



Regenerative agriculture

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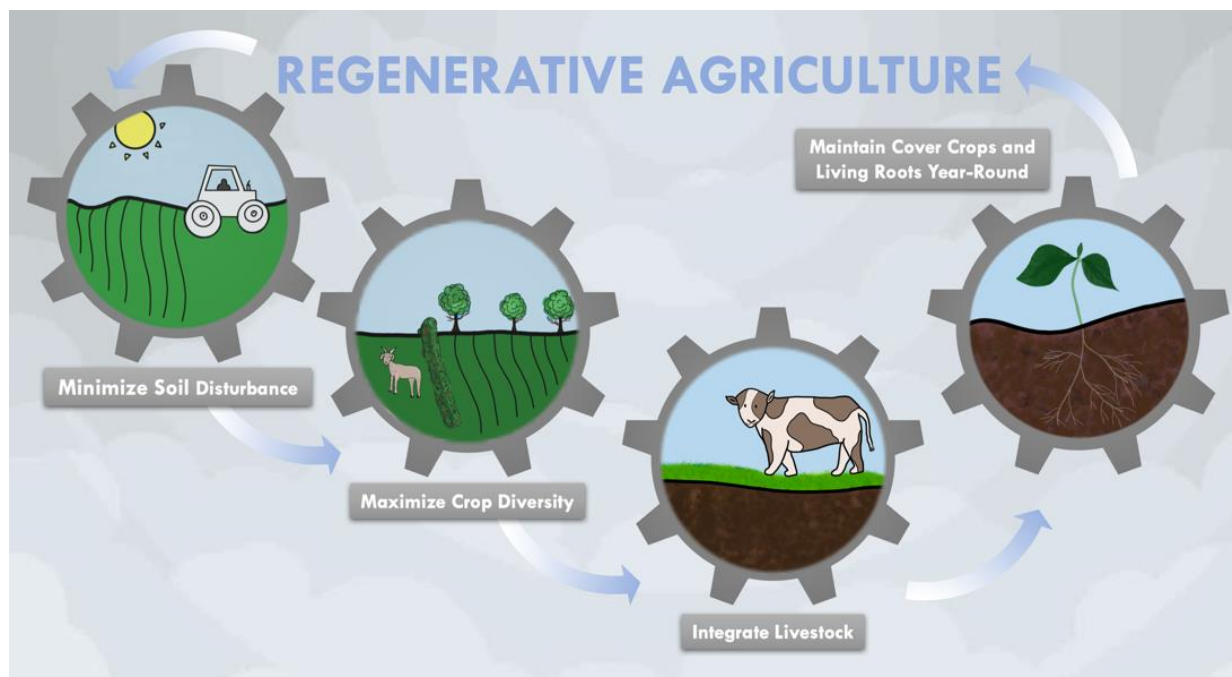
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What is it?

Regenerative agriculture is a set of farming and grazing practices that benefit the health of agricultural land ecosystems by revitalizing soil health through a focus on organic matter which in turn generates a domino effect of positive health and environmental effects.

Why it matters to the Ontario livestock industry

Regenerative agriculture has the capacity to increase carbon sequestration and reduce carbon dioxide levels in the atmosphere while bringing life back to depleted soils. Although actual levels are often overstated, the livestock industry is noted as a source of greenhouse gases. Regenerative practices can be used to lessen the industry's impact.



Livestock production in Ontario is generally highly visible to non-farmers. As such, it is open to comment and criticism from citizens with varying levels of understanding, often garnered from headlines. Ontario livestock farmers must ensure that they are running their business in a way that is good for their bottom line, for the future of their land and to maintain public trust.

With recent global emission reports, there is a sense of urgency to modify farming practices. In 2018, global greenhouse gas emissions approached dangerous levels indicating that a seven percent reduction is needed every year until 2028 to limit global warming to more than 1.5 degrees Celsius (IPCC Climate Change and Land, 2020 & Moyer et al., 2020). Soil degradation and loss of soil carbon to the atmosphere is believed to be a large contributor to greenhouse gas emissions particularly in the livestock industry (Moyer et. al, 2020).

Increasing the adoption of regenerative agricultural practices could mitigate this challenge at minimal cost to farmers and it would provide tremendous benefits to society. Pending the development of cap and trade markets, along with supportive policies, regenerative agriculture could present an opportunity for farmers to be paid for carbon capture and sequestration.

The first step to regenerative agriculture is a refocusing on the land used for raising livestock. Too often soil health is not considered as a measure of success on the farm. A key to successful regenerative agriculture is patience. Practices such as reduced and no-tillage cropping and rotational grazing may take years to yield improvements to soil organic matter (LaCanne & Lundgren, 2018).

Regenerative agriculture also works to close the nutrient loops in food production systems. Manure or compost is used for fertilizer, and healthy soil improves water retention which subsequently reduces drought severity and improves the water cycle through healthy soil, roots, and increased diversity (Moyer et. al, 2020). Regenerative agriculture is important for the livestock industry as adapting to these changes would prevent the exhaustion of farmland with implementation of livestock for grazing (Masters, 2019). The adoption of regenerative agricultural practices can be challenging. It includes short term costs for farmers and at its core, regenerative agriculture requires diversified and integrated farming systems.

Farm system evolution and farm markets over the past five decades have encouraged specialized farms that make the adoption of regenerative practices difficult. Farmers interested in regenerative agriculture will need to develop individualized plans and must be dedicated to regenerative agriculture. To ensure success more education and training can be made available and incentives made accessible.

History of regenerative agriculture:

- Organic matter was first recognized as a critical element in plant nutrition in the 1500s. In 1761 Johann Wallerius stated that humus was the essential nutritive element of plants (Waksman, 1938).
- In the 1760's the industrial revolution began, and had a large impact on agriculture as technological advances sparked great improvement in farm production. Profitability within the

industries increased and the way people farmed completely changed. These improvements unfortunately led to overuse of resources and depletion of environmental health (Creamer et. al, 2003).

- Around 1840, German scientist Justus von Liebig’s theories on fertilizer and N-P-K in relation to plant nutrition simplified fertilization by adding chemical compounds as alternatives to manure (Korcak, 1992). Entering the 1900s, there were concerns about simplifying farming systems by relying on chemical fertilizers rather than manure (Barton, 2001).
- In the early 1900s, F.H. King and Sir Albert Howard focused on the positive relationship between soil health, plant health, animal health and human health (Korcak, 1992).
- In 1962, Rachel Carson’s book *Silent Spring* raised concerns about pesticide use and led to the creation of environmental agencies in the U.S and elsewhere.

Regenerative agriculture practices	Benefits
<ul style="list-style-type: none"> • No-till • Diversified cropping systems <ul style="list-style-type: none"> ○ Cover crops ○ Crop rotation ○ Addition of perennial crops • Planned pasture and rotational grazing • Biochar (soil ameliorant) • Composting • Agroecology and agroforestry (incorporating ecological practices and the conservation of trees in agriculture) • Silvopasture (integration of trees, forage and grazing) • Integration between crop and animal production 	<ul style="list-style-type: none"> • Improvement in arable top soil • Restore organic matter into soil and crops over time • Improvement of the water cycle • Increased nutrients in food through soil wealth • Increased production and income with good management • Increased soil carbon storage, release 40% fewer carbon emissions • Reduced likelihood of floods and droughts, yield more in times of drought up to 40% • Increased biodiversity • Prevents pests and disease • Use 45% less energy

Market pull

Change is often driven by market forces. One such emerging market force is One Planet Business for Biodiversity (OP2B), a cross-sectorial business coalition focused on regenerative agriculture, new product portfolios for biodiverse diets, and protecting natural ecosystems. Currently, 21 companies are members, including Loblaw Companies, McCain, Walmart and Nestle. Companies such as these aim to meet changing consumers expectations. Today's consumers have a growing interest in their food and the environment.

Research gaps

Research in the area of regenerative agriculture is long term and costly. To meet the needs of farmers considering change, research must operate at a whole systems level.

Innovation gaps

Farmers consider change in light of their own business and personal situations. Regenerative agriculture can include a number of actions, and the costs and benefits, as well as advice on “how to” are needed.

Cultural change

Decades of modernization of farming that have focused on specialization, veered away from diversity and integration and have created a cultural vacuum related to the acceptance of the philosophy of regenerative agriculture and a general farming community championship of the fundamental principles. Research has shown that the most important factor in the adoption of new farming practices is the farmers personal desire, based on personal conviction, to adopt the practice, and this is even more influential than incentives (Nazarko et al. 2004).

For more information

Please contact LRIC at info@livestockresearch.ca or 519-766-5464.

Additional resources:

1. Websites: Regeneration Canada – <https://regenerationcanada.org/en/>
 - a. Regeneration International - <https://regenerationinternational.org/why-regenerative-agriculture/>
 - b. The Rodale Institute - <https://rodaleinstitute.org/education/resources/regenerative-agriculture-and-the-soil-carbon-solution/>
 - c. The Climate Reality Project - <https://www.climate realityproject.org/blog/what-regenerative-agriculture>
2. Ontario Soil and Crop Improvement Association - <https://www.ontariosoilcrop.org/blog/2020/11/17/agricultural-sustainability-just-a-buzz-word-or-much-more/>

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