



2021-22 Consumer Attitudes Towards Innovative Agricultural Technologies Survey and Focus Groups

Executive Summary

Prepared for Agriculture and Agri-Food Canada

Supplier name: Quorus Consulting Group Inc.

Contract number: 01B68-220002/001/CY

Contract value: \$159, 576.74

Award date: April 12, 2021

Delivery date: March 31, 2022

Registration number: POR 001-21

For more information on this report, please contact Agriculture and Agri-Food Canada at:

aafc.info.aac@agr.gc.ca.

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This public opinion research report presents the results of quantitative and qualitative research conducted by Quorus Consulting Group Inc. on behalf of the Department of Agriculture and Agri-Food Canada. The research was conducted in June and December, 2021.

Cette publication est aussi disponible en français sous le titre : Sondage et des groupes de discussion de 2021-2022 sur les attitudes des consommateurs envers les technologies agricoles novatrices : sommaire

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Public Affairs Branch
Agriculture and Agri-Food Canada
1341 Baseline Road
Ottawa, Ontario, K1A 0C5

Catalogue Number: A22-669/2022E-PDF

International Standard Book Number (ISBN): 978-0-660-42449-1

Agriculture and Agri-Food Canada Number: 13109E

Related publications (registration number: POR 001-21):

Sondage et des groupes de discussion de 2021-2022 sur les attitudes des consommateurs envers les technologies agricoles novatrices : sommaire

978-0-660-42450-7

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Executive summary

Purpose, study objectives and issues of interest

Building on previous research waves in 2011 and 2016, Agriculture and Agri-Food Canada (AAFC) launched a third wave of public opinion research to assess Canadians' perceptions and attitudes towards emerging agricultural technologies and their applications in the sector, and to gather information on public trust regarding these technologies. Having explored some of these issues in past research, this study generated comparative data, allowing AAFC to track Canadians' attitudes over time. In addition, the results provide insights into Canadians' knowledge and awareness of new technologies that did not exist or were emerging at the time of previous research.

The total contract value of this research (including HST) was \$159,576.74. This research will inform policy development and engagement strategies by providing critical insights on the opinions of Canadians on agricultural innovation.

Methodology

In order to provide reliable tracking data, Quorus used a similar approach to what was used in the previous waves, using both quantitative and qualitative research. More specifically, the study consisted of the following:

- **Quantitative Phase:** This phase of the research project consisted of a national survey with Canadian adults aged 18 and older. Approximately half of the data (1,009 completed surveys) was collected using an online panel of households, and the other half (1,033 completed surveys) via a stratified random sample of Computer Assisted Telephone Interviewing (CATI) interviews. Data collection took place from June 25th to July 16th, 2021. The CATI questionnaire had an average survey duration of 24 minutes, while the online version took roughly 12 minutes to complete. **The previous waves of this study used telephone interviewing to track data. In order to accurately track the data with previous waves, the results for each methodology have been presented separately in this report and all associated deliverables. The results in the main report and in this executive summary are those from the telephone interviews while those from the online survey are presented separately in a section near the end of the report.**

- **Qualitative Phase:** This phase of the research project consisted of 10 online focus groups. Eight focus groups were completed with members of the general population located in four parts of Canada: Ontario/Nunavut, Quebec, Atlantic Canada, and Western Canada/Yukon/Northwest Territories. In each of these regions, participants were segmented into two age groups: 18 to 34, and 35 years of age and older. The two remaining focus groups were dedicated to individuals living in official language minority communities (OLMC) in Ontario and Quebec. Data collection took place from December 8th to 15th, 2021. Each focus group lasted approximately 90 minutes, a total of 73 individuals participated and each received \$100 for their participation.

Qualitative research disclaimer

Qualitative research seeks to develop insight and direction rather than quantitatively projectable measures. The purpose is not to generate “statistics” but to hear the full range of opinions on a topic, understand the language participants use, gauge degrees of passion and engagement, and leverage the power of the group to inspire ideas. Participants are encouraged to voice their opinions, irrespective of whether or not that view is shared by others.

Due to the sample size, the special recruitment methods used, and the study objectives, the results discussed in this report are exploratory in nature. The findings are not projectable to a larger population.

One cannot suggest or infer that few (or many) real world users would behave in one way simply because few (or many) participants behaved in this way during the focus group sessions. This kind of projection can only be done through quantitative research.

Overall summary of research findings

A. General attitudes towards and familiarity with biotechnology

Based on the current wave of research, the results show that a little more than half of Canadians (52%) are at least somewhat familiar with “biotechnology”. Longitudinal tracking of this measure shows that while familiarity had remained fairly consistent from 2003 to 2016, the current study saw a decrease of 4% from the last wave in 2016, where 56% reported being familiar with “biotechnology”. For the most part, Canadians are also supportive of the use of biotechnology. The survey results show that, without the benefit of a basic definition, participants were approximately three times more likely to have a positive reaction to the term “biotechnology” (35%) as opposed to a negative one (12%).

Once a short explanation was provided, nearly eight in ten (79%) survey respondents either “strongly support” or “somewhat support” the general use of products and processes that involve biotechnology. Despite a lack of increase in familiarity with biotechnology over the same period, support has largely increased, reaching an all-time high of 79% in the current wave (an increase of 8% from 2016).

There are, however, important considerations when assessing these generally favourable findings in support of biotechnology. First, a majority (52%) of survey respondents have a neutral opinion of “biotechnology” without being provided a definition or description and, when it comes to support and familiarity, more than four in ten survey respondents (44%) are “somewhat familiar” and almost six in ten (57%) “somewhat support” the general use of products and processes that involve biotechnology. All these findings point to some degree of hesitation, reservation or uncertainty regarding biotechnology. This was something that was also witnessed in the focus groups where, despite many participants having some notion of what biotechnology was about, most could not speak about or describe the concept with complete confidence. The focus groups also revealed that although participants were generally supportive of the use of biotechnology, this support was not unconditional or without concerns.

The survey findings show Canadians are consulting an increasing variety of sources when it comes to biotechnology. The primary sources cited by respondents were a general internet search (80%), labels available on food packaging (67%) and news media (66%), among a variety of other information sources. At first glance, these results seem to suggest Canadians are actively looking up information on biotechnology, however, the focus group findings point to a much more infrequent and passive approach to accessing information on biotechnology. Participants may have seen information pertaining to biotechnology at some point through many of the sources listed in the survey, however, this is a topic they are rarely researching. The general lack of knowledge among focus group participants when talking about biotechnology supports the conclusion that research on the topic of biotechnology is not a regular activity. References in the focus groups to biotechnology in the context of COVID-19 vaccines might also partially explain the survey findings showing relatively high levels of use of resources like the Internet, government-related sources and news media, especially as they compare to study findings from 2016.

The survey research also reveals that familiarity is related to comfort when it comes to biotechnology. The more familiar respondents felt towards biotechnology and its regulatory system, the more likely they were to feel positively towards biotechnology.

On the topic of the regulatory system, both phases of this research point to a low level of familiarity among Canadians. More specifically, 3% of survey respondents felt “very familiar” with the process by which biotechnology is regulated in Canada, whereas 43% felt “not at all familiar.” This lack of familiarity was echoed in the focus groups, where very few could confidently describe how regulation was done or who was responsible for it.

Despite this general lack of familiarity, survey respondents did seem to have an opinion of how strict or lax the rules and systems are in Canada. On this, nearly three in five (57%) of Canadians scored the regulatory process as “very strict” (8%) or “somewhat strict” (49%) – the largest percentage observed across all recent waves of the study. Feedback from the focus groups suggest some participants have trust in the regulatory system simply because they feel there is no reason to believe that regulation is not being done properly. Canadians are seeking some form of “strictness” in their regulatory system given the concerns raised regarding the health, environmental, and ethical impacts they feared might come from the use of biotechnology in general or specific types of biotechnologies, such as gene-editing and cellular agriculture.

Just as familiarity with biotechnology seems to generate positive sentiments towards the use of biotechnology, a similar relationship seems to exist when it comes to the regulatory system. Overall, roughly one in four (24%) survey respondents feel they are extremely (8%) or quite confident (16%) in the safety and regulation of biotechnology in Canada whereas 35% are not confident. Results from the survey also indicate the more familiar a respondent is with the regulatory system, the more likely they are to feel confident in the safety and regulation of biotechnology in Canada.

B. Biofuels and bioproducts

Results from this most recent wave of research show a fair level of familiarity with, and support for, the development and use of biofuels and bioproducts, although, like every other type of biotechnology explored in this study, participants are not without any concerns.

Study participants were provided the following information about biofuels:

Biofuels use biological materials such as plants, wood and waste to produce fuels that can be used for cars, trains, airplanes, or to heat and power buildings.

Survey results show nearly three in five (57%) respondents were either “very familiar” (12%) or “somewhat familiar” (44%) with biofuels, a slight increase from 54% observed in 2016. Familiarity was also fairly common in the focus groups, both before and after participants were provided with a description of the technology. Focus group participants were also fairly supportive of biofuels, pointing out their environmental benefits (for example, biofuels use renewable resources, producing them causes less environmental harm than converting fossil fuels, their emissions are less harmful than those from fossil fuels). Participants also liked the idea of waste diversion or recycling associated with the production of some biofuels. Overall, there was a sense that the use of biofuels is a credible strategy to help lower greenhouse gas emissions.

However, along with the general support for biofuels, participants did show some concerns for various uses of this technology. Both survey and focus group results show when it comes to producing biofuels and bioproducts, support was highest for processes involving non-food crops and notably lower for processes involving the use of land or crops that could otherwise be used as food sources.

- For instance, roughly nine in ten (89%) survey respondents “strongly support” (59%), or “somewhat support” (30%) the use of crop and agriculture waste **to produce biofuels**. Eight in ten (80%) feel the same way regarding using crops that cannot be used as food, and processes involving non-food crops grown on poor-quality land that cannot be used to grow food.
- Similarly, 93% support **making bioproducts** from non-food crops, such as using hemp to make clothing fibres, with a similar level of support for making bioproducts from agricultural waste like straw or husk to make packaging, paper products or chemicals. Support decreased to 78% when it comes to making bioproducts from food crops, such as using corn to make food packaging or car parts.

Specific concerns regarding processes involving the use of land or crops that could be used as food sources was explored in the focus groups. Those who struggled with this approach were generally concerned with food security in both Canada and in the world and felt there were other viable ways to produce biofuels. There were also some concerns about the extent to which farmers would switch from growing consumable crops to crops used exclusively for biofuel purposes, possibly threatening food security for the sake of greater profits.

The focus groups raised other noteworthy concerns. For instance, some questioned whether the environmental costs of producing biofuels offset or outweighed the environmental benefits of using biofuels. Some were also concerned with the potential for clearing land and deforestation to produce biofuels and using wood that could be used for other purposes. That said, most of these concerns were hypothetical – none of the participants had seen, read or heard anything that would suggest their concerns are based on experience or fact.

C. Gene-Editing

Results from this most recent wave of research show some familiarity with and support for the use of gene-editing, however, study participants also had very clear concerns. Study participants were provided the following information about gene-editing:

Gene-editing involves making small changes to a cell's gene structure and does not necessarily involve mixing together DNA from different species of plants or animals. Gene-editing is often used for medical and agricultural purposes.

Survey results reveal that 40% of respondents were either “very familiar” (7%) or “somewhat familiar” (34%) with gene-editing. This has also increased since 2016, where 34% reported familiarity with gene-editing. Both survey and focus group results showed the greatest level of support was for the use of gene-editing in medical or human health improvements, with nearly nine in ten survey respondents supporting experimental treatments for certain types of cancer (86%) or sickle cell disease (85%). Support was similar for using gene-editing to create chemicals for use in the production of biofuels (83%).

Support for medical applications was also quite high in the focus groups, with a few who explained that they support its use in applications such as vaccines such as messenger ribonucleic acid (mRNA) and fighting congenital diseases. Some focus group participants also felt that gene-editing has been common practice for a long time and there have not been any negative effects but rather only positive outcomes (for example, more nutritious food, food with longer shelf life, etc.). Others believed gene-editing can help address issues related to world hunger, global food supply and food security by improving crop yields, improving nutrition, and, helping crops become more resilient to pests, diseases, and changing or challenging climates.

Support of gene-editing begins to drop when plants and animals are involved. In the first instance, support stands at 73% for improving plants, such as improving their resistance to disease and drought. Support drops further when it comes to using gene-editing in livestock to improve animal health (69%) or animal welfare (52%). The focus groups revealed the main concern was the potential for negative effects on human health due to human consumption. Participants were also concerned with the unknown long-term impact. Some also said gene-editing might unbalance the natural food chain, or it could have negative effects on animal health. This was also seen in the survey results, where the application of gene-editing to produce fish that grow faster, and which would potentially be eaten or become part of the natural food chain, received the lowest levels of support (44%) across the specific gene-editing applications explored in the survey.

D. Cellular agriculture

Cellular agriculture was a new topic added in the 2021 study to explore familiarity with and perceptions of this technology. Study participants were presented with the following explanation of cellular agriculture:

Cellular agriculture involves making animal products such as meat, seafood, dairy, or leather from animal cell cultures instead of using live animals. By taking cells from an animal and growing them with nutrients, we can obtain products such as meat, leather and milk. Cellular agriculture also includes inserting DNA from an animal into a microorganism like yeast or fungi to make food ingredients like egg or milk protein.

Survey results revealed that 32% of respondents were either “very familiar” (5%) or “somewhat familiar” (27%) with this technology. The focus group findings reinforced these results by showing that, even with an explanation and examples, many participants could still not wrap their heads around the concept and the technology, leaving them with many questions. The extent to which some participants still confused cellular agriculture with plant-based “meat” products might suggest the survey results could be somewhat misleading and the actual level of familiarity is lower.

Despite low levels of overall familiarity, there are moderate levels of support for the three specific applications explored in this study. Roughly two in three (62%) respondents support growing skin cells from animals to produce materials such as leather. As well, 61% support using microorganisms, such as bacteria or fungi, to recycle carbon dioxide out of the air to produce proteins as ingredients for human food. Support drops to 47% for using cellular agriculture to make food products such as meat, milk, or eggs without having to raise farm animals. In the focus groups, participants echoed results from the survey where a minority of respondents (45%) agree that food products made using cellular agriculture are as nutritious as food products taken from animals. Furthermore, somewhat of a majority (60%) who agree that government will ensure products of cellular agriculture, such as cheese, seafood or meat, are safe for people to eat.

Positioning this technology to participants as a way to protect the environment and aquatic ecosystems had limited appeal, with some arguing there are other or better ways of achieving that goal, however they did not mention any specific alternatives. This was heard in the focus groups but also seen in the survey results where cellular agriculture was proposed to respondents to ultimately reduce the environmental impact of agriculture. This proposal was met with mixed feelings of support (47%) and opposition (49%).

E. Summary of attitudes towards agricultural technologies

In the end, various results from this research point to guarded optimism in relation to biotechnology overall and with respect to each of the three specific technologies explored, some more than others. While both survey and focus group participants feel each of these technologies holds strong promise for benefiting them and society, there are important concerns that would need to be explained or addressed in order for them to be more accepting.

Case in point, the survey revealed that nearly three quarters (74%) of respondents felt quality of life could be improved from advanced biofuels and biotechnology in general. This sentiment decreases to 55% of respondents when it comes to genetically modified plants. Similarly, while many believe there are benefits for society, many also believe there are risks. More specifically, survey results showed 45% believe gene-editing offers either a strong or a substantial benefit to society, however 75% of all respondents also believe it poses at least a moderate risk. Similarly, 41% of survey respondents believe cellular agriculture offers either a strong or substantial benefit to society while 62% also believe it poses at least a moderate risk. In terms of specific benefits for society, there is broad consensus on the following:

- Almost three quarters (73%) of respondents believe products made using cellular agriculture will help produce more food to feed a growing global population given the world's limited natural resources.
- As well, 84% agree overall, and 41% strongly agree that increasing the use of innovative agricultural technologies in general can help feed a growing global population while limiting the impact of food production on the environment. This result represented a significant increase in agreement compared to what was observed in 2016 (67%).
- A similar proportion (84%) agree that increasing the use of innovative agricultural technologies in general can help reduce Canada's greenhouse gas emissions and increase our chances of meeting our country's targets.
- Finally, 82% agree that Canada's food production and distribution systems have faced certain challenges brought on by extreme events, like global pandemics, and that increasing the use of innovative agricultural technologies in general may help address these challenges.

While study participants did have some notable concerns about how some of these technologies could be used, there was a clear indication of where these technologies should be developed. There is strong agreement (85%) among survey respondents that these technologies are going to

be developed somewhere in the world, so it is better they are developed in Canada than somewhere else. In fact, 90% believe Canada should be among the world's leaders in this area, a position that fewer (72%) believe Canada actually holds.

The study reveals respondents continue to demonstrate an awareness of the risk these technologies may pose but are accepting of the inevitability of their future use. Nearly nine in ten (88%) respondents "strongly agree" (56%) or "somewhat agree" (33%) that all we can do is ensure the uses of technologies like biotechnology are as safe as possible.

Finally, when taking demographics into account, a few trends appear in the results when responses are broken down by gender and age. When taking gender into account, generally, men tended to say they were more familiar and supportive of biotechnology and the three specific technologies studied. Youth (18-34 years) were more likely to support all biotechnologies mentioned in the questionnaire. Overall, youth and men saw these technologies as a benefit to society and less risky compared to women and respondents 35 years and older.

Research Firm: Quorus Consulting Group Inc. (Quorus)

Contract Number: 01B68-220002/001/CY

Contract Value: \$159, 576.74

Contact Award Date: April 12, 2021

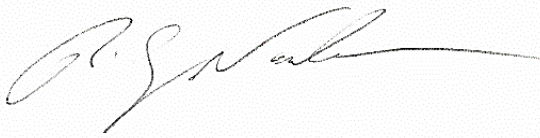
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Signed:

Date: March 31, 2022

A handwritten signature in black ink, appearing to read "R. Nadeau", is written over a light gray, textured rectangular background.

Rick Nadeau, President
Quorus Consulting Group Inc.