Vol. 13 No. 2, pp. 26–66 August 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Review Article

What do Canadian agricultural policies support?: The need to prioritize environment and health

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Abstract

Industrial agri-food systems and food consumption patterns in high-income countries contribute to a range of environmental problems, including greenhouse gas emissions, biodiversity loss, persistent toxicity, and freshwater pollution. Industrial agri-food systems also receive considerable government support in many high-income countries. This study provides a critical assessment of Canadian agricultural production support policies, showing how they have overwhelmingly focussed on increasing the volumes and export competitiveness of a small range of feed crops, food grains, and livestock production, ultimately subsidizing energy- and input-intensive practices. Our analysis also reveals how these support policies have mostly served to enhance the revenues and incomes of relatively higher-income farmers, during a period marked by the dramatic consolidation of farms and the concentration along the agricultural supply chain, while doing little to stabilize the livelihoods of small- and medium-scale farmers, evident in the steep decline in the number of smaller farms. Our central aim is to explain how Canada's agricultural production support policies make key aspects of its agri-food system worse not better, and why there is an urgent need to reorient these policies to focus on improved environmental sustainability, distributional outcomes, and public health.

Keywords: agriculture, farm subsidies, consolidation, environment, dietary patterns

Abbreviations and conventions: Throughout the text "mt" refers to metric tons. All dollar figures are in Canadian dollars (CAD), in current prices unless otherwise stated.

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DOI: 10/15353/cfs-rcea.v13i2.779
ISSN: 2292-3071

Résumé

Les systèmes agroalimentaires industriels et les habitudes de consommation alimentaire dans les pays à revenu élevé contribuent à un ensemble de problèmes environnementaux, notamment l'émission de gaz à effet de serre, la perte de biodiversité, les produits toxiques persistants, la pollution de l'eau douce. Les systèmes agroalimentaires industriels reçoivent aussi des aides gouvernementales considérables dans plusieurs pays à revenu élevé. Cette étude réalise une évaluation critique des politiques canadiennes d'appui à la production agricole et montre qu'elles ont grandement été axées sur l'augmentation de la production et de la compétitivité à l'exportation d'un petit nombre d'aliments, de grains et d'animaux, en subventionnant des pratiques très exigeantes en énergie et en intrants. Notre analyse révèle aussi comment ces politiques ont principalement servi à augmenter les chiffres d'affaires et les revenus d'agriculteurs ayant déjà des revenus relativement élevés, pendant une période marquée par la concentration des fermes et celle des différents maillons de la chaîne d'approvisionnement agricole, alors que peu a été fait pour stabiliser les moyens de subsistance des petits et moyens agriculteurs, comme en témoigne le déclin important du nombre de fermes plus petites. Notre objectif principal est d'expliquer en quoi les politiques de soutien à la production agricole du Canada aggravent les aspects primordiaux de son système agroalimentaire plutôt que de les améliorer, et pourquoi il y a un urgent besoin de réorienter ces politiques vers la durabilité environnementale, la répartition des revenus et la santé publique.

Mots-clés : agriculture, subventions agricoles, concentration d'entreprises, environnement, habitudes alimentaires

Introduction

There is a growing scientific consensus about the need to urgently transform agri-food systems and consumption patterns (FAO, UNDP and UNEP, 2021; Gautam et al., 2022), and an important part of this is to better align policies that relate to agriculture, food, environmental sustainability, and human health (Willett et al., 2019, Damatia et al., 2023). In addition to directly and indirectly affecting farmer incomes and the competitiveness of certain export commodities, agricultural production support policies have significant impacts on environmental aspects of agricultural production, including land use, water, chemical inputs, energy, and greenhouse gas (GHG) emissions. By incentivizing some forms of production over others, agricultural production support policies have significantly enhanced the relative affordability and availability of certain foods, which in turn influences consumer behaviour and dietary patterns, with implications for population health (Cash et al., 2006; Batini, 2021). As we show in this paper, the impact of agricultural production support policies has been *highly* uneven with relatively larger support for feed crops, food grains, and beef cattle, and relatively less support for fruits and vegetables, directly affecting relative affordability across these products. Canada has strong agricultural production support policies, including supply management focussed on dairy and poultry, risk management involving crop and livestock insurance, and direct subsidies for certain inputs, agricultural research, and marketing. These government support programs have consistently focussed on increasing agricultural productivity (understood in terms of rising yields and output per farmer) in a small range of feed crops, food grains (especially wheat), and livestock products (especially meat and dairy). The basic assumptions are that highly mechanized, energy- and input-intensive farms are needed to provide affordable and abundant food for increasingly urbanized modern populations and to ensure export competitiveness. The historical record indicates that the focus of these support programs on increasing productivity, volumes,

and exports has succeeded in generating large volumes of select commodities. However, there is a negative flipside to this narrowly-defined success, as these policies have consistently given inadequate attention to the importance of healthy diets, sustainable production, and the vitality of rural communities (MacRae, 2011; Kevany et al., 2024).

Our analysis combines publicly available data from OECD, Statistics Canada, and FAO, and uses a systems approach that combines economic, environmental, and health indicators, to critically assess Canadian agricultural production support policies. Following the analytical approaches of MacRae (2011) and Batini (2021), our framework examines both direct and indirect consequences of these policies on the environment and population health, as well as extending it by incorporating distributional considerations. Our analysis in sections 5 and 6 draws links between agricultural production support policies and ongoing farm consolidation and farm income polarization.

An important aspect of this is our discussion of how Canada's agricultural support policies relate to trends in farm consolidation and the dramatic decline in the number of small-scale farms, which we consider at both national and provincial levels. Despite relative increases in food prices since the mid-2000s and stable levels of total government expenditure on agriculture, farming has remained a perennially precarious financial enterprise for many Canadian farmers, especially those operating on small and medium scales. Most of the growth in the agri-food sector has been dominated by major agricultural enterprises—with tremendous concentration occurring in the processing and retail sectors—and the largest and most industrialized farmers, which has had detrimental impacts on the fabric of rural communities.

Another key aspect of our analysis of how agricultural production support programs have overwhelmingly focussed on increasing the productivity and export competitiveness of a small number of feed crops, food grains, and livestock products is that practically no attention has been given to the implications of these policies with respect to the dietary patterns they foster. This policy orientation has contributed to unhealthy and unsustainable agri-food systems, as agricultural practices associated with livestock-heavy diets have been shown to: heighten risks of a range of non-communicable diseases; account for disproportionately higher demands on land, water, and other resources; and be responsible for a substantial share of the GHG emissions from agriculture that are accelerating global warming (Steinfeld et al., 2006; IPCC 2019, Willett et al., 2019; Poore and Nemecek, 2018). Our analyses show that continuing the historic focus of Canada's agricultural production support programs would contradict both the dietary recommendations in Canada's Food Guide (Government of Canada, 2025) and the government's expressed commitment to achieve net zero by 2050. In contrast, we argue that there is an urgent need to rethink Canada's agricultural production support policies and the overarching economic objectives that have guided them (Figure 1), with support policies reoriented to focus on simultaneously improving the financial stability of small- and medium-scale farmers who are producing in less resource- and pollution-intensive ways and encouraging healthier dietary patterns.

The rest of the paper is organized as follows. We begin with an overview of Canadian agricultural production support policies in section 2, before examining the impact of these policies by commodity in section 3 and linking these policies to Canadian food consumption and dietary outcomes in section 4. Our analysis in sections 5 and 6 draws links between agricultural production support policies and ongoing farm consolidation and farm income polarization. We conclude by reviewing key findings and policy implications, before providing suggestions for future work.

Overview of Canadian agricultural production support policies

Canada's agricultural production support policies have considerable historical continuities, though there also have been several significant changes in recent decades. The most notable changes were the phase out of grain market price support following the establishment of the Agreement on Agriculture in the World Trade Organization (WTO) in 1995, and the phase out of export subsidies for dairy products by 2020 under political pressure from the first Trump

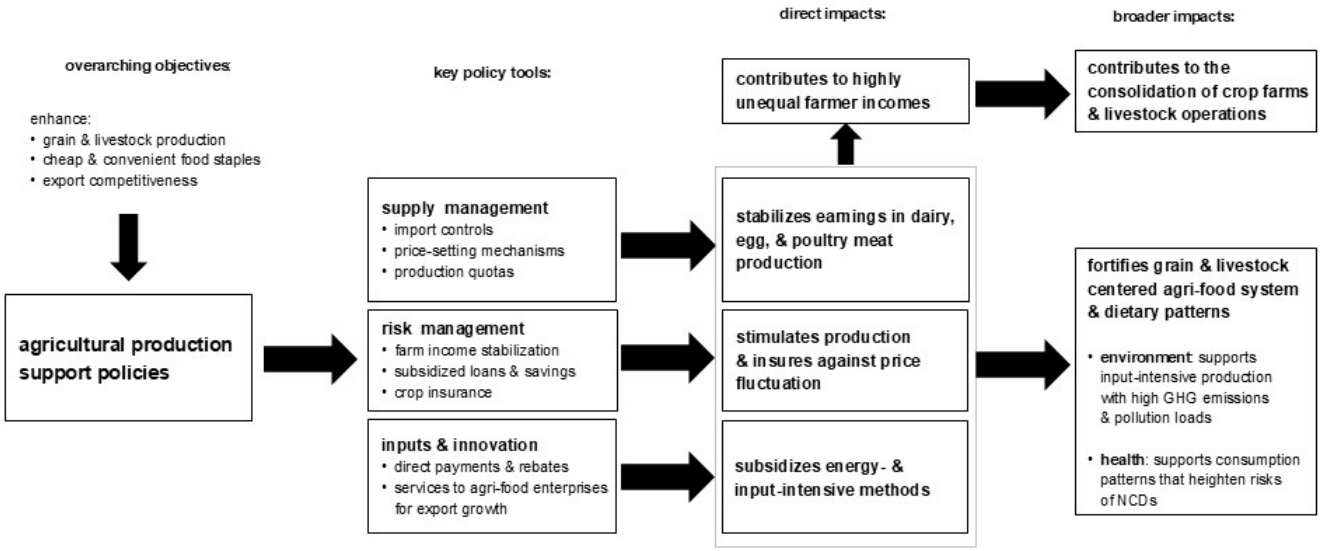

Figure 1: Agricultural production support policies in Canada: Key objectives, policy mechanisms, and impacts

administration in the United States. Currently, the support given by the Canadian government to agri-food production falls under the broad umbrella of the Sustainable Canadian Agricultural Partnership (Sustainable CAP) and is funded by federal and provincial governments. The policies that involve government funding are primarily based on risk management and input and innovation subsidies (OECD, 2024), while there are also sizable implicit transfers from consumers to producers of certain commodities that result from supply management. Figure 1 highlights these key policy tools in relation to their primary objectives and impacts.

The primary goal of supply management is to stabilize the domestic marketable volume of commodities[1], and in turn the unit prices that farmers receive. In general, supply management is pursued through a combination of import controls, price-setting mechanisms, and production quotas, producers are required to hold a quota license from the government, which allows them to sell in the market only up to, and not beyond, the volume that it defines. Canada's supply management policies are largely focussed on dairy (raw milk), egg, and poultry meat production, which is dominated by chickens (but also includes turkeys).

Although there is no outlay cost to the government for supply-managed commodities, these policies translate into positive market price support for producers; as indicated above, they amount to a transfer from paying consumers rather than a transfer of taxpayer-generated revenue. Without supply management, greater domestic production and imports would dampen prices, reduce profit margins, and increase price volatility. Lower profitability and higher uncertainty would inevitably cause some farmers to exit the industry and lead towards more consolidation in the sector, as larger-scale producers tend to be better equipped to cope with thinner margins and higher price volatility than smaller-scale producers and farm consolidation can generate short-term financial benefits for the remaining producers. During the first Trump administration (2016-2020), the United States put considerable political pressure on Canada to eliminate its import restrictions on dairy products, and the 2018 U.S.-Mexico-Canada (USMCA) trade agreement that was renegotiated during this time gave dairy producers in the United States and Mexico increased access to the Canadian market, though other key aspects of supply management continued (Agriculture and Agri-Food Canada, 2024). The second Trump administration has, from the outset, shown a willingness to dismantle all existing rules with its trading partners, including Canada, and we can expect that further pressure on supply management in the

dairy sector will be part of ongoing trade negotiations.

Supply management tends to be broadly supported by most Canadian farmers (NFU, 2024), apart from some of the largest scale producers who would be poised to increase their market share at the expense of smaller scale peers in the absence of these constraints. At the same time, supply management has long been criticized by economists for its impact on the prices paid by consumers. The critique has two main threads: first, restricting supplies and enhancing domestic market prices above border market prices, which in this context effectively amounts to comparing prices in Canada with those in the United States, are seen to reduce consumption relative to what would be the case under less constrained market conditions (OECD, 2024); second, from an economic standpoint, increasing prices on major food staples is understood to be regressive. As far back as the 1970s and 1980s, research findings indicated that the higher domestic prices on supply managed commodities had disproportionate impacts on lower income households, given that food purchases comprise a higher share of household expenditures, though estimates involved a high degree of uncertainty and were difficult to calculate with precision (Schmitz, 1983). More recently, Cardwell et al. (2015) attempted to calculate the regressive impacts of supply management by comparing the differentials between the border and domestic prices, and estimated that the financial burden was as much as 2.3 percent of the annual income of the poorest households in Canada.

In contrast to supply management, risk management policies involve direct transfers from taxpayers to farmers, including through farm income stabilization payments, subsidized loans and savings, and crop insurance, and together these policies tend to stimulate rather than stabilize production (OECD, 2023). The primary goal of risk management policies is to insure farmers against fluctuating prices in commodities not affected by supply management and where there are no private insurance options (NFU, 2024). These policies protect against weather-, climate-, and market price-related declines in farm incomes primarily from the production of grain crops, although other commodities such as fruits, vegetables, and more recently, beef and dairy can also be covered. While dairy had long been exempted from direct transfers due to supply management, this changed in 2023, when the federal government earmarked $1.6 billion over six years to support the incomes of dairy farmers through its Dairy Direct Payment Program (Agriculture and Agri-Food, 2025a) to mitigate the impact of increased market access for the US and Mexican dairy imports.

Distinct from the objectives of supply and risk management lies another aspect of Canada's agricultural support policies: the direct subsidization of inputs and agricultural research oriented towards science and technological innovation. These supports include direct payments and rebates for some inputs (e.g., diesel fuel) and public funding geared to promoting "innovation; competitiveness and market development; and adaptability and industry capacity."[2] One example of the latter is an Agri-Food Trade Services program that provides a suite of services to Canadian agri-food enterprises that are seeking to expand into international markets[3].

As noted at the outset of this section, the combination of Canada's agricultural production support policies is framed as promoting "sustainability". However, these policies consistently fail to prioritize concerns that are commonly associated with sustainability, such as reducing GHG emissions and other environmental burdens, and improving public health outcomes (for instance, enhancing the affordability of a greater diversity of nutrient-rich foods). On the contrary, the focus of these policies has overwhelmingly been on stabilizing the prices, increasing production, or managing the short-term risks with respect to a relatively small range of industrial agricultural commodities (OECD, 2024, p. 155). Also, while science and technological innovation will undoubtedly remain significant foci of agricultural support in Canada (OECD, 2024), it would be self-defeating if innovation-oriented initiatives are not increasingly integrated with climate change policies and health goals, given how negatively the failure to mitigate climate change is expected to affect both agriculture and public health outcomes. (IPCC 2022; Willett et al. 2019; Yang et al. 2024). The failure to reorient Canada's agricultural policies to mitigate climate change will continue to negatively affect agricultural and public health outcomes.

Canadian agricultural production support

Total support estimates

The task of estimating the total value of agricultural production support is more complex than one might assume, as it is necessary to consider both the direct financial transfers to farmers from taxpayers (from all levels of government) and the indirect financial transfers from consumers that result from supply management policies. To assess the value of Canadian agricultural production supports over time, we rely on two complementary data sources: OECD's Agricultural Production Support program data on Canada, and Statistics Canada data on Net Programs Payments to farm operators. The OECD data are compiled and reported for comparability across reporting countries and use several core indicators that are all measured relative to a broad metric[4] (Supplementary Material (S) S.1.1). While the Statistics Canada data on program payments tend to be more detailed by commodity and more comprehensive (including being disaggregated by farm revenue and by net farm income classes), the data do not include estimates of transfers from consumers to producers. Moreover, the policies associated with the net program payments are becoming the most significant way that agricultural production in Canada is subsidized (Figure S.1 and the discussion surrounding it).

Support by commodity

The OECD's estimate of total agricultural production supports is broken down by commodities and distinguishes between transfers from taxpayers (directly paid by governments) and transfers from consumers (paid through higher prices, which are ultimately inflated by various government policies) and tends to be reported as a share of the total value of production by commodity (Figure 2A). These so-called "producer single commodity transfers" are transfers from consumers and taxpayers that are uniquely devoted to supporting the production of a single commodity, as distinct from general government agricultural support programs and services that do not necessarily target a commodity. Since Canada terminated its grain transportation subsidies in 1995 (by repealing the Western Grain Transportation Act of 1983), livestock production has received the lion's share of transfers both from taxpayers and consumers; in 2020, more than 80 percent of total production transfers associated with individual commodities were associated with dairy, eggs, and meat (Figure 2B). A large part of this stems from the prices received by Canadian producers in excess of prices for comparable commodities on the other side of the border and is associated with supply management programs in dairy, eggs, and poultry meat, with transfers from consumers to producers exceeding half a billion dollars on average from 2020 to 2022 (Figure 2C-E). Feed crop producers are also major recipients of transfers from taxpayers to producers, which further braces livestock production. Beef and veal receive a significant level of support through such policy mechanisms, and beginning in 2023, support for dairy, poultry and egg farmers was augmented through the Dairy Direct Payment Program (see above) and the Poultry and Egg On-Farm Investment Program (Agriculture and Agri-Food Canada, 2025b).

As noted above, the net program payments reported by Statistics Canada reflects a growing share of total agricultural support payments and excludes transfers from consumers to producers. From 2019 to 2022, an average of $2.52 billion per year was devoted to crop production and $1.21 billion per year was devoted to livestock production, with the share of program payments received by crop production increasing steadily over time (Figure S.3B). Alberta, Saskatchewan, Quebec, and Ontario have been by far the largest recipients of net program payments (Figure S.3D). Below, we discuss the use of these crops as feed, food, and exports to give an indication of how these payments also serve to subsidize the consumption of certain food items.

Canada's agricultural support payments also heavily subsidize the use of inputs, led by fuel. These highly distortionary subsidies are not capped, and thus payments to individual farmers increase with the volume of inputs they use. In 2023, payments for input use alone were $908.2 million, and this annual figure has been increasing in constant terms over time (OECD, 2025).

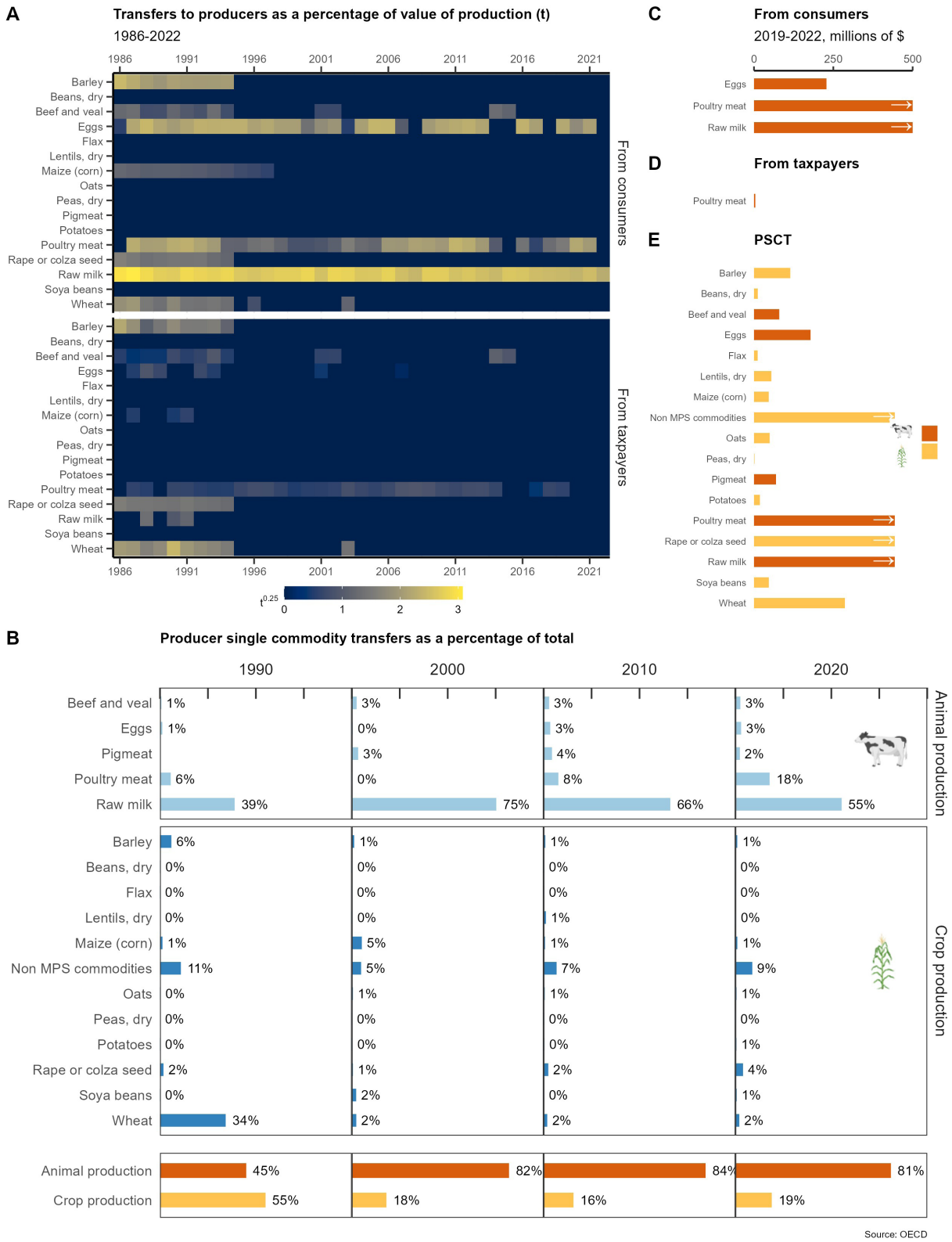

Figure 2: OECD agricultural producer support estimates by commodity (Note: In Panel (A) the heat map shows government transfers to producers as a percentage of value of production, with darker shades indicating lower percentages and lighter shades indicating higher percentages. The percentages are uniformly scaled to improve shade readability.

Agricultural production

This section examines the connections between Canada's agricultural support policies and agricultural production patterns, discussing the consequences separately for livestock and crop production. Our results show that animal feed crop production receives a large fraction of Canada's agricultural production support program payments, which amounts to an implicit subsidy for livestock production where it is a key input (Figure 3).

Livestock

As noted, Canada's agricultural production support policies have historically been heavily concentrated on livestock production and largely aimed at increasing total volume, stabilizing the prices of select commodities, and enhancing export competitiveness. This subsidy regime has contributed to a massive expansion in livestock production over time.

From 1961 to 2022, the total annual volume of meat (cattle, chicken, and pig) produced in Canada increased

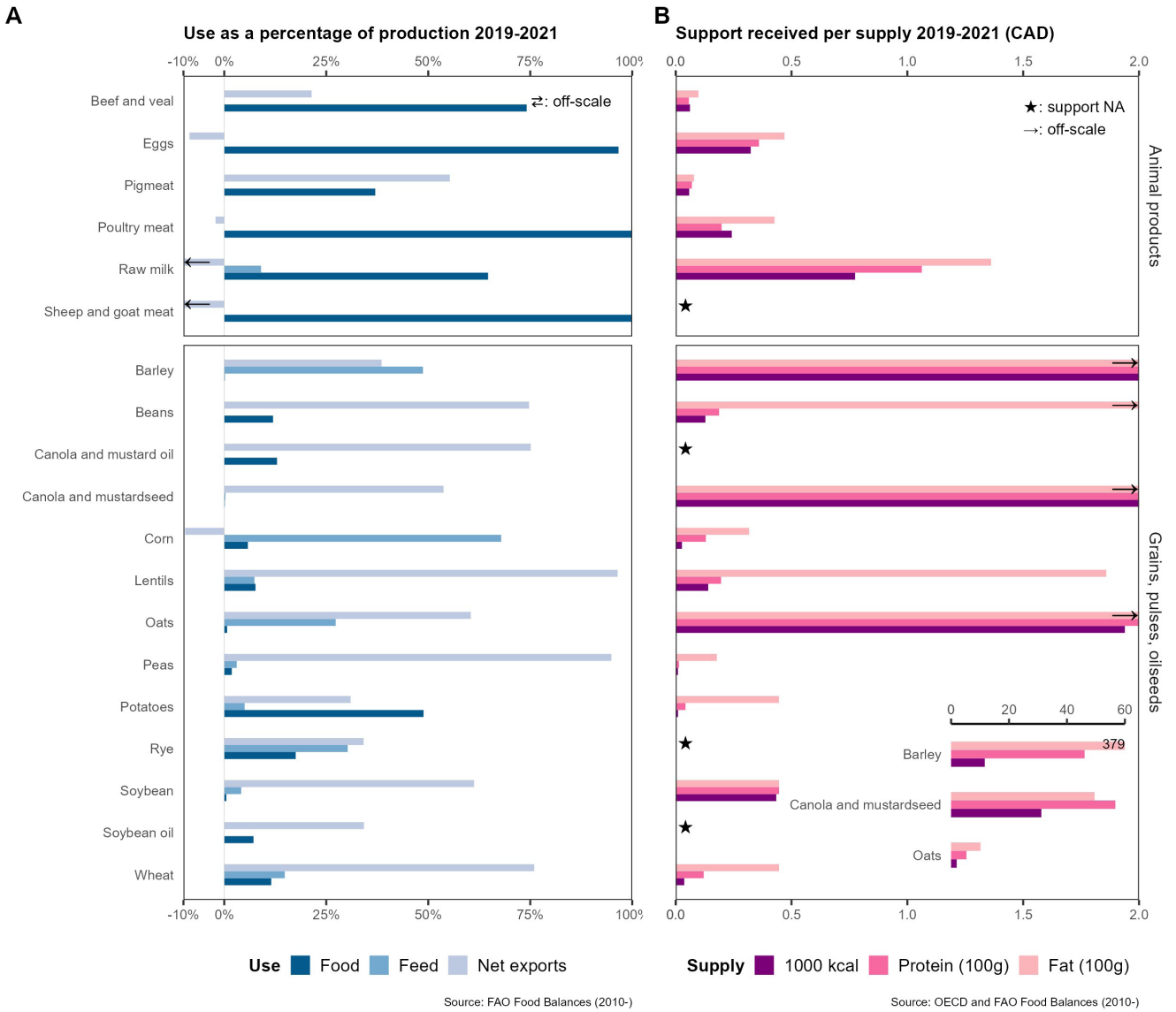

Figure 3: Use, disposition, and support estimates by commodity. (Note: Domestic includes "loss in handling" so that domestic supply equals domestic use, at least in principle.)

by a factor of 3.6 (FAO 2025), and the nature of this growth has been largely in line with global patterns, with pigs and poultry accounting for nearly all the increased volume since the 1970s (Figure 4A). In 2023, nearly three-quarters of all meat production in Canada was from pigs (44 percent) and poultry birds (30 percent), mainly chickens, and pig meat accounted for more than 60 percent of Canada's total meat exports (FAO 2025). As will be elaborated further below, this production is now concentrated on vastly fewer and larger farms than was the case just a few generations ago. Among animal products, Canada runs a significant trade surplus in beef and veal, and pigmeat, and a trade deficit in eggs, poultry meat, raw milk, and sheep and goat meat (Figure 3).

Milk production per dairy cow increased significantly since the 1970s (Figure 4A), such that a rising volume of total milk production now comes from a smaller relative population of dairy cattle. Although Canada is a net exporter of beef cattle, total stocks have fluctuated over time for a variety of reasons, including shifting consumer preferences for pig and poultry meat and periodic health risks such as bovine spongiform encephalopathy (BSE).

Crops

Among crops, support and program payments have had the largest impact increasing the production of canola, corn silage, lentils and soybeans, while wheat and rye notably receive relatively little support (Figure 4B). From the second half of the 1990s until the second half of 2010s, the total volume of canola production increased by a factor of almost three, soybeans by 2.5, corn silage by 2.1, and lentils by 4.5. The increased volumes in many crops relate significantly to rising yields that stem from a combination of new varieties and greater input use. Canola is a good example of this, as yields increased by 61% from the 1990s to the 2010s, while the yields of other crops appear to have been flattened out in recent years (Figure 4C).

There is little doubt that Canada's agricultural policies have been successful in stimulating increased crop output. One very important aspect of this increased production is that only a fraction of total crop production is directly consumed by humans as food. We draw upon data from Statistics Canada to disentangle the various ways that crop production is used, including for human food, animal feed, industrial inputs, seeds, dockage, and exports, as well as some that gets wasted.

However, in pursuing this line of inquiry, it is necessary to acknowledge that there is a degree of fuzziness about various categories, which the three biggest crops produced in Canada—wheat, corn, and canola[5]—help to illustrate. These three crops are directly consumed by humans to varying degrees, such as with wheat milled to produce flour, high fructose corn syrup used in a countless array of processed foods and beverages, and canola pressed into a widely used cooking oil. They are also used as industrial inputs, but there is no standard definition for this, and categorization is done on a case-by-case basis. For corn and wheat, industrial use refers to the portion of production that is diverted to produce ethanol for blending into gasoline. For canola, some oil is used to produce biodiesel and a historic variety of rapeseed is used to produce a specialty high-temperature resistant lubricant (as with other oilseeds, industrial use refers to the amount of product that is known to be used solely for industrial purposes)[6]. Moving beyond these three crops, an additional concern arises from the fact that there are no separate estimates distinguishing human food and industrial uses for several grains, or estimates of human use have remained constant over time, which appears more like an assumption than a direct estimate[7]. There is also some fuzziness about the share of agricultural production used as animal feed, as Statistics Canada does not have separate estimates for what is used as feed, apart from wastage and dockage (S 1.3).

The primary crops used for animal feed on a world scale are corn and soybean. For instance, corn accounts for up to 95 percent of total grain crop used for animal feed (with sorghum, barley, and oats making up the rest) and soybeans supply virtually all of the protein-dense oilseed meal (ERS 2025a)[8]. While these specific estimates are from the United States, it is possible to get a sense of the scale of feed crops in Canada from a combination of Statistics Canada and FAO data, and we report these feed estimates as a share of domestic supply (and use) and production (Figures 3, S.4C-D).

Canada is a large net exporter of grains and oilseeds,

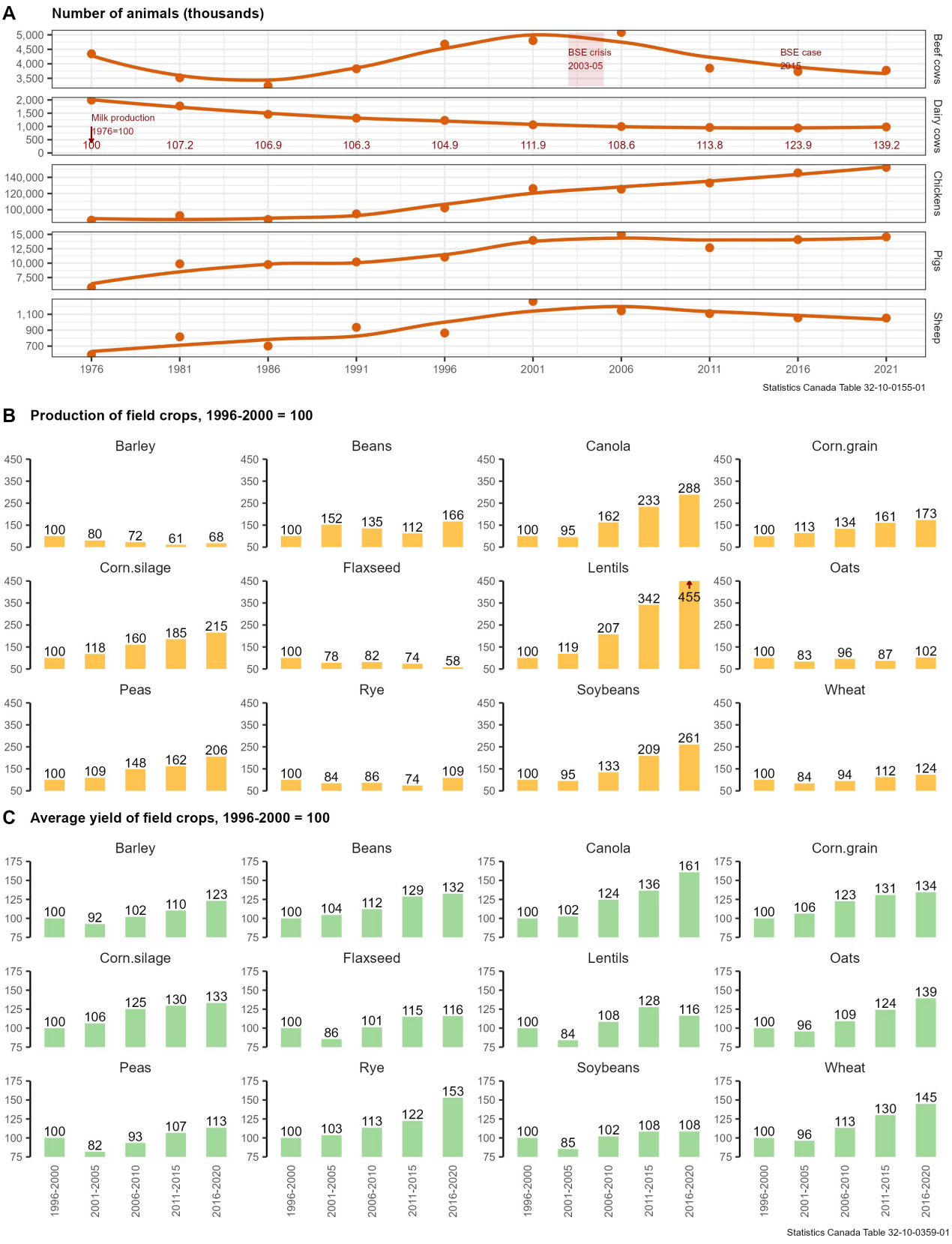

Figure 4: Farm production and yields

led by wheat and canola, demonstrated by the large differences between ratios using domestic use and production values. However, one grain crop that Canada consistently runs a minor trade deficit with is corn, which averaged less than 10 percent of the total volume of Canadian production in the 2019-2021 period (Figure 3).

Although the Statistics Canada and FAO data on feed is not consistent (as Statistics Canada fails to separate feed from waste and dockage), both estimates agree that a large share of Canadian grain and oilseed production are used as animal feed[9]. Both estimates indicate that more than 70 percent of Canada's domestic supply of barley and oats are used as animal feed, along with more than 50 percent of corn, and about 40 percent wheat. Canadian oilseed production is overwhelmingly used for either animal feed or industrial inputs, and a large share (roughly 75 percent) of the total annual volume is exported (Figure 3). In 2023, close to 60 percent of the canola (6.2 of 10.6 mt) that was processed domestically in Canada comprised meal, which is mostly used for livestock feed, and just over 40 percent comprised oil, which is used in cooking and as an industrial lubricant and fuel (Canadian Oilseed Processors Association, 2025). In 2023, nearly 80 percent of the soybeans processed domestically in Canada comprised meal, and was primarily used as a protein-rich animal feed (Soy Canada, 2024)[10]. In addition to grains and oilseeds, Canada is also a significant producer of pulses, and these are also highly export oriented (Figure 3). Of what remains in Canada, 40 percent of pulses are used for animal feed.

In sum, it is evident that most grains, oilseeds, and pulses cultivated in Canada are not being directly consumed by Canadians and instead are either used as animal feed or industrial inputs or sold as exports. Although we cannot trace what happens to Canadian exports of canola or soybeans, we can assume that their use in Canada is representative, and that they will also be largely used as animal feed or industrial inputs in importing countries (Nye & Youngman, 2024). Despite limits in the data, it is possible to get a good approximation of the total volumes of Canadian grains, oilseeds, and pulses that are used as animal feed, either domestically or through exports, and a number of these crops are heavily supported through various agricultural policies. We can also translate the volume of feed crops produced to the land they command, which amounts to more than 20 million acres or about 30 percent of all cultivated land in Canada, which is about the same size as the entire country of Austria (Figure 5).

Consumption and diets

Agricultural production support policies directly and indirectly affect the production of various commodities, the prices that farmers receive, and the prices that consumers pay, and because the volumes and prices of some foods are being subsidized relative to others, these policies should also be understood to have a significant effect on societal food consumption patterns. Since the 1960s, the total annual volume of meat consumed in Canada has nearly quadrupled, and the average Canadian consumes nearly 100 kg of meat per year, more than double the world per capita average (45 kg/year). Nearly all the increased volume in Canadian meat production and consumption since the 1970s has come from pigs and poultry, while the per capita consumption of milk, beef, sheep, and goat meat have declined (FAOSTATS 2025; Figure S.4A), reflecting a shift in domestic consumer preferences. This shift may be motivated by a combination of factors, including prices, tastes, marketing, and health advocacy favouring "white" meat over the fattier flesh of ruminants. Meanwhile, the durability of Canadian beef exports reflects the competitiveness of the sector in the absence of direct subsidies.

These consumption patterns have important implications for sustainability and health. To appreciate this, it is helpful to evaluate the average Canadian diet in relation to the dietary guidelines in the EAT-Lancet Commission (henceforth EAT), which involved a global consortium of experts assessing a vast array of literature at the intersection of diets, epidemiological patterns, and environmental science, and concluded with an assessment of food consumption patterns that would optimize human and planetary health (Physicians Committee for Responsible Medicine, 2025; The Nutrition Source, 2025; Springmann et al. 2020; Willett et al., 2019; Figure S.5). It is

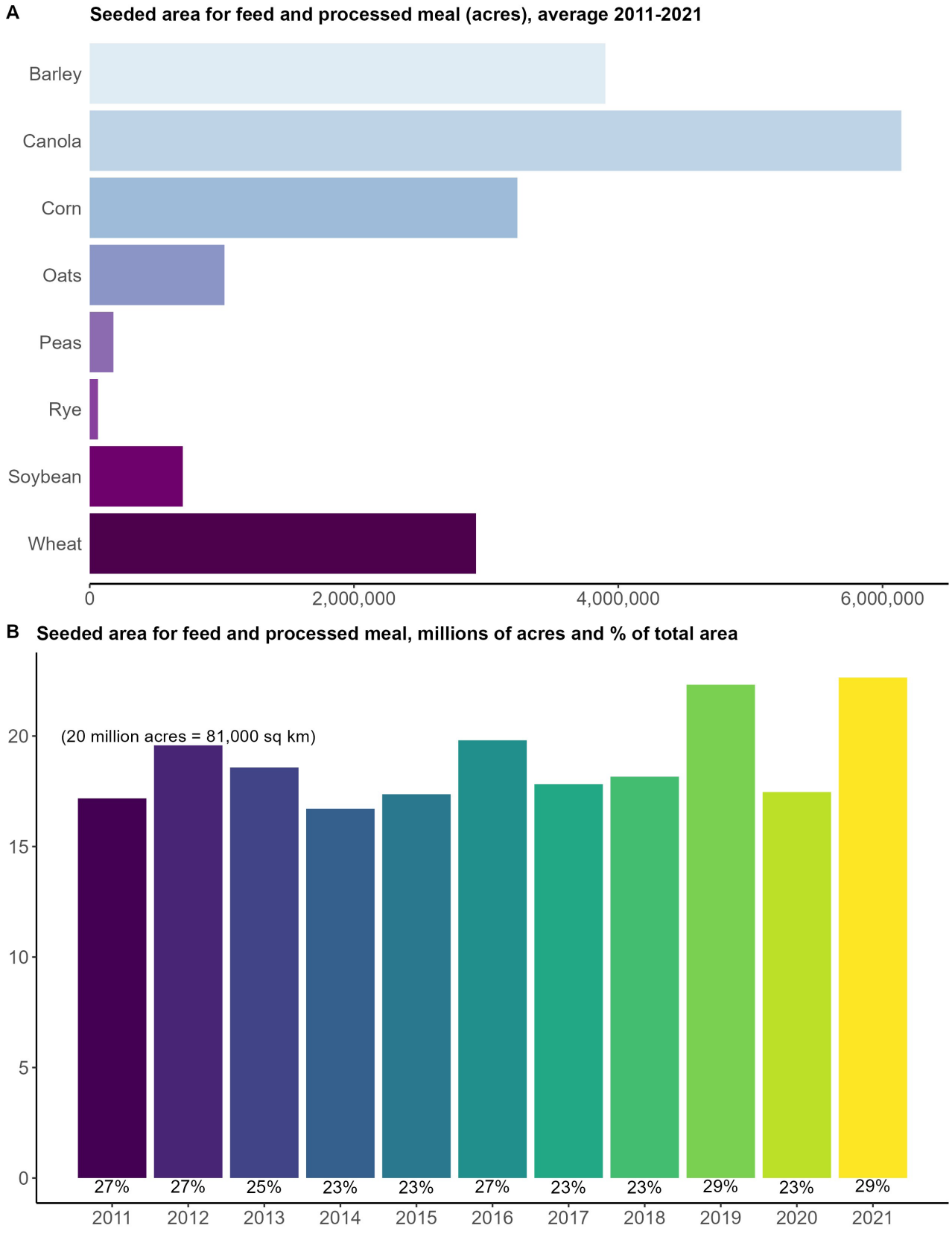

Figure 5: Seeded area for feed and processed meal, by commodity and total

also notable that Canada's Food Guide (Government of Canada, 2025) is broadly consistent with these recommendations, though it is not prescriptive and focusses on health without attempting to account for environmental considerations.

As illustrated in Figure 6, if the average Canadian were to follow EAT guidelines, this would entail reductions in the consumption of animal products by roughly 80 percent, from around 100 kg to 20 kg, as well as a 50 percent reduction in sugar and a 15 percent reduction in fruits. As well, a growing body of research links the rising consumption of Ultra Processed Foods (UPFs) to worsening health outcomes. The convenience, alluring flavouring, and "snackability" of UPFs like chips, breakfast cereals, cookies, cakes, and crackers regularly contain unhealthy amounts of salt, sugar, and fat (Moss 2013). One systematic review linked the consumption of UPFs among adult populations to greater risks of: obesity, unhealthy weight, and cardiovascular diseases; a variety of cancers; type-2 diabetes; irritable bowel syndrome; and depression. The consumption of UPFs among children and adolescents is also implicated in a range of adverse health outcomes (Elizabeth et al. 2020). Conversely, following EAT guidelines would compel far greater consumption of other food groups, as the average Canadian would need to increase their consumption of vegetables, whole grains, and staple foods (like grains and potatoes) by at least 25 percent and increase their consumption of pulses by more than 165 percent.

In short, Canadian dietary patterns are very far from the EAT guidelines, and the goal of improving both sustainability and health outcomes, and two of the most important features of this discrepancy are the overconsumption of animal products, UPFs, and the insufficient consumption of pulses, vegetables, and whole grains. One troubling and contradictory element of this is that despite being a major producer of several pulses and grains, Canadians are consuming them well below recommended levels and exporting them in large volumes. Viewing Canadian dietary patterns in relation to EAT guidelines also shines a light on the extreme misalignment between Canadian agricultural production support policies and sustainability and public health goals. Making matters even worse, the benefits of these support policies have been unevenly distributed across farmers and have disproportionately advantaged large-scale producers, and the failure to sufficiently support small and medium-size farmers is reflected in the polarizing trajectory of agriculture in Canada.

Increasing consolidation

Consolidation and increasing concentration are two key long-term trends in the Canadian agri-food sector. Consolidation is a process driven by mergers and acquisitions, which increases the average size of operations. Concentration is an outcome which measures the market power of firms and tends to increase with consolidation when entry is limited. Canadian agriculture has long experienced farm consolidation, and it is illuminating to consider this over the past half century. From 1976 to 2021, there was a nearly 45 percent drop in farm operators in Canada, falling from 338,552 to only 189,874 (Statistics Canada, 2022). According to the most recent census, current to 2021, beef cattle and dairy cattle were the livestock farm types with the largest number of operators, while oilseed, grain and other field crops were the crop farm types with the largest number of operators (Figure S.6B). The trajectory of farm consolidation increased the number of large farms relative to small and medium-size farms as measured by revenues. From 1981 to 2016, there was a significant decline in the number of farms with annual farm receipts of $250,000 or less and an increase in the number of farms with annual receipts above $500,000 (Figure 7A)[11].

From 1976 to 2021, the cultivated area declined only slightly, as a result the decline in the number of farm operators largely represents a massive consolidation in agriculture measured by the number of farms by area. Statistics Canada reports the size distribution of farms by area in 14 distinct area classes, ranging from "Under 10 acres" to "3,520 acres and over" (Figure 7C). Classifying farms as small, medium, and large by area is admittedly imperfect, and does not account for regional differences in agro-climatic considerations[12]. Nevertheless, using these categories, the data illustrate that small- and medium-scale farms have been shrinking in numbers. From 1976 to 2021, the number of farms in size categories with less than

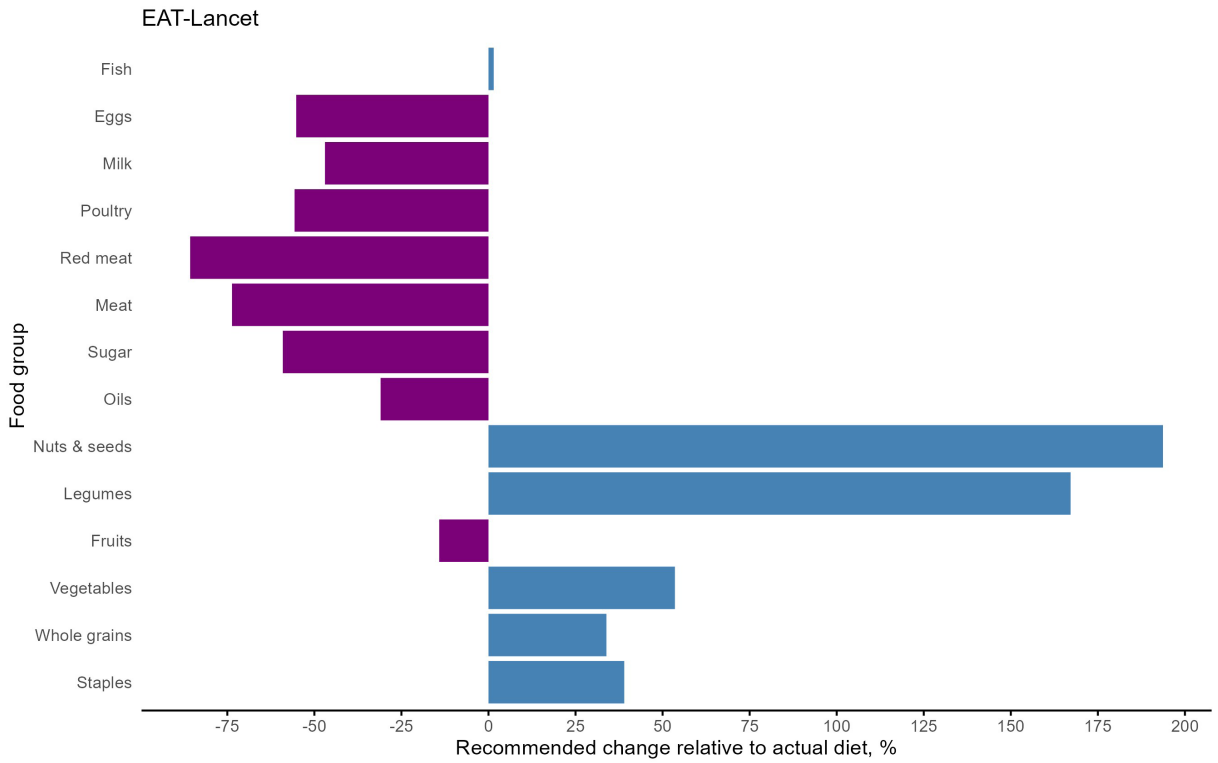

Figure 6: Recommended change in average diet by food product relative to EAT-Lancet Commission guidelines, based on Springmann et al. (2020)

1,600 acres decreased significantly, while there was a noticeable increase in the number of large farms with more than 2,240 acres[13].

Provincial data on the number of farms by receipt class and by area (Figures 7B, D) indicate significant differences across these two distinct measures of farm size. In the case of receipt class, national trends are consistent across all the provinces, with a noticeable decline in the number of small- and medium-scale farms and an increase in the number of large farms. In the case of area, however, there are observable differences across provinces, with the consolidation of farms over time especially striking in the prairie provinces of Alberta, Saskatchewan, and Manitoba. Ontario has experienced a sharp decrease in the number of small- and medium-size farms, but not a corresponding increase in large farms, while Quebec has been relatively less affected by farm consolidation. Regardless of the provincial differences and the differences measured by receipt class and area, it is abundantly clear that the average farm in Canada is getting bigger and small- and medium-scale farms are in decline.

While the consolidation of Canadian agriculture is evident in both livestock and crop production, it is especially dramatic with livestock. In 1951, most Canadian farms had relatively small populations of multiple livestock species: 79 percent reported cattle (493,321), 58 percent reported pigs (364,068), and 69 percent reported chickens (427,317), either for eggs or flesh or both. Since then, however, livestock farming has been entirely transformed, by the rise of Concentrated Animal Feeding Operations (CAFOs) or what are widely referred to as "factory farms". The design of CAFOs has been shaped by the twin goals of increasing bodily yields and labour productivity with rising densities and automation essential to the reduction of unit costs—a competitive discipline that has made it increasingly harder for smaller scale operations to survive (Weis, 2025). From 1976 to 2021, the number of beef cow operators decreased by an average of 1.5 percent per year and the number of pig farms decreased by an average of 2 percent per year, while the average number of beef

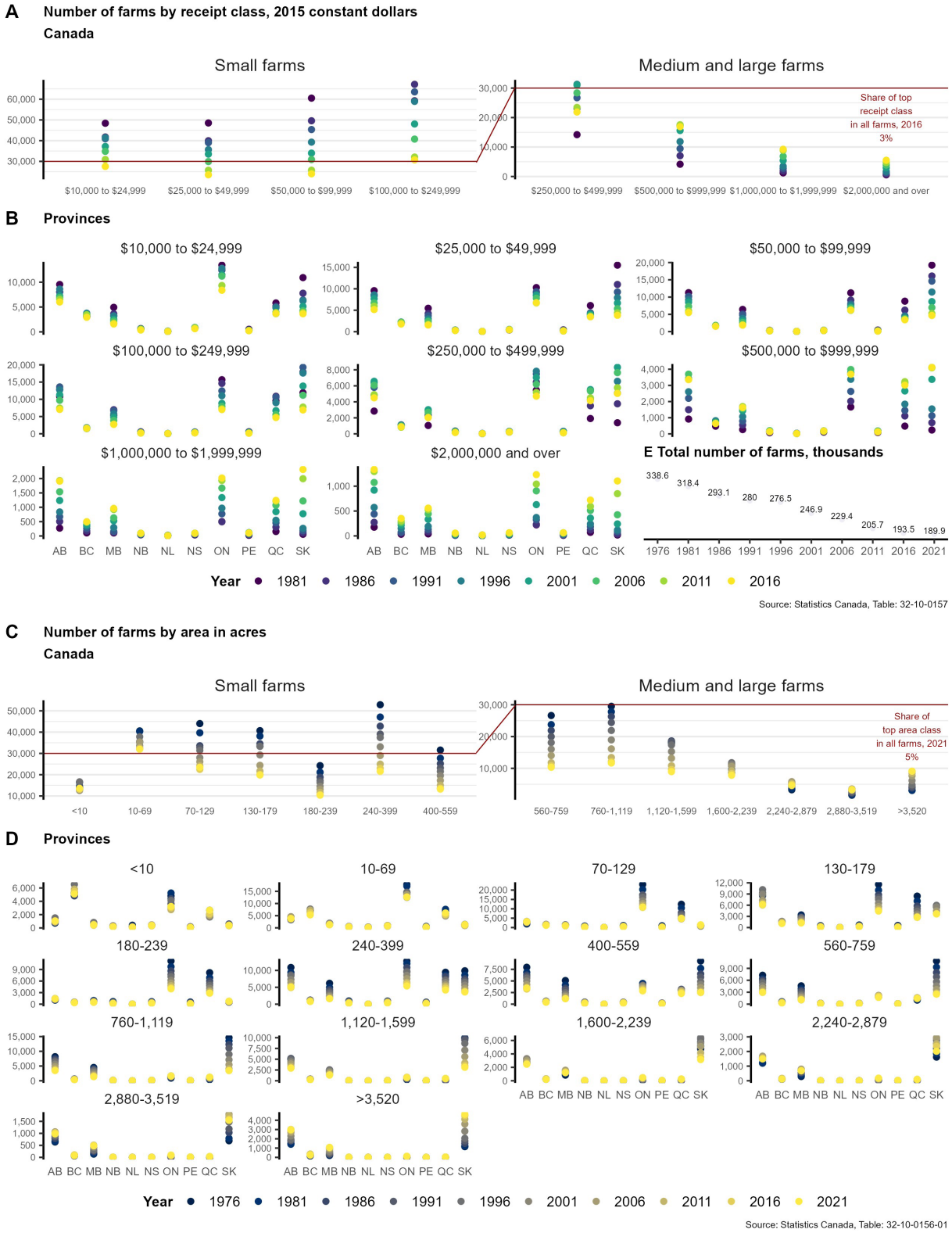

Figure 7: Number of farms by receipt class and area Note: Each dot in the panels corresponds to a year and the number of farms by receipt class (panel A), by area (panel C) or by province (panels B and D). Data are in five-year intervals. Data on receipt class start in 1981, and data on area start in 1976. For both series, the latest year for which we have available data is 2021. Lighter shade values correspond to more recent years.

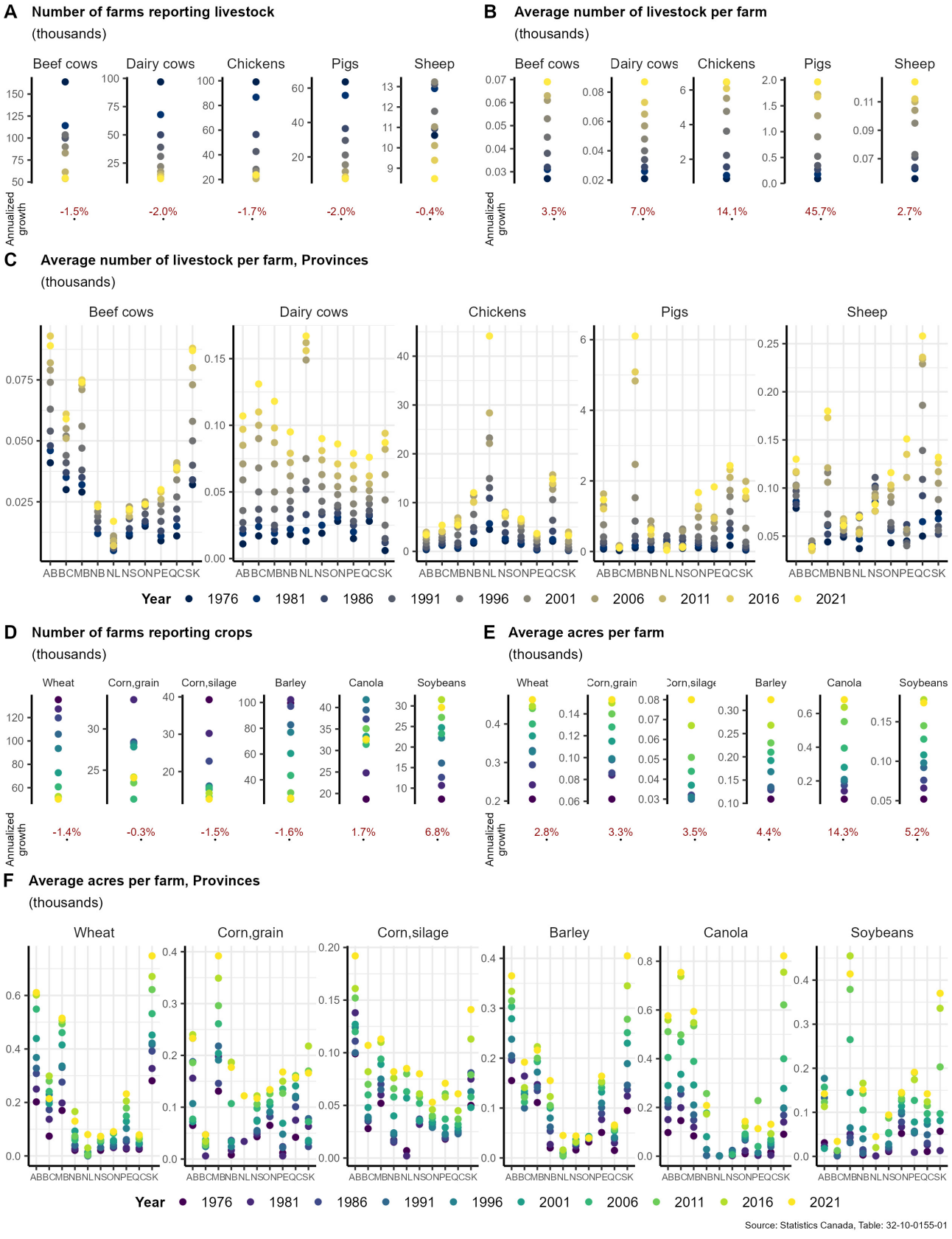

Figure 8: Number and average size of farms reporting livestock and crops

cows per farm operator increased by 3.5 percent (Figure 8A-C) and the average number of pigs per farm literally exploded. Dairy and poultry farms—sectors that operate under supply management—did not fare much different. From 1976 to 2021, the number of dairy cow farms decreased by about 2 percent per year and the number of chicken farms decreased by 1.7 percent per year, while the number of dairy cows per farm increased by 7 percent and the average number of chickens per operator increased by a whopping 14.1 percent per year. As a result of this trajectory, there are now vastly fewer and larger operations than there were in the mid-twentieth century. In 2021, pig production in Canada occurred on a mere 7,423 operations, only 7,505 operations reported producing broiler chickens (with the average broiler farm growing nearly 14,400 birds at a time and turning over this "inventory" many times a year), and only 18,536 operations reported producing eggs (with the average layer shed housing over 1300 hens at a time) (Statistics Canada, 2021).

The dramatic consolidation in livestock production in Canada is fundamentally rooted in declining margins, market pressures imposed by supply chains, and the competitive advantages associated with larger scales of operations. However, Canada's agricultural production support policies should also be understood to have played a significant enabling role in this trajectory. In supply management systems, one driver of consolidation is the capitalization of ever-increasing rents in quota valuations, which increases barriers to entry for prospective young farmers with limited start-up equity. Another emerging way that government support policies reinforce consolidation in the livestock industry is the response to the HPAI (avian flu) crisis that began in 2022, which has involved the "depopulation" of around 15 million birds in Canada, mostly in BC (Charlebois, 2025). While industrial livestock enclosures are worsening long-term threats associated with infectious diseases, government support policies (Agriculture and Agri-Food Canada 2025b) have focussed on increasing the biosecurity of industrial enclosures and compensating farmers for depopulated flocks (subsidizing their repopulation), which serves to further reinforce the trend towards more consolidation and larger-scale industrial operations.

There has also been a large degree of consolidation in grain and oilseed farming, with the increasing production of oilseeds influenced by the growing demand for livestock feed. From 1976 to 2021, the number of farm operators growing canola increased by 1.7 percent per year and the number of farm operators growing soybeans increased by 6.8 percent per year (Figure 8D-F). Further, canola and soybeans were only cultivated on a relatively small number of acres per farm in 1976, but the average acreage dedicated to these crops increased dramatically over the ensuing 45 years. As discussed, large shares of canola and soybeans are used as livestock feed, and thus the increasing conversion of farmland from crops that directly feed humans to crops that primarily feed livestock is one important component of the overall consolidation in crop production in Canada.

As with livestock, while declining margins, market pressures and market-induced advantages of economies of scale prove a driving force in the consolidation of crop production, the nature of Canadian agricultural production support policies has further contributed to this trajectory. Transfers from taxpayers and consumers to agricultural producers are partly capitalized in land values (OECD, 2002) and thereby contribute to the rising valuation of farmland. Rising farmland values, in turn, constitute a significant barrier to both prospective young farmers and to farm succession within families, and this makes the consolidation of farmland more likely.

In sum, the consolidation of farm operations in Canada over the past half century was not simply a matter of average farms getting bigger, but of agricultural production as a whole shifting towards a greater focus on livestock, through both increasingly large-scale meat, dairy, and egg operations and greater feed crop production. Although it is beyond the scope of discussion here, the growing consolidation of farms and the declining number of farm operators should also be understood to have had major negative implications for the vibrancy of rural communities. Dramatic increases in the value of farmland and production quotas will complicate the challenge of intergenerational renewal in agriculture and further inhibit the entrance of prospective young farmers (FCC, 2025)[14].

The polarization of farm incomes

While Canadian agricultural production support policies have contributed to increased total farm revenues, rising total production and yields, and competitive exports in several commodities, many farmers face constant financial stress. The root causes of farmers' financial woes are long standing and multifaceted, with rising debt an important manifestation of increasingly precarious economic conditions. Between 2000 and 2019, total farm debt in Canada nearly doubled, topping $100 billion (Qualman and the National Farmers Union, 2019, p.5), and by 2022, farm debt had risen further to $139 billion (Statistics Canada, 2025). This translates to a debt-to-revenues ratio of 128 percent and a debt-to-revenues net of expenses ratio of 686 percent.

Increasing farm debt, of course, does not by itself imply economic duress. On the asset side of agriculture balance sheets, farmland valuations have also been increasing over the last 20 years, doubling from 2006 to 2014 and doubling again from 2015 to 2024 (valued at $785 billion in 2024; Statistics Canada, 2026). Because farmland valuations increased faster than liabilities over this period, the debt-to-equity ratio in the agricultural sector is now lower than what it was in 2006, although still above what it was in the 1990s (Figure S.7).

There are several considerations that qualify the gains in asset values. While agricultural prices exhibit high volatility, which contributes to volatile farmland prices, farm debt is contractually fixed in value. The debt-to-equity ratio does not make an allowance for the risk of future price declines that farmers bear. Moreover, the rate of return on investment is a common indicator of economic profitability. With an average annual return on equity often less than 2 percent (Figure S.8), unadjusted for risk, agriculture is not a sector with high economic returns. In addition, rising farmland values largely benefit older and more established farmers, while making access financially more difficult for younger aspiring farmers. According to the estimates by Farm Credit Canada (FCC, 2025), purchasing new farmland has become much more expensive in Canada since the mid-2010s, raising concerns about the uneven distribution of benefits across generations and the prospect of generational renewal, especially for aspiring farmers who do not have access to a family farm.

A common indicator of farm profitability is to express, for a given year, farm expenses as a ratio of farm revenues, with a ratio above one indicating economic losses. This ratio tends to vary by revenue classes, with farms in upper revenue classes exhibiting lower expenses-to-revenues ratios. To illustrate the highly uneven distribution of farm profitability in Canada, we thus assessed the expenses-to-revenues ratio by revenue classes (see Figure 9A). Between 2015 and 2022, an average farm in the lower revenue classes (less than $100,000) consistently faced operating expenses exceeding revenues, at times at a margin of 1.5 to 1. Sometimes, sudden economic losses can stem from crop failures or livestock disease outbreaks, and for operators carrying significant debts this can have a devastating impact on profitability. Nevertheless, the differences in expenses-to-revenues ratios are on average 30–50 percent lower for higher revenue classes, indicating that profit margins are highly unequally distributed between the lower to upper revenue classes.

Livestock and crop production tend to have different expenses-to-revenues ratios. Livestock production accounts for about half of all farm expenses in Canada, but less than half of all farm revenues, indicating that crop farming tends to involve greater margins and be more economically profitable (Figure 9B). Among crop farms, those with annual operating revenue of $2,000,000 or over accounted for roughly 60% of the national total (Figure 9D), with this share having increased significantly over time, despite accounting for less than 3% of all farms (Figure 7A). Among livestock farms, in 2022, those with annual operating revenues of $2,000,000 or over accounted for about 65% of the national total. But despite these differences between livestock and crop production, in both cases operators in higher revenue classes tend to have lower expenses-to-revenues ratios (Figure 9C), although the highest revenue-class of livestock operators exhibit relatively high expenses-to-revenues ratios. Given the limits of available data, it is difficult to extend this analysis to differences across farm types within livestock and crop production (but see Figure S.6 and the discussion surrounding it).

In sum, the data on farm incomes and expenses-to-revenues ratios starkly illustrates the precariousness of farming, especially for small- and medium-scale farming operations. Many farmers consistently struggle with low profit margins and heavy reliance on costly machinery and inputs, which has resulted in unsustainable debt loads (Qualman & NFU, 2019), and the consolidation of farms is reflected in a striking degree of revenue polarization.

Unfortunately, the impact of agricultural production support policies on the distribution of income among Canadian farmers has not received sufficient attention. While most of these policies are not explicitly intended to have either progressive or redistributive outcomes among farmers, their design and delivery inevitably have inadvertent distributional effects. In the late 1990s, an analysis of the distribution of agricultural supports received by farms in Canada found that they tended to be more concentrated than gross farm output, with a disproportionate amount of support going to larger producers (OECD, 1999), and this in turn increased the concentration of farm receipts and tilted the distribution of income within the agricultural sector even more towards larger farms. However, a more recent study (Moreddu, 2011) found that in Canada in 2007, the top 25 percent of the farms by gross agricultural output accounted for slightly less than 70 percent of gross agricultural output and received almost 60 percent of the total support payments, whereas the bottom 25 percent of the farms accounted for about 5 percent of gross agricultural output and received about 8 percent of the total support payments (Moreddu, 2011, figures 3.1 and 3.2)[15]. This regressive pattern, with the biggest operators getting the most total support, is made worse by the fact that the financial benefits of various support policies do not fully accrue to farmers, and a significant portion gets captured at other points in the supply chains, as indicated in the preceding section.

Although we are unable to update these estimates (because of restrictions on access to the data needed to calculate the distribution of income and support payments across farms) we can shed some light on recent dynamics by combining several data sources published by Statistics Canada on net program payments. Between 2015 and 2022, the distribution of net program payments across revenue classes and farm types shows that farms within higher revenue classes received a larger share of these payments (Figure S.3D). During this period, farms with annual operating revenues of $2,000,000 and over received about 45 percent of all the payments, including 15 percent received by livestock producers and 30 percent by crop producers, while farms in the lowest three revenue categories received a negligible share of the payments (Figure S.3B).

Conclusion and future research

We have argued that while Canada's agricultural production support policies have contributed to long-term increases in volumes and yields in many commodities, they have not helped stabilize the financial situation for most farmers, and have disproportionately benefited large-scale operations, which amplify the financial incentives to consolidate farms and effectively "get bigger". We have also argued that these policies have outsized impacts on a small range of commodities, benefiting crops that are largely used for livestock feed and industrial products and that are heavily exported. The bias towards large-scale livestock operations and crop farms has exacerbated the striking consolidation that is occurring in both realms and has also indirectly benefited corporations within increasingly oligopolistic agricultural supply chains, a topic that deserves further analysis in future research.

The focus of support on livestock feed, industrial products, and meat and dairy does not align with major scientific assessments about sustainability and healthy diets, or the central objectives set out in Canada's Food Guide. Moreover, Canadian agriculture remains highly input-intensive, with agricultural support policies, such as fuel subsidies, further incentivizing industrial methods, although it is not clear to what extent these policies stimulate the use of pesticides and synthetic fertilizers (and this is a subject that warrants attention in future research).

We acknowledge that Canada may not necessarily produce the volumes of fruits and vegetables to match the level of domestic consumption recommended by Canada's Food Guide. However, there is nothing inevita-

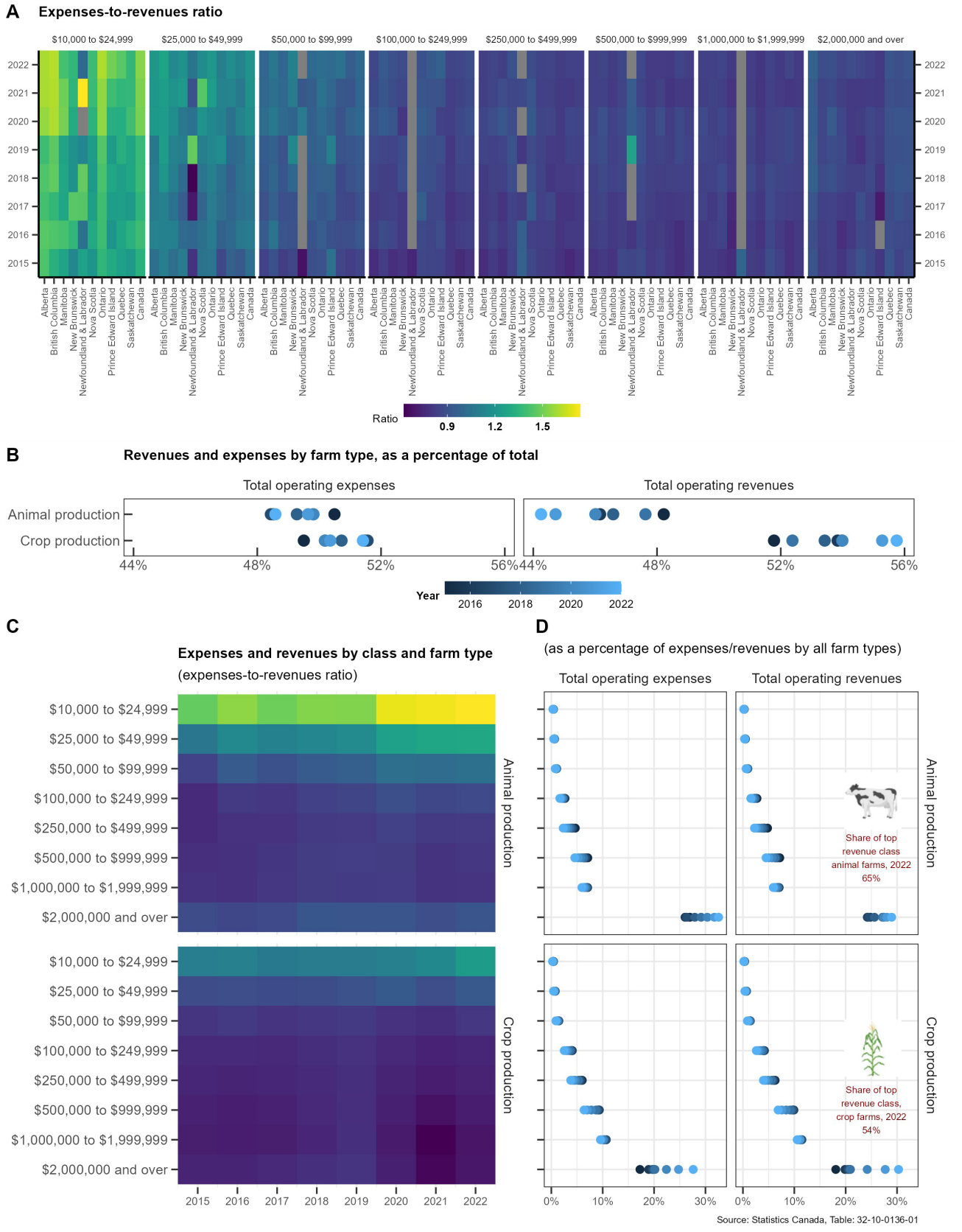

Figure 9: See caption on following page.

Figure 9 (previous page): Farm expenses and revenues by farm type and revenue class. Note: Panel (A) The heat map of the expenses-to-revenues ratio by revenue class (by subpanel), province, and year (from 2015 to 2022). Darker shades indicate lower expense-to-revenue ratios (higher financial profitability), and lighter shades indicate higher ratios (lower financial profitability). For a revenue class-province pair, going from bottom to the top of the map illustrates the changes in expenses-to-revenues ratio over time. Panel (D) The heat map of the expenses-to-revenues ratio by revenue class, year, and farm type (by subpanel). Darker shades indicate lower expense-to-revenue ratios (higher financial profitability), and lighter shades indicate higher ratios (lower financial profitability). For a revenue class-farm type pair, going from left to the right of the map illustrates the changes in expenses-to-revenues ratio over time. Panels (B) and (D) Each dot in the panels corresponds to a year from 2015 to 2022. Lighter shade values correspond to more recent years.

ble about this, and efforts to enhance fruit and vegetable production in Canada could be directly linked to the goal of supporting more sustainable smaller-scale farms and more resilient bioregional agri-food systems.

As noted at the outset of this paper, Canada's agricultural support policies are framed by notions of "sustainability" (the Sustainable Canadian Agricultural Partnership, Agriculture and Agri-Food Canada, 2025c) and "resilience" (the Resilient Agricultural Landscape Program, Agriculture and Agri-Food Canada, 2025d). There are also programs operating outside Agriculture Canada's portfolio that are meant to "tackle" or "solve" climate change (the Agricultural Climate Solutions, Agriculture and Agri-Food Canada, 2025e). However, most of these new programs focus on extensive land management practices related to grain, oilseed, and livestock production, such as cover cropping, rotational grazing practices, and even the subsidization of synthetic fertilizer use[16]. These are not transformative changes and fall far short of tackling the negative environmental and health implications of Canadian agri-food system as it is currently configured. We argue that there is an urgent need to reorient agricultural production supports in Canada, with improved environmental sustainability, equity, and public health outcomes the overarching objectives that should guide future policies.

Endnotes

[1] Before Canada's dairy export subsidies were dismantled, they complemented supply management by helping to stabilize domestic supplies and increase domestic market prices—though in this case involving a cost to consumers.

[2] The quotation is from a concise submission to the World Trade Organization (WTO) by the Canadian delegation dated 29 May 2018 (WTO, 2018).

[3] We stress that farmers are not typically the sole beneficiaries of the transfers from taxpayers and consumers because part of the additional income earned through such programs "leaks" to input producers, processors and landowners. One estimate (OECD, 2001) suggests that on average only 25% of a market price support program directly benefits farmers, and in the case of input subsidies this further declines to as low as 17%. Thus, these policies support a range of activities outside the intended beneficiaries.

[4] These are: consumer support estimate as a percentage of value of production; general services support estimate (GSSE) as a percentage of total support estimate (TSE); producer support estimate (PSE) as percentage of gross farm receipts (GFR); total budgetary support estimate (TBSE) as a percentage of gross domestic product (GDP); total support estimate as a percentage of GDP. We also report (Figure S.1) all the estimates in the numerators as a percentage of farm net operating income (NOI).

[5] Canola is a Canadian-developed variety of rapeseed and is largely produced for export markets.

[6] Email communication by the AAFC specialist, dated April 16, 2024

[7] In the case of flaxseed, even aggregated data on human food and industrial use are unavailable due to data confidentiality (because of concentration in the processing industry), meaning that domestic use data are grossly understated, comprising only the estimates of seed, loss in handling, feed, waste, dockage, and statistical discrepancy.

[8] According to Gary Berg of the United Soybean Board "animal agriculture consumes 97 percent of U.S. soybean meal" (mostly for chickens, hens and pigs) and "investing in animal agriculture helps grow demand for U.S. soybean farmers" (Smith, 2023). Soybean meal is a protein-rich byproduct of soybean crushing for oil extraction. Aside from being consumed as animal feed it is also used as human food in tofu, soy milk, and meat substitutes, and has industrial uses like adhesives, biodegradable plastics, and biofuels (Agrilinkage, 2023). In the United States, in 2023, 47 percent of domestic soybean supply was crushed, 45 percent was exported, and out of the total domestic disposition 42 percent was for biofuel production (ERS, 2025b; tables 3–5). Soybean disposition in Canada is also dominated by animal feed and exports.

[9] According to the Animal Nutrition Association of Canada, in 2023 an estimated 29.2 million mt of feed processed by commercial and on-site farm mills were consumed by Canadian livestock, meaning domestic feed processors are almost exclusively producing for the domestic market. Pigs, cattle, and poultry birds accounted for about 97% of that total. While the share that feed

represents in the total cost of livestock production varies across species, it is estimated to be as high as 75 percent in ruminants, which have lower feed conversion ratios (Animal Nutrition Association of Canada, 2025).

[10] The soybean sector in Canada is representative of the logic of the contemporary international trade system, as about 24 percent of total meal produced and 42 percent of total oil produced were exported in 2023 (with China being by far the top destination), while that same year, 434,000 mt of soybeans, 1.1 mt of soy-based meals, and 223,000 mt of soy-based oil were imported.

[11] We are only able to use data from 1986 to 2016 because Statistics Canada does not always adjust the revenue data for inflation. The revenue classes we report here are in 2015 constant dollars and are not consistently available from 1976 to 2021. There are nine revenue classes, ranging from "less than 10,000", which we drop as these farms are likely to be a very heterogeneous group, to farms with revenues "2,000,000 or over." So, the changes in the number of farms in each revenue class is not due to changes in prices, but due to the expansion of the number of large-size farms.

[12] In the Prairie provinces, for example, it is unlikely that a contemporary farm less than 5,000 acres would be considered large—a category that is higher than the lower bound for largest area class in Statistics Canada's reporting system.

[13] Unfortunately, Statistics Canada does not publish data on holdings by size as a percentage of total holdings. A brief discussion of the ongoing concentration along the agricultural supply chain is included in the supplementary materials.

[14] Farm consolidation is increasingly influenced by the growing investments made by large-scale financial institutions in farmland and agricultural production (Stephens, Clapp, & Isakson, 2022; GRAIN, 2024). A brief discussion of the ongoing concentration along the agricultural supply chain is included in the supplementary materials.

[15] The findings for a more narrowly defined total "direct" payments are similar: the share of the top 25 percent farms is over 50 percent and the share of the bottom 25 percent farms is less than 15 percent (Moreddu, 2011, figures 3.1 and 3.2).

[16] In 2023, for example, the On-Farm Climate Action Fund (Agriculture and Agri-Food Canada, 2025f) reimbursed farmers impacted by the rising price of synthetic fertilizers.

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Conflicts of Interest: None to declare

Funding: Talan İşcan and Kathleen Kevany acknowledge the financial support provided by the MacEachen Institute.

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Appendices

See following pages for Supplementary Material for:

"What do Canadian agricultural policies support?: The need toprioritize environment, equity, and health"

S.1 Data sources and variables

S.1.1 OECD's main agricultural support indicators: definitions and examples

OECD (2023) uses a number of indicators that track agricultural support programs in a way that is comparable over time and across countries.

The **producer support estimate** (PSE) is the monetary value of transfers from consumers and taxpayers to agricultural producers due to policies that provide support to agriculture. In Canada, these transfers are arise from supply managed production systems, import restrictions, or direct income transfers to farmers.

The **consumer support estimate** (CSE) is the monetary value of transfers to consumers of agricultural commodities. Food subsidies that reduce the cost of agricultural commodity purchases by consumers are included here.

The **general services support estimate** (GSSE) is the monetary value of transfers through privately or publicly-provided services and institutions that primarily support the agricultural sector and that do not involve any direct payments to individual producers or consumers. In Canada, General Services Support is a collection of several programs available to producers and agri-businesses. At the time of the writing, there were a number of Agricultural Programs and Services (accessed 13 March 2024). For example, two programs listed therein relate to industry "promotion":

- AgriCommunication Program (federal): non-payable contributions up to $8 million must support "activities which increase appreciation and pride in the contributions of farmers and the food industry and enhance public trust. The activities will help strengthen public trust about the origin of the food Canadians eat and how it is produced."
- Agri-Food Trade Services (federal): support the "Canadian food industry and businesses reach international markets."

Producer, consumer and general services support estimates are annual, gross measures (reverse transfers are not netted out), calculated at the farm gate level (except for GSSE), and can be wide-ranging in terms of their impacts on farm production or income. Whereas producer and consumer support transfers directly affect producer receipts or costs to producers and consumers, general services support transfers do not. OECD (2016) provides a detailed discussion of each of these concepts.

S.1.2 Statistics Canada's Net Program Payments: examples

We use net program payments reported by Statistics Canada to complement the OECD data and to evaluate the distribution of agricultural support programs across farm types. According to Statistics Canada (personal correspondence, email dated 8 March 2024) the "Revenue - Program payments and insurance proceeds" variable is the sum of the following components:

- Program payments revenues
- Crop insurance

- NISA payments
- Disaster Assistance Program payments
- AgriStability and AgriInvest benefit
- Production insurance premium benefit
- Stabilization payments
- Rebates
- Insurance proceeds

AgriStability is within the suite of programs that are intended as an income insurance against substantial declines in farming income margins as a result of crop failure, increased costs and changes in market prices. Program payments are linked to a producer-specific historically calculated reference revenues-to-expenses margin and are triggered when the current year's margin drops below 30 percent of the reference margin. The federally funded Advance Payments Program pays, for loans up to $1,000,000 for eligible products, the interest on the first $100,000 ($250,000 for 2024) of the loan with a repayment period of up to 18 months for most commodities and up to 24 months for cattle and bison. Dairy Direct Payment Program, intended to support dairy producers who will be affected by the Canada-United States-Mexico Agreement that gave market access to dairy imports earmarked $1.2 billion over 6 years with $300 million in 2023-2024, so that "an eligible producer with 80 cows could receive around $26,500 in 2023-24" (accessed 13 March 2024).

S.1.3 Feed, waste, and dockage

Accounting for dispositions as feed, waste, and dockage is remarkably difficult. In Canada, these dispositions publicly reported as a single item include a residual or an error term. The reason is that this item is based on the following accounting identity:

$$\mathsf{Supply}_t = \mathsf{Use}_t.$$

The above expression holds if independent estimates of supply and use were exactly equal to each other, which is never the case in practice. Due to these statistical discrepancies, it is best to express this relationship as

$$\mathsf{Supply}_t = \mathsf{Use}_t + \mathsf{Statistical\ discrepany}_t. \tag{1}$$

Supply over a period t consists of

$$\mathsf{Supply}_t := \mathsf{Domestic\ production}_t + \mathsf{Imports}_t - \Delta\mathsf{Stocks}_t$$
$$Y_t + M_t - \Delta S_t$$

S.2

where $\Delta S_t := S_t - S_{t-1}$ corresponds to a change in stocks. Use_t consists of

$$\mathsf{Use}_t := \underbrace{\mathsf{Domestic\ use}_t}_{\text{food, industrial, seed, loss, fwd}} + \mathsf{Exports}_t$$
$$C_t + X_t.$$

In the above expression fwd stands for Feed, Waste and Dockage. AAFC calculates fwd as the difference between Supply and the other components of Use

$$\underbrace{Y_t + M_t - \Delta S_t}_{\mathsf{Supply}} - (\mathsf{Food} + \mathsf{Industrial} + \mathsf{Seed} + \mathsf{Loss})_t - X_t = \underbrace{\mathrm{fwd}_t + \mathsf{Statistical\ discrepany}_t}_{\text{“Feed, Waste, Dockage”}}$$

Thus, what the AAFC publications report as “Feed, Waste, Dockage” include statistical discrepancy. Since this discrepancy can be large and can be either negative or positive, it is not unusual to find a negative number reported for Feed, Waste, Dockage. According to expert opinion (email communication by Lina Gordon dated April 16, 2024), a negative number usually indicates an error in production estimate, in part because production estimates are based on Statistic Canada surveys, which are subject to estimation error. On-farm consumption or intra-provincial transfers of grains are also missing. In the case of grain exports to the United States, the data are based on the grain shipped to the United States by licensed companies, but those shipped by unlicensed grain dealers or exported by container are not always accounted for. All such factors contribute the size and direction of the statistical discrepancy. In general, reports by Statistics Canada acknowledge the pervasiveness of “data gaps and the fragmentation of information on food supply chains” (Toor & Hamit-Haggar, 2021).

S.2 Canadian agricultural production support

S.2.1 Total support estimates

(OECD, 2023) data on agricultural production support policies start in 1986 (Figure S.1). Over this time, there has been a decline in Canada’s total agricultural production support in relation to gross farm receipts (GFR) and gross domestic product (GDP). Within the total support estimate (TSE), there has been a relative increase in general services support (GSS), which is a broad category that does not distinguish between the beneficiaries of different programs by farm type, like livestock and vegetable farms. Also, per capita agricultural total support estimates (in constant prices) have declined significantly since 1986, although they remained relatively constant over the period 2013–2022 (Figures S.1 and S.2). The same is true for the producer single commodity transfers (PSCT), which are targeted (Figure S.2). While PSCT for grains, pulses and oilseeds has effectively remained constant in per capita terms since the mid-1990s, the PSCT for animal products more recently (around 2010) started declining in per capita terms. There has thus been a tendency for the policies to maintain a targeted level of financial support to Canadian agriculture adjusted for GDP, inflation, and population

growth.

Another way to assess the importance of Canada's agricultural production support programs is to weigh estimates of their size in relation to the net operating income of farmers, using data that have been released by Statistics Canada since 2015 based on administrative tax records.[1] Over this time, roughly half of the net operating income of Canadian farmers is estimated to have come from total agricultural production support, including the combination of direct transfers from governments (35 percent) and indirect supply management-related transfers from consumers (15 percent) (Figure S.1B). Thus, while the costs of agricultural support programs to both governments and consumers have declined in relative terms, they continue to have a major place in the net operating incomes of farmers and in perpetuating the prevailing agri-food system in Canada.[2]

Statistics Canada data on net programs payments to farm operators provide a complementary but narrower assessment of the total support given to agricultural production than that of the OECD, because they do not incorporate estimates of transfers from consumers to producers (S.1.2). It is also notable that several payments in this assessment have insurance components where farmers are required to pay a premium. In 2015, the net program payments in the Statistics Canada assessment were only about one-third of what the OECD defined as producer single commodity transfers and one sixth of the OECD's estimate of total agricultural production support (Figure S.1D).[3] However, this subsequently changed dramatically: by 2022, net program payments exceeded the OECD estimate of producer single commodity transfers, and constituted nearly half of the OECD's estimate of total agricultural production support. In other words, the policies associated with the net program payments are becoming the most significant way that agricultural production in Canada is subsidized.

S.2.2 Concentration: upstream and downstream of farms

Industrial agri-food systems are often visualized as a sort of hourglass, with a very small number of corporations controlling inputs and outputs located between a large number of farmers and a much larger number of consumers. The degree to which farming has been consolidated pales before the extent of consolidation that has taken place across the rest of agri-food supply chains, with economically significant implications for concentration and oligopolistic power. As Qualman and the National Farmers Union (2019) emphasize, most of the total agricultural revenue in Canada flows to a few corporations that control farm machinery, fertilizers, chemicals, seeds, fuels, data, credit, and other materials and services, with as little as 5 percent ending up in the hands of farmers.

The degree of concentration in upstream and downstream of Canadian farms is remarkable. Cur-

[1] The limitations of this time series data are compounded by restrictions and programs related to COVID-19 and the supply-chain issues in its aftermath.

[2] There is cyclical variation in commodity prices. For instance, from 2003 to 2024, crude oil prices saw the highest increase, followed by fertilizer prices, food prices (farm gate), and agricultural raw materials (IMF, 2025). Given the rising input costs, including fuel, fertilizer, chemicals, and seeds, real net farm incomes were not necessarily increasing. It is also important to note that the prices received by farmers at the farm gate deviate considerably from the retail prices paid by consumers, with food processors and retailers controlling a large share of the total value in commodity chains (NFU, 2025).

[3] Over the period from 2019 to 2022, total NPP averaged $3.73 billion or 1.5% of average GDP over the same period (Figure S.3A).

rently, about 95% of all beef processing capacity in Canada is owned by just two companies: Cargill and JBS (Nixon & Keldon, 2024).[4] Seeds of the primary grains (corn) and oilseeds (canola and soybean) that feed beef cattle and other livestock are supplied just by four companies (Bayer-Monsanto, BASF, Corteva, Chem-China-Syngenta). Three firms (EW Group, Hendrix Genetics, and Tyson Foods) effectively control the hatchlings for poultry. Hog processing is slightly less concentrated, with two processors (Maple Leaf Foods and Olymel) accounting for 50% of the market, though the degree of concentration is much higher in Quebec, which contains a significant share of Canadian pigs. As indicated above, a large fraction of total grain produced in Canada is sold in international markets, and a striking 70% of global grain trade is handled by merely four corporations (ADM, Bunge, Cargill and Louis Dreyfus).

The concentration at every turn in the industrial agri-food supply chain in Canada has increased over time, enabled by an interpretation of the anti-trust legislation, by the Competition Bureau Canada (Nixon & Keldon, 2024), that permits high degrees of market concentration and pricing power by a few corporations. Given how much of the total value in agriculture is contained in both input and output supply chains, the taxpayer and consumer transfers associated with Canada's agricultural production support policies should therefore also be understood to be flowing towards the oligopolies.[5]

S.2.3 The polarization of farm incomes

Family farm income Net family income is another significant consideration that also relates to farm debt, net worth, and profitability. Most farm families have been compelled to diversify income through off-farm employment. According to Statistics Canada (2026) in 2023, nearly half of the average income per farm family ($116,778 of $216,021) came from off-farm sources, and more than one-fifth of the average net operating income ($20,258 of $99,233) came from net program payments. With an average capital cost allowance (amortization of physical assets due to depreciation) amounting to $54,002, an average family farm had a net market income (after depreciation) of slightly under $25,000.

Of course, these averages hide significant variations in net farm income across Canada, and the great differences in scale and between commodities. Overall, the picture that emerges from family farm income accounts is consistent with our analysis based on expenses and revenues: while there are a relatively small number of large-scale farms that earn high incomes and are consistently profitable, many small- and medium-scale family farms face significant economic risks and vulnerabilities. This picture also reinforces our conclusion that, on average, the larger the size of a farm operation, the more net program payments they receive.

[4] All the concentration data reported herein come from the excellent study by the Canadian Anti-Monopoly Project (Nixon & Keldon, 2024). It is notable to contrast this with a recent Statistics Canada publication on the beef supply chain (Toor & Hamit-Haggar, 2021), which makes no reference to concentration in the beef supply chain. For a recent study on global concentration in food and farming, see GRAIN (2025).

[5] Estimating the fraction of transfers captured by these oligopolies is beyond the scope of this study. However, about 60% of the farmers express that increased concentration along the supply chain had a negative impact on their incomes (Nixon & Keldon, 2024), with, as we showed above, transfers from taxpayers and consumers being a significant component.

Livestock and crop farm incomes Given the limits of available data, it is difficult to extend our analysis of the polarization of farm incomes to differences across farm types within livestock and crop production. Nevertheless, it is possible to examine some broad patterns, drawing on 2021 data for six types of animal farming (beef cattle, dairy cattle, pigmeat, poultry meat and egg, sheep and goat, and other animals), and five types of crop farming (fruit and tree nut, greenhouse, oilseed and grain, vegetable and melon, and other crops) and considering them across six income classes (Figure S.6A). Among livestock operations, supply managed poultry and egg production had the highest share of farms within the top two income classes ($100,000 or more). Fruit, tree-nut, greenhouse, vegetable, and melon operators also tend to be those with relatively high incomes, but their numbers are relatively small (Figure S.6B–C). In general, crop production is associated with relatively higher incomes per farm and a relatively higher share of farms within the medium and top operator income classes, and there are similar financial income profiles and distributions across the different crop specializations.

S.3 Supplementary figures and tables

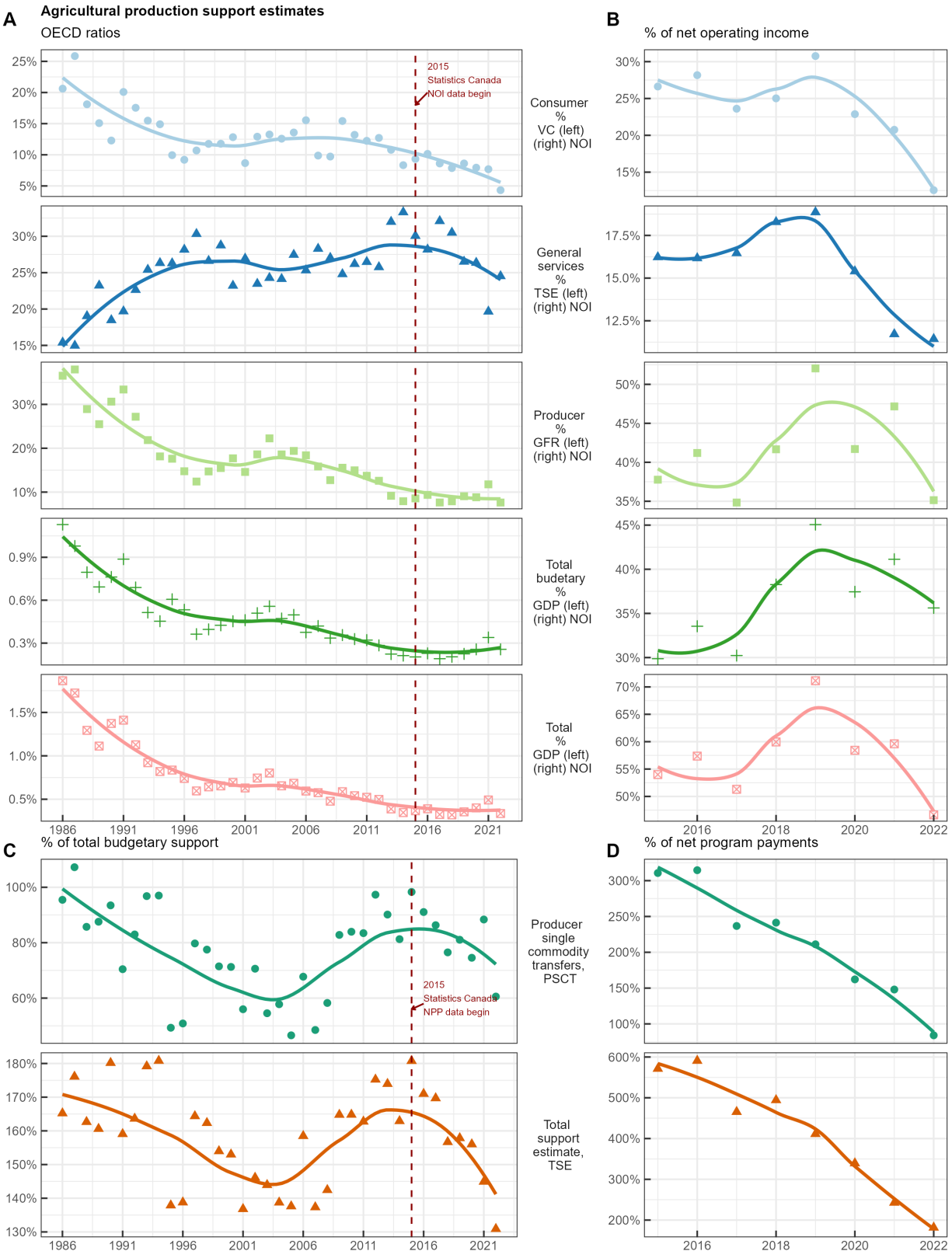


Figure S.1: OECD agricultural production support indicators

S.8

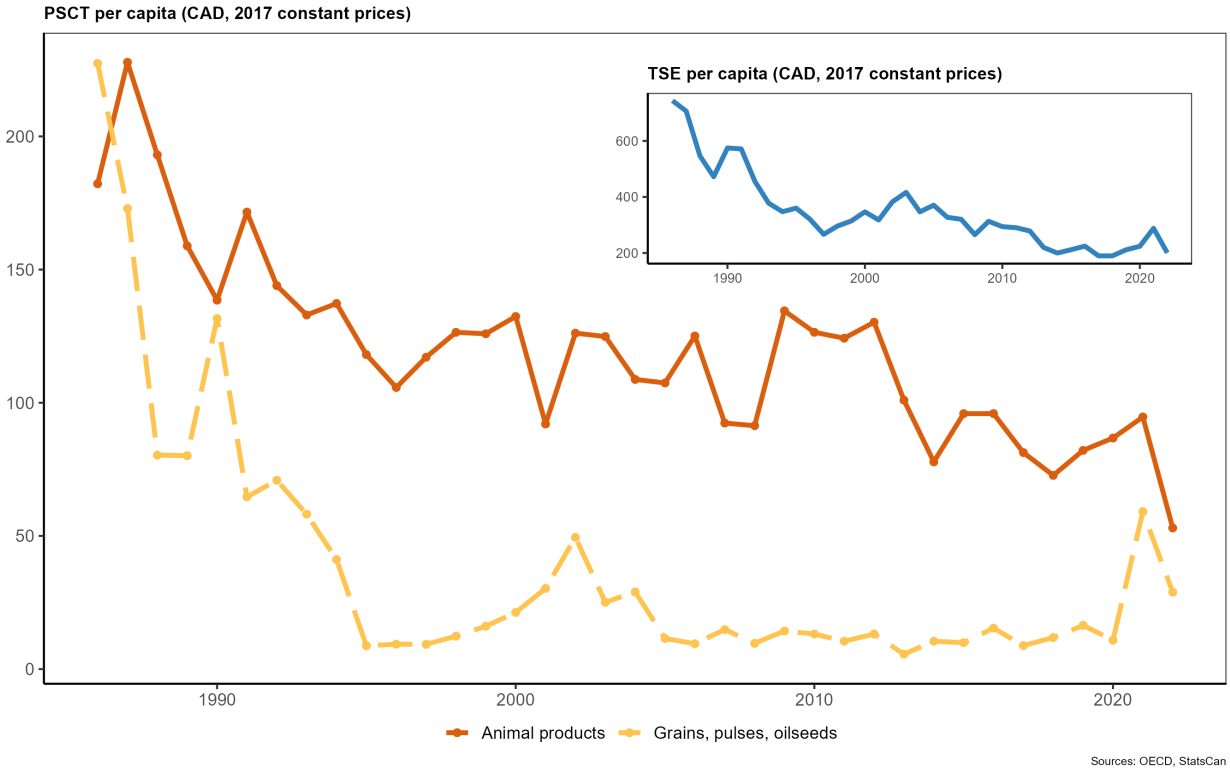


Figure S.2: Agricultural support estimates

Notes: TSE, total support estimate. PSCT, producer single commodity transfers. TSE include program payments that do not necessarily target specific commodities.

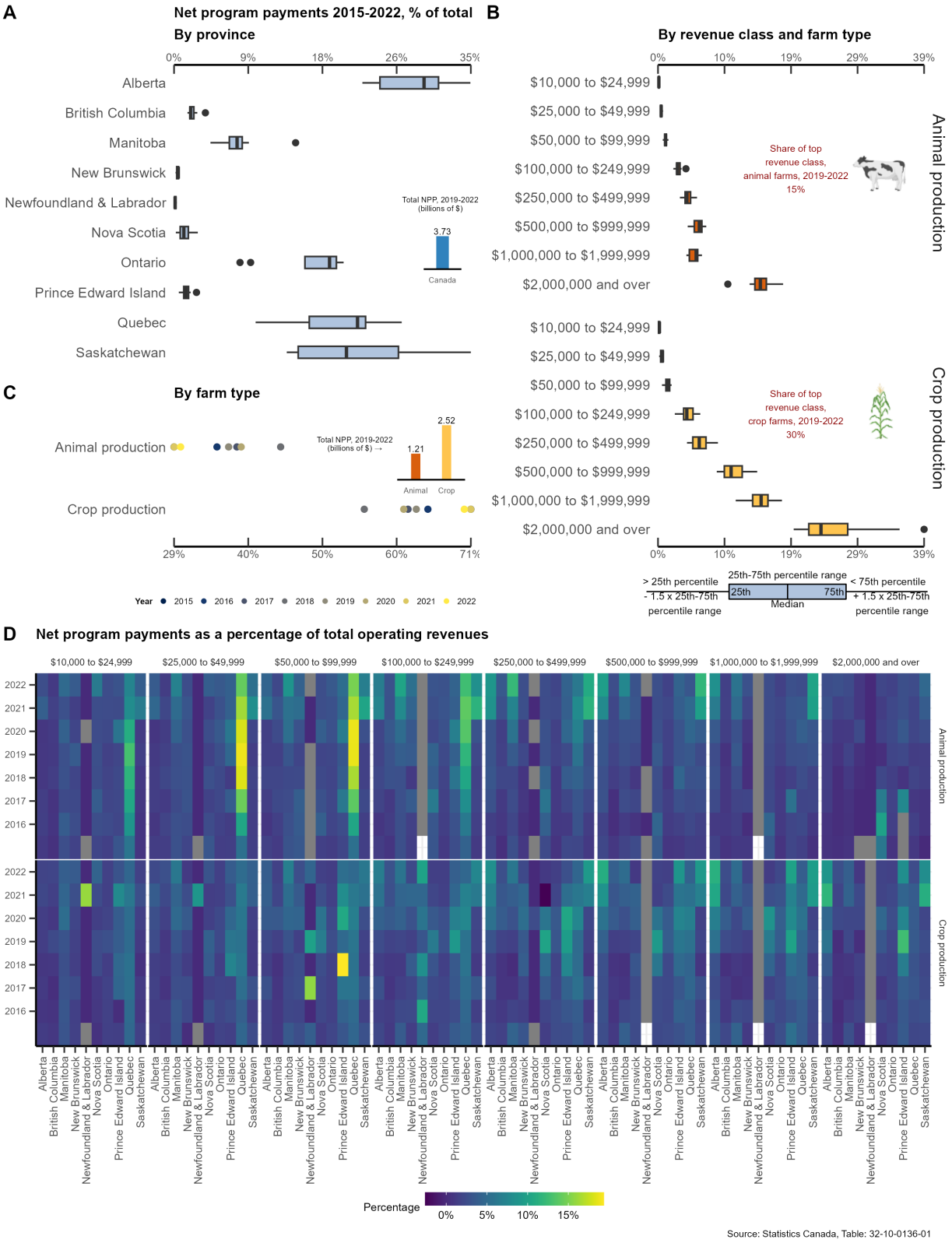


Figure S.3: Net program payments

S.10

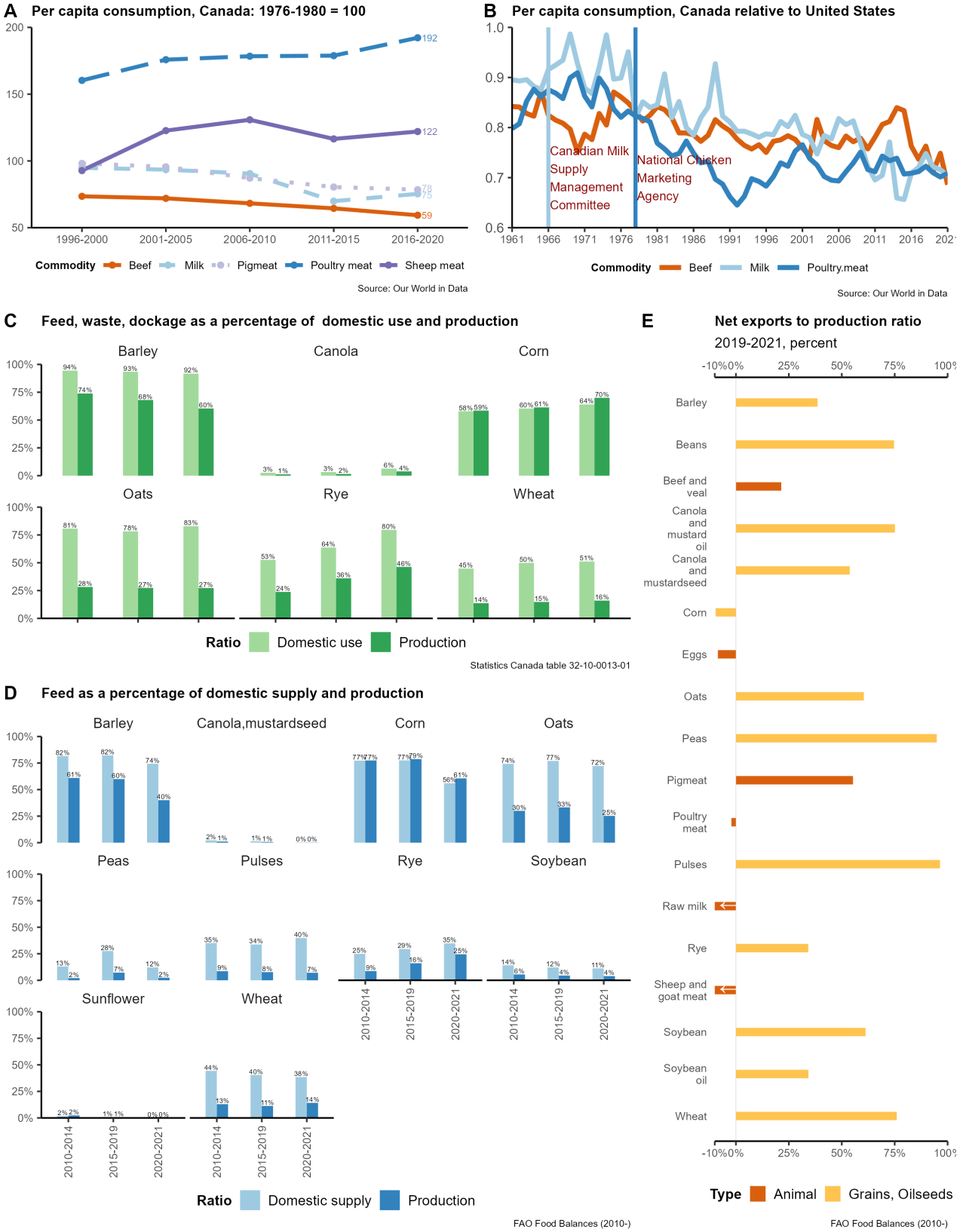
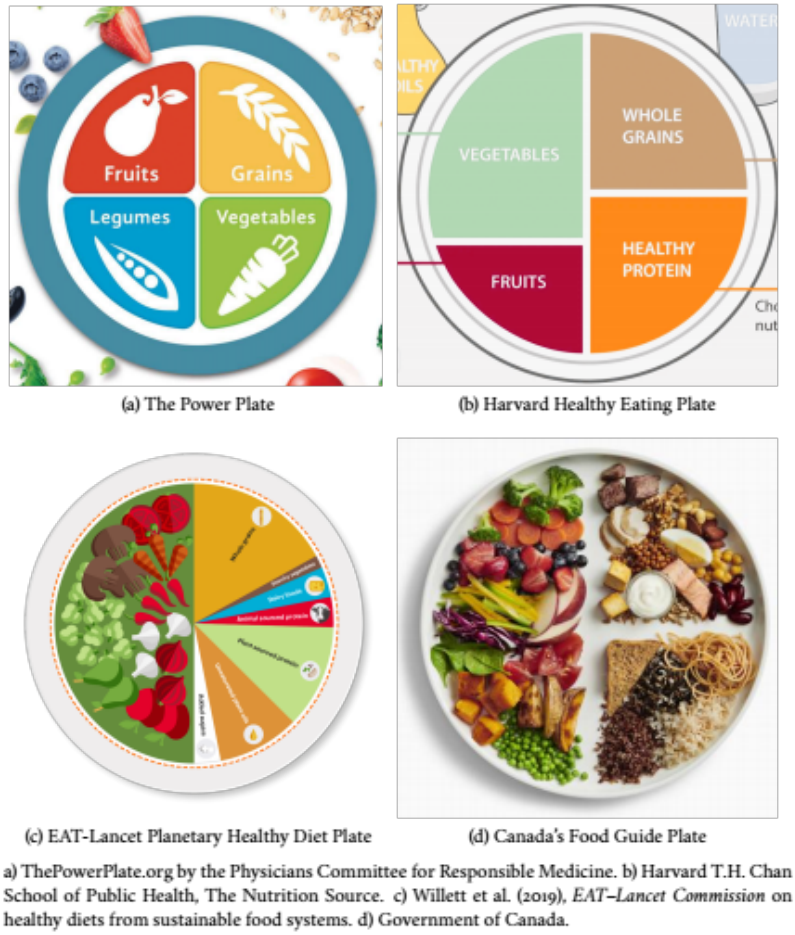


Figure S.4: Consumption and disposition of animal products and crops



(a) The Power Plate

(b) Harvard Healthy Eating Plate

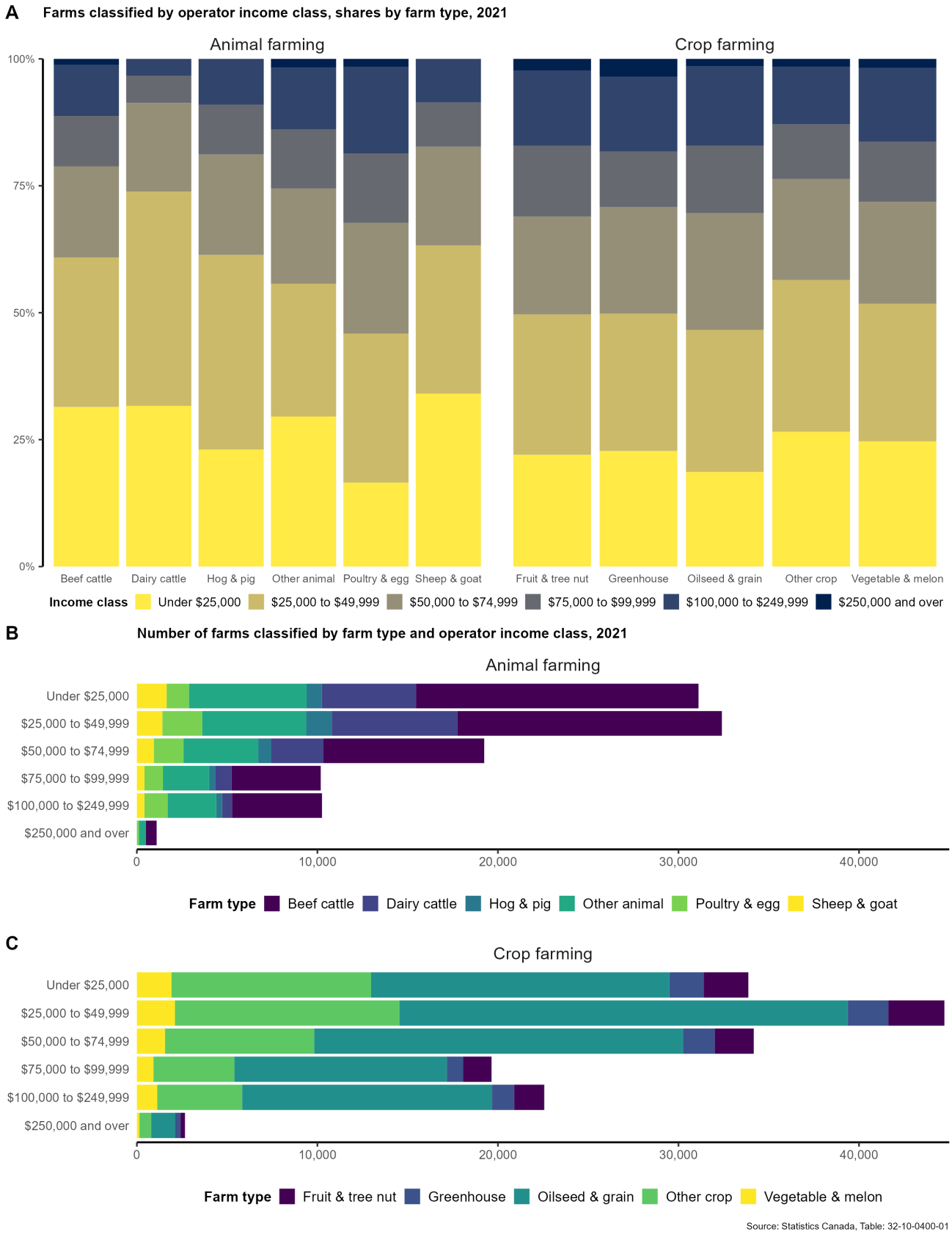
(c) EAT-Lancet Planetary Healthy Diet Plate

(d) Canada's Food Guide Plate

a) ThePowerPlate.org by the Physicians Committee for Responsible Medicine. b) Harvard T.H. Chan School of Public Health, The Nutrition Source. c) Willett et al. (2019), *EAT–Lancet Commission* on healthy diets from sustainable food systems. d) Government of Canada.

Figure S.5: Published healthy diet plate guidelines

S.12



Source: Statistics Canada, Table: 32-10-0400-01

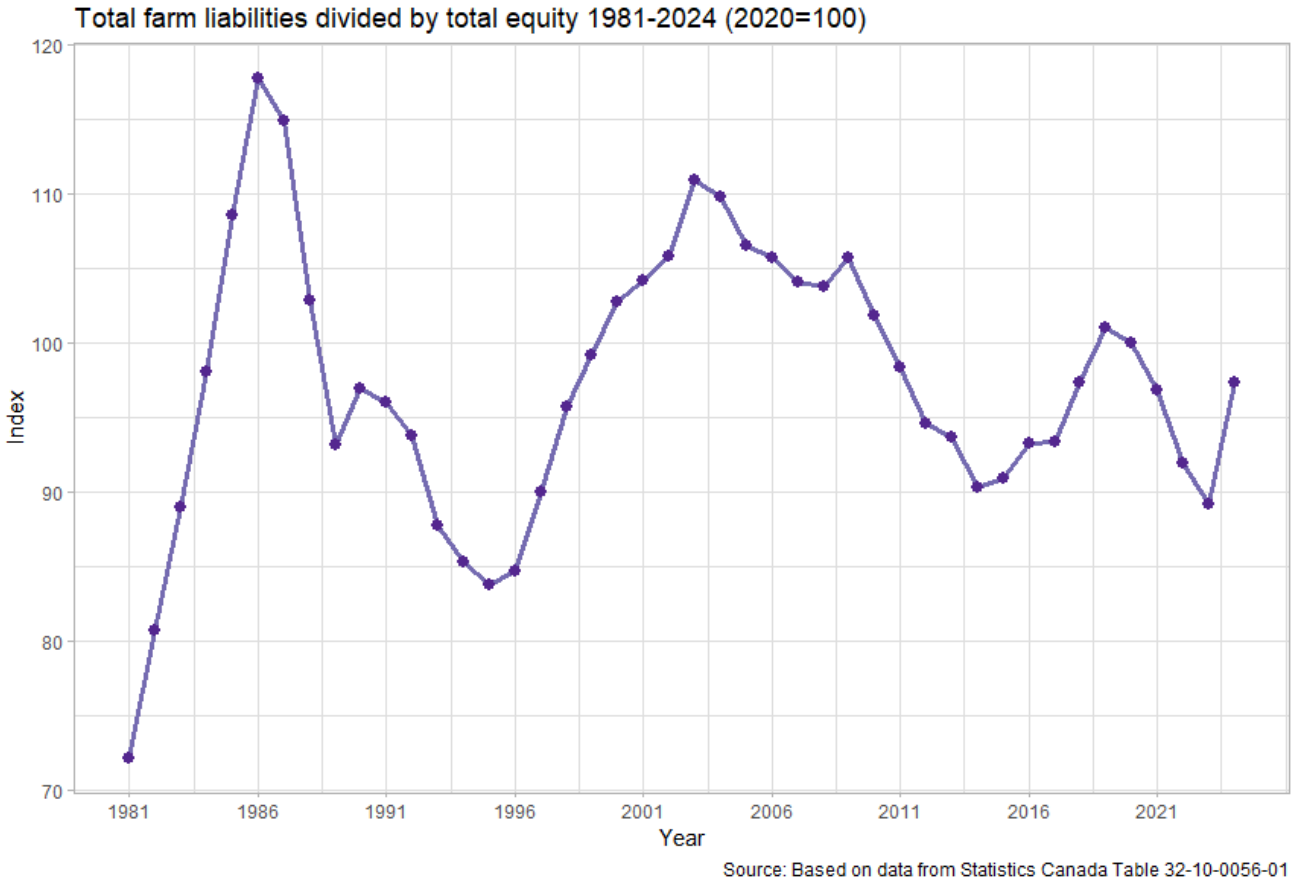


Figure S.7: Farm debt to equity ratio

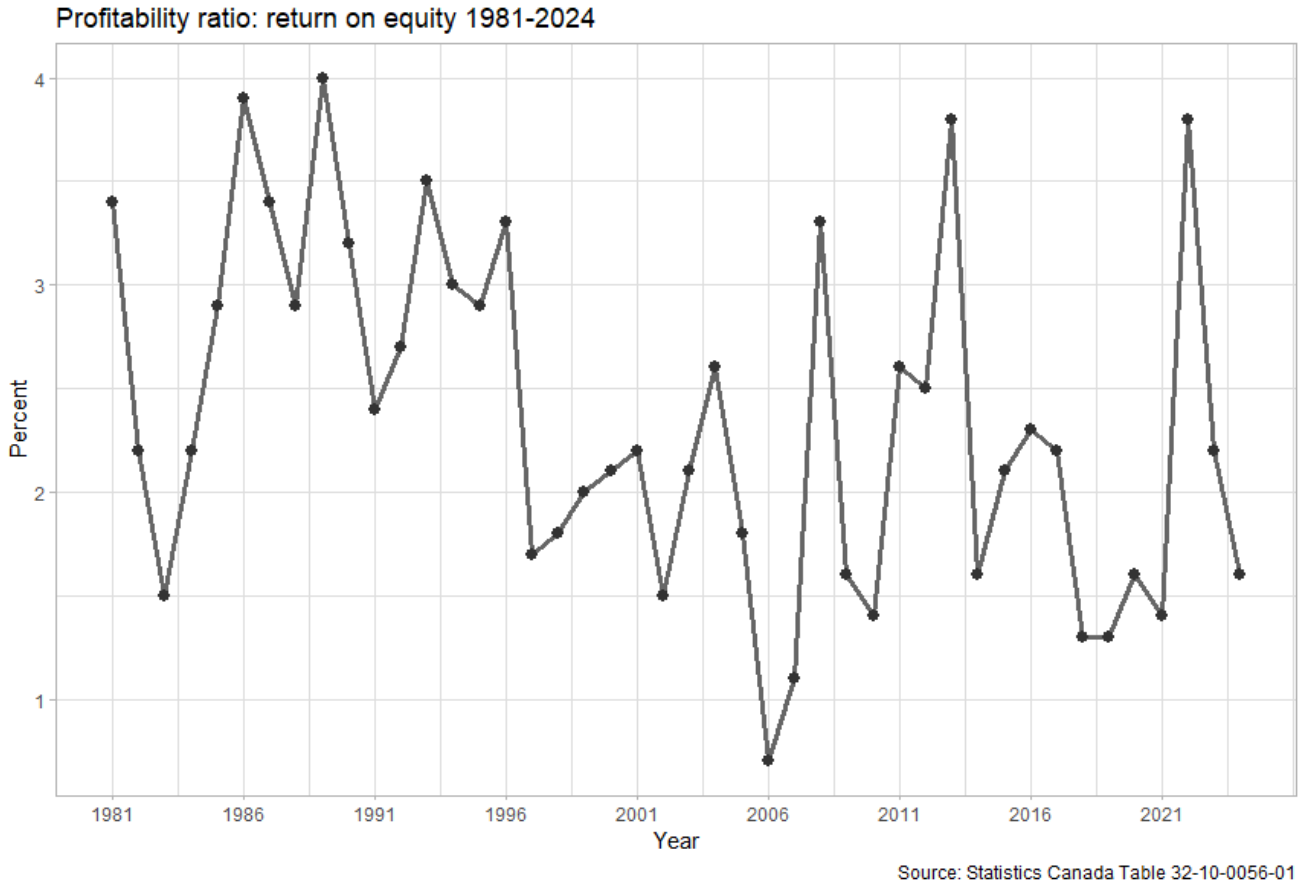


Figure S.8: Farm sector rate of return on equity

S.4 Notes and calculations

Population. Statistics Canada. Table 17-10-0005-01 Population estimates on July 1, by age and gender.

Gross domestic product. Statistics Canada. Table 36-10-0222-01 Gross domestic product, expenditure-based, provincial and territorial, annual ($\times$ 1,000,000), at market prices.

NPP as a percent of GDP. Over the period from 2019 to 2022, Canadian GDP at market prices averaged CAD 2,476 billion.