



Sustainability Advances in Saskatchewan Agriculture

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Thank you to my stakeholders



Economic sustainability drives adoption

Market incentives are more effective at changing behaviour than regulations

Sustainability – Economic or Environmental?

- Environmental sustainability is capturing headlines globally
- In 2022, the UN held conventions on climate change in Egypt and on biodiversity in Montreal – about 60,000 attended both
- Media and environmental NGOs increasingly fixated on improved environmental sustainability
- However, without economic sustainability, environmental sustainability improvement will be impossible
- If farmers aren't profitable, improvements in the environmental are a non-starter

EU Farm to Fork Strategy by 2030

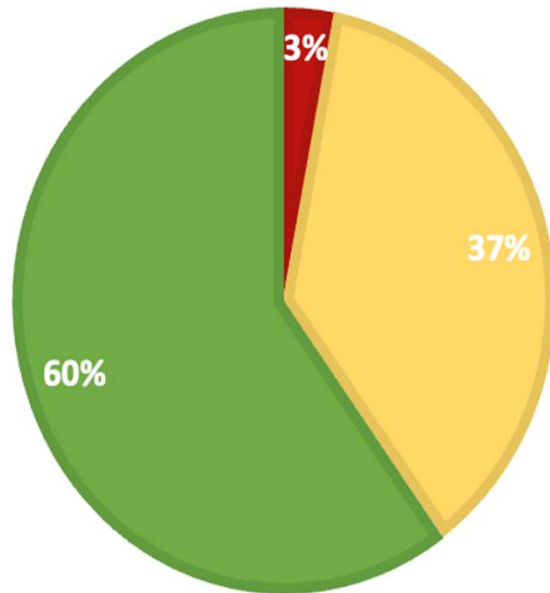
- Reduce the use and impact of pesticides by 50%
- Reduce fertilizers use – including animal manure – by at least 20%
- Increase organic farming to reach 25% of agricultural land, the current level is 8%
- Organic chemicals are far more toxic than synthetic ones, but will be exempt
- Not a single one of these strategies is based on any supporting empirical evidence

Source: https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

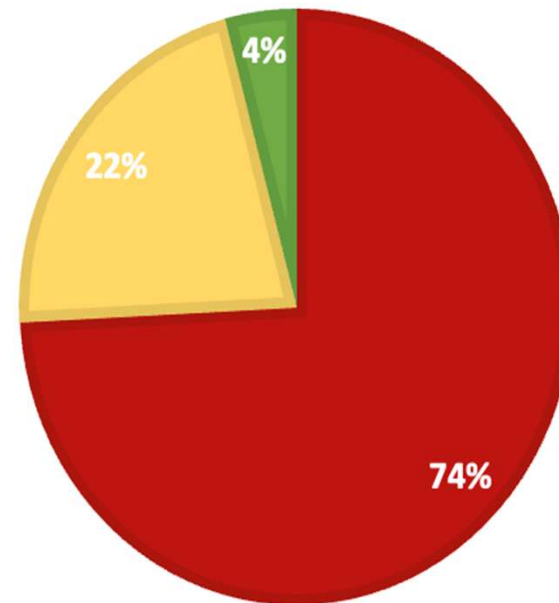


Tillage use: Sask vs EU

SASKATCHEWAN TILLAGE PRACTICES 2016-19



EU TILLAGE PRACTICES - 2016

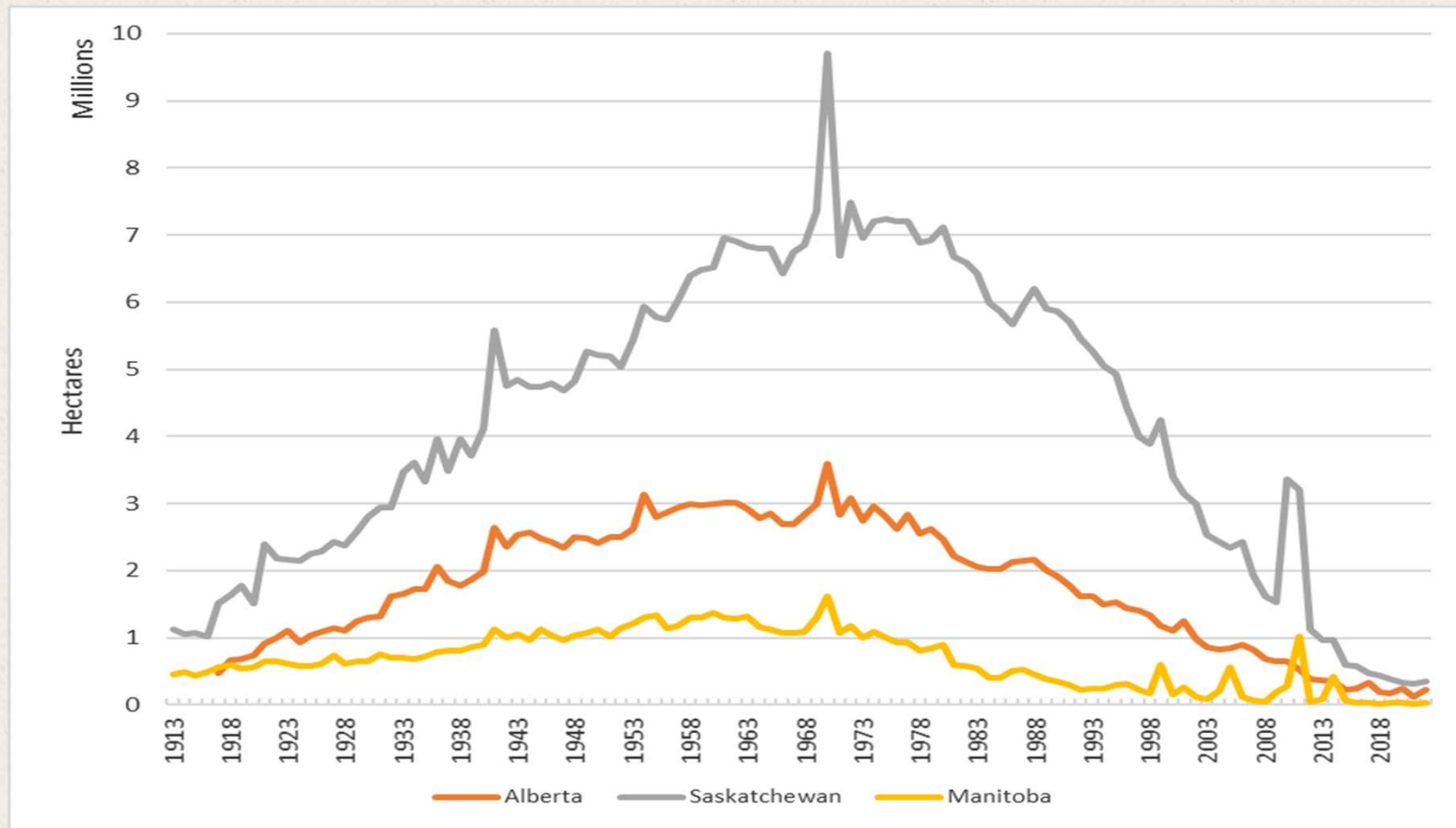


■ Conventional Tillage Ha ■ Minimum Tillage Ha ■ No-tillage Ha

SK Source: Sutherland et al. 2021. <https://www.mdpi.com/2071-1050/13/21/11679>

EU Source: Eurostat. 2020. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Figure1_Share_of_tillage_practices_in_the_EU27_2016.png

Prairie summerfallow hectares, 1913-2022



Source: Statistics Canada. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210035901>

Crop loss factors

Crop	Weeds	Insects	Plant disease	Total loss
Vegetables	8-13%	4-21%	8-23%	20-55%
Soybeans	10-37%	0-11%	40-60%	50-100%
Corn	50%	15-50%	8-14%	73-100%
Wheat	5-20%	5-20%	0-16%	10-56%
Canola	40%	10-50%	18-99%	68-100%
Range	5-50%	0-50%	0-99%	

- Left uncontrolled weeds, insects and disease can completely decimate the production of soybeans, corn and canola

Source: Smyth and Charlebois 2024. <https://www.tandfonline.com/doi/full/10.1080/21645698.2024.2318876>



Prairie GM crop adoption benefits - 2006

- 85% of the canola grown on the prairies utilized minimum or zero tillage
- 83% of producers experienced increased soil moisture
- 86% experienced a reduction in soil erosion
- 41% were seeding canola onto erodible land
- 95% of farmers reported that weed control improved or stayed the same following GM canola
- 75% of farmers reported that the management of herbicide resistance in weeds was less of an issue

Reference: Smyth et al. 2011. <https://www.sciencedirect.com/science/article/pii/S0308521X11000151>



Sustainability drivers

To what extent do you believe each of these technologies facilitated the adoption of reduced tillage and summerfallow? (1 = did not at all facilitate, 10 = played a major role in facilitating)

	HT Canola (n=95)	Glyphosate (n=95)	Other HT Crops (n=90)
Mean	7.3	9.1	5.3

What percentage of your land would include summerfallow management in the absence of HT crops?
(n=84)

Mean	24%
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Source: Sutherland et al. 2021. <https://www.mdpi.com/2071-1050/13/21/11679>



Sask fertilizer use changes – 1991-94 & 2016-19

Period	Crop yield (bu/ac)	Fertilizer applied (lbs/ac)	Crop acres (M)
1991-94	40	231	33.3
2016-19	51	467	40.5
Percent increase	28%	102%	22%

- Fertilizer use efficiency has increased 28%, all achieved by market signals without the need for regulation

Sask changes in fertilizer components

Period	Nitrogen (N)	Phosphorus (P)	Potassium (K)	Sulfur (S)	Total (lbs/bu)
1991-94	4.1	1.4	0.7	0.8	7
2016-19	5.3	1.8	0.8	1.3	9.2
Percent increase	29%	29%	14%	63%	31%

➤ A 30% reduction of nitrogen fertilizer emissions by 2030 is not, in any way, possible

Changes in fertilizer application

- From 1991-94, most fertilizer was applied as a pre-seed treatment or in conjunction with seeding
- The lack of equipment capable of in-crop application prevented fertilizers being applied at this time
- 45% of nitrogen applied was done post-harvest, increasing the potential to end up in watersheds
- From 2016-19, fertilizers are applied throughout the entire season, from pre-seed to post-harvest
- Nitrogen application – pre-seed (29%), with seed (27%), in-crop (13%) and post-harvest (31%)

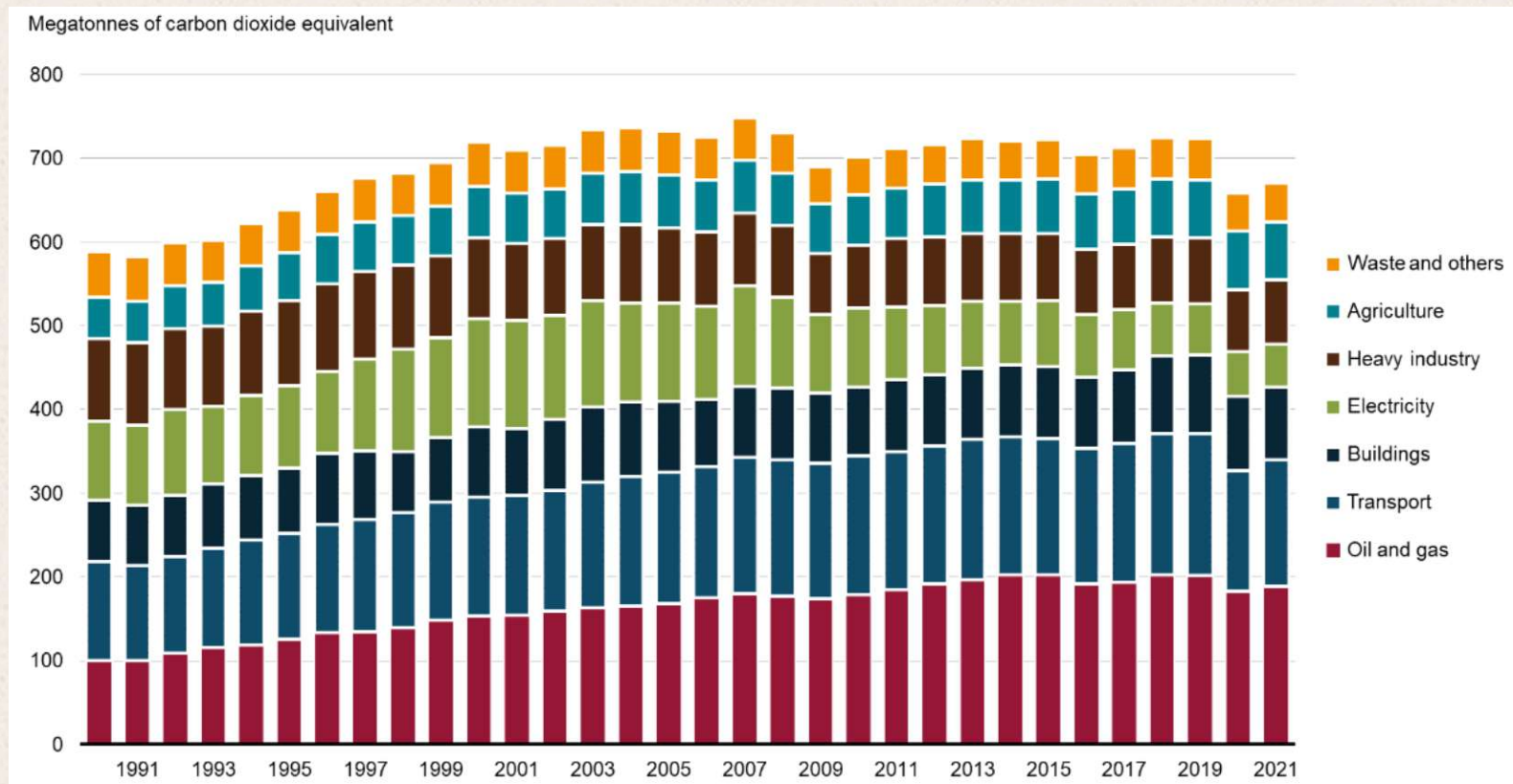
Reduced environmental impact of in-crop herbicides

Comparison	1991-1994	2016-2019	Percentage change
EIQ/acre	2,733	954	-65%
EIQ _{farmers} /acre	2,062	528	-74%
EIQ _{consumers} /acre	727	235	-68%
EIQ _{ecology} /acre	5,390	1,972	-63%
Grams of ai/acre	215	118	-45%

Source: Lika et al. 2024. <https://www.cambridge.org/core/journals/weed-technology/article/quantifying-changes-in-the-environmental-impact-of-incrop-herbicide-use-in-saskatchewan-canada/A46EE5D27D60B150C459E5487E906E66>

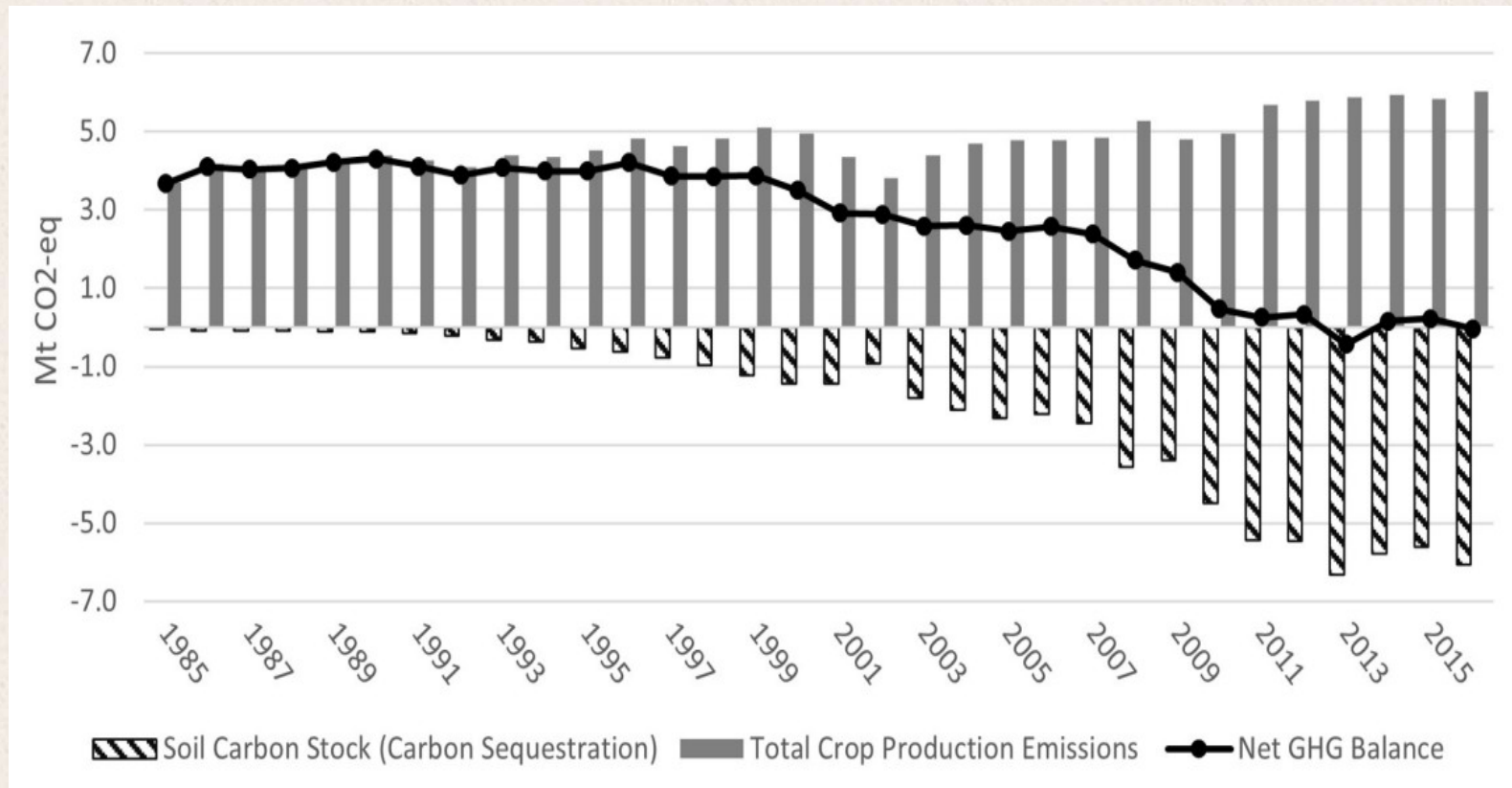


GHG emissions in Canada



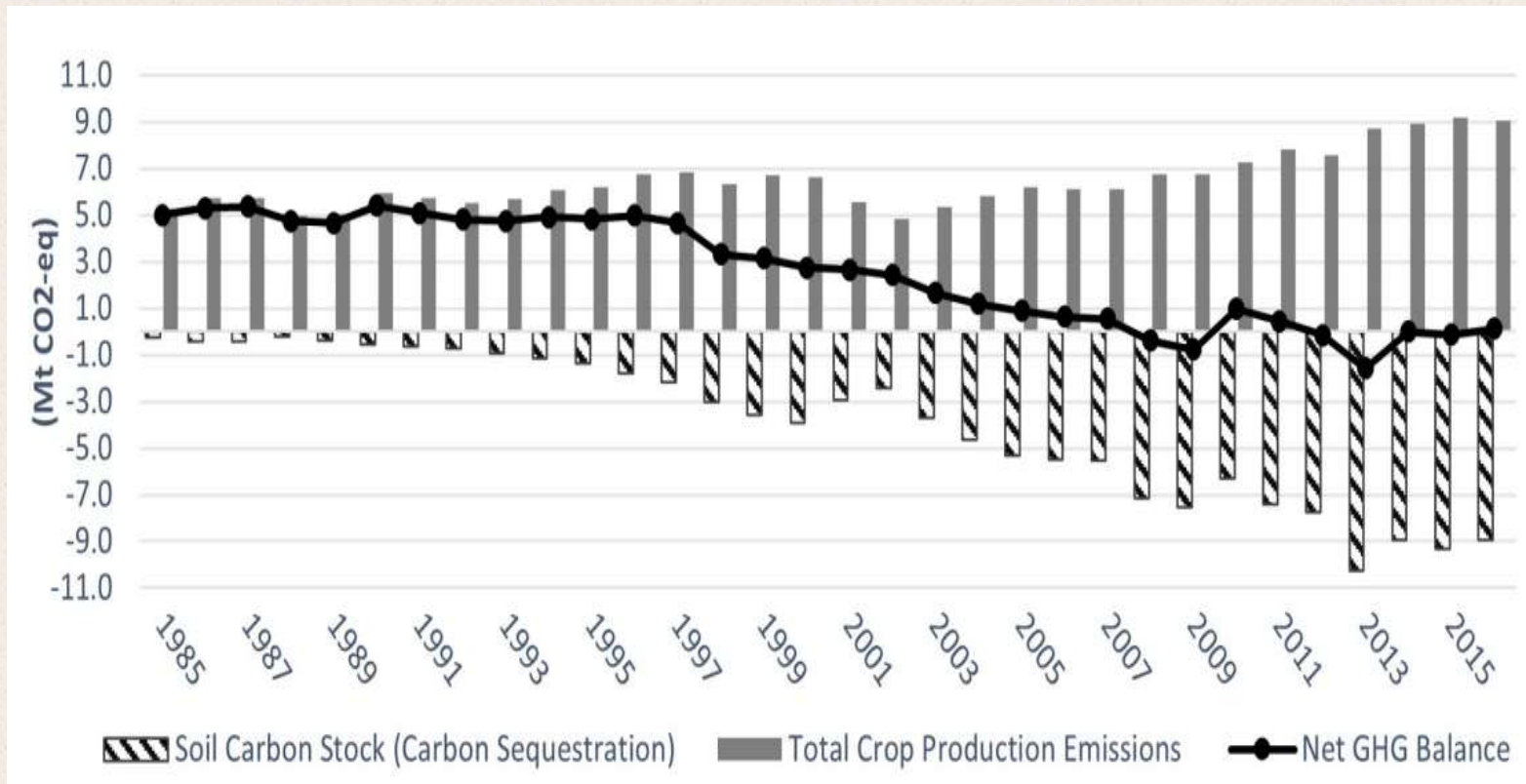
Source: ECCC 2023. <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>

GHG changes in Alberta crop production



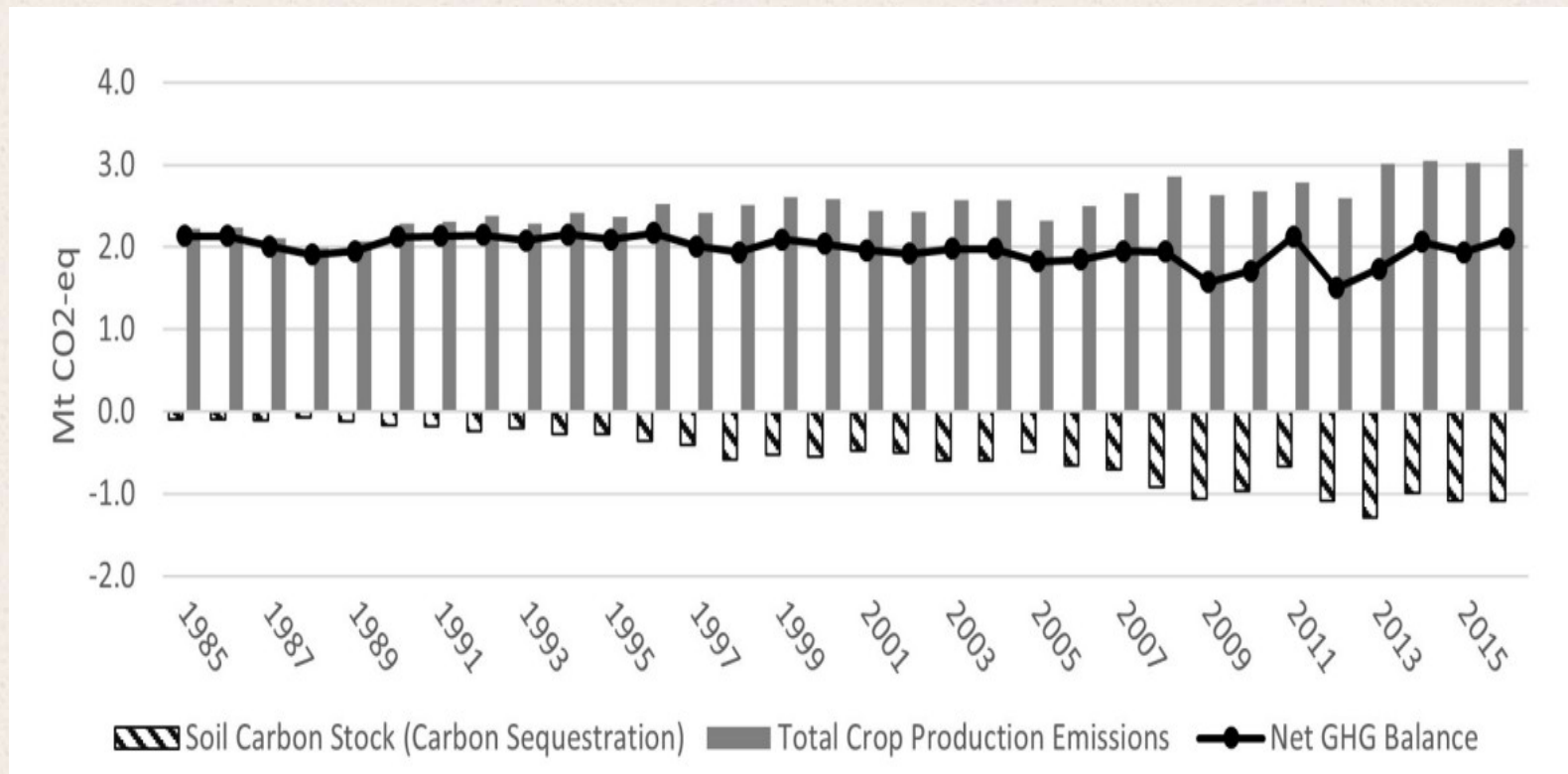
Reference: Awada et al. 2021. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0260946/>

GHG changes in Sask crop production



Reference: Awada et al. 2021. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0260946/>

GHG changes in Manitoba crop production



Reference: Awada et al. 2021. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0260946/>

Prairie agriculture and the Paris Accord

- The Paris Accord uses 2005 as the baseline for Canada's Paris commitment
- Net prairie emissions have decreased by 53% since 2005
- This surpasses the 30% requirements to achieve the 2030 target
- Prairie agriculture needs to be recognized for this significant achievement
- Tillage is commonly used in many other provinces

Reference: Awada et al. 2021. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0260946/>



Carbon smart agriculture

- Carbon is going to be an increasingly important market
- Through ECCC, Canada reports to the International Panel on Climate Change
- Prairie crop agriculture is a net carbon sink, yet gets no recognition for this
- If voluntary mandates aren't based on evidence, what happens when they can't be met?

Key take aways

- Crop production in the Canadian prairies is a global leader in sustainability
- Sustainability is driven by economics, not by regulation
- Evidence is crucial for policy, especially farm level data
- Canadian policy is based on evidence and policy makers require farm level data to ensure policies aren't influence by activist organizations
- Data collected by The Rack is an important part of the evidence communication with policy makers
- I encourage you to continue to contribute to helping improve evidence communication with policy makers





Thank you,
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