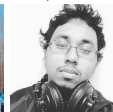


Analysis of components of food production for sustainability in Canada



Chris Bunio, Cuneyt Akcora.

S. Moraga ¹, E. Pacheco ², T. Pender ³, I. Vinícius ⁴, S. Yeal ¹



¹Department of Mathematics. Simon Fraser University. Canada. ²Department of Mathematics and Statistics, University of Calgary.

³Department of Mathematics and Computer Science, University of Lethbridge. ⁴Department of Mathematics, University of British Columbia

August 26, 2021

Outline

- 1 Introduction
- 2 Problem
- 3 Results achieved
- 4 Data analysis

TheoryMesh and food sustainability challenges

A bit background

Co-founders:

- Chris Bunio (mentor), Paul Westdal, Stephanie 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

- 1 Introduction
- 2 Problem**
- 3 Results achieved
- 4 Data analysis

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.

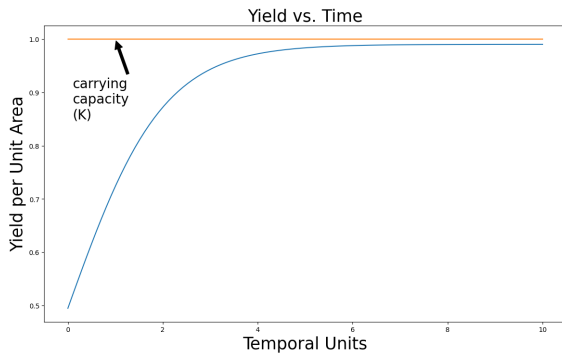
Impact on production and producers

- From data to information;
- The impact on consumers

Outline

- 1 Introduction
- 2 Problem
- 3 Results achieved**
- 4 Data analysis

What can be gleaned from the data?

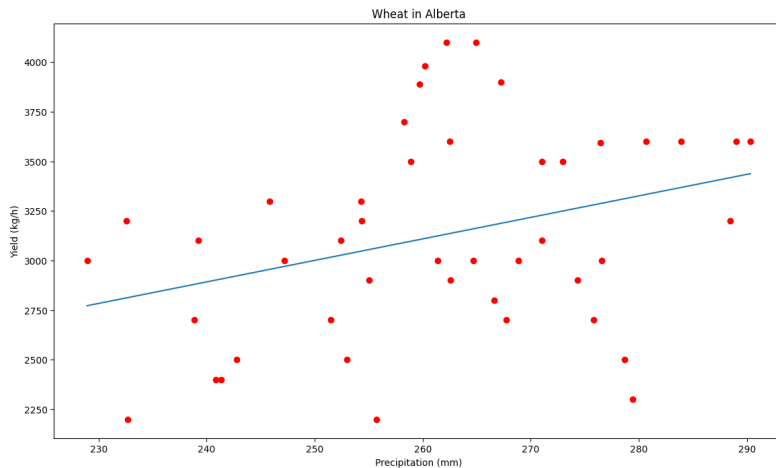


- $K = K(x_1, x_2, \dots, x_n)$, where no x_i is a temporal variable.

Factors Affecting K



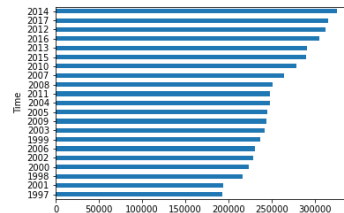
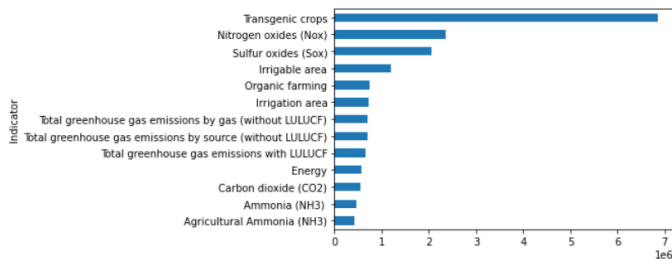
Yield vs. Precipitation in Alberta



Outline

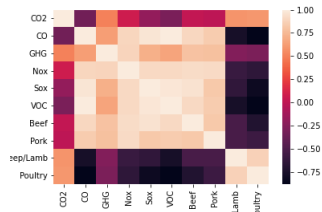
- 1 Introduction
- 2 Problem
- 3 Results achieved
- 4 Data analysis**

Environmental impact Canada: Amount of indicators from 1984-2017

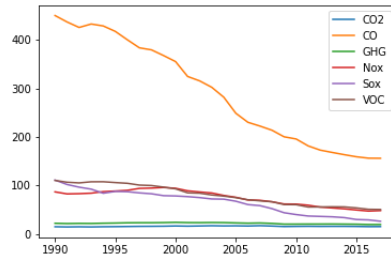
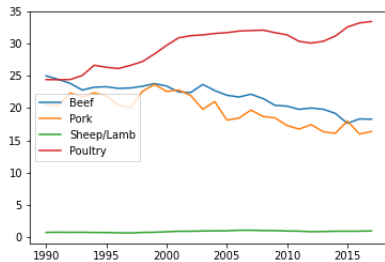


Correlation between Greenhouse gases and farms

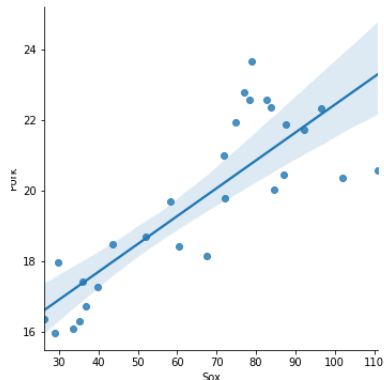
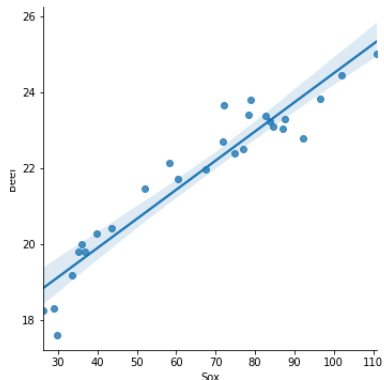
	CO2	CO	GHG	Nox	Sox	VOC	Beef	Pork	Sheep/Lamb	Poultry
CO2	1.00	-0.34	0.50	0.07	-0.19	-0.30	0.02	-0.00	0.59	0.60
CO	-0.34	1.00	0.63	0.89	0.97	1.00	0.90	0.84	-0.77	-0.88
GHG	0.50	0.63	1.00	0.89	0.71	0.66	0.80	0.79	-0.26	-0.29
Nox	0.07	0.89	0.89	1.00	0.91	0.91	0.93	0.91	-0.60	-0.65
Sox	-0.19	0.97	0.71	0.91	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



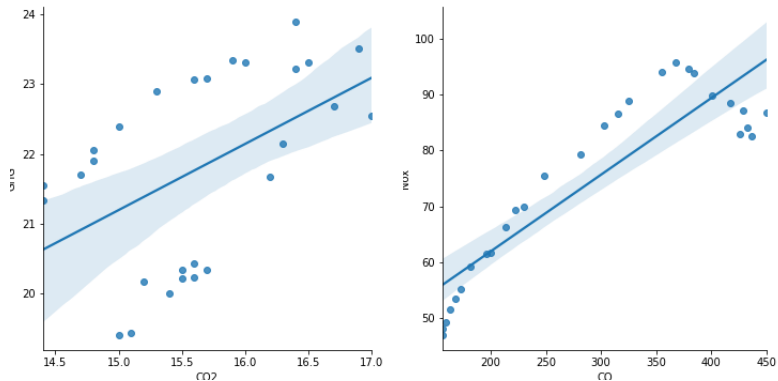
Growth farming and agriculture



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.