Meat Exhaustion Day

Animal Welfare.
Worldwide.

FOUR PAWS

When meat is eating up the planet

Summary

Does our meat consumption fit within planetary boundaries and health recommendations? The short answer is: No.

To answer this question, FOUR PAWS calculated the Meat Exhaustion Day.

Meat Exhaustion Day is the day on which the maximum recommended meat consumption – in terms of sustainability and health impacts – is reached based on the current average consumption of meat per day.

According to the research results, the global average meat consumption is way beyond what is healthy or sustainable, this is particularly true in high income / Global North countries (North America, Europe and Australia), South America, and most of the Asian regions. The US and Australia already exceeded the recommended amount of meat consumption in the month of March, while in Europe[a] the Meat Exhaustion Day will be reached in April.

To be in line with the planetary boundaries, meat intake needs to be reduced by more than 70% in regions of high-income countries / the Global North.

a For regional categorisation, the FAO region categories of FAO stat were used as reference. Europe refers to the geographic Europe and not the EU.

Meat Exhaustion Day is calculated in reference to the Planetary Health Diet, recommended by the EAT Lancet Commission. This is a panel of renowned scientists who give scientific guidance for what would be a consumption pattern that provides healthy food for a growing world population within planetary boundaries[1]. To estimate to what extent consumption patterns are in line with these recommendations, this research compared countries' and regions' actual consumption of meat with the recommended consumption.

FOUR PAWS urges governments and industries to support a swift reduction of meat production and consumption by any means. An end to factory farming and a transition towards food systems that support animal welfare, human health standards, care for the environment, and that enable ecological restoration are key.

Factory farming and the overconsumption of meat come with harmful environmental and human health impacts. Meat and dairy production are drivers of the climate crisis, loss of biodiversity, and environmental pollution. The provision of meat by these industries prioritises a high return through a cheap price for consumers, a price that is paid in animal suffering, pollution, and public health costs. A change in the food system and a reduction of meat consumption is needed to bring our general food consumption in balance with the carrying capacity of the planet.

Introduction

Factory farming of meat: bad for animals, climate, nature, and human health

The production of factory-farmed meat causes enormous environmental and human health consequences. Industrially produced meat products have become extremely cheap, therefore encouraging an ever-growing consumption of meat. The hidden costs[2] are animal suffering, global climate change, and massive loss of biodiversity, in addition to human illnesses and deaths.

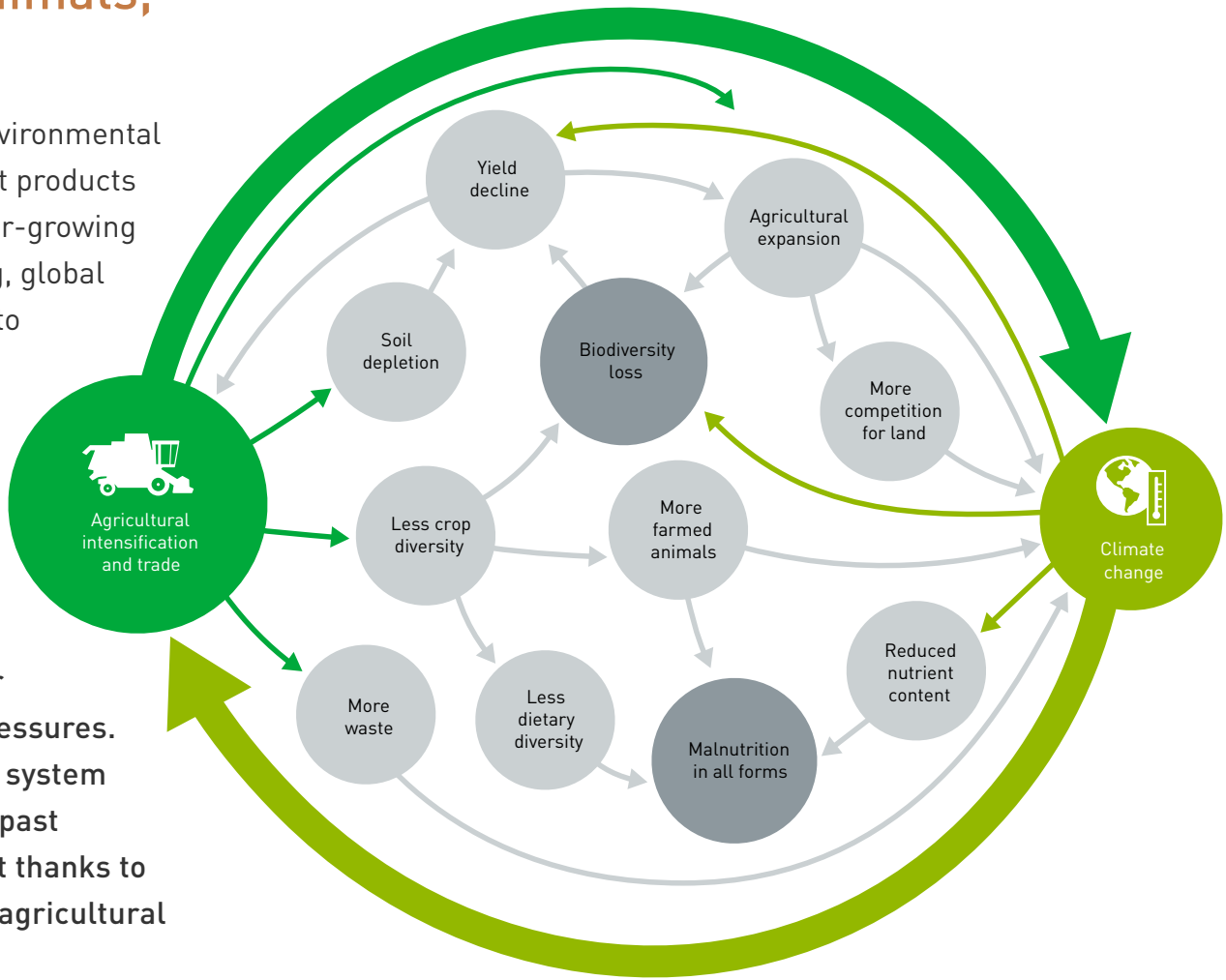

Figure 1: The 'cheaper food' paradigm. Graph retrieved from Chatham House's paper "Food system impacts on biodiversity loss"[3]. Growing global consumption of cheaper calories and resource-intensive foods aggravates these pressures. This report expands on the causes and impacts of our food system that has been shaped by the 'cheaper food' paradigm over past decades, as more food is being produced at ever lower cost thanks to policies and economic structures that promote intensified agricultural production.

Factory farming causes animal suffering

Animal welfare breaches arising from meat production are numerous, they happen throughout the production process, and they affect – though differently – wild animals as well as farm animals.

Factory farms directly affect animals that are in the production value chain as they treat them as a mere object and a commodity[4]. In factory farms, animals are housed and confined in inappropriate structures that prevent natural behaviour and cause chronic stress. The animals are also subjected to long and unnecessary transport in small containers and in unsuitable conditions, often across multiple countries. These bad conditions result in illnesses and deaths that industries mitigate by using pharmaceuticals[5] – or by overstocking to mitigate mortality losses.

Meanwhile, factory farming is driving deforestation and severe environmental pollution, such as contamination of water sources[6]. Wildlife is in drastic decline since when local environments become too altered or polluted because of factory farms and industrial agriculture to produce feed, many native animal species lose their habitats and sources of food, and can even become extinct, causing a chain reaction of biodiversity loss.

"What is bad for animals is ultimately bad for people, regardless of how one feels about animal welfare."
– Richard & Richard [5]

Factory farming fuels climate crisis, biodiversity loss and water depletion

On the global level, food production accounts for around a third of global greenhouse gas (GHG) emissions[7]. According to Clarke et al. (2020), even if fossil fuel emissions were immediately stopped, current trends in global food systems would prevent keeping the 1.5 °C Paris Agreement limit and, by the end of the century, threaten to stay within the 2 °C limit[8]. Livestock causes between 14.5% and 16.5% of all GHG emissions. While 44% of these emissions are made up of the short-lived and very potent gas: methane (CH_4); while the rest of emissions are divided into 29% N_2O emissions and 27% CO_2 emissions[9,10].

The Intergovernmental Panel on Climate Change (IPCC) estimates that methane accounts for almost a third of the warming observed to date[11]. Even the animal-based products

with the lowest environmental impact are much worse than their plant-based alternatives. Beef and lamb meat perform worst from a GHG emission perspective, closely followed by cheese and other dairy products[9]. In the current food system, the production of animal-based foods causes twice the amount of GHG emissions of plant-based foods[12].

Almost 90% of global deforestation is caused by the expansion of agricultural land[13]. Production of animal feed like soya, maize and converting land into pasture are responsible for 67% of deforestation[9]. Local hotspots of deforestation, particularly found in the Amazon rainforest, lead to weakened ecosystem resilience and a reduction of ecosystem services for human society. With its importance as a global climate tipping element, the passing of its threshold may turn the Amazon into a savannah, which would cause a climate domino effect. Moreover, the destruction of buffer zones may lead to an increased risk of zoonotic diseases that can cause severe harm to global human society[14]. Livestock farming is, in fact, the single most powerful driver of habitat loss on Earth[15]. Increase of meat and dairy consumption is directly and indirectly causing habitat loss and fragmentation, biodiversity loss at unprecedented rates, and converting the earth's carbon sinks into carbon sources[11].

The water footprint of beef protein is nearly six times the footprint of protein derived from eating pulses.

Meat production has detrimental effects on water sources' quality and quantity. It heavily pollutes and changes water quality across the whole process of production[16]; nutrient run-offs from agricultural practices, such as feed production, and nitrogen runoff from manure cause water eutrophication and acidification[9]. This has devastating outcomes on the aquatic ecology and causes repercussions in the supply of domestic and potable water. In addition, meat and dairy farming consumes massive amounts of water: to produce animal feed, nearly 4,387 km^3 of water is used each year, making up 41% of total agricultural water use[17]. Beef production is the most water consuming: it uses a staggering 15,400 m^3 per ton of meat[18]. In fact, the water footprint of beef protein (liter/g protein) is nearly six times the footprint of protein derived from eating pulses[18]. In a world where the climate is changing, and droughts and heatwaves are getting more and more common, addressing water pollution and overuse is crucial for more resilient food systems. Climate change and draughts will in fact impact livestock production; specifically it will affect the nutritional quality of forage and fodder leading to a worsening of animal health and welfare consequently affecting the livelihood of people working across this value chain[19].

Human health impacts of factory meat

Public health[20] is also deeply affected as factory-farmed meat is produced and consumed in a way that threatens environmental health through pollution and the spread of diseases, and individual health through bad diets.

The negative impacts from factory farms puts in evidence how animal welfare issues and socio-environmental issues are inter-dependent as antibiotics[21] and hormones[6] reach humans through contaminated soil, water, and from the direct consumption of meat, causing serious health risks[22]. In addition, factory farms create the ideal conditions[b] for the mutation and spread of zoonoses, with one of the most recent zoonotic pandemics, Swine Flu, originating in industrial pig farms in Mexico[23,24].

Unprocessed and processed[25] red meat consumption is associated with coronary heart disease, colorectal cancer, diabetes and stroke[26]. Furthermore, the International Agency for Research on Cancer classified red meat as 'probably carcinogenic to humans' and processed meat as a 'carcinogenic to humans'[27]. Instead of meat being part of a healthy diet, its current rate of consumption – especially in high-income Western countries – has led to an increased rate of human diseases and deaths[28]. Meanwhile, the protein we derive from meat can be found in healthier foods like legumes, nuts and whole grains, that have extremely lower environmental impacts and cause less to no animal suffering[9,26].

Food systems change is needed: reduce meat production and consumption, ensure plant-based diets, and end factory farming.

It is clear that the reduction of global meat production and consumption is a key factor to solve a multitude of interconnected crises caused by humans on Earth.

Reducing the numbers of farm animals will reduce the direct GHG emissions from livestock systems, such as the emissions arising from the production of feed, the emissions coming from the animals themselves, and their manure. Furthermore, decreasing consumption of animal products will not only prevent deforestation, but will also make room for ecological restoration, reforestation and re-wilding[29].

b Industrial factory farms follow processes that maximise economic output at the expense of ethics, animal fitness and health. Factory farms have high animal stocking density, mutilations, genetic selection, and uniformity. Animals have no access to fresh air or sunlight in factory farms.

The Planetary Health Diet

The EAT Lancet Commission on Food, Planet and Health answered a very important question: 'Can we feed a future human population of 10 billion people in a healthy way within planetary boundaries?'

The EAT Lancet reference diet, titled the 'Planetary Health Diet'[1], is calculated using the 'planetary boundaries' framework[1] and is analysed in reference to the nutritional value and the health consequences of different foods. It considers scientific targets for sustainable food production and suggests a transition to diets low in meat, dairy and other animal-derived products and a high intake of fresh vegetables, fruits, nuts, and legumes. It is a global reference diet that provides the first evidence-based recommendation for a healthy and environmentally friendly diet. Here, red meat and processed meat, as well as refined sugar, grains and starchy vegetables are not considered healthy and sustainable unless consumed at zero or low quantity. Seafood and poultry are recommended to be consumed only in moderate amounts.

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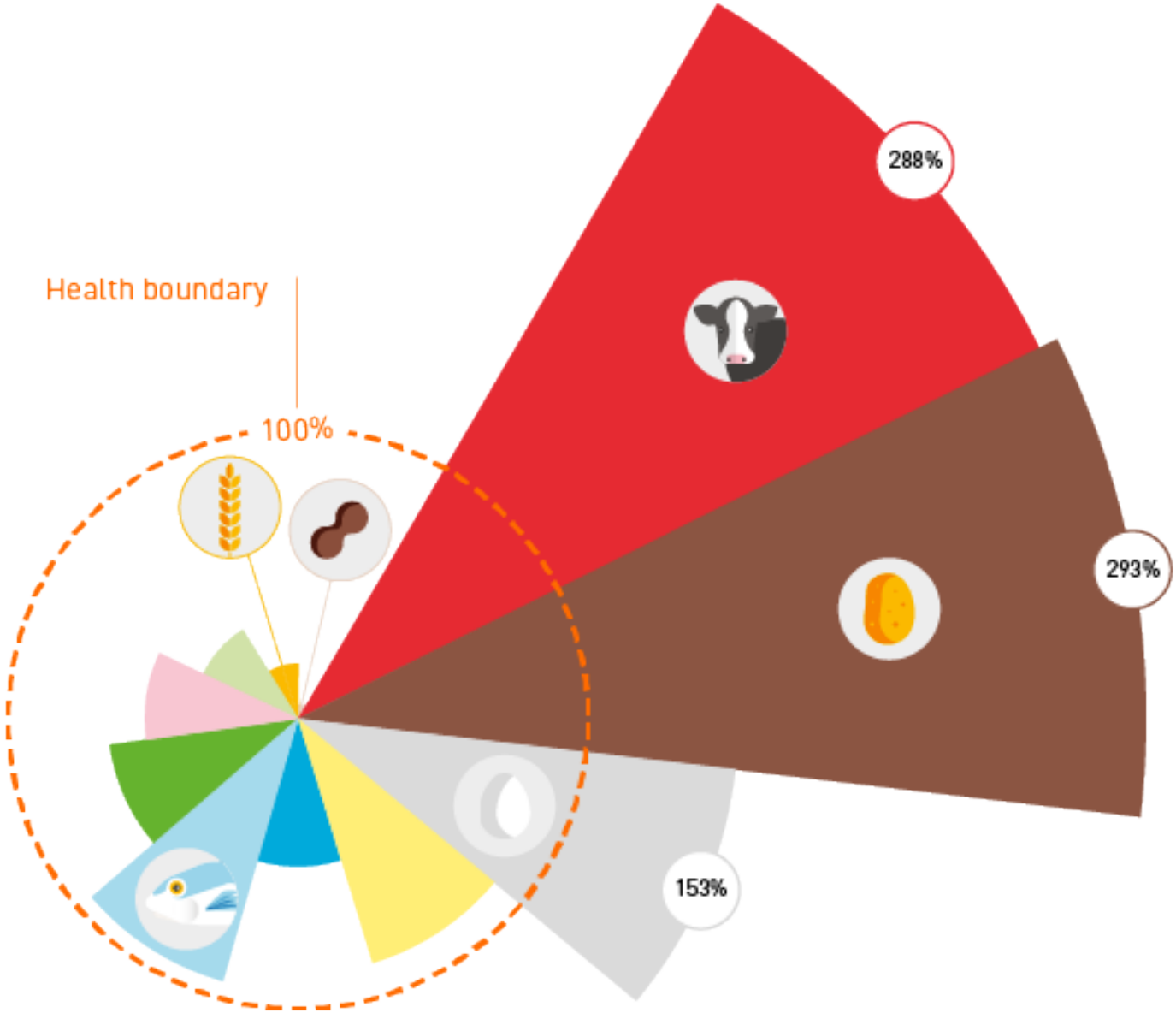
Figure 2: Graph retrieved from the Stockholm Resilience Centre. [Global Health Boundary according to the Planetary Health Diet][1]. This graph shows by how much the current diets exceed the Planetary Health Diet.



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Food and 'planetary boundaries'

The 'planetary boundaries' framework presents a set of nine planetary boundaries[c] that defines the 'safe operating space'[30]. To ensure the thriving development of future generations, human activities should not go beyond these boundaries.

To calculate the Planetary Health Diet, six of these indicators that are relevant to food were used:

1 nitrogen cycling
2 phosphorus cycling
3 freshwater use
4 biodiversity loss
5 extinction rate
6 land-system change

"Presently, the planetary boundaries framework is arguably the most robust conceptual lens available in terms of defining food system-specific absolute sustainability thresholds."[50]

c The nine planetary boundaries: (1) stratospheric ozone depletion, (2) loss of biosphere integrity (biodiversity loss and extinctions), (3) chemical pollution and the release of novel entities, (4) climate change, (5) ocean acidification, (6) freshwater consumption and the global hydrological cycle, (7) land system change, (8) nitrogen and phosphorus flows to the biosphere and oceans, (9) atmospheric aerosol loading

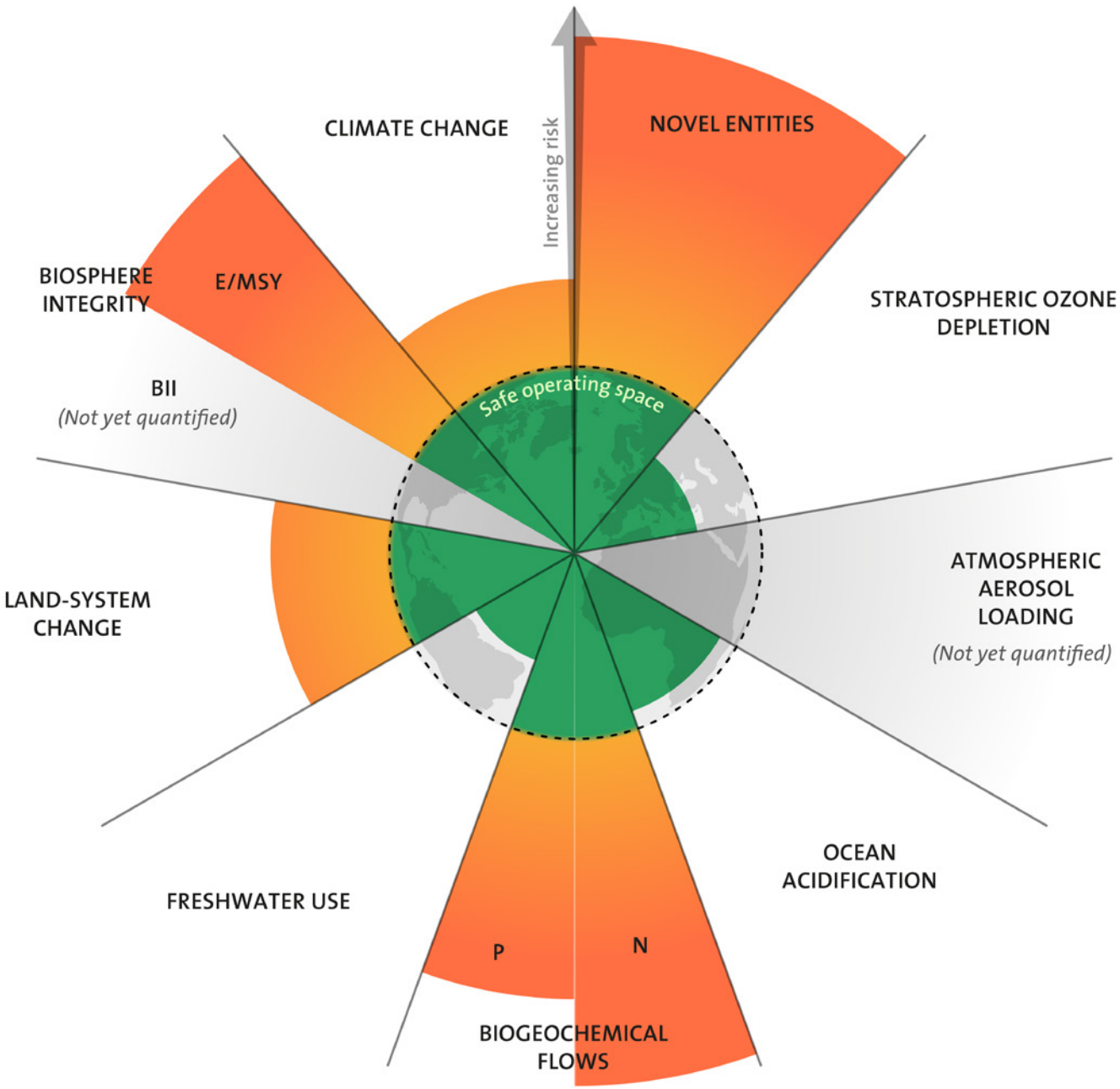

Figure 3: Graph retrieved from the Stockholm Resilience Centre. The nine planetary boundaries: To what extent does humanity live within the safe operating space with respect to the Earth system and the planet's biophysical subsystems or processes? – Updated Planetary Boundaries. Stockholm Resilience Centre, based on analysis in Wang-Erlandsson et al., 2022, Persson et al., 2022 and Steffen et al., 2015. (E/YMS meaning 'extinctions per million species per year'. BII meaning Biodiversity Intactness Index.)

Meat Exhaustion Day: When should we stop eating meat?

The obvious question regarding meat consumption is: How are we doing? Does our meat consumption fit within planetary boundaries and health recommendations? The short answer is: No.

To illustrate this analysis, FOUR PAWS is initiating the Meat Exhaustion Day. This date determines the day on which the recommended meat consumption has been reached[d].

The Meat Exhaustion Day is calculated by comparing the average actual consumption of meat per person with the recommended consumption (this was done on the global level, on the regional level and on the country level). The recommended consumption is extracted from the Planetary Health Diet. Because of existing scientific uncertainties, the reference diet gives a range of 0-14 grams of beef, 0-14 grams of pork, and 0-58 grams of poultry per day. For this analysis, we use the average of 7 grams for beef and pork and 29 grams for poultry.

The EAT Lancet Commission recommends a considerably lower consumption of 'red' meat – such as pig meat, beef, and sheep – than chicken and other poultry. However, we do not recommend replacing red meat protein with other animal-source proteins (chicken, eggs, dairy, seafood, etc.) despite their argued smaller ecological footprint and their slightly less harmful impacts on human health when compared to red meat[26]. It is important to note that the welfare of chickens in factory farms is dreadful[31], with excessive stocking densities, musculoskeletal deformities, dermatitis and injurious behaviours being the most common issues, while the ecological impacts are still considerable. Plant-based proteins by far have some of the lowest environmental footprints[9,18,26].

d The concept is comparable with the Earth Overshoot Day.

Meat Exhaustion Day is calculated for specific countries where FOUR PAWS is present. To set a general benchmark for the global perspective and to show Global North–Global South[e] differences, we calculated Meat Exhaustion Day in different global regions. Annex I describes the methodology of the research in more detail.

In the next section, we discuss the main outcomes of the country analysis and the assessment of global regions and we conclude by putting the findings in the context of global meat consumption trends.

Global Meat Exhaustion Day is reached this year on 26 June. This date is close to Earth Overshoot Day 2023 on 27 July. To stay within health and planetary boundaries, global meat consumption should be reduced by 51.6%. However, since not everyone on the planet consumes the same amount of meat, regional and country-specific data help better determine where meat reduction should occur.

When does meat consumption become unhealthy and unsustainable? A country perspective

Comparing the available most recent[f] meat consumption statistics of Australia, Austria, Germany, Netherlands, Switzerland, South Africa, UK, and the US to the Planetary Health Diet, shows that the meat consumption in these countries is far beyond what is recommended to be healthy or sustainable. Figure 4 and Table 1 summarise the outcomes of this comparison.

Consumers in European countries currently reach their Meat Exhaustion Day in April or early May, which means they must reduce their total meat intake by ~70%. In the US and Australia, the need for meat reduction is even higher – 81% and 78%, respectively – and these countries presently reach their Meat Exhaustion Day as early as March. Meanwhile, countries that have slightly lower levels of meat consumption, such as South Africa, only reach their meat quota in May.

e The term Global North is often used for wealthy countries such as the United States, European countries, Australia, and the UK. The term Global South is used for countries that are less wealthy such as countries in Latin America, Africa and Asia. https://www.rgs.org/CMSPages/GetFile.aspx?nodeguid=9c1ce781-9117-4741-af0a-a6a8b75f32b4&lang=en-GB

f All the data is for the year 2021, except for the UK, for which 2020 data is used. The data table can be found in the complete methodology in Annex I.

Comparison of the average meat consumption of individual countries (2021 data) to the Planetary Health Diet (grams/capita/year)

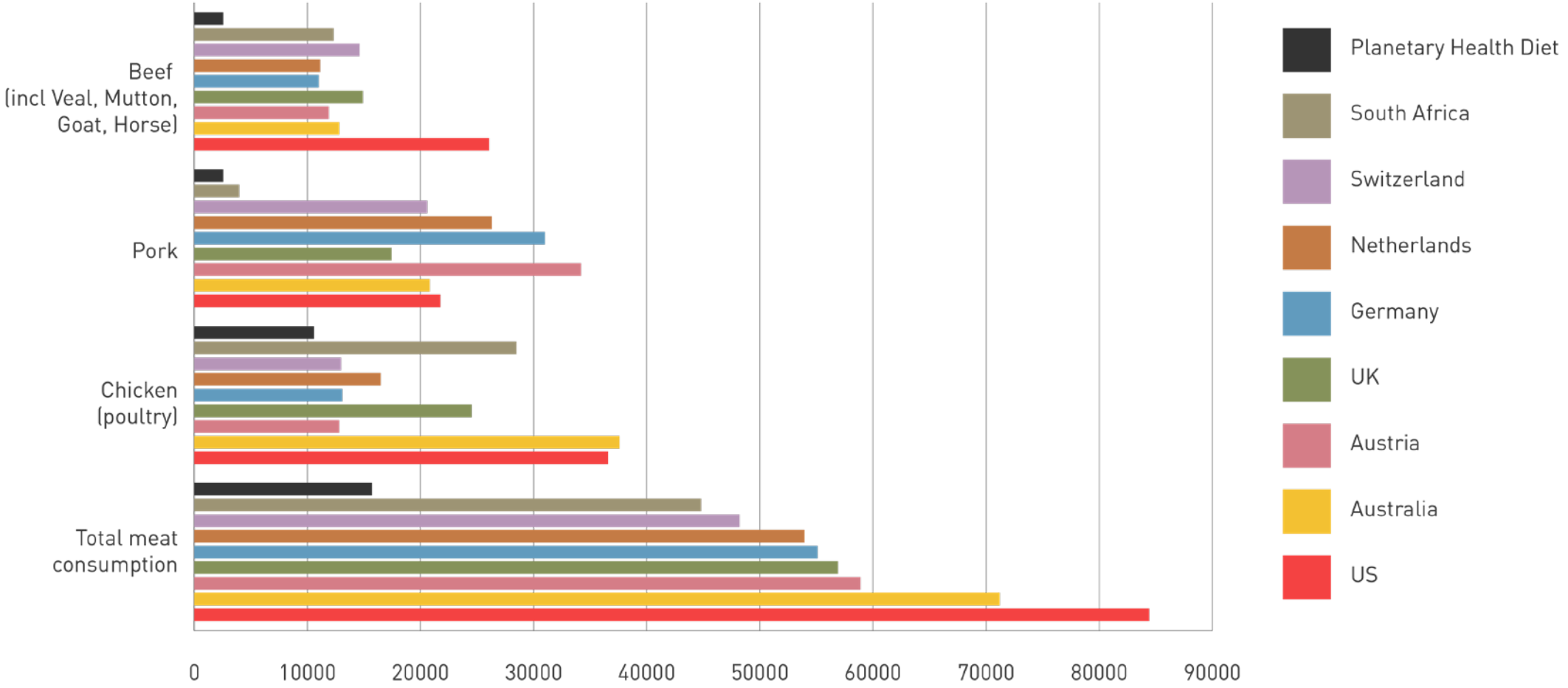

Figure 4: Comparison Planetary Health Diet to average consumption (Data sources: see Annex I)

Table 1: The percentage of meat reduction needed to reach the Planetary Health recommendations based on the Meat Exhaustion Day in selected countries. (Data sources: See Annex I).

	South Africa	Switzerland	Netherlands	Germany	UK	Austria	Australia	US
Meat Exhaustion Day	8 May	29 April	17 April	14 April	11 April	8 April	22 March	09 March
Meat Reduction Ratio	65%	67%	71%	72%	72%	73%	78%	81%

Meat overconsumption is a particular problem of the Global North

Comparing the meat consumption (FAO data 2020) in different global regions to the recommendations of the EAT Lancet Commission (see Figure 5) shows a clear consumption difference between the Global North and the Global South. In fact, overconsumption of meat is a particular problem of the Global North. Figure 6 is a visualisation of the national and regional Meat Exhaustion Days around the globe for the year 2023.

Meat consumption is highest in the two regions of North America and Australia/New Zealand[g]. These regions reach their meat consumption limit already by the beginning of March. The rate of consumption is also significantly high for South America and Europe and to a lesser extent in certain regions in Asia. Regions in Africa – except for Northern and Southern Africa – consume less than the recommended amount of meat per individual. Southern Asia has the lowest consumption of meat. While in European countries the needed meat reduction is around 70%, it is important to note that despite meat consumption being low in India and in African countries, communities there also struggle securing healthy meals that fit the Planetary Health Guidelines. This is largely affected by unsustainable production patterns – comparable to factory farming – that favour the industrial production of specific crops (palm oil, rice, sugarcane) that become cheap and accessible for local and national[32]. Many of the countries on the African continent do not have a meat exhaustion day.

g The Oceanian countries of Australia and New Zealand were combined into one regional zone for this research.

Comparison of the average meat consumption of global regions (2020 data) to the Planetary Health Diet (kg/capita/year)

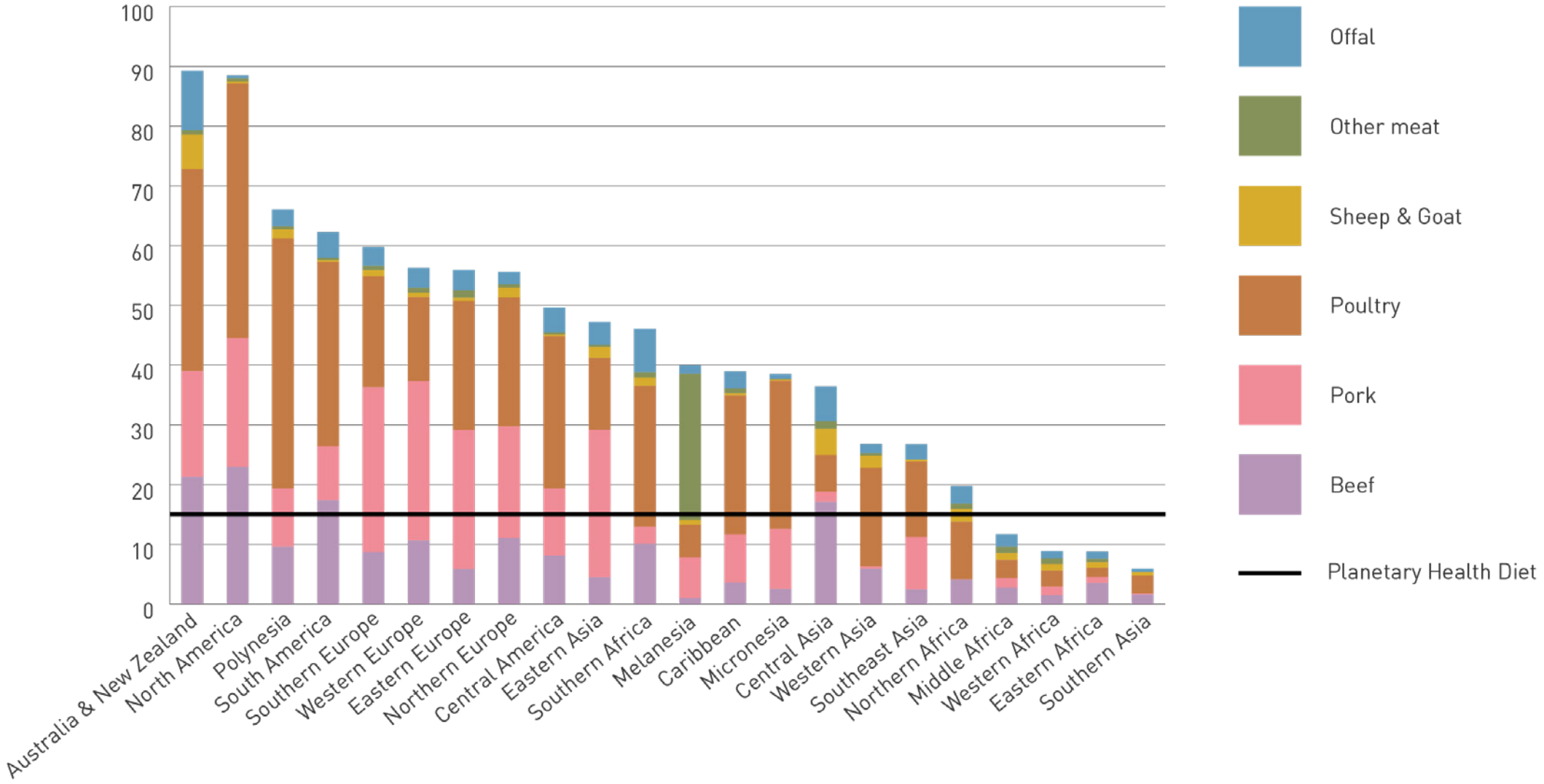

Figure 5: Comparison of average meat consumption of global regions to Planetary Health Diet. (Data source: FAOSTAT)

Meat Exhaustion Day 2023

On which day of the year 2023 do we reach the maximum recommended meat consumption – in terms of sustainability and health – based on current average meat consumption and in reference to the Planetary Health Diet?

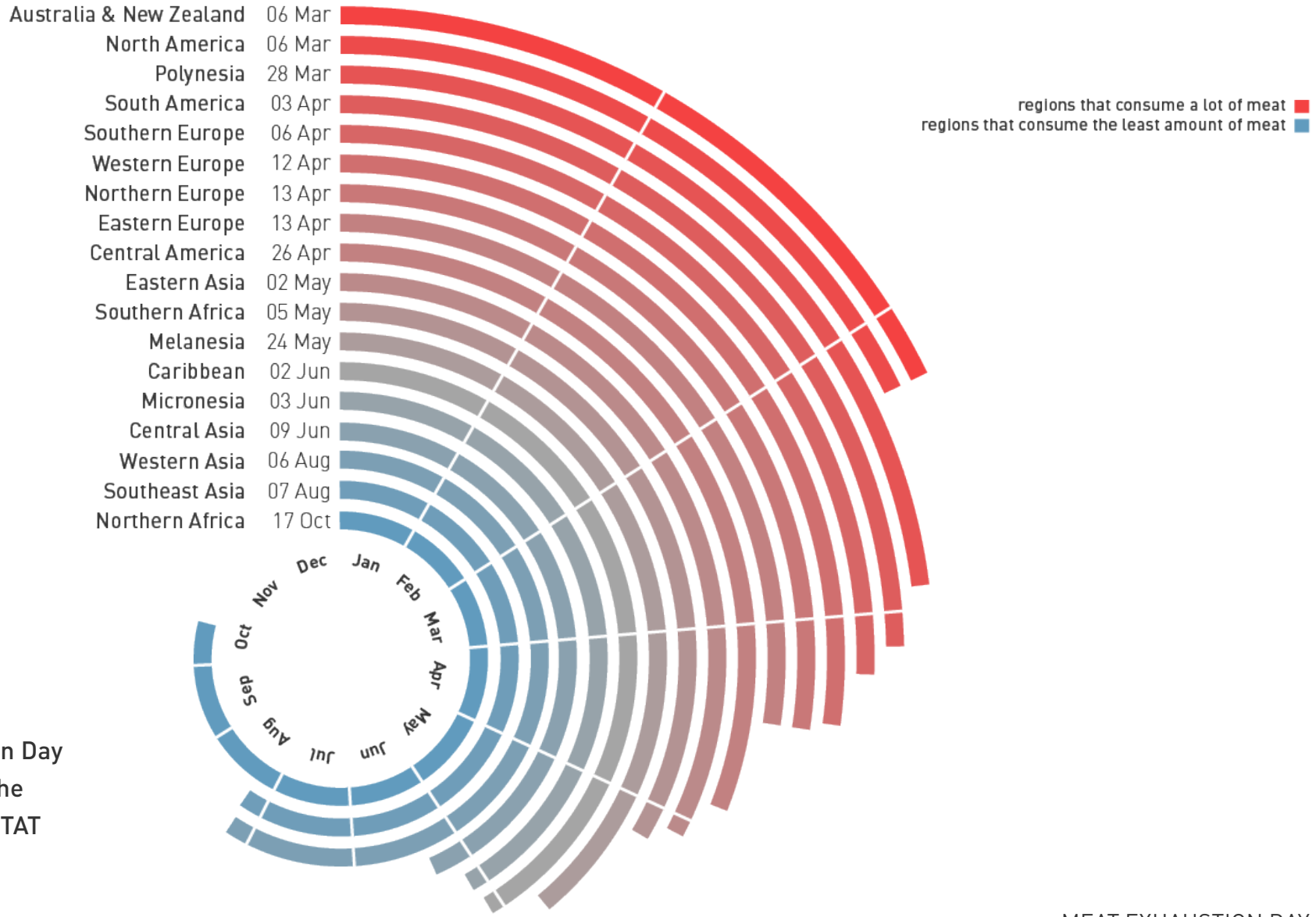

Figure 6a: Meat Exhaustion Day in global regions around the world. (Data source: FAOSTAT Food Balance Sheets)

Meat Exhaustion Day 2023

On which day of the year 2023 do we reach the maximum recommended meat consumption – in terms of sustainability and health – based on current average meat consumption and in reference to the Planetary Health Diet?

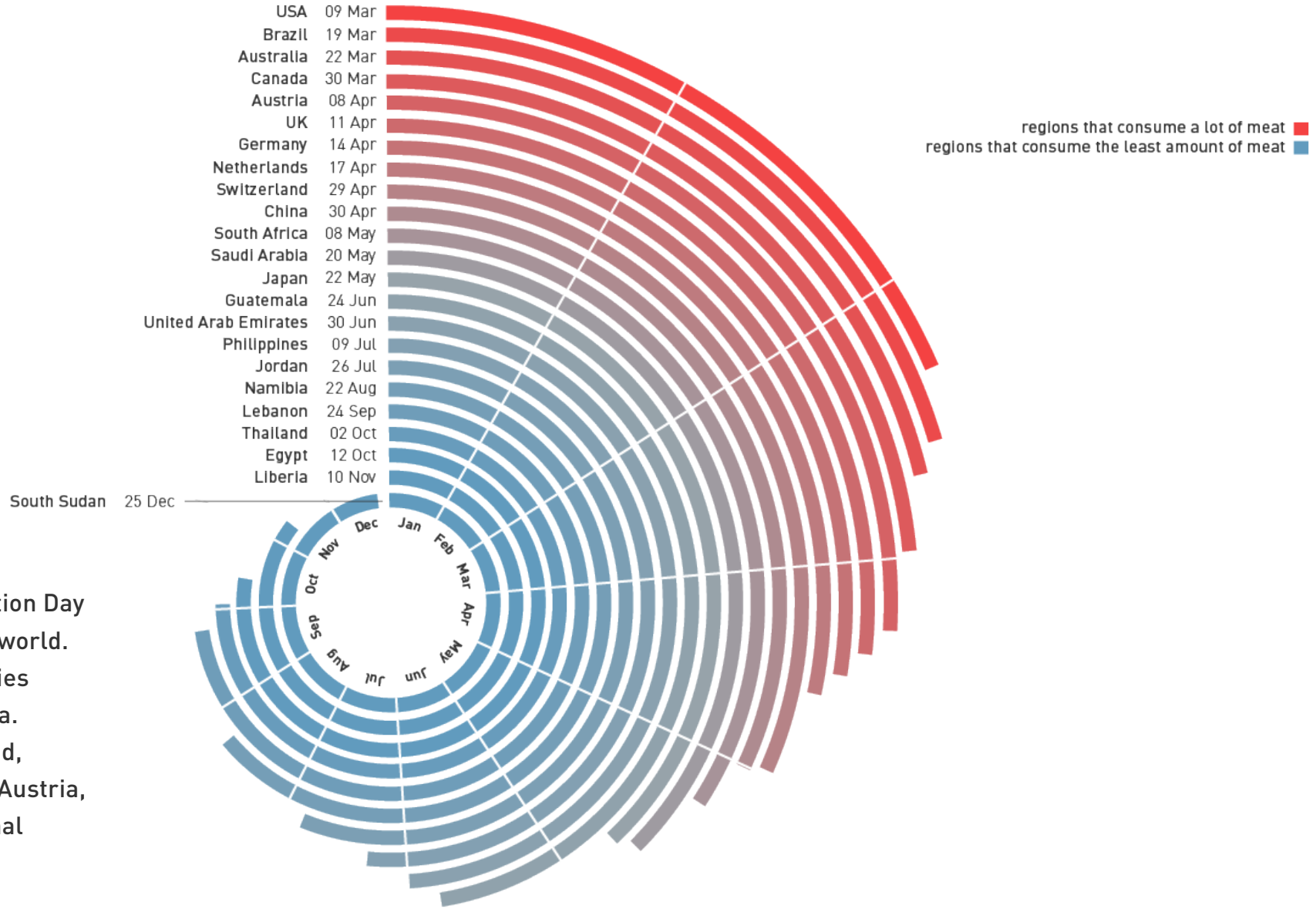

Figure 6b: Meat Exhaustion Day in countries around the world. (Data source: All countries FAOSTAT Food, 2020 data. South Africa, Switzerland, Netherlands, Germany, Austria, Australia and US: national statistics, 2021 data.)

Meat reduction is urgent, but the global consumption trend shows the exact opposite is happening.

Historic meat supply data collected by the FAO and visualised in Figure 7 shows that the global meat consumption grew from slightly over 70 million tons in the early 1960s to 340 million tons in 2020. In Europe and Northern America, total meat consumption has grown steadily in the last century and is now relatively stable. However, in some European countries, meat consumption is slowly decreasing (e.g. in the UK[33] and showing a reasonably steady decline in Germany[34,35]). This trend needs to be observed in the hope of it being one that is maintained. In all other global regions, such as Asia, meat consumption is growing steadily.

The FAO and OECD Agriculture Outlook 2021-2031 concludes that this trend of growth in total meat consumption is expected to continue. They project a growth of 15% – mainly in low – and middle-income countries, catalysed by population and income growth. In terms of number of individual animals, the outlook foresees a global increase in 'livestock inventories' of 1.8 billion cows, 1.0 billion pigs, 31 billion chickens and other poultry, and 2.9 billion sheep. The amount of greenhouse gas emissions from the livestock sector is projected to increase by 9% by 2031[36].

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Meat Domestic Supply Quantity by global region 1961-2020 (x 1.000 tonnes)

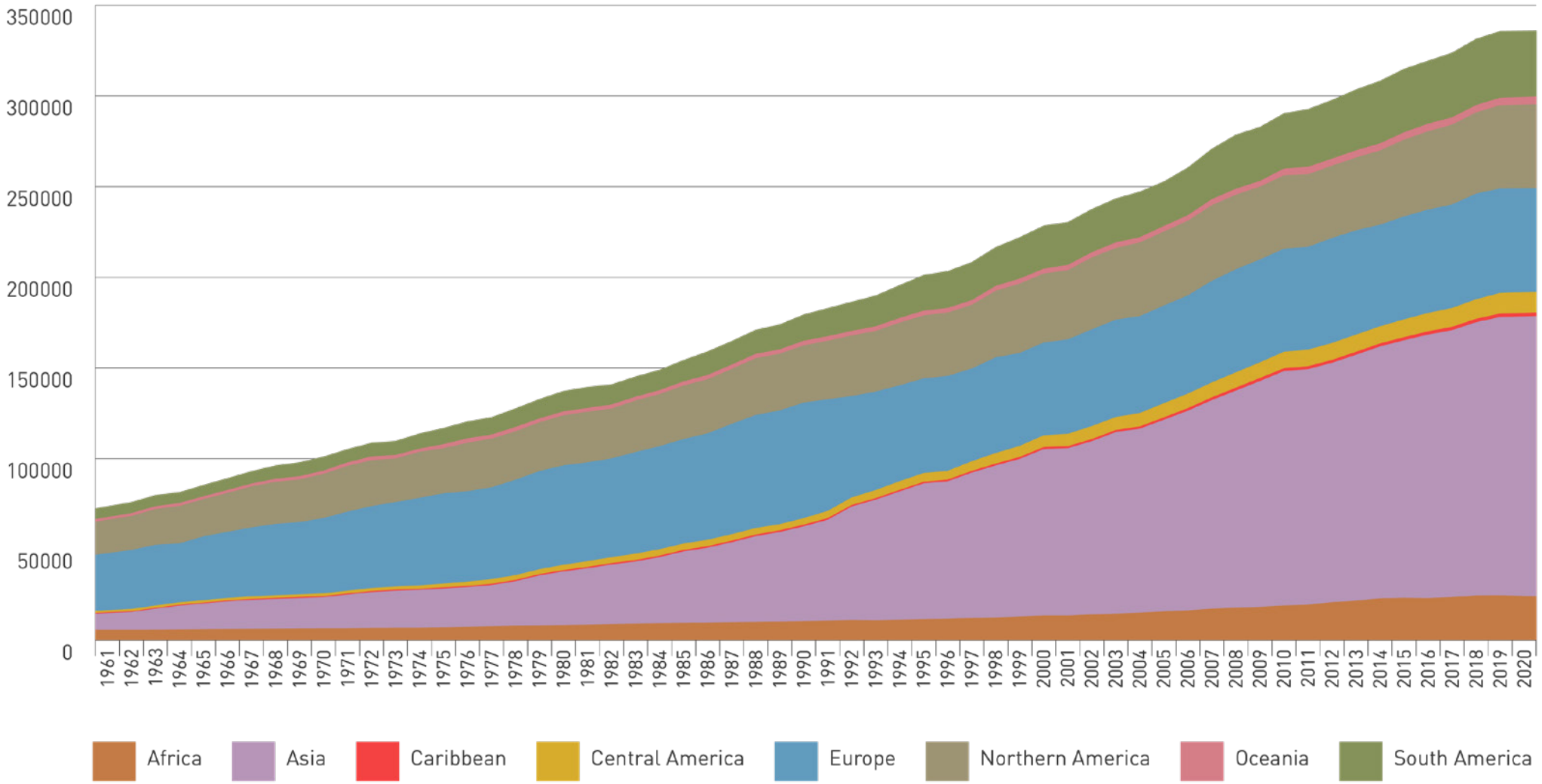

Figure 7: Global growth of meat consumption. Data source: FAOSTAT. Note: these figures are in 'carcass weight'.

Conclusion

Comparing average meat consumption to the EAT Lancet recommendations has made it crystal clear that our current meat consumption is far beyond the limits of the carrying capacity of our planet and exceeds individual health limits.

Although we observe a slow reduction of meat consumption in some Global North countries, the overall picture is rather grim. Global meat consumption is growing as if there were no limits. This growth makes the climate crisis even more severe. Although we need restoration efforts to re-wild spaces into thriving ecosystems and halt the biodiversity collapse and climate crisis acceleration, the need for arable land to produce animal feed will drive further loss of forests and other ecosystems.

Outlook: benefits of a diet within planetary boundaries

By shifting from unhealthy diets to the one described by the Planetary Health Diet, 11 million premature adult deaths can be prevented each year[1]. The dietary changes would, in addition, encourage the transition towards a sustainable global food system by 2050. This means that by 2050 healthy food can be ensured for all humans, while staying within planetary boundaries. The Planetary Health Diet guideline is therefore necessary to be followed in high income countries – the global North – where food costs and access to food can positively be managed by governments and retails. Governments and market actors should follow the recommendations of the diet to influence consumer behaviour.

Moving away from factory farming and adopting sustainable diets has major positive effects for the planet. Dietary guidelines that encourage less meat intake are not only beneficial for human health, but can also help reduce environmental impacts such as river pollution[16]. A Global Assessment of the Water Footprint of Farm Animal Products showed that it is more water efficient to consume protein, fat and calories from crop products than animal products[18].

Ecological restoration is in fact very important to mitigate the impact of climate change by carbon sequestration – trees and other biomass that capture carbon from the

atmosphere and preserve it in biomass and soils. In fact, Sun et al., modelled the 'double climate dividend' of (1) adopting the EAT Lancet diet in 54 rich countries and (2) allowing nature to restore in the freed-up land; and concluded that restoration would capture the same amount of carbon as what is emitted by the entire global farming system during 14 years[37].

Switching to the Planetary Health Diet will reduce GHG emissions and revive carbon sinks. A study that modelled different scenarios on the impact of food waste and diet choices on land concluded that scenarios involving healthy diets reduce the area necessary for cropping by ~5%, pasture by ~25%, and the total GHG emissions by ~45%, compared to scenarios that only involve food waste reduction. The study also concluded from these scenarios that almost all of the large GHG emission savings are associated with livestock reductions; the two sources of savings are a decrease in enteric fermentation and manure emissions, and carbon sequestration resulting from the restoration of crop and pasture lands into natural ecosystems[38]. Another study concludes that the impact of a swift reduction of meat consumption in combination with an increased carbon sequestration on former agricultural land could in itself achieve half of the emission reductions needed to reach the goals set by the Paris Agreement – limiting global warming to preferably 1.5 °C[39]. The IPCC concludes in its Sixth Assessment Report that near-term climate action is needed and viable solutions to combat the climate crisis are available. When compared to other sectors, agriculture, forestry and other land use have "substantial" climate mitigation and adaptation potentials that could be realised in the near-term[40].

Recommendations

The science is evident: for the sake of the planet, people, and animal welfare, a swift shift in the current food system is crucial. This food system change needs a serious reduction in meat production and consumption.

FOUR PAWS therefore calls on policymakers and food companies to:

1. Prioritise addressing the overconsumption of meat. This has clear and proven benefits for animals, climate, biodiversity, environment, human health, and food systems as a whole. Setting ambitious and clear targets for a rapid reduction of meat consumption and production are a necessary first step.

2. Embrace the EAT Lancet recommendations and implement meat reduction in policies (especially in high income countries, and the Global North). This must happen on a governmental as well as industry level, similar to the adoptions of the Danish Ministry of Food, Agriculture and Fisheries (they used the reference diet to update their official dietary guidelines)[41] or the supermarket chain LIDL (LIDL announced that it will use the reference diet in determining its product range[42]).

3. Set ambitious and clear targets on the regional and sector-specific level[9], as well as a roadmap for a fast reduction of meat production as a crucial starting point.

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- Catalyse the transition away from overconsumption of meat and unethically sourced meat at the consumer level through fiscal interventions like true cost accounting of meat products[2,43], tax relief of plant-based food, and animal welfare labelling to increase transparency[5].

- Redirect policies, subsidies and investments to help farmers and producers transition from harmful practices towards production systems that support health and environmental goals[44] and halt (indirectly) subsidising factory farming and promotion of meat consumption.

4 Stop factory farming, starting with an immediate ban on the worst animal welfare practices, and enforce animal welfare standards and regulations[45]. Move away from further intensification of livestock farming and start transitioning to diverse food systems that assure high farm animal welfare and fit within planetary boundaries.

5 Enable a fair and just transition[46] of food and farming. The Global North with its disproportionate role in the meat industry and market, must lead the way in transitioning to sustainable food systems and use its economic power to enable other countries to adapt. This is in line with the equity principles embodied in the concept of 'common but differentiated responsibilities and respective capabilities' that underpin the Paris Agreement.

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Annex I: Methodology: calculating the Meat Exhaustion Day

In this section, we present the methodology used to calculate the Meat Exhaustion Day, where we compared the Planetary Health Diet with actual/current meat consumption. This methodology is based on analyses in other studies such as the analyses conducted by Wageningen Economic Research titled "Meat consumption per capita in the Netherlands, 2005-2019", and the research conducted by Blackstone & Conrad "Comparing the Recommended Eating Patterns of the EAT-Lancet Commission and Dietary Guidelines for Americans: Implications for Sustainable Nutrition" [47,48].

National and global meat consumption reference data

To estimate the average meat consumption in countries and global regions, we made use of available national data and FAO statistics. For the national perspective, we looked into the respective datasets of countries' national statistics authorities and retrieved the data on meat available for consumption for the year 2021. For the global comparison, we used the FAOSTAT Food Balance Sheet and retrieved data on meat available for consumption for the year 2020.

Country	Data source
Netherlands	Wageningen Economic Reseach. Vleesconsumptie per hoofd van de bevolking in Nederland, 2005-2021. https://edepot.wur.nl/577742
US	USDA. Livestock and meat domestic data – recent meat supply and disappearance tables. https://www.ers.usda.gov/data-products/livestock-and-meat-domestic-data/
Austria	Statistik Austria. Versorgungsbilanzen – pro Kopf-Verbrauch tierischer Produkte. https://www.statistik.at/statistiken/land-und-forstwirtschaft/landwirtschaftliche-bilanzen/versorgungsbilanzen
Germany	Bundesamt für Landwirtschaft und Ernährung. Versorgung mit Fleisch in Deutschland im Kalenderjahr 2021. https://www.ble.de/DE/BZL/Daten-Berichte/Fleisch/fleisch.html?nn=8904230#doc9091258bodyText1
Australia	Department of agriculture, fisheries and forestry ABARES. March '23 Agricultural commodities outlook. https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#agricultural-commodities
UK	The most recent available data from UK government sources is from 2019. Therefore, we used FAOSTAT 2020 data for calculating the UK Meat Exhaustion Day.
Switzerland	Schweizerische Eidgenossenschaft. Bundesamt für Statistik. Fleischbilanz. https://www.bfs.admin.ch/bfs/de/home/statistiken/land-forstwirtschaft/landwirtschaft.assetdetail.23945843.html
South Africa	https://baseline.bfap.co.za/wp-content/uploads/2022/08/BFAP-BASELINE-2022-ONLINE-Final.pdf and the annual report about the meat safety by the ministry: http://www.daff.gov.za/index.php/publications
World & global regions	Food and Agriculture Organisation of the UN - FAOSTAT Food Balances: https://www.fao.org/faostat/en/#data/FBS

Calculations methodology

The datasets listed above allowed us to calculate an estimation of the actual meat consumption.

We used the Food Supply Quantity of meat (kg of meat available for consumption per capita per year) which is provided in the used Food Balance Sheets. It is, however, good to understand how the Food Supply Quantity is calculated: The Domestic Supply Quantity is multiplied by the current population of the country. The Domestic Supply Quantity of meat is calculated using this formula: production + imports – exports + changes in stocks (decrease or increase) = supply for domestic utilisation. Other assessments: see e.g. Westhoek et al, 2011, who also use the Food Supply Quantity as an indicator for consumption[49]. It is, however, worth noting that this figure includes meat that goes wasted in the food supply chain, and it is based on the weight of slaughtered animals, i.e. the 'carcass weight'.

Calculating 'carcass weight' to retail weight

The Food Supply Quantity of meat obtained in 'carcass weight' was converted to 'retail weight' (Retail weight is equivalent to the consumable meat, without bones and non-consumable parts of the animal). This allows us to compare our data to the Planetary Health Diet's reference that is in 'intake of macronutrients in grams per person per day'.

What is important in this calculation is the 'yield percentage'. This factor is different from species to species, and is very diverse across the globe. For example: An American cow from an industrial farm does not have the same yield percentage as a cow in subsistence farming systems in Africa. Therefore, we used the average of a range of different yield percentages:

Table 2: Yield percentages from meat production

Beef	62,5% (range: 60–65%)
Pork	72,5% (range: 70–75%)
Lamb	52,5% (range: 50–55%
Chicken	75% (range: 70–80%)

To calculate 'other types of meat', such as horse and mule, we used the same yield percentage as beef.

Comparing the average consumption to the Planetary Health Diet

The Planetary Health Diet[21] consists of a series of recommendations on daily intake of meat, dairy, fresh fruits and vegetables, nuts and other macronutrients by giving a range for recommended amounts. To conduct our analysis, we took the average of the recommended range and got the recommended consumption per day and per year:

Table 3: Recommended consumption of meat products based on the Planetary Health Diet.

	Grams per year	Grams per day	Range
Beef, veal, sheep, goat	2,555	7	0–14
Pork	2,555	7	0–14
Chicken and other poultry	10,585	29	0–58

Calculation Meat Exhaustion Day

We calculated the number of days in the year when Meat Exhaustion Day happens in 2023 by dividing the total recommended meat consumption per year of the Planetary Health Diet (15,695 grams/year) by the average meat consumption per day in a country or region.

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