SEARCH FOR SOLUTIONS
Making Agriculture’s Carbon Footprint Smaller

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INTRODUCTION

- Agriculture is responsible for 18% of total GHG emissions worldwide (Food and Agriculture Organization of the United Nations)
  - This is more than the whole transportation sector’s emissions

- Agricultural practices lead to significant emissions of greenhouse gases, namely:
  - CO$_2$ and N$_2$O in crop production, due to use of machinery, yield-maximizing practices, and fertilizer use
  - CH$_4$ in the livestock industry, due to methane being a byproduct of ruminant digestion

- Several solutions have been posed to address these issues individually...
To help reduce the climate change impact of crop production, farmers can:
- Use intensive crop rotation
- Use nitrogen fixing crops, such as legumes
- Eliminate post-harvest waste

And consumers can:
- Support local agriculture

http://www.farmflavor.com/corn-life-cycle/
**CROP PRODUCTION SOLUTIONS**

- Intensive crop rotation helps reduce the effects of pests and disease and decreases land use
  - Legumes take N\(_2\) out of the air and convert it into nitrates
- Local agriculture reduces CO\(_2\) emissions from transport and provides resilience to climate change
- Reducing post-harvest waste reduces the amount of crops needed to be produced

http://www.extension.org/pages/64401/legume-inoculation-for-organic-farming-systems#.VjaPqGSrTiw
LIVESTOCK—OVERVIEW

- 1 cow produces the same amount of methane as 10,000 humans (BBC News)
- To help reduce the climate change impact of the livestock industry, farmers can:
  - Employ practices to make use of cow manure as an energy source or fertilizer, rather than as runoff

http://www.azula.com/one-simple-trick-stop-cow-farts/
Anaerobic digesters

- Convert the energy stored in manure into methane, allowing it to be used as an energy or fuel source for on and off-farm use
  - Solid and liquid byproducts may be used as bedding and fertilizer
  - Increase in environmental and social benefits

http://www.farmpower.com/Digester%20operation.html

www.dairydoingmore.org/environment/bioenergy/howdigesterswork
WEIGHING THE PROS AND CONS

- Despite the social and environmental benefits...
  - These solutions are expensive and adjustments to current practices can lead to less profit
  - More manual labor, more time consuming
    - Big businesses largely control the crop production industry, and generally place a higher emphasis on profit than carbon footprint
    - While many small farms would like to employ these solutions, they already are less profitable and therefore would struggle to meet the high initial costs
SUMMARY

- These methods would only be truly effective if adopted at a large scale or used in combination of each other.
- Maintaining the yield efficiency required to feed the human population (both directly and indirectly, as feed for animals) would be more difficult.
- Convincing farmers to adopt these methods would likely prove challenging without some form of government subsidization for using these practices.
- Agriculture will inevitably impact climate change, but these solutions may mitigate the damage and prove beneficial on both social and private scales in the long run.

BIBLIOGRAPHY

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