3.7 Sustainable growth | Focus on innovation

Innovation is fundamental to achieving greater sustainability and advancing economic growth. Innovation improves performance across many indicators including productivity (output), GHG emissions, food safety, disease detection and control, and supply chain security, which all also combine to improve economic performance. Therefore, innovation can have different definitions and will be difficult to measure. Innovation is also dependent on many contributing factors, such as a skilled workforce and an enabling regulatory environment. Pinning down the direct correlation of these factors to actual innovation outcomes can be challenging. To focus on innovation, this overview therefore profiles Index metrics involving public and private investments in research and development; both of which are marking recent increases.

Results from the Index: Economic Indicators

Given measurement challenges, suitable innovation is challenging to measure. Suitable outcomes-based data on the net benefits of innovation is often unavailable. As such, proxies can be used to measure activities that support innovation. The Index relies on various metrics as proxies to track how well Canada's agri-food system delivers on innovation. While there are national public and private R&D spending metrics (see Figure 1), on-farm innovation is more difficult to capture.

- Public (government) R&D investments had been on a slow decline, decreasing up until 2019; however, there was a jump to $869 million in 2020, an increase of 8.8% from 2019.
- Private (industry) investments in agri-food R&D have been on a steadier upward trend, increasing 22% from 2017 to reach $358 million in 2020.
- On-farm innovation requires a proxy. Using capital investments as an innovation metric, which includes machinery, equipment and buildings, innovation on the average Canadian farm is increasing, with investments up from $74,646 per farm in 2011 to $90,951 in 2019.

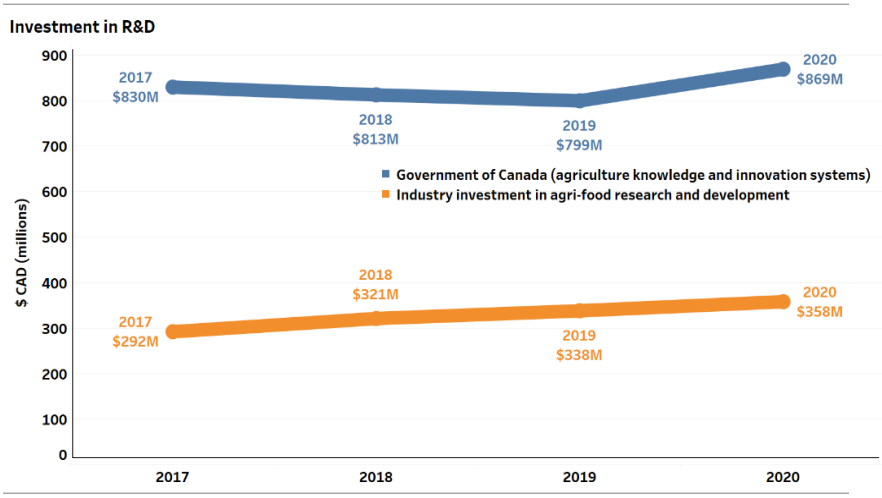

Figure 1: Investments in innovation, R&D

Interpreting the results

Innovation

Innovation in agri-food is broad and can play a significant role in the sustainable growth required to meet national and environmental priorities and food security needs. Examples include:

- Genetic improvements, such as selective breeding and gene editing, can enable new cultivars to enhance

drought and pest resistance in plants, address antimicrobial resistance in farm animals and help lower emissions from livestock.
- Clean energy technologies benefit by diverting waste into biogas, helping to improve productivity and reduce greenhouse gas (GHG) emissions.
- Food loss / waste can be reduced somewhat by diverting waste streams to create new value-added products (upcycling). This can also help provide new healthy food options to consumers.
- Adopting new packaging can reduce plastic use while still ensuring food safety and quality.
- Utilizing technologies such as IT and data analytics can deliver productivity gains for producers and companies and simultaneously track sustainability claims being made about sourced ingredients.

Measuring innovation requires looking at enabling conditions, as the outcomes of innovation can impact almost every indicator across the Index. Other enabling conditions tracked in the Index include the number and impact of peer-reviewed articles published by Canadian universities, attracting and retaining skilled workers in the sector, regulatory timelines, and new product approvals.

On-farm innovation

Looking at on-farm innovation is important, as farms are on the front line of increasing production while decreasing environmental impacts. Farm innovation is diverse and ranges from new production practices, precision farming tools, and improved plant varieties.

On-farm innovation requires a proxy. Given the significant improvements being made in the technology, efficiency and productivity of capital items like farm equipment, animal housing, et cetera, measuring capital investments can serve as a proxy for on-farm innovation. Using this proxy, capital investments on the average Canadian farm are increasing, with investments up from $74,646 per farm in 2011 to $90,951 in 2019.

Additional context

Recognizing its broad importance, innovation is described as one of several “levers of change” required to deliver on all 17 of the UN Sustainable Development Goals.

Measuring innovation among global standards and indices largely focuses on investment in R&D, an approach shared with the Index. However, such schemes focus on the activities that support innovation rather than tracking innovation expenditures. Examples of global practices include optimization of fertilizers, increasing availability and affordability of healthy foods, and investment in production efficiency. These items are generally tracked in this Index under other indicators but not under the banner of “innovation.”

One area where the Index differs from global schemes is that it uniquely includes innovation from the perspective of Indigenous engagement. However, its focus on capital funding for Indigenous businesses and clean energy investment is not segmented by adoption within the agri-food sector.

Measuring **innovation** helps to drive sustainable growth and is one component of a sustainable agri-food system.

The National Index on Agri-Food Performance is a first-of-its-kind Canadian initiative to define and report on a comprehensive and consolidated picture of sustainability from food production to retail.

Complete Index results along with references to global practices are available at **agrifoodindex.ca**. All information in this paper is sourced from the Index (Part 2) unless otherwise stated. This paper is one of seven published together as Part 3 of the Phase 3 Final Report, May 2023.