**Environmental Impact of Animal-Based Foods: Fact Sheet**

**Food Security**

* 1/3 of global crops are fed to animals (Cassidey et al, 2013)
* On average, 4 calories of crop-based feed roughly equals 1 calorie of animal products (Pradhan et al, 2013)
* Less than 20% of the protein in feed fed to animals becomes meat (WRI, 2013)

**Water Pollution**

* Approximately 70% of the global dietary phosphorus footprint (1961-2007) is linked to animal foods (Metson et al 2012)
* Each year livestock produce 7-9 times more manure output than humans do (Schipanski & Bennet, 2012)
* The production of livestock can be linked to about 60% nitrogen pollution released to the environment (Pelletier & Tyedmers, 2012)

**Land Competition**

* Some livestock rearing can be considered resource efficient, by using land unsuitable for crops or forests, or by consuming crop residues. But only ~30% of current production levels could be reared in this way (Bajželj et al, 2014)
* Livestock are linked to ~70% of historic deforestation in the Brazilian Amazon (Nepstad et al, 2014)

**Water Stress**

* Livestock production uses ~17% of the freshwater extracted globally for agriculture (Mekonnen and Hoekstra, 2012)
* Of this ~12% is for the irrigation of crops fed to animals (Mekonnen and Hoekstra, 2012)

**Climate change**

* Studies show, that to stop global temperatures rising beyond the dangerous 2˚C level of climate change, demand for livestock products must be reduced (Hedenous et al, 2014; Bajželj et al, 2014; Pelletier & Tyedmers, 2010; Davidson, 2012; Tilman & Clark 2014)
* The raising and feeding of livestock produces ~14.5% (7.1 GtCO2 eq) of global greenhouse gas emissions (UNFAO 2013)
* Between 1961-2010 emissions from livestock rose by ~51% (Caro et al, 2013)

**Biodiversity Loss**

* Livestock production is a major driver of biodiversity loss globally, linked by one study to roughly 30% of human caused losses (Westhoek et al, 2011)
* In many places, encroachment upon ecosystems by agricultural expansion puts livestock producers in conflict with carnivores, making them vulnerable to extinction (Ripple et al, 2014)

**What does the future look like?**

* By 2050, consumption of meat and dairy products is expected to have risen 76% and 65% respectively against a 2005–07 baseline (FAO, 2012)
* 75% of the global increase in livestock production up to 2030, is expected to come from industrialized production methods, mostly in developing countries (Bruinisma, 2003)
* If the entire world were to eat the average North American diet, this would result in a 320% increase in the global consumption of animal protein and a doubling in the area of global cropland (Sutton et al, 2013; Kastner et al, 2012)
* The collective weight of all global livestock is equal to that of all humans, as well as all large wild animals on earth (about the size of a sheep upwards) – doubled (Barnosky, 2008)

**If current global dietary trends continue…**

* Global agricultural emissions in 2050 could be up to 80% greater than in 2009, and total global cropland and pasture area could have expanded by up to 43% and 13% respectively (Bajželj et al, 2014)
* By 2050, over more crops could be being fed to livestock than to humans (Pradhan et al, 2013)
* There may not be enough sustainable water resources to feed the expected population in 2050 (Jägerskog and Clausen, 2012; Springer & Duchin, 2014; Jalava et al, 2014)
* By 2050 the amount of reactive nitrogen pollution released into the environment could increase by 36% on 2000 levels (Pelletier & Tyedmers, 2012)

**Why does this matter?**

* Livestock are the single largest human caused source of non-CO2 greenhouse gases, producing 44% and 53% of methane and nitrous oxide emissions, respectively (FAO, 2013)
* Depending on the accounting method used, livestock produce 50-80% of global agricultural emissions (Tubiello et al, 2013; WRI 2013)
* If current trends towards increasing consumption of livestock continue, and if a cap on emissions is put in place to limit warming to 2˚C or less, by 2050, 70% of the cap would be taken up by the livestock sector alone (Pelletier & Tyedmers, 2010)
* It is estimated that the livestock sector could reduce its emissions ~32% by adopting ambitious yet achievable farming techniques, but these improvements would still be insufficient to compensate for the expected growth in future demand for livestock products (FAO, 2013; see Fig 28)
* Studies show that in order to achieve greenhouse gas reductions from the livestock sector, consistent with keeping climate change below the dangerous 2˚C level, reduction in demand of animal-foods will be essential. (Hedenous et al, 2014; Bajželj et al, 2014; Pelletier & Tyedmers, 2010; Davidson, 2012; Tilman & Clark 2014)
* Non-CO2 gas reductions are essential to achieving global climate targets (Ripple et al, 2014: Popp et al, 2010; Davidson, 2012)

**How big is the opportunity?**

* Modeling suggests that worldwide adoption of the Harvard Healthy diet (including modest consumption of meat) could reduce the cost of cutting emissions in the energy sector up to 2050, by 50%, and that under a global plant-based scenario, savings could be as great as 80%. (Stehfest et al, 2009)
* A recent review of mitigation opportunities in agriculture up to 2030, compared the Harvard Healthy diet scenario to actions in other sectors, and found it to have higher potential than any other option (Dickie et al, 2013)
* In its latest report, the IPCC (2014) has stated “changes in diet, reductions of losses in the food supply chain, and other measures could have a significant impact on GHG emissions from food production (0.76-8.55 GTCO2eq/yr by 2050)”

**What if we shifted our consumption?**

* Grass-fed beef can produce 60-70% more emissions and can require almost 80% more land (Capper, 2012)
* In 2009, 30% of marine stocks were over exploited, and another 57% were fully exploited, with only 13% exploited at less than their potential (FAO 2012)
* Meat or milk engineered in a lab is not a ‘silver bullet’. It may be an option in 10-20 years, and would likely have significantly less environmental impact, should people accept it (Tuomisto & Mattos, 2011)

**How can dietary change have an impact?**

* Meat contributes 37% to the food-related water footprint of an average American citizen (Mekonnen & Hoekstra, 2012)
* On average, for the same amount of protein, plant-based foods have a lower climate footprint and water footprint that animal foods (Ripple et al, 2014; Nijdam et al, 2012; Mekonnen & Hoekstra, 2012)
* Plant-based diets can have half the climate footprint of the typical US or UK diet (Scarborough et al, 2014; Heller and Keolian, 2014)
* Approximately 1 GtCO2eq worth of animal-foods are wasted along supply chains globally each year, equaling roughly 1/5 of the world’s agricultural land. In developed countries, most of this waste occurs after purchasing. (UNFAO 2011)