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REPORT: Evaluation of the Control of Diseases in the Hog Industry (CDHI)

Office of Audit and Evaluation

Canada

The AAFC Evaluation Committee recommended this evaluation report for approval by the Deputy Minister on March 3, 2015.

Evaluation of the Control of Diseases in the Hog Industry (CDHI)

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Description of the Initiative

In 2007, AAFC announced a contribution of $76 million to combat disease and enhance prosperity and stability in the hog sector. The resulting Control of Diseases in the Hog Industry (CDHI) programming was delivered in two phases.

- Phase 1, the Circovirus Inoculation Program (CIP), provided assistance to minimize the overall potential effect of Porcine Circovirus Associated Diseases (PCVAD) from 2007-08 to 2009-10. Eligible producers received reimbursements through the CIP to partially offset the economic impacts of costs incurred from the virus existing within the Canadian hog herd, including diagnostic testing and vaccination costs.

- Phase 2 of the CDHI supported activities related to biosecurity, research and long-term disease risk management solutions, delivered by the Canadian Swine Health Board (CSHB) from 2008-09 to 2014-15.

Findings on Program Relevance

There was a strong rationale for governments and the agriculture and agri-food sector to assist the hog industry in combatting disease in the short and long-term. In the short-term, Phase 1 of the CDHI provided financial assistance to producers for the identification and mitigation of PCVAD. In the long-term, Phase 2 supported the development of an industry-led framework to achieve long-term health and stability of the Canadian hog herd through actions on three key pillars: biosecurity, research, and long-term disease risk management solutions.

Findings on Program Effectiveness

In Phase 1, the CIP achieved its intended outcomes: it supported the detection and inoculation against PCVAD, offset the costs of PCVAD diagnosis and vaccination for producers, and increased the health of the Canadian hog herd by helping control the outbreak through inoculation.

In Phase 2 of the CDHI, the immediate outcomes were fully achieved. Biosecurity and best management practices were enhanced in the hog industry through the development and implementation of the National Swine Farm-level Biosecurity Standard and the completion of 26 research projects relating to swine diseases. In addition, long-term disease risk management solutions were designed to respond to future disease outbreaks, and a surveillance system to monitor the health status of the Canadian hog herd was developed and implemented (i.e., the Canadian Swine Health Intelligence Network [CSHIN]).

As part of Phase 2, the CSHB, made progress toward achieving its intermediate outcomes but did not fully achieve them. Limited evidence was found confirming the widespread adoption of the Biosecurity Standard. The surveillance network has only been partially

adopted by its intended users.

The end outcome of Phase 2 was not achieved: a comprehensive and structured risk management framework was not established for the Canadian hog sector. Nonetheless, as a result of progress made through the CDHI, particularly with regard to biosecurity practices, the hog industry is better prepared to face disease threats.

Findings on Program Efficiency and Economy

The CDHI programs were administered economically and efficiently by AAFC. Phase 1 was found to be economical because few opportunities to further minimize costs were identified.

Findings on Program Design

Best practices from the CDHI that could be replicated in future programming with similar objectives included: early and sustained collaboration; coordination and communication between key organizations involved in animal health; supporting national leadership and coordination to bridge gaps across regional efforts; and, an industry-led collaborative model to deliver this coordination.

Although the CSHB model was effective throughout the duration of the CDHI, it did not prove to be financially sustainable, leading to a lesson learned that could be considered in the design and delivery of future initiatives with similar objectives. Several factors suggest that the model used to develop CSHB (i.e. providing funding to establish an organization) may have risks. By not providing funding that is gradient (i.e. decreasing over the years of a contribution agreement) or matched by industry, there exists a possibility that there will be limited accountability and sustainability beyond the funding cycles of the contribution agreements.

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

The evaluation of the Initiative for the Control of Diseases in the Hog Industry (CDHI) was undertaken by Agriculture and Agri-Food Canada's (AAFC) Office of Audit and Evaluation (OAE) as part of AAFC's five-year Departmental Evaluation Plan (2014-15 to 2018-19) and fulfills the requirements of the *Financial Administration Act (FAA)* and the Treasury Board *Policy on Evaluation* (2009).

Data collection for the evaluation was completed September 2014. The evaluation examined the relevance and performance of program activities associated with the two phases of the CDHI between 2007-08 and 2014-15. Phase 1 refers to the Circovirus Inoculation Program (CIP), which provided assistance to minimize the overall potential effect of Porcine Circovirus Associated Diseases (PCVAD) from 2007-08 to 2009-10. Phase 2 supported programs related to biosecurity, research, and long-term disease risk management solutions, delivered by the Canadian Swine Health Board (CSHB) from 2008-09 to 2014-15. Funding under Phase 2 expires on March 31, 2015.

1.2 EVALUATION METHODOLOGY

The evaluation addressed the five core issues defined in the Treasury Board *Policy on Evaluation* (2009) associated with the relevance and performance of the CDHI. Under relevance, the evaluation examined the need for the program, alignment with government priorities and the department's strategic outcomes, and alignment with federal and departmental roles and responsibilities. In terms of performance, the evaluation assessed effectiveness (achievement of expected outcomes, unintended outcomes), as well as efficiency and economy. Design and delivery issues and lessons learned were also examined as part of the evaluation.

The evaluation included the following data collection methods:

- ***Literature review and media scan:*** A review of literature and general documentation (e.g., AAFC and federal) was performed to explain program rationale, to address relevance issues, and to assess program effectiveness. Literature included peer-reviewed papers, and reports and websites of the CSHB, the Canadian Pork Council (CPC), as well as other national and international pork industry associations. These sources provided evidence on the need for the CDHI and other programs with similar goals to the CDHI. The media scan examined what the external views were on the connection between program objectives and societal and agricultural sector needs. This scan used keyword-based searches of the *Canadian Newsstand* database and the *Bibliothèque et archives nationales du Québec* database, to ensure appropriate regional coverage.

- ***Document, file and data review:*** Approximately 100 files were reviewed systematically across Phase 1 and 2 of the CDHI, focusing on financial and performance data to address performance issues. Documents, files and data

reviewed included:

- departmental performance reports (and other related AAFC reporting);
- administrative files (e.g., agreements, procedures);
- program work plans and progress/performance reports;
- financial statements/data;
- audits and external reviews;
- documentation on activities, including decision-making (e.g., meeting minutes, activity reports); and,
- data on outputs and outcomes (including websites).

- ***Key informant interviews***: A total of 31 key informants were interviewed, to provide insight on questions relating to relevance and performance of the program. This included 11 AAFC representatives (e.g., senior management and staff), and 20 external representatives (e.g., CSHB staff and board members, industry representatives, hog disease experts). Six interviews focused on Phase 1 and 25 interviews focused on Phase 2. Several key informants (KI) interviewed for Phase 2 also provided views on the need for and outcomes of Phase 1.

1.2.1 Limitations of the Methodologies

As factors existed outside of the control of the CDHI during the timespan of the initiative, such as new or emerging hog diseases, complementary provincial programs, and/or economic conditions affecting the income of hog producers, it was not possible to directly attribute all of the outcomes of the CDHI to program activities.

1.3 PROGRAM DESCRIPTION

1.3.1 Program Context

The term Porcine Circovirus Associated Diseases (PCVAD) describes the effects of a virus, also known as Porcine Circovirus 2,[1] which spread across most major hog production regions of Canada and internationally between 2002 and 2005.[2] At the time, producers, practitioners and governments did not have readily available tools to treat PCVAD and the virus severely affected the health and livelihood of the Canadian swine industry.

In early 2007, members of the CPC, private practitioners, and representatives from AAFC and the Canadian Food Inspection Agency (CFIA) formed a task team mandated to advise the Minister of Agriculture and Agri-Food Canada on what could be done to address PCVAD in the Canadian pork industry.[3] The task team recommended that an initiative to

[1] American Association of Swine Veterinarians (n.d). *A producer's guide to managing PCVAD*. Accessed from: http://www.aasv.org/aasv/documents/PCVADBrochure.pdf
[2] eBiz Profesionals Inc. (2010). "*Analysis of the economic and animal production impact of Porcine Circovirus Associated Disease (PCVAD) on the Canadian and North American pork industries."* Submitted to the Canadian Swine Health Board, Guelph, Ontario.
[3] AAFC. (2007). *National Porcine Circovirus II Associated Diseases (PCVAD)/Postweaning Multisystemic Wasting Syndrome (PMWS) Program Options Task Team Recommendations.*

control diseases in the hog industry be established to assist the Canadian pork sector both in the short and long-term to eradicate or manage PCVAD and other diseases. The recommendations formed the basis for the establishment of the CDHI by AAFC to combat disease and enhance prosperity and stability in the hog sector.[4]

1.3.2 Overview of Program Components

The CDHI programming was delivered in two distinct, overlapping components, identified as "Phases" and described below. The logic models for Phase 1 and Phase 2 are included in Annex A.

CDHI Phase 1 – Circovirus Inoculation Program, 2007-08 to 2009-10

The Circovirus Inoculation Program (CIP) was designed to provide Canadian hog producers with financial assistance to minimize the potential effect of PCVAD on the Canadian hog herd. AAFC reimbursed eligible producers up to 50% of the costs for clinical diagnosis and testing of PCVAD in their herd and up to 50% of vaccination costs incurred.[5]

The CIP ran from 2007-08 to 2009-10. As per the original Terms and Conditions, funding was provided to producers whose hog herds were affected with PCVAD between March 1, 2006 and December 31, 2008. The total value of applications received before the December 31, 2008 deadline was greater than the original CIP allocation. A revised Terms and Conditions extended the program from March 31, 2009 to November 30, 2009 to cover the additional claims submitted to the program and to allow for the inoculation of sows.

CDHI Phase 2, 2008-09 to 2014-15

The purpose of Phase 2 of the CDHI was to assist the Canadian pork sector in addressing PCVAD and other emerging diseases over the longer term through three program elements, biosecurity, research and long-term disease risk management solutions, also referred to as "pillars". The objectives of each pillar were as follows:

- Develop, implement and foster the adoption of a national standard of biosecurity and best management practices for the hog industry, targeting the containment or eradication of PCVAD and/or Postweaning Multisystemic Wasting Syndrome (PMWS).

- Fund research projects and provide an administrative structure to facilitate, coordinate and report on research related to PCVAD/PMWS and other emerging diseases within the Canadian hog herd.

[4] AAFC. (2008). *Departmental Performance Report 2007-2008*. Accessed from: https://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/inst/agr/agr00-eng.asp
[5] AAFC. (2008). *Circovirus Inoculation Program (CIP) – Program Information and Eligibility Criteria.*

- Develop, implement, deliver and maintain a framework that would lead to the establishment of long-term disease risk management solutions for diseases affecting the hog industry.

The CDHI, Phase 2 activities were delivered by a third-party organization, the CSHB, funded through a series of Contribution Agreements between AAFC and CSHB through the 2008-09 to 2014-15 fiscal years:

- 2008-09 to 2010-11
  - The original Contribution Agreement for Phase 2 expired on March 31, 2011. The first payment made to CSHB was in March 2009.

- 2011-12 to 2012-13
  - After delays in the implementation, Budget 2011 announced an extension of Phase 2 and existing funds to allow CSHB to complete its planned activities.[6] A second Contribution Agreement was signed in June 2011 that covered the period of April 1, 2011 to March 31, 2013.
  - There was the expectation that the organization would be self-sustainable by the end of this Contribution Agreement. Due to financial challenges in the industry, this objective was not met.
  - A total of $3 million dollars from 2012-13 Phase 2 funding was provided and is set to expire March 31, 2015.

- June 19, 2013 to November 30, 2013
  - AAFC and CSHB entered into a third Contribution Agreement for up to $500,000 in federal funding to cover the period of June 19, 2013 to November 30, 2013 to assist CSHB with transitioning from being fully federally-funded. [7]

- January 29, 2014 to March 31, 2015
  - AAFC entered into a fourth Contribution Agreement with CSHB, originally covering the period of January 29, 2014, to July 31, 2014 for four activities, specific to long-term disease risk management solutions. The intention was to ensure CSHB's key activities were salvaged, that an approach based solely on industry funding was identified to ensure the sustainability of the swine health file moving forward, and to manage the threat of the Porcine Epidemic Diarrhea virus (PEDv) through project-specific activities
  - Since then, two amendments were made to that Contribution Agreement, which was still ongoing at the time of this evaluation.
    - Amendment No. 1 provided up to $200,000 in additional federal funding to support a national coordination role, and a new expiration date of March 31, 2015.

[6] AAFC. (2011). *Departmental Performance Report 2010-2011.* Accessed from: https://www.tbs-sct.gc.ca/dpr-rmr/2010-2011/inst/agr/st-ts05-eng.asp
[7] AAFC. (2013). *Contribution Agreement for the Initiative for the Control of Diseases in the Hog Industry, Phase 2, between the Minister of Agriculture and Agri-Food Canada and the Canadian Swine Health Board*.

        - Amendment No. 2 provided up to $227,578 in additional federal funding for two new activities related to the auditing of truck wash facilities and transporters, also to be completed by March 31, 2015.
    - It should be noted that due to CSHB's lack of operational capacity, the organization entered into a Memorandum of Understanding with the CPC for the management of all the activities included in the Contribution Agreement for the period of January 29, 2014 to March 31, 2015.

1.3.3 Program Resources

The total financial allocation for the CDHI is $76 million. Approximately $27.2 million was originally planned for the CIP (Phase 1). An additional $6.0 million was transferred from Phase 2 funding to cover unpaid eligible claims submitted to the CIP before the December 31, 2008 deadline, for a total allocation of just over $33.2 million. The remaining funding allocated to Phase 2 was $42.8 million (Table 1).

The actual expenditures of the CIP totaled $32.4 million (Table 1), of which $31 million was directed to Vote 10 (Contributions) and the remaining $1.4 million to Vote 1 (Operating) and Employee Benefit Plans (EBP). Actual expenditures for Phase 2 were $29.9 million, which were almost entirely directed to Vote 10 (approximately $29.5 million), and $0.4 million for Vote 1 and EBP. Overall, for the two components combined, actual expenditures were $62.3 million, $13.7 million below the allocated $76 million.

Table 1 - CDHI resources, planned and actual, by Phase, 2007-08 to 2014-15

		Vote 1 and EBP [1, 2]		Vote 10		Total	
		Budget	Actual	Budget	Actual	Budget	Actual
Phase 1	Aug-07	$1,100,700	$600,329	$14,250,000	$14,250,000	$15,350,700	$14,850,283
	Sep-08	$1,113,200	$815,749	$13,227,973	$13,227,973	$14,341,173	$14,043,722
	Oct-09	$0	$3,413	$3,514,927	$3,514,927	$3,514,927	$3,518,338
	Sub-total	$2,213,900	$1,419,491	$30,992,900	$30,992,900	$33,206,800	$32,412,391
Phase 2[3]	Sep-08	$296,000	$26,088	$141,627	$121,212	$437,627	$147,300
	Oct-09	$240,000	$199,127	$3,959,573	$3,881,643	$4,199,573	$4,078,274
	Nov-10	$327,000	$191,632	$13,551,450	$6,287,528	$13,878,450	$6,479,160
	Dec-11	$0	$0	$9,227,858	$9,156,061	$9,227,858	$9,156,061
	2012-13	$0	$0	$12,072,142	$9,475,105	$12,072,142	$9,475,105
	2013-14	$0	$0	$1,000,000	$438,130	$1,000,000	$438,130
	2014-15	$0	$0	$2,000,000	$112,718 [4]	$2,000,000	$112,718
	Sub-total	$863,000	$416,847	$41,952,650	$29,472,397	$42,815,650	$29,889,244
Total		$3,076,900	$1,836,338	$72,945,550	$60,465,297	$76,022,450	$62,301,635

Source: Compiled from program sources:
[1] The Vote 1 and Employee Benefits Plans (EBP) Budget and Actuals includes salary, non-pay operating, and employees benefits plans, but excludes accommodations.
[2] The EBP fluctuates from year to year, the amounts included in the Budget and Actuals have been estimated at 20% of salary.
[3] The Vote 10 Actuals are net of Payables at Year-End (PAYE) that were not released to the Recipient, reflects transfers, and returned unused funds from the Recipient.
[4] The Vote 10 Actuals for 2014-15 are current as of February 6, 2015, and are not to be considered final.

2.0 RELEVANCE

2.1 NEED FOR THE PROGRAM

2.1.1 Rationale

A PCVAD outbreak started in the fall of 2004 in eastern Canada and spread across the western provinces, affecting 75-100% of hog farms in pork producing regions by 2007.[8,9,10] Mortality and morbidity from PCVAD ranged considerably across affected herds and regions (e.g., 5-50%).[11] Overall mortality rates in the Canadian herd increased from 5% in 2000 to 9% in 2006.[12]

A study on the economic impact of PCVAD on the Canadian and North American pork industries estimated the direct economic losses associated with this disease at $560 million from 2004 through 2009.[13] The PCVAD outbreak caused net losses for producers by reducing the number of hogs they could bring to market (i.e., lost revenue) and by increasing their costs (e.g., veterinary fees, vaccination, repopulation of barns), but did not result in any trade or price disruptions (e.g., barriers for access to international markets, reduced consumer demand).[14] Reports in the Canadian regional and national media outlets indicate that, because of hog mortality caused by PCVAD, hundreds of producers faced financial ruin and pork processors laid off hundreds of staff.[15,16] By 2006, pork producers requested aid and access to vaccines from provincial and national governments to help them control the PCVAD outbreak and reduce its impact on the industry.[17,18]

The rationale for a national response to PCVAD and other emerging diseases was based on the negative economic impact of these diseases on the hog industry, which contributes billions of dollars to the Canadian economy. The hog production sector is an important source of employment and of revenues from local and international markets.[19] At program inception, there were approximately 11,500 pork producers and over 15 million hogs in the

[8] Poljak, Z., Dewey, C.E., Rosendal, T., Friendship, R.M., Young, B., & Berke, O. (2010). Spread of porcine circovirus associated disease (PCVAD) in Ontario (Canada) swine herds: Part I. Exploratory spatial analysis. BMC Veterinary Research, 6:59.
[9] Desrosiers, R. (2007). Overview of PCVD - The Disease in Eastern Canada & US vs. Europe. *Advances in Pork Production*. 18: 35-48
[10] Harding, J.C.S. (2007). History of Porcine Circoviral Disease (PCVD) and Current Western Canadian Situation. *Advances in Pork Production*. 18: 27-32.
[11] Kelwin Management Consulting. (2010). *A Case Study of the response to the emergence of Porcine Circovirus Associated Disease (PCVAD) within the Canadian pork industry*. Prepared for the Canadian Swine Health Board.
[12] Statistic Canada. (2008). *Hog Statistics; Fourth Quarter 2008*. Catalogue No. 23-010-X. Cited in AAFC. (n.d.). *Circovirus Program (CIP) Final Performance Report*.
[13] eBiz Profesionals Inc. (2010). *Analysis of the economic and animal production impact of Porcine Circovirus Associated Disease (PCVAD) on the Canadian and North American pork industries.* Submitted to the Canadian Swine Health Board.
[14] *Ibid.*
[15] Côté, Charles. (November 29, 2005). "Première baisse de la production en 15 ans." *La Presse*, Montreal, Quebec.
[16] Shypula, Brian. (March 26, 2006). "Virulent new strain of common pig virus is wreaking havoc on Ontario herds." *The Canadian Press Toronto Star,* Toronto, Ontario.
[17] Bleser, Joshua. (Sept. 19, 2006) "Pork producers want emergency aid." *The Record*, Sherbrooke, Quebec.
[18] Canadian Press. (April 8, 2006). "Virus hits hog farms." *The Intelligencer*, Belleville, Ontario.
[19] Ontario Pork. *2013 Pork Industry Profile*. Accessed from: http://www.ontariopork.on.ca/Portals/0/Docs/About/industry/Industry_Profile_2013.pdf

Canadian herd.[20] Canadian farms received between $3 and $4 billion per year in cash income from the sale of hogs over the course of the program (2007 to 2013),[21] with pork exports reaching nearly $3 billion in 2011.[22]

The PCVAD outbreak was one of several causes that led to a crisis in the Canadian hog industry, which resulted in a 36% reduction in the number of hog farms and a 16% decrease in the herd between 2006 and 2011.[23] The PCVAD outbreak occurred at a time when the hog sector faced numerous challenges including other diseases (e.g., porcine reproductive and respiratory syndrome [PRRS]), declining hog prices, global pressures that increased the cost of oil and feed, a strong Canadian dollar, the cost of international country-of-origin labelling, and a loss of market confidence in Canadian pork associated with the incorrectly called "swine flu" (influenza A; H1N1).[24] In this context, most operators did not have the capacity to absorb the vaccination costs for PCVAD.[25]

2.1.2 Responsiveness of CDHI to Agriculture Sector Needs

In consultation with a PCVAD task team composed of industry, private practitioners and other government stakeholders, AAFC established the CDHI program in 2007. The CDHI responded to the PCVAD outbreak in the short-term, and sought to assist the hog industry in managing and mitigating the impacts of new and emerging diseases in the Canadian hog industry in the long-term. The establishment of the CDHI was based on the five recommendations made by the PCVAD task team[26]:

1. Allocation of funds to an inoculation strategy that would provide short-term financial assistance to Canadian hog producers that were affected by PCVAD. It was recommended that a federal government agency deliver the program.
2. A management body to provide strategic direction, coordinate, and manage the development and delivery for three program elements (i.e., biosecurity, research, surveillance/long-term strategy). This body would be guided by a Board of Directors consisting of Canadian hog industry, government representatives and veterinarians.
3. Allocation of funds to develop, implement and foster the adoption of a national biosecurity and best management practices standard for the Canadian hog industry.
4. Allocation of funds to finance research projects related to PCVAD and other emerging diseases in Canada.
5. Allocation of funds to manage and mitigate impacts, through surveillance and emergency response, of new and emerging diseases in the Canadian hog industry.

By supporting producers' access to an effective vaccine, the CIP addressed the short-term

[20] Statistics Canada. (2014). *The Changing Face of the Canadian Hog Industry*. Accessed from: http://www.statcan.gc.ca/pub/96-325-x/2014001/article/14027-eng.pdf
[21] Statistics Canada. (2014). *Farm Cash Receipts*, CANSIM Table 002-0111.
[22] Statistics Canada. (2014). *The Changing Face of the Canadian Hog Industry*. Accessed from: http://www.statcan.gc.ca/pub/96-325-x/2014001/article/14027-eng.pdf
[23] *Ibid.*
[24] *Ibid.*
[25] eBiz Profesionals Inc. (2010). *Analysis of the economic and animal production impact of Porcine Circovirus Associated Disease (PCVAD) on the Canadian and North American pork industries.* Submitted to the Canadian Swine Health Board.
[26] AAFC (2007) *National Porcine Circovirus II Associated Diseases (PCVAD)/Postweaning Multisystemic Wasting Syndrome (PMWS) Program Options Task Team Recommendations.*

need identified by the task team by providing an appropriate means to control the spread of the PCVAD and to contain its potential negative effects.

To address longer-term needs identified by the task team, Phase 2 of the CDHI supported the creation of the CSHB, which provided strategic direction, coordinated, and managed the remaining three program elements of the CDHI. The CSHB was established in 2008, after the PCVAD outbreak, as an industry-led national coordination body to improve the capability of the Canadian hog industry to prevent and control future emerging diseases. When Phase 2 of the CDHI was announced, hog industry associations praised the program's responsiveness to "urgent" industry needs, to enable them to "react swiftly to emerging animal health challenges" and "to make sure the right tools are available to keep diseases from affecting the Canadian swine population."[27] Phase 2 was appropriate because it responded to industry needs, specifically: [28,29]

- to enhance disease prevention measures through the development and implementation of a biosecurity standard for the hog industry;
- to develop and share knowledge about swine diseases through research; and,
- to help industry respond in the event of new disease outbreaks through surveillance and other emergency response measures.

The three program elements of Phase 2 of the CDHI (biosecurity, research, and long-term disease risk management solutions) were designed to address each of these specific needs.

2.1.3 Presence of Comparable Programs and Remaining Gaps

The CIP addressed industry needs by filling a gap: there were no existing efforts to provide pork producers with financial assistance to offset the costs of PCVAD diagnosis and vaccination. There were indications that Québec, Manitoba and Ontario considered programs to support access to PCVAD vaccinations, but no comparable provincial vaccination programs were implemented and no other sources of support to finance diagnostic testing and vaccinations were identified.

Excluding vaccination programs, programs to assist producers in responding to PCVAD and other emerging hog diseases existed in some provinces (e.g., in Québec and Manitoba) but none were found at the national level that dealt with the three pillars addressed under Phase 2. Stakeholders perceived a lack of national coordination and leadership for emerging swine disease issues prior to the CDHI.[30] In the absence of Phase 2 of the CDHI, the longer-term needs of the pork industry regarding emerging diseases would not have been addressed adequately or would have taken longer to address. In this context, Phase 2 of the CDHI directly addressed the gap for national

[27] Canadian Pork Council. (March 30 2009). *CPC Confident Announcement Will Enable the Industry to Proactively Address Animal Health Challenges*. News Release. Accessed from: http://www.cpc-ccp.com/news.php?rev=e&ID=113&article=1&year=2009&da=1&incl=0
[28] Ernst & Young. (2012). *Canadian Swine Health Board Performance Assessment Final Report.*
[29] Kelwin Management Consulting. (2010). *A Case Study of the response to the emergence of Porcine Circovirus Associated Disease (PCVAD) within the Canadian pork industry*. Prepared for the Canadian Swine Health Board.
[30] Ernst & Young. (2012). *Canadian Swine Health Board Performance Assessment Final Report.*

coordination to link the variety of separate efforts related to swine health across provinces.

2.1.4 Continuing Industry Needs

The Canadian hog industry continues to face emerging swine disease threats, which require ongoing efforts to control the risks and mitigate their economic impacts.[31,32] In the past 10 years, new diseases have been detected in the Canadian hog herd, not only PCVAD, but also porcine reproductive and respiratory syndrome (PRRS) and Porcine Epidemic Diarrhea (PED). A recent review[33] found that the economic and health risks associated with these and other emerging and/or new swine diseases are on the rise, and the Canadian hog industry considers itself increasingly vulnerable to these threats.

In 2014, hog industry stakeholders were unanimous in the opinion that swine health remained a critically important issue.[34] There was an ongoing need for mechanisms to help industry detect and manage current and anticipated swine disease threats in a timely and effective manner in order to support the long-term viability of the Canadian hog industry.

Federal funding for Phase 2 of the CDHI will expire on March 31, 2015. The funding was extended through multiple Contribution Agreements between AAFC and CSHB. The intention of extending federal funding was to assist the organization in transitioning away from being fully federally-funded through the development of a sustainable model for the future management of swine health issues; to maintain the herd health surveillance capacity developed by CSHB, specifically the Canadian Swine Health Intelligence Network (CSHIN); and avoid PED through project-specific activities. The extension was based on multiple factors, but mainly, the organization's inability to achieve financial sustainability by March 31, 2013 (the original expiration date). At the time of this evaluation, there was no equivalent group in place tasked specifically to oversee national coordination efforts relating to swine health. A concern shared by industry and government stakeholders was that without the CSHB or an equivalent body, most efforts to address these needs would revert back to the approach that existed before the CDHI, in which actions occurred primarily within provinces, without adequate national coordination and knowledge sharing. The agreement that will expire on March 31st had a number of objectives including the establishment of a model for the management of swine health issues that is sustainable by industry resources, establishing a long term self-sustaining plan for CSHIN surveillance network and actions designed to avoid the spread of diseases, including PED.

At the time of the preparation of this report, CPC had engaged a part-time national health coordinator and had a financial commitment from its provincial pork boards to continue to resource the coordination of animal health activities, with the intent that this individual would fill the national coordination and knowledge sharing role previously undertaken by CSHB. The CPC, with this coordinator, has been actively working on projects specifically

[31] Ernst & Young. (2012). *Canadian Swine Health Board Performance Assessment Final Report.*
[32] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.
[33] Ibid.
[34] Ibid.

intended to limit the spread of disease, including PEDv. With respect to CSHIN, a newly formed producer-led organization in Western Canada has taken over some of CSHB's responsibilities, focusing on capturing surveillance information, with the intent of eventually bridging the gaps between the Western, the Ontario and the Quebec systems, thereby creating a national surveillance system. As part of the last amendment to the contribution agreement, the Federal Government has contributed to the cost of the necessary licence transfers from CSHB to CPC's Manitoba Pork Board, bringing the plan of an industry-led surveillance strategy into reality. In addition, the Federal Government has financially contributed to the development of an electronic application to facilitate the entry of data by veterinarians into the system. Therefore, there are plans in place to ensure the key activities of CSHB continue in the industry.

2.2 ALIGNMENT WITH GOVERNMENT PRIORITIES

Alignment with Federal Government Priorities

At the time of program implementation, one of the federal government priorities was to enhance the economic competiveness of the agricultural sector. Federal Budgets[35] and Speeches from the Throne[36] make references to building a profitable agricultural sector and to aid in the development of measures that enable farmers to proactively manage risks. The CDHI program objectives were consistent with this priority and with the Government of Canada's Strong Economic Growth outcome as a healthy Canadian hog herd contributes to the prosperity, stability and competitiveness of the sector.[37]

During the CDHI program, the federal government also made several commitments to address disease control and mitigation in the hog industry, including renewed support for the CDHI in the 2011 Budget,[38] and by implementing programs that support traceability regulations for hogs.[39] These sustained investments show that support for the hog industry continues to be a federal government priority.

Alignment with Departmental Priorities

Comparing AAFC strategic outcomes and CDHI objectives during the course of the program found a direct alignment between the programs' aims and departmental priorities. Both Phases of the CDHI were established as part of the Business Risk Management program activity, under AAFC's Strategic Outcome "Security of the Food System": "A secure and sustainable agriculture and agri-food system that provides safe and reliable food to meet the needs and preferences of consumers."[40] The CDHI program supports

[35] Government of Canada. (2009). *Canada's Economic Action Plan; Government of Canada.* (2009). *The Next Phase of Canada's Economic Action Plan. A Low-Tax Plan for Jobs and Growth*.
[36] *Speech from the Throne (2006)*. Accessed from: http://www.parl.gc.ca/Parlinfo/Documents/ThroneSpeech/39-1-e.html
[37] AAFC. (2008). *Departmental Performance Report 2007-2008*. Accessed from: https://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/inst/agr/agr00-eng.asp
[38] Government of Canada. (2011). *A Low-Tax Plan for Jobs and Growth*. Tabled in the House of Commons by the Honourable James M. Flaherty, P.C., M.R., Minister of Finance.
[39] AAFC. (2013). *Departmental Performance Report 2012-2013*. Accessed from: http://www5.agr.gc.ca/resources/prod/doc/pdf/dpr-rmr_2012-13_eng.pdf
[40] AAFC. (2008). *Departmental Performance Report 2007-2008*. Accessed from: https://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/inst/agr/agr00-eng.asp

AAFC, producers and organizations in the development and implementation of food safety, biosecurity and traceability risk management systems to prevent and control risks to the animal and plant resource base, thus strengthening the sector against widespread diseases and losses in domestic and foreign markets.[41]

2.3 ALIGNMENT WITH FEDERAL ROLES AND RESPONSIBILITIES

There was an appropriate and necessary role for the federal government and AAFC in the CDHI program as swine diseases negatively affect hog producers across the country and involve both animal health and economic considerations, including farm income and trade. Programs that address animal health and related economic considerations are aligned with federal government jurisdiction and responsibilities, and with AAFC's mandate. AAFC's work is concentrated in "areas of core federal jurisdiction, including supporting agricultural and agri-food productivity and trade, stabilizing farm incomes, and conducting research and development."[42]

In addition to AAFC, other federal departments and agencies participated in CDHI in accordance with their federal roles and responsibilities. The CFIA provided expertise to help inform CDHI programming in accordance with this agency's federal roles and responsibilities relating to biosecurity and disease surveillance. CFIA representatives were members of the PCVAD task force, sat on CSHB advisory committees, and provided input on annual work plans. The CFIA's participation in the CDHI was primarily in an advisory capacity because the agency's mandate is constrained to surveillance for and response to federally reportable diseases listed in the *Reportable Disease Regulations;* because PCVAD and other new or emerging diseases targeted by the CDHI (e.g., PRRS, PED) are not federally reportable, they are not under the explicit mandate of the CFIA.[43] PCVAD and most other swine diseases do not pose a risk to human health (i.e., they are non-zoonotic); emerging zoonotic diseases found in swine (e.g., sub-types of influenza) fall under the federal public health mandate of the Public Health Agency of Canada.

2.3.1 Complementary Role of Provincial/Territorial and Industry Organizations

Agriculture is a shared jurisdiction with provinces/territories, and industry plays an active and necessary role in developing and implementing sound risk management strategies for hog diseases, but the specifics of the responsibilities held by these stakeholders are evolving and often unclear.[44]

Provincial and industry organizations played a complementary rather than a duplicative role in the CDHI, often through direct participation in CDHI activities.[45] Provincial

[41] Government of Canada. (2013). 2013-14 Reports on Plans and Priorities: Agriculture and Agri-Food Canada. Retrieved from: http://www.agr.gc.ca/eng/about-us/planning-and-reporting/reports-on-plans-and-priorities/2013-14-reports-on-plans-and-priorities/?id=1360279926085#s1.3
[42] AAFC. (2008). *Departmental Performance Report 2007-2008*. Accessed from: https://www.tbs-sct.gc.ca/dpr-rmr/2007-2008/inst/agr/agr00-eng.asp
[43] AAFC. (2007). *National Porcine Circovirus II Associated Diseases (PCVAD)/Postweaning Multisystemic Wasting Syndrome (PMWS) Program Options Task Team Recommendations.*
[44] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.
[45] CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31,*

organizations gave financial support to producers to address issues related to swine health to encourage the implementation of measures developed as part of Phase 2 of the CDHI (e.g., biosecurity) within their province. Duplication with provincial or industry efforts for Phase 2 of the initiative was avoided by the CSHB through the use of gap reports, which identified existing programs across the country and provided recommendations for actions for each of the three Phase 2 pillars. Based on the gap reports, CSHB programming was designed to fill the identified gaps and to build on existing initiatives, to avoid overlapping with them.

2013.

3.0 PERFORMANCE

3.1 ACHIEVEMENT OF EXPECTED OUTCOMES

This section of the report examines the effectiveness of the CDHI. Achievement of expected outcomes for Phase 1 and Phase 2 are analyzed separately, given that they had distinct outputs, outcomes and timeframes. The logic models for Phase 1 and Phase 2 are presented in Annex A.

3.1.1 Phase 1

3.1.1.1 Overview of CIP Outputs

The outputs of the CIP were payments to producers for diagnostic testing for PCVAD and for vaccination following a positive PCVAD diagnosis. Payments to partially offset diagnostic testing and vaccinations costs for PCVAD were made to approximately 1,950 eligible producers via nearly 3,700 approved applications[46] (i.e., there were multiple applications per producer, as per the program's guidelines[47]). Of those 1,950 producers, 1,900 (98%) received a payment for testing and 1,840 (97%) also received payment for vaccinations following a positive PCVAD diagnosis.[48] In total, $31 million in payments to eligible hog producers were processed by AAFC through the CIP: $400,000 to offset eligible diagnostic testing costs, and $30.6 million – or 99% of the total payments – to offset eligible vaccination costs.[49]

3.1.1.2 Immediate outcomes: Detection of PCVAD within the Canadian hog herd and inoculation of the Canadian hog herd against PCVAD

The assessment of whether the CIP met its immediate outcome of detection of PCVAD within the Canadian hog herd was based on the proportion of hog producers who participated in the CIP. The participation rate of eligible hog producers in the CIP was lower than expected: less than 45% compared to the 50-60% target.[50] The target was set in 2007 using the number of Canadian hog producers as a proxy for the size of Canadian hog herd, but the number of hog farms and of hogs in the herd declined 36% and 16%, respectively, from 2006 to 2011.[51] Due to these changes, this target was not a reliable indicator of the detection of PCVAD within the hog herd. Although this target was not met, this does not mean the outcome was not achieved; other lines of evidence were used to more adequately assess whether the CIP achieved this outcome.

Because the CIP only provided reimbursement for vaccination costs to producers who

[46] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[47] Producers could claim benefits for a positive diagnostic test and for vaccinations on the same form, or they could apply for diagnostic testing and vaccination elements separately. Applicants were also required to submit separate application forms for every infected herd. Source: AAFC. (2008). *Circovirus Inoculation Program Application Form*. PRFA/ARAP 7300-E (2008/01)
[48] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[49] AAFC program documents.
[50] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[51] Statistics Canada. (2014). *The Changing Face of the Canadian Hog Industry*. Accessed from: http://www.statcan.gc.ca/pub/96-325-x/2014001/article/14027-eng.pdf

could provide diagnostic evidence of PCVAD in their herd, evidence of the uptake of vaccination through the CIP can be used to determine if the program achieved both immediate outcomes: the detection of PCVAD within the Canadian hog herd and the inoculation of the herd against PCVAD. More animals were vaccinated through the CIP than originally anticipated. When the CIP was created in 2007, it was estimated that about 21 million animals would be vaccinated through the program. In total, approximately 1.4 million eligible breeding animals (estimated at 87% of the breeding stock) and over 42 million piglets were vaccinated against PCVAD during the CIP.[52] This is higher than the number of pigs that existed in Canada at any one time because producers could vaccinate successive cycles of piglets between March 1, 2006 and December 31, 2008 to protect multiple generations or cohorts of animals from the disease.[53]

Almost all eligible producers (97%) who were reimbursed for PCVAD diagnostic tests through the CIP also applied for and were reimbursed for vaccination costs; this rate surpassed the target of 90%.[54] The high level of uptake of the PCVAD vaccination through the CIP supports the conclusion that the program achieved the immediate outcomes of detection of PCVAD and inoculation of the majority of hogs across Canada.

Two key factors contributed to the achievement of these outcomes by stimulating industry uptake of vaccination and diagnosis testing for PCVAD through the CIP. First, the vaccine was remarkably effective at controlling the spread of PCVAD, so producers were motivated to vaccinate their herd when their herd tested positive. Second, because many hog producers were experiencing economic difficulties at the time of the PCVAD outbreak, they were more likely to apply for financial assistance from AAFC to minimize the economic impact of the costs associated with controlling this disease.

3.1.1.3 *Intermediate outcome: Negative economic impact of PCVAD inoculation is reduced*

CIP payments were expected to reduce the negative economic impact of inoculation for PCVAD by offsetting hog producers' costs associated with controlling this disease (i.e., detection and vaccination costs). The program did not aim to reduce other negative economic impacts associated with the disease (e.g., lost revenue due to hog mortality).

The evaluation found that CIP payments to offset diagnostic testing and vaccination costs reduced the economic impact of PCVAD inoculation for producers. The CIP provided $31 million to 1,900 eligible hog producers, which offset an estimated 40-50% of the cost of diagnostic testing, and about half of vaccination costs incurred by these producers.[55] An analysis of PCVAD's economic impact on the Canadian hog industry stated that the expenditure of public funds to support the vaccination program were essential because the industry's financial position did not allow most operators to absorb that level of costs.[56]

[52] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[53] At any given time, there are approximately 13 million marketable pigs in Canada. Based on the number of piglets vaccinated, it could be assumed that the program helped to vaccinate approximately 3.3 cycles of Canadian piglets. Source: AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[54] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[55] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[56] eBiz Profesionals Inc. (2010). *Analysis of the economic and animal production impact of Porcine Circovirus Associated Disease (PCVAD) on the Canadian and North American pork industries.* Submitted to the Canadian Swine

3.1.1.4 *Intermediate Outcome: Early detection of concentrated areas of PCVAD*

The CIP was expected to contribute to early detection of concentrated areas of PCVAD through mapping of data on positive diagnostic tests submitted in CIP applications. By using these maps to identify higher concentrations of the disease and collect baseline data as to its spread, the CIP was expected to contribute to future surveillance of PCVAD in the hog herd.

A series of maps tracking the spread of PCVAD from 1999 to 2008 were produced through the CIP based on the application data provided by producers.[57] These maps provided baseline data, showing the PCVAD outbreak began in 2004, with the first cases occurring on farms in Ontario and Quebec before spreading across the country in 2005. The highest numbers of farms reporting the disease from 2004 to 2008 were observed in provinces that had the largest hog herds,[58] which were also the provinces that submitted the most applications to the CIP.

This mapping exercise was seen as an innovative approach capable of demonstrating the spread of the disease across the country during the outbreak, but the data included in these maps was limited. The maps showed the number and location of farms reporting positive diagnoses to the CIP, but did not provide detailed information on infection rates (e.g., number or proportion of hogs infected), nor did they include data on farms that did not apply to the program or that extended beyond the CIP's eligibility period (i.e., after 2008). Due to the absence of a country-wide hog disease surveillance system at the time of the outbreak, data on PCVAD infection rates was not available.

Despite these limitations, the maps helped track the spread of disease across the country and identified areas of high concentration during the CIP. After the end of the program, these maps were not used for future surveillance of the hog herd. Instead, a surveillance network was designed and implemented in 2013 as part of Phase 2 of the CDHI to detect and monitor a range of swine diseases, as discussed in later sections of this report.

3.1.1.5 End outcome: Increased health of the Canadian hog herd

The end outcome of the CIP was the increased health of the Canadian hog herd by reducing the disease incidence and number of hog mortalities associated with PCVAD. According to AAFC data, the number of farms reporting PCVAD sharply decreased after the CIP was implemented: from 304 farms reporting PCVAD in 2006, to 135 farms in 2007 and 2 farms in 2008.[59] Overall pig deaths and condemnations, which include mortality from causes other than PCVAD, fell to pre-PCVAD levels of approximately 5% in 2007, from a high of 9% in 2006,[60] and remained at about 5% from 2008 to 2012.[61] It was widely reported that effective and widespread vaccination was the solution that controlled the spread of PCVAD in the herd: "the only tangible response [to the PCVAD outbreak] was the immediate success of the vaccine once it was available".[62] This evidence supports the

Health Board.
[57] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[58] Statistics Canada. (2014). *Hog inventories*. Accessed from: http://www.statcan.gc.ca/daily-quotidien/140305/t140305a002-eng.htm

conclusion that the CIP achieved its end outcome by helping control PCVAD through inoculation of the majority of Canadian hogs with an effective vaccine.

The program was successful in establishing the diagnosis and vaccination for PCVAD as a standard practice in the industry, which has contributed to maintaining the health of the herd since the end of the CIP. Although PCVAD cases continue to be reported across the country, veterinary data from 2013 and 2014 demonstrate that the prevalence of this disease remains below the levels observed during the 2004-2007 outbreak. Veterinarians reported that the disease continues to be effectively controlled in properly vaccinated herds.[63]

3.1.2 Phase 2

3.1.2.1 Overview of Activities/Outputs

For Phase 2 of the CDHI, AAFC's planned activities were to support the hog industry in the development, design and structure of the CSHB and to negotiate an agreement for its creation. The target for these activities was to have the CSHB in place by September 2008 to organize and implement the three program elements of Phase 2 (referred to as "pillars"), including establishing coordinators and advisory committees for each pillar. The three Phase 2 pillars are: biosecurity; research; and, long-term disease risk management solutions.

With the support of AAFC and the CPC, the CSHB was developed and established by the hog industry as the third-party delivery agent for Phase 2. As part of this activity, the CSHB was incorporated in November 2008 as a non-government organization led by industry stakeholders with the mandate of providing leadership, coordination and support in the management of the health of the Canadian swine herd. CSHB's three pillars and the CSHB's management and governance structures were established as defined by the Contribution Agreements between the CSHB and AAFC. Each pillar was led by an advisory committee composed of representatives from AAFC, CFIA, industry and veterinary groups; these pillars were overseen by the CSHB's Board of Directors and supported by CSHB staff.[64] These management and governance structures were established over one year after the original target dates, by December 2009 instead of by September 2008.

These activities led to two outputs: first, the signature of a first Contribution Agreement by the CSHB and by the Minister of Agriculture and Agri-Food in March 2009, and second,

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[59] AAFC. (1999-2008). *Static Maps of Farms Reporting Circovirus Incidences*. It should be noted that that no documentary evidence was found on mortality rates associated specifically with PCVAD.
[60] Statistic Canada. (2008). *Hog Statistics; Fourth Quarter 2008.* Catalogue No. 23-010-X. Cited in AAFC. (n.d.) *Circovirus Program (CIP) Final Performance Report*.
[61] Statistics Canada. (2013). Hog Statistics. Accessed from: http://www.statcan.gc.ca/pub/23-010-x/2010001/t032-eng.htm and http://www.statcan.gc.ca/pub/23-010-x/23-010-x2012003-eng.htm
[62] eBiz Profesionals Inc. (2010). *Analysis of the economic and animal production impact of Porcine Circovirus Associated Disease (PCVAD) on the Canadian and North American pork industries.* Submitted to the Canadian Swine Health Board.
[63] CSHIN. (2014). *Swine Veterinary Network - Clinical Impressions Summary*.
[64] CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*

the provision of funding to the CSHB for administration and program elements for the duration of the program. AAFC provided funds for the CSHB through a series of Contribution Agreements to support the development and implementation of the three pillars.[65]

The CSHB was responsible for delivering the remaining planned activities and outputs of Phase 2 of the CDHI. These activities were to conduct gap analyses for each of the three pillars: biosecurity and best management practices and initiatives; research initiatives; and, long-term disease risk management solutions (e.g., surveillance and disease response initiatives and practices). The outputs resulting from these activities were gap analysis reports for each pillar and recommendations on how to address the identified gaps, which were presented to the CSHB Board of Directors.

The biosecurity and research gap analysis reports and recommendations were completed first (2010), while the long-term disease risk management solutions gap report and recommendations on surveillance were completed in 2011. These gaps reports and recommendations were used by the CSHB's Board of Directors and advisory committees to identify appropriate priorities and guide the development of the CSHB's programs and projects for each of the three pillars. The Research pillar's advisory committee rapidly determined priorities to direct the allocation of research funding to study prevalent swine diseases (e.g., PRRS).[66]

Because of the initial delay in establishing the CSHB's management and government structure, these gap reports were delayed beyond the target date of July 2009. Considering the importance of these outputs in guiding the development of the CSHB's subsequent programs and projects, AAFC provided extensions to the original Contribution Agreement. These extensions allowed CSHB to implement and complete its projects and to make progress towards its outcomes according to revised timelines.

3.1.2.2 Achievement of Expected Outcomes by Pillar

1a. Biosecurity pillar immediate outcome

The immediate outcome of the Biosecurity pillar "to enhance, enrich and/or implement biosecurity and best management practices in the hog industry" was achieved through the development and implementation of the National Swine Farm-level Biosecurity Standard (the Standard). This voluntary standard is a tool for producers and industry stakeholders to help reduce the risk of disease entry by tailoring biosecurity measures to individual farm needs and regional considerations.
The development of the Standard ran from January to October 2010 and was conducted by a multi-stakeholder Technical Committee under the leadership of the CSHB. The Standard was then reviewed by international animal health experts and recognized by the CFIA as meeting the requirements of National Agri-Commodity Biosecurity Standards.[67]

[65] Refer to explanation of Contribution Agreements between AAFC and CSHB on pages 6-7.
[66] CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*
[67] AAFC. (2012). *Departmental Performance Report - Transfer Payment Programs for AAFC 2011-12*. Accessed from: http://www.agr.gc.ca/eng/about-us/planning-and-reporting/departmental-performance-reports/2011-12-departmental-

1b. Biosecurity pillar intermediate outcome

The intermediate outcome of the Biosecurity pillar was "the establishment of a national standard of biosecurity for hog practices that will be widely adopted". Once the Biosecurity Standard was developed and published, the Biosecurity pillar promoted and accelerated the adoption of the Standard through the following approaches:

- To develop the Standard, CSHB management had leveraged the expertise of a broad network of swine professionals. This professional network helped disseminate the Standard through provincial pork and veterinary organizations.
- The CSHB published a set of complementary tools such as a user's guide, training tools, references and videos on various biosecurity and best management practices, along with the Standard itself.
- The CSHB developed a National Swine Biosecurity Training Program, including training material, self-assessment forms, actions plans and veterinary assessment forms. The goal of this training program was to build awareness of the Standard and to facilitate the implementation of biosecurity best management measures adapted to individual swine production sites across the country. From 2011 to 2013, participants at targeted swine production sites across Canada were trained on-site on biosecurity processes by veterinarians. The training program included a self-assessment and development of a proposed action plan, and a follow-up site visit by the veterinarian to discuss the results. Financial incentives were provided to participants in the training program, which were managed by provincial producer associations.

Sites within all 10 provinces received training and the actual participation rate in the training program surpassed the 75% target set by the Biosecurity pillar: 90% of targeted sites across Canada participated in the program (Table 2).[68] Industry participation in this training program contributed not only to the uptake of the Standard and implementation of proposed biosecurity measures at swine production sites, but also to raise awareness among hog producers of the importance of biosecurity to prevent and mitigate swine diseases threats.

Table 2 - Coverage of the National Swine Biosecurity Training Program, by province

performance-report/2011-12-departmental-performance-report/?id=1347580464728
[68] Ibid.

Province	No of target sites	No of trained sites	Participation rate (%)
Alberta	340	309	91%
British Columbia	19	19	100%
Manitoba	550	508	94%
New Brunswick	17	17	100%
Nova Scotia	7	6	86%
Ontario	1740	1259	72%
Prince Edward Island	25	22	88%
Quebec	2400	2064	86%
Saskatchewan	145	138	95%
TOTAL	**5,243**	**4,342**	**90%**

Source: CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009 March 31, 2013.*

As a result of these approaches, the National Swine Farm-level Biosecurity Standard was perceived to be widely adopted by the hog industry across Canada, meaning that many hog producers had implemented the biosecurity processes and measures outlined in the Standard. No documented data were available at the time of the evaluation on the exact proportion of Canadian hog producers, who have adopted biosecurity processes as a result of the Standard.

2a. Research Pillar immediate outcome

The Research pillar's immediate outcome "to enhance, enrich and/or implement research projects" was achieved through the support of research projects and activities by the CSHB. By June 2012, CSHB had provided 28 grants to researchers for scientific research projects (26 were completed), on emerging swine diseases at major research centres, and six post-doctoral fellowships were established at swine health laboratories across the country.[69] In 2014-15, CSHB returned the funding associated with the two incomplete projects directly to the Department. Allocation of these grants was overseen by the Research Advisory Committee, which developed a systematic research project selection/review process and recommended grants for approval to the CSHB Board of Directors.

2b. Research Pillar intermediate outcome

The intermediate outcome of the Research pillar was "to coordinate swine research and develop a research repository". This Research Advisory Committee was composed of stakeholders from industry, veterinary and government organizations. The Committee determined which swine health research topics were critically important and ensured that research being conducted led to farm-level benefits for the hog industry. The Committee established appropriate research priorities and helped coordinate research efforts relating to swine health.

The CDHI-funded grants and fellowships provided new research opportunities that encouraged researchers and postgraduate students to get involved in research on hog

[69] CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*

diseases, including through new collaborations that were supported by the grants. Some of the supported post-doctoral researchers continued to work on swine health research projects and secured continuing, full-time appointments in swine and animal health teaching and research laboratories in Canada. CSHB-funded research projects also leveraged additional financial support from other sources, such as industry and government research grants. By attracting researchers, students, collaborators and funding to hog disease research, the Research pillar of the CDHI helped increase the research capacity in the field in the short-to-medium term. Although not specifically identified as an outcome of the Research pillar, this was perceived to be a beneficial and expected result of the coordination outcome.

The second part of the intermediate outcome, to develop a research repository to track swine health research, took the form an inventory of Canadian swine health research capacity[70] and efforts to disseminate swine health resources and research project results. Research results were disseminated at the CSHB annual forum and through other outlets (e.g., conferences, articles). These efforts helped inform relevant parties (e.g., hog researchers, swine veterinarians, hog producers, and, industry associations) of progress in understanding and responding to swine health diseases. The CSHB took a leadership role in organizing workshops and participating in targeted industry activities and conferences dealing with swine health issues at regional, national and international levels[71] to discuss research projects and other timely research-related topics (e.g., 2012 increase in *Brachyspira spp*. on Canadian farms).

Despite these efforts, there was no knowledge transfer strategy at the national level to ensure systematic tracking or communication of CDHI-funded research results to relevant parties. With the end of the CDHI, it remains to be seen if subsequent research results stemming from CDHI-funded projects will continue to be shared among the swine health research community.

3a. Long-Term Disease Risk Management Solutions Pillar immediate outcome

The immediate outcome “to develop, enhance and/or implement long-term disease risk management solutions” was achieved through a variety of options and tools developed as part of the Long-Term Disease Risk Management Solutions pillar. It was anticipated that the options and tools developed in this pillar would include a surveillance process to monitor the health status of the hog herd, as well as industry-led solutions to respond to future disease outbreaks. Solutions for long-term disease risk management were developed under the leadership of the CSHB through 30 projects spanning several topics, including surveillance, disease control/elimination, and emergency preparedness and response planning (including insurance).[72] The main solutions developed as part of this pillar are discussed below, beginning with the most notable solution and the one that has

[70] George Morris Centre. (2011). *An Inventory of Canadian Swine Health Research Capacity*. Prepared in partnership with Prairie Swine Centre, Saskatoon; the Centre de développement du porc du Québec, Quebec City and Prof. Ron Ball, Edmonton, for the Canadian Swine Health Board.
[71] CSHB. (2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*
[72] CSHB. (November 30, 2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*

been most advanced, a surveillance tool called the Canadian Swine Health Intelligence Network (CSHIN).

The CSHIN is the first pan-Canadian hog health surveillance network. It was developed under the CSHB through a series of projects over a span of fourteen months (2011-2013), following the surveillance gap analysis report and a consultative workshop. The CSHIN was designed to integrate data from regional swine expert networks and laboratories, and to provide a social networking platform to allow veterinarians and swine health experts to share information relating to swine disease issues. This data is compiled, distributed and reviewed in a series of teleconferences at the regional and national levels, to allow participating professionals to monitor the sanitary status of the hog industry. The CSHIN network allows users to quickly detect swine disease threats, to inform control measures (e.g., quarantine, destruction), and to help coordinate these measures at the national level. Because of this range of capabilities, the CSHIN is considered to be an innovative and advanced surveillance tool and information system.

The CSHIN became operational by March 2013. At the time of this evaluation (2015), various components of the CSHIN had not been fully implemented (e.g., laboratory data component), and there were varying levels of participation by veterinarians across regions (e.g., higher adoption of CSHIN in western Canada than in eastern Canada).[73] This is considered normal for a young, unproven system; in comparison, other successful animal disease surveillance networks, such Quebec's *Réseau d'alerte et d'information zoosanitaire*, have taken 5-6 years to gain significant cooperation by practitioners and industry.[74] Despite not being consistently adopted by veterinarians in all regions, CSHIN has been useful to veterinarians and industry, especially to provide information used to monitor and facilitate responses to the PED outbreak.

In addition to the CSHIN, the following long-term disease risk management solutions were developed or enhanced under the Long-Term Disease Risk Management pillar:

- A comprehensive strategy for an Emergency Response Capacity Fund was developed, which would give industry access to immediate funds in the event of a swine disease outbreak. It is up to government and industry partners to decide whether this Fund will be implemented. AAFC informed CSHB on April 14, 2014 that it will not be supporting this type of industry fund.
- A National Framework for the Emergency Destruction of Swine was developed, to enable the humane depopulation of a large number of pigs in response to a major swine disease outbreak (e.g., foot and mouth disease).[75] This framework has been shared with provinces but its implementation has not yet been necessary.
- Enhancements were made to a proposed Swine Mortality Insurance Product for producers to cover hog mortality losses in case of disease or other causes. More time would be required for this product to be adopted to address questions from federal and provincial partners and industry. A federal, provincial and industry

[73] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.
[74] *Ibid.*
[75] CSHB. (November 30, 2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*

working group is currently pursuing options to expand this work into a mortality insurance plan under the AgriInsurance program.

3b. Long-Term Disease Risk Management Solutions Pillar intermediate outcome

The intermediate outcome of the Long-Term Disease Risk Management Solution pillar was "to implement solutions and associated surveillance processes to monitor the sanitary status of the hog industry and to ensure that the adequate response mechanisms are in place". Of all the solutions developed under this pillar, only the CSHIN was implemented and this network has only been partially adopted by its intended users. The intermediate outcome for this pillar was not achieved; doing so would have required a greater level of implementation or adoption of the solutions that were developed to ensure that surveillance and adequate response mechanisms are in place.

The development of these long-term disease management solutions generally began after the Biosecurity and Research pillars had been launched and approximately 60% of the Long-Term Disease Risk Management projects were still ongoing as of March 2013.[76] Given the relatively late start of the development of these solutions, they had reached various levels of readiness by the original end date of CDHI Phase 2 funding on March 31, 2013.

Continued efforts led by the hog industry would be necessary to achieve implementation of long-term disease risk management solutions developed through this pillar.[77] The extent to which they will be implemented is currently unknown, as this depends on the ability to attract the necessary support from industry and other stakeholders (e.g., veterinarians, governments) once federal funding under Phase 2 of CDHI ceases. At the time of the evaluation, the hog industry was leading efforts to identify options for future governance, direction and support of the CSHIN.[78]

4. Achievement of End Outcomes

The expected end outcome of Phase 2 of the CDHI was that a structured risk management framework be established for the Canadian hog sector. If this were achieved, in the event of another swine disease outbreak, the swine industry would react by localizing, labeling and minimizing the spread of the disease (emerging and otherwise) so that it is contained in a relatively small area. Given that the Phase 2 intermediate outcomes were not all achieved, particularly for the Long-Term Disease Risk Management Solutions pillar, a comprehensive and structured risk management framework does not currently exist for the Canadian hog sector.

The work accomplished under Phase 2 of the CDHI has resulted in improvements in the preparedness of the hog industry in the event of another swine disease outbreak, particularly due to achievements under the Biosecurity pillar. Specifically, the development and implementation of the National Swine Farm-Level Biosecurity Standard and

[76] *Ibid.*
[77] Ernst & Young. (November 28, 2012). *Canadian Swine Health Board Performance Assessment Final Report.*
[78] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.

associated training program contributed to industry preparedness, both through raising awareness and by helping industry identify and implement specific biosecurity measures and practices. Stakeholder awareness about the economic impacts of the diseases in the hog sector, through the research supported by the CDHI and through implementation of the CSHIN, also helped enhance industry preparedness in the event of another disease outbreak. Outside of the CDHI, the series of disease outbreaks that have affected the industry in the last 10 years (e.g., PCVAD, PED, PRRS, *Brachyspira spp.*), have also resulted in increased awareness and responsiveness of industry, so this heightened preparedness cannot be solely attributed to the CDHI.

The preparedness of the industry has already been tested by the increase in the number of farm sites being diagnosed with *Brachyspira spp*. and traditional swine dysentery in 2012, and by the 2014 outbreak of PED. To date, the distribution and incidence of *Brachyspira spp.* and PED has been limited in Canada and the negative impacts of these diseases have been largely mitigated. By October 2014, 76 cases of PED had been reported in Canada, almost exclusively in Ontario and Manitoba, since the outbreak began in January 2014, with few new cases of PED reported since the 14th week of the outbreak.[79] In contrast, over 8,700 cases of PED have been reported across 31 states in the US since November 2013[80] and over 50 new PED cases continue to be reported each week in that country.[81] In the first quarter of 2014, the US hog inventory was nearly five times as large as that of Canada's (63 million head[82] vs. 13 million head[83]), so the 100-fold higher number of cases in the US is not solely attributed to the size of the herd. The evidence linking the containment of the spread of PED in Canada to Phase 2 of the CDHI is currently anecdotal, based primarily on the perceptions of stakeholders interviewed for this evaluation. There was consensus among these stakeholders that the increased responsiveness of the industry in recent years has resulted in Canada being better prepared in the event of swine disease outbreaks, which can be attributed in part to the biosecurity, surveillance, and coordination elements of the CDHI. For both *Brachyspira spp.* and PED, biosecurity measures and associated tracking and communication efforts overseen by the CSHB (e.g., working groups, daily updates, production and distribution of information materials) or through the CSHIN contributed to coordinating responses of the hog industry and other stakeholders (e.g., veterinarians, governments) to these diseases. For PED, provincial pork associations and government departments have also been active in working with industry to respond to the outbreak (e.g., Manitoba,[84] Ontario,[85] Quebec[86]).

[79] Ontario Pork Industry Council. (2014). *PED Now – OSHAB Industry Update June, 2014*. Accessed from: http://opic.on.ca/images/pdfs/PED_Now_June12_2014.pdf & Alberta Pork. (2014). *PED updates*. Accessed October 31, 2014 from: http://ped.albertapork.com/

[80] United States Department of Agriculture. (2014). *Swine Enteric Coronavirus Disease Testing Summary Report*, October 29, 2014. Accessed from: https://www.aasv.org/pedv/SECoV_weekly_report_141029.pdf

[81] American Association of Swine Veterinarians. (2014). *Porcine Epidemic Diarrhea Virus (PEDv) – What's New This Week?* (Last updated: 10/30/2014). Accessed from: https://www.aasv.org/Resources/PEDv/PEDvWhatsNew.php

[82] United States Department of Agriculture. (2014). *Quarterly Hogs and Pigs*. Accessed from: http://usda.mannlib.cornell.edu/usda/nass/HogsPigs//2010s/2014/HogsPigs-03-28-2014.pdf

[83] Statistics Canada. (2014). Hog inventories, by province (quarterly). Accessed from: http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/prim51a-eng.htm

[84] The Manitoba Chief Veterinary Officer is working with the Manitoba Pork Council to monitor and respond to the PED outbreak. Government of Manitoba. (February 21, 2014). *Porcine Epidemic Diarrhea (PED) Virus Bulletin #2*. Media Bulletin – Office of the Chief Veterinary Officer. Accessed from: http://news.gov.mb.ca/news/index.html?archive=&item=20532

[85] Ontario's Ministry of Agriculture and Food provides information on PED incidence and best practice information for

With the end of the CDHI, it is currently unclear whether a structured risk management framework will be established for the hog sector that will contribute to the prosperity and stability of the sector over the longer term.

3.2 UNINTENDED OUTCOMES

No unintended outcomes (positive or negative) were found to have occurred as a result of Phase 1 of the CDHI. For Phase 2, the measures developed and implemented under the CDHI have resulted in the following positive unintended impacts:

- The CSHB contributed to the efforts supporting the access of Canadian pork to international markets by promoting the biosecurity measures implemented in the hog industry to trade delegation.
- Foreign countries facing similar challenges with regard to swine diseases, such as the US, Italy, Switzerland, Australia and New Zealand, have shown interest in adopting biosecurity and surveillance programs and coordination approaches similar to those developed under the CDHI Phase 2. Such adoption could contribute to enhance disease responsiveness at the global level, which would in turn reduce the threat to Canada of foreign animal diseases.

3.3 EFFICIENCY AND ECONOMY

To determine if the program used the most economic and efficient means of achieving outputs and targeted outcomes (i.e., demonstrated an optimal use of resources), this section begins with a review of the economy and efficiency of program administration and delivery.

Economy and Efficiency of Program Administration and Delivery

The CDHI program's expenditures were less than the planned budget. Overall, the CDHI was delivered with $62 million, nearly $14 million below its $76 million allocation, a variation of 18%, (Table 3).

Table 3 - CDHI expenditure variation, planned and actual, by Phase

	Phase 1	Phase 2	Total
Planned	$33,206,800	$42,815,650	**$76,022,450**
Actual	$32,412,391	$29,889,244	**$62,301,635**
Variation ($)	$794,409	$12,926,406	**$13,720,815**
Variation (%)	2%	30%	**18%**

Source: Compiled from program sources.

industry. Ontario Ministry for Food and Agriculture. (2014). *Porcine Epidemic Diarrhea (PED).* Accessed from: http://www.omafra.gov.on.ca/english/food/inspection/ahw/PED-advisory.html

[86] MAPAQ. (2014). *Diarrhée épidémique porcine (DEP).* Accessed from: http://www.mapaq.gouv.qc.ca/fr/Productions/santeanimale/maladiesanimales/DEP/Pages/DEP.aspx

Phase 1 was delivered with over $32 million in actual expenditures, nearly $0.8 million below its $33 million budget, (Table 3). This represents a variation of 2%. For this Phase, Vote 10 expenditures (i.e., grants and contributions) equals the planned, Vote 1 expenditures (operating, i.e., administrative costs, including salary and non-pay) were $794,409 less than the budget, Vote 1 expenditures accounted for 4% of total program expenditures for Phase 1, well within acceptable AAFC standards.[87]

Phase 2 was delivered with close to $30 million, nearly $13 million below its almost $43 million budget, (Table 3). This represents a variation of 30%. This variation is largely explained by the fact that the CSHB did not claim $10 million of the funding allocated in the contribution agreements for Phase 2.[2] As a result, Vote 10 expenditures (i.e., grants and contributions) were $13 million less than planned. Vote 1 expenditures (operating, i.e., administrative costs, including salary and non-pay) accounted for 1% of total program expenditures for Phase 2, even below the percentage achieved for Phase 1 (i.e., 4%). No Vote 1 costs were reported by AAFC for the CDHI after the 2010-11 fiscal year, so the program was administered using other resources.

To deliver the CIP, AAFC used existing procedures for the review, approval and payment of applications, which led to the timely reimbursement to producers for diagnostic tests and vaccinations. The service standard target for the CIP was that 90% of applications would be processed for payment by AAFC's Client Service Centre within 70 days of receipt of a completed application. The CIP processed 78% of applications within the service standard time. About 710 CIP applications (nearly 20%) were processed outside the service standard because of the time required to acquire additional authorities to pay out the additional claims that were submitted at the end of 2008. If these 710 applications are excluded, only 2.4% of applications fell outside the service standard, well within the target service standard.[88]

To support the efficiency of the CIP application and payment process, AAFC provided information about the CIP and eligibility criteria to potential applicants and other program stakeholders (e.g., veterinarians, trade associations) through a website, a media release, public notices, and a toll-free bilingual information line, which fielded almost 6000 calls. Over 96% of CIP applicants were eligible for benefits, which was higher than the rate observed for other contribution programs managed by AAFC.[89]

Few opportunities to improve the economy of Phase 1 (i.e., to minimize resource use in the implementation and delivery of the program) were identified. Strategies to reduce vaccination or delivery costs for the CIP, such as bulk purchasing of vaccines or partnering with another federal agency (e.g., CFIA), were suggested by program staff and external stakeholders but it is unclear to what extent these would have reduced program costs.

For Phase 2, delivery of the program was largely achieved through the third-party delivery agent, the CSHB. As shown in Table 4, the Biosecurity and Long-Term Disease Risk

[87] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[2] As per the contribution agreements, Vote 10 funds were transferred on an as-needed basis to the CSHB.
[88] AAFC. (n.d.). *Circovirus Inoculation Program (CIP) Final Performance Report*
[89] *Ibid.*

Management Solutions pillars were each delivered well below the budgeted allocation for these program elements (a variation of 59% and 17% respectfully), while the Research pillar and the CSHB's operating expenses were approximately equal to the budgeted allocation. Note that the budget allocation was not adjusted to deduct the $8 million transfer to Phase 1; this transfer was intended to be absorbed primarily from the Biosecurity pillar. If $8 million is deducted from the Biosecurity budget allocation, the remaining allocation ($21.8 million) remains well above the actual expenditures ($12 million) – a variation of 44%. These findings suggest that Phase 2 was operationally efficient, as its outputs (i.e., gap reports) and immediate outcomes (e.g., development of a National Biosecurity Standard, research projects, development of long-term disease risk management solutions) were achieved using either the intended budget or fewer resources than planned.

Table 4 - CDHI Phase 2 expenditures, budgeted and actual, by pillar

	Biosecurity	Research	Long-Term Disease Risk Management Solutions	CSHB operating expenses*
Budget allocation†	$29,800,000	$ 6,900,000	$8,360,695	$3,926,000
Actual (paid out to CSHB)	$12,231,519	$7,021,136	$6,430,979	$3,860,727
Variation ($)	$17,631719	$(121,136)	$1,343,021	$65,273
Variation (%)	59%	-2%	17%	2%

Note: *Including sustainability activities; †Allocations per pillar were calculated as a total across all three Contribution Agreements but do not account for the transfer of $8 million from Phase 2 to Phase 1; this transfer was intended to be absorbed primarily from the Biosecurity component. Of the $8 million, $3.5 million was spent and the unused funds were returned to Phase 2.

Source: Compiled from program sources.

Because Phase 2 was managed and delivered by the CSHB rather than AAFC, the CSHB could leverage other sources of funding and engage stakeholders. The Research pillar provided $4.55 million in CDHI-funded grants and was able to leverage an additional $3 million from other industry and government sources of funding.[90] These leveraged funds extended the reach of research efforts, which increased the cost-effectiveness of the public investments for this program element.

3.4 PROGRAM DESIGN

AAFC provided the near totality of the CSHB's funding for the duration of the CDHI, with the understanding that it was CSHB's responsibility to ensure it could sustain its activities via support from industry and other partners after the end of the contribution funding. The CSHB's Board identified sustainability as a core issue soon after the organization was created, and attempted to seek funding. To support these efforts, a performance assessment review by Ernst and Young was commissioned by the CSHB to help demonstrate the value of the CSHB's programming to industry stakeholders.[91] These approaches were not successful in raising the funds necessary to support the continuation of the organization.

[90] CSHB. (November 30, 2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*
[91] Ernst & Young. (2012). *Canadian Swine Health Board Performance Assessment Final Report.*

The fact that the CSHB has not achieved financial sustainability is likely to hinder the achievement of the CDHI end outcome *"to maintain a structured disease risk management framework for the hog sector"*. Alternative approaches to continue to ensure national coordination and long-term disease risk management for emerging diseases (particularly biosecurity and surveillance), including financial support and appropriate governance structures, were under discussion by key stakeholders at the time of this evaluation report.[92]

Several key factors contributed to the fact that the CSHB was not able to attain financial sustainability by March 31, 2015. One was the relative independence (including financial independence) of the CSHB from producers and/or producer associations, which likely hindered their buy-in and willingness to provide future financial support for some components of the program.[93] Differing priorities across provincial organizations or segments of the hog industry contributed to the lack of consensus about how to support the CSHB after the end of CDHI funding. Second, as the CSHB was established solely from AAFC funding, CSHB had to hit the road running in terms of establishing itself, funding suitable research and finding ways to be accountable to producers and industry stakeholders when they had no historical track record of doing such work. Lastly, the CSHB faced challenges in communicating the value of its model in order to promote a shared understanding of its activities and solidify support for its key activities (e.g., CSHIN),[94] and to answer questions related to cost-effectiveness of the approach or alternative models. [95] These factors suggest that the model used to develop CSHB (i.e. providing funding to establish an organization) may have risks. By not providing funding that is gradient (i.e. decreasing over the years of a contribution agreement) or matched by industry, there exists a possibility that there will be limited accountability and sustainability beyond the funding cycles of the contribution agreements.

The financial state of the hog industry during the program's timespan constrained the availability of resources of producers and industry associations, which limited the financial support from these sources for the CSHB as the end of CDHI funding approached. The industry crisis of 2012—brought on by low hog prices and high feed costs—created challenges with industry partners' ability to participate actively in supporting CSHB.[96]

Program Governance

Governance structures for the CDHI, including program administration processes, roles, and accountabilities (e.g., reporting, communication) within AAFC, were adequate to support decision-making of the initiative. In Phase 1, two branches of AAFC were involved in managing and delivering the CIP: one was responsible for the CIP (Farm Financial Programs Branch) and the other for delivering the program (Prairie Farm Rehabilitation

[92] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.
[93] *Ibid.*
[94] *Ibid.*
[95] Ernst & Young. (November 28, 2012). *Canadian Swine Health Board Performance Assessment Final Report.*
[96] CSHB. (November 30, 2013). *Initiative for the Control of Disease in the Hog Industry Phase 2; Final Report March 9, 2009-March 31, 2013.*

Administration and Environment Branch). The use of previously existing procedures and systems to track payments for the CIP ensured the efficiency of weekly reporting processes within AAFC.

For Phase 2, the governance structure was clear and facilitated interaction and communication among the various stakeholders involved in overseeing and delivering the program, both within CSHB and AAFC. A review of the meeting minutes of the CSHB Board of Directors showed that decision-making processes within the CSHB were well established, frequent, and well supported by the three advisory committees, who were actively meeting and reporting to the Board from 2010 to 2013. During this same period, AAFC officials met with CSHB officials and industry stakeholders to discuss annual results and to establish work plans for the following year. The CSHB submitted annual work plans and reported against objectives as per the Contribution Agreement. Ongoing communication and collaborative work between the CSHB and AAFC contributed to a well-managed performance reporting process.

Best Practices and Lessons Learned

The best practice and lessons learned from both phases of the CDHI could be considered in the design of future federal programs targeted at addressing emerging animal disease issues. The best practice is to ensure early and sustained collaboration, leadership, coordination and communication between AAFC and other key organizations and individuals involved in animal health, such as veterinarians, producers, provincial and federal government representatives.

This best practice was seen in Phase 1 as coordination between AAFC and industry to develop solutions to deal with the PCVAD outbreak directly contributed to the success of the CIP. AAFC's communication efforts during the design phase of the CIP and the quality of information it shared about the program with industry and stakeholders through the rest of the CIP were identified as best practices to attract the participation of eligible applicants. The achievements of Phase 2 were facilitated by the CSHB's collaborative industry-led approach that brought together producers, veterinarians, federal, provincial and national organizations from different perspectives, sectors and regions to work towards a common goal. The inclusive nature of CSHB membership and advisory committees facilitated stakeholder participation during the CDHI and ensured the inclusion of people who had the experience, knowledge and the skill-set to ensure the objectives and activities undertaken under the CDHI met the agriculture sector's needs. Multi-stakeholder participation in governance and advisory committees helped accelerate information sharing and network development among stakeholders, which supported the achievement of immediate outcomes within a short timeframe.

Specific to Phase 2, to support national leadership and coordination to address emerging animal health issues, especially when these diseases, like PCVAD, can affect the national herd as a whole. Addressing the needs of the Canadian hog industry through specific elements like biosecurity and surveillance requires "a coordinated, national effort that integrates local and provincial swine health initiatives" and "a fully operational monitoring

and surveillance network that spans Canada."[97] A recent situation analysis concluded that the only effective response to emerging outbreaks is to have in place a national network of collaboration and coordination that enables each of the responsible parties (federal, provincial and industry) to agree on a coordinated course of action and the respective roles and responsibilities.[98]

Prior to the CDHI, provincial efforts to address emerging diseases were perceived to be operating in silos, with limited sharing across producers, veterinarians and other groups, and a lack of mechanisms by which to coordinate a national response. Through the CSHB, the CDHI helped bridge gaps and create links between provincial efforts and those of stakeholder associations with regard to swine health issues. In the absence of the CSHB's national coordination, solutions to emerging disease threats would have been developed as they had been prior to the CDHI: in a fragmented manner, mostly at the provincial level.

A third area giving evidence of the best practice was in the adoption of an industry-led collaborative approach to deliver national leadership and coordination addressing emerging animal health issues. Given the diverse responsibilities of national, regional/provincial, public and private organizations relating to swine health issues, stakeholders agreed it was appropriate that delivery of the Phase 2 pillars was led by industry and involved extensive consultation and participation from the range of stakeholders who play roles in swine health issues (e.g., veterinarians, governments).[99] In terms of its effectiveness, this approach was beneficial for industry as proved by its improved preparedness for new disease outbreaks (e.g., PED) after the implementation of the CDHI.

The CSHB model was a novel and proactive approach adopted by AAFC, and although it was effective in achieving expected immediate outcomes of Phase 2 of the CDHI, it encountered several challenges and did not prove to be financially sustainable. Lesson learned from Phase 2 of the CDHI suggest an adjustments could be considered by the federal government in the design and delivery of future initiatives. The lesson would be especially relevant in the case of future initiatives with similar objectives to be delivered by a third-party agent, to ensure their overall performance and long-term sustainability:

- Future industry-led programs developed by the federal government could include co-funding from industry and/or provincial stakeholders. This would ensure a broader diversity of funding sources and promote greater buy-in for shared priorities to support the sustainability of the program activities. Co-funding would also support greater efficiency from a federal perspective (i.e., greater outputs and outcomes from a smaller investment of public funds), as well as efficient management of funds by the mandated industry-led delivery agent.

[97] Ernst & Young. (2012). *Canadian Swine Health Board Performance Assessment Final Report.*
[98] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.
[99] Serecon Inc. (2014). *Situation Analysis, Implications and Recommendations for the Future CSHB and CSHIN*. Prepared For Canadian Pork Council.

4.0 CONCLUSIONS

4.1 RELEVANCE

From an economic perspective, there was a strong rationale for programs to assist the hog industry in combatting disease with the aim to increase their stability and prosperity. There was and continues to be a need for leadership and coordination at the national level to address PCVAD and more recent swine disease threats, such as PRRS and PED.

The objectives of the CDHI to combat disease and to enhance the prosperity and stability of the hog sector were closely aligned with federal government priorities relating to the economic competiveness and profitability of the agricultural sector, which contributes to Canada's economic growth. The CDHI objectives are also aligned with AAFC's strategic outcomes relating to business risk management, by developing the capacities and structures within the hog industry to help reduce risks associated with the spread of swine diseases, which supports a secure, sustainable and competitive agriculture and agri-food sector.

The CDHI helped industry control and address the impacts of swine diseases were aligned with federal government jurisdiction and AAFC responsibilities relating to animal health and economic growth of the agricultural sector. Given that agriculture is a shared jurisdiction with provinces and territories, the CDHI avoided duplication with other provincial/territorial and industry-led initiatives.

4.2 PERFORMANCE

Expected program outcomes for Phase 1 of the CDHI were achieved by contributing to the detection of and the inoculation from PCVAD in the Canadian herd. In the intermediate term, the CIP helped reduce the negative economic impact of diagnosis and inoculation for PCVAD for Canadian hog producers. The CIP ultimately led to a healthier Canadian hog herd by helping control PCVAD in the herd and reduced hog mortality caused by the disease.

Immediate expected program outcomes for Phase 2 of the CDHI have been achieved for the three pillars of the initiative, in that biosecurity and best management practices, research project, and long-term disease risk management solutions were each enhanced, enriched and/or implemented in the hog industry. Progress was made toward achieving the intermediate outcomes of Phase 2; however, these have not yet been fully achieved across the three pillars:

- Biosecurity practices were perceived to be widely adopted by the hog industry across Canada.
- The CSHB coordinated swine research funded by the CDHI, supported the development of Canadian swine health research capacity, and helped disseminate swine health resources and research project results.

- Of all the long-term disease risk management solutions developed through the CDHI, only the CSHIN was implemented and this network has only been partially adopted by its intended users.

The end outcome of Phase 2 was not achieved: a comprehensive and structured risk management framework was not established for the Canadian hog sector. Nonetheless, as a result of progress made through the initiative, particularly with regard to biosecurity practices, the hog industry is currently better prepared to face disease threats. This preparedness has been tested by outbreaks of emerging diseases that have occurred in the years following the implementation of the CDHI: the spread of these diseases, particularly PED, was limited in Canada compared to the US.

Governance structures for the CDHI, including program administration processes, roles, and accountabilities (e.g., reporting, communication) within AAFC, were adequate to support decision-making.

The fact that the CSHB has not achieved financial sustainability and is unlikely to persist as an organization with the end of AAFC funding, is likely to hinder the achievement of CDHI end outcome to maintain a structured disease risk management framework for the hog sector. Alternative approaches to continue to ensure national coordination and long-term disease risk management for emerging disease (particularly biosecurity and surveillance), including financial support and appropriate governance structure, were under discussion by key stakeholders at the time of this report.

Best practices that could be replicated in future programming targeted at addressing emerging animal disease issues include:

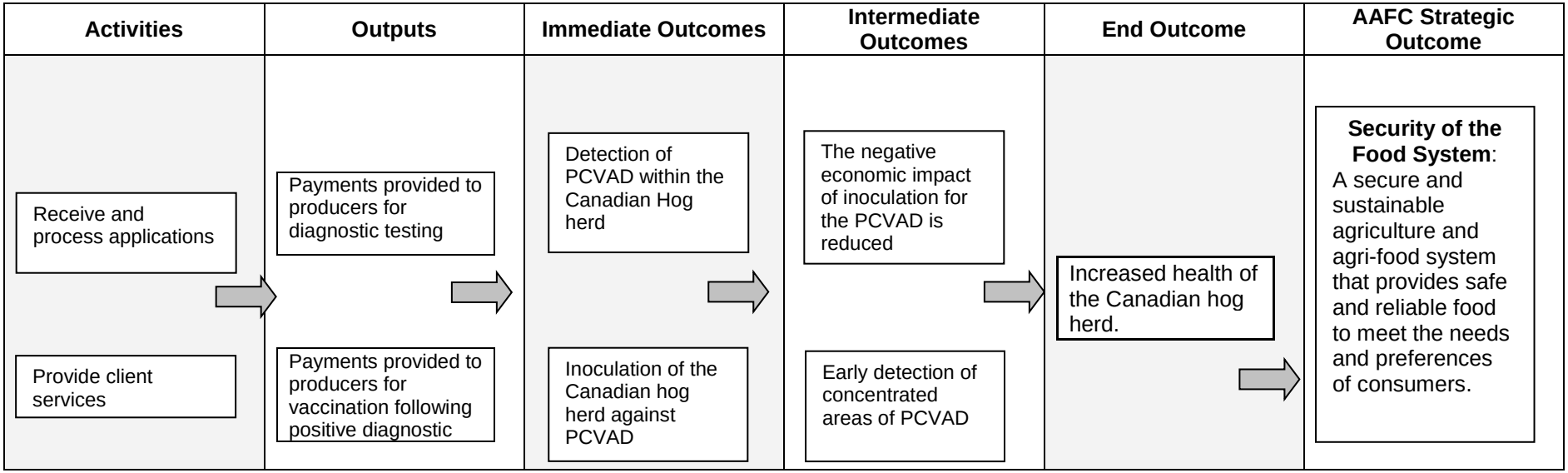
- Early and sustained collaboration, coordination and communication between AAFC and other key organizations and individuals involved in animal health.
- Supporting national leadership and coordination on animal health issues helps bridge gaps between provincial and industry efforts.
- Using an industry-led collaborative model was a novel and effective approach to improve industry preparedness for emerging animal diseases.

Lesson learned from Phase 2 of the CDHI suggest that the CSHB model could be considered by the federal government in the design and delivery of future initiatives with similar objectives, to ensure their overall performance and long-term sustainability:

- Future collaborative programs developed by the federal government could also include co-funding from industry and/or provincial stakeholders.
- Providing funding to a pre-established organization poses less risk as the organization has proven accountability to producer and industry stakeholders.

ANNEX A: LOGIC MODELS

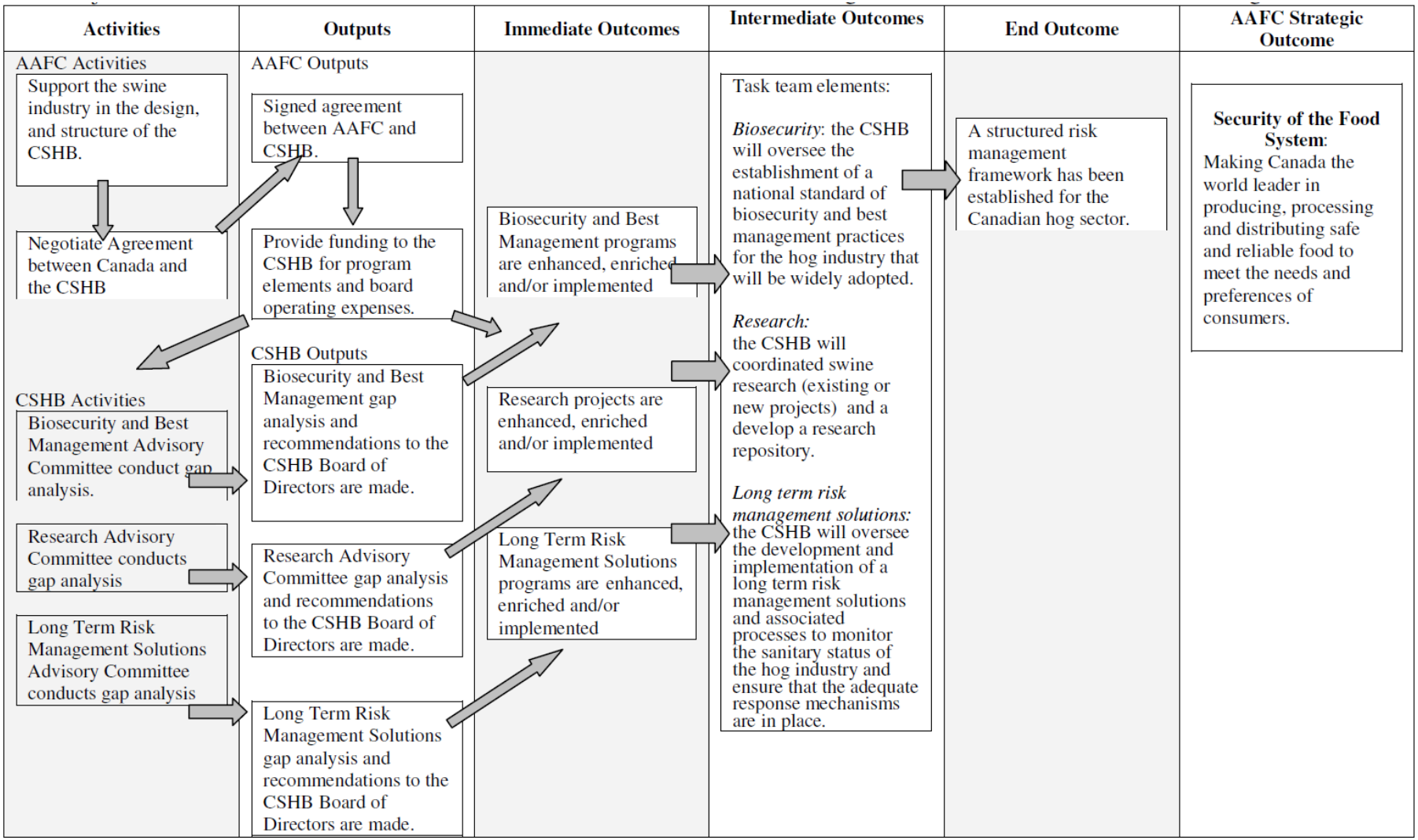
Table 5 - Logic Model: CDHI Phase 1 (Circovirus Inoculation Program)



The table illustrates the logic model for Phase 1 of the CDHI program. The contents of the table are as follows:
Activities for the program are:
1. Receive and process applications, and;
2. Provide client services.
Outputs for the program are:
1. Payments provided to producers for diagnostic testing, and;
2. Payments provided to producers for vaccination following positive diagnostic.
Immediate Outcomes for the program are:
1. Detection of PCVAD within the Canadian hog herd, and;
2. Inoculation of the Canadian hog herd against PCVAD.
Intermediate Outcomes for the program are:
1. The negative impact of inoculation for the PCVAD is reduced, and;
2. Early detection of concentrated areas of PCVAD.

The End outcome for the program is the increased health of the Canadian hog herd.
AAFC's Strategic Outcome that the program feeds into is Security of the Food System: a secure and sustainable agriculture and agri-food system that provides safe and reliable food to meet the needs and preferences of consumers.

Table 6 - Logic Model: CDHI Phase 2



The table illustrates the logic model for Phase 2 of the CDHI program. The contents of the table are as follows:

AAFC activities are:
1. Support the swine industry in the design and structure of the CSHB, and;
2. Negotiate Agreement between Canada and the CSHB.
CSHB activities are:
1. Biosecurity and Best Management Advisory Committee conduct gap analysis;
2. Research Advisory Committee conducts gap analysis, and
3. Long Term Risk Management Solutions Advisory Committee conducts gap analysis;
AAFC Outputs are:
1. Signed agreement between AAFC and CSHB, and;
2. Provide Funding to the CSHB for program elements and board operating expenses
CSHB Outputs are:
1. Biosecurity and Best Management gap analysis and recommendations to the CSHB Board of Directors are made;
2. Research Advisory Committee gap analysis and recommendations to the CSHB Board of Directors are made, and;
3. Long Term Risk Management Solutions gap analysis and recommendations to the CSHB Board of Directors are made.
The Immediate Outcomes for the program are:
1. Biosecurity and Best Management programs are enhanced, enriched and/or implemented;
2. Research projects are enhanced, enriched and/or implemented, and;
3. Long Term Risk Management Solutions programs are enhanced, enriched and/or implemented.
The Intermediate Outcomes for the program are:
Task team elements:
Biosecurity: the CSHB will oversee the establishment of a national standard of biosecurity and best management practices for the hog industry that will be widely adopted.
Research: the CSHB will coordinate swine research (existing or new projects) and develop a research repository.
Long term risk management solutions: the CSHB will oversee the development and implementation of long term risk management solutions and associated processes to monitor the sanitary status of the hog industry and ensure that the adequate response mechanisms are in place.
The End Outcome of the program is: A structured risk management framework has been established for the Canadian hog sector.
The AAFC Strategic Outcome the program feeds into is Security of the Food System: Making Canada the world leader in producing, processing and distributing safe and reliable food to meet the needs and preferences of consumers.