



## CANADA – CENSUS OF AGRICULTURE 2021 – METADATA REVIEW

### 1. Historical outline

The Constitution Act of 1867 determined that a census would be taken every 10 years starting in 1871. However, rapid expansion in Western Canada made a more frequent census necessary. Starting in 1896, a separate Census of Agriculture (CA) was taken every five years in Manitoba and, beginning in 1906, in Alberta and Saskatchewan. Since 1956, the five-year agricultural census was extended to the entire country and conducted in conjunction with the Census of Population (CP). The CA 2021, to which the metadata review and data presented here refer, was the 23<sup>rd</sup> CA conducted in Canada.

### 2. Legal basis and organization

#### *Legal framework*

The Statistics Act of 1971 stipulates that a CP and a CA shall be taken every five years, in years ending in one and six. The provisions of the Statistics Act on conducting the CA are: (i) Section 20; (ii) Subsection 21(1); and (iii) Subsection 21(2). Just as Statistics Canada is required by law to conduct a census, respondents are required by law to complete their census questionnaires. Statistics Canada is bound by law to protect the identity of individuals at every step of the statistical process, including in all published data.

#### *Institutional framework and international collaboration*

Statistics Canada, a centralized statistical agency, was responsible for conducting the CA and the CP 2021. The development, testing, processing, data validation and preparation for data dissemination for the CA and the CP were mostly handled by different groups within Statistics Canada.

#### *Census staff*

Statistics Canada relies on a broad team of staff to carry out the CA Program. Located primarily at Statistics Canada's head office in the National Capital Region, and at regional offices across the country, staff include specialists with expertise in IT, methodology, communications, subject matter, data analysis, data processing, remote sensing and geographic information systems, dissemination, client services, etc. With the growing emphasis on modern data collection methods (such as e-questionnaires), the program does not rely on field enumerators for data collection.

### 3. Reference date and period

**Reference day:** 11 May 2021 for management operators, livestock, mushrooms, greenhouse products, market value of land and buildings, machinery and equipment, written succession plan, etc.

#### **Reference period:**

- reference year 2021 for land use, area of crops, maple taps, renewable energy, etc.
- the calendar year 2020 for farm paid labour, land practices and features, inputs or manure, irrigation, hatcheries, use of technologies, direct sales, gross farm receipts and operating expenses, etc.

### 4. Enumeration period

The CA universe was divided into three segments for data collection: (i) large and complex agricultural operations; (ii) rare and unique agricultural operations; and (iii) standard agricultural operations. From February 2021, for large and complex agricultural operations, and from 3 May 2021 for the other segments, data was collected until 29 August 2021 for groups one and three, and until 30 November 2021 for rare and unique agricultural operations.

Due to COVID-19 pandemic, the key activity that was delayed was related to the decision on questionnaire content. Parliament was suspended early 2020 because of the crisis, meaning the crucial content decision was not made by March as planned. This delay had an impact on other activities including printing of census materials, completing and testing of electronic questionnaire application and other systems functionalities, etc. Statistics Canada employees across the regions adapted to new virtual work requirements, as established by the Government of Canada, ensuring the safety of Census of Agriculture data and employees. As a result of the COVID-19 pandemic, virtual outreach and engagement with agricultural stakeholders was even more important this census cycle, with meetings conducted online exclusively. Also, the attendance of CA staff to farm shows had to be cancelled.

## 5. Scope of the census and definition of the statistical unit

The ***census scope*** covered agricultural activities (crop and livestock production).

The ***statistical unit*** was the “farm” or agricultural holding, defined as a unit that produces agricultural products<sup>1</sup> and reports revenues or expenses for tax purposes to the Canada Revenue Agency<sup>2</sup>. The farm operator was defined as a person responsible for the management decisions operating and agricultural operation.

### ***Community-level data***

There were no community-level data collected along with the census.

## 6. Census coverage

### ***Geographic coverage***

The CA 2021 covered the entire country.

### ***Cut-off threshold and other exclusions***

No threshold was used in the CA 2021.

## 7. Methodology

### ***Methodological modality for conducting the census***

The classical approach was used in the CA 2021. The CA was conducted in conjunction with the CP. The two censuses were conducted concurrently and shared a common “census day”.

### ***Relation to other censuses***

The CA 2021 was conducted in conjunction with the CP, with the reference day for inventory items as of 11 May 2021. Although the CA and the CP were conducted simultaneously, they do have separate questionnaires. Most of the development, testing, processing, data validation and preparation for data dissemination for the CA and the CP were handled by different groups within Statistics Canada. However, sharing the data collection and communications activities for both censuses streamlined procedures and reduced costs considerably. Another important benefit was that information from the two questionnaires would be linked to create the Agriculture-Population Linkage Database that provided a socioeconomic profile of the farm population at the person, family, household and farm levels and includes variables such as age, sex, marital status, country of birth, mother tongue, educational attainment and income.

### ***Frames***

The CA frame was created by combining information from Statistics Canada’s Business Register with information from the latest set of tax remittances and selecting the set of units that met the conditions of the new farm definition. The selection process used the detailed tax information of the establishments

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<sup>1</sup> Agricultural products include the following: (i) crops: grains, oilseeds, leguminous crops, potatoes, vegetables, fruits, berries, greenhouse products, mushrooms, sod, nursery products, Christmas trees, maple tree taps, hay and fodder crops, cannabis, hemp, and other crops; and (ii) livestock: dairy and beef cattle (including feedlots), pigs, poultry and eggs (including hatcheries), turkeys, ducks, geese, sheep, goats, horses and other equines, bison (buffalo), elk (wapiti), deer, llamas and alpacas, rabbits, mink, bees, and other animals.

<sup>2</sup> Before 2021, the “farm” was defined as an agricultural operation that produced at least one agricultural product intended for sale. The application of the new “farm” concept will affect the comparability of farm counts with previous censuses.

on the Business Register to select those that have reported agricultural commodity revenues or expenses, signalling that they were involved in agricultural activities. To ensure complete coverage, some establishments with weaker or no agricultural activity signals from tax data were identified using other available sources of information and were included in the frame.

In addition, a subset of records was added to the frame to account for operations that entered business since 1 January 2020, and for which no tax signals could be recorded because of the timing of tax filing.

#### ***Complete or/and sample enumeration methods***

The CA was a complete enumeration of all agricultural holdings in the country.

#### ***Sample design (if sampling was used)***

No sampling was used.

#### ***Data collection methods***

Large and complex agricultural operations were offered the opportunity to respond to a paper questionnaire (mail-out/mail-back method), and have their data collected via the Large Agricultural Operations Statistics (LAOS) program from Statistics Canada's headquarters, or through the CAWI method. For rare and unique agricultural operations, the CATI method was used to collect data. On 3 May 2021, all agricultural operations in the standard universe received an invitation letter by mail to complete the CA questionnaire using the CAWI method. This letter contained a secure access code to fill out the questionnaire online, the web address of the CA 2021 website, and a telephone number to allow the respondent to contact the Census Help Line and complete the Census of Agriculture questionnaire over the phone or request a paper questionnaire by mail. The non-response follow-up process was carried out using the CATI method. To enhance the information from the CA 2021 and minimize respondent burden, Statistics Canada combined census data with information from other surveys or administrative sources: operating arrangement, revenues and expenses from the Canada Revenue Agency, and the age and sex of each farm operator from the CP.

#### ***Questionnaire(s) and items covered***

A single questionnaire was used for data collection in the CA 2021. The questionnaire covered 19 out of 23 essential items recommended in the WCA 2020<sup>3</sup>. The essential items regarding legal status of the holding, and sex and age of the holder were collected from administrative sources and the CP, respectively.

### **8. Use of technology**

The CAWI and CATI methods were used for census data collection. For paper questionnaires, a data capture module was developed. Voice broadcast, automated telephone calls and emails were used to remind respondents to respond. Census data were collected directly from administrative registers and the CP to reduce the response burden. Census results were disseminated online.

### **9. Data processing**

Questionnaire responses for both the CA and the CP were handled through common receipt and registration processes. Online questionnaire responses were received via the Collection Management Portal (CMP) and registered in the Census Processing System (CPS) hourly. The CPS also registered interviewer responses received through the Census Help Line and non-response follow-up (NRFU) on a regular basis during collection and follow-up. Paper questionnaires received from Canada Post were also registered and transmitted to the CMP on an hourly basis. A data capture mode within the CMP was developed to capture paper questionnaires. This data capture mode allowed data to be captured directly. The data from the CMP were initially processed in a dedicated Central Processing System (CPS\*Pro). Initial processing included four main tasks: (i) geographical identifiers edit; (ii) response coding; (iii) deduplication, to identify and remove duplicate questionnaires from the CA database; and (iv) agriculture–population linkage. After initial processing, CA data was moved to the newly Integrated Business Statistics Program (IBSP) system to handle the edit and imputation requirements. The IBSP

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<sup>3</sup> The following essential items were not covered: (i) 0407 Number of permanent crop trees in scattered plantings (for each tree crop); (ii) 0501 Type of livestock system; (iii) 0801 Household size by sex and age groups; and (iv) 1201 Presence of aquaculture on the holding.

system included the following three main processing tasks: (i) data import and integration; (ii) edit and imputation; and (iii) estimation. Data validation was performed in parallel with data collection and data processing in the IBSP. Values were validated at the aggregate and the farm level and compared to information from CA 2016 and other alternative data sources.

## 10. Quality assurance

Quality evaluation activities were carried out to ensure that census data are reliable and meet user needs. These activities were based on the Statistics Canada Quality Guidelines. New or enhanced methods, procedures and technologies were implemented to improve all areas of the process—from collection, to processing, validation and dissemination of the data. To reduce coverage errors, some modelled records were added to the population to represent farms that started their operations in 2020 or 2021. They were not sent for collection but rather had data modelled or imputed for them. To encourage participation, Statistics Canada provided respondents with three ways to respond to the Census of Agriculture. Non-respondents were sent several reminders through different media to encourage them to respond. A certification review committee composed of senior management and subject-matter experts assessed certification reports containing results of the analysis, including a summary of the investigation undertaken, the data anomalies found and addressed, and recommendations for publication. The committee decided whether the data were fit for use and ready to be published and made available to data users. For the first time in the CA history, quality indicators will accompany most estimates published for the 2021 Farm and Farm Operator Data release. These quality indicators take into account the variances because of the uncertainty associated with imputation and the random tabular adjustment disclosure avoidance method used to maintain the confidentiality of respondents. A full coverage evaluation is completed for each census and was made available to the public via the CA website on 11 May 2022 ([https://www.statcan.gc.ca/en/statistical-programs/document/3438\\_D5\\_V1](https://www.statcan.gc.ca/en/statistical-programs/document/3438_D5_V1)).

## 11. Data and metadata archiving

Under the terms of the *Policy on Informing Users of Data Quality and Methodology*<sup>4</sup>, Statistics Canada has the responsibility to develop, maintain and disseminate statistical metadata for its surveys and statistical programs. The metadata includes information on the variables, classifications, data sources, methodology, data quality, questionnaires, questions and response choices. CA data tables and analytical publications on the Statistics Canada website are archived once the census cycle has completed its' full dissemination cycle, according to the Statistics Canada *Web Archiving Directive*.

## 12. Data reconciliation

In addition to CA, the Agriculture Division at Statistics Canada conducts over 20 annual, semi-annual and monthly surveys on a regular basis. With each CA, new information about the structure of agriculture production and a new sample frame becomes available. The CA was used for updating the agriculture frame, calibrating survey methods and to align the current survey programs. Once the CA data were released, many of the survey program variables were reconciled and aligned with the census in a process called intercensal revisions (IR). The main objective of IR was to improve survey estimates using census data and to draw lessons for future surveys. The key steps of the IR process involved: (i) the identification of key variables and the calculation of differences between the survey and census data; (ii) diagnosis for each variable as to the reason for discrepancy - CA data were used to perform matching, data confrontation and verification of survey data, while taking into account factors such as: seasonal variations; contextual issues; special events like flooding, fires, and disease; and (iii) after the diagnosis, the last step was the correction of discrepancies where necessary. The CA data were used to align survey estimates at the macro level. The IR was conducted first on commodity variables and then subsequently on the financial accounts, which would be impacted by revised commodity inventory levels and/or flows. CA estimates concerning receipts, expenses, capital assets and farm populations were also integrated into the farm financial accounts. Methods used in estimating non-survey series were also reviewed and updated based on changes to the agriculture production structure as revealed by CA. The revisions generally cover up to 5 years of data, covering the inter-censal period.

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<sup>4</sup> Available at <https://www.statcan.gc.ca/en/about/policy/info-user>

### 13. Dissemination of census results and microdata

The CA 2021 offers a wide variety of products and services available in the Census of Agriculture portal (<https://www.statcan.gc.ca/en/census-agriculture>). Most products (data, analysis, interactive tools, maps, references, etc.) are scheduled to be disseminated in 2022, starting with the Farm and Farm Operator Data released on 11 May 2022 available at <https://www150.statcan.gc.ca/n1/en/type/data?sourcecode=3438>. CA dissemination products —such as data tabulations, analytical articles, reference materials, infographics, interactive data visualization tools and more —can be accessed via the CA portal. The CA keeps four main types of micro databases: farm data, farm operator data, socioeconomic data and agri-environmental data. All tabulated data from the CA are subjected to a disclosure avoidance procedure. Most CA data products are available at the national level, province or territory, census agricultural region (CAR), census division (CD), and census consolidated subdivision (CCS).

### 14. Data sources

**Statistics Canada.** 2022. Census of Agriculture. In: *Statistics Canada* [online]. Ottawa, Canada. <https://www.statcan.gc.ca/en/census-agriculture>.

### 15. Contact

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