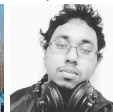
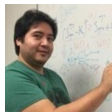
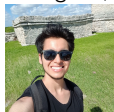


## Analysis of components of food production for sustainability in Canada



Chris Bunio, Cuneyt Akcora.

S. Moraga <sup>1</sup>, E. Pacheco <sup>2</sup>, T. Pender <sup>3</sup>, I. Vinícius <sup>4</sup>, S. Yeal <sup>1</sup>



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August 26, 2021

# Outline

- 1 Introduction
- 2 Problem
- 3 Why it matters
- 4 Results achieved
- 5 Data analysis

# TheoryMesh and food sustainability challenges

## A bit background

Co-founders:

- Chris Bunio (mentor), Paul Westdal, Sephanie Westdal, Anne Kirk.
- Started 2019.
- Increasing transparency in the food supply chain.

## Vision and Goals

- 1 Provide the platform to integrate data from first inputs to consumer purchase, creating a traceable, efficient and intelligent supply chain.
- 2 Certification.
- 3 Traceability.
- 4 Sustainability.

# Outline

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# The problem proposed

## Expectations

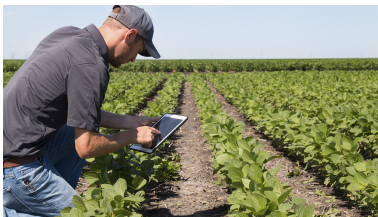
TheoryMesh's goals from the PIMS can be presented as:

- Model and predict the environmental impact from agricultural practices.
- Complement the current TheoryMesh system.
- Combine both systems to measure and predict sustainability levels of products and companies.

# Outline

- 1 Introduction
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## Impact on production and producers



- From data to information.
- Decisions driven by real time analysis.
- A plan of action based on accurate data.
- Identifying trends that could turn into profit.

# Outline

- 1 Introduction
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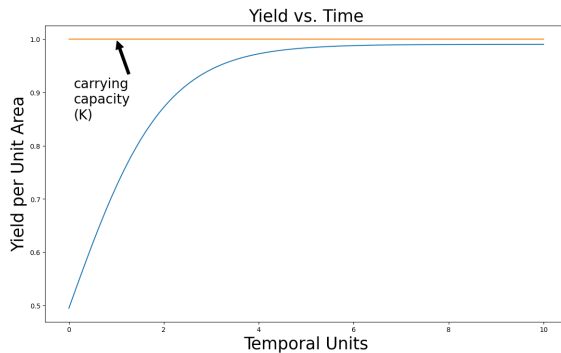


## Availability of information for producers



- Information is power.
- Currently, the relevant information resides in technical journals that is penetrable only for researchers and experts in the field.
- Needs to be available/intelligible to producers.
- The general sentiment conveyed by industry participants:
  - There needs to be a change in the way that information is disseminated.
  - It used to be that the when/where/how questions of crop production were passed by word of mouth: “Do this because it has always worked.”
  - This is no longer tenable with the rapidly changing climate/environmental conditions.
  - Over the coming decades that will span a contemporary producer’s career, they will invariably need to adjust their approaches.

## What can be gleaned from the data?



- $K = K(x_1, x_2, \dots, x_n)$ , where no  $x_i$  is a temporal variable.

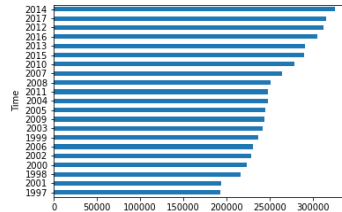
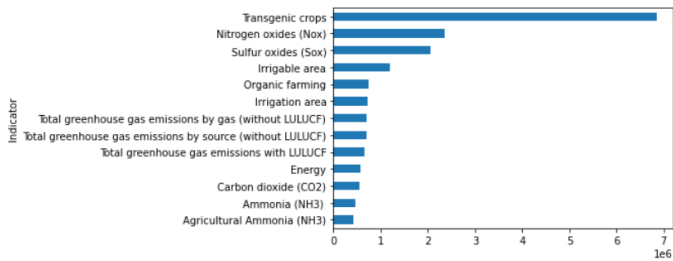
# Factors Affecting $K$



# Outline

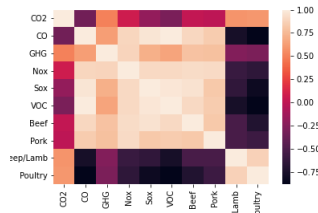
- 1 Introduction
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# Environmental impact Canada: Amount of indicators from 1984-2017

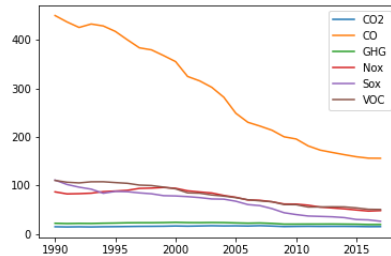
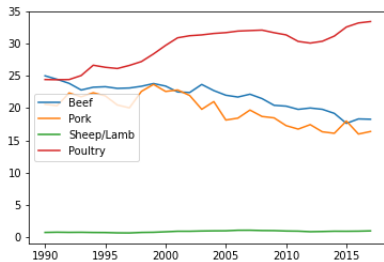


# Correlation between Greenhouse gases and farms

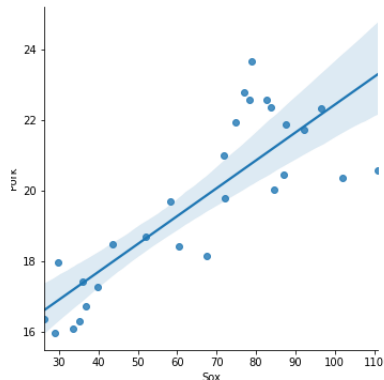
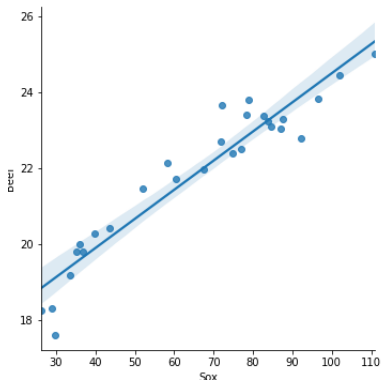
	CO2	CO	GHG	Nox	Sox	VOC	Beef	Pork	Sheep/Lamb	Poultry
CO2	1.00	-0.34	0.50	0.07	-0.19	-0.30	0.02	-0.00	0.59	0.60
CO	-0.34	1.00	0.63	0.89	0.97	1.00	0.90	0.84	-0.77	-0.88
GHG	0.50	0.63	1.00	0.89	0.71	0.66	0.80	0.79	-0.26	-0.29
Nox	0.07	0.89	0.89	1.00	0.91	0.91	0.93	0.91	-0.60	-0.65
Sox	-0.19	0.97	0.71	0.91	1.00	0.97	0.95	0.83	-0.64	-0.82
VOC	-0.30	1.00	0.66	0.91	0.97	1.00	0.91	0.85	-0.77	-0.88
Beef	0.02	0.90	0.80	0.93	0.95	0.91	1.00	0.82	-0.52	-0.72
Pork	-0.00	0.84	0.79	0.91	0.83	0.85	0.82	1.00	-0.53	-0.58
Sheep/Lamb	0.59	-0.77	-0.26	-0.60	-0.64	-0.77	-0.52	-0.53	1.00	0.87
Poultry	0.60	-0.88	-0.29	-0.65	-0.82	-0.88	-0.72	-0.58	0.87	1.00



# Growth farming and agriculture

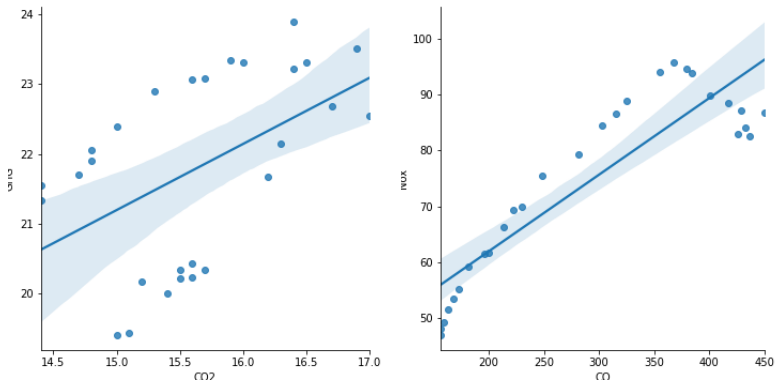


## Correlation Beef-Sox and Pork-Sox





## Correlation GhG-Co2 and Nox-CO



## Closing remarks

- There is a big opportunity to do more research about the challenges of food production.
- There is evidence that variables are strongly correlated.
- It is an important first step to look at sustainability.
- Still open challenges to tackle: certification and traceability.

## References



DMCI STRATEGIES, D. McInnes (2003), Agri-food sustainability targets. A selected overview,



OECD PUBLISHING, K. Parris et-al. (2010), Sustainable management of water resources in agriculture.