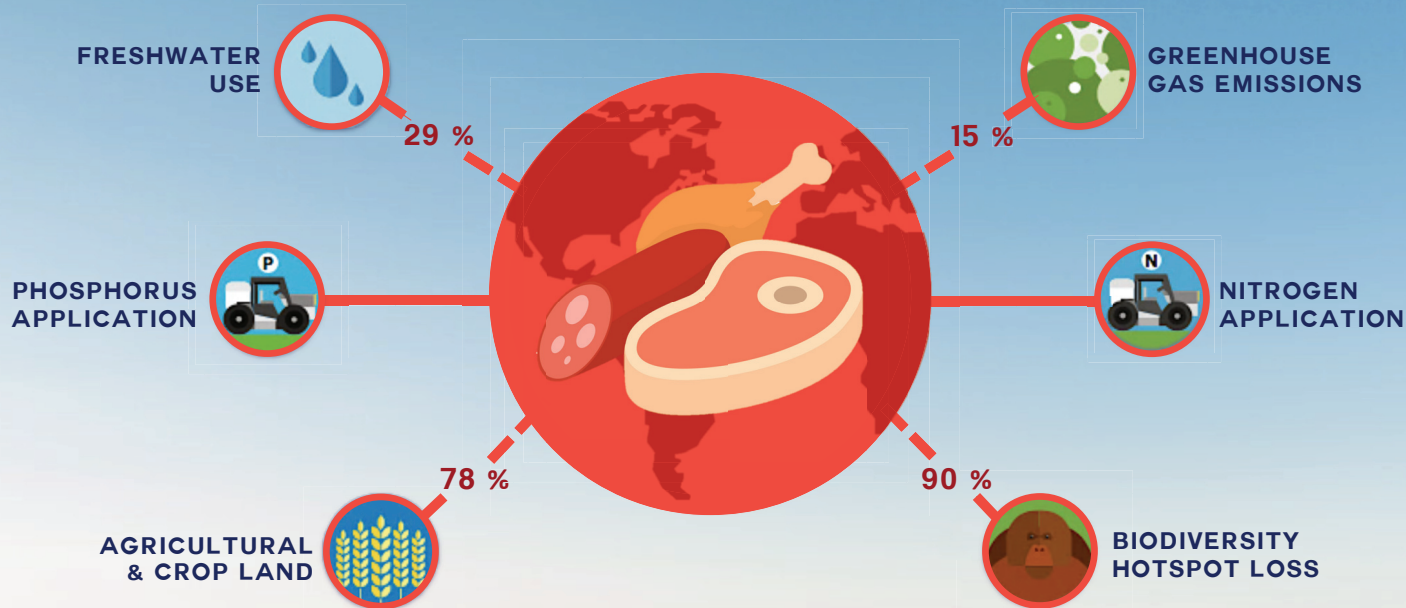


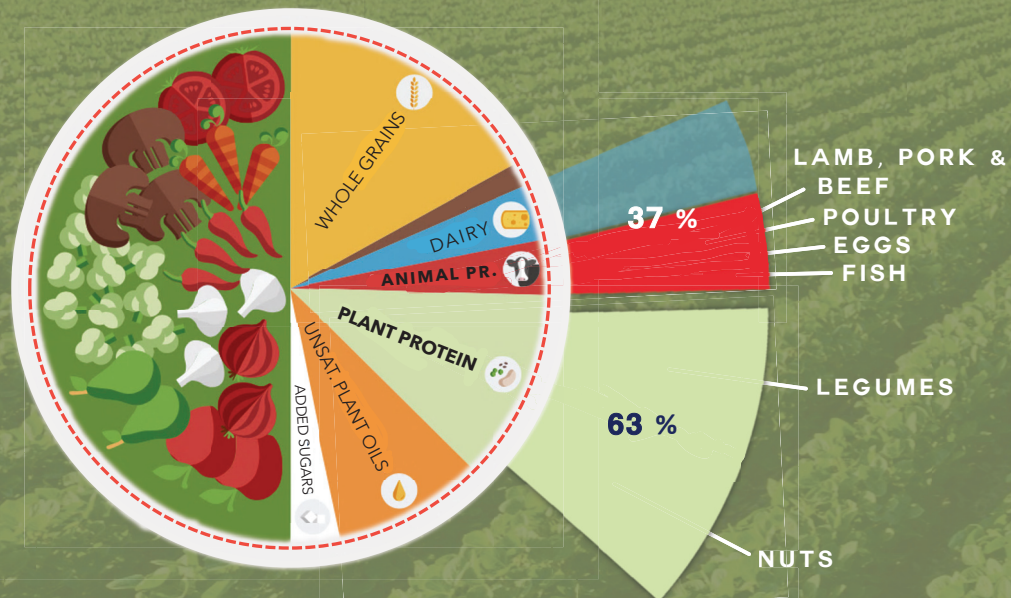


# SHOULD WE STOP "MEATING" LIKE THIS?

A CHANGE IN DIETS CAN HELP REACH GOALS OF SDG-15



## THE PLANETARY HEALTH PLATE



BUT,  
REPLACING  
**MEAT** IS  
ALSO AN  
OPTION!



## THINGS TO EAT INSTEAD OF MEAT..

WHICH 1) TASTES GREAT,



2) IS GOOD FOR YOUR HEALTH,

AND 3) MAKES THE EARTH HAPPY!

PLANT-BASED MEAT SUBSTITUTES HAVE BEEN IDENTIFIED AS  
 ⓘ A SOURCE OF **PROTEIN** THAT OFFER A NUMBER  
 OF **ENVIRONMENTAL, SOCIAL AND HEALTH BENEFITS!**

## Should we stop “meating” like this?

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### Introduction

Our planet is under great pressure as the global population will reach 10 billion people by 2050 (Ramankutty *et al.*, 2018). With higher consumption and thereby greater demand for processed food, meat and dairy products, global food production threatens climate stability and ecosystem resilience (Ibid.). Animal-based food products such as beef are generally more resource-intensive to produce than those which are plant-based, requiring 20 times as much land and emitting 20 times the amount of GHG emissions per gram of edible protein compared to common plant proteins, such as beans (Waite, Searchinger & Ranganathan, 2019). To reach the UN Sustainability Goal 15 (SDG 15): Life on Land, a radical transformation of the global food system is needed. This paper seeks to highlight how changes in diets can help reach the SDG 15: Life on Land, and reduce some of the problems related to global food production: biodiversity loss and land use, greenhouse gas (GHG) emissions, freshwater use and phosphorus and nitrogen emissions.

### Land-use as a driver of biodiversity loss

Agriculture is the single largest driver of habitat loss and is therefore considered as a major threat towards biodiversity (Benton *et al.*, 2021; Godfray *et al.*, 2018). On a global scale, agriculture accounts for 80% of all land use change including crops and livestock farming (Benton *et al.*, 2021). Livestock farming and meat production make up 78% of all agricultural landscapes (Ibid.). Furthermore, global meat production contributes to the conversion of natural habitats into grassland as well as land for growing grains and soya for livestock consumption (Godfray *et al.*, 2018). Global meat production is increasing in tropical developing countries within America, Africa and Asia (Machovina, Feeley & Ripple, 2015; Benton *et al.*, 2021). These areas are considered biodiversity hotspots and contain approximately 44% of the world's plants and 35% of terrestrial vertebrates (Machovina, Feeley & Ripple, 2015). Furthermore, human alterations of biodiversity hotspots such as the Caribbean, Madagascar and Brazil's Atlantic forest have been reduced to 90% of their original size (Ibid.). In order to reduce the negative impact on biodiversity global meat production must be significantly reduced (Machovina, Feeley & Ripple, 2015).

### GHG emissions from livestock production

GHG emission sources are mainly due to land use changes, converting peat soils to agricultural land needed to grow animal feed for pasture management: fertilizing, irrigation and subsequent emissions from slaughter waste. The release of methane (CH<sub>4</sub>) in a process called enteric fermentation, following the digestion of grasses and decomposition of manure is common in ruminant animals such as cows and goats. Through deforestation for livestock agriculture, clearing more land allows for feed crops and grazing, but represents an indirect, yet important issue from the ever increasing beef production (Waite, Searchinger & Ranganathan, 2019). This in turn releases stored CO<sub>2</sub>, as forests are important carbon sinks, sequestering carbon and preventing it from reaching the atmosphere. Red meat and dairy have a larger footprint from CH<sub>4</sub> due to its potency, but CH<sub>4</sub> also has a shorter lifetime in the atmosphere than CO<sub>2</sub>, complicating efforts of estimating its temperature impacts (Ritchie, 2020).

Excluding CH<sub>4</sub>, the average footprint of beef is nearly quadruple that of chicken and even ten to one hundred fold of plant-based foods. The production of CO<sub>2</sub> from livestock agriculture appears in numerous ways. The use of high energy feed such as corn for factory farmed animals requires large amounts of chemical fertilizer, and the production of this may emit up to 40 million tons of CO<sub>2</sub> annually on a global scale. Nearly 90 million tons of CO<sub>2</sub> is emitted as a result of using large quantities of fossil fuel based energy in operating (cooling, heating and ventilating) facilities and farm machinery when cultivating and harvesting crops (The Humane Society of the United States). As soils are carbon sinks, the grazing of pastures can cause fertile soil to dry and this releases nearly 100

million tons of CO<sub>2</sub>. The process of slaughtering, packaging and transporting livestock products also contributes to the release of tens of millions of tons (Petrovic *et al.*, 2015).

The livestock agricultural sector includes the production of feed crops, the manufacturing of fertilizer, and the shipment of meat and dairy products. This is responsible for 18% of all GHG emissions and 9% of human-induced emissions. CH<sub>4</sub> (37%) has more than 20 times and N<sub>2</sub>O (65%) has nearly 300 times the global warming potential (GWP) of CO<sub>2</sub> (González *et al.*, 2020).

### **Freshwater use**

Agriculture is the biggest exploiter of freshwater on the planet, using 92% of the available resources. 29% of the water in agriculture is used for livestock production, with irrigation accounting for 64% of withdrawals worldwide (Gerbens-Leenes, Mekonnen & Hoekstra, 2013). The agricultural water use has had catastrophic impacts on freshwater resources, for example, the groundwater depletion crisis in North West India and the complete loss of the 68.000 km<sup>2</sup> of the Aral Sea (Ramankutty *et al.*, 2018). The water used for livestock production mainly refers to water consumed or polluted to produce livestock feed and the water footprint therefore depends on the feed efficiency, what the animal eats and feed origin. Also, the water footprint is determined by local climate and soil conditions and agricultural practice. In the period 1996-2005, the annual global water footprint for livestock production was 2422 Gm<sub>3</sub> (Gerbens-Leenes, Mekonnen & Hoekstra, 2013).

### **Alterations of global phosphorus (P) and nitrogen (N) cycle**

Crop-livestock production systems are considered the largest cause of human alteration of global nitrogen (N) and phosphorus (P) cycles (Bouwman *et al.*, 2013). N and P are essential nutrients for food production, but are closely related to water quality degradation (Ibid.). For instance, anthropogenically mobilized N is lost through emissions of ammonia, nitrous oxide and nitric oxide. Ammonia is directly linked to eutrophication of freshwater, groundwater pollution and harmful algal blooms (Bouwman *et al.*, 2013; Westhoek *et al.*, 2014). Similar negative effects on human health are linked to alterations of the phosphorus cycle. On a global scale, reduction of livestock is linked to 40% lower nitrogen emission (Westhoek *et al.*, 2014).

### **How to promote more sustainable diets**

A dietary shift towards more plant-based diets is necessary to work towards a more sustainable food system. However, different regions of the world have very different dietary patterns, and in some regions people are dependent on meat both for consumption and for their livelihoods (EAT-Lancet Commission, 2019). As a result, it is important to take into account regional differences and circumstances when promoting a more plant-based diet (ibid). The EAT-Lancet Commission (2019) suggests five strategies in order for the global food system to become more sustainable. The first strategy they propose is national and international commitments through the implementation of dietary guidelines based on the planetary healthy diet and better access to and affordability of healthy foods. Second, they recommend a shift in the focus of agricultural practices from the production of high quantities of food to the production of healthy foods. Third, they suggest intensifying food production in a sustainable manner in order for output to be increased. Fourth, they advise coordinated and strong governance. Fifth, they recommend halving food waste and loss.

Different measures to influence consumer decisions are also needed in order to reach SDG15 and establish a more sustainable food production. In order to promote more sustainable diets, the policies and strategies aimed at meat substitution should focus on specific consumer segments instead of the average consumer. This will be beneficial as consumers have many different reasons for choosing or not choosing meat substitutes (Apostolidis & McLeay, 2016). Apostolidis & McLeay (2016) identified six different consumer segments who all have different preferences. These are preferences such as valuing health, organic, 'green' or cheaper foods. The measures taken to make these consumer segments choose more meat substitutes includes developing educational campaigns and food labelling regulations which highlight the health and nutrition benefits for 'the healthy consumers'; labelling the

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environmental and carbon footprint for ‘the green consumers’ and labelling animal welfare benefits and methods of production for ‘the organic consumers’. Furthermore, decreasing the price on meat substitutes would encourage the ‘price-conscious consumer’ (Ibid.).

### **Conclusion**

In order to solve some of the problems related to SDG15, such as biodiversity loss and land use, GHG, phosphorus and nitrogen emissions, changes in diets from meat-based to flex or plant-based can be crucial. To promote a more sustainable diet, policies and strategies should focus on specific consumer segments and implement measures, such as regulatory mechanisms, financial incentives and consumer education.



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