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A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Beef Sector

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Identifying and Classifying Benefits and Costs

Canada

A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Beef Sector

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Foreword

As consumers become more sophisticated and discerning in their food purchases, Canadian agriculture and agri-food production is changing to meet the challenge. Supply chains have been formed that specifically address food safety, food quality, and environmental concerns. Even the farm gate is reassessing the way it does business. Industry initiatives are looking at the feasibility, and in many instances are already in the process, of implementing on-farm food safety programs (OFFS) and environmental farm plans (EFP). The Agricultural Policy Framework (APF) recognizes the importance of food safety and environmental concerns for the future growth of the agriculture and agri-food sector. For this purpose, Agriculture and Agri-Food Canada (AAFC) has commissioned a series of six reports to develop a conceptual framework to strengthen our understanding of the benefit and cost implications OFFS and EFP will have across the agri-food chain[1]. The conceptual framework provides a systematic approach for organizing and pulling together stakeholders and government ongoing work in determining how best to implement on-farm food safety and environmental planning. The reports also provide preliminary qualitative applications of the conceptual framework to the Canadian pork, beef, grain and dairy sectors.

This fourth report in the series "*On-Farm Food Safety and Environmental Farm Plans: Identifying and Classifying Benefits and Costs*" details the assessment for the Canadian beef sector. In particular it focuses on the initiatives currently taking place in Alberta and Ontario for both cow-calf and feedlot operations.

The full list of reports in the series "*On-Farm Food Safety and Environmental Farm Plans: Identifying and Classifying Benefits and Costs*" is as follows:

Report 1: *Overview of the Development and Applications of a Conceptual Framework for Analyzing Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans* by J.E. Hobbs, J-P. Gervais, R. Gray, W.A. Kerr, B. Larue and C. Wasylyniuk

1. *The bulk of the analysis for this study was completed in March 2003, prior to the discovery of bovine spongiform encephalopathy (BSE) in a single beef cow in Alberta, and the subsequent closure of the U.S. and other countries' borders to all Canadian live ruminant and ruminant meat and meat product exports.*

Report 2: *On-Farm Food Safety and Environmental Farm Plans: A Conceptual Framework for Identifying and Classifying Benefits and Costs* by J.E. Hobbs, J-P. Gervais, R. Gray, W.A. Kerr and B. Larue

Report 3: *A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Pork Sector* by B. Larue, J-P. Gervais, J.E. Hobbs, W.A. Kerr, and R. Gray

Report 4: *A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Beef Sector* by W.A. Kerr, C. Wasylyniuk, J.E. Hobbs, J-P. Gervais, R. Gray and B. Larue

Report 5: *A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Grain Sector* by R. Gray, M. Ferguson, B. Martin, J.E. Hobbs, W.A. Kerr, B. Larue and J-P. Gervais

Report 6: *A Qualitative Assessment of the Benefits and Costs of On-Farm Food Safety and Environmental Farm Plans in the Dairy Sector* by J-P. Gervais, B. Larue, J.E. Hobbs, W.A. Kerr and R. Gray

Executive summary

This report deals with the potential benefits and costs associated with implementation of OFFS and EFP in the Canadian beef sector. Beef production at the farm level in Canada is vertically segmented into cow-calf production and feedlots that finish animals for slaughter. Cow-calf and feedlot enterprises operate within very different production systems and thus, face separate challenges relating to on-farm food safety and environmental planning. As a result, this report examines the benefits and costs of OFFS and EFP from both perspectives.

Existing food safety and environmental initiatives in Alberta and Ontario are summarized and assessed. There is already considerable private and public sector activity that is attempting to encourage more formal food safety activities on farms and raise the awareness of environmental stewardship among beef farmers and ranchers. While the response to these initiatives is positive, there is a general feeling that the costs associated with on-farm food safety and environmental planning are real, and the benefits more nebulous. If there are perceived benefits, they are expected to arise because future losses stemming from consumer concerns will be reduced rather than from increases in returns from product differentiation. The exception to this is the international market where product differentiation and/or branding based on food safety and environmental stewardship may lead to increased returns. Both cow-calf and feedlot operators doubt that such premiums will trickle down the supply chain to them.

A widely held belief among industry stakeholders is if benefits are to arise from an OFFS, they would be from improved consumer perceptions of beef products rather than from an actual increase in safety. There would be, however, considerable societal and group private benefits from improving the ability to trace problems back to their source and in being able to deal more quickly with food safety breakdowns. In this sense, the costs of implementing OFFS can be viewed as insurance against a catastrophe.

Cow-calf producers do not expect market-based benefits to arise from EFP although they would receive non-market benefits in terms of personal satisfaction from taking a more proactive role in environmental stewardship. Feedlot producers, on the other hand, feel they are already proactive in their environmental management and adding additional initiatives would increase costs through extra paperwork without providing any additional benefits.

Few synergies are expected between OFFS and EFP. The one exception is the potential for sharing audits and auditing costs.



Chapter 1

Introduction

1.1 The context

Food safety, food quality and environmental concerns have become issues in domestic markets and in export markets for many Canadian agri-food products. A large number of industry-led and public sector initiatives are attempting to respond to these rising concerns. While these initiatives can be solely reactive, it is hoped that the changes being put in place can improve the competitive advantage of individual Canadian agri-food industries and the Canadian agri-food industry as a whole. Besides the positive effect on profitability, there may be other benefits that accrue to society from initiatives that enhance food safety and improve the environmental sustainability of agricultural production.

The APF, endorsed by the Government of Canada and most provincial governments, stresses food safety and environmental stewardship as among the top priorities for guaranteeing a strong future for Canadian agriculture. The APF considers the implementation of Hazard Analysis Critical Control Point (HACCP)-like OFFS and the implementation of EFP as vital in ensuring Canada continues to be a world leader in the agri-food industry.

This is the fourth report in a series dealing with the assessment of potential benefits and costs associated with proposed OFFS and EFP initiatives for Canadian agriculture. The objective of this fourth report is to provide a broad preliminary assessment for the Canadian beef sector. This report is structured in 5 chapters. The remainder of this chapter provides a brief summary of the conceptual framework and methodology developed and used in this research project. Chapter 2 provides some pertinent background to the beef industry and the approach used in this study. Chapter 3 presents the analysis of OFFS in beef and chapter 4 presents EFP. Chapter 5 provides conclusions to the analysis. Appendix A and B contain the interview guides used in discussions with industry stakeholders. A glossary of key technical terms and a list of abbreviations can be found in Appendix C.

1.2 *The benefit-cost framework*[2]

Any proposed change in the way a firm, or an industry, operates needs to be assessed before a decision can be made regarding its desirability. It does not matter if this change arises in response to an opportunity identified by the firm's management, from a change in market conditions (such as a recession) or a change in the regulatory environment within which the firm operates. If the proposed change is determined to be detrimental to a firm's profits, then alternatives can be explored or a decision made to exit from the industry. Assessments may be straightforward and as simple as "back of the envelope" calculations. In many cases, however, there may be a large number of factors that enter into the assessment of a proposed change and a more formal structure is needed to organize those factors to ensure completeness and to allow positive and negative factors to be weighed. Often the interaction among factors is complex, making it impossible to arrive at a correct assessment through informal means. One of the most long-standing and thoroughly developed aids to formal decision-making is benefit-cost analysis, and it has been employed in this study.

The benefit-cost approach has a number of advantages for decision-making in complex situations. It can be undertaken with differing degrees of sophistication and rigour. Typically, the use of the benefit-cost framework starts with a relatively simple exercise that catalogues the various expected outcomes that may arise from a proposed change in the way firms or industries operate. Outcomes are sorted into benefits and costs. This catalogue is typically very broad and not all of the listed outcomes may be applicable to each firm or industry. This broad approach is undertaken to ensure completeness.

Once the catalogue is complete, the next stage surveys those who work in the firm(s) to assess the importance of each possible outcome. This allows the important benefits and costs to be identified so that further efforts can be concentrated on the key decision variables. In many cases, once this stage is reached no further analysis is required because the broad outlines of the decision are obvious.

If the result is not clear, the use of the framework can be deepened to increase the transparency of the decision. If necessary, monetary values of key benefits and costs can be obtained. This is often expensive requiring sophisticated estimation techniques and specialised professionals. There is a clear research resources question regarding the value of improving the information pertaining to decision-making relative to the costs of obtaining the information. The important point, however, is that the consistent framework is capable of organizing increasingly sophisticated pieces of information.

Since many of the changes in the way firms or industries operate will have outcomes that span considerable periods of time, and costs may incur at different times than benefits are received, more formal benefit-cost procedures can incorporate discounting techniques. If the investment is made to obtain complete quantification of key outcomes, the discounting techniques allow comparison of the monetary benefits and costs over time, and hence determination of the dollar value of the net benefit. As many assumptions are typically needed to calculate the quantitative benefit and cost estimates, the decision-maker can also measure the sensitivity of his/her net benefit calculation to these assumptions.

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2. *The conceptual framework presented in this chapter is a summary of Report 2. It is presented here for the convenience of the reader. For additional information on the conceptual model, the reader is referred to "On-Farm Food Safety and Environmental Farm Plans: A Conceptual Framework for Identifying and Classifying Benefits and Costs" (Hobbs et al. 2003).*

This report used a benefit-cost framework to assess OFFS and EFP. The catalogue of benefits and costs was first developed. Next, the experience of industry with already existing on farm quality control and environmental enhancement systems was used to identify the key benefits and costs. No attempt was made to deepen the analysis through the acquisition or development of quantitative measures, as this would have required far greater resources than were available. The framework provides a template upon which a formal quantitative analysis can be based. Considerable insights, however, can be gleaned from the qualitative analysis presented.

Benefit-cost analysis has one additional advantage as an aid to decision making. Private and societal benefits and costs often diverge (i.e. the costs imposed on society from water polluted by agricultural production do not show up on the financial balance sheet of the farm causing the pollution; nor do the benefits urban dwellers receive from farmers undertaking soil conservation practices that reduce dust storms). Thus, a proposed change in the way firms operate may lead to differences in the desirability of the outcome depending upon whether the private or public view is taken. Benefit-cost analysis allows both private and public benefits and costs to be incorporated into the decision-making framework in a consistent fashion. Through a comparison of the two decisions it is possible to assess the desirability of public sector intervention to encourage or dissuade private sector decisions.

Some of the costs of OFFS are obvious. There will be start-up (fixed) management costs associated with developing a plan and putting it into operation, including one-time costs associated with changes to facilities (fixed capital costs associated with compliance). There will also be ongoing (variable) management and compliance costs associated with operating the system, extra wage costs or possibly additional personnel, on-going staff training, computer equipment, updates of record keeping software, etc. Other costs may not be so obvious. If systems are not mandatory, there may be costs associated with segregating products that are produced under OFFS from those that are not, so that consumers can be assured of the quality of the products they are consuming. Whether products have been produced under OFFS protocols cannot be discerned when food is purchased or even after consumption. As a result, there must be ways of verifying that the products have been produced to this standard. Thus, there will be costs associated with monitoring production processes. There will also be costs associated with dealing with those who cheat or lack the skills to live up to their commitments.

A wide range of potential benefits have also been incorporated into the framework to evaluate OFFS. These benefits tend to be less obvious than the costs; and better illustrate the importance of using a formal framework. For example, in times of rising international concerns regarding food safety, having an OFFS in place may enhance access to foreign markets. It may also allow Canadian products to be differentiated from other products in foreign markets and allow Canadian producers to obtain a premium for their product. It may also enhance the reputation of Canadian food internationally, assisting in building a loyal base of international customers.

An OFFS can benefit consumers by reducing the costs they must incur to learn about the safety of the food they purchase. It may also benefit producers by reducing the expenditures they must make to build consumer confidence in their products, or in production through improvements in the use of inputs or an increased output (e.g. through the reduction in product condemnations or recalls). Benefits may also accrue along the supply chain, such as lower losses during transportation and less post-farm monitoring.

One of the major benefits may be the reduced liability cost arising from the ability to trace products through the supply chain when there is a break down in the food safety system. Being able to identify the farm(s) of origin may reduce the number of farms whose products must be

recalled and may also increase the speed with which an animal health problem or crop contamination problem can be dealt with. There may also be benefits that arise from isolating any firms currently free-riding on the food safety system (e.g. a farmer who feels he/she doesn't have to reduce his/her pesticide use because all the other farmers will and no one will notice his/her high pesticide levels if everything is mixed at the grain elevator).

Many of these benefit and cost scenarios can be couched in an insurance framework whereby incurring the costs associated with OFFS acts not to eliminate a future occurrence but rather to reduce the probability that a future occurrence takes place. As some food safety problems can greatly reduce the income of a large number of farmers (e.g. a foot-and-mouth outbreak), each farmer's contribution to increased food safety acts as an insurance premium to reduce the probability of a high cost future event that affects a large number of farmers.

The benefit-cost framework for EFP is similar to that for OFFS. On the cost side there are both fixed and variable costs associated with establishing and implementing a plan. There are also monitoring and enforcement costs in terms of ensuring that plans are actually being followed and to discipline those who breach their commitments.

If the farm plan indicates that there are unacceptable environmental practices taking place in the farming operation, there may be mitigation costs associated with remedying the problem. These may be capital costs such as the installation of more sophisticated manure handling systems or variable costs such as changes to feed rations to reduce phosphorous in faecal material. As with OFFS, there may be costs associated with segregating products produced under EFP from products not produced under such plans.

Benefits from EFP arise from lowering information costs relating to the environmental friendliness of the processes used to produce food and simultaneously increasing consumer confidence in the food system. There may be benefits from being able to brand Canadian products as environmentally friendly and from reducing the costs of meeting the market access requirements of importing countries. Farmers may benefit from enhanced self-worth and community status from increasing their environmental stewardship. Putting production on an environmentally sustainable basis will increase the quality of life for Canadians and may result in reduced human health impacts from toxic spills, etc. Externalities and liabilities pertaining to air quality and odour (nuisance) problems may be reduced. There could also be positive ecosystem effects such as enhanced wildlife habitat and green house gas reductions.

Again, some of the benefit and cost scenarios can be couched in insurance terms – as cost premiums to reduce the probability of infrequent and catastrophic events. The framework can also be adapted to deal with the long-time horizons that characterize some environmental benefits.

In addition to cataloguing the benefits and costs of HACCP-based OFFS and EFP, the distributional effects of the changes to various actors along the supply chain have been examined. For example, to reap a private sector benefit from the HACCP-based OFFS will require changes to how agricultural products are monitored along the supply chain to the final consumer. The firms that participate in the supply chain will have to incur costs in ensuring that the high food standards are maintained through the supply chain and that consumers are ultimately informed of the benefits they receive. Supply chain participants may also have a chance to share in any increase in revenues that arise from the change. Where appropriate, the factors that influence how these benefits and costs are shared among supply chain participants are identified.

Individual sectors will have differences in benefits and costs depending upon factors such as whether the industry is heavily involved in exporting and whether their products are currently branded. Where appropriate, these differences are pointed out and their effect on the efficacy of food safety and EFP initiatives are indicated.

Chapter 2

The beef industry

In the Canadian beef industry production is often vertically segmented at the farm level, with cow-calf breeding operations being separate enterprises from feedlots that fatten calves for slaughter. Feedlots are intensive livestock operations while cow-calf production is undertaken under conditions of extensive production. This leads to very different concerns and remedies for both on-farm food safety and environmental planning. Also cow-calf operations are one step further removed from final consumers in beef supply chains. As a result, this report provides separate analyses for cow-calf operations and feedlots.

Beef production takes place in all parts of Canada. Alberta and Ontario are the major beef producing areas. The agronomic and market environment within which each of these industries operates differs considerably. Therefore, separate discussions are provided for the potential impacts of OFFS and EFP for Alberta and Ontario. While it is believed that these two provinces are broadly representative of beef production, readers should take care in applying the results in this report to other parts of the country. Due to limited research resources, other beef producing areas were not directly included in the analysis although broad opinions were solicited.

The analysis involved identifying existing on-farm food safety and environmental initiatives in Alberta and Ontario. Assessments of these initiatives were made to identify their objectives, how they operate in practice and how widely they have been implemented. This information has been summarized in this report. Interview guides for industry stakeholders were developed, dealing with OFFS and EFP. The interview guides were based on the conceptual framework and the information collected concerning existing on-farm food safety and environmental planning initiatives. The OFFS interview guide can be found in Appendix A and the EFP interview guide in Appendix B.

A variety of officials from farm organizations, governments and the beef supply chain were contacted to provide input into this project as a group of knowledgeable beef industry stakeholders. The results of the industry interviews were compiled. Following the background chapter explaining existing programs for on-farm food safety and environmental initiatives, an abridged version of the stakeholder comments is reported. The results are also summarized in tabular form at the end of each chapter.

Chapter 3

OFFS in the beef industry

3.1 *Existing on-farm food safety programs in Canada: background*

3.1.1 Introduction

A number of food safety programs are being developed and implemented in the Canadian beef industry. At the producer level, Canada began developing initiatives for OFFS in 1997. Funded by the federal government, the Canadian Federation of Agriculture has coordinated Canadian OFFS program development covering all agricultural commodities, using the HACCP principles and aiming to ensure international acceptance (CFA, 1997, p. 9). Fourteen national commodity organizations had received funding for the development of OFFS programs as of 2002, including the cattle industry with its "Quality Starts Here" initiative. In April 2004, AAFC announced a further investment of $80 million over four years to help producers implement food safety systems under the Canadian Food Safety and Quality Program (CFSQP). Funds are available for workshops to promote understanding and for implementing these systems. This investment was in addition to the initial funding for CFSQP that was announced in December 2003 that provided $62 million in funds to promote traceability and food safety and quality systems (AAFC news release, 2003). At the beef processing level the voluntary acceptance of the Canadian Food Inspection Agency's (CFIA) Food Safety Enhancement Program (FSEP) has facilitated the introduction of HACCP into the beef supply chain. The goal of FSEP/HACCP is to ensure that agri-food products are processed in a safe manner. While the FSEP/HACCP for federally inspected meatpacking plants had been a voluntary program, proposed regulatory amendments to make FSEP mandatory in all federally inspected meat and poultry establishments and storages was announced in the Canada Gazette Part I on August 23, 2003. Final publication of the amendments to the Meat Inspection Regulations were made on December 12, 2004. As of December 2004, 86 percent of federally registered meat and poultry establishments will have one year to comply with the new regulations.

HACCP is an internationally recognized preventative system for food safety. It is cost effective because it has the ability to detect a safety concern in the unfinished product during the production process rather than destroying (or considerably modifying) a final product after it has been

produced (Unnevehr and Jensen, 1996). Critical control points are established at stages in the production process where control can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels (CFIA, 1996). In the beef industry HACCP is based on seven principles (Canadian Cattlemen's Association, 2000), they are:

1. *Identify potential biological, chemical, and physical hazards that reduce beef safety.*
2. *Identify procedures in production where hazards can be prevented or eliminated – critical management procedures (CMP).*
3. *Establish limits that must be met to ensure that each CMP is under control.*
4. *Establish regularly scheduled observations or tests to monitor each CMP.*
5. *Establish corrective actions to take if monitoring signals that there is a problem.*
6. *Verify that all CMP are working correctly.*
7. *Establish an effective record keeping system that documents the HACCP plan.*

The Canadian Cattlemen's Association's (CCA), Quality Starts Here program (QSH) uses HACCP-based models for both cow-calf and feedlot operations. The QSH as an HACCP based program is voluntary and third party audits are provided by provincial governments. The program is described below.

3.1.2 T he CCA's Quality Starts Here program for cow-calf operations

The cow-calf QSH documents several procedures that should be followed to adhere to the program. Each of the following seven points could be placed within one of the seven HACCP principles. Some items in the QSH are not listed here. The QSH for cow-calf operations includes the following (CCA, 1996):

1. *Unique individual animal identification. This aspect of the QSH is now mandatory for all beef operations across Canada through the Canadian Cattle Identification Agency (CCIA).*
2. *Record keeping. This includes records on cattle inventories, disease treatment, dead stock management, cattle sales, cattle purchases, and drug withdrawal periods.*
3. *Upkeep of cattle handling facilities. This includes maintaining safe and clean facilities. Transport trailers must also be safe and clean.*
4. *Safe animal health product use. This includes maintaining a professional relationship with a veterinarian, developing a preventative herd health management program, following drug labels and adhering to drug withdrawal periods.*
5. *Culling cattle from the herd based on recommendations from packers. This also includes developing an emergency protocol in case of a severe disease outbreak.*
6. *Feeding. This includes modifying feed rations due to weather stress and monitoring the water and pasture where cattle are to drink and feed. Feed is purchased only from reputable suppliers.*
7. *Suckling calf round-up. This includes proper castration techniques, timely vaccinations, safe calf handling, adhering to recommended injection sites on the animal and documenting any broken needles.*

3.1.3 The CCA's Quality Starts Here program for feedlot operations

The following describes the HACCP plan for feedlots. This is taken from the "Good Production Practices for Feedlots" manual (CCA, 2000).

1. *Identify potential biological, chemical, and physical hazards that reduce beef safety. This includes identifying chemical residues from animal health products, physical hazards such as broken needles and biological hazards such as bacteria.*
2. *Identify critical management procedures (CMPs) in production where hazards can be prevented or eliminated.*
3. *Establish limits that must be met to ensure that each CMP is under control.*
4. *Establish regularly scheduled observations or tests to monitor each CMP. This includes record review, staff performance evaluations and feed and water testing.*
5. *Establish corrective actions to take if monitoring indicates a problem. This includes informing feed suppliers of poor product, withholding cattle with chemical and physical hazards from packers and informing packers of suspect animals.*
6. *Verify that all CMP are working correctly. This includes record review, feed and water testing and carcass testing.*
7. *Establish an effective record keeping system that documents the HACCP plan. This includes records for feed, water, bedding, pharmaceuticals, dead stock disposal, equipment, manure management and cattle vaccinations.*

3.1.4 Future development of the Quality Starts Here program

Effective May 11, 2004, the Canadian Cattleman's Association's Quality Starts Here/Verified Beef Production Program (VBP) successfully completed a technical review which is part one of the recognition process led by the CFIA. Under this technical review, a review team comprised of federal, provincial and territorial commodity specialists examined and assessed the national producer organization's generic HACCP model and producer manual to confirm that the program is technically sound and adheres to HACCP principles. There still remain several stages of the recognition program to go through before this program is fully recognized.

The audited QSH program is being administered at the provincial level even though it is a national program. This will allow provincial governments to have some influence on third party auditing. Industry officials hope that the audited QSH will be cost neutral for producers in each of the provinces. The audited program is designed to use trained, private third party auditors. The auditor-training program will be approved by the CFIA and the private auditors' reports will be submitted to the CFIA (McNabb, 2003).

The QSH does not include environmental issues and therefore auditors will not be testing environmental markers. However, industry officials suggested that auditors could someday monitor beef producers for food safety, environmental stewardship, and animal welfare. They indicated that the QSH infrastructure would allow these new components such as environmental stewardship to be added in the future (McNabb, 2003).

The first few years of the audited QSH will include continuous, random third party auditing of beef operations. A review will be undertaken at the end of that period to examine if ongoing third party auditing should continue. Industry officials hope that the potential to combine the auditing component of the QSH with other commodity groups in the future could result in sig-

nificant cost savings for the agricultural industry. In addition, industry stakeholders indicated a hope that the audited QSH will also allow private, differentiated beef supply chains to develop in the future. This would mean that the audited QSH is only a first step or a "springboard" in developing private, differentiated beef supply chains in Canada. Beef market premiums for adhering to the audited QSH are not anticipated, however, there may be discounts for beef producers who do not join the QSH (McNabb, 2003).

3.1.5 The Ontario Corn Fed Beef program

In 1999, the Ontario Cattle Feeders Association (OCFA) began to develop the Ontario Corn Fed Beef program (OCFB) in an attempt to differentiate Ontario beef. The program is voluntary and it has not yet been widely adopted by Ontario beef producers. However the program is unique because it integrates product quality, on-farm food safety, and EFP.

There are many practices beef producers must adhere to in order to be recognized by the program. It is similar to the QSH in that there are rules about feed quality audits, cattle bruising prevention, cattle handling safety, detailed records and proper injection sites. However the OCFB is different from the current QSH in that all producers must take the provincial Livestock Medicine Course, the OCFB Quality Assurance course and have an approved Ontario Environmental Farm Plan (OEFP) to be part of the OCFB. Additionally, 80% of the feed ration must be corn and an annual on-farm third party audit is in place. The program has provided access to speciality meat markets, and speciality butcher shops are now actively promoting the program. OCFB beef products have been fetching a small premium, however this has not been realized or passed through to the feedlot or cow-calf levels of the supply chain.

The next three sections present information gathered through interviews with industry stakeholders. Assessments of cow-calf producers, feedlot operators and commodity association representatives concerning the relative importance of the benefits and costs identified in the conceptual framework are discussed. Section 3.5 provides an overall qualitative assessment of the benefits and costs arising from OFFS in the Canadian beef industry.

3.2 Cow-calf producer reactions to on-farm food safety programs

3.2.1 Comments from Ontario

Cow-calf producers were contacted for information on their reactions to and experience with OFFS. Approximately 40% of cow-calf operators have taken the Livestock Medicine Course for quality assurance purposes in Ontario. The course will soon be mandatory if operators wish to purchase pharmaceuticals for their livestock. Many Ontario cow-calf operators do not appear to know the QSH exists. However this does not mean cow-calf operators are not using generally accepted production practices. Many, if not most, cow-calf operators may be following QSH procedures without being aware of the program.

For cow-calf operations, initial quality assurance costs include the time and the $50 fee involved in attending the Livestock Medicine Course. There are also significant variable costs such as detailed record keeping, which includes maintaining a livestock medicine record with serial numbers. The Livestock Medicine Course must be renewed every five years. Some cow-calf producers believe that any future quality assurance programs will add cost to their operations as additional record keeping costs may exceed any realized production efficiencies.

There are currently no third-party monitoring costs. Most cow-calf producers do not receive

feedback from other levels in the beef supply chain regarding carcass quality. Cow-calf producers believe that if continuous third party monitoring was to occur, it could be coordinated with audits for EFP using a single auditor. It is possible that a quality assurance system could be integrated with the current CCIA system because it is essential to realize efficiencies in the operation of the programs.

The cow-calf producers contacted did not believe that the current CCIA cattle tracking system reduces information asymmetry. Current beef production systems are regarded as safe. However, they feel that more safety information should be provided to consumers in the future. It is possible that a more coordinated beef safety system through several stages of the beef supply chain would allow for reduced beef product testing by retailers. Cow-calf producers suggested that the current CCIA system will reduce the potential and the size of legal liability claims from consumers. In the event of a catastrophic disease outbreak, the current system could greatly reduce post-contamination costs. Many industry stakeholders suggest that developing beef product differentiation based on beef safety is a dangerous strategy. A commonly held view is that all beef must provide the same level of consumer safety and that beef should only be differentiated on the basis of other quality attributes. A coordinated beef safety system in the future could provide both a safer beef product and increased consumer confidence.

3.2.2 Comments from Alberta

Industry stakeholders in Alberta comment that technology is available to reduce record keeping costs for beef producers. Radio frequency identification (RFID) tags allow for automatic livestock tracking using computer software. The software automatically links the RFID tag number to any previously collected data. The software also allows animal data to be uploaded to packers or carcass data to be downloaded from packers. This system minimizes daily record keeping costs for beef safety purposes.

However, implementing a RFID tag system would still be a significant capital cost for a beef operation wishing to pursue an on-farm beef safety program. Variable costs would also be significant. They include wages for veterinarians and bookkeepers. Industry stakeholders feel that the level of record keeping required due to consumer concerns will increase in the future, and that additional record keeping costs will continue to exceed any realized production efficiencies. As of January 2005, however, the Canadian Cattle Identification Agency announced that ear tags will be replaced with RFID tags for tracing cattle back to their farm of origin. Therefore, these costs will now be incurred by all producers.

Some cow-calf producers do not believe on-farm third party auditing is critical for on-farm beef safety. This statement arises because of constant contact with veterinarians and packers that provide carcass quality feedback. However it is possible that future on-farm third party auditing could be coordinated with auditors for EFP.

It will be important that any future beef safety system be integrated with the current CCIA cattle traceback system to achieve information efficiencies. Any future quality assurance programs or specialized beef supply chains could also be included and integrated into the existing system. Cow-calf producers felt that the entire beef supply chain is becoming more coordinated due to beef safety concerns. They believe that current beef production systems are safe and that implementation of formal HACCP-based programs probably would not make these systems any safer in the future. Formal programs, however, could be important in providing additional safety assurances to consumers.

Industry stakeholders believed that the bacteria threat in ground beef will not allow for reduced retailer beef product testing. Additionally, the current CCIA system should reduce the potential occurrence and size of legal liability claims from consumers. As with their Ontario counterparts, Alberta producers believed that in the event of a catastrophic disease outbreak, the current system could significantly reduce post-contamination costs. Thus, the ongoing costs associated with on-farm HACCP can, in part, be seen to operate like an insurance premium against unlikely events. It was hoped that Canadian beef market access could increase due to a consumer perception that Canadian beef is safer than other beef in the international market.

3.3 Feedlot operator reactions to on-farm food safety

3.3.1 Comments from Ontario

It is estimated that 20% of Ontario feedlots participate in the OCFB. With program participation, initial quality assurance costs include the time and cost involved in attending courses. There are also variable costs such as detailed record keeping. This includes maintaining a livestock medicine record. There may not be any additional cost associated with feeding a ration containing 80% corn. Industry stakeholders felt that any future quality assurance programs will increase costs for feedlot operations. Additional record keeping costs are expected to exceed any realized production efficiencies.

Some Ontario feedlot operators do not regard on-farm third party auditing as critical for on-farm beef safety, since packers provide carcass quality feedback. Some feedlot operators argue that OFFS should not be coordinated with EFP. The perception is that the skill sets required for on-farm food safety monitoring and environmental monitoring are sufficiently different so that it would be difficult to combine the tasks. It was also suggested that the current CCIA system is designed for emergency traceback only and that any quality assurance system should be separate from it. This is currently the case with the OCFB. Thus, the extent to which on-farm food safety and quality assurance programs can be linked with the CCIA system is a very controversial issue in the beef industry at the current time.

As with cow-calf operators, Ontario feedlot operators are leery about developing beef product differentiation based on beef safety. They feel that all beef must provide the same level of consumer safety, so that OFFS are more likely to result in increased consumer confidence than a measurable increase in the safety of Canadian beef. Clearly segments of the industry remain unconvinced that the procedures implemented under the beef OFFS will actually improve the safety of beef (e.g. through reducing incidences or the risk of E. Coli contamination).

3.3.2 Comments from Alberta

Alberta feedlot operators suggest that beef retailers want quality assurance and source verification, but that not all consumers are concerned with quality assurance. Some feedlot operators also feel that the push for source verification is coming from the public sector based on governments' perceptions of what beef consumers are looking for.

Alberta feedlot operators indicate that the most significant capital cost of implementing an OFFS is computerized record keeping. Variable costs include software updates and veterinarian and record keeping wages. Many feedlots constantly receive carcass quality feedback from packers. This information can be combined with OFFS and EFP auditing in the future to provide a more encompassing quality and safety assurance to downstream customers. There is significant disagreement between feedlot operators as to whether the current CCIA system can be coordinated

with a private supply chain information system. There is also significant disagreement between feedlot operators regarding the relationship between feedlot efficiency and OFFS. Some operators argue that feedlots become more efficient due to the safety system, while others stated that the increased time and cost required to implement safety programs exceeds any production efficiencies from the programs. A more complex quantification of the potential benefit-cost trade-off would be necessary to determine whether production efficiency gains would outweigh the management and compliance costs for different types of feedlot operations.

There is also disagreement among Alberta feedlot operators as to whether a coordinated beef safety system would allow for reduced beef product testing by retailers. Feedlot operators agreed that the current CCIA system should reduce the frequency of liability claims from consumers. In the event of a catastrophic disease outbreak, the current system should help reduce post-contamination costs.

Feedlot operators state that the current safety program for the beef supply chain is resulting in closer coordination along the beef supply chain, except for the link between the cow-calf producer and the feedlot. They believe the cow-calf to feedlot link will need to be strengthened in the future. There is a strong belief in the ongoing safety of beef production systems among feedlot operators. They hope that Canadian beef access into foreign markets can be increased due to a positive consumer perception based on safety and beef product differentiation.

3.4 CCA comments regarding on-farm food safety

Industry officials with the CCA expect that every beef producer will, in future, need to be recognized as adhering to the QSH to continue to do business. Although the Government will not mandate participation, it is likely that beef retailers, processors and consumers will eventually require their beef to be sourced from production units that comply with the QSH. The QSH is not designed to create beef product differentiation. Instead, the goal of the program is to create a base level of safety (proper injection sites) and quality (minimal bruising) for all Canadian beef. It is merely a building block to allow private, differentiated beef supply chains to develop (McNabb, 2003).

The most significant initial cost is expected to be the time involved in planning for the QSH. Variable costs are significant. This includes record keeping and the cost of the third party audit. Audit cost will need to cover the costs involved in training independent auditors. A feedlot operator's herd health veterinarian would not be allowed to perform the audit due to a conflict of interest. It remains to be seen whether the audit cost would be covered by individual producers or offset through funding from public sources. There may also be a small cost to beef producers to pay for the administration of the QSH (McNabb, 2003).

Some industry stakeholders believe that the CCIA cattle identification system is already designed to allow private, differentiated beef supply chains to develop (McNabb, 2003). The CCIA system allows the CFIA to perform a rapid traceback in the case of a disease outbreak. The information in the CCIA database is confidential. However it is possible that the CCIA would allow its cattle tag numbers to be used for cattle identification purposes in private beef supply chains. This would allow an individual animal to have only one identification number. Additionally, it may be possible for the CCIA database information to be released if permission was granted by the parties involved, although this is likely to be controversial. This would also facilitate separate, private beef supply chains developing their own information systems.

The detailed record keeping system that the QSH requires could allow beef producers to realize operation efficiencies. Some industry officials expected that the program would increase cattle prices for cow-calf producers and feedlots. Currently, packers reduce their cattle bid prices because of bruising and other undesirable attributes. If the amount of bruising decreases due to producer adoption of the QSH, prices may increase accordingly if packers face less uncertainty about carcass quality. It is felt that once the QSH is entrenched in the industry, packers might begin to pay for other quality attributes such as tenderness (McNabb, 2003). These premiums may evolve due to the existence of new, private, differentiated beef supply chains. These new supply chains would be separate from the QSH, but might use it as a base on which to bolt on additional assurances.

Some industry stakeholders believe that the QSH will improve supply chain efficiencies in the future. Packers will realize efficiencies if cattle bruising is reduced. It is felt that consumer education regarding the industry's food safety initiatives would be important. The CCIA cattle traceability system could reduce the potential and size of legal liability claims from consumers if the source of a problem can be accurately identified and due diligence can be demonstrated when a product liability claim is made. Demonstrating compliance with a HACCP-based system could aid a due diligence defence (McNabb, 2003).

In the event of a catastrophic disease outbreak, it is hoped that the current system would reduce post-contamination costs. However the level of cost savings would depend on the nature of the disease outbreak (McNabb, 2003). Industry officials believe that consumers would benefit from QSH implementation because their confidence level for beef products would increase, and consumer information asymmetry with respect to safety attributes would decrease. Consistent with the attitude of feedlot operators and cow-calf producers, it was argued that QSH will not make beef safer but will increase quality and reduce the potential for liability claims (McNabb, 2003). The industry hopes that market access for Canadian beef will increase due to the program's implementation. Ultimately, international market share for Canadian beef could be a measure of the QSH's success.

3.5 Conclusions regarding on-farm food safety

Several conclusions can be drawn based on the interviews discussed above. Both the CCA and the OCFA have implemented voluntary on-farm quality assurance or food safety programs. These programs are HACCP-based. Industry leaders argue that the CCA QSH has been designed to establish a higher base level of beef safety and quality in the cow-calf and feedlot sector. The CCA's intention is to eventually have 100% beef industry compliance with the QSH through market-based mechanisms in the beef supply chain. The voluntary OCFB is designed to differentiate Ontario beef in the marketplace. The objectives of the two programs are different, however the processes implemented in both programs are similar.

Many beef producers in Alberta and Ontario believe there are beef market benefits from implementing OFFS. There is debate however as to who is encouraging this development. Some producers believe that consumers are encouraging change while others believe that retailers are encouraging change in an attempt to reduce potential legal liability. It also could be a combination of these two factors. Producers believe that OFFS increase consumer confidence and could potentially lead to increased foreign market access for differentiated Canadian beef.

Secondly, producers believe that OFFS will reduce product liability costs. They believe cost reductions will occur in the event of a post-contamination cleanup. Most producers stated that detailed computerized record keeping is essential to doing business and stated that it will be

even more essential in the future in order to develop information flows to the beef consumer. They do not believe that packers and retailers will be able to reduce their product safety measurement costs due to OFFS. Most producers state that the bacteria threat and consumer concerns will not allow packers and retailers to reduce product testing.

There is considerable debate regarding changes in operating efficiency due to OFFS. About half of the interviewees state that the increased cost of record keeping will exceed any cost savings realized once the OFFS is implemented. The other half of the interviewees argue the opposite. It does not matter if the interviewees are from Alberta or Ontario or if they are cow-calf operators or feedlot operators. No definite conclusion can be drawn in this report as to whether OFFS increase or reduce operational efficiency.

Producers in Alberta and Ontario believe there are non-product market benefits. All producers believe that OFFS reduce information asymmetry. However, there is considerable debate regarding the reduction of foodborne illness due to OFFS. Once again, about half of the interviewees believe that the frequency of foodborne illness will decrease due to OFFS. The other half of the interviewees argue there will be no change. It does not matter if the interviewees are from Alberta or Ontario or if they are cow-calf operators or feedlot operators.

These comments reflect conflicting reactions to OFFS in the beef industry. On the one hand, producers have a high degree of confidence in the safety of Canadian beef, and do not believe that the OFFS will make beef measurably safer and are nervous about a differentiation strategy based on food safety. Yet the potential market benefits of the beef OFFS are seen as increasing access to foreign markets due to a positive consumer perception based on differentiating Canadian beef on the basis of safety. It is hard to reconcile these viewpoints. It may be that the OFFS is a method of documenting production practices to provide credible assurances in export markets. The credibility of a quality or safety claim for Canadian beef, however, would be seriously weakened by a food safety incident arising from an on-farm production practice that was not prevented by an OFFS. Thus it would seem that putting an OFFS in place by the industry must be more than merely 'window-dressing' to be effective in the long run.

Tables 1-3 are based on the conceptual framework for OFFS and are used as the basis for the industry interviews. They present a generalization of the findings in this chapter. While this synthesis is not necessarily the viewpoint of every interviewee, effort was made to represent the majority's opinion.

Table 1: Potential benefits of on-farm food safety programs in beef production

DEMAND-SIDE BENEFITS	DESCRIPTION
Domestic market:	
Reduce transaction costs for consumers	Industry stakeholders perceive that transaction costs are not likely to be reduced because they consider their beef to already be safe. They also feel that new on-farm beef safety systems will not make the product measurably safer
Build consumer confidence	The implementation of HACCP-based systems is warranted for both cow-calf and feedlot operations due to current negative consumer perceptions. Consumer confidence may increase due to HACCP-based systems. Beef market premiums are not expected but these systems are expected to maintain meat market shares
International markets:	
Provide differentiation on the international market	Producers believe HACCP is an instrument to protect traditional market share and to develop new markets. Premiums are not anticipated
Reinforce and develop trade networks	It is unlikely HACCP will affect international trade networks because existing food safety initiatives along the beef supply chain are expected to dominate over on-farm food safety effects
Facilitate trade by reducing non-tariff barriers	Non-tariff barriers to market access may be reduced because HACCP systems would now extend over the entire beef supply chain providing increased assurance to importing countries
SUPPLY-SIDE BENEFITS	**DESCRIPTION**
Efficiency gains at the farm level:	
Improve the productivity of inputs	There is significant disagreement between beef producers as to whether productivity will increase or decrease due to the implementation of HACCP-based systems. Record keeping costs are expected to be substantial

Table 1: Potential benefits of on-farm food safety programs in beef production (Continued)

DEMAND-SIDE BENEFITS	DESCRIPTION
Efficiency gains in business relationships between producers, processors and retailers:	
Lower logistics costs	Expected to lower costs associated with product recalls
Reduce ex-post cost following detection of contaminant in food	Expected to lower expected losses in the event of a serious contamination incident and reduce the probability of a serious incident
Reduce measurement costs	Retailers/packers will probably have to maintain rigorous product testing even if HACCP-based systems are implemented at the cow-calf and feedlot level due to beef consumer concerns
Reduce monitoring and enforcement costs	Producer monitoring costs will increase with a HACCP-based system. This is especially true for an audited QSH program
Reduce product liability costs	A "due diligence" defense could allow beef producers to reduce the frequency and severity of successful court cases against the beef supply chain

Source: Based on interviews with beef industry stakeholders.

Table 2: Potential costs of on-farm food safety programs in beef production

SUPPLY-SIDE COSTS	DESCRIPTION
Management costs:	
fixed – establishing the HACCP plan	There are initial management costs for designing the plan however these costs are minimal for the individual farm operator. The generic hazard analysis and creation of the OFFS plan has been carried out at the industry level
Compliance costs:	
fixed – capital costs	These costs include modifications to a feedlot or other fixed investments. Beef producers state that these costs will be minimal if they have already implemented most HACCP based practices without actually implementing the recognized QSH
variable – includes self-monitoring	These costs are expected to be significant due to the high level of record keeping required. The opportunity cost of the time required for record keeping must also be considered
3rd party monitoring costs:	
variable	These costs may be significant once an audited QSH is implemented

Source: Based on interviews with beef industry stakeholders.

Table 3: The benefits and costs of on-farm food safety systems: an institutional comparison

	Voluntary industry-wide OFFS (current QSH)	Audited industry-wide OFFS (future QSH and OCFB)	Buyer specific OFFS (natural beef – only one response)	Regulatory standards
Benefits				
Reduce transaction costs for consumers	No	No	No	No
Build consumer confidence	Yes	Yes	Yes	No
Convey additional information	Yes	Yes	Yes	No
Provide differentiation on international markets	Yes	Yes	Yes	No
Facilitate trade by reducing NTBs	No	No	No	No
Reinforce and develop trade networks	No	No	No	No
Reduce monitoring costs	No	No	Not applicable	No
Improve productivity of inputs	Possibly	Possibly	Yes	Unknown
Improve efficiency in production	Possible	Possibly	Yes	Unknown
Reduce logistic costs	Yes	Yes	Yes	Not applicable
Reduce measurement costs	No	No	Yes	No
Reduce free-rider impacts	Not applicable	Unknown	Not applicable	Not applicable
Reduce product liability costs	Yes	Yes	Yes	Yes (CCIA)
Reduce post-contamination costs	Yes	Yes	Yes	Yes (CCIA)
Reduce incidence of foodborne illness	Possibly	Possibly	Yes	No
Reduce information asymmetry	Yes	Yes	Yes	No
Costs				
Management costs				
fixed – establishing the HACCP plan (if applicable)	Minimal	Minimal	Minimal	Not applicable
variable – revising policy	None	None	None	Not applicable
Compliance costs				
fixed – capital costs, includes self-monitoring	Minimal	Minimal	Minimal	Minimal
variable – includes self-monitoring	Significant	Significant	Significant	Significant
3rd party monitoring costs				
fixed	None	Minimal	None	None
variable	None	Significant	None	Some (CFIA)
Segregation costs				
fixed	None	None	Minimal	None
variable	None	None	Minimal	None
Sunk investments – risk of hold-up	Unknown	Unknown	Unknown	Unknown

Source: Based on interviews with beef industry stakeholders.

3.6 Modeling the effects of OFFS

A technical analysis of the economic impacts of OFFS at various stages of the supply chain is presented in Appendix A of report #3 (pork sector report). A similar graphical analysis (for the situation of an exporting industry) could be applied to the beef sector. This section summarizes the main conclusions from the technical analysis under different scenarios[3]. First, the effects of

3. *Readers are referred to the technical appendix of report #3 for a graphical analysis and full explanation of the assumptions underlying this analysis.*

implementing OFFS on the cost structure of producers is explored. The net effect of OFFS on producers' costs can be either positive or negative. Second, the potential implications of OFFS initiatives on the demand for farm and processed products is also explored.

Four different scenarios are relevant to the beef industry.

Scenario 1: OFFS simply increases producer costs without any demand-side benefits, leading to a decrease in production and a decrease in live cattle exports. The assumed negative impact of the OFFS is not transmitted downstream to processors and consumers; producers incur the full cost impact. In this scenario, any benefits stemming from implementing the OFFS would also be captured exclusively by producers.

Scenario 2: Implementing HACCP at the farm and processing levels can also have positive implications if it leads to efficiency gains that decrease both producers' and processors' costs. There will be an increase in beef production but it does not affect the farm price if we assume free trade. Quantities processed by domestic processors increase. The increase in domestically processed beef is all exported. In this scenario, producers and processors benefit.

Scenario 3: It is also important to consider the impact of OFFS on foreign markets. Assume that OFFS increases the demand for Canadian beef. Under a free trade assumption, this increases cattle and beef domestic prices. The final effects are increases in live cattle and beef exports, and in beef production. But domestic beef consumption decreases due to higher prices. These effects unambiguously decrease domestic consumers' benefits (consumer surplus) and increase producers' benefits (producer surplus). The impact on processors is ambiguous because of the effect on the domestic price of live animals. Processors sales increase but purchases of their necessary inputs cost more than before the implementation of the OFFS.

Scenario 4: In a final scenario, assume that implementing food safety initiatives at the farm level increases consumers' demand. Under the assumptions explained in report #3 (i.e., free-trade and the small country assumptions), the domestic price of beef products does not change as Canadian provinces remain net exporters of beef. Hence, given the constant domestic price, domestic consumption of beef products increases and exports decrease. Producers and processors do not benefit from this positive demand-side effect of food safety initiatives since prices remain constant at all market levels. Beef production also remains constant.

Chapter 4

Environmental stewardship in the beef industry

4.1 *Existing and proposed environmental regulations for Alberta and Ontario*

4.1.1 *Alberta's Agricultural Operation Practices Act*

On January 1 2002, Alberta implemented new environmental regulations for intensive livestock operations (ILOs) in the Agricultural Operation Practices Act (AOPA) (Alberta Queen's Printer, 2001a). The new AOPA details how ILOs must interact with the environment. The objectives of the Act are to support sustainable growth of the livestock industry, protect the environment, provide consistency in ILO approvals, and to address the concerns of municipalities. A significant change is that the Natural Resources Conservation Board (NRCB) now oversees ILO environmental regulation. The NRCB reports to the Minister of Sustainable Development.

All Alberta ILOs are subject to the AOPA. The Act stipulates that any new or expanding confined feeding operations must notify the NRCB of their operations. The NRCB has created two regulatory regimes to administer ILOs. One regime is for small operations (200 to 499 beef feeders and 150 to 349 beef cows) and the other is for large operations (500 beef feeders and up and 350 beef cows and up) (Alberta Queen's Printer, 2001b). Small operations must register to legally operate while large operations must be granted approval. The approval process for large ILOs is more stringent and requires a professional engineer to design the site. Any cow-calf operations with less than 150 beef cows or beef feeder operations with less than 200 feeders are exempt from the NRCB regulations. See Table 4 for comparison of registration and approval requirements for large and small operations.

The Act primarily deals with three issues: minimum distance separation, manure storage, and nutrient management. Minimum distance separation involves maintaining distances between ILOs and other operations to avoid nuisance claims such as odour. The distance requirements are based on the size of the ILO and the sensitivity of neighbouring land uses. Land use categories include farming activities, acreages, towns and cities. Manure storage regulations address

surface water control systems, natural water and wells, water table protection, erosion protection and groundwater protection (Brethour et al., 2002). The nutrient management regulations stipulate where manure can be spread, how it can be applied, soil testing procedures and requirements and the maximum nutrient loads allowed. The requirements are based on crop nutrient requirements and nitrate limits. Most sections of the Act have now become law.

The AOPA is the sole legislation that ILOs must follow in Alberta. The regulations are scientifically based and they take social-municipal concerns into account. The Act provides fair treatment for ILOs in that it harmonizes ILO regulations across the province. The Act allows for a full environmental audit for large ILOs while still requiring heightened environmental awareness for small ILOs.

Table 4: Application processes for ILOs in Alberta

APPLICATION REQUIREMENTS	APPROVAL – LARGE ILOs –	REGISTRAITON – SMALL ILOs –
1. List affected persons	Yes	Yes
2. Consistent with municipal development plan	Yes	Yes
3. Engineering plans for manure storage, collection and contamination	Yes	No
4. Hydro-geological assessments	Yes	No
5. Number, species and age of livestock	Yes	Yes
6. Scaled site plan indicating water bodies, buildings and run off controls	Yes	Yes
7. Explanation of how the operation will meet the requirements of the AOPA	Yes	Yes
8. Legal description of the land where manure is to be spread for the first three years	Yes	Yes
9. Nutrient management plan	Yes	Yes
10. Documents stamped/signed by a professional engineer	Yes	No

Source: Alberta Queen's Printer, 2001a.

4.1.2 Ontario's Nutrient Management Act (NMA)

Ontario's *Nutrient Management Act* received royal assent on June 27, 2002. New or expanding operations became subject to the Act as of September 30, 2003. OMAF is the lead negotiator with Ontario's agricultural producers. The NMA is a direct response to the Walkerton[4] tragedy. The regulations will likely be the most stringent environmental regulations in Canada. The projected date of the first phase of implementation was March 31, 2003. Full implementation is expected by the end of 2008 (OMAF, 2003b).

4. *In Walkerton, Ontario in 2000, many people became ill and 7 people died from Escherichia coli O157:H7 bacteria present in the water supply. It is believed that the primary source of the contamination may have been manure spread on farm land adjacent to a local well that made its way into the water supply (O'Connor, 2002).*

The regulations will affect almost every agricultural operation in Ontario due to the low nutrient thresholds prescribed in the regulations. The regulations use nutrient unit production and consumption to categorize farms into one of nine categories. A nutrient unit is defined as ten tonnes of beef cattle manure (OMAF, 2003c) which is approximately what 1 beef cow is assumed to produce annually. Farms producing or receiving this manure are subject to the regulations. Category one is the lowest threshold to which the regulations apply and consists of livestock operations with five to thirty nutrient units (5 to 30 beef cows). The highest threshold is Category four with three hundred or more nutrient units (300 beef cows or more). This latter threshold is considerably lower than that in Alberta. Table 5 provides the four categories pertaining to livestock operations.

Table 5: Categories for Ontario's livestock operations (nutrient units)

CATEGORY	NUMBER OF NUTRIENT UNITS	PROPOSED PHASE-IN DATE
1. Category one	5-30	New or expanding operations – 2003 Existing operations – 2008
2. Category two	30-150	New or expanding operations – 2003 Existing operations – 2007
3. Category three	150-300	New or expanding operations – 2003 Existing operations – 2006
4. Category four	300 or more	New or expanding operations – 2003 Existing operations – 2005

Source: OMAF, 2003b.

The nutrient management requirements differ depending on what level a beef operation is categorized. All livestock operations must develop a nutrient management strategy (NMS) and a nutrient management plan (NMP). The NMS and NMP must be completed before a farm begins operation and every five years thereafter. The documents must be approved by OMAF before operations can begin or continue to operate. Additionally, livestock operators or their consultants can only submit these documents with formal training in nutrient management planning provided by the OMAF. Tables 6 and 7 provide the components of an NMS and NMP respectively.

OMAF (2003a) states that any information that is required in both the NMS and the NMP only has to be submitted once to OMAF. OMAF will perform random and unannounced audits to ensure that submitted NMS and NMP are being followed. Category one and category two livestock operations are allowed to complete a short form for both the NMS and the NMP. These operations do not have to submit their short forms to OMAF, however OMAF will examine these short forms during random audits.

One provision of the NMP states that manure spreading is not permitted on frozen or snow covered land. This rule means that all livestock operations are required to have 240 days of manure storage available. Additionally, livestock operators and consultants must participate in nutrient management courses at least once every five years.

Table 6: Components of a nutrient management strategy

1.	Operation description
2.	Contingency plans
3.	Nutrient unit production listing all nutrients and the annual amount of production
4.	Minimum distance separation from private and municipal wells, homes, health care facilities and schools
5.	Diagram of the operation
6.	Nutrient storage description (for e.g. catch basins)
7.	Nutrient analysis of manure

Sources: OMAF, 2003a and 2003b.

Table 7: Components of a nutrient management plan

1.	Operation description
2.	Contingency plans
3.	Nutrient unit production listing all nutrients and the annual amount of production or the annual amount of nutrients received
4.	Crop rotations and manure application practices for all fields in crop production
5.	Diagram of the operation
6.	Nutrient storage description (for e.g. catch basins)
7.	Nutrient analysis of manure
8.	Landowner agreements to ensure that an adequate land base exists to spread manure

Sources: OMAF, 2003a and 2003b.

The Ontario Cattlemen's Association (OCA) has been providing detailed responses to the proposed regulations. One of the responses is that the OCA is concerned that OMAF enforcement officers may not have an understanding of generally accepted farming practices (OCA, 2003). The OCA states that winter manure spreading should continue in certain geographical areas. It also states that the required length of manure storage should be reduced. The OCA believes that free information should be available to beef producers so they can easily complete the NMS and the NMP.

4.2 EPP in Alberta and Ontario

4.2.1 Alberta environmentally sustainable agriculture program (AESA)

Alberta Agriculture, Food and Rural Development's (AAFRD) Conservation and Development Branch coordinates the Alberta environmentally sustainable agriculture program (AESA). This voluntary program pays for 75% of a producer's costs to implement environmental protection measures approved by the AESA (AAFRD, 2002). AAFRD also provides free extension services to assist in implementing these measures. Producers who wish to participate must submit a three-year plan for review by AAFRD. The four goals of the program are to increase soil and water quality, biodiversity, and to reduce greenhouse gas emissions.

The livestock industry is mainly involved in water quality improvement through proper nutrient, grazing, and riparian management. This includes nitrogen, phosphorus, and bacteria monitoring in ground and surface waters, fencing off waterways from cattle, and appropriate livestock densities for pasture conditions. The AESA also monitors soil and water quality across Alberta at independent sites. The testing is done to establish a benchmark across Alberta for soil and water quality.

In April 2003, the Alberta Environmental Farm Plan Company, a non-profit organization comprised of industry and government stakeholders, started providing workshops in EFP. As of September 2004, 300 such workshops had been held. Approximately $48.8 million was invested by the federal government in Alberta over a five-year period, with the provincial government providing an additional $32.6 million in in-kind support, to help the agriculture sector develop and implement EFPs. Those producers who complete an EFP under this program will be eligible to apply to the Canada-Alberta Farm Stewardship Program and Greencover Canada, cost-shared financial incentives that are in place to help implement BMPs.

4.2.2 Ontario environmental farm plans

The EFP was first launched in Ontario in 1993. The OMAF developed the Ontario EFP to be a voluntary environmental management system (OMAF, 2003d). The Ontario plan initializes the process by identifying farming practices that are environmentally sustainable. If producers want to implement an EFP they must participate in workshops. These workshops assist producers in identifying environmental risks around their farm site. This includes items such as ensuring that fuel tanks do not leak and making sure that well caps are at least three feet above ground. There are no provisions for nutrient management planning in the Ontario EFP. Essentially, the plan exists to minimize environmental risk at the farm site.

Producers are given the flexibility to adapt the recommendations to their own farming situation. Once a producer has attended the workshops and finalized his or her environmental plan it is submitted for peer review. The reviewers must approve the plan in order for the producer to claim he or she has an EFP. However, once that is completed there is no further environmental auditing. An approved plan garners a $1500 subsidy from the Ontario government.

From the launch of this initiative until April 2004, a total of $15 million was claimed by about 11,500 producers. Over 27,000 participants attended workshops held across Ontario to acquire the EFP Workbook. No more workshops were offered after April 2004 until the third edition EFP workbook is re-tooled.

The following sections present reactions of industry stakeholders to environmental stewardship, identifying where the industry perceives the potential benefits and costs would occur. Given the different size structure of operations in Alberta and Ontario, which may lead to a different incidence of costs, industry comments from these provinces are presented separately.

4.3 Cow-Calf producer reactions to environmental stewardship

4.3.1 Comments from Ontario

Most cow-calf operations have implemented the Ontario EFP. It is likely that the availability of the $1500 subsidy generated a high level of implementation. Cow-calf producers state they reaped some satisfaction from implementing a program that recognizes environmental stewardship.

The initial costs associated with implementing the plan include the time involved in attending workshops, completing the self-assessment of the operation, and developing an action plan for the farming operation. Items include incurring costs to ensure fuel tanks do not leak and raising well caps above ground level to ensure that possibly contaminated runoff does not contaminate wells. Vulnerabilities to ground and surface water are important considerations. Manure management is not a part of the Ontario EFP. There are no variable costs to maintain the plan. There is an initial monitoring cost because each EFP has to be submitted for peer review. However, once the plan is approved no further monitoring occurs. Cow-calf producers believe that if continuous third party monitoring was to occur in the future, it could be coordinated with the audits for OFFS.

Producers feel that it is unlikely that they will receive a premium for beef labelled as being produced in an environmentally friendly manner, however consumers may benefit from a reduction in information asymmetry. Some producers are unsure if a branding program could be coordinated with the CCIA system because it was originally designed as a traceback system rather than a system for ex ante quality verification. Producers feel that the benefits of implementing an EFP are more likely to be non-product market benefits. Local soil and water quality could improve due to program implementation.

The value of livestock operations could increase due to the presence of an EFP. Producers believe that the entire beef industry is increasing its efforts to provide environmental protection. The Walkerton tragedy has forced all links in the supply chain to spend more time and money on environmental protection. However there are concerns that the NMA is overly restrictive and will add significant capital and variable costs to every livestock operation in Ontario.

4.3.2 Comments from Alberta

Most cow-calf operations are not participating in the AESA but some have implemented a range of environmental protection measures. They include manure management plans and soil and water testing by an independent third party. They also include fencing off waterways to prevent livestock access and establishing buffer or filter strips between the waterway and grazing land to prevent nutrient and bacteria runoff into waterways. Some producers have made provisions to re-establish shelterbelts or replant trees where livestock have destroyed them and they continuously monitor livestock density on grazing land.

The majority of the noted items are capital costs. Initial costs are relatively high but variable costs are quite low. The only ongoing cost is continuous soil and water quality monitoring and some maintenance costs such as maintaining shelterbelts and filter strips. Some producers believe that soil and water quality monitoring could be coordinated with audits for OFFS in the future. It would probably be necessary to achieve program efficiencies in the future.

Producers are unsure if the conveying of environmental protection practices to beef consumers is warranted. However, it may allow Canadian beef to maintain its foreign market access. As with Ontario producers, it is felt that the benefits from implementing environmental protection measures are likely to be primarily non-product market benefits. Local soil and water quality should improve due to the environmental protection practices but producers believe it is unlikely that human health will improve. Some producers feel that environmental protection measures are necessary today to buy or sell livestock operations and that the entire beef industry will need to increase its efforts to provide environmental protection. Government monitoring costs may be reduced in the future due to the increasing level of due diligence practiced by the industry.

4.4 Feedlot operator reactions to environmental stewardship

4.4.1 Comments from Ontario

Some feedlot operators (approximately 20%) have implemented an OEFP as a requirement of the OCFB. Overall, approximately 60% to 70% of feedlots have implemented EFP. Operators may be more aware of potential environmental risks on their operation but some operators feel that their operations are no more environmentally friendly, than they were before plan implementation.

The initial costs include the time involved attending workshops, completing the operation self-assessment and developing an action plan for the farming operation. Capital costs are minimal to adhere to the OEFP however there are significant capital costs to adhere to Ontario's NMA. Operators may spend about ten hours a month monitoring the critical management procedures in their EFP. There is also an initial monitoring cost because the plan has to be submitted for peer review. No continuous third party monitoring occurs.

Feedlot operators do not perceive that there will be beef market benefits from implementing EFP but consumers could benefit from a reduction in information asymmetry. Some operators feel that EFP provide a few non-product market benefits. They may be more aware of potential environmental risks due to the training component of the EFP, however that does not necessarily mean that soil and water quality has improved around an operation.

Some feedlot operators believe that EFP have no effect on the value of a livestock operation. However, producers do receive personal satisfaction in implementing EFP for their operations. They believe it is necessary for the entire beef industry to increase its efforts to provide environmental protection. The due diligence practiced by the beef industry would likely result in cost savings for a government's environmental monitoring.

4.4.2 Comments from Alberta

Alberta feedlot operators believe environmental sustainability is crucial to remain viable. They also receive personal satisfaction from implementing an environmental stewardship program. Environmental stewardship practices include ground and surface water analysis, manure analysis, soil analysis, balancing crop rotations with manure management and ensuring proper manure application rates, timing, and incorporation. Some operations are composting manure to reduce manure transportation costs and to decrease road repairs. Additionally, some operations are adjusting feed rations to prevent excess phosphorus in manure. Some operations are landscaped on a clay base.

There are significant capital costs in landscaping an operation and establishing manure storage ponds and groundwater monitoring wells. There are also significant ongoing monitoring costs, composting costs, and taking the time to plan and incorporate nutrient management. There is an initial audit to obtain a feedlot license but there is no continuous independent third party monitoring although it may be possible in the future through the AESA program. Some feedlot operators feel that soil and water quality monitoring could be coordinated with audits for on-farm food safety in the future.

Some operators believe that conveying environmental stewardship practices to beef consumers will be necessary to maintain foreign market access in the future. Others believe that environmental stewardship does not affect the beef market. A premium for environmentally friendly beef is felt to be highly unlikely. In contrast, it is believed that the beef industry will have to document its environmental protection practices in the future to remain in business. It is likely that

livestock operations are now being discounted at the time of sale if the seller does not have documented and obvious environmental protection measures. Producers feel there are non-product market benefits from implementing environmental protection measures, such as improvements in local soil and water quality. Overall, the entire beef industry is increasing its efforts to provide environmental protection.

4.5 Conclusions regarding environmental stewardship

Several conclusions can be drawn based on the previously discussed interviews. Currently, both Alberta and Ontario have voluntary EFPs. Both programs offer a subsidy to entice beef producers to join the program. This subsidy may be justifiable for two reasons. Firstly, most beef producers in Alberta and Ontario do not believe there is any beef market benefit from implementing an EFP. Therefore, there is no market-driven incentive to participate in the program. A payment may be warranted to encourage participation. Secondly, most beef producers in Alberta and Ontario believe there are non-product market benefits or benefits to society. While beef producers do benefit from these non-product benefits, the local community receives several benefits such as improved surface and ground water quality, reduced odours and a possible increase in human health. An argument could be made that a beef producer subsidy is justified based on the societal benefits received from EFP implementation and the market failure that results if there are insufficient private market incentives to adopt an EFP. However it could also be argued from an environmental standpoint that the local community would be even better off if the beef operation did not exist in that community.

Increased environmental protection is being driven on three fronts. First, there are the aforementioned EFP. In both Alberta and Ontario these plans are designed to deal with environmental issues on farm sites. Manure management and nuisance concerns are being driven by legislation in both Alberta and Ontario. Second, The Nutrient Management Act (NMA) in Ontario and the Agricultural Operation Practices Act (AOPA) in Alberta both provide very detailed regulations regarding nutrient management and nuisance concerns. Ontario's NMA will probably be more stringent than Alberta's AOPA. The third driver is the federal APF. One of the five pillars of the APF is the environment (Agriculture and Agri-Food Canada, 2002). Based on the consultations to date, compliance with the environment pillar will be voluntary for beef producers. However, it is possible that if beef producers want to participate in federal risk management programs they will be required to participate in federal environmental programs as well.

Clearly there is a mix of voluntary environmental programs and mandatory environmental regulations. Provincial beef producer participation in Ontario's EFP is higher than in Alberta Environmentally Sustainable Agriculture. However, this does not mean that Alberta beef producers have not implemented voluntary environmental protection practices. It appears that a mix of voluntary programs and mandatory regulations will continue. Since beef producers do not believe there is a beef market benefit in implementing a recognized environmental program, incentives will be needed to encourage producers to join a recognized program. Beef producers have already implemented environmental protection measures they believe will ensure their operation's long-term viability.

Tables 8-10 are based on the conceptual framework for EFP that was used as a basis for the industry interviews. Some of the categories listed in the conceptual framework are not listed in Table 8 because the categories are not applicable to this industry. For example emission standards for beef operations do not exist. Tables 8-10 are a generalization of the findings in this chapter. They do not necessarily represent the viewpoint of every interviewee, rather it is the majority opinion of their comments.

Table 8: Potential benefits of environmental farm plans in beef production

DEMAND-SIDE BENEFITS	DESCRIPTION
<u>Domestic market</u>:	
Build consumer confidence	EFP may provide increased consumer confidence for some "eco-consumers." However according to beef producers these consumer benefits are highly questionable
Convey additional information (when used with identity preservation systems)	There is significant disagreement among beef producers as to whether market share could be affected by EFP. Additionally, producers who agree or disagree could be from any point in the beef supply chain. It also did not matter if producers were from Alberta or Ontario
<u>International markets:</u>	
Provide differentiation on the international market	Producers do not believe that Canadian beef can be differentiated on the basis of environmental stewardship alone. There may be an opportunity for Canadian beef that contains many attributes such as increased tenderness and specific animal welfare practices
Reinforce and develop trade networks	Given the small size of the benefits arising from EFP, trade networks will be unaffected
Facilitate trade by reducing non-tariff barriers	In some import markets, EFP may act to reduce barriers to trade by providing evidence of environmentally responsible production
SUPPLY-SIDE BENEFITS	**DESCRIPTION**
Improve efficiency in production	EFP are unlikely to have effects on efficiency
Reduce monitoring and enforcement costs	Monitoring costs will increase for the beef operation but will decrease for government
	Enforcement costs will be reduced in the event of prosecution or litigation because of the "due diligence" defense
	Environmental farm plans could lead to more favourable risk assessments by leading institutions, however industry stakeholders felt that the plans would not lead to lower insurance premiums

Source: Based on interviews with beef industry stakeholders.

Table 9: Potential costs of environmental farm plans in beef production

SUPPLY-SIDE COSTS	DESCRIPTION
Management costs:	
fixed – establishing the EFP	There are significant management costs for designing the plan
Mitigation costs:	
fixed – capital costs	These costs include modifications to a feedlot or other fixed investments. Beef producers state these costs will be minimal for EFP because they have already implemented environmental protection practices to comply with land use regulations and to ensure their operations' long term viability
	Significant capital costs are incurred to comply with land use regulations. This includes landscaping feedlots
variable	These costs are minimal for beef producers with EFP. These variable costs are essentially maintenance costs to maintain structures built to comply with environmental farm plans
	Significant variable costs are incurred to comply with land use regulations. This includes manure management
Monitoring costs:	
fixed	There is an initial audit to obtain a feedlot license in Alberta. Ontario EFP require an initial audit but not continuous, random audits
variable	There is no continuous monitoring for the OEFP or AESA
	There are significant monitoring costs incurred to comply with land use regulations. This includes manure management

Source: Based on interviews with beef industry stakeholders.

Table 10: The benefits and costs of environmental stewardship: institutional comparison

	ONTARIO		ALBERTA	
Benefits				
Reduce transaction costs for consumers	No	No	No	No
Build consumer confidence	Possibly	No	Possibly	No
Convey additional information	Possibly	No	Possibly	No
Provide differentiation on international markets	No	No	No	No
Facilitate trade by reducing NTBs	No	No	No	No
Reinforce and develop trade networks	No	No	No	No
Reduce monitoring costs	Not applicable	No	No	No
Reduce free-rider impacts	Not applicable	Not applicable	Not applicable	Not applicable
Reduce non-pecuniary benefit to producers	Yes	No	Yes	No
Reduce negative human health	Possibly	Possibly	Possibly	Possibly
Reduce negative impact on farm assets	Possibly	Possibly	Yes	Yes
Reduce nuisance	No	Possibly	Yes	Yes
Improve local ecosystem effects	Yes	Yes	Yes	Yes
	Voluntary EFP	Land use regulations	Voluntary EFP	Land use regualtions
Costs				
Planning costs				
fixed – establishing the framework	Significant	Significant	Significant	Significant
variable – revising policy	None	Significant (reoccurring)	None	Minimal
Monitoring costs				
fixed	Minimal	Significant	Minimal	Minimal
variable	None	Significant	Minimal	Minimal
Mitigation costs				
fixed – capital costs	Minimal	Significant	Minimal	Significant
variable	None	Significant	Minimal	Unknown
Segregation costs	Not applicable	Not applicable	Not applicable	Not applicable

Source: Based on interviews with beef industry stakeholders.

Chapter 5

Conclusions

The beef industry stakeholders interviewed believe there is market demand for OFFS in beef production. However some expect OFFS to decrease on-farm productivity and efficiency. This realization means that producers will need positive beef market signals to encourage widespread adoption of new OFFS.

Producers believe that the level of food safety should remain constant in Canadian beef production following the implementation of OFFS. While producers hope that beef product differentiation will develop in the future based on quality attributes, they do not advocate beef brands that differentiate their market positions based on beef safety. Most beef producers believe that new food safety systems could increase foreign market access.

Industry stakeholders do not believe there is market demand for environmental stewardship in beef production. However, they do expect environmental stewardship to be important in ensuring the long-term viability of their operations. Secondly, they believe that non-market benefits exist for the local community. It is unclear whether the desire of a local community for producers to practice environmental stewardship is consistent with producers' objectives for the long-term viability of their operations. As evidenced by the OEFP and Alberta's AESA, it may be necessary to provide financial incentives to producers to comply with voluntary environmental programs. Variable costs for environmental stewardship are low; therefore, only one-time initial subsidies may be required to promote environmental stewardship. Financial penalties might alternatively be applied in cases of non-compliance. Penalties are not likely to build positive attitudes toward environmental stewardship and a penalty system would also likely require closer monitoring.

There seem to be few complementarities between OFFS and EFP initiatives, except in the potential sharing of audit costs. The lack of synergies can be attributed to the belief that little market demand exists for EFP. Of concern is the belief that any market benefits arising from OFFS initiatives would accrue to others in the beef supply chain, and there would be little trickle down of benefits to those who incurred the costs. It is not clear which parties in the beef supply chain would be able to capture the benefits.

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OFFS survey for the beef industry[5]

APPENDIX A

INTRODUCTORY QUESTIONS

1. Please give a brief overview of the on-site food safety system at your level of the beef supply chain. This is not necessarily specific to your operation.
2. Do most operations at your level of the beef supply chain follow a program such as "Quality Starts Here?" Or are there programs specifically designed for a niche market? Or do most operations simply follow the law?
3. Are processors, retailers, or consumers demanding the implementation of a food safety system? In other words is the system necessary to continue doing business?

Costs

1. Are there management costs (fixed and variable) involved in establishing on-site food safety at your level of the beef supply chain? These are the costs to design the plan.
2. Are there compliance costs (capital and variable) involved in establishing on-site food safety? These are the costs to actually implement the plan.
3. Are there monitoring and enforcement costs (fixed and variable) involved in establishing on-site food safety? These are the costs involved to monitor food safety implementation but not the costs to actually implement the plan.
4. Is there any third party verification now? For example, auditors checking records or cattle handling facilities. Post-slaughter; are bruises, improper injection site lesions, and improper drug withdrawal times being traced by auditors?
5. Do you see any synergy between this program and environmental farm plans? Could third party auditors handle both?
6. Are any beef products currently labelled as "super-safe?" Are labelling costs incurred?
7. If there is "super-safe" labelling, do you see any synergy with the current CCIA system?
8. Do any operations at your level in the beef supply chain incur any product segregation costs due to on-site food safety?

5. *The following questions were based in the conceptual framework developed for this project. Further details of the conceptual framework can be found in Report #2 of this series "On-Farm Food Safety and Environmental Farm Plans: A Conceptual Framework for Identifying and Classifying Benefits and Costs"*

Benefits

Questions regarding benefits at your level in the beef supply chain:

1. Do you believe that an on-site food safety program allows an operator to realize greater operation efficiencies? Reduced input costs? Increased productivity? Reduced insurance costs?
2. Do you believe that an on-site food safety program reduces free-rider problems? For example, in the past, your operation may have implemented a detailed strategy for food safety but your neighbour did not. However your neighbour (the free-rider) promoted the safety of his or her product to be equal to yours in the past. Has this problem occurred and if it has, is it still continuing?

Questions regarding benefits for the entire beef supply chain:

1. Is the food safety program at your level in the beef supply chain coordinated with other food safety programs up and down the beef supply chain? Has the program strengthened the links in the supply chain?
2. Do you believe that an on-site food safety program at your level in the beef supply chain reduces product measurement costs at the retail level? An example would be reduced product testing.
3. Do you believe that an on-site food safety program at your level in the beef supply chain reduces logistic costs? For example if the entire supply chain adopts HACCP, are different links in the supply chain now more sensitive to other links' needs?
4. Do you believe that an on-site food safety program at your level in the beef supply chain reduces product legal liability costs?
5. Do you believe that an on-site food safety program at your level in the beef supply chain would reduce post-contamination costs? For example the system may allow quicker traceback thereby reducing costs.
6. Do you believe that an on-site food safety program at your level in the beef supply chain would maintain and enhance market access? Allow for product differentiation? Reduce non-tariff barriers such as import bans due to food safety concerns?
7. In what way does the beef consumer gain from the current food-safety program implemented? More information? Consumer confidence? Safer food?
8. Comments

EFP survey for the beef industry[6]

APPENDIX B

INTRODUCTORY QUESTIONS

1. Please give a brief overview of environmental protection measures at your level in the beef supply chain. This may not be specific to your operation.
2. At your level in the beef supply chain, are the current environmental protection practices higher than current environmental regulations? For example, do operations use the standards laid out in the Quality Starts Here program?
3. If the answer to question #2 is yes, are some beef consumers demanding environmental protection? Is the system necessary to continue doing business?

Costs

1. Are there planning costs (fixed and variable) involved in establishing environmental protection at your level in the beef supply chain? These are the costs to design the plan to adhere to environmental regulations or standards.
2. Are there mitigation costs (capital and variable) involved in establishing environmental protection at your level in the beef supply chain? These are the costs to actually implement the plan.
3. Are there monitoring and enforcement costs (fixed and variable) involved in establishing environmental protection at your level in the beef supply chain? These are the costs involved to monitor the environment but not the costs to actually implement the plan.
4. Is there any third party verification now? For example, auditors checking records, taking soil or water samples.
5. Do you see any synergy between this program and on-farm food safety? Could third party auditors handle both?
6. Are some beef products currently labelled as "environmentally friendly?" Are labelling costs incurred?
7. If there is environmental labelling, do you foresee any synergy with the current CCIA system?
8. Do any operations at your level in the beef supply chain incur any product segregation costs due to environmental protection practices?

6. *The following questions were based in the conceptual framework developed for this project. Further details of the conceptual framework can be found in Report #2 of this series "On-Farm Food Safety and Environmental Farm Plans: A Conceptual Framework for Identifying and Classifying Benefits and Costs".*

Benefits

Questions regarding benefits at your level in the beef supply chain:

1. Do you believe that operators generally feel better about themselves because they implemented an environmental protection program?
2. Do you believe that an environmental protection program reduces free-rider problems? For example, in the past, your operation may have implemented a detailed strategy for environmental protection but your neighbour did not. However your neighbour (the free-rider) promoted the environmental sustainability of his or her product to be equal to yours in the past. Has this problem occurred and if it has, is it still continuing?
3. Do you believe that an environmental protection program increases the value of cattle operations due to improved air quality and reduced nuisance concerns?
4. Do you believe that an environmental protection plan could lower insurance costs for the operation?

Questions regarding the entire beef supply chain:

1. Is the environmental protection program at your level in the beef supply chain coordinated with other environmental programs up and down the supply chain? Has the program strengthened the links in the supply chain?
2. Do you believe that an environmental protection program reduces the need for environmental protection enforcement by government officers?
3. Do you believe that an environmental protection program at your level in the beef supply chain maintains and enhances beef market access? Allows for product differentiation? Reduces non-tariff barriers such as import bans due to environmental protection practices?
4. In what way does the beef consumer gain from the current environmental protection program implemented? More information? Consumer confidence?
5. Do you believe there is a significant improvement in ecosystem effects such as water quality, soil quality, greenhouse gas reduction, and wetland habitat due to current environmental protection practices at your level in the beef supply chain?
6. Do you believe there is an increase in human health in the local geographical area due to current environmental protection measures?
7. Comments

Glossary of terms and list of abbreviations

APPENDIX C

Glossary

TERMS	DEFINITIONS
Demand-side effect	A benefit or costs that manifests itself by increasing or decreasing the demand for a product
Externality	Costs or benefits that flow between economic agents but that are not paid for in the market place
Free-ride	The ability to benefit from something without incurring the costs
Information asymmetry	When one party to a transaction (e.g. the seller) has more information than the other (e.g. the buyer)
Market benefit/cost	See Private benefit/cost
Market failure	When distortions prevent prices from accurately reflecting the true benefit or cost of a good, leading to a misallocation of resources (see externalities)
Non-market benefit/cost	See Public benefit/cost
Private benefit/cost	Benefits and costs for products that bought and sold in the marketplace
Public benefit/cost	Benefits and costs that flow between economic agents but that are not paid for in the market place (see externality)
Social benefit/cost	See Public benefit/cost
Supply-side effect	A benefit of cost that manifests itself by increasing or decreasing the supply of a product
Sunk costs/investments	Costs that cannot be recovered
Traceability	The ability to traceback a commodity through the supply chain, identifying where it came from
Transaction cost	The cost of carrying out an exchange, including search costs of gathering information, the costs of negotiating the transaction costs, the costs of monitoring product quality or actions of trading partners and the costs of enforcing the terms of the transaction

Abbreviations

AAFRD	Alberta Agriculture, Food and Rural Development
AESA	Alberta Environmentally Sustainable Agriculture Program
AOPA	Agricultural Operation Practices Act
APF	Agricultural Policy Framework
CCA	Canadian Cattlemen's Association
CCIA	Canadian Cattle Identification Agency
CFIA	Canadian Food Inspection Agency
CMP	Critical Management Procedures
EFP	Environmental Farm Plan programs
FSEP	Food Safety Enhancement Program
HACCP	Hazard Analysis, Critical Control Points
ILO	Intensive livestock operation
NMA	Nutrient Management Act
NMS	Nutrient Management Strategy
NRCB	Natural Resources Conservation Board
OCA	Ontario Cattlemen's Association
OCFA	Ontario Cattle Feeders Association
OCFB	Ontario Corn Fed Beef Program
OEFP	Ontario Environmental Farm Plan program
OFFS	On-Farm Food Safety programs
OMAF	Ontario Ministry of Agriculture and Food
QSH	Quality Starts Here Program
RFID	Radio frequency identification