CALF | Coller Animal Law Forum

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# UPA

## Ultra-Processed Animals: Killer Facts Policymakers Can't Ignore

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# Why you should read this paper

Ultra-processed foods – UPFs – are everywhere. In some countries, including the US and the UK, they account for more than 50% of the average diet, despite their widely acknowledged health risks.

The range of UPFs is ever-growing. It includes certain types of bread, cereals, condiments, sweets, cakes, soft drinks, microwavable meals and other packaged products.

You might think the products of intensive, industrialised animal agriculture – factory farming – should also feature on the list. But it is not so simple.

Such products are considered UPFs only if excessive processing has taken place after an animal has been slaughtered.

But what about the countless products derived from animals that have undergone excessive processing before slaughter?

Around 80 billion animals – 10 times the number of people on Earth – are slaughtered for food each year. Most undergo ultra-processing before they are killed.

This is why it is time to acknowledge and address the far-reaching issue of ultra-processed *animals* – UPAs.

# Contents

# 1. Executive Summary

- **The term "ultra-processed foods" has long been used to describe foods that have undergone excessive processing after the slaughter of the animals from which they are derived.**

- **Almost completely overlooked is the fact that excessive processing also routinely takes place before slaughter – and that this can also give rise to significant risks.**

- **To fill this gap in awareness, this paper introduces the term "ultra-processed animals" – UPAs – and calls for urgent measures to increase public awareness of this issue.**

- **Mandatory labelling of UPA-derived foods – in line with warnings on alcohol and tobacco products – is proposed as a bare-minimum, eminently achievable policy response.**

### About CALF

The Coller Animal Law Forum (CALF) has been designed for policymakers, parliamentarians and researchers working to bring about a more sustainable global food system. It is an initiative of the Jeremy Coller Foundation, a UK registered charity..

CALF seeks to bridge the knowledge gap around legal and policy issues associated with intensive animal agriculture, including animal welfare, health, antimicrobial resistance, animal sentience, subsidies and taxation, as well as laws and polices that could support alternative proteins, including regulatory approvals, health and safety standards and common sense labelling.

CALF's flagship tool is an interactive, international database that collates and analyses various laws and policies that impact farmed animals. Supporting the database, CALF offers topical factsheets that outline key considerations that should be taken into account when drafting laws and policies. It also provides reviews of practices that demonstrate leadership or which should be improved.

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# 2. Introduction: Towards Positive, Lasting Change

**The term "ultra-processed foods" (UPFs) has been in use for around half a century. Although applied ever more widely, it is most often associated with foods that have undergone excessive processing after the slaughter of the animals from which they are derived.**

Amid ever-mounting evidence of the negative impacts of such products, this designation is routinely – and rightly – associated with risk. But the time has come to start talking about ultra-processed **animals** – UPAs – which may pose an even bigger threat.

I coined the term "UPA" to account for the excessive processing that takes place **before** slaughter. The rise of intensive, industrialised animal agriculture – commonly known as factory farming – has made such practices near-ubiquitous.

This is an issue that consistently generates neither headlines nor debate. It has received precious little attention from policymakers, businesses, investors and other key stakeholders. As a result, public awareness of it is practically non-existent. This cannot continue.

We must bridge this knowledge gap. We need to urgently raise awareness of what may be the ultimate illustration of a global food system that has increasingly come to work against us rather than for us.

This paper attempts to explain both how we have arrived at this point and where we might go from here. In doing so, it aims to offer a valuable lesson in the law of unintended consequences and a viable roadmap for avoiding a repeat of past errors. The text is organised as follows:

- 'How we got here' charts the history of the Green Revolution, a sweeping transformation that began with the best intentions but gradually gave rise to an array of problems – UPAs foremost among them – that are perhaps even more disquieting than those it originally sought to address. The warning from history is stark: humanity regularly seeks to innovate its way out of trouble, only to inadvertently innovate its way back into it again.

- 'Understanding UPAs' explores the blight of ultra-processed animals in detail. It highlights both the distinctions and the similarities between UPAs and UPFs; it outlines the conditions and circumstances that have made UPAs a "new normal"; and it examines the principal dangers that UPAs now pose, particularly through cancer, infectious diseases and antimicrobial resistance.

- 'Public awareness through mandatory labelling' discusses realistic means of delivering greater transparency and awareness around UPAs. It identifies the mandatory labelling of products as a bare-minimum response to the unfolding crisis of UPA proliferation.

- 'Genuine change or unforgiveable sin?' considers progress to date. It asks whether the current trajectory – in terms of legislation, technological advances, industry sentiment and so on – is likely to ameliorate or exacerbate the challenges around UPAs.

"This is an issue that consistently generates neither headlines nor debate. As a result, public knowledge of it is practically non-existent."

- Finally, the paper concludes with a summary of the arguments presented. It stresses that if we are to tackle the issue of UPAs – along with the myriad other failings of present-day food production and consumption – we must first acknowledge their root cause: the exponential expansion of factory farming which resulted from growing as much as we want rather than as much as we need.

What follows is not a call to ban meat production or consumption. It is instead a proposal for positive, lasting change.

As humans, we have agency. We have the right to choose. Yet we cannot exercise that agency and make optimum choices if we do not have all the information we need.

I find it astonishing – not to say terrifying – that today, in an age when so many health risks are made abundantly clear at every turn, the perils of UPAs are still hidden in plain sight. Transparency must be introduced to enhance both producers' integrity and consumers' confidence.

It is not too late. I firmly believe there is hope. But we need to act fast if we are to undo the damage wrought by decades of intensive, industrialised animal agriculture and build in its place a global food system that is genuinely sustainable.

**Jeremy Coller**
August 2025

> **"We need to urgently raise awareness of what may be the ultimate illustration of a global food system that has increasingly come to work against us rather than for us."**

### An important note about ultra-processed foods

As observed later in this paper, there is still no strict definition of ultra-processed foods. The term has recently been applied to an increasingly broad array of products.

The designation is readily associated with meat products that have undergone excessive processing after the slaughter of the animals from which they are derived. Such products might include bacon, charcuterie, chicken nuggets, corned beef, hot dogs, salami and sausages.

An array of non-meat and non-animal products – including, for example, some types of bread, cheese, cereals, condiments, yogurts, desserts and soft drinks – also qualify as UPFs. Even a number of alternative protein products, such as vegan burgers, are ultra-processed.

However, it does not automatically follow that all ultra-processed foods give rise to health risks. Such suggestions are highly contentious and in some cases may amount to misinformation. As noted by the Chief Scientific Adviser to the UK's Food Standards Agency, Professor Robin May, the term "UPF" should not be assumed as indicative of what is healthy and what is not.[1]

For the purposes of this paper, crucially, "UPF" refers predominantly to meat products that have undergone excessive processing after the slaughter of the animals from which they are derived. Such products are known to give rise to health risks. This vital distinction is re-emphasised where appropriate throughout the following pages.

A detailed examination of the health and nutritional benefits of plant-based products that are now sometimes referred to as UPFs can be found in *The Processing Paradox*, published by the Alternative Proteins Association, another initiative of the Jeremy Coller Foundation, in early 2025. The paper is available for download **here**.

# 3. How We Got Here

**To understand the enormous threat they pose, it is first necessary to appreciate how ultra-processed animals came into being. In effect, UPAs are the products of a failed revolution.**

To contextualise: there have been four episodes of truly radical disruption in the history of agriculture. The first occurred around 12,000 years ago, when humans transitioned from hunter-gatherers to subsistence farmers and herders. The second took place during the 18th century, when selective livestock breeding, systematic crop rotation and other groundbreaking techniques were introduced. The third began in the 1940s, when high-yielding crop varieties and new machinery helped drive away the spectre of hunger in a world ravaged by war. The fourth is under way now.

We are concerned here with the third. It was launched against a post-conflict backdrop of massive reconstruction, an era-shaping baby boom and an urgent quest for self-sufficiency, alongside the age-old challenge of eradicating hunger and feeding all of humanity.

The principal architect of what came to be known as the Green Revolution was American agricultural scientist Norman Borlaug. He was recruited by the Rockefeller Foundation, which had first shown an interest in agricultural reform several years earlier by launching a programme of rural reconstruction in China.

In the aftermath of World War II, having gained a PhD in plant pathology and genetics, Borlaug set about creating novel varieties of high-yielding, disease-resistant wheat. His “miracle” crops soon enabled Mexico, where he carried out his trailblazing research, to produce more than enough food to feed its own citizens, with the country’s agricultural output rising by around 400% in the space of just a quarter-century.[2]

In light of this dramatic transformation, the Green Revolution quickly spread. Like Mexico, the US went from net importer to net exporter of crops in barely 20 years. Nations such as India, Bangladesh and Pakistan were able to avoid famine. Yields were boosted to a spectacular degree in Southeast Asia, Africa and the Middle East.

As the benefits were felt ever more widely, the long-held dream of universal food security seemed within reach. The vast surpluses generated by Borlaug’s breakthroughs were successfully used to feed a global population of around three billion people.

However, what appeared to be an enduring solution eventually proved instead to be a calamitous demonstration of the law of unintended consequences. As the years passed, the very same surpluses were increasingly used to feed the livestock central to another milestone innovation in food production and consumption: the phenomenon that came to be known as factory farming.

The Green Revolution thus helped give birth to intensive, industrialised animal agriculture. It fuelled and accelerated factory farming’s rise. Borlaug, the Rockefeller Foundation and others made feeding the world a reality, but the revolution showed capitalism without regulation lacks integrity.

The impacts have been catastrophic. Sixty years ago, when the Green Revolution was in full flow, approximately seven billion cattle, pigs, sheep, goats and poultry were farmed worldwide. Today around 80 billion animals – 10 times the number of people on Earth – are slaughtered for food each year.[3]

> **“What appeared to be an enduring solution eventually proved instead to be a calamitous demonstration of the law of unintended consequences.”**

Meat production has trebled during the past half-century and is expected to grow even further as more economies experience higher income levels[4]. More than three quarters of all farmland is given over to livestock, almost 95% of which is factory-farmed.[5]

The Green Revolution can therefore be seen today as anything but "green". Factory farming emits more greenhouse gases than the whole transport sector; is the main cause of deforestation; is the number-one user of fresh water and antibiotics; and is a leading source of epidemics and pandemics. The global food system – with UPAs at its heart – has become arguably the biggest barrier to the wellbeing of our planet and its inhabitants.

We cannot even take comfort from the elimination of hunger. That scourge is still very much with us. In 2024 the Food and Agriculture Organization (FAO) of the United Nations (UN) reported that around 750 million people – roughly one in 11 of the current global population – may have faced hunger in 2023[6]. Efforts to achieve UN Sustainable Development Goal 2, Zero Hunger, are still "far off track".[7]

As I observed in an earlier paper,[8] *An Ever-Green Revolution: Why Ending Factory Farming Holds the Key to Feeding Humanity*, every revolution is launched in the hope that it will last. While there is seldom an expectation that it will prove absolutely immutable and nothing will ever change again, there is usually an assumption that it will at least remain integral to whatever follows.

The Green Revolution failed miserably in this respect. Its legacy has been so disastrous that any viable successor – ideally, the new agricultural revolution that is in its infancy now – has little choice but to wipe the slate clean. Going forward, tackling the problem of UPAs will be vital to erasing the costly mistakes of the past.

### Timeline of a failed revolution

**1930s** – The Rockefeller Foundation, a philanthropic organisation devoted to ensuring the wellbeing of humanity, begins to champion wide-ranging agricultural reform.

**1940s** – Supported by the Foundation, Norman Borlaug uses new, selectively bred varieties of wheat to double, treble and eventually quadruple crop yields in post-war Mexico.[9]

**1950s** – With the global population exceeding 2.5 billion, the Green Revolution spreads to the US – which, like Mexico, experiences a dramatic increase in yields.[10]

**1960s** – As the revolution continues to gather pace, developing nations such as India, Bangladesh and Pakistan are able to avoid potentially disastrous food crises.

**1970s** – Amid the rapid rise of factory farming, the rate of growth in global livestock production outstrips the rate of human population growth for the first time.[11]

**1980s** – Despite mounting fears over the Green Revolution's long-term impacts – including the prevalence of pesticides, herbicides and chemical fertilisers – factory farming cements its dominance.

**1990s** – The Food and Agriculture Organization (FAO) publishes the Rome Declaration on Food Security, a historic pledge to reduce undernourishment globally.[12]

**2000s** – Almost 850 million people are classified as undernourished in 2005. The total hits 923 million – nearly 80 million higher than at the start of the 1990s – in 2007.[13]

**2010s** – The FAO concedes the rate of progress in tackling hunger worldwide will not be enough to eradicate the problem by a target date of 2030 – or even by 2050.[14]

**2020s** – A growing body of research continues to link the failings of post-Green-Revolution food and agriculture systems to climate change and other global challenges.[15]

Source: CALF

### An Ever-Green Revolution

A full analysis of the causes and consequences of the Green Revolution can be found in *An Ever-Green Revolution: Why Ending Factory Farming Holds the Key to Feeding Humanity*, published by the Jeremy Coller Foundation and CALF in 2023. The paper is available for download here.

> **"The global food system – with UPAs at its heart – has become arguably the biggest barrier to the wellbeing of our planet and its inhabitants."**

# 4. Understanding UPAs

## 4.1. Beyond UPFs

The term “ultra-processed foods” first became popular in the 1980s. At the time it was most often used in relation to products containing low levels of nutrients and high levels of colouring, emulsifiers, artificial sweeteners, flavour enhancers and other synthetic additives.[16]

Fast-forward almost 50 years and, remarkably, we find there is still no strict definition of UPFs. However, when applied to animal products, as noted earlier, the designation normally refers to foods that have undergone excessive processing following the slaughter of the animals from which they are derived.

The World Health Organization (WHO) has long recognised the health risks of such products, as well as those of various ultra-processed soft drinks, sauces, spreads and condiments.[17] In April 2025 it unveiled an initiative to establish new guidelines for the consumption of processed meat,[18] having previously published a report that named this type of UPF as one of four causes – along with tobacco, alcohol and fossil fuels – of around 2.7 million deaths a year in Europe.[19]

A wealth of academic research has also highlighted the dangers to which some UPFs can give rise. For example, one recent study identified a connection between eating processed red meat and developing dementia,[20] while another warned of links with cancer and other chronic diseases.[21]

Yet neither the WHO nor any other supranational organization has to date formally acknowledged the risks arising from ultra-processed *animals*. This represents a dangerous blind spot, which is why it is imperative to clearly define what is meant by “UPAs”.

Logically, we can arrive at a satisfactory definition only after clarifying a number of prevailing misconceptions surrounding what constitutes “processing”. Two in particular have persistently impeded meaningful progress.

First, there are many meat products that are still generally not thought of as UPFs. For example, pork sausages are usually regarded as processed, whereas whole cuts of pork are not.

> **“Numerous health risks can be patently linked to ultra-processed animals.”**

Such distinctions are erroneous. The truth is that most foods available for purchase have been processed in some way.

Before they reach a supermarket shelf, in all likelihood, the very same whole cuts of pork will have been subjected to an assortment of processes. These might include dehairing, decontamination, exsanguination, tissue removal, brining and colourising.

Second, processing of this kind – that is, processing that takes place after slaughter – tells only half the story. Despite the proliferation of labels such as "farm-fresh", "grass-fed" and "all natural", factory-farmed animals almost invariably also undergo processing *before* they are killed.

Take broiler chickens. Bred to grow unnaturally large and quickly, they hit their slaughter weight in around five weeks – compared with around 10 weeks for organic breeds – after being fed a diet "enriched" with antimicrobials.[22]

Similarly, consider a "pure" beef steak. While it might not have undergone the sort of post-slaughter processing typically associated with animal-derived UPFs, its ingredients could include poloxalene, ractopamine hydrochloride and chlortetracycline – just some of the drugs and additives regularly pumped into cattle in order to maximise growth and profits.

Ultimately, there is limited value in seeking to distinguish between post-slaughter and pre-slaughter ultra-processing. Why? Because each gives rise to health risks – and the overwhelming majority of factory-farmed food products sold to consumers are likely to have been subjected to either or both.

Taking all the above into account, UPAs might simply be defined as factory-farmed animals. In other words, they are animals that are bred, fed and reared in a way significantly removed from more traditional methods.

To get a sense of the scale of the threat this phenomenon presents, remember that only around 5% of the world's livestock is *not* factory-farmed.[23] This reflects the fact that intensive, industrialised animal griculture has been the norm for decades. There can be no doubt that we are living in the age of the UPA.

### An academic perspective on UPAs

CALF has collaborated with leading researchers in the fields of social science and agriculture to produce an academic journal paper that discusses in detail the risks arising from UPAs. Expected to be published in early 2026, it will provide an extensive evidence base for the urgent action required to tackle this issue. The authors, Dr Suzannah Gerber, Dr Christopher Bryant and Elise Hankins, have also greatly informed this paper.

**"Neither the WHO nor any other supranational organisation has to date formally acknowledged the risks arising from ultra-processed animals. This represents a dangerous blind spot."**

### 4.2. Five Major Threats

The conditions in which factory-farmed livestock are kept are highly conducive to generating and spreading disease. As a result, numerous health risks can be patently linked to ultra-processed animals.

I believe five in particular are worthy of discussion. They are zoonotic disease, antimicrobial resistance, poor nutrition, chronic disease and foodborne disease.

1. A copious body of research details factory farming's grim standing as the principal source of **zoonotic disease**. This can take a number of forms, including those diseases known to be deadly to humans, such as anthrax and avian flu, and those that can cause substantial livestock fatalities, such as mad cow disease. A number of these diseases can lead to sepsis, which causes around 11 million deaths a year.[24]

   Worldwide, 60% of emerging infectious diseases – some of which develop into epidemics and even pandemics – come from animals.[25] UPAs must be seen as central to this issue, given that they are customarily bred, fed and reared in high-density, close-proximity conditions that encourage immunodeficiency.[26]

2. Often mixed into animals' food and water, antimicrobials – also known as antibiotics – are ostensibly employed to guard against infection in factory farming but also serve as a potent means of fattening livestock before slaughter.[27] Misuse and overuse are commonplace, despite research showing vaccines are a superior alternative in terms of disease prevention.[28]

   Continued use builds resistance, eventually spawning deadly pathogens – "superbugs" whose invulnerability to drugs effectively eliminates one of the most important advances in modern medicine.[29] In 2019 alone, globally, **antimicrobial resistance** (AMR) was directly responsible for 1.27 million deaths and contributed to another 4.95 million.[30]

3. There is abundant evidence that intensive, industrialised animal agriculture results in food products that provide **poor nutrition** – which is say they are far less nutrient-dense than those produced via more traditional methods. UPAs offer no exceptions in this respect.

   Various studies have shown meat from UPAs is lower in nutrients such as proteins and omega-3 fatty acids. Research has also repeatedly found meat from organically raised animals contains less fat and cholesterol than meat from factory-farmed livestock.[31] Again and again, such differences are traced back to feeding regimes, physical activity and other determinants of animal welfare – in essence, the factors that characterise UPAs.

4. Processed animal meat is consistently associated with **chronic and diet-related disease**, including Alzheimer's disease, type 2 diabetes and heart disease. The WHO has even classified it as a class 1 carcinogen, meaning there is very strong evidence that it causes cancer.[32]

   As explained in the preceding section, the majority of such meat comes from UPAs in any event. In addition, several of the nutrients and nutrient compositions known to play a role in conditions such as blood clots, plaque build-up in arteries and chronic inflammation are more likely to be present in meat from UPAs.[33]

5. Since they are usually reared indoors in densely packed conditions, UPAs are more likely than organically reared animals to be unsanitary. Transport to abattoirs for slaughter compounds the problem. The result: a much higher probability of **foodborne disease**.

   Between 2019 and 2023, according to a study by the European Food Safety Authority, foods of non-animal origin accounted for just 7% of foodborne disease outbreaks in the European Union. By stark contrast, meat (and meat products) accounted for 21%.[34] *Salmonella*, *E. coli*, *Campylobacter* and listeriosis are among the diseases most likely to be sparked by factory farming.

**"UPAs cement intensive, industrialised animal agriculture's position at the crux of a complex network of threats. It is a network that endangers not just individuals but entire populations, as well as UPAs themselves."**

Given all the above, it is clear that UPAs cement intensive, industrialised animal agriculture's position at the crux of a complex network of threats. It is a network that endangers not just individuals but entire populations, as well as UPAs themselves.

Such language might be deemed alarmist in some circles. But its use is hard to dispute when we consider, for example, that an outbreak of swine flu which began at a pig farm in Mexico caused around 284,000 deaths in 2009;[35] or that the FAO fears resistant infections could kill more people than cancer by 2050;[36] or that a 2020 study suggested over 70% of agricultural businesses were at high risk of fostering future pandemics;[37] or that most of the foodborne illnesses found in the world's water systems can be traced back to UPAs.[38]

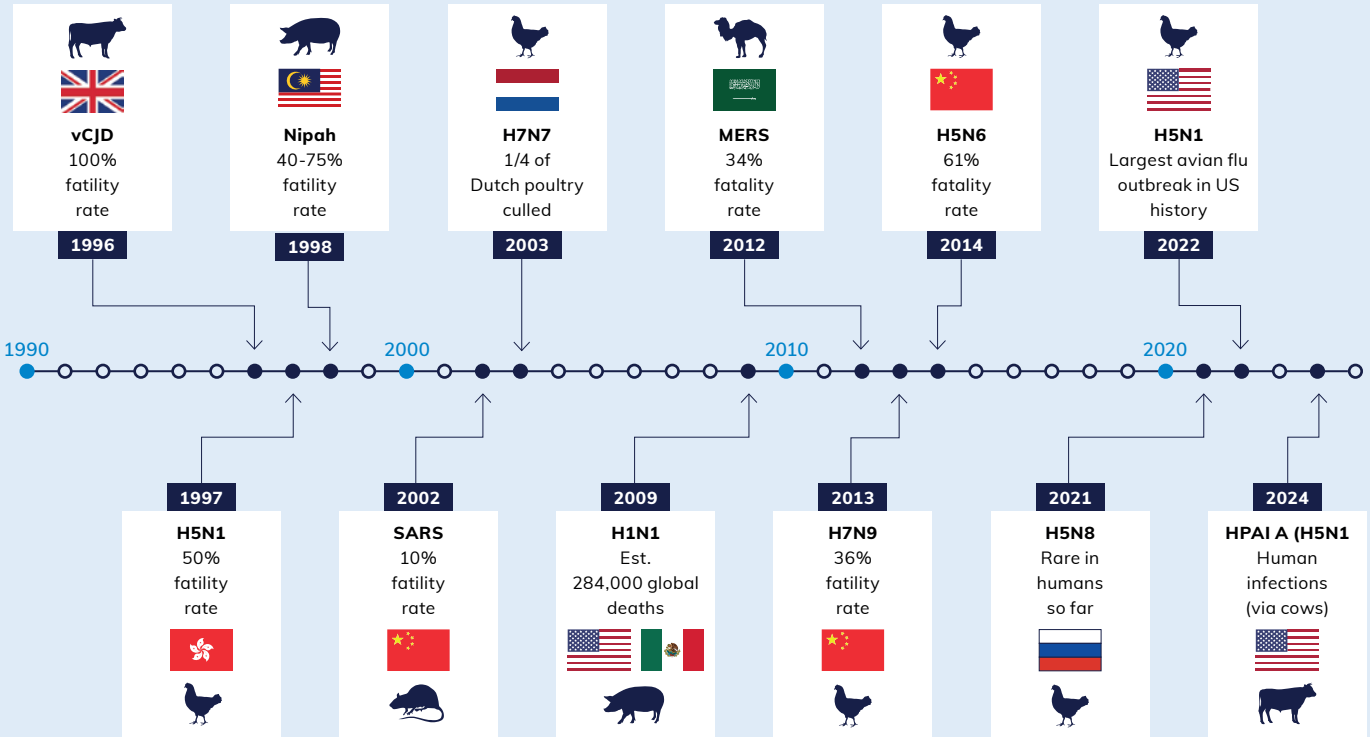
There are countless other disturbing facts and figures that show we are in the midst of a public health timebomb whose repercussions could be vast, if not immeasurable. In my opinion, frankly, it would be no exaggeration to say UPAs are killing us.

### Seven killer facts about factory farming and disease risk which consumers cannot ignore

1. Each year an estimated 600 million people fall ill and 420,000 die because of exposure to unsafe food, resulting in the loss of 33 million healthy life years.[39]
2. Around 40% of all bacterial foodborne diseases in the US are traced to contaminated meat and poultry.[40]
3. The annual costs of illnesses attributable to the consumption of animal products in the US has been estimated at $2.5 billion for poultry, $1.9 billion for pork and $1.4 billion for beef.[41]
4. The total cost of foodborne disease in the UK has been estimated at more than £9 billion a year, mostly in the form of lost earnings.[42]
5. Some 60% of the 335 infectious diseases that emerged worldwide between 1940 and 2004 were of animal origin.[43]
6. The WHO has described the provision of safe food as "fundamental" to the support of national economies, trade, tourism, food security and sustainable development.[44]
7. Intensive, industrialised agriculture significantly increases the likelihood of the transfer of pathogens between animals – accelerating the rate of pathogen evolution and the spread of disease.[45]

Source: CALF

### Three decades of deadly human diseases from factory-farmed animals




Source: CALF

# 5. Public Awareness Through Mandatory Labelling

**Why do policymakers pass legislation that discourages people from drinking alcohol or smoking cigarettes? A basic answer might be that they have a duty to warn consumers of the dangers of such products.**

But why do they refrain from imposing flat-out bans? Does the aforementioned duty not oblige them to do all they can to safeguard the public's wellbeing? The explanation in this instance is rather less straightforward.

One important dynamic is that the alcohol and tobacco industries, like many others, are extremely powerful entities. They ensure employment, generate colossal revenues and have enormous lobbying influence.

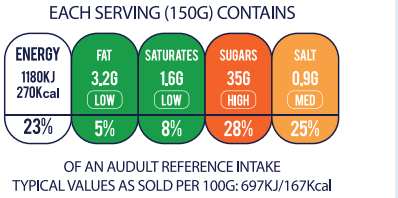
Another critical factor is that consumers have a right to make their own choices. Relatedly, the spirit of libertarian paternalism relies on governments' ability to "nudge" citizens towards informed decisions and, in turn, utilitarian behaviours and outcomes.

Such political, economic and social considerations help explain why the policymaking community must almost always try to find a balance between legislation and laissez-faire. In the case of ultra-processed animals, though, the tilt towards the latter has so far been not just excessive but absolute.

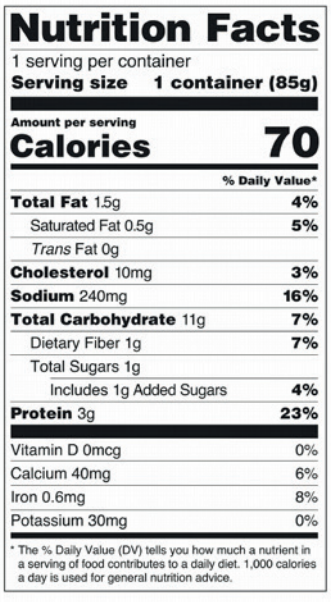
Food labelling is a decades-old practice that has evolved over time in many countries. In the UK, for example, there is now a requirement to display a product's ingredients, place of origin, special storage conditions, cooking instructions and "best before" or "use by" date.

> "This failure to raise public awareness is inexcusable. UPAs are unique in posing threats capable of affecting whole populations."

**Examples of current food labelling in the UK and the US**








Crucially, there is also a requirement to display what the UK government describes as "any necessary warnings".[46] These might include references to the risks arising from high levels of caffeine, skimmed milk, sweeteners and even liquorice. In Switzerland, since July 2025, all food products of animal origin must also carry labels that disclose the use of painful procedures without anaesthesia or stunning.[47]

Yet nowhere are consumers likely to find references to the proven threat of zoonotic disease or antimicrobial resistance. Nowhere are they likely to find a few cautionary words about the prospect of developing chronic disease or encountering foodborne disease.

In my view, this failure to raise public awareness is inexcusable. It is a dereliction of the same duty that drives wider education around the likes of alcohol and cigarettes – especially given that UPAs are arguably more hazardous than those two combined.

There is nothing hyperbolic about this suggestion. UPAs are unique in posing threats capable of affecting whole populations.

This is why clear labelling should be acknowledged as a bare-minimum response. Yes, it would be wonderful to sweepingly impose higher standards for animal farming, but – although essential – that is likely to be a long and winding road. In the short term – if not in the immediate term – mandatory warnings represent the very least that can be done.

Warnings on the packaging of alcohol products are comparatively discreet, whereas warnings on the packaging of tobacco products must be sizeable in many countries[48] and are often profoundly graphic. Should warnings on the packaging of UPA products set out to jar or even horrify?

It is a moot point. A label adorned with an image of a chicken or a piglet undergoing ultra-processing is likely to be significantly more impactful than a label featuring only a typically staid caveat, yet such an approach could easily prove beyond the pale.

In this context, realistically, nudging is much more likely to be accepted than shock tactics. Neither producers nor retailers will countenance these products suddenly being presented in a way overtly designed to discourage purchase – and even many consumers might baulk at such a turn of events.

Ultimately, the aim should not be to alarm or outrage. Rather, it should simply be to educate. What matters is that members of the public must be given a chance to understand the substantive risks associated with the UPA-derived foods that they are free to choose to eat.

### Potential mandatory health warnings for UPA-derived foods

*"This food is derived from animals raised in factory-farm conditions."*

*"This food is derived from animals fed antimicrobials, a practice that has been shown to lead to antimicrobial resistance."*

*"This food may contain antimicrobial residues that could lead to antimicrobial resistance in humans, as well as negative metabolic and digestive health."*

*"Food made from animals raised in factory-farm conditions is likely to have lower nutritional value"*

*"Animal-derived foods produced under factory-farm conditions contribute to increased chronic inflammatory conditions in humans."*

Source: CALF


**"Clear labelling should be acknowledged as a bare-minimum response. In the short term – if not in the *immediate* term – mandatory warnings represent the very least that can be done."**

# 6. Genuine Change or Unforgiveable Sin?

**The biggest tragedy of the Green Revolution was that an extraordinary burst of innovation solved existing problems only in part before somehow creating new and in many ways more serious challenges. It raised hopes of worldwide food security but instead ushered in the age of the ultra-processed animal.**

"We need a global food system that is environmentally sustainable, socially responsible and economically viable."

As the *Ever*-Green Revolution builds momentum, could we commit the unforgiveable sin of making the same mistake twice? More specifically, are the innovations we are starting to see now likely to tackle the issue of UPAs or add to it?

The overarching goal today is much the same as it was when Norman Borlaug introduced his "miracle" crops in the wake of World War II: we need a global food system that is environmentally sustainable, socially responsible and economically viable. Many pieces must fall into place if we are to complete this puzzle.

This paper principally proposes mandatory health warnings as an eminently achievable means of heightening public awareness. But what else might be necessary if this revolution is to succeed?

First, there should be a single "roadmap" for all stakeholders to follow. This must be all-encompassing, universally accepted and definitive – unlike the mish-mash of policies, targets and initiatives which has held sway for decades.

Second, there has to be a level playing field in relation to subsidies, pricing and other factors that shape the landscape of food and agriculture. The established system's longstanding bias towards meat and dairy producers is not only innately unfair, but tremendously unhelpful and intrinsically detrimental to public health. To repeat an earlier point: capitalism without effective regulation does not have integrity.

Third, investors must play their part in bringing about positive change through engagement. This includes both backing disruptive players and persuading incumbents to adopt more responsible, forward-looking practices.

Encouragingly, there are signs of progress in all three of these areas. They do not guarantee that the Ever-Green Revolution will be successful – or even that it will be anything less than tumultuous – but they perhaps indicate a direction of travel that increasingly allows scope for optimism.

For example, the FAO's "global roadmap" for accomplishing UN Sustainable Development Goal 2 sheds an important light on the value of a comprehensive strategy.[49] It may be far from perfect, but its underlying objective is difficult to fault.

Meanwhile, a nascent body of research is amplifying calls for legislative equality. This includes initiatives around labelling, with several large-scale empirical studies showing the efficacy of applying health warnings to processed red meat products[50].

Advances in fields such as alternative proteins are also gaining more attention, attracting both policymaker interest and billions of dollars' worth of investment[51]. At the same time, as evidenced by the findings of the annual Coller FAIRR Protein Producer Index, more of the world's largest food companies are embracing sustainability[52].

So what might a "good" outcome look like, particularly in relation to UPAs? Inevitably, this is a question of degrees.

A global food system that willingly alerts consumers to the dangers to which it gives rise would be a barely adequate result. Those dangers would persist – including in the form of UPAs – but the public would at least be cognisant of them and able to make fully informed choices. Fundamentally, it would likely be a safer version of an unsatisfactory status quo.

A system in which the prevalence of UPAs is massively reduced would be a marked improvement. It would signal genuine disruption and, ideally, the makings of a "just transition" to a more sustainable system.[53]

But best of all would be a system in which UPAs are a distant and unhappy memory. Animals would be bred, fed and reared organically and traditionally. Diets would be healthier. Thanks to public awareness and other measures, the risks explored in this paper would have been acknowledged and maybe even eliminated. Above all, factory farming – the apogee of the Green Revolution's unintended consequences – would be no more.

### Rating the reform of food and agriculture

By its very nature, radical upheaval of the status quo is seldom easily accomplished. At least to date, the Ever-Green Revolution has proved this rule of thumb. A forthcoming Jeremy Coller Foundation paper will assess in detail the progress of ongoing efforts to build a food system that is environmentally sustainable, socially responsible and economically viable.

> **"There are signs of progress. They do not guarantee that the Ever-Green Revolution will be successful, but they perhaps indicate a direction of travel that increasingly allows scope for optimism."**

### Transparency and effective regulation

The relationship between capitalism and regulation is delicate and highly nuanced. Zero regulation invites a free-for-all; misguided regulation skews markets; excessive regulation constrains innovation and progress.

To be truly effective, regulation must benefit all stakeholders. In doing so, it helps ensure capitalism has integrity. Proposition 65 – formerly the Safe Drinking Water and Toxic Enforcement Act of 1986 – offers an illustration.

Administered by the California Office of Environmental Health Hazard Assessment, Proposition 65 – also known simply as Prop 65 – aims to protect sources of drinking water from toxic substances. It also endeavours to reduce or eliminate exposure to such substances through consumer products.

The legislation requires individuals and/or companies to provide consumers with advance warning of possible exposure to certain chemicals. The ultimate goal is to persuade businesses to reformulate their products – that is, to exclude such substances – so that no warnings are necessary.

Enforcement is carried out through civil lawsuits, which can be brought by the California Attorney General, any district attorney or selected city attorneys. Private parties "acting in the public interest" are also allowed to take action in some instances. The big-name alleged violators have included Amazon,[54] McDonald's and Burger King.[55]

Proposition 65 has been credited with the reformulation of a large number of consumer products.[56] It has also encouraged government and industry to cooperate on scientific issues, resulting in the introduction of numerous risk-based standards. It clearly shows the power of mandatory warning labels.[57]

# 7. Conclusion: Ending the Inexcusable

**Ultra-processed animals are at the centre of a global food system that grew out of an unfulfilled dream. The proliferation of UPAs is a legacy of the Green Revolution, which began as an auspicious solution but steadily metamorphosed into a pervasive threat.**

We stand where we are today because of an ill-fated confluence of dynamics. They include the use of demand-side innovation to enable and maintain factory farming's dominance; the notion that eating meat is indicative of upward social mobility; and the perpetuation of intensive, industrialised animal agriculture through a combination of corporate inertia and policymaker inaction.

By recognising the concept of UPAs – the idea that all food products derived from factory-farmed animals undergo some kind of processing – we can appreciate the magnitude and urgency of the challenges we now face. In turn, we can at last begin to address them with the level of exigency they so obviously warrant.

To return to a point I made at the outset: it is incredible that the risks posed by some ultra-processed *foods* have been highlighted for around half a century but the risks posed by ultra-processed *animals* are still scarcely acknowledged. The public has a right to know.

I readily accept, as noted in the Epilogue where we outline a just transition away from UPAs, that the success or otherwise of the latest revolution in food and agriculture will not lie in merely ordering everyone to stop eating meat. Consumers must instead be given all the information they need to arrive at fully informed decisions.

> **"The public has a right to know. Consumers must be given all the information they need to arrive at fully informed decisions."**

At the very least, they should be made aware of the potential consequences of UPA-derived products – just as they are made aware of the potential consequences of alcohol or tobacco. Mandatory labelling would make this possible.

Many people might be completely unmoved. But many others might see their dietary habits in a new light. What matters is that everyone is in a position to make a choice that they consider right for themselves and their families.

For any of this to happen, of course, governments and industry alike must step up to the plate – pun intended. It is their responsibility to do so.

Policymakers have generally shown a firm commitment to environmental, social and governance issues. Public education around UPAs clearly falls into this category in a number of respects, since factory farming can be linked to a wide range of relevant concerns – including those encapsulated in the UN's Sustainable Development Goals.

Meanwhile, most businesses are answerable to their shareholders. Investors – especially pension funds – now regularly exert their influence in pursuit of the greater good, because they want to protect their investments from risk. Here, again, UPAs should be a key element of the conversation.

None of this need ultimately lead to a ban on meat products. But it could ultimately lead to the end of factory farming – and this, in the final reckoning, is what responsible stakeholders of every sort should strive for.[58]

When all is said and done, UPAs are just another symptom of everything that is wrong with food production and consumption in the 21st century. Intensive, industrialised animal agriculture is the root cause.

As it was when the Green Revolution commenced around 80 years ago, our collective task today is to feed all of humanity – and to do so safely. Factory farming has long been an impediment rather than an enabler in this regard, and it remains so now.

Why? Because it has fuelled and propagated the age of the UPA, thereby consuming a superabundance that could have been used to rid the world of hunger.

Millions of people are still undernourished. Numerous new, alarming and even existential threats loom large. Orientated to feed 80 billion animals instead of eight billion people, the global food system is edging ever closer to total ruin. This cannot – and need not – go on.

> **"Our collective task is to feed all of humanity – and to do so safely. Factory farming has long been an impediment rather than an enabler in this regard, and it remains so now."**

# 8. Epilogue: A Just Transition

**Irrespective of the industry or sector involved, the notion of a "just transition" should be at the heart of efforts to bring about more sustainable means of production. The concept strives to prioritise social and environmental justice and to ensure positive, lasting change does not come at the expense of specific stakeholder groups.**[59]

Fulfilling this ideal in addressing the problem of ultra-processed animals undoubtedly presents a huge challenge. It requires a transformation that allows farmers' autonomy to be strengthened rather than undermined, environmental degradation to be reduced rather than intensified and consumer choice to be expanded rather than destroyed.

With these goals in mind, broadly speaking, a just transition for the global food system could be built on three pillars: a return to more traditional methods of animal agriculture; adoption of whole-food, plant-based diets and/or eating less and better meat; and increased recognition of the multiple advantages of lab-grown, plant-based and other alternative proteins. Together, these could underpin a shift from today's "business as usual" mindset to a large-scale, long-term transformation from which everyone would benefit. They are briefly discussed in turn below.

- The risks arising from the breeding, rearing and feeding of UPAs are far greater than those arising from more traditional methods of animal agriculture. Switching to animal products derived from non-UPAs therefore promises an obvious "win" – but it does not promise an easy one.

  The problem is that more traditional methods are less productive. In tandem, there are not enough available natural resources to convert to non-UPA farming while also keeping pace with demand for animal products. According to one study, consumption would need to fall by up to 75% in order for animals to be farmed under such conditions.[60]

- In light of the above, it is highly likely that individuals would need to implement stepwise improvements in their own eating habits as farmers gradually move away from raising UPAs. One option would be to adopt predominantly **whole-food, plant-based diets and/or eat less and better meat**.

  This reflects global public health advice, with the EAT-Lancet Commission's recommended Planetary Health Diet expressly consisting of "a diversity of plant-based foods" and "low amounts of animal-sourced foods".[61] The Commission has called for consumption of healthy foods to rise by more than 100% by 2050.[62]

- Against this backdrop, lab-grown and plant-based alternative proteins could well offer a compelling means of meeting rising protein demand. Plant-based meat, whole-food plants and animal-sourced meat produced by regenerative farming techniques have emerged in recent years from innovations such as cell-cultured and precision fermentation.

- Many of these products taste similar – if not identical – to those they seek to replicate and have comparable or even optimised nutritional profiles. Most can also be produced rapidly, efficiently and with much less negative impact on natural resources. Research has already demonstrated the potential for production at scale and the positive implications for food security,[63] as well as the environmental benefits.[64]

**"Switching to animal products derived from non-UPAs promises an obvious 'win' – but it does not promise an easy one."**

The fourth agricultural revolution is under way today. The hope must be that, unlike its predecessor, this will prove to be an *Ever-Green Revolution*. The above three pillars should help it successfully incorporate a move away from UPAs.

At the same time, though, we should not lose sight of the fact that we already have enough protein to feed humanity. The uncomfortable but undeniable truth is that we have long been able to end hunger worldwide.

The Green Revolution provided a superabundance that could have fed everyone on Earth – regardless of whether the population was three billion, as it was in the early 1950s, or eight billion, as it is today. But that very same superabundance was instead used to meet the protein requirements of tens of billions of factory-farmed animals destined for slaughter.

So the problem, contrary to widespread perceptions, does not lie in the extent of protein supply. Rather, it lies in the use of protein supply. This is an absolutely vital point that in many circles has been conveniently ignored for decades – as have its far-reaching implications for health and society.

Beyond that, looking forward, we also have to accept revolutions and just transitions alike invariably take time. The effects of the measures outlined above are unlikely to be tangible, less still quantifiable, over the short term.

Fortunately, there are other steps that could be undertaken relatively quickly. As discussed in this paper, the mandatory labelling of products offers the simplest and fastest means of delivering transparency and, in turn, raising public awareness of UPAs.

> **"We already have enough protein to feed humanity. The uncomfortable but undeniable truth is that we have long been able to end hunger worldwide."**

### Towards a healthy diet for people and the planet

The EAT-*Lancet* Commission's Planetary Health Diet emphasises a shift towards whole-food, plant-based diets and eating less and better meat. It prioritises fruits, vegetables, whole grains, legumes, nuts and unsaturated plant oils and recommends only modest amounts of meat, fish and dairy products. Allowing for adaptability around local culture, food availability and individual preferences, the specifics are as follows:

| Food | Macronutrient intake (grams per day and possible range) | Caloric intake (kcal per day) |
|---|---|---|
| Vegetables | 300 (200-600) | 78 |
| Dairy | 250 (0-500) | 153 |
| Whole grains | 232 | 811 |
| Fruits | 200 (100-300) | 126 |
| Tubers and starchy vegetables | 50 (0-100) | 39 |
| Unsaturated oils | 40 (20-80) | 354 |
| Added sugars | 31 | 120 |
| Saturated oils | 11.8 (0-11.8) | 96 |
| **Protein sources** | | |
| Legumes | 75 (0-100) | 284 |
| Nuts | 50 (0-75) | 291 |
| Chicken and other poultry | 29 | 62 |
| Fish | 28 | 40 |
| Beef, lamb and pork | 14 | 30 |
| Eggs | 13 | 19 |

Source: EAT-Lancet Commission: Food in the Anthropocene: The EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems, 2019

### Rethinking the fight to feed humanity

The idea that humanity must discover new ways of feeding itself is basically false. In fact, we have had the required capability for decades but have squandered it in order to maintain factory farming's dominance. A forthcoming Jeremy Coller Foundation / CALF paper will examine in detail the enduring myths surrounding this issue and the role of intensive, industrialised animal agriculture in perpetuating them.

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