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Forging Stronger Links: Traceability and the Canadian Food Supply Chain



Centre for Food
in Canada



Forging Stronger Links: Traceability and the Canadian Food Supply Chain
by *Alison Howard, Jessica Edge, and Michael Grant*

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Preface

In response to the globalization of food markets, changing trade regulations, and greater focus on food safety incidents, calls for better traceability systems and tools grow louder. This has prompted industry, encouraged by government, to speed up investments in traceability. This report analyzes food traceability system issues and examines the costs and benefits of traceability for the different participants in the food supply system. Without a solid grasp of the costs and related benefits of the available traceability options, supply chain stakeholders may not be investing wisely. At the same time, if governments are not fully aware of the costs and benefits for supply chain stakeholders, and for consumers, they risk mandating traceability regulations that are unaffordable or unsustainable. Several potential solutions, which could lead to more and better traceability systems that meet both public and private interest priorities, are also examined.

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CONTENTS

- Executive Summary i**

- Chapter 1—Introduction 1**
 - Purpose of the Report 2
 - What Is Food Traceability? 2
 - Framing the Analysis 5
 - Methodology 7

- Chapter 2—Features and Challenges of Food Traceability Systems 8**
 - Traceability in Canada 8
 - Key Features of Traceability Systems 8
 - Food Traceability Drivers 9
 - Traceability Initiatives in Canada 12
 - Traceability System Gaps and Issues 15
 - Traceability Regulations and Standards Within Food Industries 20
 - Conclusion 23

- Chapter 3—Public Interest and Food Traceability Systems 24**
 - Using Traceability to Enhance Emergency Management 25
 - Regulating Traceability: Protecting the Public Interest 29
 - Conclusion 35

- Chapter 4—Private Interests and Food Traceability Systems 36**
 - Improving Supply Chain Management 36
 - Enhancing Industry Competitiveness: Product Differentiation 39
 - Conclusion 41

- Chapter 5—Potential Solutions 42**
 - Potential Solutions 43
 - Conclusion 46

- Appendix A—Incentives for Traceability by Principal Industry Stakeholders 47**

- Appendix B—Food Traceability—Roadmapping/Planning for Organizations 49**
 - Step 1—Gather Information 49
 - Step 2—Identify Traceability Strategy 49
 - Step 3—Evaluate Current Efforts 49
 - Step 4—Innovate and Enhance 50
 - Step 5—Monitor Continuously 51

- Appendix C—Bibliography 54**

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The findings and conclusions of this report are entirely those of The Conference Board of Canada, not of the Centre investors. Any errors and omissions in fact or interpretation remain the sole responsibility of The Conference Board of Canada.

ABOUT THE CENTRE FOR FOOD IN CANADA

The Centre for Food in Canada (CFIC) is a three-year initiative of research and dialogue to help address one of the mega-issues facing our country today—food. Food impacts Canadians in an extraordinary range of ways. It affects our lives, our health, our jobs, and our economy.

The twin purposes of the Centre for Food in Canada are:

- ♦ to raise public awareness of the nature and importance of the food sector to Canada's economy and society; and
- ♦ to create a shared vision for the future of food in Canada—articulated in the Canadian Food Strategy—that will meet our country's need for a coordinated, long-term strategy for change.

The Centre is taking a holistic approach to food. It focuses on food in Canada through three interrelated but distinct lenses: safe and healthy food, food security, and food sustainability. These lenses ensure that the Centre focuses on the full range of important issues facing the food sector.

The work involves a combination of research and effective communications. The goal is to stimulate public understanding of the significance of the food sector and spur the demand for collaborative action. To achieve its goals, the Centre is working closely with leaders and partners from Canada’s food sector, governments, educational institutions, and other organizations.

Launched in July 2010, CFIC actively engages private and public sector leaders from the food sector in developing a framework for a Canadian food strategy. Some 25 companies and organizations have invested in the project, providing invaluable financial, leadership, and expert support.

For more information about CFIC, please visit our website at www.conferenceboard.ca/cfic.

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The Conference Board of Canada is grateful to the following Centre for Food in Canada investors for making this report possible.

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EXECUTIVE SUMMARY

Forging Stronger Links: Traceability and the Canadian Food Supply Chain

At a Glance

- ◆ Food traceability is a vital part of the food risk management system: it underpins consumer trust in food safety, quality, and healthiness, and improves industry efficiency.
- ◆ The complexity of food supply chains, globalization of food markets, communications breakdowns, limited system participation, and other challenges hamper the efficiency and effectiveness of food traceability initiatives.
- ◆ Farms and food companies have been compelled to implement traceability standards by national and provincial regulations, regulations in their export markets, and/or private standards demanded by their customers (e.g., large manufacturers and retailers).
- ◆ Traceability systems designed to meet private interests allow firms to capture direct financial benefits, thereby helping to offset their costs.
- ◆ Potential solutions that governments, industry, and others could take to strengthen traceability's role in the food supply chain are also presented.

The report examines the costs and benefits of traceability for the different participants in the food supply system. It recognizes that businesses operating within the food supply chain need to determine a level of food traceability that meets their economic needs: their investments in traceability must yield net value. Without a solid grasp of the costs and related benefits of the available traceability options, supply chain stakeholders may not be investing wisely. At the same time, if governments are not fully aware of the costs and benefits for supply chain stakeholders, as well as for consumers, they risk mandating traceability regulations that are unaffordable or unsustainable.

Traceability is about trust. As Canadians, we expect to be able to choose foods that suit our personal needs for safety, health, consistent quality, taste, and cost. We use a food product's value, nutritional content, freshness, and taste as indicators of its quality and, potentially, its safety. To make good choices, businesses and consumers both seek information about a food product's origin and journey up to the final point of purchase. Thus, the ability to trace a product's journey from point of sale back to its origin (i.e., its "traceability") is a vital part of today's food risk management system. This, in turn, underpins consumer trust in food safety, quality, and healthiness. Traceability is also crucial to speeding up responses to food safety incidents and allowing more precise interventions.

Forging Stronger Links: Traceability and the Canadian Food Supply Chain analyzes food traceability system issues and identifies potential ways to improve traceability performance in Canada.

In response to the globalization of food markets, changing trade regulations, and greater focus on food safety incidents, calls for better traceability systems and tools grow louder. This has prompted industry, encouraged

by government, to speed up investments in traceability. The challenge now is to ensure that traceability becomes more universal in a manner that buttresses industry competitiveness. This means ensuring that traceability costs are effective yet affordable, and that traceability's value to industry outweighs the cost to the companies that pay for it.

PUBLIC AND PRIVATE INTERESTS

Companies and governments have some differences in how they assess the value of food traceability and how they determine the optimal level of traceability. This report explores public and private interest factors affecting traceability adoption. International traceability standards affecting Canada's food exporters and importers are also examined.

Traceability can improve a company's supply chain management systems, leading to more efficient production and shipping practices that cut costs.

Three key drivers of traceability that are motivated by broad public interest concerns include the desire to improve emergency management, government regulations, and private standards.

Responding to the widespread social and economic impacts of major food safety incidents, many firms and industries have invested in traceability systems to prevent future issues. These systems also help them limit the costs of product recalls and sustain consumer confidence. As traceability systems evolve and become more trusted sources of information, retailers will be able to better target and remove only contaminated products and avoid product wastage. Traceability systems also allow authorities to limit the scope of recalls relating to food safety incidents, thereby mitigating the negative economic consequences for the broader industry and benefiting public interest.

In Canada, government regulations both foreign and domestic—and private standards are significant drivers of the adoption of traceability systems to protect public interest.

Furthermore, retailers and food processors with strong brands may also be more inclined to use traceability to protect public interest because they are particularly vulnerable to the private costs of a failure to protect. Governments in Canada have already taken some steps to regulate traceability, both as a way to improve food safety and as a means to protect the economic interests of the food industry.

Private interests are a major factor in motivating the food industry to invest in traceability, in addition to public interest considerations. Companies that invest in traceability systems (notably electronic systems) can gain significant private benefits. Traceability can improve a company's supply chain management systems, leading to more efficient production and shipping practices that cut costs. It can allow companies or producers to differentiate their products (e.g., certifying that they are organic or sustainably produced), giving them a competitive advantage or allowing them to charge a premium price.

Many firms, especially smaller producers, are unaware of the private benefits that traceability systems offer. Other companies and/or industries may find that the public and private benefits of traceability are less than the private costs of implementation. Some companies and producers are reluctant to adopt a traceability system—particularly an electronic traceability system—due to the entry costs of buying the technology, the potential impact on production efficiency, and the need to train staff to operate it. For many smaller firms, the financial incentives are not large enough to induce them to invest in a costly electronic traceability system. Larger firms, by comparison, tend to see greater direct financial benefits from a sophisticated traceability system, and have access to the capital to pay for it.

Food traceability is an issue of concern globally, and a number of countries and regions have adopted regulations requiring traceability for some or all food products. This has a significant impact on Canadian companies and producers looking to export their products to these jurisdictions. Canada has fewer regulatory requirements governing traceability than other comparable jurisdictions, such as the United States, the European Union, and Australia.

BUILDING STRONGER LINKS IN FOOD TRACEABILITY CHAINS

Individual firms or stakeholders have developed many traceability systems to meet their own needs. However, this limits their impact. To be fully effective, they must all link together so that the *entire* food supply chain is covered. This is the best way to ensure that the source of food safety and animal disease outbreaks can be detected quickly and accurately. The linkage can be kept relatively simple: each firm in the food supply chain only needs to be able to accurately trace its products or ingredients one step forward and one step back in the supply chain. This ensures that products are traceable—but, at the same time, lessens the financial burden borne by companies.

Other potential solutions to improve traceability efforts include:

- ◆ making traceability systems universal and comprehensive;
- ◆ developing traceability systems that are compatible;
- ◆ mandating minimum requirements for affordable traceability systems;
- ◆ making premises identification mandatory for poultry and livestock producers;
- ◆ requiring detailed information to handle emergencies quickly;
- ◆ helping to fund firm's start-up costs and encourage flexible, cost-effective systems;
- ◆ promoting the benefits of participation in traceability; and
- ◆ using continuous evaluation to improve system performance.

In Canada, as in other developed countries, food traceability systems generate both public interest benefits and private benefits, but also substantial costs for stakeholders. Efficient and effective traceability systems offer maximum benefits for minimum costs. The ultimate prescription for creating the best possible traceability system in Canada is to balance public and private costs for traceability with public and private benefits.

CHAPTER 1

Introduction

Chapter Summary

- ◆ Food traceability is a vital part of the food risk management system: it underpins consumer trust in food safety, quality, and healthiness, and improves industry efficiency.
- ◆ Concerns about food safety, globalized food markets, genetics, emerging technologies, and changing trade regulations have prompted calls for better traceability systems and tools.
- ◆ This report examines traceability issues, and highlights potential solutions that governments, industry, and others could take to strengthen traceability's role in the food supply chain.

Traceability is about trust. As Canadians, we expect to be able to choose foods that suit our personal needs for safety, health, consistent quality, taste, and cost. Most of us choose our foods based, in part, on whether we trust the safety—and often the origin and journey—of the product. It is not surprising that “safe to eat” is a prerequisite to food choices, as the physical, social, and economic harm of unsafe food can be devastating. Our food choices are also determined by our sense of their impact: Does a food contribute to healthy living or, conversely, does it contribute to chronic disease and other health problems?

We use a food product's value, nutritional content, freshness, and taste as indicators of its quality and, potentially, its safety.

To make good choices, businesses and consumers both seek information about a food product's origin and journey up to the final point of purchase. Thus, the ability to trace a product's journey forwards and backwards between its origin and its point of sale (i.e., its “traceability”) is a vital part of today's food risk management system. This, in turn, underpins consumer trust in food safety, quality, and healthiness. Traceability is also crucial to speeding up responses to food safety incidents and allowing more precise interventions. When a food safety issue or a product verification challenge arises, consumers and industry rely on the food risk management system, including traceability, to resolve the problem quickly and effectively, stemming harm to health and reducing financial costs.¹

Increasingly, traceability is seen as a core element of the food risk management system. It has great potential for managing food safety risks, building consumer trust and awareness of the importance of healthy food choices, and strengthening the Canadian food industry's competitiveness in domestic and export markets. In response to the globalization of food markets, changing trade regulations,

1 For more information on food safety in Canada, see The Conference Board of Canada's report *Improving Food Safety in Canada*.

and greater focus on food safety incidents, calls for better traceability systems and tools grow louder. This has prompted industry, encouraged and financially supported by government, to speed up investments in traceability. The challenge now is to ensure that traceability becomes more universal in a manner that buttresses industry competitiveness. This means ensuring that traceability costs are effective yet affordable, and that traceability's value to industry outweighs the cost to the companies that pay for it.

While traceability is valuable to numerous stakeholders because it serves both public interests and private interests, the expenses are not always evenly shared.

In sum, traceability is valuable to consumers, who choose foods based on safety, quality, and health information. It is valuable to governments because it helps them safeguard the public interest through food tracking and precise response to food safety incidents. It is valuable to producers, processors, and manufacturers that operate extended, often global, supply chains, and which must demonstrate safety and quality to regulators and customers alike. And it is valuable to retailers, exporters, and importers that use it to build customer loyalty and win over new markets.

At the same time, while traceability is valuable to all of these stakeholders because it serves both public interests and private interests, the expenses are not always evenly shared. While governments invest substantially in grants and subsidies, industries pay for start-up and operating costs. Consumers pay at both ends—in taxes and for products with premium pricing. What can be done to adjust the situation so that, as a nation, we gain the maximum value from traceability—serving both public and private interests well—while ensuring that participating firms remain cost-competitive?

PURPOSE OF THE REPORT

This report analyzes food traceability system issues and identifies potential ways to improve traceability performance in Canada. The report's empirical findings

will be used to prepare the Canadian Food Strategy, which will be released in fall 2013. (See box “Developing the Canadian Food Strategy.”) In particular, the report:

- ♦ examines and assesses the structure and impact of current food traceability systems;
- ♦ profiles effective domestic and international food traceability practices;
- ♦ examines the challenges in implementing food traceability across segments of the food sector;
- ♦ identifies key private and public interests and incentives for investing in food traceability; and
- ♦ provides recommendations, advice, and tools for extending and improving food traceability systems.

WHAT IS FOOD TRACEABILITY?

The Codex Alimentarius Commission defines traceability in the food system as “... the ability to follow the movement of food through specified stage(s) of production, processing and distribution.”² Those foods that derive from animal sources further require the development of animal traceability. For the purposes of this report, the term “traceability” is used to refer to traceability systems that involve food or animal traceability systems, or both. The Canadian Food Inspection Agency (CFIA) maintains that there are three main pillars to traceability systems: “animal/product identification; premises identification; and animal/product movement.”³

Food traceability systems vary considerably in their complexity. A food traceability system can be as simple as a paper record-keeping system (e.g., a producer in a supply chain creates a paper record of where it received a product from and where the product was sent to). However, as food supply chains become more complex and globalized, paper records are increasingly inadequate tools for tracking product and ingredient origins. More complex electronic traceability systems apply technology—such as bar codes or radio frequency identification (RFID) tags attached to products—to make it easier to track food products throughout the supply chain. Electronic

2 Codex Alimentarius, *Principles for Traceability*, 1.

3 Canadian Food Inspection Agency, *Canadian Traceability*.

Developing the Canadian Food Strategy

The principal goal of the Centre for Food in Canada (CFIC) is to engage stakeholders from business, government, academia, associations, and communities in creating a framework for a Canadian Food Strategy—one that will meet the country's need for a coordinated, long-term strategy.

The Strategy will take a comprehensive approach to food: it will cover the full range of issues and themes relating to healthy and safe food, food security, and food sustainability—encompassing both social and economic dimensions.

The completed Strategy will present a framework of workable solutions and actions and will identify food sector businesses, governments, communities, and other groups to take the lead on implementing them.

The process for creating, disseminating, and implementing the Strategy involves research, analysis, and synthesis; consultation and a high level of collaboration; the development of a shared understanding and shared objectives among stakeholders; broad dissemination through many communication channels; and the commitment of key players to take action.

THE ROLE OF RESEARCH

The 20 CFIC research projects (including this report) are essential to the development of the Canadian Food Strategy. The process to develop the Strategy began with conducting research that develops empirical findings and potential solutions to the challenges and issues facing the food sector. These research findings are being used as the basis for dialogue and consultation with CFIC investors and other major food stakeholders, which will culminate in the completed Canadian Food Strategy.

CFIC research aims to:

- ◆ understand the current reality of Canada's food system, including its impact on health, environment, trade, and other major economic and social factors;
- ◆ define a future desired state for the food system; and
- ◆ suggest workable solutions for moving Canada from its current reality to the desired state. The workable solutions take into consideration the realities of economic activity, market forces, environment, policies, laws and regulations, and the social conditions and health needs of Canadians.

KEY STEPS AND TIMELINES

The three key steps, and their timelines, are as follows:

1. Begin CFIC research studies—July 2010
2. Begin dialogue and consultations on the Strategy—May 2012
3. Release the Canadian Food Strategy—November 2013

CANADIAN FOOD SUMMIT EVENTS—LAUNCHING THE CANADIAN FOOD STRATEGY

We are hosting three major events. The first was the Canadian Food Summit 2012, held in February 2012. The first Summit brought together more than 600 of Canada's food system leaders and practitioners from business, government, academia, and communities to discuss the latest research, share insights, and discuss how best to address Canada's major food challenges and opportunities. The second Canadian Food Summit will be held in April 2013. It will include extensive dialogue and active participant input into the draft strategy. The third Canadian Food Summit will be held in November 2013 to launch the Canadian Food Strategy.

traceability allows detailed food product/ingredient information to be captured, such as an animal's age or the temperature at which produce is being transported.

All traceability systems assist with product/ingredient tracking and tracing, but differ in their “breadth, depth and precision.”⁴ System breadth refers to the level of information detail recorded. System depth refers to how far back or forward it tracks information in the supply chain. Breadth and depth are closely related, as the amount of information required impacts how far back or forward the traceability system can track. System precision describes the ability to pinpoint a product or ingredient's characteristics and path through the supply

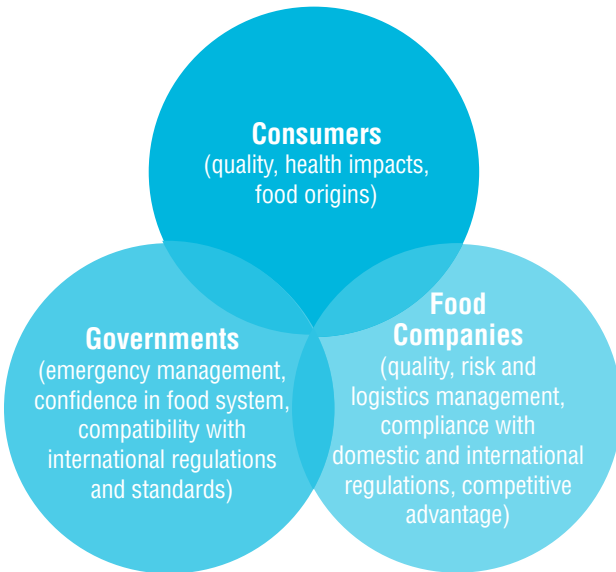
chain. Some traceability systems track small units of analysis, such as an individual cow or fish, while others focus on larger units of analysis, such as the grain from an entire silo.

WHY FOOD TRACEABILITY?

Traceability is that part of food production management that relies on knowing sources of supply, with the twin goals of ensuring quality and improving logistics. Traceability, with its focus on where, should not be confused with quality management, which is a much broader concept that is concerned more with how food is produced. Motives for adopting traceability vary considerably among consumers, food companies (including producers), and governments. (See Exhibit 1.)

4 Golan and others, *Traceability in the U.S. Food Supply*, 3.

Exhibit 1
Stakeholders That Drive Traceability Adoption
and Their Motives



Source: The Conference Board of Canada.

Quality, in its commercial sense, refers to the set of characteristics that the food consumer cares about (e.g., healthiness of foods, taste, nutritional content, freshness, and price). Canadians expect companies and governments to manage food safety for them. Although all consumers care about food safety, some are also concerned with the healthiness of their food choices and consider the logistics and process of their food's journey to their table. Based on a Conference Board of Canada's Centre for Food in Canada household survey, "certified organic" and other labels appeal to a large group of consumers who wish to know more about their food's origins.⁵ Consequently, the consumer-driven adoption of traceability by industry depends heavily on the percentage of the market that cares about *where* food comes from.

Companies want to manage risks concerning food safety. Although they do not use food safety as a way of differentiating brand (e.g., "now with less salmonella"), companies want to manage the reputational and liability

risks associated with food safety incidents and reduce their risk as much as possible. Such incidents can be devastating commercially, especially for companies whose corporate value depends on their brand. Therefore, it is extremely helpful to have traceability systems that enable them to track sources of supply throughout their supply chains.

Companies also look at traceability as a part of their logistics management systems. Traceability systems can help them find efficient ways to produce, assemble, store, and distribute products. Traceability systems can also help companies to cut food spoilage and hold their transportation suppliers responsible for delivery speed and spoilage during transport. Product-tracing tools can give companies highly accurate inventory records, allowing them to better manage the logistics of their product supply.⁶ Lean manufacturing techniques depend critically on these data.

Traceability systems can help companies cut food spoilage, and hold their transportation suppliers responsible for delivery speed and spoilage during transport.

Retailers and large restaurant chains have been particularly eager to adopt traceability systems for supply and logistics management purposes, as well as to bolster food safety and consumer confidence. For example, a 2006 pilot project involved affixing GS1 DataBar⁷ tags to apples and bananas in Loblaws and Walmart stores. Using the tags led to decreased out-of-stock incidences and better management of product replenishment needs for both companies.⁸ Electronic traceability systems also help companies to identify potential efficiency gains in their supply chains.⁹

6 Alfaro and Rábade, "Traceability as a Strategic Tool"; Layton, "Traceability Rule Represents Big Adjustment."

7 GS1DataBar tags are used to mark small products and carry more information than regular bar codes in half the amount of space. Some DataBar tags also have the potential to carry information such as expiration dates, product quality, and traceability.

8 GS1 Canada, *Update on Loblaw and Wal-Mart*.

9 Mai and others, "Benefits of Traceability," 977.

5 The Conference Board of Canada, *CFIC Survey Data 2011*.

The challenge for companies is to determine how much they should invest in *dedicated* food traceability systems. They may already have logistics programs which are, effectively, traceability systems: e.g., company-specific quality programs, inter-company quality programs, acceptance sampling, and private standards. Given cost constraints, companies need to balance their investments among these programs.

Governments, too, have an interest in food traceability. During a food safety incident, all levels of government work together to limit the risk to human health by coordinating recalls and communicating with the public. Governments assess costs from food-borne disease outbreaks somewhat differently than food companies. While they all share a concern about safeguarding public safety, food companies are also concerned about their individual brands and governments are concerned about *confidence in the overall food system* and maintaining the Canadian brand. As a result, governments value traceability differently than do companies.

For governments, food traceability fits as a type of policy/regulatory system that is targeted “at producing better societal outcomes than would be produced through pure market mechanisms, especially in areas where market failures occur.”¹⁰ In the interests of protecting consumers, governments typically combine regulatory (e.g., fines and orders) and non-regulatory traceability policy instruments (e.g., information sharing and incentives) in their approaches to minimizing risk.¹¹

Given the range of public and private interests, who should be investing in food traceability, how much should be spent, and what is the best way to allocate the costs of the systems? Some of this is already being solved in the open market, which has led to a certain level of traceability adoption. Government is tasked with determining whether this is adequate to address the public interest. If governments deem that it is not adequate, then they will prescribe various remedies to encourage higher adoption, either through regulatory or non-regulatory policy instruments.

FRAMING THE ANALYSIS

The analysis considers the full range of activity in and around Canada’s food industry, which employs more than 2.3 million people in producing, processing, retailing, shipping, distributing, importing, exporting, and food services.¹² In addition, government agencies, research organizations, and educational institutions all play important roles in ensuring that traceability efforts are sufficient.

During a food safety incident, all levels of government work together to limit the risk to human health by coordinating recalls and communicating with the public.

Our approach is to examine the costs and benefits of traceability for the different participants in the system. It recognizes that businesses operating within the food supply chain need to determine a level of food traceability that meets their economic needs: their investments in traceability must yield net value for them. They cannot make good decisions unless they have a sound understanding: without a solid grasp of the costs and related benefits of the available traceability options, supply chain stakeholders may not be investing wisely. At the same time, if governments are not fully aware of the costs and benefits for supply chain stakeholders, as well as for consumers, they risk mandating traceability regulations that are unaffordable or unsustainable. Governments must also take into consideration the costs of managing food safety and animal and plant health incidents, such as compensation costs for producers that are harmed by such incidents.

Because of the globalization of the food market, the Canadian food industry must consider other countries’ traceability regulations and concerns. Canadian traceability systems need to be compliant with international systems in order to allow the free movement of food exports. For these reasons, our analysis includes the

10 The Conference Board of Canada, *Governing Food*, 5.

11 *Ibid.*, 6.

12 The Conference Board of Canada, *Valuing Food*, 18.

challenges and costs as well as the benefits and incentives of traceability for food supply chain stakeholders in Canada and in other countries.

We argue that companies and governments have some differences in how they assess the value of food traceability, and how they determine the optimal level of traceability. We will explore the following areas.

PUBLIC INTEREST FACTORS AFFECTING TRACEABILITY ADOPTION

Governments have a paramount responsibility to safeguard the public interest—and to take action when things go wrong in times of crisis. Given their perspective on this, they are inclined to seek adoption of traceability systems by all companies. We examine how government measures the benefits of traceability and how it is encouraging industry to adopt it through regulatory and non-regulatory policy instruments.

Companies and governments have some differences in how they assess the value of food traceability, and how they determine the optimal level of traceability.

Most firms want to be part of running a food system that is as safe as possible and minimizes threats to the public. At the same time, they see that helping to safeguard the public interest is important to their corporate reputations as trustworthy suppliers of foods and ingredients. However, government will find it hard to secure universal industry uptake of traceability because not all companies see the value of investing in a traceability system despite their concerns about the public interest.

PRIVATE INTEREST FACTORS AFFECTING TRACEABILITY ADOPTION

In addition to a commitment to the public interest, private interests and private costs affect much of industry's investment decisions. Firms are partly driven to adopt traceability by their sense that consumers will buy only

from companies they trust—a trust that must be earned by demonstrating that the companies' products are safe in all parts of the supply chain, and that they can respond rapidly to isolate and solve food safety incidents. Adoption is also partly driven by managements' use of traceability as a way to enhance and protect brand, improve supply chain performance, and increase value for consumers, leading to expanded or sustained sales and market share.

Against this, firms weigh the often-substantial costs of implementing and running traceability systems when they are deciding whether or not to invest. They often consider whether traceability is most efficiently and effectively covered by their existing logistical systems or whether they need to invest in a dedicated traceability system. Questions about the costs and benefits of integrating their own traceability efforts with other systems are often asked.

INTERNATIONAL DRIVERS FOR TRACEABILITY ADOPTION

International traceability standards affect Canada's food exporters and importers. Exporters must meet international standards to be able to sustain export operations. Importers must ensure that international products are compliant with Canadian standards and regulations regarding quality, safety, and provenance.

Competition in international markets from suppliers based in other nations that run sophisticated traceability systems is stimulating some Canadian-based operators to look for ways to meet these competitor traceability systems with better ones of their own.

POTENTIAL OPPORTUNITIES AND SOLUTIONS FOR CANADA

Potential solutions are presented for governments and firms to consider in developing policies and selecting optimal traceability systems for investment. These are based on the analyses of costs and benefits of domestic and international food traceability systems, including functionality.

In addition, some advice and tools are provided in appendices A and B to assist firms in considering their own investments in traceability.

METHODOLOGY

Research for this report involved a multi-faceted methodology, including:

- ◆ a review of relevant food traceability literature;
- ◆ analysis of data gathered through CFIC's Industry and Household surveys. (See box "About the Centre for Food in Canada's Surveys.");
- ◆ interviews with 12 experts in industry, government, and other stakeholder organizations;
- ◆ analysis of existing case studies; and
- ◆ primary research to prepare five new case studies of organizations operating within the food supply chain.

About the Centre for Food in Canada's Surveys

A key mandate of the Centre for Food in Canada is to generate insights about the food system from the perspective of industry, consumers, and households. The achievement of this mandate requires the Centre to gather proprietary data on the specific challenges facing Canada's food industry and Canadian households' food-related skills, attitudes, and behaviours. To this end, we designed and executed, first, a business survey of the Canadian food industry and, second, a survey of Canadian households. These surveys were conducted by Forum Research, a Toronto-based survey company.

For the industry survey, Forum Research randomly surveyed 1,186 food companies during June 23–July 22, 2011, using questions prepared by The Conference Board of Canada. Companies were sampled according to the following 3-digit North American Industrial Classification System (NAICS) codes: 445 (retail food distribution), 311 (food processing), 111 (crop production), and 112 (animal production). Of the surveys, 1,177 were telephone surveys conducted by trained interviewers, and 9 were filled in by hand and submitted in hard-copy form. Aggregate survey findings are considered accurate +/- 2.85 per cent, 19 times out of 20.

For the household survey, Forum Research randomly surveyed 1,056 Canadian households during September 8–11, 2011, using questions prepared by The Conference Board of Canada. In this case, aggregate survey findings are considered accurate +/- 3.02 per cent, 19 times out of 20. Subsample results have wider margins of error for both surveys.

CHAPTER 2

Features and Challenges of Food Traceability Systems

Chapter Summary

- ◆ Traceability systems rely on participation by food supply chain stakeholders, and on the compatibility of information collection, data storage, and retrieval platforms.
- ◆ The complexity of food supply chains, globalization of food markets, communications breakdowns, limited system participation, and other challenges hamper the efficiency and effectiveness of food traceability initiatives.
- ◆ Traceability regulations can help to fill industry-led system gaps, which vary among the food industry subsectors.

driven by industry standards. Organizations such as GS1 are making efforts to provide a coordinated approach going forward.

Benchmarking of traceability systems in different countries reveals that Canada's priorities differ from most other OECD countries. The Johnson-Shoyama Graduate School of Public Policy in Saskatchewan ranked 16 peer countries on the depth of their food traceability systems (ability to trace from "farm to fork"). While Canada was ranked 15th out of 16,¹ most of the higher-ranked countries belonged to the European Union where farm-to-fork traceability systems are universally regulated. Instead, Canada's priorities for traceability focus on developing economically viable systems that can respond quickly to food safety emergencies. In this respect, Canada's food sector acts more like that of the United States (the only country ranked lower than Canada in the aforementioned study).

TRACEABILITY IN CANADA

In Canada, both the public and private sectors have been prominent in creating and adopting animal and food traceability. Governments and industry leaders have been collaborating since 2006 through the Industry Government Advisory Committee. Moreover, the federal and provincial/territorial (FPT) governments have been coordinating traceability efforts through the FPT Traceability Task Team. Industry–government working groups continue to establish standards around animal movements, communications, and data. Food traceability is still being conceptualized and is largely

KEY FEATURES OF TRACEABILITY SYSTEMS

Traceability systems, whether for livestock, crops, or processed foods, have key elements in common. Typical requirements for traceability in Canada are animal/product ID, animal/product movement, and premises/location identification. These three pillars of traceability are

1 Charlebois, *World Ranking*, 65.

based on “participation and unique identifiers.”² Participation refers to the fact that efficient and effective traceability systems rely on everyone in the supply chain taking an active role. This, in turn, requires that they all agree to use common traceability identification platforms and practices. Typically, they will do this only if they are satisfied with the reliability, depth, and precision of the system in the absence of mandatory regulations. Getting agreement is crucial because if any supply chain partner opts out, there will be an information gap or a weak link in the traceability of the entire supply chain.

Ready access to a product’s information is vital to minimizing risk during a food safety incident or when a product’s origins are in question.

Identification practices involve identification platforms, the parties responsible for each stage of product transformation or packaging (i.e., collection methods), and the recording and storage of unique identification information. (See boxes “Food Identifiers—Products, Parties, and Premises” and “Radio Frequency Identification Devices” for more details.) The information must be linked so that it is available to the next partner in the supply chain or accessible in a central database or registry.³ Ready access to the information is vital to minimizing risk during a food safety incident or when a product’s origins are in question. Compatibility with other supply chain links depends on the design parameters of the traceability system’s ability to collect, store, and retrieve data.

FOOD TRACEABILITY DRIVERS

Consumers, governments, and companies within the food industry itself have been pushing for improved traceability in Canada. As noted in Chapter 1, logistics and supply chain management are intertwined with

2 Agriculture and Agri-Food Canada, *Can-Trace at a Glance*, 10.

3 McEntire and others, “Traceability (Product Tracing) in Food Systems,” 6.

Food Identifiers—Products, Parties, and Premises

To maintain traceability integrity, commercial food products, parties, and premises have “unique identifiers” assigned to them. Unique product identifiers generally include a number, code, or unique descriptor. Primary product identifiers also distinguish individual units of production, such as an animal, bin, or flock. Processed or finished goods use a product identifier that reveals a seller’s retail trade item or non-retail trade item (such as the case or master carton). A unique shipment identifier uses a number, code, or unique descriptor that distinguishes a unique shipment of product and may be linked to a lot number.¹

A unique identifier can be generated by an individual company’s customized system or by using standardized systems. The problem with individual company-generated unique identifiers is that the tracking information may be lost as a product moves through the supply chain because other companies are not able to read a code or input it into their own tracking system. Currently, there are only a few standardized systems for assigning unique identifiers for products. The most widely used is the Global Trade Item Number (GTIN), which is assigned to individual organizations by GS1—a global, non-profit organization that focuses on creating and implementing global standards to improve supply chain efficiency.² GTINs incorporate a globally unique company prefix and a product reference number.³

Technological advances reflect strategically significant opportunities to improve traceability systems. New and emerging technologies will continue to change how traceability systems operate. The potential for future technologies, such as DNA use in meat traceability, to advance traceability systems is, as yet, unknown. Nanotechnology (e.g., nanosensors) and other breakthroughs may offer new opportunities to facilitate innovative methods of product identification. Costs and other considerations will affect the likelihood of certain technologies becoming the industry standard.

1 Agriculture and Agri-Food Canada, *Can-Trace at a Glance*, 10.

2 McEntire and others, “Traceability (Product Tracing) in Food Systems,” 106.

3 *Ibid.*, 133.

Source: The Conference Board of Canada.

traceability. Other key drivers of traceability efforts in Canada include food safety and quality, regulatory compliance, and competitiveness.

FOOD SAFETY AND QUALITY

Mitigation of food safety risk is the major driver behind the adoption of increasingly sophisticated traceability systems.⁴ Traceability and the accompanying informa-

4 For more detailed information and analysis of food safety issues in Canada, see The Conference Board of Canada’s report, *Improving Food Safety in Canada*.

Radio Frequency Identification Devices

For livestock traceability, special types of identification equipment are employed. The use of Radio Frequency Identification (RFID) tags is one data collection technique. In RFID-based traceability systems for livestock, an RFID tag is attached to each animal. The tag may contain only a unique number identifying the animal, but can store a variety of types of information about a product—such as the temperature at which it has been stored, its age and/or expiry date, and the speed at which it has moved in the supply chain. RFID readers use radio waves to read the information stored in an RFID tag.¹ Key information is typically stored by industry associations or in another centralized system.

Where RFID tags are used, producers must acquire the tags, applicators, and readers. Available equipment varies in sophistication and price. Choices depend on herd size, operating processes, and existing facilities.² The ongoing operation of an RFID-based system requires labour to apply and read tags and to manage the traceable data.³ Some national and provincial government funding programs are available to offset the technology costs.⁴

Depending on the type of RFID tags used, they can store information about when a product moves through the supply chain. However, the cost of RFID tags continues to be an issue, especially when it comes to low-cost products. Producers must consider the costs of the tags themselves, the associated equipment, and the labour involved to attach them to each animal, product, or group of products. The cost of RFID readers is also considerable.⁵

1 McEntire and others, "Traceability (Product Tracing) in Food Systems," 113.

2 Gardner Pinfold Consulting Economists Limited, *Costs of Traceability in Canada*, 13.

3 Ibid., 16.

4 Ibid., 38.

5 McEntire and others, "Traceability (Product Tracing) in Food Systems," 113–14.

Source: The Conference Board of Canada.

tion may prevent consumers or end-users from coming into contact with contaminated food products. Food-borne illness can cause death. A notable case is the death of 23 Canadians that was linked to the Canadian listeriosis outbreak of 2008. More recently, 2012 saw the largest beef recall in Canadian history, with several reports across the country of gastrointestinal illnesses linked to beef from an Alberta processing plant. Such high-profile food safety incidents raise consumer awareness of food safety concerns and help propel the passage of traceability regulations by governments. Food safety incidents create substantial costs for companies due to recall expenses, lost sales, brand impact and, sometimes, liability. In combination with good manufacturing practices, traceability can reduce the costs and time

spent in responding to food safety incidents. Improving safety, by ensuring that domestically produced food can be tracked at each step in the supply chain, helps to protect Canada's reputation—both domestically and internationally—as a producer of safe food.⁵

Traceability systems can reduce supply chain disruptions and allay public fears by enabling industry and food safety authorities to more accurately pinpoint sources of food safety issues. As CFIA has observed, "improving the traceability of food products will increase the success of food borne disease outbreak investigations."⁶ Traceability systems have the potential to link a problem to a particular producer at a specific point in time—limiting illness, reducing the need for widespread recalls, and calming consumers' health concerns.

Following a food safety issue or disease outbreak, traceability systems can minimize the health impacts of a food recall by allowing for quicker and more precise identification of a contaminated food source. This, in turn, helps governments to bolster public confidence in food safety. Traceability systems can also mitigate financial impacts by helping food companies avoid increased or unnecessary costs. The importance of traceability is highlighted by cases where traceability was lacking. For example, in 2011, German officials, in the absence of a strong traceability system, repeatedly misidentified the source of a food-related *E. coli* outbreak. Spanish cucumbers were first blamed, followed by a German organic farm that grows sprouts. The source of the outbreak was actually fenugreek seeds from Egypt, which are used to grow sprouts. Fifty people died as a result of the outbreak and thousands more were ill—at one point hospitals in some regions of Germany were overwhelmed.⁷ Spanish vegetable producers have claimed the outbreak cost them as much as 200 million euros a week, while the transport industry is said to have lost another 15 million euros.⁸

5 Sparling, *Traceability in Ontario's Agri-Food System*, 4.

6 Canadian Food Inspection Agency, *Lessons Learned*.

7 Flynn, "Top Food Safety Stories of 2011."

8 Fuchs, "Spain Takes on Germany."

An efficient and effective traceability system can allow a company to identify and resolve a food safety issue even before a product reaches the market, thus avoiding negative consumer health impacts, recall costs, and reputational damage. This makes traceability systems particularly appealing to companies with strong brands and reputations.⁹ However, the type of product and speed of the supply chain are significant factors in how effective traceability systems can be at mitigating food safety risks. For example, contaminated fresh produce may have cleared the supply chain before the source of the contamination can be identified. Products that undergo a transformation, such as baking, are inherently less risky. Traceability can also help to establish the boundaries of a firm's liability if a food safety or quality issue does arise.¹⁰ In addition, companies with sophisticated traceability systems may enjoy lower insurance premiums.¹¹

REGULATORY COMPLIANCE

Regulations exist for every stage of food production and distribution: from “farm to fork.”¹² Those relating to food traceability aim to minimize food safety risks and ensure that product origins can be verified. As economic incentives have prompted Canadian food industries to adopt increasingly sophisticated traceability systems, new regulations have been added to fill system gaps and ensure that minimum traceability standards are met.

CFIA produces regulatory guidance documents applicable to all foods and provides information and understanding about traceability requirements in Canada (e.g., *Good Importing Practices for Food* provides information on traceability requirements for food manufacturers).¹³ Examples of regulations in action include the Canadian Cattle Identification Program (2001) and the Canadian Sheep Identification Program (2004), which require cows, sheep, and bison to wear a registered ID tag before they leave their farm of origin. These regulations are mandatory in

all provinces. Information from these tags can be accessed by CFIA from a central database.¹⁴ Such regulations aim to ensure quick and easy identification of infected animals or premises in the event of a food safety incident.

Regulations, whether domestic or foreign, influence Canadian business decisions to implement traceability systems to meet the needs of their target markets. International regulations impact Canada's ability to export food products while domestic regulations direct its right to refuse food imports.

An efficient and effective traceability system can allow a company to identify and resolve a food safety issue even before a product reaches the market.

Although companies try to differentiate themselves from the competition by pointing out their products' desirable attributes, often these are not readily visible to consumers. Traceability systems offer the verification necessary to ensure the authenticity of the product and reveal desirable attributes.¹⁵ For some products, including non-genetically modified or organic, government regulations also require firms to verify the manner in which a product was produced. These regulations protect the consumer and help ensure a level playing field in the industry by preventing misleading product claims.¹⁶

COMPETITIVENESS

With food markets becoming more globalized, Canada's food companies face rising international competition for consumer dollars. Further, partnerships with international food producers or other businesses within the supply chain can be advantageous. The “suspicion that foreign standards are weaker than Canadian standards, and the reality of globalized supply chains, are at the heart of food traceability technology.”¹⁷ Ensuring that international suppliers meet Canadian traceability standards is a sometimes difficult, but vital, task for Canadian

9 Lenton, “From Farm to Fork,” 27.

10 Mai and others, “Benefits of Traceability in Fish Supply Chains,” 977.

11 Pehanich, “Race to Traceability.”

12 For an analysis of regulations that govern the food chain in general, see The Conference Board of Canada, *All Together Now*.

13 Canadian Food Inspection Agency, *Good Importing Practices (GIP): Good Importing Practices for Food*.

14 Canadian Food Inspection Agency, *Lessons Learned*.

15 Sparling, *Traceability in Ontario's Agri-Food System*, 7.

16 Golan and others, *Traceability in the U.S. Food Supply*.

17 The Conference Board of Canada, *Governing Food*, 10.

companies. At the same time, success in global food markets requires Canadian exporters to demonstrate that Canadian traceability standards match or exceed those in other countries.

The primary forces behind new industry-led traceability systems are consumer food safety concerns and the demands of key buyers and export markets.

Consumer interest in the origins and manufacturing processes undergone by their food is rising. Some consumers are willing to pay extra for food that is organic or non-genetically modified, produced locally, or produced using methods that address environmental sustainability or animal welfare. By producing food with in-demand value-added attributes, companies can potentially charge more for their products and/or capture increased market share.

TRACEABILITY INITIATIVES IN CANADA

Traceability systems used in Canada were developed at different levels and have been adopted by different food industries. Industry-led initiatives, federal (and joint federal/provincial/territorial) initiatives, as well as provincial/territorial initiatives, form a mosaic of traceability efforts in Canada. Some of the major initiatives from each level are described below.

INDUSTRY INITIATIVES

Many food industry associations in Canada have been actively developing traceability systems that are at various stages of implementation. The primary forces behind new industry-led traceability systems are consumer food safety concerns and the demands of key buyers and export markets.

The Canadian Industry Traceability Infrastructure Program (CITIP) is part of the Canadian Integrated Food Safety Initiative. It provides funding (up to \$2 million per project) to develop and implement industry-led traceability

systems.¹⁸ The program has funded traceability systems in the Canadian egg industry, the Saskatchewan herb and spice industry, the Quebec maple syrup industry, the British Columbia beef industry, the Canadian pork industry, and others.¹⁹ Funding has also been provided for the Fisheries Council of Canada initiative to develop and pilot a Canadian eco-certification system to certify fisheries' products as responsibly harvested and to track fish from harvest to final sale. This eco-certification system will be based on United Nations Food and Agriculture Organization (FAO) guidelines for the seafood sector, assuring buyers and consumers that their food can be traced to sustainable fishing operations.²⁰ In addition, funding has been provided for the Canadian Aquaculture Industry Alliance's national seafood certification and traceability project to develop and pilot an FAO-based certification system for use across the Canadian aquaculture sector. This assures buyers and consumers that their farmed seafood has been produced in an environmentally responsible manner and with solid management practices for food safety and quality.²¹

The FPT governments have also helped fund the Can-Trace initiative. Can-Trace, an industry-led initiative, developed traceability standards for all food products sold in Canada.²² In 2004, Can-Trace created the first version of the Canadian Food Traceability Data Standard, based on a one step forward, one step back model of traceability, using international standards.

CanadaGAP (Good Agricultural Practices) is the Canadian Horticultural Council's On-Farm Food Safety Program. The program consists of national food safety standards and a certification system for the safe production,

18 Agriculture and Agri-Food Canada, *Canadian Industry Traceability*.

19 Agriculture and Agri-Food Canada, *Government of Canada Invests to Strengthen Traceability in B.C. Beef Industry*; *Government of Canada Working to Strengthen Traceability for Maple Syrup*; *Government of Canada Working With Egg Producers*; *Strengthening Canada's Herb and Spice Industry*; Canadian Pork Council, *PigTrace History*.

20 Agriculture and Agri-Food Canada, *Government of Canada Invests to Strengthen Seafood Market Access*.

21 Ibid.

22 Can-Trace, *About Can-Trace*.

storage, and packing of fresh fruits and vegetables. It is an approved certification scheme benchmarked to Global Food Safety Initiative (GFSI) standards. CanadaGAP-certified companies benefit from using “a made-in-Canada program to meet the food safety requirements of the international marketplace.”²³ This initiative is a good example of how Canadian producers are strategically linking their efforts in food safety and traceability to global programs in order to ensure domestic safety and access to international markets.

While industry-led traceability systems remain voluntary, some industries, such as the pork industry, foresee their systems becoming mandatory in the future.²⁴ By helping to fund system development costs of many industry-led traceability systems, the Canadian government is encouraging industry adoption and enabling each industry to develop a system that is sensitive to its specific product attributes, and therefore more efficient.

In addition to industry-wide traceability schemes, a growing number of individual retailers, processors, producers, and others in the food sector have also implemented advanced traceability systems. A variety of factors have driven individual Canadian companies to implement voluntary traceability schemes. Some companies are motivated by export regulations, food safety concerns, and customer demands; others see traceability systems as a way to add value by verifying specific attributes such as organic or sustainably harvested—which will appeal strongly to some consumers. For example, through the traceability system ThisFish, consumers can view where their fish was caught, the fisher who caught the fish, details about the fishing method used, and other information.²⁵

FEDERAL AND FEDERAL/PROVINCIAL/ TERRITORIAL INITIATIVES

Despite facing different pressures at each level of government, the FPT governments committed to phasing-in a National Agriculture and Food Traceability System

23 CanadaGAP, *Benefits to Program Participants*.

24 Canadian Pork Council, *PigTrace History*.

25 Leung, “Hi, I’m Paul.”

National Agriculture and Food Traceability System’s Performance Targets

The National Agriculture and Food Traceability System (NAFTS) Performance Targets apply to all livestock or poultry species subject to traceability requirements.

Within 48 hours of the relevant CVO¹ or competent authority being notified of a sanitary issue or natural disaster, or in the prevention or preparedness of such issue, it must be possible to:

- ◆ establish the location(s) where a specified animal has been kept during its life;
- ◆ establish the location(s) from where animals at a given site were received;
- ◆ establish a listing of all animals that have been kept at the same location as the specified animal at any stage during those animals’ lives;
- ◆ determine the current location of all animals that have been kept at the same site as the specified animal at any time during those animals’ lives;
- ◆ determine the identification number and movement history of all conveyances used to transport animals to and from a given location;
- ◆ establish the location of a specified animal immediately prior to importation into Canada or the location of a specified animal immediately subsequent to exportation from Canada; and
- ◆ establish the location and date at which deceased animals were sent, transported, received, and disposed of (both on- and off-site), and a listing of those animals if identified individually.

1 CVO refers to the federal, provincial, or territorial chief veterinary officer in the jurisdiction where the specified animal is located or to which it has been traced.

Source: Agriculture and Agri-Food Canada, *Canadian Traceability*.

(NAFTS) in 2006. (See box “National Agriculture and Food Traceability System’s Performance Targets.”) The Industry Government Advisory Committee (IGAC), as the principal industry–government collaboration forum on traceability, is made up of a majority of industry representatives and is mandated to “lead” the development of NAFTS in collaboration with industry.²⁶ The FPT governments’ commitment to creating NAFTS was reaffirmed in 2008, when they completed the Growing Forward agricultural policy framework. In 2009, ministers

26 Agriculture and Agri-Food Canada, *Canadian Traceability*.

of agriculture committed to move forward on a comprehensive national traceability system for livestock and poultry.²⁷ Through NAFTS, national performance targets for livestock and poultry traceability systems were introduced with the goal of rapidly and efficiently managing future sanitary issues and natural disasters affecting and/or originating from Canadian herds.²⁸ The plan is to phase-in government regulations and industry standards over time to build a system that will meet these standards. The Growing Forward policy framework and Agricultural Flexibility Fund will provide support for key elements of the national system. Effective in 2013, Growing Forward 2 will represent an evolution of previous frameworks. It will aim to help the industry position itself to respond to future opportunities and challenges, and create the conditions for long-term competitiveness, sustainability, and adaptability, with an emphasis on industry capacity and self-reliance.²⁹ Furthermore, as part of the Government of Canada's Red Tape Reduction Action Plan, specific recommendations for Agriculture and Agri-Food Canada "will lead to a more competitive environment for Canadian farmers."³⁰ The development of a single-window approach for collection of traceability data is expected to facilitate information sharing for both industry and government.³¹

Further, the Livestock Auction Traceability Initiative (LATI) will provide contributions to assist primarily in the alteration of animal-handling structures, which will enhance traceability capabilities at high-risk, high throughput sites where animals from different herds co-mingle.

LATI is an up to \$20-million, three-year (2011–14) program undertaken through the Agricultural Flexibility Fund. LATI will cover up to 80 per cent of eligible project activities, to a maximum of \$100,000 per facility.³²

PROVINCIAL AND TERRITORIAL INITIATIVES

As part of the Growing Forward policy framework, provincial and territorial governments in Canada have encouraged individual businesses (e.g., producers, ranchers, feedlots, transporters, processors, distributors, and retailers) to adopt traceability systems by providing funding to help with implementation.

Each province and territory has its own funding programs for implementation. The costs are shared between the federal and the provincial/territorial government. While the terms and eligibility requirements of programs vary, they all allow food sector businesses to apply to have government cover some of the costs of buying traceability equipment and training employees.³³ For example, through British Columbia's Enterprise Infrastructure Traceability Program, the provincial government reimburses 75 per cent of eligible expenses associated with implementing a traceability system.³⁴ Alberta's RFID Technology Assistance program pays 80 per cent of the cost (up to \$30,000) of RFID hand-held readers and software for feedlots with more than 1,000 head of cattle annually.³⁵

A priority of the Growing Forward policy framework is that provincial and territorial governments will ensure that registration data for "priority agricultural and food premises are collected and verified to the extent that legislation permits."³⁶ Premises identification systems assign a unique number to a piece of land where animals or food are kept, assembled, grown, or disposed of. Premises include farms, feedlots, zoos, abattoirs, livestock sale facilities, racetracks, and rendering plants.³⁷ Premises identification is mandatory in Quebec, Alberta, and Manitoba.³⁸ Other provinces, such as British Columbia, register premises on a voluntary basis.³⁹

27 Agriculture and Agri-Food Canada, *FPT Ministers*.

28 Agriculture and Agri-Food Canada, *National Livestock and Poultry Traceability*.

29 Agriculture and Agri-Food Canada, *Growing Forward 2, 2013–18*.

30 Canadian Federation of Agriculture, "Government Cuts Red Tape."

31 Red Tape Reduction Commission, *Recommendations Report*.

32 Livestock Auction Traceability Initiative, *Objectives and Available Funding*.

33 Agriculture and Agri-Food Canada, *Growing Forward*.

34 BC Agricultural Research and Development Corporation, *Enterprise Infrastructure Traceability Program*.

35 Alberta Agriculture and Rural Development, *RFID Technology Assistance*.

36 Agriculture and Agri-Food Canada, *Growing Forward—Part IIB: Initiatives*.

37 Agriculture and Agri-Food Canada, *Premises ID*.

38 AGCanada.com, *2011 Ushers In a New Era*.

39 British Columbia Ministry of Agriculture, *British Columbia Premises Identification*.

In addition to helping fund industry traceability initiatives, provincial governments have also made strides to further traceability efforts: descriptions of traceability initiatives in Quebec and Alberta are provided as examples.

Agri-Traçabilité Québec

The Quebec government created Agri-Traçabilité Québec (ATQ) in 2001 as a non-profit organization to develop and implement a traceability system for agricultural products. ATQ has created a central database for traceability data for all Quebec agricultural products. It also manages traceability systems for cattle, sheep, deer, and elk. It is actively involved in developing traceability systems and has conducted numerous pilot projects, including ones for lettuce, eggs, pork, and poultry.⁴⁰ ATQ's subsidiary, Agri-Traçabilité International (ATI), offers traceability solutions that meet international standards.⁴¹

Alberta

Alberta's traceability system is made up of three key components: premises identification, animal identification, and animal movement tracking. Together, these enable the Office of the Chief Provincial Veterinarian (OCVP) or other emergency management officials to pinpoint and isolate specific sites of concern and target resources in the event of a threat to animal or human health as a result of a natural disaster. The integrity of this system also translates into opportunities for Alberta's livestock and meat industries to differentiate their products.⁴²

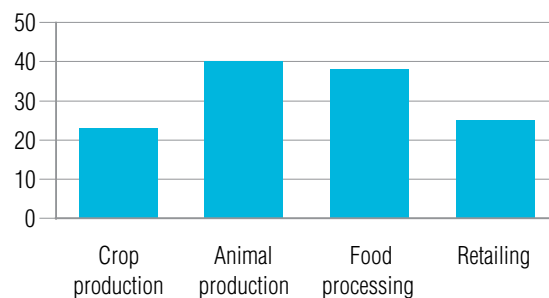
TRACEABILITY SYSTEM GAPS AND ISSUES

Despite the initiatives described above and others already under way, some gaps persist in Canadian food traceability efforts. In part, this is because many companies do not feel that traceability systems are essential to their future success. The CFIC Industry Omnibus Survey asked food companies in Canada to rate the key factors that will determine the success of their business in the next five years. While 52 per cent of companies felt that it

was "very important" or "extremely important" to improve food safety (n=1,172), only 31 per cent of respondents felt that it was "very important" or "extremely important" to implement traceability (n=1,080). Survey responses varied by industry subsector.

Crop production and retail industry respondents were less likely to feel that implementing traceability was very or extremely important for their future business (23 and 25 per cent, respectively) compared with respondents from the animal production (40 per cent) and food processing industries (38 per cent). (See Chart 1.) The difference may be partly due to the influence of high-profile food safety incidents, such as the BSE (bovine spongiform encephalopathy) epizootic and the Canadian listeriosis outbreak of 2008, which have affected the animal production and food processing industries' efforts to improve their animal and food safety response management in recent years.

Chart 1
Importance* of Implementing Traceability to Future Business (per cent)



*"very" and "extremely" important combined
Source: The Conference Board of Canada.

Traceability's role in food safety emergency situations is well known. Other, less vital but still important, benefits and uses of traceability are not as well understood, or leveraged. Several system gaps and issues hamper the efficiency and effectiveness of food traceability initiatives.

- ◆ The complexity of food supply chains with their myriad of ingredients, processes, and stakeholders creates difficulties in designing and maintaining tracking and tracing policies and practices.

40 Agri-Traçabilité Québec, *Background*.

41 Canadian Food Inspection Agency, *Lessons Learned*.

42 Alberta Agriculture and Rural Development, *Traceability*.

- ◆ Globalization of food markets presents a host of international traceability regulations and standards that must be considered before food may be exported or imported.
- ◆ Communications breakdowns occur due to insufficient knowledge of procedures and to incompatibilities among the traceability systems of supply chain link operators.
- ◆ High costs that exceed the *perceived* benefits deter some operators from upgrading their traceability systems.
- ◆ Lack of participation in traceability efforts by food supply chain operators create traceability information gaps that undermine the value of the overall systems.

COMPLEXITY OF THE FOOD SUPPLY CHAIN

As consumers' preferences for prepared foods and quick meal options rise, the food processing industry grows in complexity and volume. Accordingly, food traceability systems are becoming more complex. The sheer number of supply chain participants for some food products creates challenges for establishing efficient and effective traceability systems.

Breakdowns in traceability systems, however, are wholly unacceptable when public health and safety are at stake: the consequences can be horrific. For example, during the Peanut Corporation of America's food safety recall of 2008, it was enormously difficult to track the products in the food supply because the supply chain was so complex: "one manufacturer might coat the [peanut] paste in chocolate and make a peanut butter cup, which is then sold to another company that mixes it into ice cream that may or may not also contain peanut butter. A grocery chain might buy that ice cream and sell it under a private label."⁴³ Partway through the recall efforts, the director of the U.S. Food and Drug Administration's food centre admitted, "We don't have a good idea of how much of that product is still out there."⁴⁴

To illustrate the complexities of food supply chain traceability, two examples are described below: a "short" food supply chain and a "long" food supply

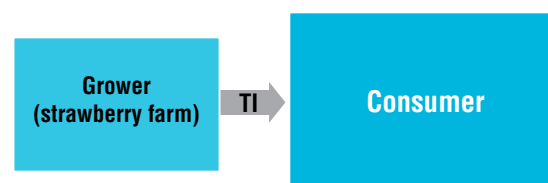
chain. The short food supply chain example is a basket of strawberries from a pick-your-own farm. The long food supply chain example is a frozen pizza from a retail outlet. These examples demonstrate the relative complexity of traceability needs based on two parameters: length of the supply chain and the number of links in the supply chain.

Short Food Supply Chain Traceability Example: Basket of Strawberries

In Canada, visiting a pick-your-own fruit farm is a fun summer activity for many families. Those consumers out in the field picking their own basket of strawberries, or purchasing a ready-picked basket from the grower, constitute a short supply chain. A minimal number of supply chain stakeholders (i.e., a single consumer/purchaser, and a single grower/producer) conduct a business transaction for a single-ingredient food product.

In this case, the grower or producer is also the distributor and the retail outlet. There is no processing, and packaging is minimal. Product freshness and quality are readily apparent to the consumer who is on-site at the grower's operation. And verifying or tracing the product's origin is likewise simple when the consumer is on the premises. Traceability costs for this type of transaction, therefore, are practically non-existent since the consumer is fully aware of the food product's origins. Exhibit 2 shows where and how the traceability information (TI) is passed along the short supply chain. However, this type of consumer-to-grower relationship is rare and not practical for the majority of consumers or food products.

Exhibit 2
Short Food Supply Chain Traceability Example:
Basket of Strawberries



Source: The Conference Board of Canada.

43 *The New York Times*, "List of Tainted Peanut Butter Items."

44 *The New York Times*, "Peanut Product Recall Grows."

Long Food Supply Chain Traceability Example: Frozen Pizza

Consider, instead, the example of purchasing a frozen pizza from a local retail outlet, such as a grocery store. A food product with multiple ingredients and processes requires the involvement of a number of supply chain stakeholders before reaching the consumer. Growers and producers of the raw ingredients (e.g., wheat, tomatoes, cheese, pork, peppers, or spices) may send their food products in bulk to wholesalers, which turn them over to production facilities (e.g., bakeries or meat-packing plants). The semi-prepared food products (e.g., flat breads or pepperoni) may then be delivered to another processing facility, which prepares and packages the final food product. It may then be sent to a distributor or shipped directly to warehouses or retail outlets.

Some of these processes may be combined in a single facility or the processing facilities may be owned by a single company that has vertically integrated its business. Exhibit 3 shows a representation of this long food supply chain, although it is still a simplified version of ingredient and traceability events. Tomato sauce, for example, includes many other raw ingredients besides tomatoes, each of which has its own traceability information and place in the system. Also, other stakeholders may be involved, such as traceability data information centres and government agencies.

At each stage of food product “turnover” or movement, traceability information must be received from the previous link in the supply chain, recorded, stored, and sent to the next link in the supply chain or to a centralized data storage system. Transparency of information and the ability to collect, store, and transmit the same type of information is vital to the system’s success. Organizations of different sizes within the supply chain will have different-sized budgets for traceability, and not all may be able to afford the most technologically advanced systems. They will also have to comply with different regulations, depending on their role in the supply chain and their location. Further, the incentives to participate in traceability will differ: while the tomato grower from Ontario may be interested only in selling locally, for instance, the meat-packing plant in Alberta may be trying to grow

its business and capitalize on international markets. While their efforts are ultimately contributing to producing the same final food product, their interests and business needs are different. Therefore, their views of participation in traceability efforts will vary accordingly. (See Exhibit 3.)

GLOBALIZATION OF FOOD SUPPLY CHAINS

The globalization of food supply chains adds to the complexity of traceability systems. Demands for specialized food products and lower costs of some food ingredients are encouraging Canadian food suppliers to invest more deeply in import and export markets. However, in order to deal in international markets, domestic food suppliers and processors must be able to verify food products destined for import or export. The reality of specialized products is that “ingredients ... are sourced from a variety of different suppliers who can be located anywhere around the world. Increasingly, the ingredients for a single food product come from many different companies and countries.”⁴⁵ Educating Canadian food suppliers and raising their awareness of traceability requirements for imported and exported food products is an ongoing challenge for government.

Canadian food exporters must take the traceability requirements of their international trading partners into account. Key food export markets for Canada include the U.S., the EU, and Japan. Following are brief examples of the food traceability regulations and standards from these markets that Canadian food exporters need to consider:

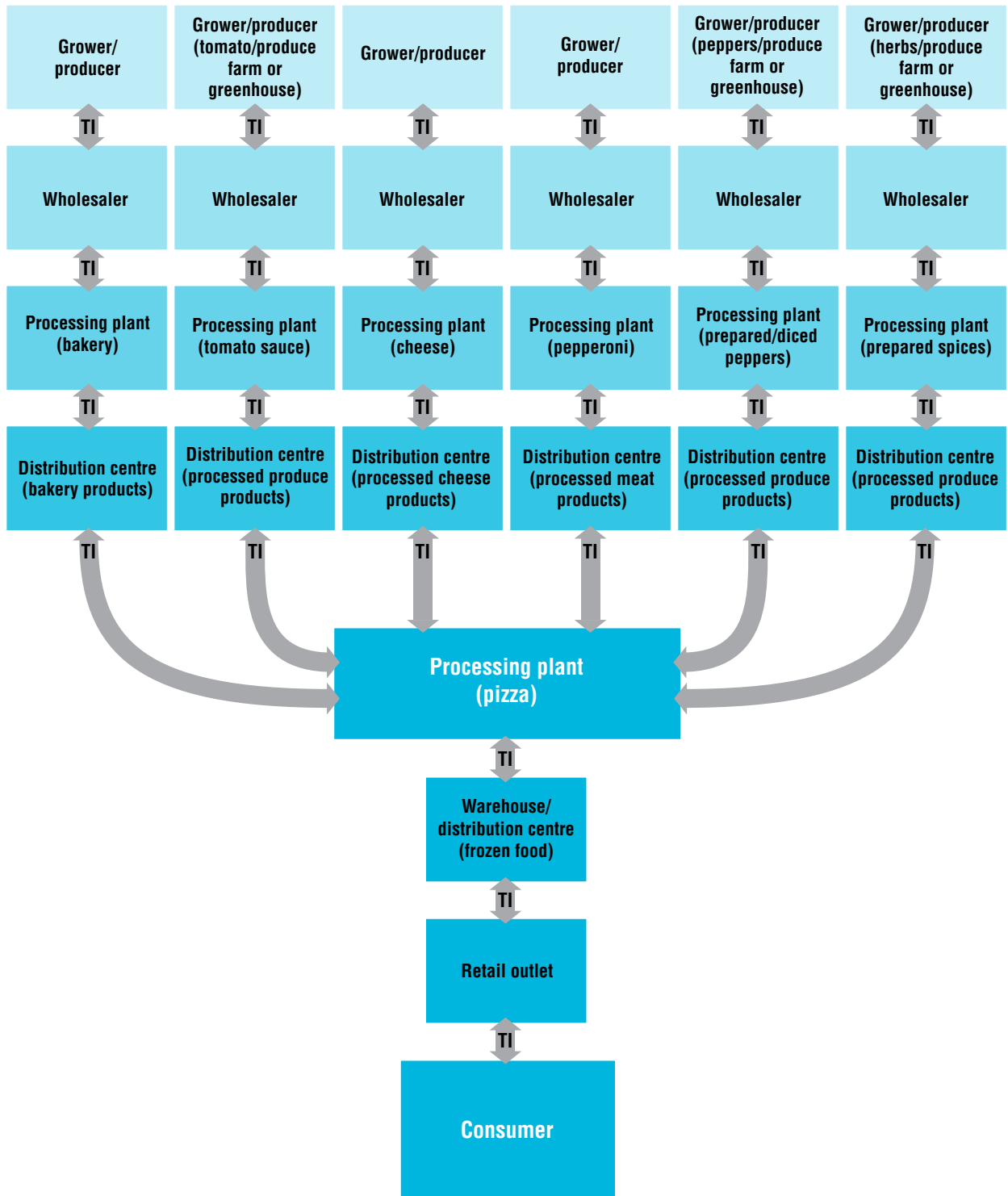
- ◆ The U.S. *Bioterrorism Act of 2002* requires that food manufacturers, processors, transporters, and distributors track products one step forward and one step back in the supply chain.⁴⁶
- ◆ When fully implemented, it is expected that the U.S. *Food Safety Modernization Act* (2011) will require companies to be able to quickly track their product sources and where they sent products. It will also require this information to be available in digital form.⁴⁷

45 The Conference Board of Canada, *Valuing Food*, 40.

46 Major, “Tracking the Transition,” 78.

47 Layton, “Traceability Rule Represents Big Adjustment.”

Exhibit 3
Long Food Supply Chain Traceability Example: Frozen Pizza



Source: The Conference Board of Canada.

- ◆ The EU's *General Food Law—Traceability* (2002) requires businesses to be able to identify the path of a food product one step forward and one step back in the supply chain.⁴⁸
- ◆ The EU requires specific traceability information for products that may contain genetically modified ingredients.⁴⁹
- ◆ The EU's illegal, unreported, and unregulated (IUU) fisheries regulations allow only marine fisheries' products validated as legal by the relevant flag state or exporting state to be imported to or exported from the EU.⁵⁰
- ◆ Japan's Ministry of Agriculture, Forestry, and Fisheries (MAFF) encourages private companies to use traceability systems. As traceability systems have grown more sophisticated over the past decade, Japanese consumer expectations have risen. It is increasingly common, for example, for consumers to expect instant access to food product traceability information through bar code readers built into their cell phones.⁵¹
- ◆ Japan has stringent requirements for age-verified beef, which allow only imported beef from animals 20 months of age or less.⁵²
- ◆ Retailers around the world are increasingly demanding that suppliers be compliant with one of the food safety schemes approved by the Global Food Safety Initiative. All of these programs require traceability.

COMMUNICATION BREAKDOWNS

Communicating the importance of traceability and how traceability systems operate is a key challenge for industry and government. A survey of Canadian dairy producers found that the most significant costs of implementing, maintaining, and/or operating a system of product traceability “related to the attitude and motivation of staff and/or the need for retraining.”⁵³ Without proper training, companies may be collecting, storing, or passing along incorrect or inadequate information to other links in the

supply chain. Raising staff awareness of how weak links in the traceability information chain affect the integrity of the entire supply chain requires ongoing support for marketing and training.

Traceability system compatibility issues create communications issues between organizations within the food supply chain. Since current systems derive from a number of sources and incorporate various levels of technology—from none to highly sophisticated—there are challenges in ensuring that information from one link in the supply chain can be accurately shared with the next link. However, the mandating of universal systems throughout individual food industries may create financial, technical, and administrative hardships for those operating at the lower levels of technology or those that currently collect minimal information.

Standardizing traceability information is a challenge for the entire food sector (including industry and governments). Agreement on standard product identifiers on products to enable different trading partners to link information still needs work. For instance, suppliers often assign proprietary codes to identify ingredient names and lot numbers, but manufacturers that receive the products then assign their own codes for entry into their systems. The information link is broken, or at least, difficult and time-consuming to trace.

Further, information sharing between parties is hampered by trust issues. Before giving out or allowing access to product and company information, businesses want clear, trustworthy answers about privacy restrictions and control of access to data. This is particularly true when governments are involved or are thought to have access to the data. One potential solution is to store traceability information locally and share only product identifiers with governing bodies. The system could be queried for data in the event of a food safety incident or other previously agreed situation.

PROHIBITIVE COSTS

While most operators in the food supply chain collect and provide some level of traceability information, their systems vary considerably. To solve system incompatibility and information consistency issues, instituting mandatory systems is a possible answer. However, some food

48 European Commission, *General Food Law—Traceability*.

49 Ibid.

50 European Commission, *Illegal Fishing (IUU)*.

51 Hall, “Food With a Visible Face,” 826.

52 Alberta Agriculture and Rural Development, *Benefits and Costs*, 3.

53 Sparling and others, “Costs and Benefits of Traceability,” 159–60.

producers, processors, and other operators view the costs of changing or upgrading existing systems as being too great when balanced against the perceived benefits and their ability to remain price competitive. Depending on the traceability information gathering and the recording and sharing systems used, implementation may involve both fixed and variable costs. Smaller producers and operators are particularly vulnerable to high fixed costs of implementing traceability systems. Larger organizations often already have other control systems in place that can provide at least some traceability information. However, while larger organizations have the option to spread fixed costs over a larger output, they are vulnerable to high unit costs of implementation. Costs include:

- ♦ auditing, inspection and laboratory analysis, and the opportunity cost of supervisory, production, and managerial/administrative staff time.⁵⁴ Depending on the food product and its traceability needs, other costs may include:
 - materials and labour for new construction or renovations to accommodate traceability equipment and processes, or for increased or modified storage, construction of data collection stations, scanning infrastructure, and modifications to existing livestock enclosures;⁵⁵ and
 - initial purchasing of RFID equipment, such as electronic ear tags, applicators, readers, computer and telecommunications equipment, and software.⁵⁶

It will be important, as new traceability regulations and standards are created, to take into consideration how these changes affect all sizes of food industry operators, including the impact on competitiveness.

SUPPLY CHAIN NETWORK PARTICIPATION

Lengthy supply chains can also prevent or discourage participation in traceability. The greater the length, the more likely it is that at least one participant does not have a compatible traceability system in place. Non-participation in traceability can lead to potentially

dangerous delays due to inaccurate or missing information in the event of a food recall or safety issue. Often, new traceability systems are introduced on a voluntary or phased-in basis to give supply chain operators the time to evaluate and gear up for participation. Offering advice and information on participation benefits along with technical details of system requirements will encourage and help operators plan for traceability participation as a “value-added” part of their business strategy going forward. For example, governments could facilitate the showcasing of current technologies to help industry and the broader public to better understand them. In addition, if traceability requirements held to a “one step forward, one step back” system, operators’ costs would be reduced, which would further encourage them to participate in traceability.

TRACEABILITY REGULATIONS AND STANDARDS WITHIN FOOD INDUSTRIES

Traceability regulations exist to cover system gaps and to ensure a level of compliance. Regulations and standards have developed in accordance with the nature of the various food industries. Tracing the origins of an individual livestock animal, for instance, is a different process than tracing milk, which is sold in bulk. Traceability regulations, standards, and issues concerning some of the major categories of food industries are described below. In addition to the regulations listed for each category of food industry, those that deal with animal identification are also required to comply with Health of Animals regulations.⁵⁷

CATTLE

The Canadian Cattle Identification Program (CCIP) was introduced in 2001 and applies to all cattle and bison, including dairy cattle.⁵⁸ While the program is industry-led, it is mandatory in all provinces and enforced by the CFIA, although provinces share responsibility for traceability investigations.⁵⁹ The mandatory traceability regulations require cattle to have a registered ear tag before

54 Sparling and others, “Costs and Benefits of Traceability,” 159–60.

55 Gardner Pinfold Consulting Economists Limited, *Costs of Traceability in Canada*, 11.

56 *Ibid.*, 13.

57 Canadian Food Inspection Agency, *Acts and Regulations*.

58 Canadian Food Inspection Agency, *Canadian Traceability*.

59 Charlebois, *World Ranking*, 68–69.

leaving their farm of origin (all ear tags for cattle are RFID-based as of July 2010). Information on the animals is then stored in a central database accessible to governments during an animal health or food safety emergency. Failure to comply with these programs can result in letters, fines, or prosecution.⁶⁰

SWINE

Development of a national traceability system for pigs began in 2002. PigTrace Canada is an industry-led initiative of the Canadian Pork Council. PigTrace will focus on all three pillars of traceability, namely animal ID, premises ID, and movement. Using a phased-in approach, swine site operators must report movement (i.e., shipping or receiving) of swine to PigTrace Canada (or in Alberta, to a provincial swine traceability system) using one of several reporting methods (including online, via cellular network; integration with commercial herd management software; and databases of commercial transport companies).⁶¹ Since swine primarily move as groups or lots, it was felt that “reporting animal movements using individual identifiers for all swine would be time-consuming and costly to producers, while any additional benefit to disease monitoring would be minimal.”⁶² However, hog producers will have the option of tagging their breeding sows individually (with both non-electronic and RFID tags approved for use in swine).

The costs of RFID technology and the industry norm of tracking hogs in lots are seen as impediments to electronic identification adoption.⁶³ While slap tattoos (a permanent ink mark) are an acceptable way to identify hogs sent for slaughter,⁶⁴ ear tags are also available with unique identification numbers.⁶⁵ Development and implementation costs of PigTrace Canada are covered

under the Growing Forward policy framework until March 2013, but the tools used for animal identification, including tattooing equipment and ear tags, are not.⁶⁶ PigTrace Canada aims to provide national ear tags at cost-effective prices by sourcing them from a single manufacturer.⁶⁷

SHEEP

In 2004, the Canadian Sheep Federation (CSF) began administering the Canadian Sheep Identification Program (CSIP)—the national mandatory identification program that requires producers to apply official tags to all sheep that leave their farm of origin.⁶⁸ Tags are purchased from official suppliers, which then assign animal tag numbers, record flock, and operator information, and relay it to CFIA. Information on the animals is then stored in a central database accessible to governments during an animal health or food safety emergency. Failure to comply with these programs can result in letters, fines, or prosecution.⁶⁹

These tags are read visually and are not part of an RFID system. As in the hog industry, take-up of electronic identification systems is not widespread among Canadian sheep producers (outside of Quebec, where electronic identification is heavily supported and subsidized). Sheep producers cite the cost per head of RFID as the greatest barrier to its adoption.⁷⁰

POULTRY AND EGGS

National performance targets for livestock and poultry traceability systems were developed through NAFTA for the purposes of emergency management.⁷¹ (See previous box “National Agriculture and Food Traceability System’s Performance Targets” for details on the

60 Canadian Cattle Identification Agency, *Frequently Asked Questions*; Canadian Food Inspection Agency, *The Canadian Cattle Identification Program*.

61 Canadian Pork Council, *PigTrace Canada: Frequently Asked Questions*.

62 Canadian Pork Council, *PigTrace Canada: PigTrace History*.

63 Gardner Pinfold Consulting Economists Limited, *Costs of Traceability in Canada*, 9.

64 Canadian Pork Council, *PigTrace Canada: Tattooing for Traceability*.

65 Canadian Pork Council, *PigTrace Canada: Introducing Traceability Ear Tags for Swine*.

66 Canadian Pork Council, *PigTrace Canada: Frequently Asked Questions*.

67 Canadian Pork Council, *PigTrace Canada: PigTrace History*.

68 Canadian Food Inspection Agency, *Canadian Sheep Identification Program*.

69 Canadian Cattle Identification Agency, *Frequently Asked Questions*; Canadian Food Inspection Agency, *Canadian Cattle Identification Program*.

70 Ibid.

71 Agriculture and Agri-Food Canada, *National Livestock and Poultry Traceability Performance Targets*.

established targets.) Responsibility for establishing the components of poultry traceability systems is shared: “While provincial governments are responsible for developing premises identification, commodity associations are responsible for the flock identification and movement systems.”⁷²

In addition, the federal government recently funded the development of a Canadian Egg Industry Traceability System. It will support processes and procedures for “tracing the movement of eggs, pullets, and egg-laying birds [as well as] the establishment of database requirements for egg and bird traceability information required.”⁷³ As well, the Egg Farmers of Canada plans to unveil a voluntary traceability standard in 2012 that will mark an egg with a variety of traceability information, including the farm at which it was produced, the day it was produced, a best-before date, and a “Product of Canada” identification. The organization anticipates that its egg traceability system will have significant participation by egg farmers.⁷⁴ As these national initiatives are still in their infancy, a number of start-up challenges are expected—including getting full industry participation, and general communications around system requirements and benefits.

SEAFOOD

Traceability of seafood starts at the sea or inland body of water and follows through to retail and food service. This spans the regulatory jurisdiction of Fisheries and Oceans Canada (DFO) and CFIA. DFO traceability programs apply to the source of the fish or seafood (before they reach a federally registered establishment). DFO’s Dockside Monitoring Program aims to provide accurate, timely, and independent third-party verification of fish landings. It is also a fisheries management tool and helps to address the EU’s illegal, unreported, and unregulated (IUU) fisheries regulations.⁷⁵

The Fish Inspection Regulations (FIR) are administered by CFIA and apply to fish and seafood products that are involved in international and interprovincial trade, and products manufactured or processed in federally registered establishments.⁷⁶ The FIR traceability requirements apply to food products and require that the common name, country of origin, net quantity grade/size/class/count, moisture content, and quality designation be labelled on most seafood products.⁷⁷ However, packaging and labelling requirements for Canadian seafood “are dictated by several pieces of legislation, with rules found in the *Food and Drugs Act*, the *Consumer Packaging and Labeling [sic] Acts [sic]*, and the *Fish Inspection Act*.”⁷⁸ To fill regulatory requirement gaps, government-funded and non-government programs provide recommendations on sharing seafood information along the supply chain. For example, SeaChoice recommends that labels provide information on “species name (preferably the scientific name); catch or farm method; catch or farm location; processing location; and feed ingredients (if farmed).”⁷⁹

As traceability technology becomes cheaper, seafood supply chain stakeholders, especially small fisheries, will find participation more appealing. Until now, the costs of traceability technology have been prohibitive for some.⁸⁰ Another incentive for the fishing industry to adopt traceability is to enhance the sustainability of fish supplies. ThisFish is a Canadian example of a voluntary electronic traceability system for seafood that contributes to sustainable and responsible fishing. (See Chapter 3 for further details.) Documenting sustainable fishing practices is another way for fishers and retailers to differentiate their products to consumers. The ability to track and trace seafood also satisfies the concerns of NGOs and consumer/retail demand for NGO eco-certification, and helps to control against illegal, unreported, and unregulated fishing.

72 *Chicken Farmers of Canada*, “New National Traceability System,” 1.

73 Agriculture and Agri-Food Canada, *Government of Canada Working With Egg Producers*.

74 Interview findings.

75 Fisheries and Oceans Canada, *Review of Dockside Monitoring Program*.

76 Canadian Food Inspection Agency, *Acts and Regulations*.

77 Magera and Beaton, *Seafood Traceability in Canada*, 23; *Fish Inspection Act*.

78 Magera and Beaton, *Seafood Traceability in Canada*, 23.

79 *Ibid.*, 23–24. For more information on Sea Choice, visit www.seachoice.org.

80 Leung, “From Farm to Fork.”

PRODUCE

Tracking individual produce items is arguably more complex than tracking livestock animals, due to product diversity. For this reason, the Produce Traceability Initiative (PTI), sponsored by the Canadian Produce Marketing Association, GS1 US, the Produce Marketing Association, and the United Fresh Produce Association, focuses on tracking produce. Although participation is voluntary, PTI would like to see supply chain-wide adoption of electronic traceability of all cases of produce by 2012.⁸¹ While supply chain stakeholders already using electronic traceability systems should be able to adopt this platform with relative ease, smaller organizations and those using paper-based systems would experience higher costs due to technology, training, and system set-up. However, information collected in the product labelling process mirrors some of the information used in traceability systems. CFIA administers produce regulations, which usually require that labelling includes the common name, country of origin, net quantity, as well as the identity or premises of the grower or processor.⁸²

SPECIALTY PRODUCTS

A number of specialized food products, such as honey and maple syrup, are also regulated with regard to origins and packaging. CFIA administers regulations for honey, which normally require that the labelling information includes the type of honey (i.e., source); the grade name and colour classification; the net weight; the content state (e.g., creamed), if applicable; the name and address of the packer (or first dealer); registration number of the packer; and the brand or trade name, if any.⁸³ Again, some labelling information for specialty products could also be used in traceability efforts.

Taking matters a step further, the True Source Honey Initiative launched a Certified True Source Honey Traceability Program in 2011. Designed to certify the origin, food safety, and purity of honey available in North America, it is a voluntary standard for packers,

producers, importers, and exporters.⁸⁴ As a new and voluntary system, spreading the word about the initiative and generating industry interest in participation will be the first challenges.

CONCLUSION

Efficient and effective food traceability systems are becoming increasingly important. In fact, they are on the verge of becoming a requirement for international import and export to many countries. While there are technical and financial challenges to creating and maintaining traceability systems, existing initiatives and programs from different levels in the supply chain and in different food industries point the way forward, in part. Producers, processors, and other food supply operators can learn from high-performing traceability initiatives already working in Canada and internationally. Presenting them with information on the benefits of traceability, and the trend toward traceability becoming an international requirement, will help motivate many firms to participate and refine current efforts.

There is also a variety of non-market and market incentives that can stimulate greater industry engagement and investment in traceability. The incentives relate to the expected outcomes of traceability participation: both types can motivate food sector businesses. Market incentives may be thought of as opportunities for businesses—such as increased sales and access to markets—where there are potential benefits of participation. Non-market incentives may be thought of as threats to businesses—such as loss of business customers and limitations on access to markets—where there is a consequence of non-participation. Both opportunities and threats are external forces acting upon a business. How a business chooses to approach these forces helps to determine its business strategy and traceability system choices. The next two chapters discuss different—but often intertwined—incentives to participate in traceability.

81 The Produce Traceability Initiative, *The PTI Initiative*.

82 *Canada Agricultural Animals Act*, “Fresh Fruit and Vegetable Regulations.”

83 *Canada Agricultural Animals Act*, “Honey Regulations.”

84 Canadian Manufacturing, *Honey Traceability Program to Launch in 2011*.

CHAPTER 3

Public Interest and Food Traceability Systems

Chapter Summary

- ◆ Food traceability systems protect the public interest by helping to prevent and minimize the effects of food safety incidents and animal disease outbreaks.
- ◆ Traceability systems can help to reduce the scope of recalls during a food safety incident, and maintain and rebuild consumer confidence in food safety.
- ◆ Farms and food companies have been compelled to implement traceability standards by national and provincial regulations, regulations in their export markets, and/or private standards demanded by their customers (e.g., large manufacturers and retailers).
- ◆ In some instances, the private costs incurred in implementing traceability systems act as a barrier to greater industry engagement.

The desire to protect the public interest is a major motive for traceability systems in the food industry. Firms and governments alike view traceability systems as a way to protect the public by preventing or reducing the consequences of emergency management situations, such as food safety incidents and animal disease outbreaks.

Canada's food safety system generally performs well at managing food safety risks.¹ However, when they do occur, food safety incidents not only harm people's health, they can undermine public confidence in affected organizations and the entire food system. Such failures to protect the public interest harm our society and can cause financial losses for firms and industries. Spillover effects can hurt industries and companies that are not directly implicated in a specific food safety incident. While most companies recognize that it is important to protect the public interest, they vary widely in the extent to which they see traceability as a practical tool to help them do so. The value they attach to traceability depends on such factors as the type of products they produce and the associated food safety risks, operational size, place in the supply chain, and the regulatory requirements to which they are subject.

This chapter looks at the challenges, benefits, and value of implementing traceability systems for public interest reasons. It examines three drivers of traceability that are motivated by broad public interest concerns: the desire to improve emergency management, government regulations, and private standards. (See Table 1.)

1 The Conference Board of Canada, *Improving Food Safety in Canada*.

Table 1
Public Interest Incentives for Food Traceability and Primary Beneficiaries

Incentives for Traceability	Primary Stakeholders Benefiting
Emergency Management	
Respond more quickly to food safety incidents	Producers, processors, manufacturers, retailers, food service, consumers, distributors
Determine the source of food safety incidents	Producers, processors, manufacturers, food service, consumers
Prevent food safety incidents	Producers, processors, manufacturers, retailers, food service, consumers, distributors
Reduce insurance premiums	Producers, processors, manufacturers, distributors
Protect and enhance brand name and reputation	Brand-name manufacturers, major retailers, major food service chains
Locate animals in a natural disaster	Producers
Contain an animal disease outbreak	Producers
Access export markets	Producers, processors, manufacturers
Regain and/or enhance consumer confidence	Commodity-based industries (e.g., eggs), brand-name manufacturers, major retailers, major food service chains
Regulatory Compliance	
Domestic regulations	Producers, processors, manufacturers
Foreign regulations	Producers, processors, manufacturers, distributors that export product
Private standards	Producers, processors, manufacturers, retailers, major food service chains

Source: The Conference Board of Canada.

USING TRACEABILITY TO ENHANCE EMERGENCY MANAGEMENT

Responding to the widespread social and economic impacts of major food safety incidents, many firms and industries have invested in traceability systems to prevent future issues and contain their collateral damage. In the event of a food safety incident, their traceability systems will help them to limit the costs of product recalls and sustain consumer confidence. Market forces are driving firms to invest in food safety to protect their brand and reputation, and avoid costly recalls.

For example, in 2007, a U.S. company realized that 8,000 cartons of its fresh spinach had potentially been contaminated with salmonella. The company used its traceability system to locate the cartons and within three days of the product being harvested, it had notified stores and restaurants of the problem, preventing 90 per cent of the potentially contaminated spinach from reaching consumers. The number of consumers at risk of illness was significantly reduced by the speed of the company's

response.² This example demonstrates how traceability improves a produce firm's capacity to respond to food safety incidents and contain their effects.

Traceability systems can also help to locate animals during a natural disaster or isolate animals during an animal disease outbreak, enhancing animal welfare and mitigating the economic consequences.³ For example, when a cyclone hit North Queensland, Australia, in February 2011, authorities used the information from RFID tags to identify stray cattle and return them to their owners. Electronic traceability systems can also reduce the effects of animal disease outbreaks following a natural disaster.⁴ The financial implications are huge. In 2002, it was estimated that an outbreak of foot and mouth disease in Canada would result in financial losses of between \$13.7 and \$45.9 billion, depending on the scale of the outbreak and the effectiveness of control strategies, such as traceability.⁵ The desire to better manage animal disease outbreaks continues to be an important motivation for the pork and egg industries to develop traceability systems.

CONTAINING FOOD SAFETY IMPACTS

Traceability systems help prevent and contain food safety incidents, and limit the financial damage to an industry or company when an incident occurs by reducing the impact of recalls.

In 2008, a salmonella outbreak in the U.S. led to about 1,300 reported cases of food poisoning. The U.S. Department of Agriculture and the Centers for Disease Control and Prevention first attributed the outbreak to the consumption of contaminated raw tomatoes. Subsequent investigations by U.S. authorities found that the actual cause of the outbreak was likely peppers from Mexico. However, by this time, the mistake had already hit the tomato industry hard—the cost to Florida tomato growers

alone was an estimated \$100 million.⁶ This example shows the vulnerability of the public's health and the limitations of food companies' traceability systems in the face of errors in identifying a contamination source or information delays and gaps. The ability of traceability systems to narrow the scope of product recall is affected by the information available and by a firm's place in the supply chain. Retailers and large manufacturers with well-known brands may recall more than just the affected lots of a product in order to protect their brands.⁷ As traceability systems evolve and become more trusted sources of information, retailers will be able to remove only the contaminated product and avoid product wastage.

Traceability systems can also help to locate animals during a natural disaster or isolate animals during an animal disease outbreak, enhancing animal welfare.

Traceability systems may allow authorities to reduce the scope of recalls in the event of food safety incidents, thereby mitigating the negative economic consequences for the broader industry and benefiting the public interest. A U.S. study estimates that if traceability decreased the incidence of food-borne illness by 1 per cent, it would lead to public benefits of \$114 million annually in addition to the private benefits the food industry would receive.⁸ (For more on firm-level impacts, see box "Enhancing Food Safety in the Produce Industry With Traceability: The Oppenheimer Group.")

Industries or companies with a comprehensive traceability system may be able to more quickly regain their access to key markets following a food safety crisis. For example, the 2003 detection of BSE in an Alberta cow led Japan, the U.S., and Mexico to ban imports of Canadian beef and cattle.⁹ Because of its provincial traceability system, Agri-Traçabilité Québec, Quebec was the first Canadian source of beef products allowed to export to

2 Mejia and others, "Traceability (Product Tracing) in Food Systems," 169.

3 Tyrchniewicz and Tyrchniewicz, *Perspective of the Impact*, 8.

4 *9News*, "Livestock ID."

5 Ontario Ministry of Agriculture, Food and Rural Affairs, *Canada and the Province of Ontario's Foreign Animal Disease Response Plan*.

6 Produce Safety Project, *Breakdown*.

7 McEntire, "Traceability (Product Tracing) in Food Systems," 136.

8 Mejia and others, "Traceability (Product Tracing) in Food Systems," 171.

9 CBC News, "Canada, the United States and Japan."

Enhancing Food Safety in the Produce Industry With Traceability: The Oppenheimer Group

The Oppenheimer Group imports and distributes produce to retailers, wholesalers, and food service operations across North America. Based in Coquitlam, B.C., the company is one of the largest produce distributors in North America. It has offices in North and South America and distributes more than 100 varieties of produce from more than 25 countries.¹

Oppenheimer uses a proprietary electronic traceability system to trace its products from the farm to the grocery distribution centre. Historically, each produce grower used its own system for marking information on its produce packaging; therefore, Oppenheimer's traceability system is built to handle a variety of different types of proprietary markings. The company can track its products down to the carton level, as well as by pallet level, lot level, and transport load.² Its traceability system allows it to identify potential food safety problems and quickly respond to product recalls—it can recall and hold product at any point in its supply chain. Oppenheimer's traceability system is compliant with several private standards, including the British Retail Consortium and the Global Food Safety Initiative. Its traceability system is also compliant with the Produce Traceability Initiative (PTI) standard, as are some of its growers' systems.³

Oppenheimer's primary motive for implementing its traceability system was a desire to be proactive on food safety issues. There was also pressure from major clients—retailers and

food service operations—that require traceability. The traceability system enables the company to obtain more favourable insurance rates.⁴ In addition, it has seen some supply chain benefits from the use of its traceability system—specifically, better supply chain visibility down to individual cartons. While this supply chain visibility has not yet led to direct financial savings for the company, traceability has given it better ability to handle greater volumes of product—thereby enhancing its ability to take on new business and grow.⁵

The Oppenheimer Group has had challenges bringing growers into its traceability system. Educating and training growers has been an issue. Many growers are reluctant to adopt PTI because of the costs and because the PTI system uses bar codes and is more complex than older systems.⁶

Equipment has been the biggest cost incurred. The company spends roughly 2 per cent of its overall annual budget on food traceability.⁷ In the future, Oppenheimer plans to measure the impact of its traceability systems, including the ability to implement just-in-time supply chain management, reductions in product waste, and customer (retailer) confidence.⁸

1 The Oppenheimer Group, *Corporate Profile*.

2 Interview findings.

3 Ibid.

Source: The Conference Board of Canada.

4 Ibid.

5 Ibid.

6 Ibid.

7 Ibid.; rough estimate only.

8 Interview findings.

Japan after the crisis.¹⁰ The BSE crisis helped to make the Canadian cattle industry aware of the widespread economic costs of a food safety incident, and the potential of traceability to curtail them.¹¹

During a food safety incident, traceability can limit the liability of a farm or company by verifying that it was not the source of the problem. Insurance companies are also starting to recognize traceability's value in protecting companies from being mistakenly held liable for a food safety issue and for containing disease outbreaks. Some

now offer insurance discounts for producers with traceability systems. In the future, producers and companies without traceability systems may see their insurance premiums increase or may be able to purchase only limited liability coverage.¹²

CONSUMER CONFIDENCE

Traceability systems can help to maintain and rebuild consumer confidence in food safety. U.S. surveys have repeatedly shown that consumer confidence in the food supply decreases following a high-profile food safety

10 Maynard, "Traceability."

11 Interview findings.

12 Sparling, *Traceability in Ontario's Agri-Food System*, 6.

incident.¹³ The impact can be severe and lasting. For example, in 2006, after bagged spinach was identified as a source of *E. coli* in the U.S., sales of all leafy greens dropped significantly. One year following the outbreak, bagged spinach sales had still not recovered to their previous level.¹⁴

For industries or firms that have suffered food safety incidents, a traceability system can help rebuild consumer confidence in an industry's food safety practices.

Traceability can also help maintain consumer confidence in the food industry's ability to protect the public interest by enabling a quick and accurately targeted response to a food safety incident. When industry and government struggle to accurately identify contaminated products, as they did in the 2009 Peanut Corporation of America recall, consumer confidence in the ability of government and industry to protect the public interest is undermined. For industries or firms that have suffered food safety incidents, a traceability system can help to rebuild consumer confidence in an industry's food safety practices. For instance, the British Egg Industry Council introduced traceability alongside food safety measures, to bolster the industry's reputation after reports of widespread salmonella in eggs caused a significant drop in U.K. egg consumption. (See box "British Lion Eggs: Bolstering Consumer Confidence With Traceability.")

PRIVATE COSTS OF EMERGENCY MANAGEMENT TRACEABILITY SYSTEMS

Some companies and/or industries may find that the public and private benefits of traceability are less than the private costs of implementation. Traceability can help a company or industry achieve public benefits, such as reduced impacts of food safety incidents on consumers, as well as private benefits, such as entry into niche or international markets. However, some companies and producers are reluctant to adopt a traceability system—particularly an electronic traceability system—due to

the entry costs of buying the technology, the potential impact on production efficiency, and the need to train staff to operate it. Furthermore, the businesses in the supply chain that incur the greatest costs when implementing traceability systems are not necessarily those that see the greatest benefits from traceability. (See box "Traceability in the Canadian Cattle Industry: Who Pays? Who Benefits?")

Most companies and producers never experience a food safety incident; yet they face the certainty of incurring yearly costs for implementing and maintaining a traceability system.¹⁵ Under these circumstances, it is hard for them to measure the financial benefits of having a traceability system, particularly if they are in a part of the industry with relatively low food safety risks, and challenges with disaggregating product information. This is the case, for example, for grains such as wheat, which are grouped in large silos and have low food safety risks due to various "kill" steps in processing that eliminate many bacterial risks.¹⁶ By comparison, melons, which have higher food safety risks, are easier to tag individually or in batches as they leave their farm or field of origin, thereby facilitating more precise traceability. However, many companies and producers will be affected if international borders close due to safety incidents or suspected contamination of food products in their industry. Encouraging all players to participate in traceability efforts is key to protecting the public's health and industry viability.

One way to increase participation is to implement traceability across an entire industry with cost sharing among the participants. This allows financial resources to be pooled to develop and experiment with different types of traceability systems, to determine the most effective system while cutting costs per participant. For example, Egg Farmers of Canada received government funding to determine the most efficient and cost-effective computer systems and printers to use in its traceability system.¹⁷

13 McEntire and others, "Traceability (Product Tracing) in Food Systems," 102.

14 Mejia and others, "Traceability (Product Tracing) in Food Systems," 162.

15 Mejia and others, "Traceability (Product Tracing) in Food Systems," 169.

16 Golan and others, *Traceability in the U.S. Food Supply*.

17 Interview findings; Agriculture and Agri-Food Canada, *Government of Canada Working With Egg Producers*.

British Lion Eggs: Bolstering Consumer Confidence With Traceability

The British Egg Industry Council (BEIC) has implemented a voluntary food safety standard, the Lion Quality Code of Practice, which includes comprehensive traceability. Eggs produced in the U.K. in compliance with this voluntary industry standard are clearly branded “British Lion Eggs.” More than 85 per cent of eggs produced in the U.K. are now certified British Lion Eggs.¹ The Lion Code was created following a widely publicized food safety incident in 1988, when most U.K.-produced eggs were declared to be infected with salmonella. As a result, British egg consumption dropped by 60 per cent almost overnight, and continued to decrease by about 8 per cent per year over the next 10 years.² In 1998, with the support of egg producers and packers, BEIC created the Lion Code to ensure the safety of British eggs, along with a complementary marketing campaign. The Lion Code’s food safety measures include:

- ◆ use of a vaccine (which became available in the mid-1990s) to protect laying hens and their eggs from salmonella;
- ◆ on-farm and packing station food safety practices;
- ◆ independent audits; and
- ◆ creation of a traceability scheme for Lion eggs.³

The Lion Code traceability system encompasses all breeding farms, rearing and laying farms, feed mills, and packing centres involved in the production of Lion eggs. All hen flocks used to produce Lion eggs must have a passport certificate and the movement of all Lion eggs must be fully traceable. All Lion eggs

are stamped with the Lion logo, the name of the farm where they were laid, their country of origin, the type of production system used to produce them (i.e., caged, barn, free-range, or organic), and their best-before date. A website also allows consumers to trace each egg back to the farm using an individual code stamped on each egg.⁴ The Lion Code is a “live” code of practice that has been gradually revised over time as scientific and technical knowledge has increased.⁵

Since the Lion Code’s creation, egg consumption has steadily risen in the United Kingdom. Between 1998 and 2009, the egg market in the U.K. grew from 9.8 to almost 11 billion eggs per year, suggesting that the Lion Code had bolstered consumer confidence in the safety of British eggs.⁶ In 2010, 95 per cent of eggs sold in the U.K. retail market were British Lion Eggs.⁷ Many major retailers refuse to sell eggs that do not comply with the Lion Code.⁸

BEIC actively shares information about the Lion Code with producers around the world, including those in Canada. Egg Farmers of Canada has studied the Lion Code in the development of its own traceability system; when implemented, its voluntary traceability system will have several similarities to the Lion Code.⁹

1 British Lion Eggs, *British Lion Eggs Marketing History*, 11.

2 Ibid., 5.

3 British Lion Quality, *British Lion Quality Code of Practice*.

Source: The Conference Board of Canada.

4 British Lion Quality, *Egg Codes*.

5 Interview findings.

6 British Lion Eggs, *British Lion Eggs Marketing History*, 11.

7 Ibid.

8 Interview findings.

9 Ibid.

Segments of the food industry with strong industry organization, such as eggs and beef, may find it easier to bolster member participation in their traceability systems than industries such as produce, where industry organization is not as strong. In supply-managed commodities, such as the Canadian egg industry, it may also be easier to ensure widespread participation in industry-led traceability schemes because set prices for the industry allow the costs of traceability to be passed on to the consumer more easily. By comparison, in industries with more competitive pricing structures and voluntary traceability systems, producers may find it harder to pass on the costs of implementing and maintaining a traceability system, particularly if only a minority of firms adopt

traceability. Firms in an extremely competitive industry or sector may be reluctant to adopt a traceability system if their competitors do not, because the costs of a traceability system may cut into company profits if they cannot be included in the price of products.

REGULATING TRACEABILITY: PROTECTING THE PUBLIC INTEREST

In Canada, both government regulations—foreign and domestic—and private standards are significant drivers of the adoption of traceability systems to protect the public interest. Given their responsibility to protect the public

Traceability in the Canadian Cattle Industry: Who Pays? Who Benefits?

The BSE crisis underscored the potential public benefits of traceability for the Canadian cattle industry. The industry is moving forward to finalize a cattle implementation plan and is leading an industry–government working group to develop a national cattle movement document. However, potential solutions would involve costs for everyone in the cattle supply chain, including cow and calf producers, feedlots, auction houses, and slaughter houses. (See table.) Note: This report’s authors noted variability of the underlying data and the need for a better sample to reflect the true cost of traceability in the Canadian context.

As in other subsectors, one major challenge is that the firms that might pay a premium for implementing traceability may not be aware of the indirect benefits. For example:

- ◆ Cow and calf producers are responsible for buying and attaching RFID tags to cattle, but as commodity producers they are generally not able to pass on the costs of traceability to their customers. However, with support from the federal government, industry has developed the Beef InfoXchange System, or BIXS, which leverages the data from each individual animal’s unique electronic ID tag number to enable movement of information through the supply chain.¹

Further, participation in traceability keeps the market open for the producers’ livestock and can potentially mitigate major loss through a more targeted response to a disease outbreak.

- ◆ Auction houses face costs from installing equipment required for traceability, and traceability will slow down cattle processing (due to the need to scan individual cows), potentially making them less efficient. Against these costs, auction houses will not see increased revenue. However, as traceability becomes a prerequisite for trade in the industry, auctions will increasingly need to adopt traceability costs into their business models. Auction houses may apply for financial support through the Livestock Auction Traceability Initiative (LATI), which will cover up to 80 per cent of eligible project activities, to a maximum of \$100,000 per facility.²
- ◆ The costs incurred by feedlots and slaughterhouse operations to implement traceability systems are relatively low, and these stakeholders see direct benefits from traceability. They are able to make use of information collected on the characteristics of particular animals and sort animals into lots, depending on which characteristics they can get a premium for.³

1 Beef InfoXchange System, *About BIXS*.

2 Livestock Auction Traceability Initiative, *Objectives and Available Funding*.

3 Interview findings.

Cost of Traceability in the Canadian Cattle Industry 2006–07¹

Stakeholder ²	Number of Head of Cattle	Total Start-Up Cost (\$)		Total Annual Cost (\$)		Total Annual Cost Per Head (\$)	
		High ³	Low ⁴	High	Low	High	Low
Cow and calf producer*	250	6,522	3,388	2,588	1,419	10.35	5.68
Auction house**	25,000	26,605	2,710	3,824	640	0.15	0.03
Feedlots***	1,000	6,605	2,710	1,973	667	1.97	0.67
Slaughterhouses****	75,000	12,105	2,710	2,374	640	0.03	0.01

1 Costs may have decreased since 2006–07 due to the declining cost of technology, such as RFID tags and readers.

2 For a detailed discussion of how cost estimates were determined, see Gardner Pinfold Consulting Economists Limited, *Costs of Traceability*, 2007.

3 High cost estimates assume higher equipment and training costs, extensive facilities modification, as well as the purchase of top-of-the-line traceability systems and equipment.

4 Low cost estimates involve no training costs, basic equipment, and no facilities modification.

*Cost estimates include any necessary facilities modification, RFID tags, RFID readers and applicators, data accumulator (i.e., computer system), software, RFID tag loss replacement, training, data transfer, and Internet service.

**Cost estimates include any necessary facilities modification, RFID readers, data accumulator, software, training, and Internet service.

***Cost estimates include any necessary facilities modification, RFID readers, data accumulator, software, training, RFID tag loss replacement, and Internet services.

****Cost estimates include facilities modification, RFID readers, data accumulator, software, training, and Internet service.

Note: This report’s authors noted variability of the underlying data and the need for a better sample to reflect the true traceability in the Canadian context.

Source: Gardiner Pinfold Consulting Economists Limited, *Costs of Traceability*.

Source: The Conference Board of Canada.

interest, governments may choose to use regulations to impel the adoption of traceability systems if they feel that the food industry is not moving fast or far enough to protect the public.

Furthermore, retailers and food processors with strong brands may also be more inclined to use traceability to protect public interest because they are particularly vulnerable to the private costs of a failure to protect. This is one reason why major retailers, restaurant chains, and brand-name food processors require their suppliers to adopt private standards that include traceability requirements.

TRACEABILITY REGULATIONS IN CANADA

Governments in Canada have already taken some steps to regulate traceability, both as a way to enhance food safety and as a means to protect the economic interests of the food industry. As noted in Chapter 2, Canada has mandatory traceability regulations for cattle, bison, and sheep. Alberta and Quebec have specific traceability requirements for their respective provinces, and several provinces require producers to register their agricultural premises in a provincial database. Furthermore, the F/P/T governments are working to set up a National Agriculture and Food Traceability System (NAFTS). Since food traceability has both private and public benefits, governments view traceability as a shared responsibility between themselves and industry.¹⁸

Traceability regulations have been developed after consultation with the sectors that they impact in an effort to design them to be as efficient and effective as possible. As detailed in Chapter 2, particular foods vary considerably in their characteristics, the processes they go through before they are consumed (e.g., grain versus beef), and their safety risks. These differences naturally lead to different types of traceability systems, depending on the product and the company or farmer's location in the supply chain.¹⁹

When considering the public benefits and the private costs of traceability, governments will need to balance the economic interests of firms and their employees,

along with food safety risks. The difficulties encountered in enacting NAFTS speak to the challenges that governments face when attempting to regulate traceability. In 2006, the ministers of agriculture announced that they would have traceability in place for poultry and livestock by 2011 as part of NAFTS. However, this target date has been pushed back primarily to give government time to consult closely with industry; to identify the scope, breadth, and depth of the system; and to identify existing commerce-based activities that can be leveraged to mitigate the impacts on producers and other stakeholders.

Retailers and food processors with strong brands may be more inclined to use traceability to protect the public interest because these companies are particularly vulnerable to the private costs of a failure to protect.

In Canada, the issue of who will pay for traceability has been a significant stumbling block to NAFTS. This is partly because implementation costs vary considerably for companies in different parts of the food supply chain; and, as noted earlier, those that incur the highest costs may not see the most value.²⁰ The unequal distribution of costs and value makes regulating food traceability difficult. The cost issue is especially significant for commodity-based producers that will often see no immediate benefits from traceability, as their products are sold on an undifferentiated basis.²¹

Trust is another issue encountered when formulating mandatory traceability regulations. Within affected industries, producers may be reluctant to release information about their products and production practices to an external database. Some are worried that their confidential information will be accessed outside of a food safety incident, violating their privacy and harming their future competitiveness.²² Therefore, the circumstances in which information can be accessed will need to be clearly

18 Interview findings.

19 Golan and others, *Traceability in the U.S. Food Supply*.

20 Interview findings.

21 Sparling, *Traceability in Ontario's Agri-Food System*, 5.

22 Interview findings; Sparling, *Traceability in Ontario's Agri-Food System*, 5.

specified by authorities. The current practice of allowing a third-party organization, such as an industry or an arm's-length organization, to manage a database is one way to overcome the trust issues.

Partly due to the challenges involved in regulating traceability, many governments in Canada have been slow to adopt traceability regulations. However, other countries, including the U.S. and EU, have enacted traceability regulations that are having a significant impact on the Canadian food industry, propelling it to take action.

INTERNATIONAL TRACEABILITY REGULATIONS: IMPLICATIONS FOR CANADA

Food traceability is an issue of concern globally, and a number of countries or regions have adopted regulations requiring traceability for some or all food products. Many of these regulations apply to both domestically produced products and imported products. This has a significant impact on Canadian companies and producers looking to export their products to these jurisdictions. Canada has fewer regulatory requirements governing traceability than other comparable jurisdictions, such as the U.S., the EU, and Australia. In fact, Canada can look to these countries for evidence of the public and private benefits and costs of regulating traceability, and for best practices in how to implement to achieve a public-private “win-win.”

United States

Key U.S. regulations governing traceability include the *Bioterrorism Act of 2002* and the *Food Safety Modernization Act (FSMA)* (2011). The *Bioterrorism Act of 2002* requires the creation and maintenance of records for one up-one down traceability within four hours (during business hours) or eight hours (during non-business hours). The regulation does not apply to farms and restaurants or the movement of food within a company. It requires that companies transporting food into the U.S. be able to trace the imported products one step back.²³ While the manner in which the FSMA will be implemented has not been finalized, it will eventually require companies to trace products one step forward and one step back, and for information to be kept in digital

form.²⁴ The Canadian food sector anticipates increased wait times at the border (potentially resulting in product spoilage or loss) and more cumbersome border crossing requirements.²⁵ Since, in 2010, about half of Canada's agri-food and agriculture exports went to the U.S., its traceability regulations have a major impact on the Canadian food industry.²⁶

European Union

Since 2005, the EU has required that food and animal feed be traceable one step forward and one step back. Companies and producers must also be able to make this information available to food safety authorities on demand. The EU's traceability regulations apply to all businesses at all points in the food supply chain, even if their supplier is not located in the EU.²⁷ The EU requires animals in the food chain to be tagged with information on their origin, date taken to slaughter, and be stamped with a slaughterhouse's traceability code. The EU also has regulations requiring genetically modified food to be traceable and labelled.²⁸ In 2010, 6 per cent of Canada's agriculture and agri-food exports went to the EU. Operators in the Canadian food industry exporting to the EU will need to be conversant and compliant with the EU's traceability regulations.²⁹

Canada has fewer regulatory requirements governing traceability than other comparable jurisdictions, such as the U.S., the EU, and Australia.

Australia

Unlike the U.S. and the EU, Australia is not a major destination for Canada's agri-food and agriculture exports. However, the Australian beef industry is similar to Canada's beef industry in that both industries involve large-scale operations that compete based on production

23 U.S. Food and Drug Administration, *Fact Sheet*; McEntire and others, “Traceability (Product Tracing) in Food Systems,” 110.

24 Layton, “Traceability Rule Represents Big Adjustment.”

25 Macpherson, *The Impact of the U.S. Bio-Terrorism Act*, 4–6.

26 The Conference Board of Canada, *Valuing Food*, 30.

27 McEntire and others, “Traceability (Product Tracing) in Food Systems,” 108.

28 Ibid.

29 The Conference Board of Canada, *Valuing Food*, 30.

efficiencies and export a significant proportion of their products.³⁰ Australia has required traceability for livestock since 2005. Australian regulations require that the movement of livestock from the animal producer to the slaughterhouse be tracked electronically and entered into a national database. Livestock producers are also required to register their premises with the government.³¹

Similar to Canada's efforts to regulate the traceability of livestock, Australia's livestock traceability efforts were motivated by food safety incidents in the 1990s that curtailed their exports. Australian producers have experienced tangible benefits from the livestock traceability system due to their improved ability to measure and record animal performance. The Australian government provided financial assistance for traceability infrastructure and equipment and created a centralized animal tag ordering system to keep the cost of tags as low as possible.³²

PRIVATE STANDARDS

Leading private sector firms' requirements that private standards be met by their suppliers is also driving the adoption of traceability systems in the food sector.³³ As noted in *All Together Now: Regulation and Food Industry Performance*, private standards are a significant part of Canada's food safety system. The adoption of private standards has been driven by producer- and retailer-led initiatives, at times with government support.³⁴ Many of the leading private standards for food safety require traceability systems to be in place before a producer can gain compliance.

GFSI is a leading food safety private benchmark worldwide. GFSI was set up in 2000 to encourage continuous improvement in food safety systems and harmonize

worldwide food safety standards. It is supported in varying degrees by retailers and other food safety stakeholders. GFSI requires that suppliers develop and maintain acceptable traceability standards that trace one step forward and one step back, as well as keep records of lots/batches of all products and packaging used in the production process.³⁵ The British Retail Consortium (BRC) food safety standard and the Safe Quality Food (SQF) standard are examples of private standards that are benchmarked against the GFSI.

NGO traceability and eco-certification systems are also major players in developing traceability systems. They are especially active in the seafood industry where traceability is becoming increasingly critical for conducting seafood commerce, especially in Europe and some major North American markets. Examples of NGO traceability and eco-certification systems in Canada include:

- ◆ the environmental NGO Ecotrust Canada, which founded ThisFish, a voluntary electronic traceability system for seafood;³⁶ and
- ◆ the Marine Stewardship Council (MSC), which developed standards for sustainable fishing and seafood traceability certification.³⁷

The adoption of private standards with traceability requirements has been driven by retailers and other food companies with well-known brands that face potentially serious reputational damage in the event of a food safety incident. Some large companies, such as McDonald's, have developed supplier quality management systems (SQMS) that require their suppliers to implement traceability systems that meet their requirements for data. Canada's largest food retailer, Loblaw's, requires certification from one of the GFSI-approved food safety programs from its private label suppliers. Walmart Canada also requires GFSI certification for its private label vendors.³⁸ (See box "Loblaw's: Enhancing Food Safety and Consumer Confidence With Traceability.")

30 Interview findings.

31 Bowling and others, "Identification and Traceability," 288–89; McEntire and others, "Traceability (Product Tracing) in Food Systems," 110.

32 Bowling and others, "Identification and Traceability," 290; *Country-Wide*, "Traceability Lessons."

33 For further discussion of traceability standards, see the Centre for Food In Canada's forthcoming report, *Private Standards*.

34 The Conference Board of Canada, *All Together Now*, 25.

35 Global Food Safety Initiative, *Comparison of GFSI Schemes*.

36 ThisFish, *What Is ThisFish?*

37 Marine Stewardship Council, *What We Do*.

38 Interview findings.

Loblaws: Enhancing Food Safety and Consumer Confidence With Traceability

Loblaws is the largest food retailer in Canada, and its private brands, President's Choice and No Name, are the number one and two packaged goods brands by sales in Canada.¹ As a major food retailer, Loblaws invests heavily in establishing and sustaining its brand names and its reputation for quality and safety.

Traceability is an important element in its strategy. Loblaws is a leader in the adoption of traceability systems to help ensure higher food safety standards. It sees traceability as a way to help mitigate or prevent food safety incidents from arising, protect its brand and reputation, and heighten consumer confidence in its products.

Loblaws has over 800 suppliers worldwide for its extensive range of private label products² that use a wide array of ingredients from sources around the globe. Thus, Loblaws needs complex traceability systems to track the origins of its products. In Canada, Loblaws was the first national retailer to require its private label suppliers to be certified compliant with GFSI standards, which oblige companies to use traceability systems that trace one step forward and one step back. Suppliers of ready-to-eat foods, such as cheese and salads, were required to be certified compliant with GFSI standards by December 31, 2010. By the end of 2011, all of Loblaws' private label suppliers were also obliged to be GFSI compliant.³ Loblaws' requirement that its suppliers be GFSI certified has had a significant impact on the traceability practices of many firms in the Canadian food system. Loblaws also requires its seafood to be MSC certified.

Loblaws is also exploring other measures to further enhance the traceability of the products it sells. The company's *2011 Corporate Social Responsibility Report* announced plans to "achieve 100% GFSI certification for all produce and growers."⁴ In addition, Loblaws is exploring traceability for its beef products that would allow consumers to scan a product with their cell phone to find out the age, breed of cattle, and the farm where it was raised.⁵

1 Loblaws Companies Ltd., *2011 Annual Report*.

2 Androich, "Major Retailers."

3 Loblaws Companies Ltd., *2010 Corporate Social Responsibility Report*.

4 Loblaws Companies Ltd., *2011 Corporate Social Responsibility Report: 2012 Targets*.

5 *Better Farming*, "Loblaws Wants Canadian Meat."

Source: The Conference Board of Canada.

Some private standards require the adoption of traceability systems that address issues beyond preventing or responding to food safety incidents. For example, the Best Aquaculture Practices (BAP) standard uses traceability to ensure seafood is produced or harvested in line

with both food safety and environmental standards.³⁹ Companies that require BAP certification from their seafood suppliers include Walmart, Sobeys, and Target.⁴⁰ Here, traceability can not only help to protect a company's reputation, it may also enhance it.

By requiring their suppliers to be certified by private standards that require traceability systems, major retailers and restaurant chains are promoting traceability further down the food supply chain. As suppliers to large companies gain certification from private standards, they may also require their own suppliers to adopt similar private food safety standards, thereby creating a trickle-down effect throughout the food supply chain. Suppliers are willing to adopt these costly private standards because of the great value of having a large food company as a customer.

More problematic is the fact that private standards are not mandatory, which leaves room for potential traceability information gaps in the food supply chain.

Gaining certification from a private standard is a costly exercise that goes well beyond the expense of implementing a traceability system. The combined cost of implementing traceability and becoming certified by a private standard is particularly challenging for small companies. In addition to certification costs, some companies face difficulties in being certified by GFSI-approved food safety programs due to a lack of available auditors.⁴¹ However, as private standards such as GFSI have become more widely adopted and required in Canada, the number of auditors has increased. More problematic is the fact that private standards are not mandatory, which leaves room for potential traceability information gaps in the food supply chain.

39 The Global Aquaculture Alliance, *Traceability*.

40 The Global Aquaculture Alliance, *Members, 2012*.

41 Interview findings.

CONCLUSION

The desire to protect the public interest has been a significant factor behind the uptake of food traceability systems. Three drivers of traceability that are motivated in whole or in part by broad public interest concerns are emergency management concerns, domestic and foreign government regulations, and private standards (these also meet private interest needs).

Public benefits are important to companies, but they typically weigh these against the private costs of traceability. In fact, in many cases, implementation has been limited by the high private costs of implementation. In some instances, however, these private costs can be recouped through the private benefits offered by traceability systems, discussed in the following chapter.

CHAPTER 4

Private Interests and Food Traceability Systems

Chapter Summary

- ◆ Traceability systems designed to meet private interests allow firms to capture direct financial benefits, thereby helping to offset their costs.
- ◆ Traceability can increase the efficiency of a company's supply chain, leading to improved production and shipping practices.
- ◆ Many consumers are interested in where and how their food is produced. Traceability can help companies and producers to differentiate their products and gain competitive advantage.
- ◆ The extent of a company's direct financial benefits from traceability depends on factors such as the size of the company, the products it produces, and its place in the supply chain.

Pivate interests are a major factor in motivating the food industry to invest in traceability, in addition to public interest considerations. Companies that invest in traceability systems (notably electronic systems) can gain significant private benefits. Traceability can improve a company's supply chain management systems, leading to more efficient production and shipping practices that cut costs. It can allow companies or farmers to differentiate their products (e.g., certifying that they are organic or sustainably produced), giving them a competitive advantage or allowing them to charge

a premium price. (See Table 2.) If companies and producers see the chance to gain such private benefits—and if they outweigh the costs—they are more likely to invest in a traceability system.

However, many firms, especially smaller producers, are unaware of the private benefits that traceability systems offer. Others feel that the benefits are not enough to warrant the high costs. For many smaller firms, the financial incentives are not large enough to induce them to invest in a costly electronic traceability system. Larger firms, by comparison, tend to see greater direct financial benefits from a sophisticated traceability system and have access to the capital to pay for it.

This chapter examines the private benefits that arise from adopting traceability systems. It also considers how these benefits vary depending on a company's size, place in the supply chain, and the products it produces.

IMPROVING SUPPLY CHAIN MANAGEMENT

Traceability allows a company to manage its supply chain better by improving processes and information flows along the supply chain. Electronic traceability systems, particularly those that use RFID tags on products or pallets of products, can allow a company to glean detailed information about its supply chain and precisely identify inefficiencies to correct.

Table 2
Market Incentives for Traceability and Primary Beneficiaries

Incentives for Traceability	Primary Stakeholders Benefiting
Supply Chain Management	
Identify excesses or shortages in inventory	Distributors, larger retailers, major food service chains
Identify production inefficiencies	Large-scale processors, large-scale manufacturers
Make improvements in product quality	Producers, processors
Product Differentiation	
Verify product claims (e.g., sustainably harvested, fair trade)	Producers, processors, manufacturers
Comply with government regulations for product differentiation (e.g., organic standards, non-genetically modified organisms)	Producers, processors, manufacturers
Increase transparency of the production process for consumers	Producers, processors, manufacturers, retailers
Identify and verify country of origin	Producers, processors, manufacturers

Source: The Conference Board of Canada.

A number of companies, including IBM and other leading technology innovators, offer proprietary electronic traceability systems that are designed to give a company increased sight of all parts of its supply chain. Large firms in the food industry, particularly retailers and major restaurant chains, have been at the forefront in adopting these sophisticated electronic tracking systems to improve how they manage their supply chains. (See, for example, the box “IBM: Using Traceability to Create Added Value.”)

Traceability can help companies to identify excesses or shortages in their inventory and reduce waste. In the food industry, where many products can easily spoil or be damaged and where margins are low, traceability systems help companies to hold others accountable for the speed of transport and food damage in transit.¹ The supply chain visibility that comes from implementing a traceability system is especially valuable for companies operating just-in-time inventory management systems.²

For example, in Germany, the grocery retailer Metro AG has used RFID tags to track the shipment of goods to their stores from their suppliers. This has resulted in an overall reduction of inventory across the company’s supply chain, leading to operational cost savings and increased profits from process automation.³

Traceability also helps companies and producers to identify inefficiencies in their operations that have negative environmental and economic consequences. For example, Sun World International, a California produce grower, uses a traceability system to view its supply systems, including the planting, watering, and harvesting of produce, as well as the storage and distribution of its products. Traceability has helped Sun World International to reduce its fuel and water usage, thereby lowering operating costs and increasing profits.⁴

Young’s, a major British seafood manufacturer, implemented a traceability system that allows it to track where langoustines are caught, and by which vessel. The system

1 Layton, “Traceability Rule Represents Big Adjustment”; Lindh and Olsson, “Communicating Imperceptible Product Attributes,” 264.

2 Mai and others, “Benefits of Traceability,” 977.

3 Wilkinson, “Full Value Traceability.”

4 Ibid.

IBM: Using Traceability to Create Added Value

To address the increasing demand for food traceability, IBM offers companies and governments advanced electronic traceability systems and professional implementation services. IBM's traceability solution is based on the GS1 standard for the exchange of information using electronic product codes (the Electronic Product Code Information Services [EPCIS]). While the use of machine-readable tags such as RFID or 2D bar codes enhances the speed and accuracy of data collection, the solution is also designed to collect information from existing business systems and documentation and convert it into the EPCIS standard, for exchange with other parties. Tags and sophisticated software are used to track food and ingredients throughout the supply chain.

IBM's traceability system, offered as a software implementation or cloud-based "Software as a Service," provides basic track and trace information to address food safety and regulatory requirements. In addition, it helps firms gain significant business benefits by providing increased visibility to more and better information from across the supply network, and analytics software to turn data into insight. These benefits include the:

- ◆ identification of bottlenecks and underperforming suppliers that are reducing supply chain efficiency and product quality, allowing corrective action;
- ◆ verification of brand claims;
- ◆ measurement of progress on sustainability initiatives; and
- ◆ support for corporate social responsibility programs.¹

IBM has developed food traceability systems and conducted traceability pilot projects for governments and food companies worldwide, including the Government of Manitoba, the Government of Norway, German retailer METRO Group, and produce producer Sun World International.² For example, IBM worked with a Vietnamese company, Binh An Seafood, to implement an electronic traceability system. Benefits for Binh An Seafood from its IBM-designed traceability system include better ability to identify and remove the product involved in recalls; improved ability to comply with food safety regulations worldwide; and increased sight of its supply chain from the manufacturer to the point of purchase.³

1 Wilkinson, "Full Value Traceability."

2 IBM, *Less Than 20% of Consumers*.

3 Wilkinson, "Smarter Food."

Source: The Conference Board of Canada.

has yielded economic, environmental, and product quality benefits. By collecting and analyzing traceability data, fishers are able to target more mature langoustines, which in turn allows them to sell more premium product to Young's, thus increasing their profits, while helping to ensure the sustainability of the langoustine fishery—as mature langoustines have had more time to breed.⁵

5 Magera and Beaton, *Seafood Traceability in Canada*, 29; Young's, *Ten Principles*, 3.

Traceability systems that offer environmental advantages can benefit a company's reputation and corporate social responsibility programs.⁶ Young's actively promotes the sustainability of its fish products.

By allowing companies to address supply chain inefficiencies, traceability systems can cut expenses substantially, which helps offset the cost of traceability. For instance, one study examined the decision of a Spanish frozen vegetable manufacturer to implement an electronic traceability system at a cost of approximately 1.8 million euros. The company was able to recuperate the cost of its traceability system in less than two years because the system allowed it to detect and remedy inefficiencies in its supply chain, which improved the bottom line.⁷

By allowing companies to address supply chain inefficiencies, traceability systems can cut expenses substantially, which helps offset the cost of traceability.

In addition to identifying supply chain inefficiencies, traceability also helps companies and producers to better understand how their products are faring in the marketplace. For example, it could allow beef industry producers and suppliers to track individual animal characteristics and get feedback on how particular animal characteristics are doing in the marketplace. Traceability systems can also facilitate research on the quality of products or animals (e.g. in the livestock industry) by linking improvements in quality to changes in production across an industry.⁸ This can help producers to develop higher-quality, value-added products and increase their profits.⁹

However, while larger food companies can usually afford the significant initial investment in electronic traceability, the financial outlay is often more difficult for smaller firms. In competitive sectors of the food industry, where sophisticated traceability systems are neither required nor the norm, it may be difficult for

6 Wilkinson, "Full Value Traceability."

7 Alfaro and Rábade, "Traceability as a Strategic Tool," 104–10.

8 Agriculture and Agri-Food Canada, *Identification and Analysis*, 33.

9 Interview findings.

a company to pass the costs of an electronic traceability system on to its customers if the customers do not demand or see added value from traceability.

While proponents of traceability emphasize its ability to improve supply chain management, most companies we interviewed did not identify supply chain management as a factor motivating their adoption of traceability systems. Instead, several large retailers and food manufacturers indicated that they see traceability as a part of their food risk strategy while supply chain management is handled separately by their logistics department. This separation between traceability systems and logistics systems, often under separate management, may be leading to unnecessary costs and duplication for some companies. Better integration of these two types of systems could achieve increased cost savings, thereby strengthening the financial case for traceability.

ENHANCING INDUSTRY COMPETITIVENESS: PRODUCT DIFFERENTIATION

Firms and producers also use traceability systems to add value to their products and differentiate them from their competitors. Consumers are increasingly concerned about where their food comes from and how it is produced. For example, a 2009 IBM survey of 1,000 consumers, in 10 U.S. cities, found that:

- ◆ 77 per cent want more information about the content of their food;
- ◆ 76 per cent want more information about the origin of their food; and
- ◆ 74 per cent want more information about how their food is grown, processed, and manufactured.¹⁰

Some consumers are willing to pay extra for food with traceable attributes such as organic, free-range, non-genetically modified, fair trade, or sustainably produced. Companies can charge a premium for foods with value-added characteristics or capture increased market share. Potential gains are substantial. For example, the

market for organic foods in Canada was estimated to be \$2 billion in 2008 (approximately 2.5 per cent of the total retail food sales), a 66 per cent increase from 2006.¹¹

Traceability can be used to verify that products have content or process attributes that are not visible to the consumer. Content attributes refer to the physical properties of a product that are undetectable to consumers—for example, calcium added to orange juice. Process attributes do not affect the final physical characteristics of a product, but refer to production characteristics used, such as sustainably harvested or fair trade.¹²

Government regulations require the verification of some value-added characteristics, such as food produced using organic production practices. However, the labelling of many value-added characteristics is not subject to regulations, notably those characteristics addressing sustainability. In these cases, companies may introduce traceability to verify certain product attributes in order to build consumer confidence. Most firms will invest only in traceability systems that verify value-added characteristics of products if they are able to charge a premium for these products or use them to capture an increased market share.¹³ As long as price and taste continue to be the top factors motivating the food purchasing decisions of many consumers, products that are marketed based on their social and environmental characteristics will continue to be niche products.

A number of third-party traceability systems verify product characteristics for consumers. These systems substantiate product claims made by food companies, which may increase the legitimacy of the claims in consumers' eyes. For example, in 2011, the grocery retailer Sobeys introduced the ThisFish traceability system, which allows consumers to use the Internet or their cell phone to see how, when, and where their fish was caught. (See box "Nothing Fishy About ThisFish: Traceability in the

10 IBM, *Less Than 20% of Consumers*.

11 Agriculture and Agri-Food Canada, *The Canadian Organic Sector*.

12 Golan and others, *Traceability in the U.S. Food Supply*, 7.

13 *Ibid.*, 8.

Nothing Fishy About ThisFish: Traceability in the Seafood Industry

In 2008, the environmental NGO Ecotrust Canada founded ThisFish, a voluntary electronic traceability system for seafood, in cooperation with small-scale fishers. ThisFish was motivated by several factors. Ecotrust felt a fish traceability system could contribute to sustainable and responsible fishing. Small-scale Canadian fishers were worried that traceability regulations would be enacted by domestic and foreign governments and that they would be difficult and expensive to implement. Some fishers also saw an opportunity to use traceability to connect personally to consumers and differentiate their product.¹

ThisFish aims to be cost effective and ensure that the benefits for industry participants outweigh the costs.² ThisFish's electronic traceability system consists of three primary components:

- ◆ Verification: A fisher assigns each catch a unique code and electronically uploads information to that code about when, where, and how a fish was caught.
- ◆ Chain of custody: Each level of the supply chain must provide traceability information as well as information about the processing and handling of a product.
- ◆ Traceability: Retailers and restaurants use individual identifier codes to access information about the origins of a fish, its handling, and a variety of eco-ratings. Consumers can use smart phones or computers to access information from identifier codes.³

ThisFish traceability is flexible to allow it to trace different types of fisheries and seafood products—from a single fish sold whole, to processed fish products. The cost of implementing the system varies depending on the type of product and the type of fishery. ThisFish's traceability requirements

comply with existing standards for fish traceability, including EU standards that require a fish to be traceable down to the boat where it was caught.⁴

In 2011, 262 fishing vessels used ThisFish to tag their catch. The program applies to three species of fish and shellfish harvested in Atlantic Canada and eleven harvested off British Columbia.⁵ The ThisFish program is planning to release its first annual report in mid-2012. It will include data on the percentage of ThisFish products electronically scanned by consumers and the percentage of Canadian fish catch that is traceable under ThisFish.

SOBEYS AND THISFISH

Canadian grocery retailer Sobeys has adopted ThisFish on a trial basis for some of its seafood products (currently less than 5 per cent of Sobeys fish sales). Sobeys saw ThisFish as an easy way to help interested consumers identify the origins and sustainability of the fish they eat.⁶ The cost of the ThisFish traceability system is absorbed into the price of products sold in the program. Sobeys has mainly used the ThisFish standard on high-end products, such as sockeye salmon and halibut—making traceability a relatively small cost to pass on to the consumer relative to product price.

With the official launch of ThisFish in its stores in September 2011, Sobeys received widespread positive media coverage, thereby enhancing the company's brand. While the company does not yet know if the ThisFish program has had an overall impact on its fish sales, sales of products with the ThisFish label have been strong.

1 Interview findings.

2 Ibid.

3 Interview findings; ThisFish, *What Is ThisFish?*

Source: The Conference Board of Canada.

4 Interview findings.

5 ThisFish, *Island Coastal Economic Trust*.

6 Interview findings.

Seafood Industry.”) Similarly, the HarvestMark traceability system allows consumers to use smart phones or the Internet to scan a code and find out more information about their produce, including where it was grown, information about the grower, and if there has been a recall on a product.¹⁴ HarvestMark is currently used by more than 300 producers and 3,000 farms.¹⁵

Some consumers may be willing to pay a premium for food that clearly indicates its origins.¹⁶ Here, Canadian firms may be at an advantage when using traceability systems to differentiate their products and identify the origins of their products. Canadian consumers tend to have more confidence in the safety of food produced in Canada, which may give products grown or manufactured in Canada a competitive advantage.¹⁷ Canadian

14 Leeder, “What’s on Your Plate?”

15 HarvestMark, *Item-Level Traceability*.

16 Mai and others, “Benefits of Traceability,” 982.

17 Grant, “Canada’s Food Producers.”

companies exporting food to international markets may also have an advantage over companies from other regions as international consumers also tend to view Canadian food as safe and of high quality.¹⁸

CONCLUSION

Food companies stand to gain private benefits by implementing traceability systems as part of their business strategy, particularly sophisticated electronic traceability systems. These systems give greater sight of the supply chain, allowing companies to better detect and manage their supply chain inefficiencies, find cost savings, and improve profits. Traceability systems also allow companies to demonstrate the existence of value-added product characteristics that are not otherwise visible to consumers, with attendant price and market share benefits. In the food

industry, a competitive industry with tight margins, this can be a significant competitive advantage. Companies whose traceability systems offer value-added characteristics may gain financial benefits from traceability that more than offset the cost of initiating and operating these systems.

However, not all companies will benefit equally. The private benefits of traceability depend on a number of factors, including the size of a company, the product(s) it produces, and its place in the supply chain. Larger firms generally find the costs more manageable and the benefits clearer. Overall, there remains a gap between the private benefits of adopting traceability systems and their cost—a gap that will need to be closed in order to involve the whole industry. Although governments already help to close that gap through a range of incentives and supports, full participation by all food industry companies in traceability has not yet been achieved.

18 Grant, “Canada’s Food Producers.”

CHAPTER 5

Potential Solutions

Chapter Summary

- ◆ The best traceability systems are inclusive, compatible, detailed, accurate, flexible, cost effective, and continuously evaluated.
- ◆ All stakeholders should be able to quickly and accurately trace their products and ingredients one step forward and one step back throughout the food supply chain.
- ◆ Traceability systems should balance their ability to protect the public interest with the private costs that are incurred when traceability systems are implemented.
- ◆ Government and industry both have roles to play in developing, supporting, maintaining, and regulating traceability systems that are safe, responsive, and competitive.
- ◆ Eight potential solutions to implementing more and better traceability systems in Canada are also presented in this chapter.

In Canada, as in other developed countries, food traceability systems generate public interest benefits and private benefits, but also substantial costs for industry, which typically bears the great bulk of the expense.

Many traceability systems are developed by individual firms or stakeholders to meet their own needs. This limits their impact since to be fully effective they must all link together so that the *entire* food supply chain is covered. This is the best way to ensure that the source of food safety and animal disease outbreaks can be detected quickly and accurately. The linkage can be kept relatively simple: each firm in the food supply chain only needs to be able to accurately trace its products or ingredients one step forward and one step back in the supply chain. This ensures that products are traceable, but at the same time lessens the financial burden borne by companies.

Each firm in the food supply chain only needs to be able to accurately trace its products or ingredients one step forward and one step back in the supply chain.

The characteristics of efficient and effective traceability systems—ones that offer maximum benefits for minimum costs—have been discussed previously. Eight potential solutions that could lead to more and better traceability systems, which meet both public and private interest priorities, based on the identified characteristics, are described below. Additional information and tools for designing and implementing traceability systems in the Canadian food supply chain are also provided in appendices A and B.

POTENTIAL SOLUTIONS

1. MAKE TRACEABILITY SYSTEMS UNIVERSAL AND COMPREHENSIVE

Firms in every part of the supply chain, regardless of size, should implement some form of a traceability system; preferably one that is compatible with other systems, as a key part of their strategy to make Canada's food safety performance second to none. Firms should value traceability as an important tool in ensuring a safe food supply and in generating economic benefits for themselves. Traceability can be a cornerstone strategy for firms to mitigate the severe and potentially widespread health and economic consequences that can result from a food safety incident. Mass firm and farm participation is extremely important as a traceability system is only as strong as its weakest link: gaps in participation by firms in the supply chain create weaknesses that undermine the overall value of traceability.

2. DEVELOP TRACEABILITY SYSTEMS TO BE COMPATIBLE

Firms, and industry sectors, should make it a priority to develop traceability systems that are able to interface or “talk” to one another, to address the reality of a highly complex and interconnected food system. They do not all need to use a common technological platform, such as a proprietary electronic traceability system—but traceability systems should be able to effectively communicate information up and down the supply chain and with government authorities in the event of a food safety problem.

Traceability systems that are likely to offer the greatest market and non-market incentives to the food industry are those that use a common identifier language, such as GS1. However, they can also be constructed to handle multiple identifiers, as demonstrated by The Oppenheimer Group's traceability system that accommodates multiple formats of marking produce. Given the global nature of the food industry, it is also important that traceability systems can interface with others around the globe in order to facilitate tracking during a food safety emergency and to meet the traceability requirements of international trade partners. A “data dictionary” has already been developed in Canada for the livestock and poultry industries, with input from international organizations.

3. MANDATE MINIMUM REQUIREMENTS FOR AFFORDABLE TRACEABILITY SYSTEMS

To ensure maximum industry engagement, FPT governments should consider modifying regulations to require food industry firms to maintain traceability systems that, at a minimum, allow them to trace their products and ingredients one step forward and one step back, in a timely manner. Under the Growing Forward's livestock traceability approach, the federal government in Canada has responsibility for developing the national infrastructure and the regulatory framework for traceability, while the provinces and territories are primarily responsible for premises identification and enterprise infrastructure. Despite Canada's jurisdictional challenges in agriculture, national traceability standards—from farm to slaughter—are already in place for Canadian livestock and poultry.

Everyone in the food supply chain should be able to trace where they got a product or ingredient from and where they sent that product—at least one step forward and one step back. In addition, it is important for companies to be able to link their food inputs with their outputs (i.e., internal traceability) in order to keep the traceability chain intact. The one-forward, one-back requirement would apply to domestic products and ingredients as well as to imported products and ingredients. Limiting the minimum requirement to a single step in either direction would provide a cost-effective basis for a near-universal system that would help to solve the affordability problem facing many food businesses, especially the smaller ones. Mandating minimum requirements would also help to level the competitive playing field in industries with competitive pricing structures where voluntary traceability systems currently make it difficult for them to pass on costs.

Many food industry firms in Canada already comply with the principle of one step forward and one step back because of export requirements, private standards, and/or their own internal food safety practices. However, as the lengthy and extensive 2009 recall of peanut products in the U.S. by the Peanut Corporation of America illustrates, there are still companies in the food industry that do not keep adequate records of where they receive

their products from and where they send them.¹ This causes considerable delay in identifying and removing contaminated product from the marketplace, exposing consumers to risks for longer periods. For example, during the months it took for the U.S. food industry to find the contaminated peanut products, many contaminated products were still on the shelves and being sold. One extensive U.S. study of food industry traceability found that while companies usually have general information on where they received a product from and where they sent a product, “one of the least commonly communicated and/or recorded elements was lot number, which is critical for product tracing.”²

While it might be ideal for companies to be able to trace a product or ingredient throughout the entire supply chain, this is expensive and may not actually be a great improvement over one step forward and one step back in responding to a food safety emergency. One interviewee from a large Canadian food company indicated that a pilot project to trace an ingredient in its products the full length of the supply chain, from farm to fork, found that the process was extremely complex and prohibitively expensive, with little or no benefit to food safety. Members of the U.S. food industry have also indicated that the requirement that they trace more than one step forward and one step back within a short amount of time (i.e., 24 hours) would decrease the accuracy of the information they supply authorities due to a lack of time to cross-reference and verify information.³

4. MAKE PREMISES IDENTIFICATION MANDATORY FOR PRODUCERS

FPT governments should consider mandatory premises identification for livestock and poultry producers as part of the broader traceability system. Premise identification would allow for more timely isolation of animal disease outbreaks because of the improved producer location information. A natural disaster (such as a major flood) is an example of a situation that can cause an animal

disease outbreak. In the event of such a disaster, it would be especially important to know where animals are located in order to contain the spread of the disease. This is less of a concern for produce, where food safety incidents are not as likely to result in disease outbreaks and the effects may not be as long-lasting. Premises identification is already mandatory in several provinces, including Quebec, Alberta, and Manitoba, and allows authorities to respond more effectively to emergencies, such as an animal disease outbreak. Failure to be able to quickly and accurately identify the location of livestock and poultry farms in an emergency could undermine the traceability efforts of others in the industry and exacerbate the social and economic impacts of an emergency.

5. REQUIRE DETAILED INFORMATION TO HANDLE EMERGENCIES QUICKLY

FPT governments should consider setting performance standards requiring that traceability systems are able to collect and store detailed information that can be accessed quickly in an emergency. One approach would be to set time limits on how long it takes a firm to trace products and ingredients one step forward and one step back in the supply chain. Governments could also work with industry to determine the size of each product lot that should be traced: the optimal size of a lot traced will vary depending on the type of product.

This would make rapid, accurate identification of affected products and accurate pinpointing of the locus of a food safety issue possible. Several food industry interviewees suggested that government could enforce such minimum emergency management standards for food traceability systems. However, they do not want governments to specify the type of traceability system to be used due to the diverse requirements of different industry stakeholders.

6. HELP FUND FIRMS' START-UP COSTS AND ENCOURAGE FLEXIBLE, COST-EFFECTIVE SYSTEMS

FPT governments should consider providing funding or tax incentives to industries, individual companies, and farms in financial need, to help them cover the start-up costs for their traceability systems and initial implementation costs. Government financial support should be based on the food safety risks facing a particular

1 McEntire and others, “Traceability (Product Tracing) in Food Systems,” 140.

2 Ibid., 131.

3 Ibid., 140.

industry or organization and the capacity of individual businesses to pay their own costs. Funding could be made available to firms that can demonstrate that implementation costs are beyond their financial means or would threaten their viability.

The Government of Canada has already funded a variety of food industry organizations to help them develop traceability tools. For example, the Saskatchewan Herb and Spice Organization received more than \$250,000 in funding to develop traceability tools, such as template documents and manuals, to enable producers to meet the traceability requirements of buyers.⁴ The Government of Canada also provided over \$110,000 in funding to the Fédération des Producteurs Acéricoles du Québec to improve the traceability of maple syrup from farm to processor.⁵ Federal and provincial initiatives, including those already in existence as part of the Growing Forward framework, that help offset the cost of implementing traceability systems for large or small producers are also an effective way to encourage the implementation of more traceability systems.

The benefits of participation in traceability should be promoted by government and industry associations through education and promotional programs.

Organizations that receive funding could help to publicize information about the benefits of traceability to other stakeholders in the industry, assist with evaluating the costs and benefits of different types of traceability systems, and facilitate the continuous improvement of traceability systems. Governments can further help by facilitating showcases of current technologies to help industry and the broader public to better understand them.

System designers striving for cost-effectiveness will vary the particulars of their systems according to differences in product characteristics, the risk profiles of products, firm size, complexity of supply chain, and

firm location within the supply chain. For a large food manufacturer, a sophisticated electronic traceability system that enhances food safety and also helps improve supply chain efficiency may make the most sense. However, a small producer, mainly selling at farmers' markets, might find a sophisticated system to be cost prohibitive. In addition, small producers usually have shorter, simpler supply chains so that the potential for traceability to yield major benefits through improved supply chain management is much reduced. For small businesses with a limited customer base, paper traceability systems or basic electronic systems (i.e., entering information into a personal computer database) may be sufficient. When small businesses grow and expand their customer base, the incentives to switch to a more sophisticated electronic traceability system will increase as a matter of course.

7. PROMOTE THE BENEFITS OF PARTICIPATION IN TRACEABILITY

The benefits of participation in traceability should be promoted through education and promotional programs, by government and industry associations. Inadequate perception of the benefits of traceability is a critical obstacle to traceability uptake. Public and private sector benefits, such as improved public safety and the ability to engage new markets, are not all well known or understood by food supply chain players, especially by smaller producers. New or enhanced marketing efforts to raise awareness and inform producers and other supply chain actors of the opportunities and benefits that traceability offers would improve participation levels. Seeing traceability as a "value-add" to their business instead of costs would help to motivate producers to take action.

8. USE CONTINUOUS EVALUATION TO IMPROVE SYSTEM PERFORMANCE

All types of traceability systems, from basic paper systems to sophisticated electronic systems, ideally should be continuously evaluated at a firm level and a wider industry level. Traceability systems should be evaluated at different levels within the supply chain regarding their impact: notably, their effectiveness in reducing the scope of recalls and food safety incidents and in increasing emergency management abilities.

4 Agriculture and Agri-Food Canada, *Strengthening Canada's Herb and Spice Industry*.

5 Agriculture and Agri-Food Canada, *Government of Canada Working to Strengthen Traceability for Maple Syrup*.

Within firms or groups of firms, traceability systems should be evaluated for their ability to deliver improved supply chain management or increased competitiveness through product differentiation. The costs of traceability systems—both in the form of technology and in the time it takes to train staff—are readily apparent. Continuous evaluation can help firms to better understand the full value of their systems in relation to the costs, and give them a rational basis for deciding whether to invest in additional functionality.

CONCLUSION

While a number of effective traceability systems are already being used in the Canadian food industry, there are challenges to ensuring the compatibility and cost-effectiveness of traceability efforts. The complexity of the food supply chain and the increasingly globalized food market structure create challenges for the designers of traceability systems; such as how to meet the ultimate need to mitigate food safety risks while ensuring quality in a world of integrated global supply systems and rising international trade where a single product may contain ingredients from more than a score of countries. This complexity leads to many different designs. The elements of an effective traceability system vary depending on the type of products, the relative food safety risks, size and type of firm, and supply chain involved. However, at a minimum, an effective traceability system must be able to trace products and ingredients at least one step forward and one step back along the supply chain.

Effective traceability systems can and should benefit both public and private interests. Raising awareness of the importance and the full range of potential benefits of traceability is the key to increasing uptake in the food industry. Already, industry players that do see its value in helping their suppliers and customers tend to

value traceability enough to invest now. As more firms learn the value of traceability to their own private interests, in addition to safeguarding public interest, they too will engage. To encourage more firms in the food supply chain to participate in traceability efforts, the main public and private benefits of investing in traceability should be communicated and promoted.

Governments have more than one role to play in traceability. They can create helpful regulations that encourage industry to implement practical and efficient traceability systems. They can share expert knowledge of the value of traceability systems and best practices to help improve effectiveness. And, they can provide funding or tax incentives that would stimulate broader industry uptake.

The case for the comprehensive use of traceability systems has grown year by year. Industry and government can obtain the best possible outcomes from heightening the use of traceability by working together collaboratively. In the end, achieving the public interest objectives of enhanced food safety and quality, and timely and powerful responses to food crises, are best accomplished by industry becoming more committed to traceability. But achieving universal or very broad industry engagement in traceability systems and comprehensive supply chain interconnectedness will likely require a degree of government support, at least initially.

Perhaps the ultimate prescription for creating the best possible traceability system in Canada is to balance public and private costs for traceability with public and private benefits.

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APPENDIX A

Incentives for Traceability by Principal Industry Stakeholders

This table presents a number of traceability incentives for emergency management, regulatory compliance, supply chain management, and product differentiation, and identifies the principal industry stakeholders that may benefit from such incentives.

Incentives for Traceability by Stakeholder	
Incentives for Traceability	Principal Industry Stakeholders Benefitting
PUBLIC INTEREST INCENTIVES	
Emergency Management	
Respond more quickly to food safety incidents	Producers, processors, manufacturers, retailers, food service, consumers, distributors
Determine the source of food safety incidents	Producers, processors, manufacturers, food service, consumers
Prevent food safety incidents	Producers, processors, manufacturers, retailers, food service, consumers, distributors
Locate animals in a natural disaster	Producers
Contain an animal disease outbreak	Producers
Access export markets	Producers, processors, manufacturers
Regain and/or enhance consumer confidence	Commodity-based industries (e.g., eggs), brand-name manufacturers, major retailers, major food service chains
Regulatory Compliance	
Domestic regulations	Producers, processors, manufacturers
Foreign (export market) regulations	Producers, processors, manufacturers, distributors that export product
Private standards	Producers, processors, manufacturers, retailers, major food service chains

Source: The Conference Board of Canada. (continued . . .)

Incentives for Traceability by Stakeholder (cont'd)

Incentives for Traceability	Principal Industry Stakeholders Benefitting
PRIVATE INTEREST INCENTIVES	
Supply Chain Management	
Identify excesses or shortages in inventory	Distributors, larger retailers, major food service chains
Identify production inefficiencies	Large-scale processors, large-scale manufacturers
Make improvements in product quality	Producers, processors
Reduce insurance premiums	Producers, processors, manufacturers, distributors
Product Differentiation	
Verify product claims (e.g., sustainably harvested, fair trade)	Producers, processors, manufacturers
Comply with government regulations for product differentiation (e.g., organic standards, non-genetically modified organism)	Producers, processors, manufacturers
Increase transparency of the production process for consumers	Producers, processors, manufacturers, retailers
Identify and verify country of origin	Producers, processors, manufacturers
Protect and enhance brand name and reputation	Brand-name manufacturers, major retailers, major food service chains

Source: The Conference Board of Canada.

APPENDIX B

Food Traceability—Road Mapping/ Planning for Organizations

This appendix provides advice and tools to allow your organization to create its own “Food Traceability Road Map.” By considering the steps described below, organizations can ensure that their traceability systems are efficient and effective, and form an integral part of their business strategy. (See Table 1 for a checklist of considerations and action items for each step in the Road Map.)

STEP 1—GATHER INFORMATION

Begin by considering the operational details of your organization, its markets, and its place in the food supply chain. This basic information also forms the foundation for your overall business strategy. The following items will form a starting point:

- ◆ size of organization;
- ◆ location of operation(s);
- ◆ industry/sector;
- ◆ location in supply chain;
- ◆ regulatory requirements; and
- ◆ competitor environment.

ACTION ITEMS

Once the operational details are collected, seek out information on the traceability requirements for your organization, based on industry sector and type of operation. Government websites and food industry associations are good places to start.

STEP 2—IDENTIFY TRACEABILITY STRATEGY

Next, consider the goals and objectives of any traceability efforts currently being made in your organization. Consult with those involved on the internal challenges of implementing and maintaining those traceability efforts. Examine the annual budget set by the organization for traceability, if it’s a separate budget item.

ACTION ITEMS

If not already articulated, prepare a traceability strategy based on the evidence collected on the current use of traceability within the organization. Identify goals and objectives of investments in traceability and consider how those investments will be measured and evaluated in future. Discuss the expected outcomes and impacts for the organization’s traceability strategy.

STEP 3—EVALUATE CURRENT EFFORTS

Research and analyze the organization’s current traceability efforts. Consider both hard costs (such as technology and equipment) and soft costs (such as administrative time spent). Cross-examine the known costs against current and potential benefits. Some benefits, such as the ability to recall food products quickly in the event of a food safety incident, may never be realized.

Table 1
Food Traceability—Road Map/Planning Checklist for Organizations

Planning Steps	Considerations	Action Items
Step 1: Gather information	<ul style="list-style-type: none"> ◆ Size of organization ◆ Location of operation(s) ◆ Industry/sector ◆ Location in supply chain ◆ Type of products ◆ Scope of operation—domestic, international ◆ Regulatory requirements ◆ Competitor environment 	<ul style="list-style-type: none"> ◆ Collect organizational information and traceability requirements based on industry sector and operations
Step 2: Identify traceability strategy	<ul style="list-style-type: none"> ◆ Goals and objectives of current traceability efforts ◆ Challenges of implementing and maintaining traceability efforts ◆ Annual budget for traceability 	<ul style="list-style-type: none"> ◆ If not already articulated, form traceability strategy based on efforts made to enact current traceability efforts
Step 3: Evaluate current efforts	<ul style="list-style-type: none"> ◆ Hard costs of traceability initiatives ◆ Time spent on traceability efforts ◆ Benefits and impacts of traceability systems 	<ul style="list-style-type: none"> ◆ Compare actual costs of traceability with budget ◆ Examine non-tangible benefits for value
Step 4: Innovate and enhance	<ul style="list-style-type: none"> ◆ Other potential uses of traceability system ◆ Expected policy and regulation changes ◆ Business goals and strategy going forward 	<ul style="list-style-type: none"> ◆ Research potential for new markets such as imports/exports, organic, or niches, etc. ◆ Keep informed of new policies or regulations as they relate to food traceability ◆ Align traceability efforts with overall organizational goals
Step 5: Monitor continuously	<ul style="list-style-type: none"> ◆ Impacts and outcomes of innovations and enhancements of traceability efforts ◆ Overall fit of traceability efforts with organizational goals 	<ul style="list-style-type: none"> ◆ Revise and refine traceability strategy and efforts where needed

Source: The Conference Board of Canada.

However, their potential for positive economic and social impacts and outcomes are still substantial.

- ◆ hard costs of traceability systems—see Table 2;
- ◆ time spent on traceability efforts; and
- ◆ benefits and impacts of traceability systems—see Table 3.

ACTION ITEMS

Compare the actual costs of traceability efforts being made within the organization with the traceability budget. Examine any discrepancies for value and as potential evidence that the budget needs to be revisited. Consider,

too, non-tangible benefits for value to the organization, such as maintaining brand reputation in the market. Value judgments are often based on a combination of hard facts and the potential for good or harm.

STEP 4—INNOVATE AND ENHANCE

Building on the organization's traceability strategy and its stated goals and objectives, consider whether the organization could benefit from other potential uses of its traceability system. Examine the organization's business

goals and strategies going forward to look for additional ways to access more and better information from across the supply network that could improve different aspects of the organization’s business, such as entry into new or international markets. Be mindful, too, of any expected policy and regulatory changes that may require the organization to make changes to its traceability systems in the future.

ACTION ITEMS

Ensure that the organization’s traceability system choices align with overall organizational strategy and goals for optimal fit and use of resources. Research the potential for new markets, such as imports, exports, organic, or other niche markets, where traceability systems could assist with entry requirements. Stay informed of new policies or regulations as they relate to food traceability so that the organization is prepared for change.

STEP 5—MONITOR CONTINUOUSLY

Once a traceability system is in place, continue to monitor its success and periodically evaluate the efforts put into traceability. Consider the impacts and outcomes of any innovations and enhancements of traceability efforts to see whether they are worth sustaining. Continue to examine traceability through the lens of overall fit with organizational goals to know whether investments in traceability are paying off.

ACTION ITEMS

Be ready to revise and refine the organization’s traceability strategy and efforts whenever needed, but also set specific evaluation time frame targets (e.g., annually) to ensure that periodic evaluation takes place in a strategic and meaningful pattern.

Table 2
Traceability Systems Costs Worksheet

Use this worksheet to calculate an estimate of the costs of the traceability system in place or being considered for your organization. Attach known or anticipated costs to each item listed, as applicable to your location, industry, and type of operation.

Item*	Cost (\$)
A. Direct Costs of Traceability Systems	
Initial purchasing of equipment (examples: computer and telecommunications equipment, software or software services, and RFID equipment such as electronic ear tags, applicators, and readers)	
Replacement or repairs of equipment	
Equipment rentals	
Materials needed for new construction or renovations to accommodate traceability equipment and processes	
Materials needed for increased or modified storage (examples: construction of data collection stations, scanning infrastructure, or modifications to existing facilities)	
Other: specify	

Item*	Cost (\$)
B. Indirect Costs of Traceability Systems	
Auditing and inspection and laboratory analysis	
Labour due to new processes and tasks	
Labour due to need for new construction or renovations to accommodate traceability equipment and processes	
Labour due to increased or modified storage, construction of data collection stations, scanning infrastructure, and modifications to existing facilities	
Other: specify	
C. Administrative Costs of Traceability Systems	
Supervisory, production, and managerial/administrative staff time to implement new system	
Supervisory, production, and managerial/administrative staff time to maintain existing system	
Supervisory, production, and managerial/administrative staff time to facilitate audits and inspections	
Supervisory, production, and managerial/administrative staff time to conduct training to operate new system or system changes	
D. Productivity Costs of Traceability Systems	
Work interruption for installation and set-up of new system	
Work interruption for training	
Equipment out of service due to repairs, damage, or replacements	
Other: specify	
E. Legal Costs	
Legal counsel fees	
Managerial/administrative time	
<p>*Some examples taken from Sparling and others, "Costs and Benefits of Traceability," 159–60. Source: The Conference Board of Canada.</p>	

Table 3
Checklist of Benefits and Impacts of Traceability Systems

Use the checklist below during regular reviews of your organization's traceability system.

Since implementing or changing a traceability system, how would you rate your organization's performance in the following areas? (Please check.)

Performance	Significantly Better	Better	No Change	Worse	Significantly Worse	Don't Know
Food product safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recall incidents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulatory compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supply logistics management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality of products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New market penetration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer retention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brand/reputation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workplace communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to deal with change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Source: The Conference Board of Canada.

APPENDIX C

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