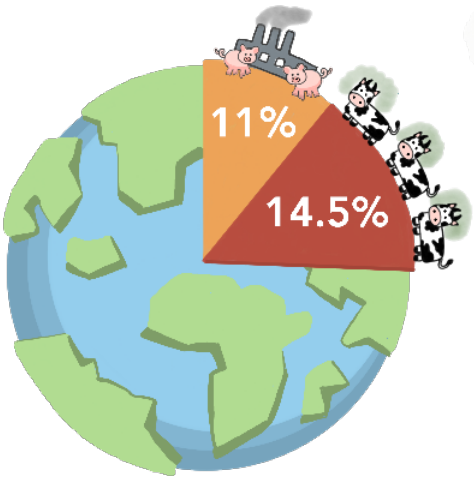
Food Systems & Agriculture

Authors: Sam Paton, Cameron Fioret
Editors: Manvi Bhalla, Christina DiCarlo, Taro Halfnight, Janaya Campbell

The production of food will have to keep up with our increasing global population. However, there are serious environmental impacts from plant and animal agriculture and food transport.

Although it feeds us, agriculture depletes resources and creates nutrient imbalances. Firstly, agriculture contributes to landscape deformation, deforestation, and decreased biodiversity, due to how much land is needed (1). To keep up with the growing global population, amounts of farmland will need to continually increase (1,2). Furthermore, farming uses huge amounts of water – the agricultural sector is responsible for about 70% of freshwater use worldwide (2). Lastly, large quantities of nitrogen fertilizers are used in crop production. Nitrogen from these fertilizers makes its way into surrounding rivers and streams, and eventually the ocean, where it triggers algae blooms that deplete nutrients and create 'dead zones' (3).

Agriculture contributes 11% of worldwide greenhouse gas (GHG) emissions from "mass-scale factory farming" and 14.5% from livestock; this includes the energy required to keep livestock alive, and the methane produced by the animals themselves (4,5). For example, cattle produce methane through the digestion of plant fibers, which is then released into the atmosphere though 'eructation,' more commonly known as burping (4). Of all meat products, red meat is responsible for the highest rates of GHG emissions. A study in *Environmental Science and Technology* found that dietary choices could be effective in limiting carbon footprints, as the authors found that changing our diets to include just one less day of red meat products, replacing with chicken, fish, eggs, or vegetable-based meals would be more effective at lowering GHG emissions than buying all locally sourced food (6).



Illustrated by Chloe Graham

Figure 1. *11% of worldwide GHG emissions are from mass-scale factory farming and 14.5% are from livestock (4). These emissions include the energy required to keep livestock alive and methane produced by the animals themselves (4, 5).*

Challenges to Food Production

While some areas of agriculture contribute to the climate crisis, others will suffer from it. Climate change will bring a number of challenges for Canada's farmers, including rises in the risk of flooding, higher summer temperatures, and frequency of extreme weather patterns, as well as severe drought and heat waves (7). Runoff from melting snow and ice can cause flooding, which could lead to infrastructure damage, soil nutrient loss, contamination of groundwater tables, increased erosion, and decreased water quality (8). Also, the unpredictability of the weather could lead to more bud kill in winter and frost in the growing season which would impact a crops ability to grow (8). On top of this, the increase in drought and heat waves will significantly decrease crop yields across the Prairie provinces and create difficulties for livestock farmers (7). Higher temperatures will also increase inland evaporation and could increase the number of pests, invasive species, and diseases, all of which are factors that will hurt, or even stop crop growth (8).

Many of our food systems (e.g. vegetable farming) rely on pollinators such as bees and butterflies, a group of insects which are very vulnerable to the impacts of climate change (9). According to a 2019 report, "evidence indicates that the primary drivers of bee declines are habitat loss, lack of forage, pesticides, and parasites", all of which climate change contributes to (9). Due to this, the climate crisis could be responsible for many species extinctions over the next 100 years if steps are not taken to protect these populations (9). Around 75% of crop production, and 90% of wild flowers, depend on pollinators, and their disappearance would wreak havoc on our food systems (10).

Solutions

While the land used for agricultural purposes amounts to only about 7% of Canada's total, the sector contributed to about 10% of national GHG emissions in 2013 (11). We have already seen how Canadian farms are at risk due to climate change. Several farmers in Canada are currently looking to implement sustainable farming practices, as recommended by the Intergovernmental Panel on Climate Change (IPCC) Climate Change and Land report (12), which suggests "soil-based carbon management," reduced deforestation, and lower rates of food waste (1). Canadian farmers are already working on carbon management, which means increasing the amount of organic carbon in the soil (the more carbon stored in the soil, the less there is in the atmosphere!), a practice which benefits both crop growth and the environment (12). Further, a Canadian House of Commons report in 2018 recognized the impacts of climate change to agriculture and the vulnerability of Canadian farmers to these changes. The report offers several recommendations for possible action, including continued support for related scientific research, increasing investment into sustainable and organic agriculture, and the development of programs that will help farmers adapt to effects (13). Agriculture in Canada is simultaneously contributing to, and being endangered by, the climate crisis. Many reports have discussed the potential damages, as well as potential solutions. It is evident that Canada needs to act to both reduce the environmental impact of our agriculture industry, as well as prepare farmers for the impending effects of a changing climate. Moving forward, the best strategy for this is to adhere to international guidelines for sustainable and resilient farming (1,12,13).

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