

A Systems Approach to Organic Agricultural Production

With Dr. Martin Entz,
Natural Systems Agriculture Lab, U of M

**Taking stock of farm resources
to optimize organic production
&
Planning processes**





- Investment platform established to develop organic agriculture and marketing in the Canadian Prairies
- Builds resilience in the sector by investing in
 - organic provincial associations (Capacity Fund); and
 - high impact programs (Innovation Fund) related to marketing, research, policy, education and capacity development that have broad public benefit to the organic sector.



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The Canadian Organic Ingredient Strategy is funded by



www.organicdevelopmentfund.org

Martin Entz, PhD

Professor of Cropping Systems, Natural Systems Agriculture Lab, University of Manitoba

Martin Entz is professor in the University of Manitoba's Plant Science department where he leads the Natural Systems Agriculture lab. He received his PhD from the University of Saskatchewan in 1988 and worked as a farm manager and research agronomist before embarking on his academic career.

"The goal of my program is to discover new ways of farming ecologically; to empower farmers with knowledge to design organic and ecological farming systems adapted to where they live; and to engage students in this exciting process". He leads the Glenlea study – Canada's oldest organic-conventional farming systems comparison study, which is in its 32nd season.

In 2011, Martin started Canada's first farmer participatory wheat and oat breeding program focussed on organic production. "Farmer involvement is an important part of my research program."

Martin teaches courses in crop production and often hosts field-based "Summer Institutes" on sustainable agriculture.

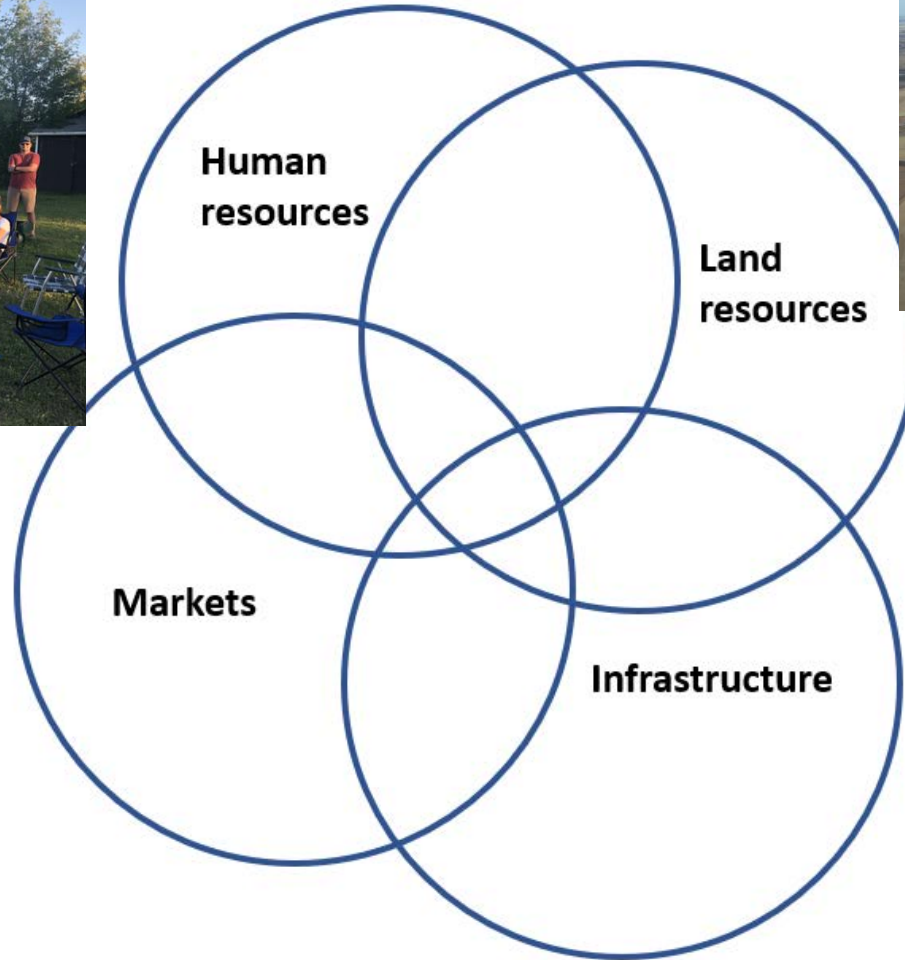
Martin has led agricultural projects in Central America and Zimbabwe, and his lab is currently engaged in "Nature-positive agriculture" in East Africa.



Part 1. Farm resources to optimize organic production



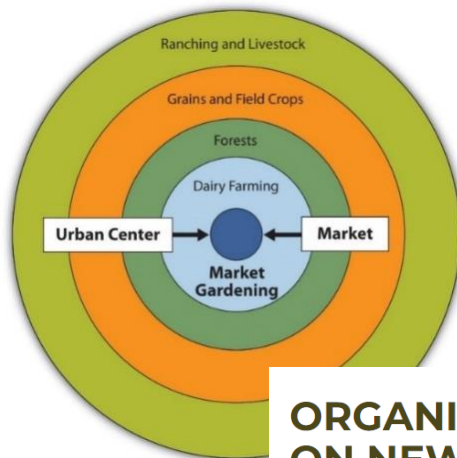
Family



Soil, landscape,
water



Machinery

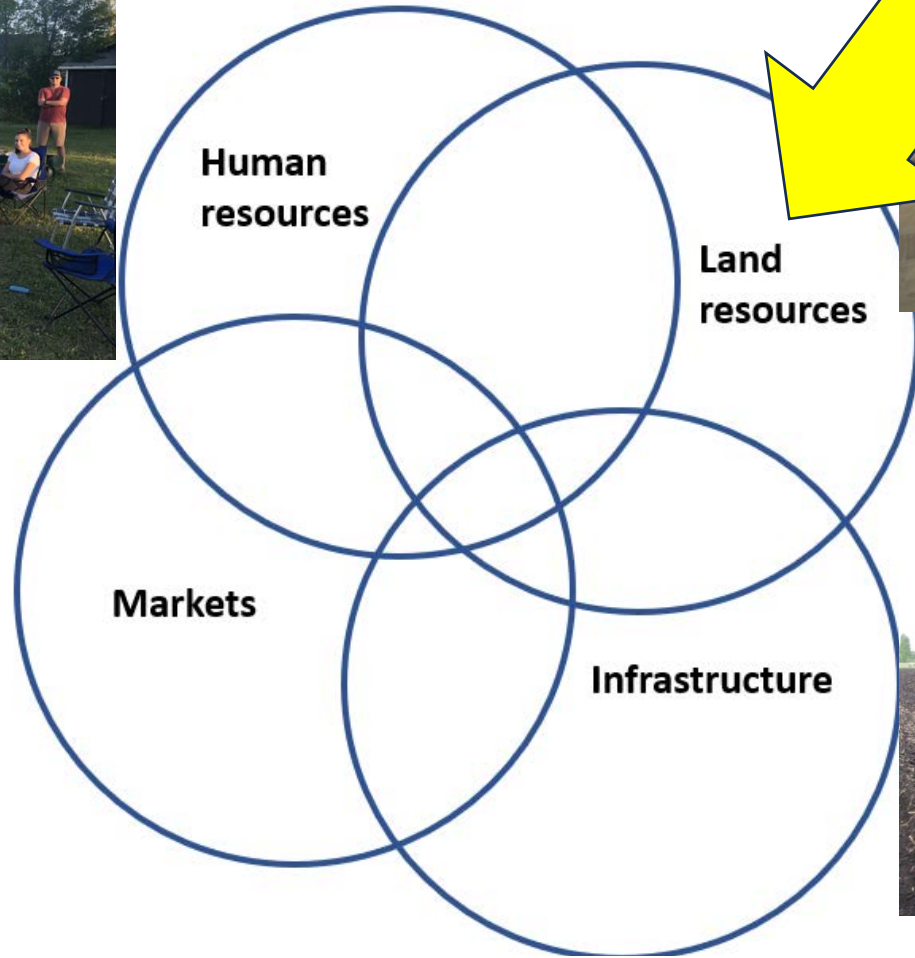


**ORGANIC PRICING LIMITED AS TRADE WAITS
ON NEW CROP**

Farm resources to optimize organic production



Family



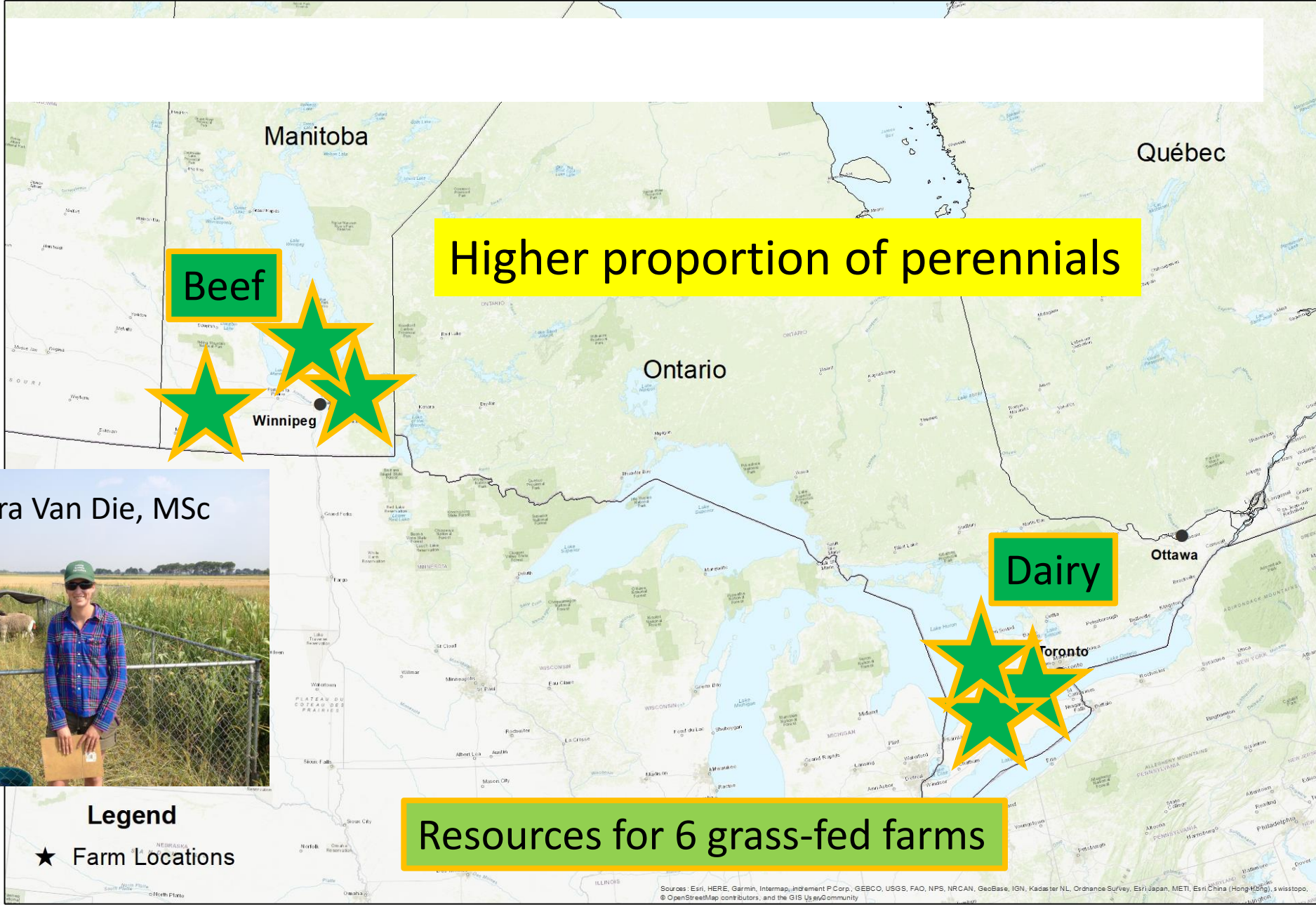
Soil, landscape, water

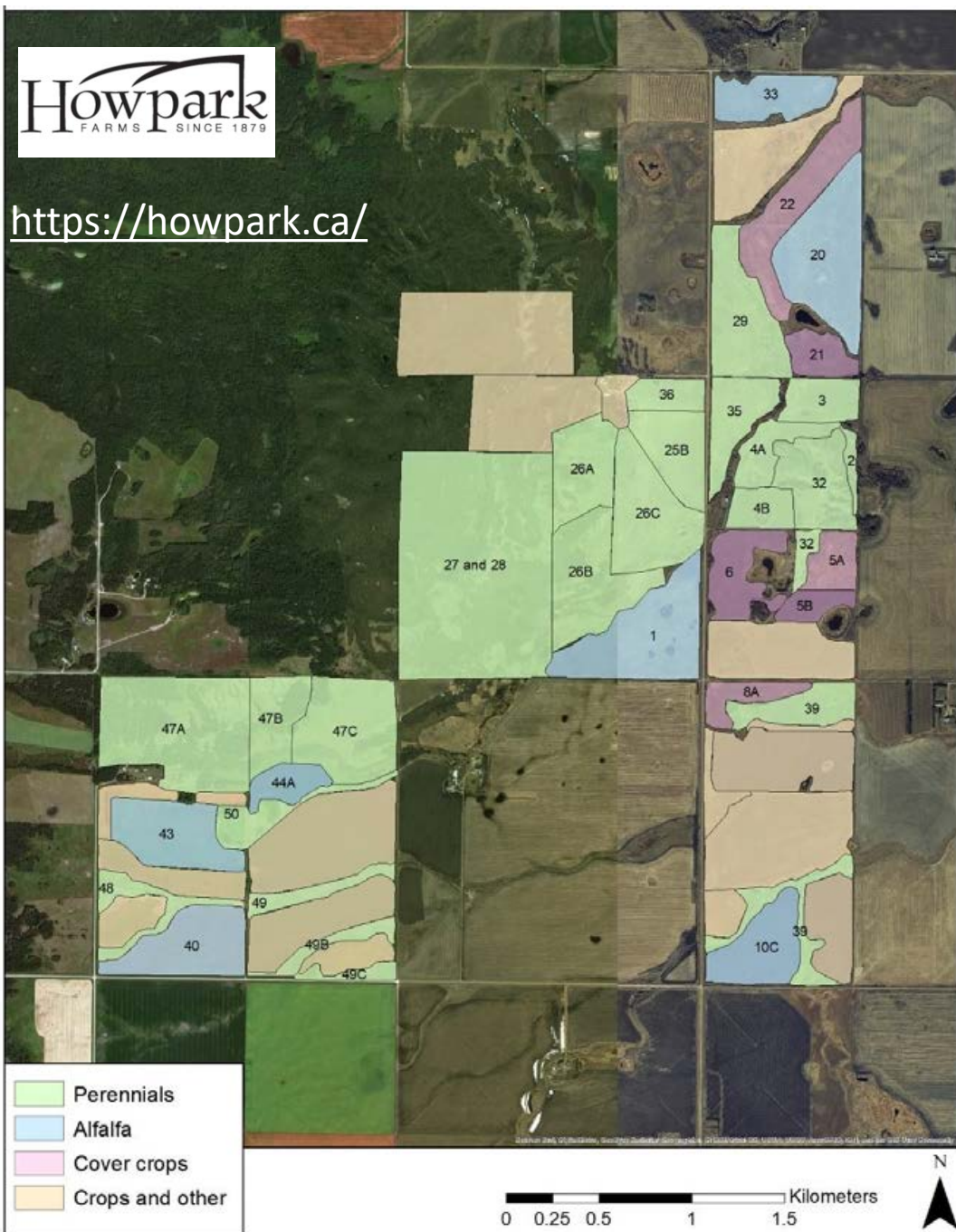


Machinery



ORGANIC PRICING LIMITED AS TRADE WAITS ON NEW CROP



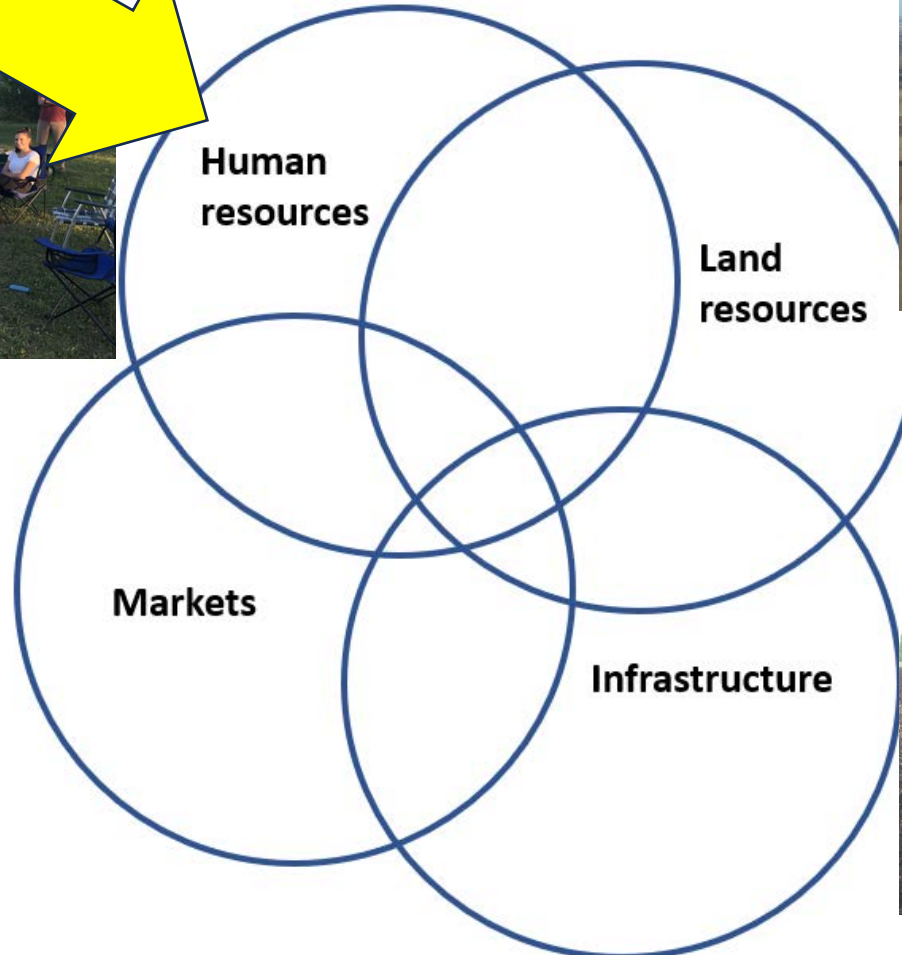


- Perennials used for beef production
 - ~417 ha total (green)
 - Including both tame and native pastures
- 8 year organic crop rotation
 - 3 years of alfalfa (blue) - Flax, oat, green manure (purple), wheat, rye (yellow)
- Crop-livestock integration
 - Hay harvested from alfalfa fields and along ravines
 - Cattle graze green manure
 - Composted cattle manure

Farm resources to optimize organic production



Family



Soil, landscape, water



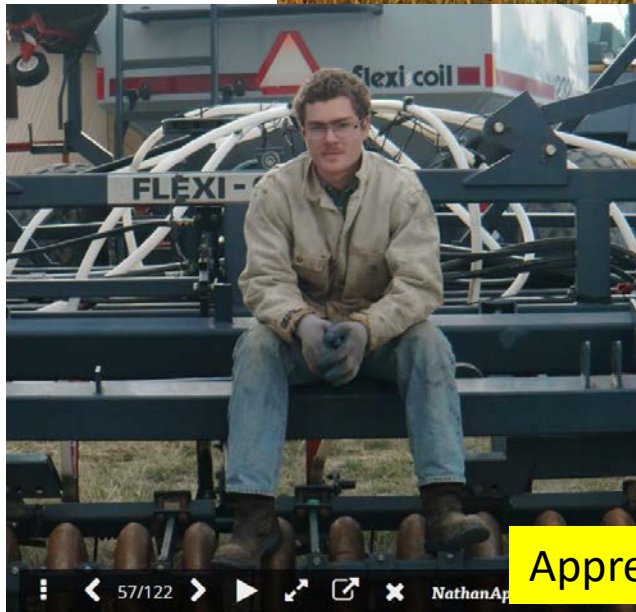
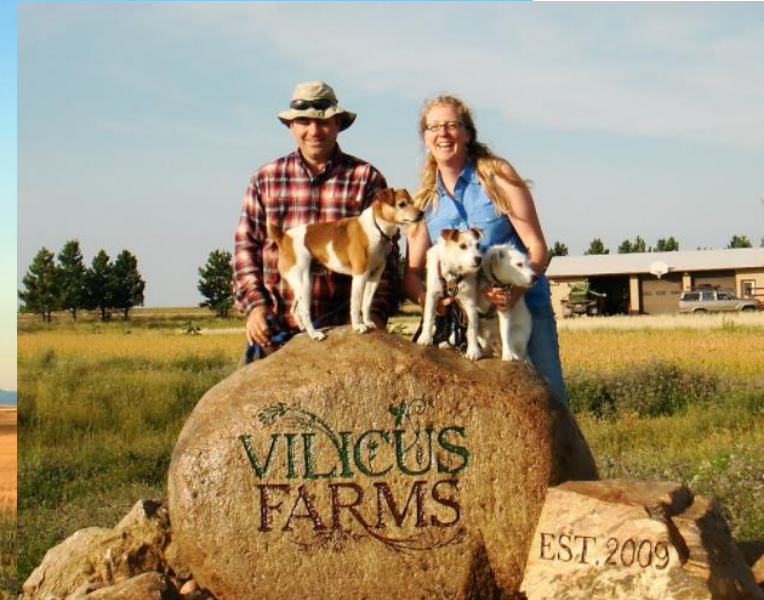
Machinery



ORGANIC PRICING LIMITED AS TRADE WAITS ON NEW CROP

Vilicus Farms, Montana Building a Farmily

<https://vilicusfarms.com/>



Apprentices on organic farms adds to labour and knowledge pool

LaurelApprentice



How to combat the sexism faced by women farmers

Published: August 19, 2020 3.28pm EDT

Women farmers say they face sexism and dismissiveness, and are expected to juggle farm work with caregiving. (Piqsels)

<https://theconversation.com/how-to-combat-the-sexism-faced-by-women-farmers-143666#:~:text=Finally%2C%20we%20recommend%20training%2C%20networking,food%20%E2%80%94%20and%20that%20benefits%20everyone.>

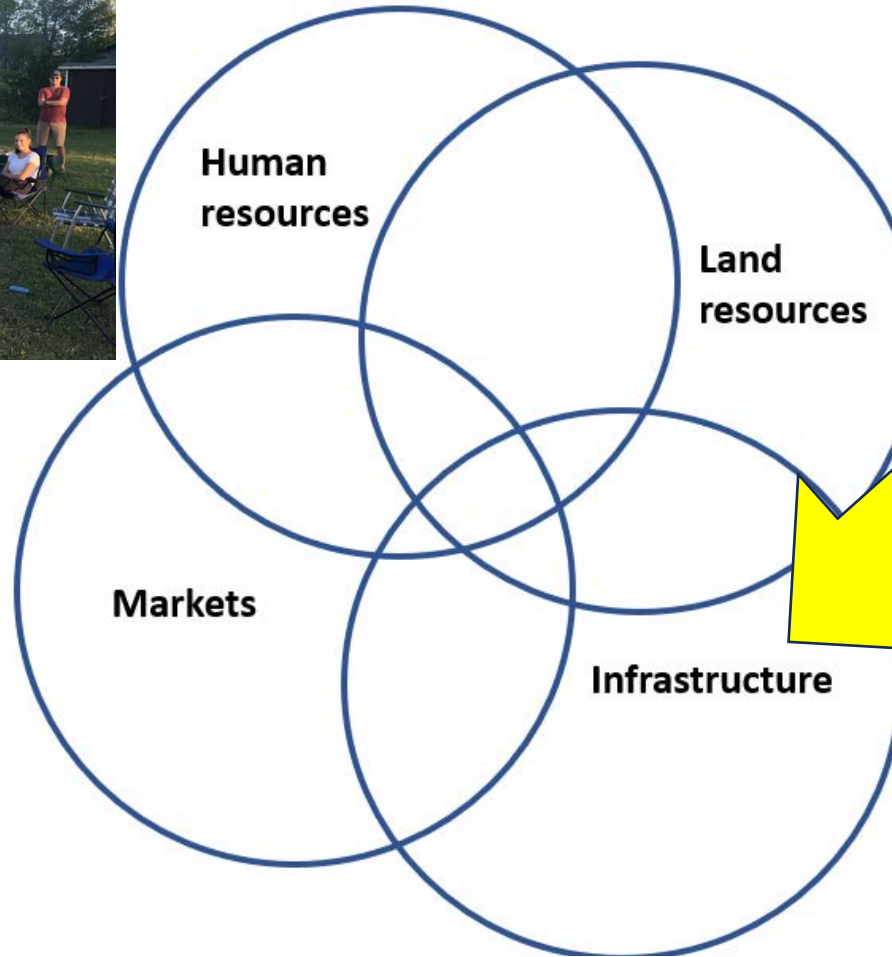
Farm resources to optimize organic production



Family



Land resources



Human resources

Markets

Infrastructure

Soil, landscape, water



Machinery



ORGANIC PRICING LIMITED AS TRADE WAITS ON NEW CROP

Infrastructure and Enterprises

- what should come?
- what should go?



Farm resources to optimize organic production



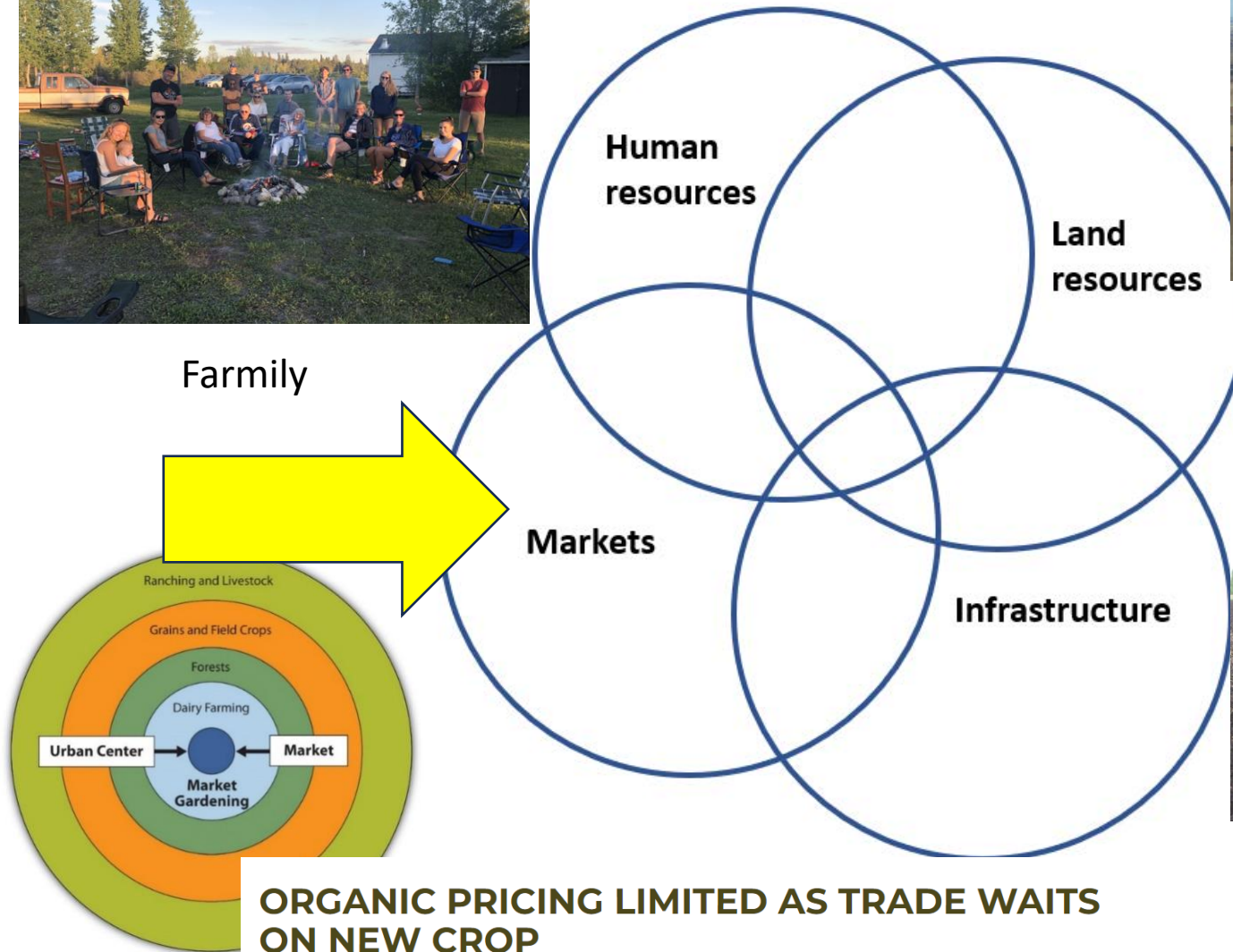
Family



Soil, landscape, water



Machinery

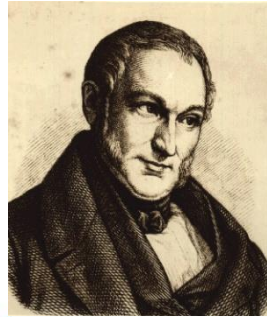


ORGANIC PRICING LIMITED AS TRADE WAITS ON NEW CROP

Markets



1783 – 1850

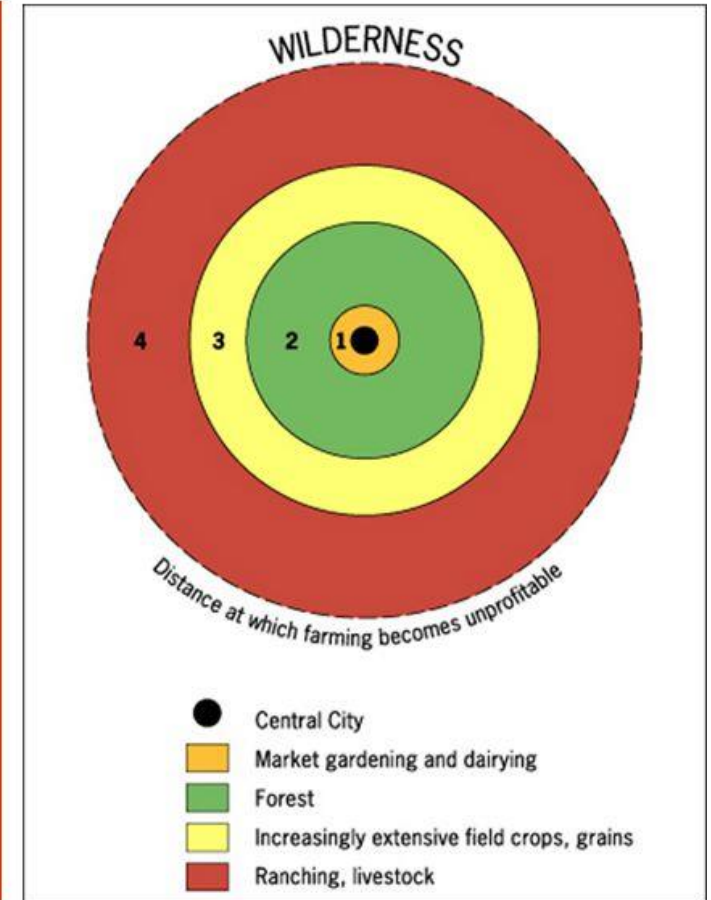


Thünen developed the basics of the theory of marginal productivity in a mathematically rigorous way, summarizing it in the formula in which R = land rent; Y = yield per unit of land; c = production expenses per unit of commodity; p=market price per unit of commodity; F = freight rate (per agricultural unit, per mile); m=distance to market.

$$R = Y (p - c) - Y F m$$

Von Thunen Model

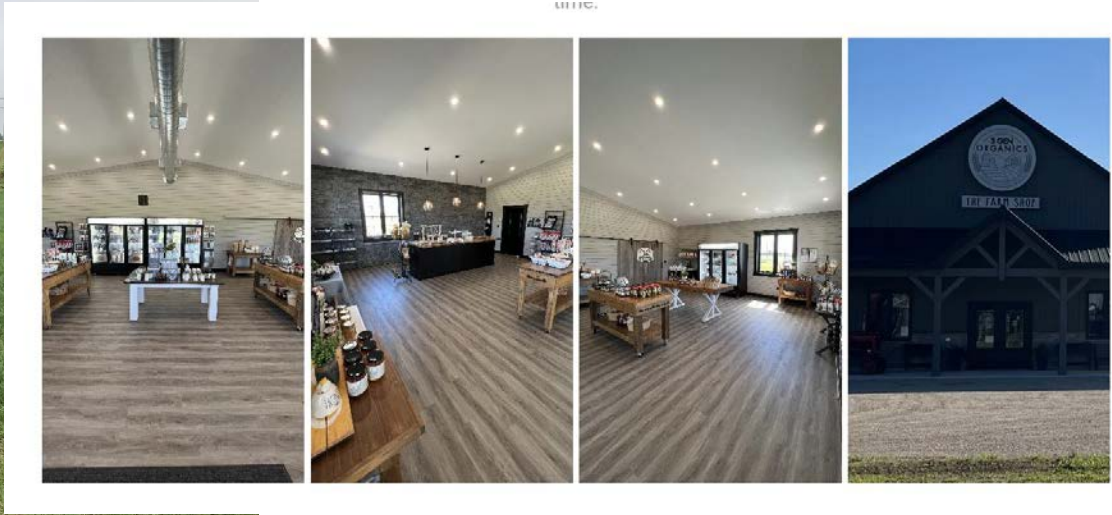
- Von Thunen Model
 - What farmers produce varies by distance from the town, with livestock raising farthest from town.
 - Cost of transportation governs use of land.
 - First effort to analyze the spatial character of economic activity.





3Gen Organics

Family Farm Fresh



<https://www.youtube.com/watch?v=cIDs9xp3OHw>

<https://www.3genorganics.ca/>

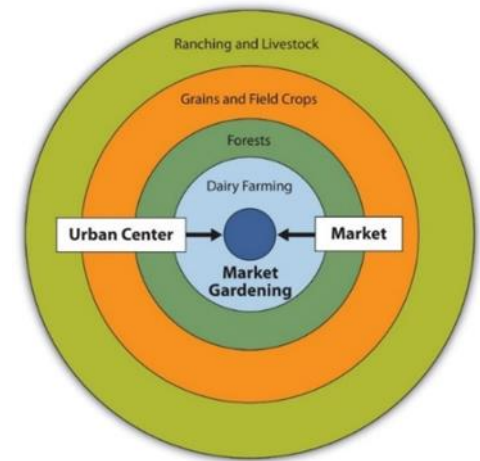
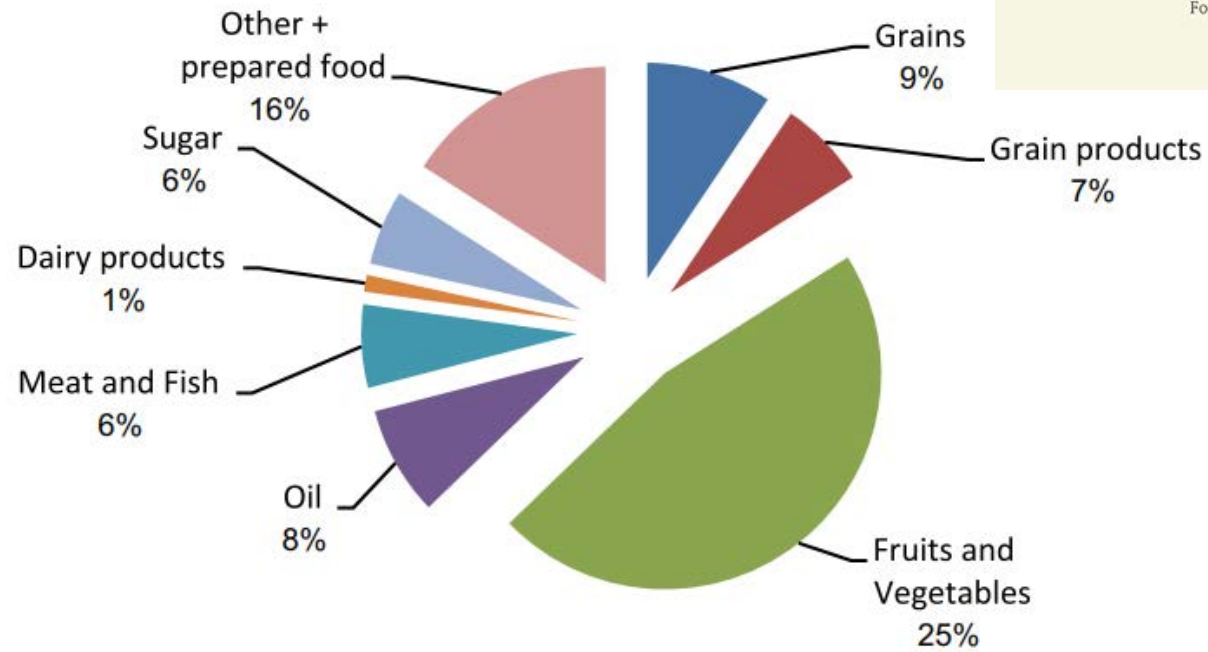
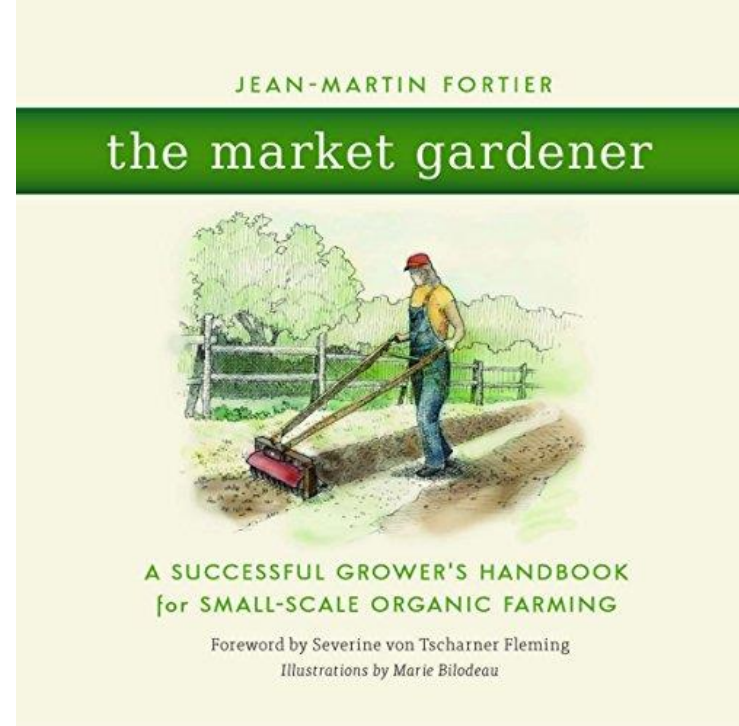
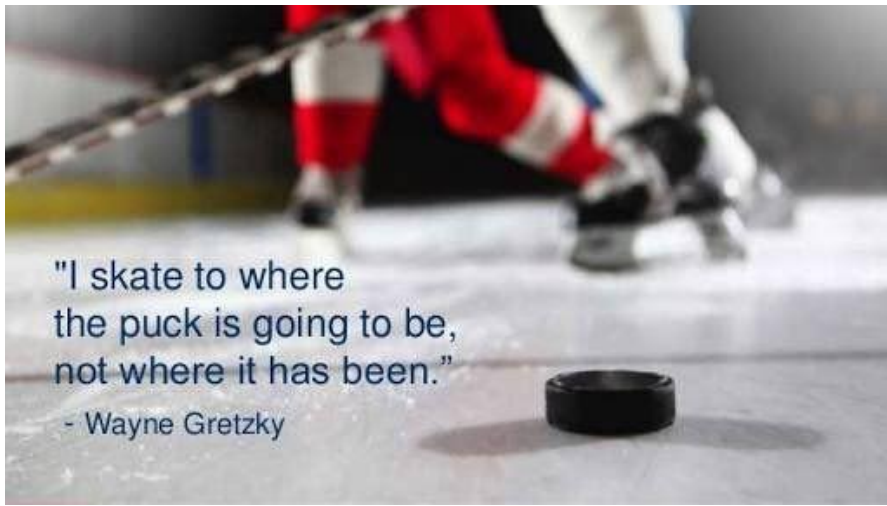
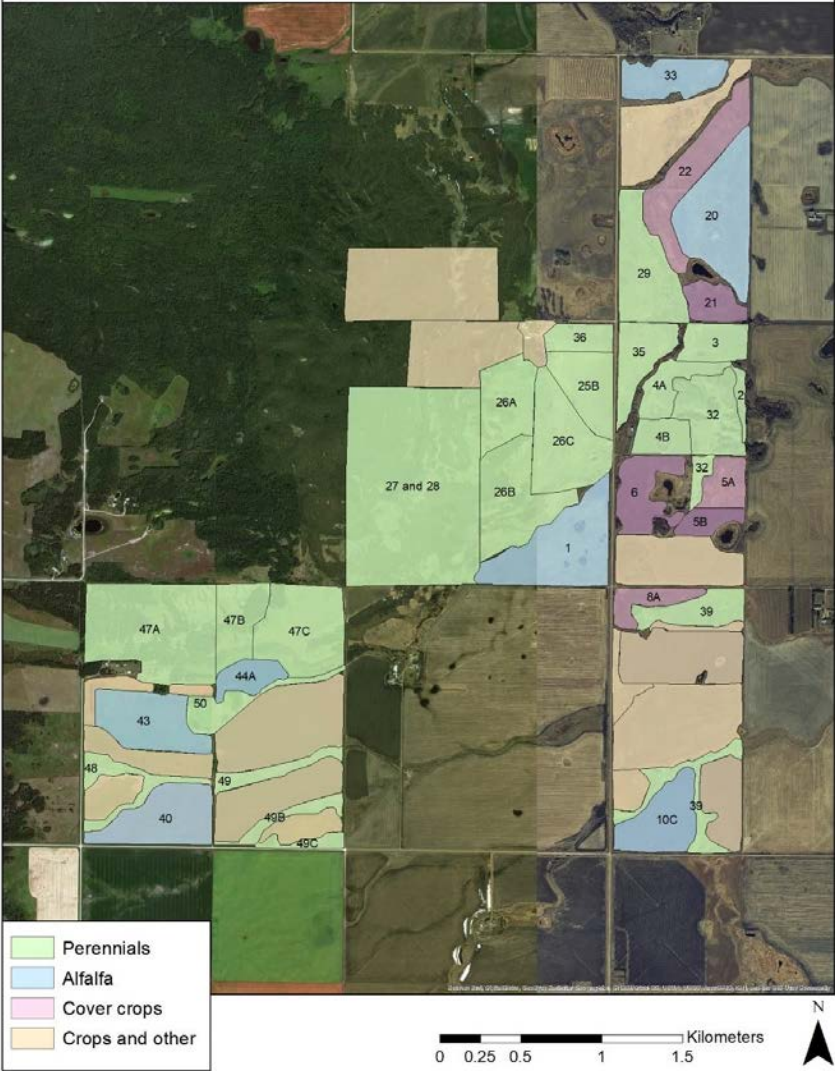


Fig. 1. Canada's food miles related CO₂ emissions by specific food group.

Edible buffer zones – Fruit trees



What would it take?



Flax, pulses could reduce health care costs: researcher

MARKETS | Canada's health care costs keep rising, but better health could reduce that trend

By GERALYN WICHERS
CO-OPERATOR STAFF

Diets supplemented with flaxseed and pulses can reduce risk of certain diseases and thus curtail Canada's health care spending.

That was the message presented to attendees of the Manitoba Sustainable Protein Research Symposium in Winnipeg June 21.

The speaker was Luc Clair, a health economist and principal investigator with the Canadian Centre for Agri-Food Research in Health and Medicine. He studies potential health care savings of food-based health interventions. The centre is a federal research group based in Winnipeg.

"If we can make people healthier, then we can reduce the demand for health care services," said Clair.

■ WHY IT MATTERS

Canada was on track to spend about \$331 billion on health care last year, according to a November 2022 report from Health Information.

Spending is rising year over year, Clair said, with chronic diseases like diabetes (and blood pressure) and heart disease is a result of higher disease rates and partly due to an aging population. That population is also aging, with the number of people aged 65 and over reaching 13.8 per cent of the population in the first year of the pandemic, according to the Canadian Institute for Health Information. That, however, the nation spent 1.5 per cent of its GDP between 2010-19. That is up from 1.2 per cent of GDP from 1990-99. The average age of Canadians in 2022, 39 years older than in 1990, and that one in five Canadians was 65 or older.

To reduce health care spending, we need to do it, Clair said.

Functional foods like pulses or flaxseed could be used as supplementary treatments along with pharmacological options.

Incorporating pulses into a diet has been shown as an effective strategy to reduce cardiovascular disease, according to Clair. He pointed to one study that showed pulses could slow the progress of peripheral artery disease or begin to reverse it.

Using that study and provincial data, Clair said he did a "cost of illness" analysis where he estimated the cost of peripheral artery disease to Manitoba and the potential savings if people with the disease ate half a cup of pulses per day.

He estimated this would reduce public costs by nearly \$566,000 per year.

"Not huge, but certainly helpful," he said.

Clair cited other research that estimated eating 100 grams of pulses per day could result in \$6.2 million in annual savings for Canada for expenses related to type 2 diabetes.

Another study, published in 2015 by *Frontiers in Pharmacology*, showed that an increase of one gram of dietary fibre per day could reduce costs in Canada related to type 2 diabetes by up to \$51 million and costs related to cardiovascular disease by up to \$92 million.

Clair also did a cost of illness study that examined savings across Canada if those diagnosed with hypertension adopted a flax-based treatment.

According to Health Canada, 40 grams of ground, whole flaxseed per day has been shown to reduce cholesterol. Clair's analysis suggested such a flax-based treatment in those with hypertension could save up to \$291 million annually in health care costs.

"Incorporating healthful plant-based foods into your diet can help reduce the risk of chronic disease, which then reduces the demand for health care services, which then reduces health care costs," the researcher said.

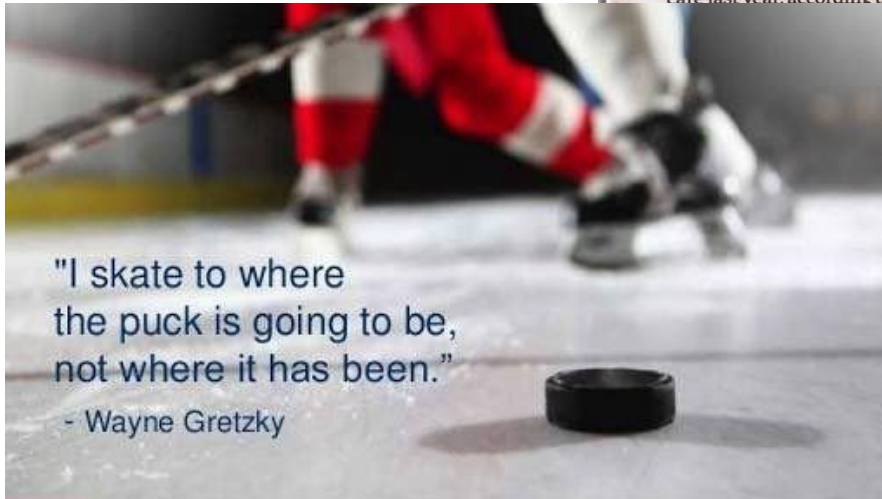
Gwichers@farmmedia.com @geralynwichers



Health economist Luc Clair speaks at the Manitoba Sustainable Protein Research Symposium in Winnipeg June 21. PHOTO: GERALYN WICHERS

"If we can make people healthier, then we can reduce the demand for health care services."

Luc Clair
CANADIAN CENTRE FOR AGRI-FOOD RESEARCH IN HEALTH AND MEDICINE



"I skate to where the puck is going to be, not where it has been."

- Wayne Gretzky



Diabetes Growth Projections 2012-2030

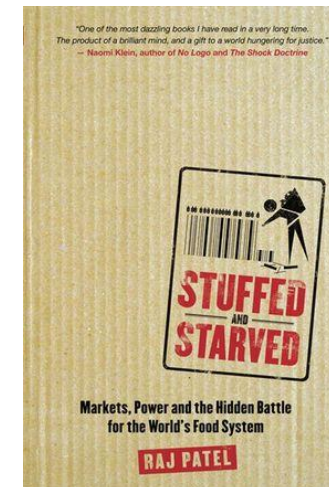
Diabetes worldwide drug market size \$35 billion
Expected to grow to \$58 billion by 2018



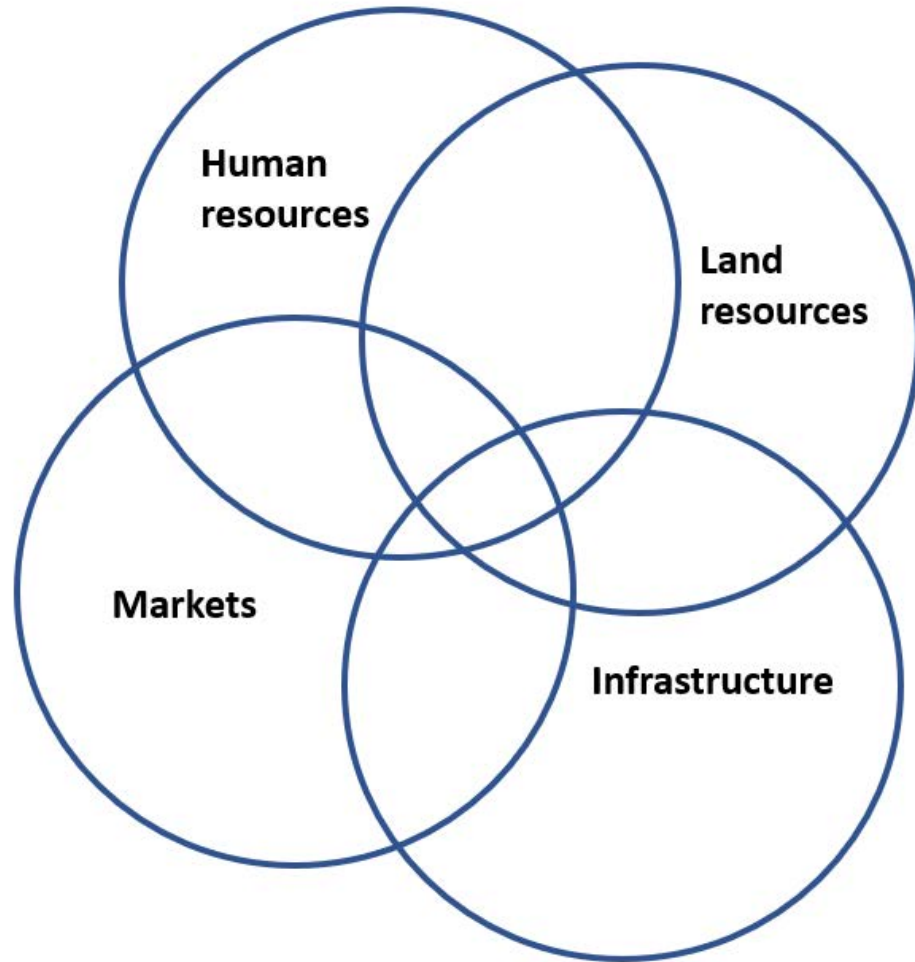
Source: International Diabetes Federation Diabetes Atlas 5th Edition: 2012 Update



Obesity has reached epidemic proportions globally, with more than 1 billion adults overweight - at least 300 million of them clinically obese - and is a major contributor to the global burden of chronic disease and disability. Often coexisting in developing countries with under-nutrition, obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups.



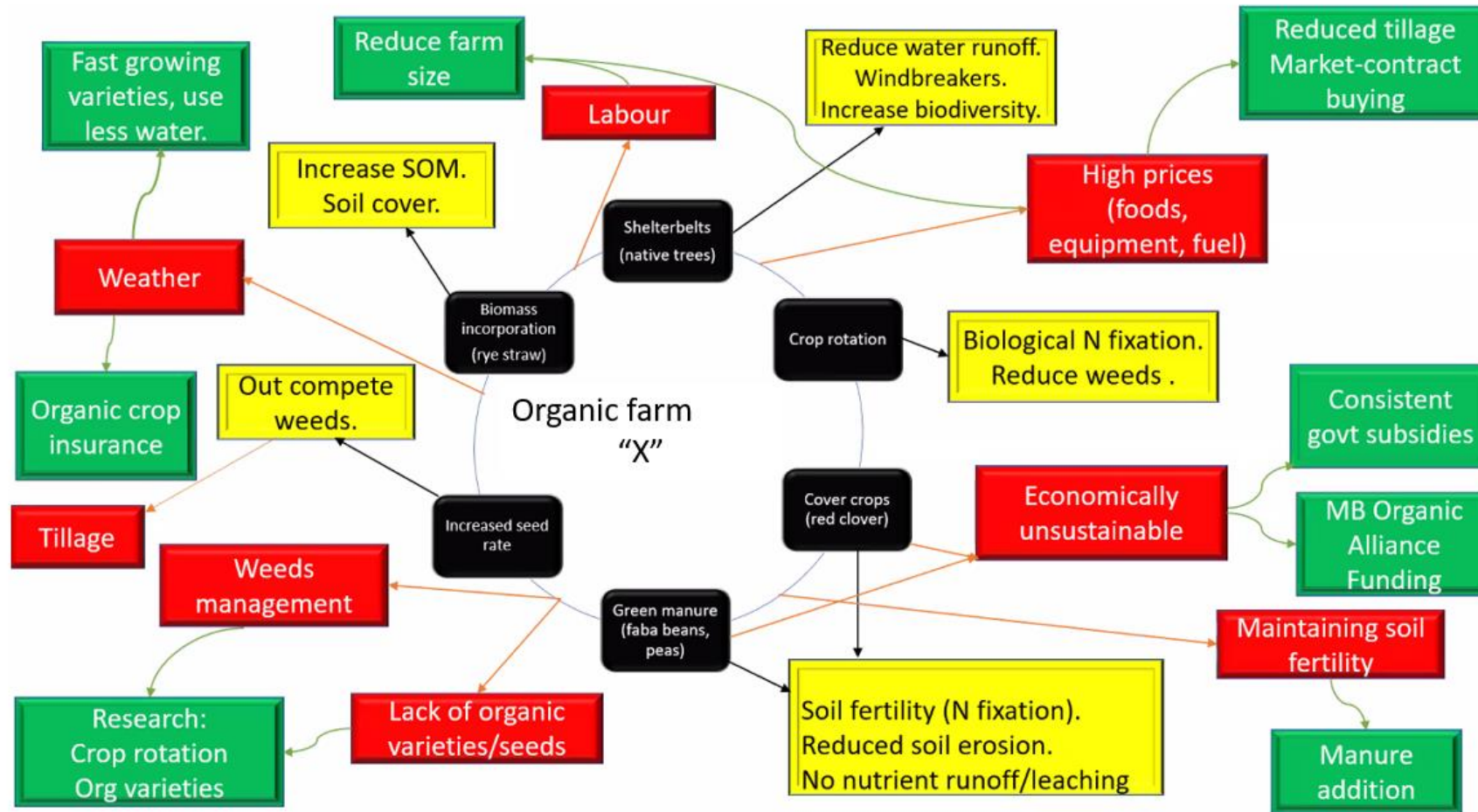
How do I see this system?

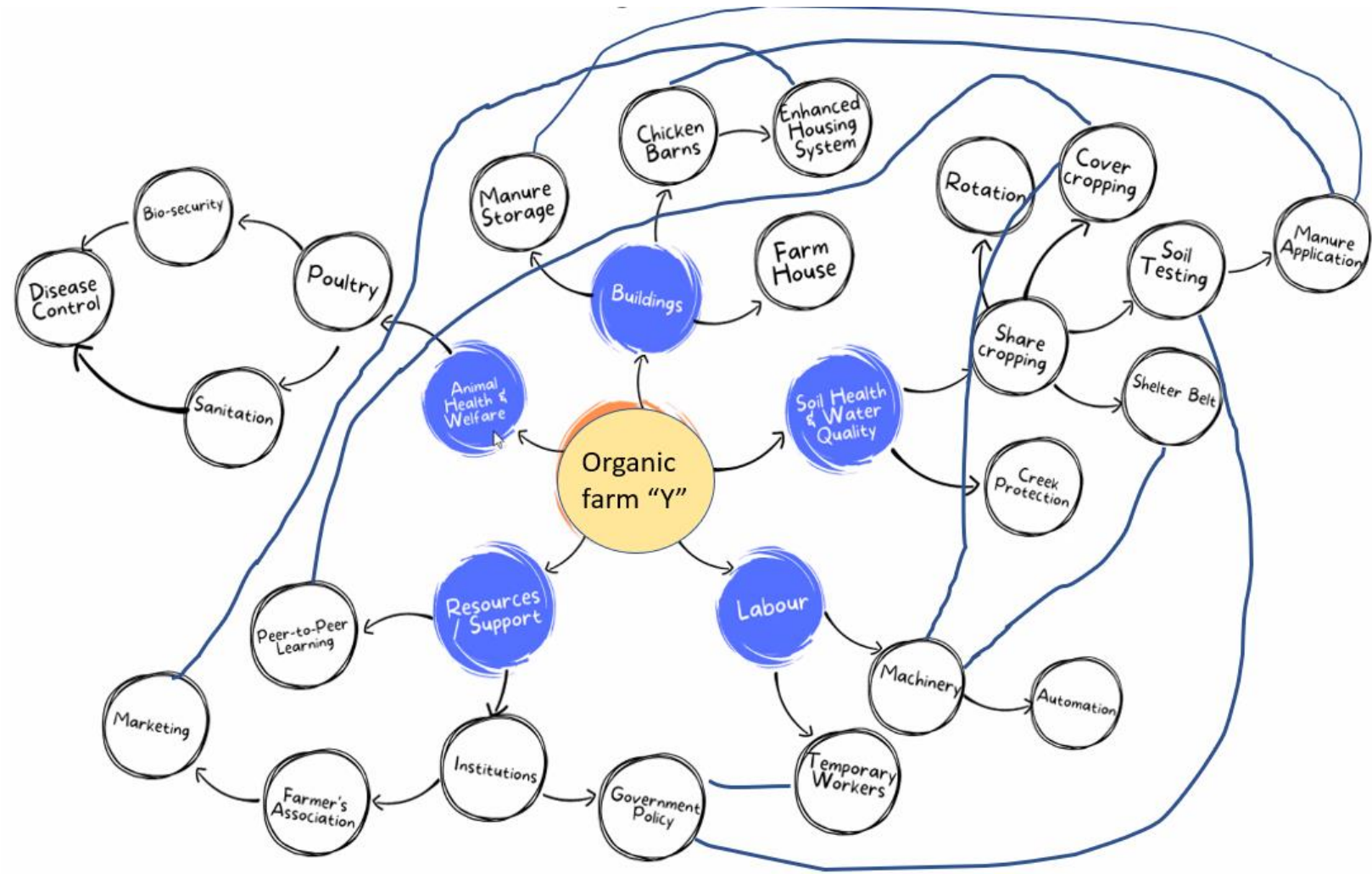


Mind Map Chart



Mind mapping





Part 2. Planning processes

“We don’t plan to fail, but sometimes we fail to plan”

- Agronomic planning
 - Rotation
 - Landscape
 - Data/record-keeping
- Business planning
- Optimum farm size?
- Threats
 - Rising land costs

Part 2. Planning processes

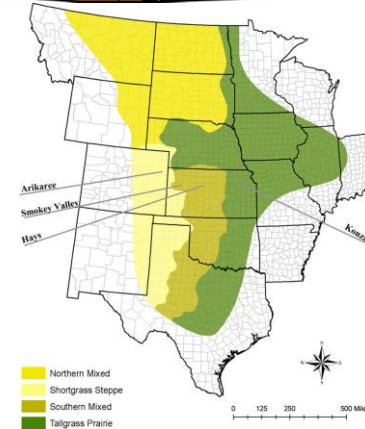
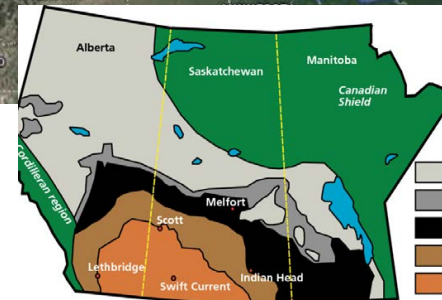
“We don’t plan to fail, but sometimes we fail to plan”

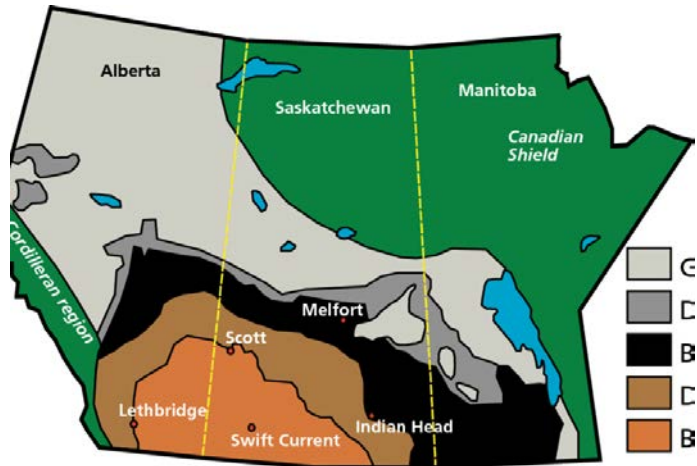
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“Every farm is different”

- Agronomic planning
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- Visit farms when you have the opportunity.
- Find out why they use a specific rotation.

SE Saskatchewan	Alberta	Manitoba	PEI	Ontario	Quebec
Alfalfa seed 3 years	Green manure (cereal/pulse)	Green manure (grazed)	Red clover green manure	3 years legume/grass forage	Soybean
Hemp	Fall rye	Wheat or flax	Spring wheat	Winter canola	Winter wheat/pea or clover cover crop
Flax (underseeded to alfalfa)	Food grade pea/oat intercrop	Lentil or pea	Soybeans	Spelt	Corn (ryegrass cover crop interseeded)
or	Green manure (cereal/pulse)	Alfalfa hay (2 years)	Pea/barley intercrop	Soybean	
Green manure (year 1)	Spring wheat	Wheat or flax	Oats underseeded to red clover	Oat/pea grain	
Spring wheat (year 2)	Pea/barley intercrop (feed)	Oats			
<i>Two different rotations depend on soils</i>	<i>Green manure every 3rd year</i>	<i>High diversity. Livestock integration</i>	<i>Diversity of legume species</i>	<i>Winter and spring seeded grains</i>	<i>Manure used to supply some N</i>



Trade-offs

Rotation excellence vs. finances



Oats where inadequate legumes in rotation



Oats where adequate legume green manures in rotation



Several weeks later.....

System rehabilitation

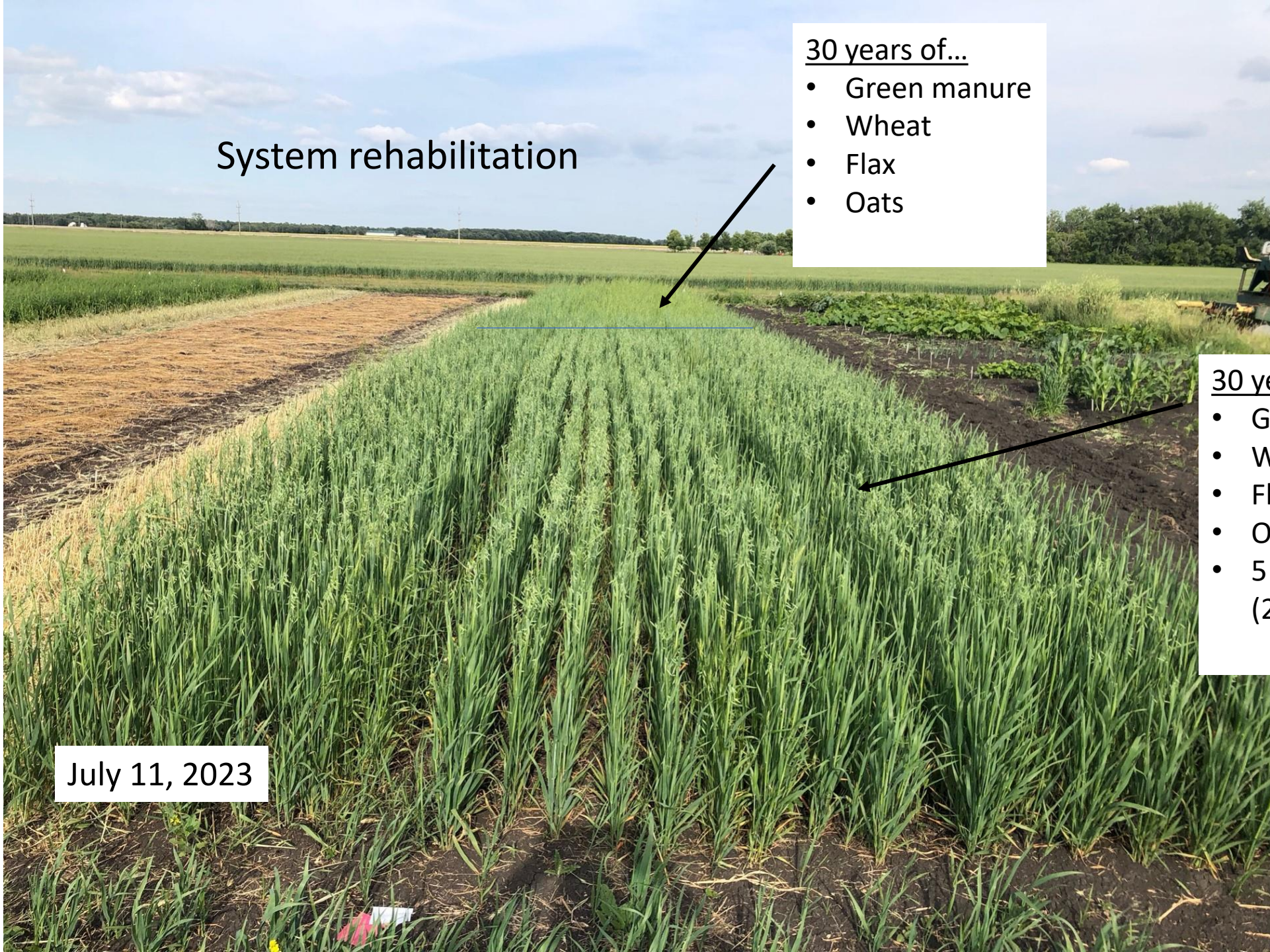
30 years of...

- Green manure
- Wheat
- Flax
- Oats

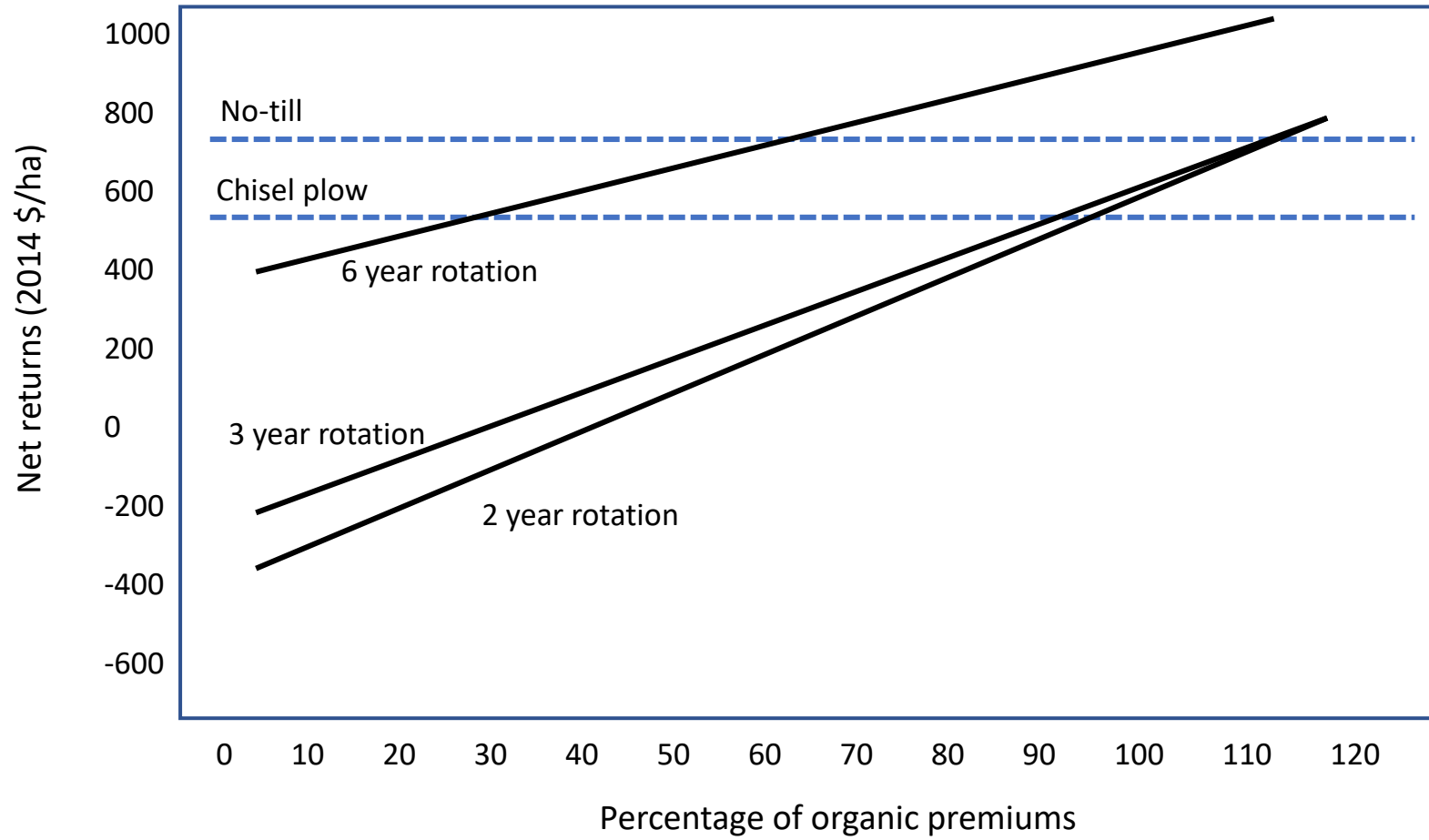
30 years of...

- Green manure
- Wheat
- Flax
- Oats
- 5 years alfalfa (2014 to 2019)

July 11, 2023

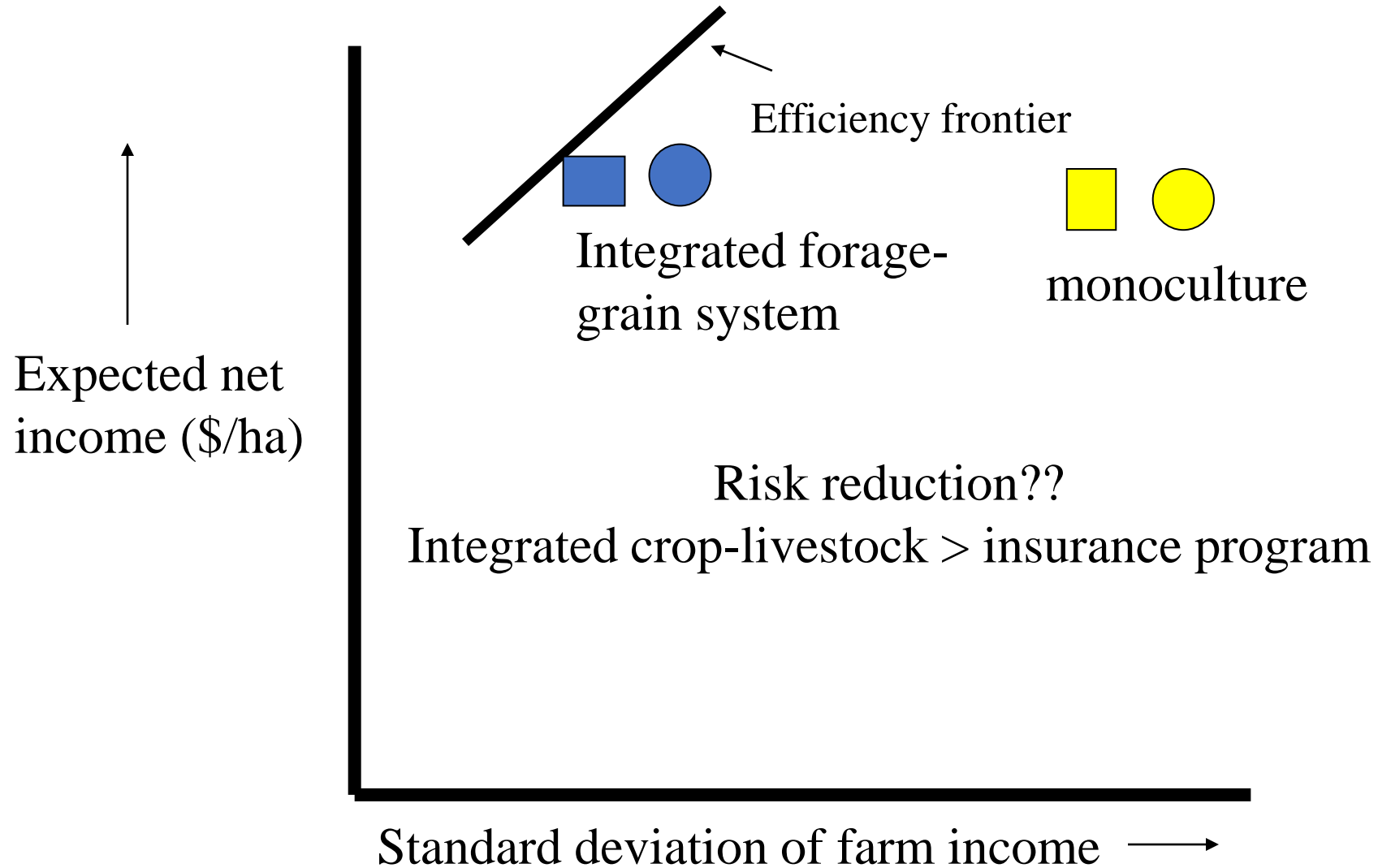


30 year study, Beltsville, Maryland shows longer rotation pays off...

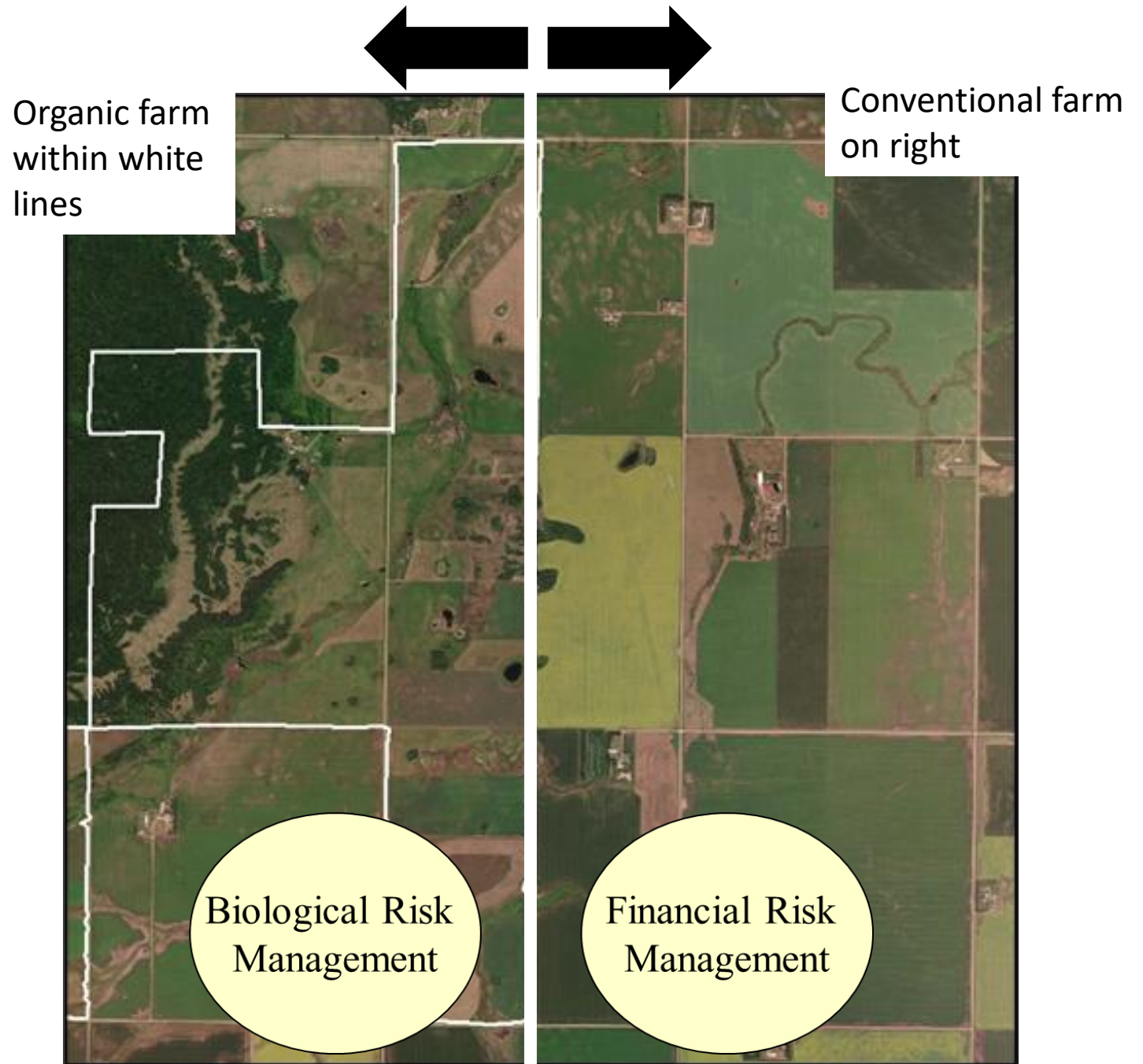


Economic Performance over 30 years

Zentner et al. 1990 *Agriculture and AgriFood Canada*



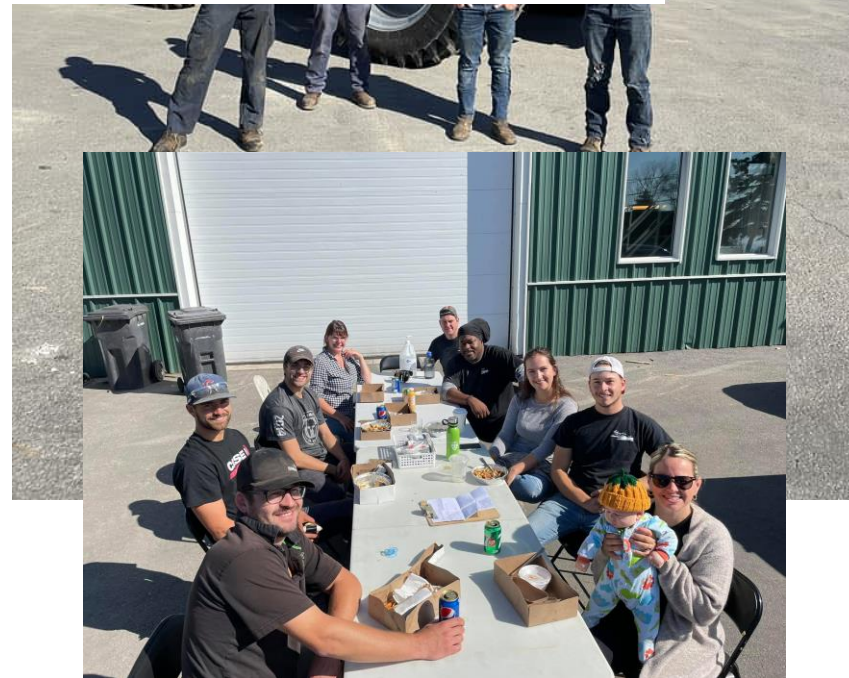
The organic farm may look different



Let me share an example....



Les Fermes Longprés (2009) Ltée.
Thanks to Matthew Dewavrin, agr. For this presentation





Objectives, values, mission

Self-sufficiency

- Inputs
- Machinery design/maintenance
- Marketing
- Infrastructure



Objectives, values, mission

Soil Conservation

- Ridge Till (~~mouldboard plowing~~)
- Green manure/ Cover Crops
- Limited use of manure
- Light equipment
- Traffic control



Objectives, values, mission

Biodiversity

- Organic certification
- Shelterbelts
- Strip Cropping
- Habitat preservation and enrichment





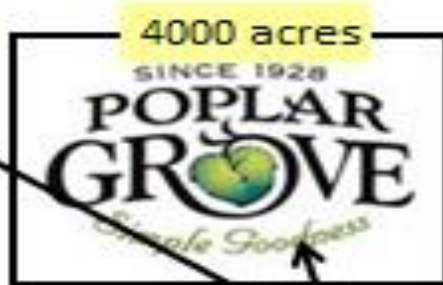
Objectives, values, mission

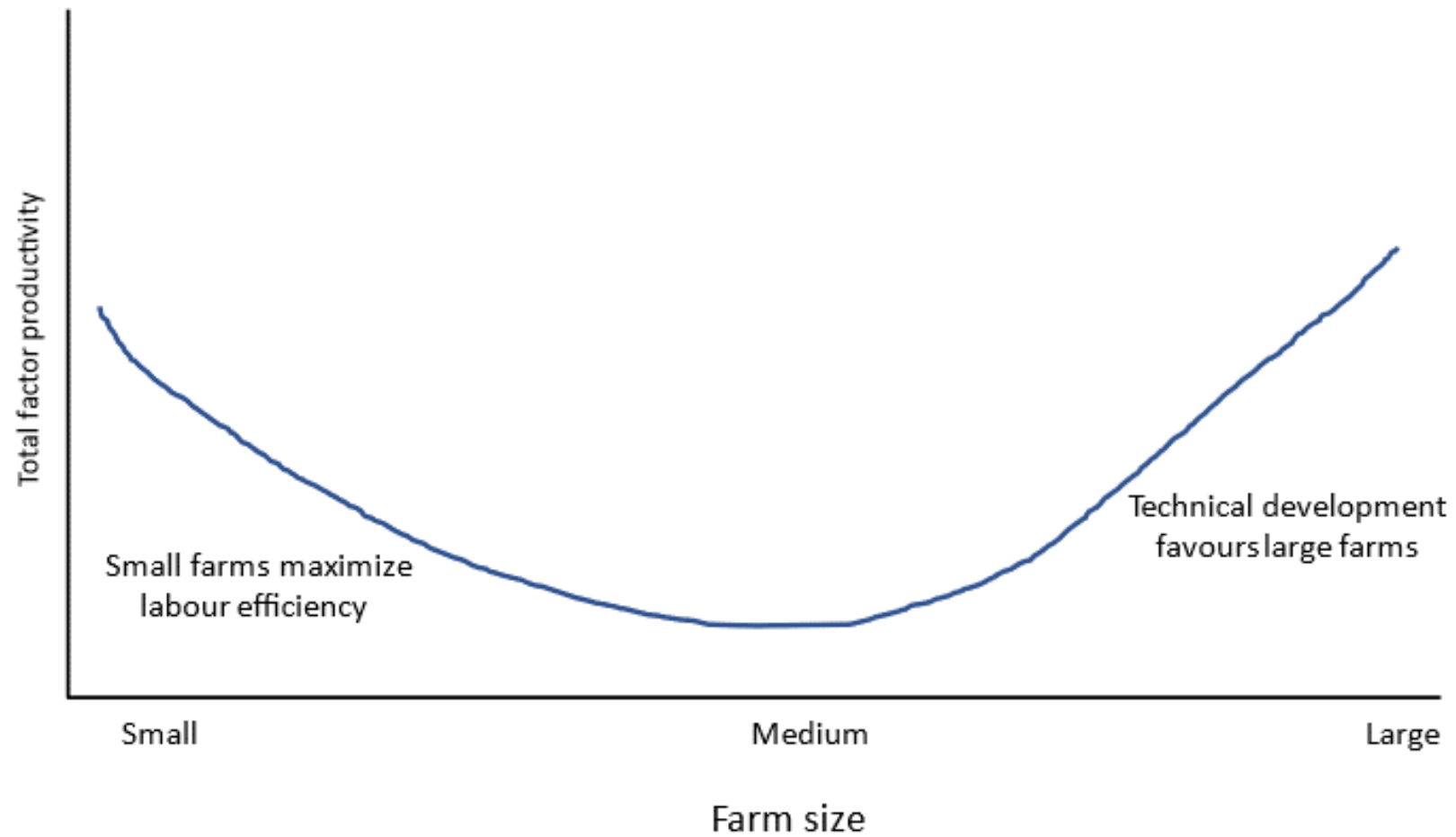
Vertical integration

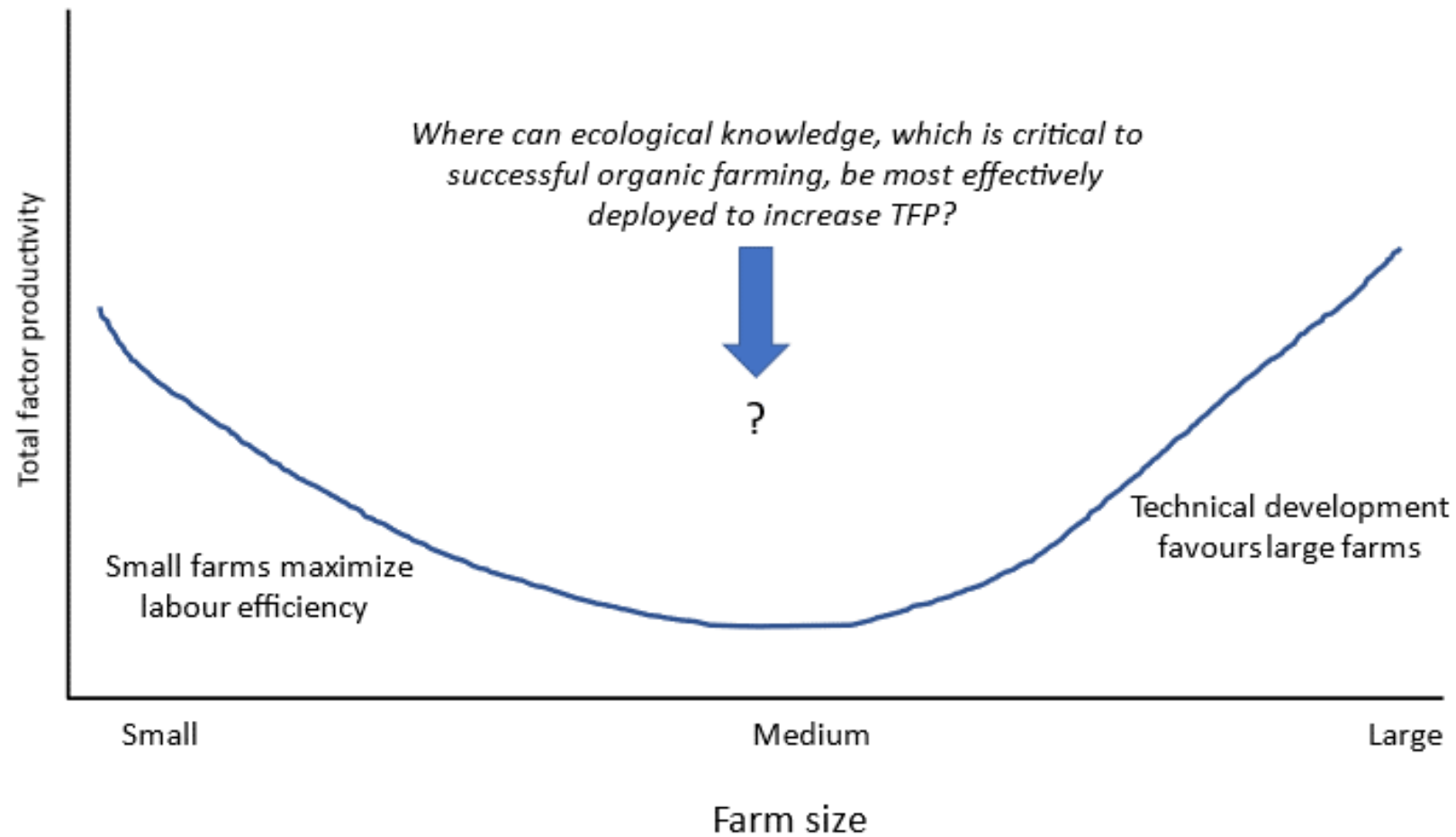
- Revenue stability
- Marketing based on traceability, transparency and environmental preservation
- Greater-Montreal Area and Vermont



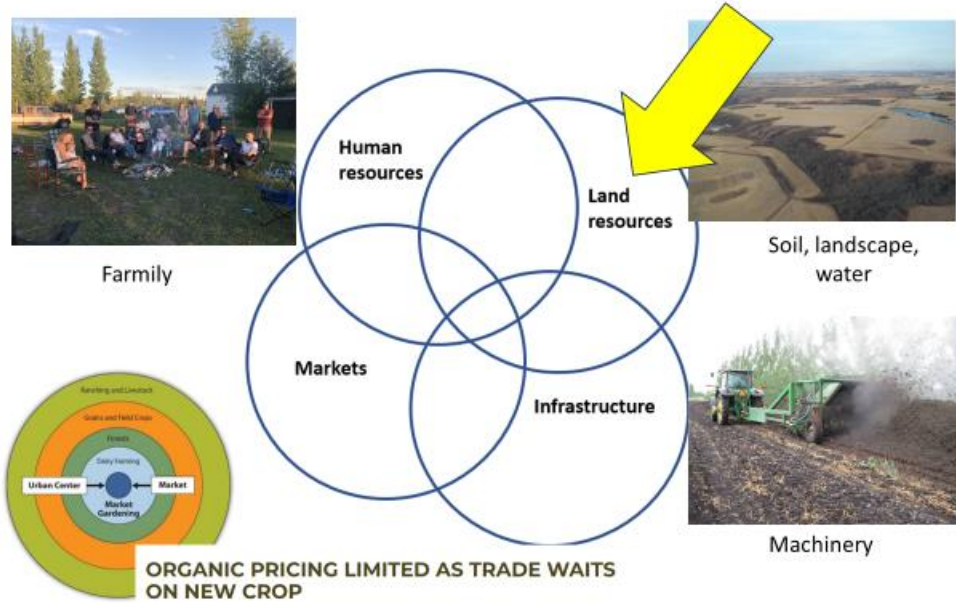
Optimum Farm Size?







Farm resources to optimize organic production



Part 2. Planning processes

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Thank you for your attention



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www.pivotandgrow.com**