or neglected. Once the mares are too weak or unable to conceive, they are often slaughtered.

The frequent and large blood extractions lead to anaemia, weakness, and immune system suppression. Many mares are inadequately fed and left dehydrated, exacerbating their suffering. They are often kept in barren enclosures with minimal care, experiencing chronic stress and exhaustion. Investigations have revealed instances of whipping, beating, and neglect to force compliance. Once they are no longer productive, they are typically slaughtered for meat or discarded.

The industry is particularly active in Argentina, Uruguay, and Iceland, where conditions for mares have been widely criticized. Animal welfare groups have exposed the cruelty behind PMSG production, leading to bans in some regions. However, the demand for PMSG remains high in industrial animal farming.

PMSG-containing veterinary products are distributed across various countries.

The sourcing and distribution of PMSG have been subjects of ethical scrutiny due to animal welfare concerns associated with its production. This has led some companies to change suppliers or cease certain imports.

Religious Slaughter

Islamic slaughter (Halaal/Zabiha) – Requires that animals be conscious when their throat is slit with a sharp knife, severing the jugular veins, carotid arteries, and windpipe. The goal is rapid blood loss leading to unconsciousness. Some countries allow pre-stunning, but many religious authorities oppose it.

Jewish slaughter (Shechita) – Like halaal slaughter, shechita prohibits pre-stunning and requires a deep throat cut. Stunning is considered to cause unnecessary injury and is therefore not permitted in traditional kosher slaughter.

While proponents argue these methods are quick, many animals remain conscious for extended periods, experiencing pain and distress. In industrial settings, religious slaughter is often rushed, exacerbating suffering.

The Myth of ‘Humane’ Slaughter

> “Let me say it openly: we are surrounded by an enterprise of degradation, cruelty, and killing which rivals anything that the Third Reich was capable of, indeed dwarfs it, in that ours is an enterprise without end, self-regenerating, bringing rabbits, rats, poultry, livestock ceaselessly into the world for the purpose of killing them.” - JM Coetzee

Animals in slaughterhouses can sense the fear of those before them. They hear the screams, smell the blood, and often resist entering.

Studies have shown that although humans are very sensitive to a wide range of odors, the vomeronasal system (which is key for detecting pheromones in many mammals) is vestigial or non-functional in humans. This means that the kind of chemical communication that affects animal behaviour through pheromones is not present in the same way in humans.

Humans retain olfactory receptors but lack a fully functional vomeronasal organ for pheromone detection. As a result, we do not directly ‘smell’ another person’s fear or pain chemicals. Instead, we rely on secondary cues - facial expressions, vocalizations, posture - to infer emotional and physical states.

Many mammals - including cattle - can detect and react to chemical cues released by stressed or injured conspecifics. When one animal experiences pain or distress, it releases stress-related pheromones that can be sensed by nearby animals, triggering heightened anxiety or fear. In captive settings and slaughterhouses, these chemical signals can contribute to an environment that is inherently stressful. Even if modern ‘humane’ slaughter practices (such as pre-slaughter stunning) minimize pain at the moment of death, the animals may still endure significant distress from the overall atmosphere, including these olfactory stress cues.

Without direct chemical signals, humans are more prone to misinterpretation or underestimation of subtle distress cues in other animals, especially those that mask pain behaviours to avoid predation. We tend to project human-like facial or vocal cues onto animals. Species with less expressive faces (e.g., fish, reptiles, many invertebrates) are often deemed to feel less, reinforcing a moral hierarchy. Welfare assessments hinge on observable behaviours (e.g., vocalizations, escape attempts), which can fail to capture internal distress that, in other animals, would be broadcast via pheromones.

Recognizing our sensory deficit imposes a moral imperative to develop more objective measures of animal welfare - such as physiological biomarkers (heart rate variability, cortisol levels) or neuroimaging techniques - to detect distress that we cannot ‘smell.’ If many non-human animals experience and signal pain in ways we cannot directly perceive, ethical frameworks (e.g., utilitarianism, rights-based approaches) should be revised to include precautionary protections for all sentient beings, regardless of our sensory access.

The evolutionary endowment of pheromone-based empathy in non-human animals highlights a profound sensory gap in humans. Ethically, this gap challenges us to transcend our anthropocentric limitations: to acknowledge that absence of perception is not absence of experience, and to structure our moral and legal systems to safeguard the welfare of all animals - even those whose suffering we cannot instinctively detect.

This evidence challenges the idea that slaughter can ever be ‘humane.’ Even with improvements aimed at reducing pain during the act of killing, the build-up of stress from factors such as unfamiliar surroundings, handling by humans, and the detection of distress signals from other animals suggests that the overall process still subjects animals to considerable anxiety. In effect, while the methods used at the moment of death might reduce acute suffering, the environment itself - laden with stress cues including pheromones - continues to compromise animal welfare. In addition, workers pressured to process hundreds of animals per hour, frequently mishandle them, leading to botched kills and prolonged suffering. Many animals are still aware when they are bled out, scalded, or dismembered. Even under ideal conditions, death is neither instant nor painless.

‘Humane slaughter’ is an absurd oxymoron. ‘Humane’ means ‘having or showing compassion or benevolence’. What exactly is compassionate or benevolent about slaughter?

One has to be extraordinarily gullible to believe that animals are treated humanely in slaughterhouses. One has to be extraordinarily ignorant to be unaware that they are sentient. One has to be astoundingly arrogant to assume that humans have the right to use and abuse them. And one has to be morally deficient to think that ignorance, gullibility and arrogance are admirable traits.

> “The animals are excessively prodded with pipes, chains and pitchforks, with no consideration for aim. Prods are often jammed in the animal's eyes, ears and down their throats. It doesn't get any better down the line either. The ‘knocker’ or ‘stunner’ has to kill as many as 1,100 animals per hour. That is only three seconds for each. Now that might not be too bad if the animals patiently stood there waiting to get hit, but, needless to say, they aren't. Often the equipment is not working properly either, thus rendering accurate stunning

> impossible, but the line keeps on moving whether the creature is unconscious or not." – slaughterhouse worker

In **Live Export,** animals are transported long distances across borders, often in overcrowded and unsanitary conditions, without adequate food, water, or rest, leading to high stress and mortality rates. Many collapse, suffer injuries, or die before arrival.

> "In my opinion, one of the greatest animal-welfare problems is the physical abuse of livestock during transportation...Typical abuses I have witnessed with alarming frequency are hitting, beating, use of badly maintained trucks, jabbing of short objects into animals, and deliberate cruelty." - Temple Grandin, Ph.D., Board member of U.S. meat industry's Livestock Conservation Institute.

Animals are harmed in transport, whatever the distance. A study by Ahsan et al. (2014) found that 89% of cows and buffaloes presented at slaughter with lesions on the back, in the ventral area, at the base of the tail, and in the lumbar, thoracic and scapular regions. These were determined to be caused by other animals and/or contact with the transport vehicle and were prevalent when animals were forced to travel at densities much higher than recommended levels, which is common.

These practices are justified by the industry as necessary for efficiency and profitability, but they raise significant ethical questions about animal welfare and the costs of industrial-scale agriculture.

The Awassi Express (2017) footage, filmed by a whistleblower and aired on Australian TV, showed sheep packed so tightly they couldn't reach food or water, collapsing in heat, and literally "cooking alive" in their own bodies. On the Cormo Express (2003, Saudi Arabia) - 57,000 sheep stranded at sea for nearly three months; over 5,000 died.

It isn't just animal rights groups saying live export is cruel - it's on record in government reports, peer-reviewed science, and veterinary testimony. Australia's own Department of Agriculture has documented thousands of sheep and cattle dying on voyages every year, mostly from heat stress and disease. The McCarthy Review (2018), commissioned after whistleblower footage, confirmed animals collapse and die in extreme heat. Peer-reviewed studies back this up, showing that overcrowding and poor ventilation make suffering inevitable. This isn't a matter of opinion - it's hard evidence.

The cruelty of live export is not an activist claim but a documented fact. Governments admit it, science proves it, veterinarians confirm it, and video footage shows it.

Live export causes unavoidable animal suffering.

Vivisection

Vivisection generally refers to the practice of performing experiments or surgical procedures on live animals. Traditionally, it meant dissecting living animals to study their internal functions, but in modern usage, it often encompasses a wide range of animal experiments aimed at understanding biological processes, testing pharmaceuticals, and developing medical treatments.

> "I abhor vivisection. It should at least be curbed. Better, it should be abolished. I know of no achievement through vivisection, no scientific discovery, that could not have been obtained without such barbarism and cruelty. The whole thing is evil." - Dr. Charles W. Mayo, son of co-founder of the Mayo Clinic, a skilled surgeon and a member of the Mayo Clinic's Board of Governors

Supposedly, vivisection has historically led to significant breakthroughs. It is claimed that many of the fundamental discoveries in physiology, pharmacology, and disease mechanisms have been made through experiments on living animals. However, around 90–95% of drugs that pass animal testing fail in human trials. This failure occurs because animals and humans have different genetics, metabolisms, and physiology. Some biological processes involve complex interactions among multiple organ systems that are challenging - or sometimes impossible - to replicate outside of a living organism. A drug that works in mice or monkeys may not work in humans or may cause unexpected side effects. Lab animals live in controlled environments, whereas humans have varied diets, lifestyles, and genetic backgrounds that affect drug reactions. There is overreliance on certain species; mice and rats, which make up most test subjects, don't always model human diseases well. Even primates, our closest relatives, have key biological differences.

Effects on the animals include prolonged suffering as the disease progresses without treatment, loss of motor control, seizures, paralysis, and disfigurement and high mortality rates with some animals suffering for weeks or months before being euthanized. Critics argue that vivisection is ethically problematic because it often involves pain, distress, or harm to sentient beings. This raises questions about the moral justification of using animals purely as tools for research.

> "Atrocities are not less atrocities when they occur in laboratories and are called medical research." - George Bernard Shaw, Playwright, Nobel prize 1925

The American Medical Association has also admitted that animal models have questionable accuracy. An AMA representative testified at a congressional hearing on drug testing that 'frequently animal studies prove little or nothing and are very difficult to correlate to humans.' – from *Animal Liberation* by Peter Singer.

Until recently, alternative testing methods like organ-on-a-chip, AI modelling, and human cell cultures weren't advanced enough to replace animal tests entirely. Because of regulatory inertia, many regulations still require animal testing for safety and efficacy, even when better methods exist. Bureaucratic processes are slow to change.

Companies may prefer animal testing because it provides legal protection. If something goes wrong in human trials, they can argue they followed standard procedures. Animal testing has been a staple of biomedical research for over a century, making it difficult to shift away from entrenched practices.

There are several promising alternatives to animal testing that are more reliable, ethical, and often more predictive of human outcomes. These include human cell and tissue cultures (In Vitro Testing), computer modelling and artificial intelligence, human-based testing methods like microdosing and organs from deceased donors, 3D bioprinting, and ethical human trials (clinical trials and epidemiology).

> "There will come a time when the world will look back to modern vivisection in the name of Science, as they do now to burning at the stake in the name of religion." - Dr. Henry J. Bigelow, Boston surgeon, pioneer in use of ether.

Non-human animals should be given a similar moral position if they are sufficiently similar to humans to be utilised as scientific models in study.

The scientific literature increasingly supports several propositions. Animal models often have limited predictive reliability for humans; many animal studies suffer from methodological weaknesses. Human-based alternatives are improving rapidly - in some domains, alternatives already outperform animal testing. Regulatory agencies are beginning to acknowledge this shift. Complete replacement has not yet been achieved for all research areas, so the strongest scientifically defensible conclusion today is probably:

Vivisection is not universally necessary, and its scope is likely to continue shrinking as human-relevant methodologies improve. The burden of proof is increasingly shifting onto those who claim animal experimentation remains indispensable.

Instrumentalism is the philosophical idea that objects (or beings) are used merely as instruments or means to achieve an end, rather than being valued in their own right. Many critics of vivisection argue that it reflects an instrumentalist approach. Animals are viewed solely as tools for obtaining data and advancing human knowledge, without sufficient consideration for their intrinsic worth or rights; in other words, means to human ends.

Proponents often counter that the potential benefits to human and animal health (such as the development of life-saving treatments) can justify the practice under strict ethical and regulatory frameworks. They stress that many institutions adhere to guidelines designed to minimize suffering and ensure that animal use is only undertaken when no viable alternatives exist.

Alternatives

Advances in cell culture techniques, including the use of human cell lines and organoids, allow researchers to study cellular responses and disease mechanisms in controlled environments. Computer simulations and bioinformatics can model complex biological systems, reducing the need for some types of animal experiments. Organ-on-a-Chip Technologies, microfluidic devices that mimic the physiological responses of human organs, offer a promising bridge between in vitro and whole-organism studies.

Even if vivisection cannot be entirely eliminated at present, many research institutions are committed to the 3Rs - Replace, Reduce, Refine - to minimize animal use and suffering.

Continued investment in alternative technologies is essential. As these methods become more advanced and validated, the reliance on live animal experiments is expected to diminish.

Live to Eat vs Eat to Live

I do not eat meat, poultry, fish or use dairy products today. I abstain, partly out of compassion with the animals, but mainly due to an intellectual and scientific understanding of the simple fact that the difference between them and us is one of degree and not kind - in other words they are pretty much like us, and if it would be immoral to murder and consume a human, it is equally so in respect of the animals.

> "Those who, by their purchases, require animals to be killed have no right to be shielded from the slaughterhouse or any other aspect of the production of the meat they buy. If it is distasteful for humans to think about, what can it be like for the animals to experience it?" - Peter Singer, Australian professor, *Animal Liberation*

If you don't know, that's ignorance. It's an excuse if you don't have access to information. If you're reading this, you have no excuse. If you know but refuse to look, that is moral cowardice. Also not an excuse. If you know and participate willingly, that is Psychopathy. Only an excuse if you were born that way. Or, if you're intelligent and knowledgeable and have a moral compass, you could change your mind and stop consuming meat and dairy.

We share a large percentage of our genes with other mammals, particularly cows (80%), pigs (98%), rodents (98%) and chickens (60%). Animals, from mice to monkeys, have the same organs (heart, lungs, brain etc.) and organ systems (respiratory, cardiovascular, nervous systems etc.) which perform the same functions in pretty much the same way. So eating other animals is pretty much the same as eating other humans. There is something inherently cannibalistic in animal consumption; it is arguably primitive. The savage lives on inside us.

> "We have created hell for animals on Earth and somehow we still think we are a moral species." - Jeffrey Moussaieff Masson

Evil is a human contrivance. Then humans invent entities in order to avoid culpability. Humans are intolerant of all evils except their own, and the atrocities of animal agriculture are just the most recent example. But it is indicative, more than anything else, of an incapacity to think clearly, especially when it means they have to give up an indulgence.

It's also time we stopped being 'nice' about this issue. Given the feedback loops of animal agriculture, which include climate change, environmental degradation, waste of water and land resources, and human disease, there is no longer time. It has now become a matter of urgency to address the greatest moral and ecological challenge of our time.

It's sad that one has to employ self-interest to convince humans, which claim to be the only moral animal, to stop doing something reprehensible, but there it is: stopping the consumption of meat is something humans will HAVE to do if the species is to survive. My prediction is that they will not, because they are too focussed on immediate needs to see the consequences of their actions and too narrow-minded to include other species in their moral framework.

Holocaust survivor Alex Hershaft compares animal exploitation to the Holocaust:

> "As I became more familiar with animal farming and slaughter operations, I noted more striking similarities between what the Nazis did to us and what we are doing to animals today:
>
> the branding or tattooing of serial numbers to identify the victims
>
> the use of cattle cars to transport people to their deaths
>
> the crowding and housing of victims in wood crates
>
> the vilification and abuse of the victims to make killing more acceptable
>
> the callous, disrespectful dumping of victims' bodies in open pits
>
> the deception about the horrors behind death camp and slaughterhouse walls

> the arbitrary designation of life and death: Christian lives, Jew dies; dog lives, pig dies”

Why is it okay for humans to force their will on sentient non-human animals and cause them emotional deprivation and pain, but it's not okay for others to tell them it's not okay? An intelligent person would recognise the double standard; an ethical person would recognise the moral imperative.

> “Our grandchildren will ask us one day: Where were you during the Holocaust of the animals? What did you do against these horrifying crimes? We won't be able to offer the same excuse for the second time, that we didn't know.” – Dr. Helmut Kaplan, Austrian Philosopher

Modern animal agriculture has become an institutionalised form of structural violence. Systemic injustice and indifference to suffering are themselves manifestations of moral evil. Systemic injustice and indifference to suffering are themselves manifestations of moral evil. The failure to critically question and reform practices that lead to such enormous suffering could indeed be seen as the epitome of moral failure. To participate in and support this system as a consumer is to collaborate with one of the great crimes of history.

My use of the word ‘crime’ is not considered lightly.

Animal Agriculture as a Collective Crime

> “The domestication of animals was a mixed blessing. Millions of years of evolution were replaced by an industrial assembly line. Today, the fate of farm animals is one of the worst crimes in history.” - Yuval Noah Harari, *Sapiens*

Animal agriculture is a multi-layered system that causes wide-ranging harm. These harms are ‘not accidental side effects’; they are *inherent outcomes* of a system optimized for profit and scale, regardless of the consequences. This attitude, that only profits matter, is criminal.

> “The global food system is not broken. It is functioning precisely as designed: to feed the wealthy and starve the poor.” - Raj Patel, *Stuffed and Starved*

Unlike traditional crimes with clear perpetrators and victims, animal agriculture involves millions of participants:

> Producers: Farmers, corporations, meat processors, feed producers.
>
> Governments, through subsidies, regulations, and international trade policies.
>
> Consumers, who create demand through daily purchases.
>
> Advertisers and Media, who normalize and glamourise meat consumption.
>
> Scientists and Technologists, who develop new ways to exploit animals ‘efficiently’.

This diffusion of responsibility makes the harm feel like ‘no one’s fault,’ though everyone is implicated. This is the essence of a collective moral crime.

Consumers sustain demand - but often under cultural, economic, or psychological pressures (tradition, taste, convenience). Producers drive supply - but are often trapped by market forces, subsidies, and industrial infrastructure. Corporations and policy-makers, however, often hold disproportionate power and leverage profit and influence to sustain the system.

So while the crime is shared, responsibility is stratified. Those with more knowledge, influence, and resources bear greater moral responsibility, or should.

Because this is not a crime of intention – nobody sets out to eat meat because they intend to commit a criminal act - but of normalized participation, dismantling it requires structural transformation: ending subsidies, supporting alternatives like plant-based and cellular agriculture. It also needs public education, exposing the true costs of animal products, and cultural change (challenging myths of tradition, masculinity, necessity), as well as legal innovation (e.g., recognition of animal sentience and environmental personhood).

Structural Violence and Legal Blindness

> “We do not want to think about the cost of our diet, because to think about it would be to recognize that we are participants in injustice - what Augustine would call structural sin.” - Charles Camosy, *For Love of Animals* (2013)

The system persists because it is legal and even subsidized in most countries. The victims - animals, ecosystems, and the world's poor - are structurally silenced or made invisible. Consumers are kept ignorant or misinformed by marketing, culture, and habit.

This is an example of what Johan Galtung called *structural violence*: violence that is built into systems, normalized, and invisible to those who benefit from it.

> "The same factories that perfected the slaughter of animals were later used in human genocides. Nazi scientists studied animal slaughter to design gas chambers. Slave owners in the American South referred to enslaved people using the same terms used for livestock. When we dehumanize, we animalize. We make people into animals, and we make animals into things. That's how violence becomes scalable. That's how it becomes efficient." - Michael Corthell

Parallels with Other Historical Atrocities

Like slavery, colonialism, or systemic racism, animal agriculture is sustained by normalization of violence, economic self-interest, devaluation of the victims, and cultural myths of superiority or necessity.

Future generations will look back and regard our participation and inaction as a grave ethical failure.

Animal agriculture is not a simple crime - it is a civilizational blind spot, a systemic and normalized form of violence that implicates nearly every level of society. Its very complexity is what allows it to persist. But complexity does not negate harm - and recognizing that diffused responsibility is still responsibility is the first step toward dismantling it.

> "It's illegal to kick an animal but it's legal to mutilate, cage and forcibly impregnate them. It's legal to take their babies, exploit them, deny them any autonomy and subjugate them. It's legal to electrocute them, shoot them in the head with a bolt, drop them in scalding tanks, force them into gas chambers and cut their throats. The law doesn't protect animals, it protects the abuse of animals." - Earthling Ed

Another Way

There is an alternative. And it's not nearly as difficult as some attempt to argue. A Whole Foods Plant Based Diet has significant positive effects on all the above.

Benefits of a Whole Food Plant Based Diet

Human Health Benefits

Reduced Risk of Chronic Diseases: Whole Food Plant-Based (WFPB) diets - rich in fruits, vegetables, whole grains, legumes, nuts, and seeds - are strongly associated with lower risks of heart disease, type 2 diabetes, hypertension, and certain cancers. Prospective cohort studies and controlled trials report improvements in blood pressure, cholesterol profiles, glycaemic control, and body weight when animal products and ultra-processed foods are minimized.

Lower All-Cause Mortality: Higher adherence to plant-based dietary patterns corresponds to reduced all-cause mortality. Analysis of large cohorts suggests that diets emphasizing minimally processed plant foods can decrease overall death rates by up to 25–30% compared to typical Western diets.

Improved Mental Well-Being: Increased intake of fruits, vegetables, and legumes has been linked to better mood and reduced symptoms of depression and anxiety. Longitudinal data indicate a dose–response relationship, where each additional daily portion of plant foods yields measurable psychological benefits.

Environmental Benefits

"*A* vegan diet is probably the single biggest way to reduce your impact on planet Earth… avoiding consumption of animal products delivers far better environmental benefits than trying to purchase sustainable meat and dairy." - Joseph Poore and Thomas Nemecek, *Science* (2018)

Land Use Efficiency: Animal agriculture occupies roughly 83% of farmland yet provides only about 18% of global calories. WFPB diets could reduce agricultural land use by up to 76%, freeing land for rewilding, biodiversity conservation, or reforestation.

Water Conservation: Livestock production consumes massive freshwater resources - producing 1 kg of beef can require ~43 000 L of water vs. ~1 000 L for 1 kg of cereal grains. Transitioning to plant-based foods could cut green and blue water use by 21% and 14%, respectively.

Biodiversity Preservation: Reduced demand for animal feed crops and pastures would alleviate pressures on ecosystems, slowing deforestation and habitat loss - the primary drivers of species extinction.

Global Warming Mitigation

Greenhouse Gas Emission Reductions: Food systems account for ~21–37% of global GHG emissions, over half of which stem from cattle products. Adopting WFPB diets could slash food-related emissions by up to 49%, a critical step toward meeting the 1.5 °C warming limit.

Carbon Sequestration Potential: Freed pasture and feed-crop lands could regenerate into carbon-sequestering forests and grasslands, providing an additional climate benefit by drawing down atmospheric CO_2.

Economic Benefits

Healthcare Cost Savings: By preventing and mitigating chronic diseases, widespread adoption of plant-based diets could substantially reduce healthcare expenditures. Modelling studies estimate potential annual savings in the tens to hundreds of billions USD globally from fewer hospitalizations and medical treatments.

Individual Grocery Savings: Empirical data show that plant-based eating can cost up to one-third less per calorie than omnivorous diets. An Oxford-led study found vegans saved nearly $800 over five months by reducing meat consumption and focusing on affordable staples like beans and grains.

Other Benefits

Antibiotic Resistance Reduction: Eliminating routine antibiotic use in animal farming—one of the main contributors to antimicrobial resistance - by shifting to plant-based alternatives helps preserve the effectiveness of life-saving drugs.

Ethical and Animal Welfare: Minimizing animal agriculture directly reduces the number of sentient beings in intensive confinement, aligning dietary choices with compassionate and ethical considerations.

Food Security and Equity: Plant-based staples often require fewer resources to produce, potentially lowering food costs and improving access, especially in regions vulnerable to climate-driven crop failures.

Enhanced Culinary Diversity: Embracing WFPB diets encourages exploration of a wide variety of grains, legumes, vegetables, fruits, nuts, seeds, and herbs - fostering innovation and cultural exchange in cuisine.

Humans are biologically Omnivores

While we are busy with the human diet, we should take the opportunity to consider the ‘natural’ human diet, which has been a topic of debate on social media for some time; the discussion is mostly punctuated with a poor understanding of biology.

Humans are best classified as ‘monogastric omnivores’.

While humans can and do eat meat - and anatomically are capable of processing animal protein and fat, our dental formula, jaw mechanics, gut morphology, and enzymatic toolkit align, not with obligate carnivores, but with omnivores. We lack the specialized fermentation chambers of herbivores and the extreme dental and gastric specializations of carnivores. It means we can digest meat – it doesn’t mean we have to.

Dental morphology

Carnivores have large, sharply pointed canines for killing prey and tearing flesh, and carnassial molars for shearing meat. Herbivores have flat, ridged molars for grinding fibrous plant material, and often reduced canines. Humans possess relatively short, blunt canines (insufficient for dispatching large prey) but adequate for tearing small pieces of meat; Broad, flat premolars and molars for crushing and grinding both plant and animal matter; A jaw joint that allows both up and down and side to side movements - critical for grinding - rather than the purely vertical motion seen in many carnivores.

Stomach structure and acidity

Carnivores (e.g., dogs, cats) have simple stomachs but very high acid (pH ~1) to denature protein and kill pathogens in raw meat. Herbivores often have multi-chambered ('ruminant') stomachs or large hindgut fermentation vats to break down cellulose. Humans have a single-chambered (monogastric) stomach with intermediate acidity (pH ~1.5–3.5) suitable for protein digestion but not specialized for high volume meat consumption alone.

Intestinal length and surface area

Carnivores typically have short intestines (3–6× body length) that rapidly process easily digested protein and fat. Herbivores have much longer tracts (10–12× body length) to allow microbial fermentation of cellulose. Humans have an intermediate total intestinal length (~5× body length, closer to dogs at ~6×) and a large small intestine (~70% of gut length) optimized for absorbing high quality nutrients, including both amino acids from meat and sugars from plants.

Enzymatic capabilities

Carnivores often lack salivary amylase (the enzyme that begins starch digestion in the mouth). Humans produce salivary amylase and pancreatic enzymes capable of breaking down carbohydrates, proteins, and fats - hallmarks of an omnivorous diet.

Evolutionary and archaeological evidence

Stone tool–cut marks on animal bones from more than 2.5 million years ago, and stable isotope analyses of hominin fossils, demonstrate regular consumption of meat alongside plant foods. Hunter-gatherer societies today obtain significant calories from both animal and plant sources, reflecting a flexible, mixed diet.

Book Summary

Consequences of animal agriculture

> "Just how destructive does a culinary preference have to be before we decide to eat something else? If contributing to the suffering of billions of animals that live miserable lives and (quite often) die in horrific ways isn't motivating, what would be? If being the number one contributor to the most serious threat facing the planet (global warming) isn't enough, what is? And if you are tempted to put off these questions of conscience, to say not now, then when?" - Jonathan Safran Foer, *Eating Animals*

Animal agriculture is not broadly unsustainable because of any single flaw, but because it compounds inefficiencies across multiple interconnected systems. It requires disproportionately large inputs of land, water, energy, and crops to produce animal products; accelerates climate change and biodiversity loss; generates significant pollution; and exposes society to disease and resource risks. The industry's by-products improve economic efficiency by extracting additional value from each animal, but they do not overcome the underlying ecological inefficiency of converting plants into animals. From a systems perspective, the model remains one of high resource throughput for comparatively low nutritional output, making it difficult to reconcile with long-term environmental sustainability.

Once these consequences are recognised as parts of a single interconnected system, continued participation can no longer be defended as mere personal preference or cultural tradition. Moral responsibility begins with understanding, but it does not end there.

Given the consequences of animal protein consumption: environmental degradation, climate change, wastage of scarce resources such as land and water, human starvation, cardiovascular disease and cancer, and the reprehensible and arguably horrific cruelty to the animals, a thinking person would cease participating in this diabolical practice.

One way of evaluating human practices is to consider their overall consequences. This is the essence of utilitarian reasoning: actions are judged by the totality of their effects on all those affected. Whether or not one accepts utilitarianism as a complete moral theory, the cumulative consequences of modern animal agriculture are overwhelmingly negative for humans, non-human animals, and the natural systems upon which both depend. From that perspective, continuing to support it cannot reasonably be regarded as a matter of mere personal preference.

To call oneself an 'animal lover', an 'environmentalist', 'spiritual', 'peaceful' or 'compassionate', and to continue to eat meat, is to be hopelessly inconsistent and hypocritical. None of these are compatible with the victimisation, exploitation, deprivation, pain, violence, primitiveness and destructiveness of meat-eating.

A rational species would recognise this and make the necessary adjustments, for its own sake, even if non-human animals are not taken into consideration.

Someone who consumes animals is motivated by a primitive or a socially-conditioned impulse. Now that we know non-human animals are sentient - this is no longer debatable - we no longer have any justification in treating them the way we do. Any reason we may offer is a rationalisation we use to excuse abuse and exploitation.

Anyone who claims to be rational must consider the use of animals in research, factory farms, and the myriad of ways we exploit them for our own purposes, to be an ethical dilemma of huge proportions. To not engage with this issue is an avoidance of responsibility bordering on moral cowardice; it cannot be claimed, as many German citizens did in relation to the Holocaust, that one doesn't know.

It is not necessary to obey evolutionary or social imperatives. If humans truly possess the capacity to reflect critically on inherited beliefs and behaviours, then there is no justification for continuing to participate in the atrocity that is animal agriculture.

The evidence is indifferent to our preferences. It has no regard for culturally-inherited preconceptions and tastes. Reducing and eventually stopping meat production and consumption is no longer a matter of 'personal choice', it is a matter of survival. If meat is a) an inefficient way of producing food; b) most likely the cause of the next pandemic; c) leads to antibiotic resistance; d) is environmentally destructive and e) is the largest single factor in climate change, then it seems a no-brainer to wean ourselves off meat.

Cancer occurs when a part of 'me' decides it is 'not me' and uses my resources to feed itself at my expense. In the same way, humanity, in its unashamed exploitation of the animal kingdom and Earth's natural resources, is a malignant cancer, and it must choose life or its own demise.

Will Tuttle spoke about the feedback consequences of animal agriculture in 2005:

> “We cause our farmed animals to grow unnaturally obese, and we experience escalating rates of human obesity; we break apart non-human animal families, and we experience the increasing fracture of human families; we commodify non-human animals as units of production, and in our culture we experience the commodification of humans; we forcibly and repeatedly rape sows, hens, and cows to impregnate them in order to commercialize their children and bodily fluids, and we experience rising incidents of rape in human societies; we inject huge quantities of pharmaceuticals into farmed animals to stimulate growth and to counter the effects of intensive confinement, and we too experience escalating drug abuse, dependence, and addiction; we confine billions of animals to cages and we experience a society in which nearly seven million men and women languish behind bars; we ignore the psychological needs of sentient non-human animals, and we experience mental health crises in human societies; we place farmed animals into living conditions that expose them to new and deadly diseases, and we too experience the

emergence of new and deadly diseases; we terrorize non-human animals, and we experience the terror of terrorism."

The threats were never unrelated. They are the interconnected consequences of one of humanity's least questioned institutions. The greatest blind spot is not only what animal agriculture does to animals. It is what it is doing to humanity.

Derek du Toit

If this book has prompted you to reconsider one of humanity's greatest blind spots, ***I Am Not an Animal*** explores the broader philosophical, psychological, and ethical foundations from which these consequences arise:

https://www.companions.org.za/i-am-not-an-animal/

