# SUSTAINABILITY INDICATORS, TOOLS AND REPORTING SYSTEMS FOR AGRI-FOOD PRODUCTS

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Alberta Government

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**About Nathan Pelletier and Global Ecologic**

Nathan Pelletier is an independent sustainability consultant specializing in environmental and social performance measurement and management strategies in food and other industrial systems. His work proceeds from the recognition that sustainability is the first principle of responsible management, whether at the level of private enterprise, regional, national or global governance. For more information, see Appendix B.

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# Executive Summary

The plethora of existing and emerging sustainability schemes for food and agriculture, including methods, calculators, certification programs, and checklist compliance initiatives, points towards a rapidly evolving market access landscape for agri-food producers and their supply chain partners. At the same time, the wide variability in the applicability, accessibility, and reliability of such schemes present distinct challenges for agri-food producers and those mandated to support them in leveraging improved social license and market access. Important questions that arise include:

- Which among these schemes are most important?
- Which are most robust?
- Which are most practicable for producers and industry associations to implement?
- What considerations should be brought to bear in order to prioritize among them and to minimize the burdens of potential multiple demands for participation in the sustainability schemes that are championed by different stakeholders and supply chain partners?

By screening a broad spectrum of food system sustainability schemes for potential relevance, and systematically evaluating a subset of these, this analysis lays the foundation for Alberta producers, industry associations and regulators to answer these questions.

**Applicability** is a function of: whether or not a scheme refers to a relevant Alberta agri-food commodity; and is/may become specifically recognized or required in an important market or by major customers. Few of the schemes reviewed are currently (or may likely become) applicable as a result of public policy/regulatory initiatives in major markets. Important exceptions here include European initiatives, where regulated corporate social responsibility is already a reality. The European Commission Product Environmental Footprint (EC PEF) methods, in particular, may become widely applied in association with future EU policy initiatives. Outside of the EU, which is not currently a major market for the agri-food commodities considered, a more important driver of potential market access requirements will likely be supply chain partners – in particular, large food processors and retailers. In light of publicized commitments from industry giants like Unilever and Walmart regarding sustainable sourcing, it seems likely that Alberta agri-food producers will be required to demonstrate compliance with certification or check-list compliance initiatives in the future in order to maintain market access. Initiatives like the Field to Market Fieldprint calculator (US and Canadian), and checklist compliance approaches such as The Sustainability Consortium's Key Performance Indicators and Unilever's Sustainable Agriculture Code may be of particular relevance.

**Accessibility** is a function of: the clarity of purpose of a sustainability scheme; the ease of implementation (including the availability of supporting information, guidance documents, and calculation tools); and the cost of implementation or participation. Depending on the nature of the sustainability scheme, accessibility scores among the reviewed schemes were influenced by different of

the sub-criteria applied. For example, methods that establish norms for sustainability accounting tend to be less accessible in that they may require expert knowledge for their implementation. This is particularly true of methods like the EC PEF, PAS 2050, and the Greenhouse Gas (GHG) Protocol. In contrast, calculators and compliance checklists tend to be more accessible in terms of ease of use because they are usually specifically designed to be user friendly for farmers and other supply chain partners. Many of the schemes reviewed are freely accessible, or have nominal associated fees. For those requiring third-party implementation (for example, BASF AgBalance), certification (for example, CanadaGAP and Food Alliance certification), or license fees (for example, to access The Sustainability Consortium Product Toolkits), cost may potentially present a barrier for some producers.

**Reliability** is a function of methodological transparency and rigor vis-à-vis best available practices. Calculator tools tend to be most reliable in this sense in that the majority of methodological decisions have already been made and built into the calculator algorithms. However, if the calculator methodologies are not, themselves, consistent with best practice, the schemes cannot be considered to be reliable.

Another important consideration for reliability is the extent to which choices of analytical boundaries or score levels may be subjective. This risk is particularly high for certification and checklist compliance schemes, whether self or third-party assessment is required. Although perhaps most important amongst the three criteria of applicability, accessibility, and reliability in terms of ensuring the effectiveness of a given sustainability scheme, reliability is arguably the least important criterion for market access. Outside of regulatory initiatives, where methodological reliability will likely be prioritized, market access considerations will largely be determined by the extent to which participation in specific sustainability schemes are required by supply chain partners.

Overall, among the four classes of sustainability schemes considered (methods, calculators, certification, and compliance checklists) certification schemes were found to have the highest, aggregate performance according to the criteria of applicability, accessibility, and reliability (Figure 1). Check-list compliance initiatives scored poorly for reliability. This is notable given that check-list compliance programs, along with certification programs, are seemingly the preferred approaches by food processors and retailers to implementing their sustainability strategies. This seeming preference likely reflects a desire to ensure that the sustainability schemes to be imposed on supply chain partners are both user-friendly and create as little burden on participants as possible.

Along with detailed information at the sustainability scheme and commodity levels, the results of the analysis also provide several additional, high-level insights. First is that the nature and scope of these schemes are testament to a new paradigm of supply chain management, which requires engaging supply chain partners in order to ensure effectiveness in the pursuit of improved sustainability outcomes. Life cycle thinking provides the theoretical basis for this paradigm, and rapidly evolving tools for sustainability measurement and management offer a practicable basis for its implementation.

Second is that, although managing supply chain greenhouse gas emissions is an obvious priority across sustainability schemes, several other indicators have also come to the fore. These include resource use efficiencies for water, land, soil and energy, but also social sustainability criteria related to labour rights, human rights, and impacts on local communities.

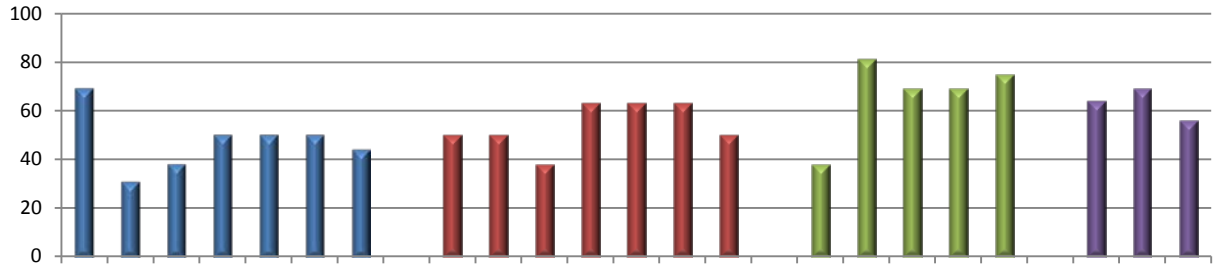
Third is that some commodity groups are attracting much more attention than others. Numerous of the schemes considered are specific to field crops and, despite the disproportionate share of resource and environmental impacts attributable to the livestock sector, surprisingly few are livestock-specific. The on-going Global Round Table for Sustainable Beef and the more recent Canadian Round Table will, however, likely provide criteria for sustainable beef production that customers such as McDonald's will apply to sourcing Alberta beef (an Alberta pilot project is already underway). In contrast, many of the priority commodities that were identified based on economic relevance in Alberta or otherwise requested for consideration by AARD are not specifically considered by any of the reviewed schemes.

In sum, sustainability is fast become an important priority in the food sector. As methods and initiatives for food sector sustainability continue to evolve and be popularized, it is likely that Alberta agri-food producers will be required to participate in order to enjoy continued market access and social license. Indeed, those at the leading edge will benefit most, hence proactive engagement is essential. The information derived from this analysis can be used to support the Alberta agri-food sector in responding to the opportunities and challenges that this new paradigm present. Key next steps to consider include:

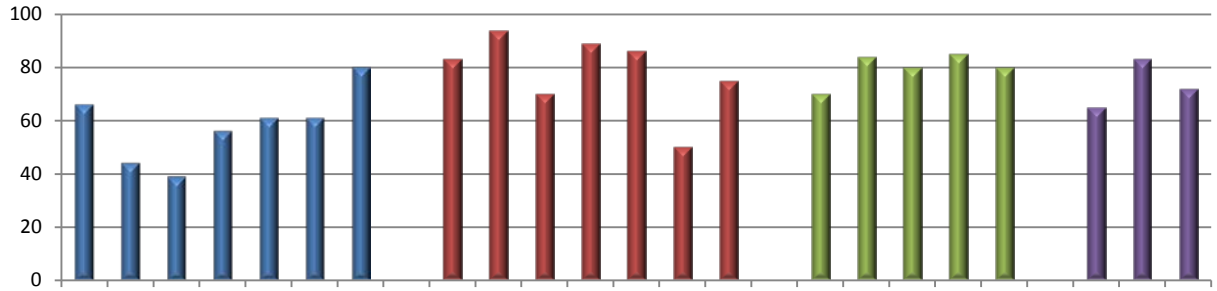
- developing and disseminating "horizon" bulletins to industry associations regarding emerging sustainability schemes that will likely impact their constituents, including indication of current participation by supply chain partners
- supporting industry associations in communicating with their constituents and preparing them to participate in those emerging sustainability schemes that are most relevant for their commodities
- evaluating the supporting information that is available for relevant sustainability schemes in order to prepare "briefing note" materials for educating industry associations and their constituents regarding the requirements for participation
- developing "briefing note" materials regarding the nature and importance of emerging sustainability indicators that are used by sustainability schemes and that will likely impact specific commodity groups (for example, social issues and animal welfare)
- developing a timeline of actionable items and measurable benchmarks for improving the social license and market access opportunities of Alberta agri-food producers vis-à-vis emerging sustainability schemes

**Figure 1. Applicability, accessibility, and reliability of the sustainability schemes considered.**

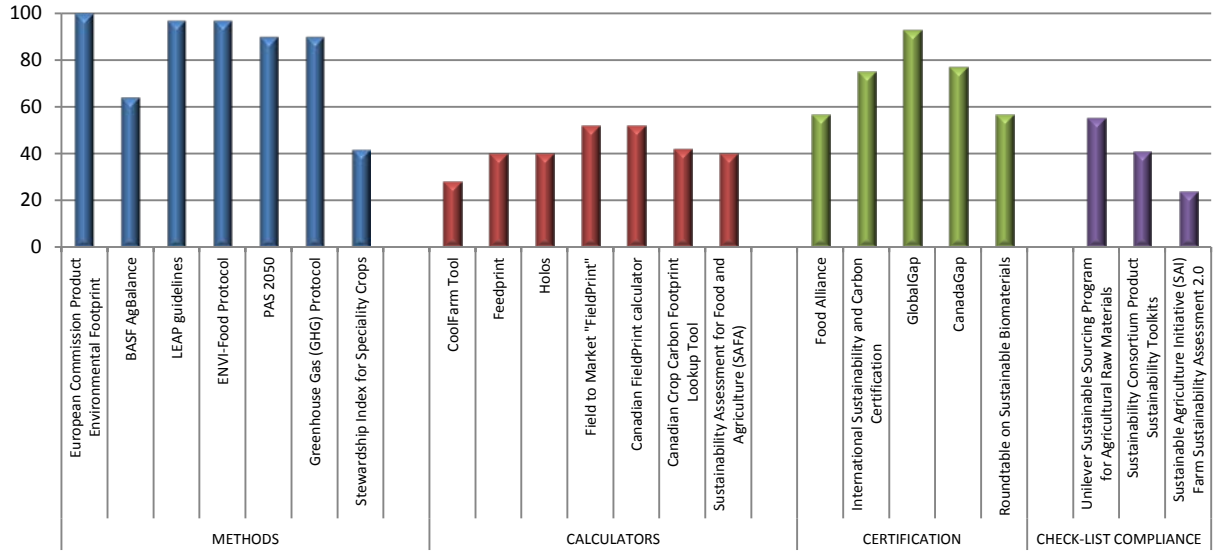
**Applicability -** *the extent to which sustainability schemes are relevant for Alberta agri-food commodities (i.e. they refer to key commodities and/or markets)*




**Accessibility -** *how easily sustainability schemes can be used by producers, associations and/or practitioners*




**Reliability -** *the extent to which sustainability schemes are scientifically robust and consistent with recognized methodologies or standards*



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# Introduction

In the context of their on-going life cycle assessment work and efforts to move towards a broader approach to sustainability, Alberta Agriculture and Rural Development (AARD) is seeking to develop the informational basis necessary to support the Alberta agriculture and food sector so as to ensure continued market access whilst improving sustainability outcomes. Towards this end, AARD commissioned Nathan Pelletier of Global Ecologic Environmental Consulting and Management Services Ltd. to undertake and report an analysis of food system sustainability measurement, certification and reporting initiatives of relevance for the Alberta agriculture and food sector, along with market access considerations.

Market access may be facilitated through (or constrained by) sustainability schemes that arise from public sector, non-governmental organization, or private sector initiatives. Examples of the former are, too date, largely European, where legislated corporate social responsibility is already a reality. Private sector initiatives are, however, more widespread globally, with a high level of participation by major food processors and retailers. These will likely increasingly impose measurement, certification, and/or reporting requirements on Alberta agri-food producers. The following examples are illustrative of the nature and breadth of private sector sustainability commitments and schemes with market access implications. These example are not exhaustive, but rather were selected for illustrative purposes based on the stature of the companies and the apparent maturity of their publically communicated sustainability commitments.

## General Mills

General Mills (2015) has publically committed to sustainably source the raw materials used in their products. They are currently focused on increasing the sustainability of 10 priority agricultural raw materials, which represent more than 50 percent of their annual purchases. By 2020, they have committed to sustainably source 100% of vanilla, cocoa, palm oil sugar cane (developing world) and oats, US wheat, US sugar beets, dry milled corn, dairy (fluid milk) and fiber packaging (developed world). Sustainability will be assessed using a combination of certification schemes (for example, for sugar cane and palm oil), demonstration of continuous improvement (oats, wheat, sugar beets, corn, dairy) and self verification (for example, with respect to animal welfare). These efforts will likely impact Saskatchewan and Alberta oat producers, as western Canada is a key oat sourcing area for General Mills. The General Mills requirement for demonstration of continuous improvement will be based on the methods of the US Field to Market initiative, which is currently being replicated in Canada.

## Unilever

Unilever (2015) has committed to sustainably source 100% of its agricultural raw materials by 2020, including canola and soybean oils. Unilever has developed a Sustainable Agriculture Code with which its suppliers must demonstrate compliance.

## Wal-Mart

Walmart (2015) has been a driving force behind The Sustainability Consortium, a leading international partnership focused on supply chain sustainability initiatives. Walmart has committed to, by 2017, buying 70% of the products that they sell in North America from organizations that utilize their "Sustainability Index". Walmart will rank suppliers using The Sustainability Consortium's indicators.

## PepsiCo

PepsiCo (2015) launched the Sustainable Farming Initiative (SFI) in 2012, which is a program for measuring and improving the environmental and local economic performance of agricultural activities in PepsiCo supply chains. The SFI applies to potato, citrus, oats, rice and corn crops and to growers of all sizes in developed, developing and emerging markets. The SFI was launched for Frito-Lay potato growers in North America in 2013.

## McCain

McCain (2015) has developed a Good Agricultural Practices Program, which focuses on environmental sustainability and food safety. McCain is also a member of the Sustainable Agriculture Initiative (SAI) Platform, which is an organization created by the food industry to promote sustainable agriculture worldwide.

## McDonalds

McDonalds (2015) has publically committed to sourcing verified sustainable beef. Towards this end, McDonalds is collaborating with major NGOs and food industry stakeholders in the Global Roundtable for Sustainable Beef, which has drafted guiding principles and best practices for sustainable beef production. McDonalds plans to begin purchasing verified sustainable beef in 2016, once detailed criteria have been developed. A pilot project for this initiative is on-going in Alberta.

Despite this high level of activity with respect to sustainability schemes in the food sector, a review of publically available documents suggests that sustainability as a market access consideration is a relatively new concept in the Canadian agri-food sector. Few communications from food stakeholder groups that contain both of the terms "market access" and "sustainability" were identified. A notable exception is the Canola Council of Canada, which explicitly recognizes sustainability as one of four key factors influencing market access. Indeed, the Canadian canola industry has already had to respond to market requirements for sustainability performance measurement and certification in order to ensure continued access to EU-28 biofuel feedstock markets as a result of requirements of the EU Renewable Energy Directive (RED). This is similarly true for demonstrating that Canadian canola meets life cycle greenhouse gas performance thresholds for the US Renewable Fuel Standard (RFS). Other Canadian agri-food organizations that have undertaken sustainability initiatives with market access implications include Canada's largest grocer, Loblaws, which uses SAI Global, and Pulse Canada, a key stakeholder in the on-going development of the Canadian Field to Market Calculator.

In part, this seeming deficit in proactive engagement may reflect a lack of clarity among Canadian agri-food sector participants as to which of these diverse, emerging schemes are actually important, the extent to which each might be considered rigorous, as well as which among the multiple dimensions of sustainability should be prioritized. Sustainability is a very broad basket, as a wide variety of criteria may be considered relevant, depending on context and stakeholder. For example, Alberta feedlot operators must participate in the Canadian Program for Certifying Freedom from Growth Enhancing Products (GEPs) for Export of Beef to the EU in order to ensure market access. For many EU consumers, meat containing GEPs is socially undesirable, hence this criterion might be considered to be a sustainability criterion (health and society) in the EU context. In contrast, others might consider the use of GEPs to be important to environmental sustainability, since research has shown lower net environmental impacts for beef production using GEPs as a result of faster growth rates and more efficient feed conversion (Pelletier et al. 2010). This points towards possible challenges in the development of harmonized, international sustainability schemes, since there is no single objective basis for prioritization amongst the multiple criteria for sustainability that might be considered. It also underscores that the Alberta agri-food sector should be attentive to the cultural norms of major export partners, which may in the future result in sustainability compliance requirements that might otherwise not seem intuitive in the Canadian context.

Against this backdrop, the overarching objective of this study is to provide an analysis of agri-food sustainability metrics and reporting schemes, including both voluntary and regulatory initiatives, which may imply market access requirements or constraints for Alberta agriculture and food products. More specifically, this study aims to:

1. understand and evaluate existing **sustainability tools, certification schemes and reporting systems** f**or agriculture and food products** based on the following criteria:

    a. **applicability** - the extent to which they are *relevant* for Alberta agri-food commodities (i.e. they refer to key commodities and/or markets)

    b. **accessibility** - how easily can they be used by producers, associations and/or practitioners

    c. **reliability** - the extent to which they are scientifically robust and consistent with recognized methodologies or standards

2. identify the most important sustainability indicators for social, economic and environmental performance assessment for certification and reporting applications based on current market requirements

3. identify specific **market access requirements for AB agri-food commodities** including but not limited to canola, chicken, egg and potato in relation to sustainability standards and certification requirements in international and domestic markets

This report describes the methods, analysis, and results of the study.

# Methods

## Screening for Priority Agri-Food Commodities

Several possible criteria could be considered as a basis for determining priority Alberta agri-food commodities and sectors for the purpose of efficiently delineating the scope of the study. These include, for example:

- production volume
- economic relevance
- AARD and/or other Government of Alberta body priorities

Identification of commodities and/or sectors to be included in the analysis was based on their significance. Here, significance was defined in terms of the comparative economic relevance of commodities when assessed against the total export values of Alberta agri-food commodities.

Total exports across commodities and sectors from the Province of Alberta were valued at 103.3 billion dollars in 2013 (Government of Alberta 2014). Of this, exports of agri-food products accounted for 8.4% or 8.7 billion dollars (AARD 2014).

Exports of agri-food commodities may be divided between the primary agricultural commodities sector (animals and crops) and the value-added agri-food commodities sector, which are largely food and beverage products. Exports of primary agricultural commodities accounted for 5.2 billion dollars (60%) of agri-food exports. Of this, wheat (including durum wheat) was the largest contributor at 2.3 billion dollars (44%), followed by canola (1.6 billion dollars or 31%) and cattle (0.5 billion dollars or 10%). The remaining 0.8 billion dollars (15%) of primary agri-food commodity exports were attributable to all other primary agri-food commodities (Government of Alberta 2014).

Exports of value-added agri-food commodities were dominated by meat products (1.8 billion dollars or 51%), grain and oilseed milling products (1.1 billion dollars or 31%), and fruit and vegetable products (0.2 billion dollars or 6%). All other value added agri-food products together accounted for 0.4 (or 11%) of the 3.5 billion dollars attributable to exports of Alberta value-added agri-food products in 2013 (Government of Alberta 2014).

On the basis of the roughly 60%/40% split between the primary and value-added agri-food commodity sectors in terms of contributions to total agri-food commodity exports, commodities from each of these two sectors were included in the analysis.

AARD (2014) reports exports of Alberta primary and value-added agri-food commodities by commodity group and value. In order to prioritize amongst agri-food commodities from these sectors, a cut-off criterion of 1% was applied based on the contributions of each agri-food commodity category to the total economic value of exports of Alberta agriculture and food commodities. Application of this criterion resulted in a selection of 16 agri-food commodity categories for inclusion in the analysis (Table 1). Together these account for 90% of agriculture and food product exports from Alberta in 2013. In addition to these product categories, AARD requested that an additional subset of commodities be included in the analysis. These are eggs, chicken, potatoes, animal semen, honey, and pulse crops.

**Table 1. Priority agri-food commodities considered in the study, as well as additional agri-food commodities specifically requested by AARD (all data from AARD 2014).**

| Priority Commodities | Export Value in 2013 | % Contribution |
|---|---|---|
| Wheat | 2,340.7 | 26.8% |
| Canola Seed | 1,617.8 | 18.5% |
| Beef (Fresh, Chilled, Frozen, Incl. Offal) | 962.0 | 11.0% |
| Other Cattle (Excl. Purebred) | 481.4 | 5.5% |
| Canola/Mustard Oil - Crude | 444.6 | 5.1% |
| Pork (Fresh, Chilled, Frozen, Incl. Offal) | 348.3 | 4.0% |
| Oilseed Cake and Meal | 229.9 | 2.6% |
| Animal Feed Preparations | 212.6 | 2.4% |
| Raw Hides and Skins | 204.5 | 2.3% |
| Processed Potatoes | 201.5 | 2.3% |
| Barley | 183.3 | 2.1% |
| Malt Roasted or not Roasted | 174.7 | 2.0% |
| Canola/Mustard Oil - Refined | 167.1 | 1.9% |
| Hay and Fodder (Incl. Dehy Alfalfa Cubes) | 104.6 | 1.2% |
| Tallow | 104.3 | 1.2% |
| Peas, Dried | 86.2 | 1.0% |
| All other Agri-food Products | 883.4 | 10.1% |
| | **8,746.9** | |
| Other Commodities to be Considered | | |
| Eggs | | |
| Chicken | | |
| Potatoes | | |
| Bovine Semen, Porcine Semen, Live Cattle, Purebred Semen, Live Hogs, Other Live Animals | | |
| Honey | | |
| Pulse Crops | | |

## Screening for Priority Agri-Food Export Markets

Alberta agri-food commodities are exported to a wide variety of trading partners. However, exports of agri-food commodities are particularly concentrated among a small subset of these trading partners. In 2013, the United States was the top export market by value for Alberta agri-food commodities, accounting for 35.2% of exports. China occupied second place at 17.3%, followed by Japan (14.7%), Mexico (6.1%) and Indonesia (2.5%) (AARD 2014). These five countries together accounted for over 75% of Alberta's total agri-food exports by value.

For exports of primary agricultural commodities, 25% went to the United States, 17% to Japan, 17% to China, 8% to Mexico and 3% to Indonesia. For value-added agri-food commodities, exports to the United States accounted for 49%, China 18%, Japan 12%, Mexico 4% and Hong Kong 4%. At the regional level, Asia accounted for the highest level of exports at 3.7 billion dollars, or 42% of Alberta's total agri-food commodity exports. Table 2 describes key export destinations and values (in millions of dollars) for a subset of the most valuable Alberta agri-food commodity exports.

AARD (2014) reports the value of Alberta agri-food exports by product category and export market. A cut-off criteria of 1% was applied based on the contribution of specific export market countries to the total export value of Alberta agri-food products in 2013 in order to prioritize amongst markets to considered in the study. The application of this criterion resulted in a selection of 12 key trading partners, which together account for 85% of Alberta agri-food commodity exports (Table 3). In addition to these priority export markets, ARRD requested that Canadian, EU-28, India, Vietnam, Philippines, Brazil, Australia, New Zealand and Singapore markets also be considered in the analysis. All sustainability schemes that were screened were checked for relevance in these identified markets.

In addition to country-level markets, large processors and retailers were also considered as markets in themselves. These markets were identified based on their involvement in existing sustainability schemes as well as their public CSR communications.

**Table 2. Highest value Alberta agri-food commodity exports by destination market and value.**

| Commodity | Market | Export Value 2013 (millions) | Total Commodity Export Value 2013 (millions) |
|---|---|---|---|
| **Canola Seed** | CHINA | 664.0 | |
| | JAPAN | 544.0 | |
| | MEXICO | 280.0 | |
| | USA | 111.2 | 1,367.3 |
| **Wheat** | USA | 364.7 | |
| | JAPAN | 204.0 | |
| | MEXICO | 125.0 | |
| | CHINA | 109.0 | |

| | | | |
|---|---|---|---|
| | INDONESIA | 174.0 | 976.7 |
| | | | |
| **Beef (Fresh, Chilled, Frozen, Incl. Offal)** | USA | 619.3 | |
| | MEXICO | 84.0 | 703.3 |
| **Canola/Mustard Oil – Crude** | CHINA | 432.0 | 432.0 |
| **Other Cattle (Excl. Purebred)** | USA | 480.3 | 480.3 |
| **Canola/Mustard Oil – Refined** | USA | 154.0 | 154.0 |
| **Processed Potatoes** | USA | 183.6 | 183.6 |
| **Raw Hides and Skins** | CHINA | 171.0 | 171.0 |
| **Pork (Fresh, Chilled, Frozen, Incl. Offal)** | JAPAN | 153.0 | |
| | USA | 85.0 | 238.0 |
| **Malt Roasted or not Roasted** | USA | 71.3 | |
| | JAPAN | 70.0 | 141.3 |
| **Animal Feed Preparations** | USA | 90.3 | 90.3 |

**Table 3. Priority markets to be considered based on % contribution to total exports, as well as additional priority markets specifically requested by AARD.**

| Export Country | Export Value (millions) | % Contribution |
|---|---|---|
| **(1) United States** | 3,080.3 | 35.2% |
| **(2) China** | 1,511.0 | 17.3% |
| **(3) Japan** | 1,288.9 | 14.7% |
| **(4) Mexico** | 536.3 | 6.1% |
| **(5) Indonesia** | 220.1 | 2.5% |
| **(6) Hong Kong** | 152.9 | 1.7% |
| **(7) Venezuela** | 128.6 | 1.5% |
| **(8) Korea, South** | 113.3 | 1.3% |
| **(9) Bangladesh** | 103.7 | 1.2% |
| **(10) Colombia** | 97.9 | 1.1% |
| **(11) Peru** | 90.9 | 1.0% |
| **(12) United Arab Emirates** | 88.3 | 1.0% |

| Additional Markets |
| --- |
| Canada |
| EU-28 |
| India |
| Vietnam |
| Philippines |
| Brazil |
| Australia |
| New Zealand |
| Singapore |

## Screening for Priority Sustainability Schemes

Identifying screening criteria for prioritizing amongst sustainability schemes to be considered in the analysis represented the most challenging aspect of the screening phase for this study. Sustainability schemes may include measurement standards, calculator tools, compliance checklists, and certification schemes for a spectrum of relevant indicators. Moreover, these may be administered by single companies, industry associations, governmental or non-governmental organizations. They may also differ widely in scale, popularity, and authority. Similarly, the nature and number of criteria considered may be quite variable. Criteria for prioritizing amongst schemes to be considered were therefore necessary in order to ensure that the most relevant schemes were considered in the study and that resources were not dedicated to evaluating schemes of lesser importance.

As a first, general level of screening, the schemes were evaluated against the previously established priority commodities and markets. Preference was given to those schemes which are applicable for the commodities and markets to be considered. However, it was also recognized that other high profile schemes should be considered where their authority/weight was sufficient to merit more general consideration, or where AARD specifically requested their inclusion.

Towards this end, a second, qualitative level of screening was implemented based on a rapid review of each scheme to assess their apparent authority, rigor, relevance from a scientific perspective, relevance from a civil society perspective, and scale of participation. This resulted in the selection of 21 schemes for detailed assessment. Of these, 7 were classified as “methods” (i.e. standards or guidance documents), 6 as “calculators,” 5 as “certification”, and 3 as “compliance checklist” schemes. It should be noted that some schemes could potentially fall under multiple of these classifications. Single classifications have been chosen for each scheme for the purpose of the current analysis.

## Matrices for Evaluation of the Selected Sustainability Schemes

Once this short-list of sustainability schemes to be included in the analysis was compiled, it was next necessary to establish a systematic basis for assessing and comparing each scheme against the criteria of applicability, accessibility, and reliability. Towards this end, assessment matrices were developed for each criterion. Performance was assessed using a "stop-light" system, whereby a scheme could be scored for each sub-criterion based on the extent to which it satisfied the criterion (i.e. red for "does not satisfy the sub-criterion", yellow for "somewhat satisfies the sub-criterion", and green for "satisfies the sub-criterion." A "not applicable" assignment was possible where sub-criteria were not relevant for the assessment of specific schemes. A notes section was also included for each matrix.

Once scores were assigned for all sub-criteria, weighted average scores were subsequently calculated for each criterion (i.e. applicability, accessibility, reliability). Here, weights of 0, 1, and 2 were assigned to red, yellow and green ratings, respectively. The overall score for each scheme and criterion were calculated by dividing the sum of the sub-criteria scores by the total possible score (i.e. number of criteria for which a green rating could have been applied multiplied by two, not including sub-criteria where a "not applicable" rating had been applied). This allowed ranking the schemes based on their scores for each of the three criteria. It also provided the basis for deriving overall, unweighted average scores and rankings for each scheme (i.e. average of applicability, accessibility, reliability scores). Table 4 describes the sub-criteria applied.

In addition to the matrix evaluation, the indicators employed in each of the schemes were tallied in order to create an indicator ranking based on frequency of use. Similar indicators were grouped into categories for the purpose of this ranking. On the basis of the evaluation results, the most relevant schemes and indicators were determined (i.e. based on scheme scores and indicator usage), with reference to priority commodities and markets.

**Table 4. Matrices of sub-criteria applied for evaluating the selected sustainability assessment schemes for applicability, accessibility, and reliability.**

| APPLICABILITY |
| --- |
| Evaluation Criteria |
| The scheme... |
| (1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request |
| (2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD |
| (3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers |
| (4) specifically fulfills regulatory requirements |
| (5) is widely recognized at the product/sectoral level |
| (6) is widely recognized by the public |
| (7) has or likely will have broad participation |
| (8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders |
| Totals |
| Weighted Applicability Score |
| ACCESSIBILITY |
| Evaluation Criteria |
| The scheme... |
| (1) provides clear information as to its purpose and applicability |
| (2) provides clear guidance documents in support of its implementation |
| (3) is accessible to a non-methods expert audience |
| (4) requires data that is reasonably accessible |
| (5) has supporting tools/software that facilitate its implementation |

(6) does not have high enrolment costs

(7) does not have high implementation costs

(8) has streamlined recertification requirements

(9) is supported by FAQ responses and similar support resources

(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase

Totals

Weighted Accessibility Score

RELIABILITY

Evaluation Criteria

The scheme...

(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process

(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability

(3) has a clearly defined purpose

(4) has a clearly defined scope

(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting

(6) requires clear and systematic definition of system boundaries

(7) clearly defines requirements for cut-off criteria

(8) provides detailed guidance regarding allocation

(9) provides specific requirements regarding documentation of assumptions

(10) provides clear requirements regarding data quality

(11) provides clear requirements for data collection

(12) provides clear requirements for data validation

(13) provides clear requirements for data gap filling

(14) provides clear and robust criteria and indicators for performance assessment

(15) provides clear and robust methods for performance assessment for each indicator

(16) provides clear requirements regarding communication of results

(17) specifies requirements for results to be disclosed to the public

(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced

(19) is subject to third-party verification

(20) specifies criteria and requirements for auditors and auditing

(21) is administered by a recognized authority

Totals

Weighted Reliability Score

# Results and Discussion

## Overview of Sustainability Schemes Considered

Twenty-one sustainability schemes were selected for detailed assessment. Of these, seven were classified as "methods" (i.e. standards or guidance documents), six as "calculators," five as "certification", and three as "compliance checklist" schemes. Table 5 summarizes the selected schemes by scheme type, the Alberta-relevant commodities to which they refer, and the markets to which they apply.

**Table 5. Sustainability schemes selected for detailed assessment.**

| Sustainability Scheme | Scheme Type | Relevant Commodities | Relevant Markets |
|---|---|---|---|
| (1) European Commission Product Environmental Footprint | Methods | all | EU-28 |
| (2) BASF AgBalance | Methods | all | non-specific |
| (3) LEAP guidelines | Methods | chicken and feed inputs (oilseed cake and meal, wheat, canola) | non-specific |
| (4) ENVI-Food Protocol | Methods | all | EU-28 |
| (5) PAS 2050 | Methods | all | non-specific |
| (6) Greenhouse Gas (GHG) Protocol | Methods | all | non-specific |
| (7) Stewardship Index for Specialty Crops | Methods | potatoes | processors/retailers |
| | | | |
| (8) CoolFarm Tool | Calculator | all | major retailers |
| (9) FeedPrint | Calculator | feed inputs (oilseed cake and meal, wheat, canola) | Netherlands, potentially EU-28 |
| (10) Holos | Calculator | all (whole farm) | Canada |
| (11) Field to Market "Fieldprint" | Calculator | wheat, potatoes | US, major processors and retailers |
| (12) Canadian Fieldprint calculator | Calculator | wheat, canola, pulse crops | Canada, major processors and retailers |
| (13) Canadian Crop Carbon Footprint Lookup Tool | Calculator | barley, canola | Canada, EU-28 |
| | | | |
| (14) Food Alliance | Certification | crops and livestock | US |
| (15) International Sustainability and Carbon Certification | Certification | canola | EU-28 |
| (16) Roundtable on Sustainable Biomaterials | Certification | primarily for bioenergy feedstocks | EU-28 |
| (17) GlobalGap | Certification | all | non-specific |
| (18) CanadaGap | Certification | potatoes | Canada |
| | | | |
| (19) Unilever Sustainable Sourcing Program for Agricultural Raw Materials | Checklist Compliance | all | Unilever |
| (20) Sustainability Consortium Product Sustainability Toolkits | Checklist Compliance | beef, barley and malt, wheat, chicken | Walmart, other major processors and retailers |
| (21) Sustainable Agriculture Initiative (SAI) Farm Sustainability Assessment 2.0 | Checklist Compliance | all | major processors and retailers |

Numerous other food sustainability schemes exist, but were not deemed sufficiently relevant for inclusion in the current analysis. These include, for example: Red Tractor Assured Fresh Produce; Linking Environment and Farming (LEAF); Local Food Plus; More Profitable Sustainability (MPS); Protected Harvest; SIP Certified; Nurture (Tesco); Freshcare; Safe Quality Food (SQF); and RSPCA Freedom Food.

## Methods

"Methods" are here defined as initiatives and resulting documents whose primary intention is to establish measurement and reporting norms for sustainability assessment. The documents reviewed in this section are largely methodological standards and supporting guidance materials that may be relevant to measuring and communicating sustainability performance for agri-food production systems and products. Some such initiatives may also have supporting calculation tools for implementing the methods.

### *European Commission Product Environmental Footprint*

The European Commission (EC) Product Environmental Footprint (PEF) (European Commission 2015) is a methodological guidance document for life cycle assessment of goods and services. The methods specified are based on ISO 14044, the international reference norm for life cycle assessment, and were also developed taking into consideration the methods and guidance provided by other internationally-recognized LCA protocols. The intention of the PEF methods is to provide for a greater degree of consistency and reproducibility between LCA studies such that they might be used in association with policy instruments. This is achieved through the specification of more prescriptive guidance than is afforded by ISO 14044. The PEF methods will be complemented with product category rules (currently being developed). Some pilot product category rule initiatives for agri-food products are now underway.

The PEF methods have been adopted as the reference methods for EC policy initiatives, and will likely be used to develop product category benchmarks for environmental performance. The European Commission has previously implemented market requirements for sustainability through the EU Renewable Energy Directive. These requirements apply to biofuel feedstocks, including those imported from third countries. If similar approaches are developed for other agri-food commodities, there is a possibility that demonstration of performance based on assessments using the EC PEF methods may be required. In this sense, the EC PEF methods may become relevant for the Alberta agri-food sector.

### *BASF AgBalance*

BASF AgBalance (BASF 2015) is a proprietary method for measuring agricultural sustainability. The method employs indicators of environmental, social and economic performance. In total, 69

sustainability indicators based on over 200 evaluation criteria are employed. A weighting system is implemented in order to produce aggregate sustainability indicator results.

Studies carried out using this method are intended to help agriculture stakeholders identify and better manage the key sustainability drivers of a given production system. The method is life cycle-based, and hence enables consideration of upstream, farm-level, and downstream supply chain activities. Clients may choose to focus on single products or production systems, or to compare different farming systems, processes and products. The method must be implemented by BASF on a consultancy basis. It seems unlikely that the BASF AgBalance method will be widely requested by customers of Alberta agri-food commodities, nor be required in association with target market policy initiatives.

### *Livestock Environmental Assessment and Performance (LEAP) Partnership Guidelines*

The LEAP partnership is a multi-stakeholder initiative convened by the United Nations Food and Agriculture Organization (2015) whose aim is advance harmonized methods for life cycle-based environmental assessments in the livestock sector. The partnership also publishes global benchmark studies. To date, draft sector-specific methodological guidelines have been produced for measuring the environmental performance of animal feeds supply chains, and for assessing greenhouse gas emissions and fossil energy demand for poultry and small ruminant supply chains. These methods may potentially become influential reference documents for the development of more specific sustainability schemes.

### *ENVI-Food Protocol*

The ENVI-Food Protocol is a harmonized life cycle-based methodology guidance document produced by the European Food Sustainable Production and Consumption Round Table (2015). The methodology is applicable for all food and drink products. It is based on ISO 14044 and compliant with the EC PEF methods. It is intended to provide additional food sector-specific guidance for LCA studies, and is positioned as bridging the gap between the PEF guide and more specific product category rules. The Protocol employs 12 default, mid-point environmental impact indicators.

Given the development of product category rules for food and drink products based on the PEF methods, it is unclear to what extent the ENVI-Food Protocol may become relevant for EU-28 markets.

### *PAS 2050*

PAS 2050 is a methodological, life cycle-based greenhouse gas accounting standard developed by the British Standards Institute (2015) in cooperation with Defra and the Carbon Trust, along with input from industry and other stakeholders. The method is intended to provide for greater consistency in the evaluation of supply chain GHG emissions for products or services. The methods are based on ISO 14040 and 14044. As one of the first credible methods developed for GHG accounting, PAS 2050 enjoys a

relatively high level of recognition and implementation. Guidance documents for use of PAS 2050 have been published by the Carbon Trust, along with a Code of Good Practices on GHG Emissions and Reductions Claims. Third-party certification is required in order to use the results of PAS 2050 studies for claims and labeling purposes. It is possible that some European markets may request information from Alberta agri-food producers in order to support, for example, carbon footprint labeling.

### *Greenhouse Gas (GHG) Protocol*

The Greenhouse Gas Protocol is a series of methodological guidance documents for life cycle-based assessments of organizations, products and services. A specific Agricultural Guidance document is also available. These guidance documents were developed by the World Resources Institute and the World Business Council on Sustainable Development (2015). The Protocol is intended to provide a global standard for measuring, managing and reporting GHG emissions. It supports quantification and communication of GHG emissions in terms of three "scopes." Scope 1 quantification is limited to direct, facility-level emissions. Scope 2 quantification includes, in addition to Scope 1, emissions related to purchased electricity and steam. Scope 3 quantification refers to a comprehensive, supply chain analysis of life cycle emissions. The GHG Protocol may be the most widely recognized standard for GHG accounting globally, in particular amongst large companies.

### *Stewardship Index for Specialty Crops*

The Stewardship Index for Specialty Crops (SISC) (2015) is a multi-stakeholder initiative to develop sustainability assessment metrics for specialty crop supply chains. These metrics are intended to support operators in benchmarking, comparing and communicating their performance. To date, the SISC has developed working metrics for five resource and environmental indicators (Applied Water Use Efficiency, Energy Use, Nitrogen Use, Phosphorus Use, and Soil Organic Matter). The initiative is currently working on additional metrics for Biodiversity and Ecosystem, Greenhouse Gases, and Simple Irrigation Efficiency. The initiative also provides a demonstration calculator for data collection and processing of metric-specific data. The metrics are cross-compliant with a subset of The Sustainability Consortium's Key Performance Indicators. Detailed methods sheets and instructions are available. Several industry associations, large food processors, and retailers are members of the SISC. Reporting based on these metrics may potentially be requested of Alberta agri-food producers in the future – in particular, for potatoes.

## Calculators

Calculators are here defined as on-line or downloadable tools whose primary purpose is to allow direct calculation of the sustainability performance of agri-food production or products. The materials reviewed for this analysis are the calculators themselves as well as supporting, publically available methods and guidance documents.

### *Cool Farm Tool*

The Cool Farm Tool is an online, greenhouse gas emissions calculation tool for farming. It is also available in Excel format). It is intended for use both by farmers and food supply chain managers in support of greenhouse gas emission reduction strategies and supply chain management. The Cool Farm Tool is free to use, but membership fees provide access to fee-paying features such as saving analytical results. The tool was developed by Unilever and the University of Aberdeen (2015). It is now used by a variety of companies internationally, and has emerged as the leading online GHG emissions calculator for agriculture.

### *FeedPrint*

FeedPrint is a calculator tool and supporting database for assessing the life cycle GHG emissions of animal feed supply chains. The calculator was developed by Wageningen University and Blonk Milieu Advies (2015) in the Netherlands. The tool will be expanded to a full LCA calculator. Detailed methodological documentation and support are available online. FeedPrint is currently being used in several EU and international initiatives. The calculator may potentially be relevant for Alberta agri-food producers in the future, in particular if FeedPrint is used to support PEF initiatives.

### *Holos*

Holos is a whole-farm model and supporting Excel-based calculator that can be used to estimate and manage greenhouse gas emissions for Canadian farms. The tool was developed by Agriculture and Agri-food Canada (2015). It provides for both emissions quantification and scenario testing of mitigation options. Holos uses farm-specific data, along with data previously collected and compiled for Canadian farming activities. Emission sources considered in the tool include farm-level energy use, cropping activities, enteric fermentation, manure management, and carbon storage/loss from land use change and management. The Holos algorithms are currently also being used in the recently developed Canadian Fieldprint calculator.

### *Field to Market "Fieldprint" Calculator*

The Fieldprint Calculator is a freely available tool for evaluating the environmental performance of corn, cotton, rice, wheat, potato and soybean production in the United States. The indicators employed are land use, conservation, soil carbon, irrigation water use, water quality, energy use, and greenhouse gas emissions. The calculator uses farm-specific data along with supporting datasets and methodologies from various sources. Fieldprint was developed by the Field to Market (2015) initiative, which is a multi-stakeholder group of industry, NGO, research, and government partners. Membership includes a broad suite of large US agri-business firms, industry associations and retailers. Reporting using the Fieldprint metrics may potentially be requested of Alberta wheat and potato producers by large processor and retailer partners.

### *Canadian Fieldprint Calculator*

The Canadian Fieldprint Calculator (Serecon 2015) is currently being developed in parallel to the US initiative. As this is a relatively new initiative, limited information was available for analysis. A pilot study of several Western Canadian field crops has, however, already been conducted. The associated report provides an overview of the metric development process and methodologies.

The calculator provides for assessment of land use efficiency, soil erosion risk, energy use, climate impact, and soil carbon release for Canadian crops. GHG emissions are estimated using the Holos algorithms. The calculator will provide for assessment of a broader suite of crops than does the American calculator.

Membership in this initiative is similarly comprised of a suite of stakeholders, including industry associations, major processors and food companies, and civil society groups. In light of the stakeholders involved and the momentum of the US initiative, this calculator may potentially be relevant for Alberta agri-food producers in the future, in particular with respect to compliance with customer requirements.

### *Canadian Crop Carbon Footprint Lookup Tool*

Very little information is publically available regarding the Canadian Crop Carbon Footprint Lookup Tool (Rogoza 2015), although a detailed description of the methodology was provided under condition of non-disclosure for the purpose of the current analysis. This downloadable calculator tool supports estimation of GHG emissions for barley and canola production at the regional scale. It was primarily developed in response to requirements to demonstrate compliance with the GHG emissions requirements of the EU Renewable Energy Directive.

## Certification

Certification schemes are here defined as programs that require third-party verification of sustainability performance against a publically available standard. Such schemes may be implemented for the purpose of business-to-business communication, business-to-consumer communication (for example, labeling), or certification of compliance with regulatory requirements.

### *Food Alliance*

Food Alliance (2015) is a US-based sustainability certification scheme for food and agriculture. According to the Food Alliance website, the purpose of certification is to support agricultural operations, food processors and distributors to:

- "Protect, conserve and enhance soil, water, wildlife habitat and biodiversity
- Conserve energy, reduce and recycle waste
- Reduce use of pesticides and other toxic or hazardous materials
- Maintain transparent and traceable supply chains
- Support safe and fair working conditions
- Guarantee food product integrity, with no genetically engineered or artificial ingredients
- Ensure healthy, humane animal treatment
- Ensure continual improvement of practices"

The Food Alliance currently offers certification according to five standards, three of which are potentially relevant for Alberta agri-food producers. These are standards for crop operations, livestock operations, and food handling operations (i.e. packing, processing and distribution facilities). Food Alliance certification may be recognized by some US retailers and consumers.

### *International Sustainability and Carbon Certification*

The International Sustainability and Carbon Certification (2015) scheme is among the leading schemes for certifying compliance with sustainability and greenhouse gas emissions requirements. In particular, it is widely used in order to certify compliance with the sustainability requirements of the EU Renewable Energy Directive. A specific certification program for food, feed, and other bioenergy applications has also been developed. This program may potentially be of relevance for Alberta animal fat, cereals, vegetable oils, and potato producers. Indeed, it is already likely used by Alberta canola producers to facilitate access to EU markets.

ISCC was developed with guidance from a broad suite of stakeholders.

### *Roundtable on Sustainable Biomaterials*

The Roundtable on Sustainable Biomaterials (2015) similarly provides a standard for certification of bioenergy and other biomaterial feedstocks (for example, for bioplastics or lubricants). A consolidated version is applied for certification of compliance with the EU Renewable Energy Directive. Third-party certification by an accredited body is necessary. The standard refers to 12 principles and their supporting criteria: legality; planning, monitoring and continuous improvement; greenhouse gases, human and labor rights; rural and local development; food security; conservation; soil; water; air; technology; land rights. This certification program may be relevant for a subset of Alberta agri-food commodities, in particular canola.

### *GlobalGAP*

GlobalGAP (2015) is an initiative that develops umbrella certification programs for good agricultural practices (GAP). The intention is to support assessment and business-to-business communication of compliance with standards for safe and sustainable food production. GlobalGAP certification initiatives are currently operational in over one hundred countries. GlobalGAP supports national and local initiatives in developing cross-compliant certification programs. GlobalGAP certification could potentially be requested of Alberta agri-food producers/processors by supply chain partners.

### *CanadaGAP*

CanadaGAP (2015) is a food safety certification program that is cross-compliant with the food safety component of GlobalGAP. The food safety requirements are derived using the HACCP approach. CanadaGAP standards cover the production and handling of fresh fruits and vegetables, and hence are relevant for the Alberta potato industry. A variety of Canadian retailers, including Sobeys, McCain Foods, Loblaws and Metro require producers to implement CanadaGAP practices, as described in the manuals for CanadaGAP certification. Producers may choose a four year or annual audit cycle, with different fee levels. Certification can be provided by one of several certification bodies. Certification requires an on-farm audit and follow-up for compliance with any identified mitigation requirements.

## Checklist Compliance

Checklist compliance programs are here defined as sustainability schemes where checklists with respect to a subset of sustainability indicators or best practices may be self-assessed or assessed by a third party. Checklist compliance approaches are employed by some of the more well established or well known sustainability schemes for food and agriculture, including the SAI Platform, the Unilever

Sustainable Sourcing Program, and The Sustainability Consortium. They seem to be particularly popular in the context of initiatives driven by large food processors and retailers, who wish to ensure that the numerous producers from whom they derive agri-food commodities are observing best practices that are consistent with their corporate social responsibility strategies and initiatives. Such schemes are considered by some to be less rigorous than those that actually require measurement-based reporting or certification.

### *Unilever Sustainable Sourcing Program for Agricultural Raw Materials*

The Unilever Sustainable Sourcing Program for Agricultural Raw Materials (Unilever 2015) was developed to support Unilever's ambition to source all of their raw materials sustainably by 2020. Unilever defines sustainable agricultural practices as those that ensure that:

- "Farmers and farm workers can obtain a liveable income and improve living conditions
- Soil fertility of agricultural land is maintained and improved
- Water availability and quality are protected and enhanced
- Nature, biodiversity and climate are protected and enhanced."

Unilever has developed a set of implementation guidelines for their program, which include mandatory requirements, continuous improvement benchmarks, and disclosure and reporting requirements for suppliers. The guidelines cover a range of socio-economic and environmental sustainability considerations. Requirements for sourcing materials from agriculture are outlined in the Unilever Sustainable Agriculture Code (SAC), which also has supporting scheme rules guidance. Since Unilever typically sources from suppliers (i.e. large processing plants) rather than directly from producers, suppliers are required to adhere to the Unilever Supplier Code. This, in turn, requires suppliers to implement Unilever's sustainable sourcing requirements by requiring that farms are either certified against an external standard which Unilever formally recognizes as compliant with their principles and practices of sustainable agriculture, or that farmers are actively engaged in self-verification of compliance with the Unilever SAC. A minimum of 30 farms supplying materials to the processing plant must be selected for self-verification annually. Unilever commissions third-party verifiers to spot audit their suppliers.

Among Unilever's 10 priority areas for sustainable sourcing, those of relevance for Alberta include potatoes, canola oil, and eggs (the target is 100% cage free eggs by 2020).

### *Sustainability Consortium Product Sustainability Toolkits*

The Sustainability Consortium (2015) is a network of member and partner organizations whose mandate is to develop science-based decision support tools for improving the sustainability of consumer products. The Consortium is jointly administered by the University of Arizona and the University of Arkansas. It currently represents over 100 of the world's largest organizations, many of these active in

the food sector (for example, Cisco, Coca Cola, Cargill, Dow, Dupont, Kellogs, Mars, General Mills, Campbells and Hersheys).

The Sustainability Consortium is continuously developing their Sustainability Measurement and Reporting System, which is tailored to the product category level. Working Groups are tasked with developing product category-specific decision support material. The decision support material for each product category consists of Sustainability Insights and Product Sustainability Toolkits. The Sustainability Insights are publically available for download. They provide an overview of key supply chain variables for sustainability management.

Product Sustainability Toolkits are available to TSC affiliates only. These are interactive tools that highlight important sustainability issues for each product category, describe mitigation measures, and specify Key Performance Indicators for tracking and measuring performance. The Key Performance Indicators are largely checklist metrics that companies can use to assess their supply chain partners for compliance. Walmart is the leading example of a major retailer using The Sustainability Consortium's toolkits to monitor suppliers.

The Food, Beverage, and Agriculture Sector Working Group was the first sector-level group to be established. The Working Group's mandate is to improve the environmental and social sustainability of global agricultural supply chains. The Working Group has developed product category-specific decision support material for 15 product categories to date. Those of relevance for Alberta include beef, chicken, eggs, pork, grains, barley and malt, beans/lentils/peas, bread, and potatoes.

### *Sustainable Agriculture Initiative (SAI) Platform Farm Sustainability Assessment 2.0*

The Sustainable Agriculture Initiative Platform (2015) is a global platform for food and drink industry stakeholders to engage in sustainable agriculture initiatives. It was created by Nestle, Unilever and Danone in 2002, and currently has over 60 members. The SAI Platform defines sustainable agriculture as "the efficient production of safe, high quality agricultural products, in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities, and safeguards the health and welfare of all farmed species."

A central goal of the SAI Platform is "developing sustainable agriculture for mainstream agricultural produce through a continuous improvement process that allows for an easier and more flexible adoption by farmers, worldwide." Towards this end, the Platform has initiated five working groups focused on arable and vegetable crops; beef, coffee, dairy, and fruit. It also has four committees devoted to cross-cutting agricultural challenges, specifically: biodiversity; farmer and supplier partnerships; farm sustainability assessment; and water.

An important activity area for the SAI Platform is developing resources, guides and tools to support food and drink companies in sustainable sourcing, in particular with respect to assessing and measuring sustainable agricultural practices throughout their supply chains. The Farm Sustainability Assessment 2.0

is a tool to support both farm-level sustainability management and sustainable sourcing. It covers environmental, social and economic aspects that reflect the SAI Platform's Principles and Practices for Sustainable Agriculture. The tool is currently suitable for assessing all crops, but does not include livestock. It largely provides for checklist/self-scoring against defined best practices.

In 2014, the SAI Platform also published "Sustainability Performance Assessment Version 2.0: Towards Consistent Measurement of Sustainability at Farm Level" (Kuneman et al. 2014). The purpose of this report is to guide developers of farm-reporting tools, indicators, methodologies and approaches. This report includes recommendations for methods and indicators specific to: climate and energy; pesticides; soil quality; water quantity; nutrients; biodiversity; land use; and animal welfare.

## Assessment Results for the Selected Sustainability Schemes

The twenty-one sustainability schemes that were selected for analysis were each evaluated against the matrices for applicability, accessibility and reliability. This assessment was based on a review of publically available documents (with the exception of the Canadian Crop Carbon Footprint Lookup Tool, where a methods document was obtained under non-disclosure agreement) for each scheme that were identified via a web search. The review was largely qualitative, and scheme operators were not contacted for verification of the analysis. Rather, the scoring reflects the reviewer's judgment of the quality of the scheme relative to best available approaches for each sub-criterion. The results are presented in figures for each criterion, with schemes ranked by score (lowest to highest) from top to bottom.

### Applicability

Applicability is a function of: whether or not a scheme refers to a relevant Alberta agri-food commodity; and is/may become specifically recognized or required in an important market or by major customers. Figure 1 presents the ranked scores for applicability for each scheme.

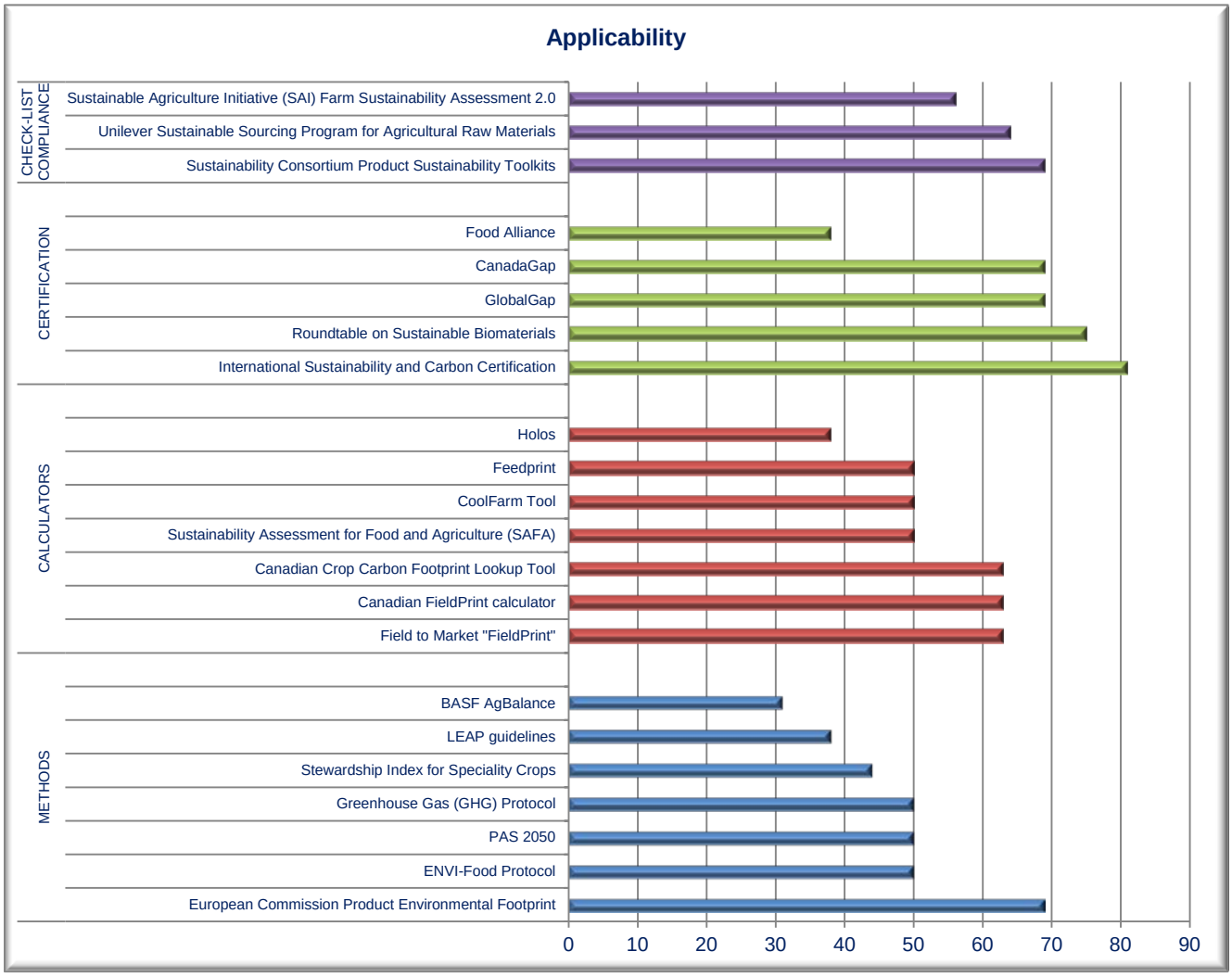
Few of the schemes are (or may become applicable) as a result of policy initiatives in major markets. Important exceptions here include European initiatives, where regulated corporate social responsibility is already a reality. Indeed, Alberta canola producers are experiencing and having to respond to EU legislated sustainability requirements laid out in the Renewable Energy Directive so as to ensure market access for bioenergy feedstocks like canola. Here, certification schemes such as International Sustainability and Carbon Certification, and the Roundtable on Sustainable Biomaterials, as well as the Canadian Crop Carbon Footprint Lookup Tool are directly applicable to maintaining market access.

The European Commission Product Environmental Footprint methods, in particular, may also become widely applied in association with future EU policy initiatives. Related methods and supporting tools and data sources like the ENVI-Food Protocol and FeedPrint calculator may therefore gain relevance in the Alberta context as well.

Outside of the EU, which is not currently a major market for the agri-food commodities considered, a more important driver of potential market access requirements will likely be supply chain partners – in particular, large food processors and retailers. In light of publicized commitments from industry giants like Unilever and Walmart regarding sustainable sourcing, it seems likely that Alberta agri-food producers will be required to demonstrate compliance with certification or check-list compliance initiatives in the future in order to maintain market access. Initiatives like the Field to Market Fieldprint calculator (US and Canadian), and checklist compliance approaches such as The Sustainability Consortium's Key Performance Indicators and Unilever's Sustainable Agriculture Code may be of

particular relevance. For Alberta potato producers, CanadaGAP certification is already required by some customers. In contrast, those sustainability schemes that are not directly linked to policy initiatives or championed by major supply chain partners are unlikely to significantly impact on market access opportunities for Alberta agri-food products.

**Figure 2. "Applicability" scores (ranked from lowest to highest) for each of the reviewed sustainability schemes.**



## Accessibility

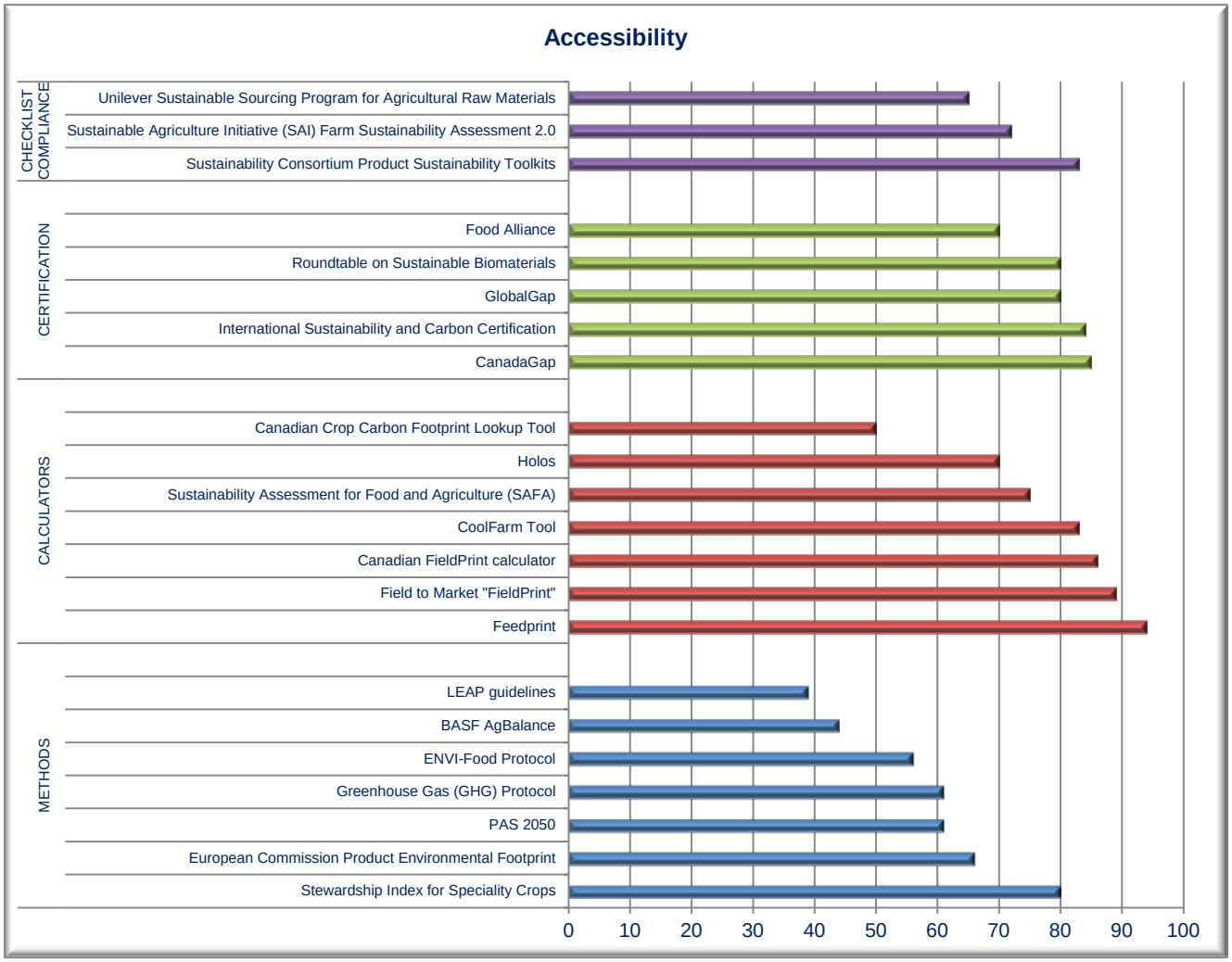
Accessibility is a function of: the clarity of purpose of a sustainability scheme; the ease of implementation (including the availability of supporting information, guidance documents, and calculation tools); and the cost of implementation or participation. Figure 2 presents the ranked scores for accessibility for each scheme.

Depending on the nature of the sustainability scheme, accessibility scores were influenced by different among the sub-criteria applied. For example, methods that establish norms for sustainability accounting tend to be less accessible in that they may require expert knowledge for their implementation. This is particularly true of methods like the EC PEF, PAS 2050, and the GHG Protocol. Engaging expert consultants will likely be required in order to implement these methods to a high standard, hence cost may also be a consideration. However, such methods often also have detailed supporting guidance and tools, and most are freely available.

In contrast, calculators and compliance checklists tend to be more accessible in terms of ease of use because they are usually specifically designed to be user friendly for farmers and other supply chain partners. Here, what might otherwise be challenging methodological and data issues have already been resolved, and users need only focus on describing their own activities accurately.

Many of the schemes reviewed are freely accessible, or have nominal associated fees. For those requiring third-party implementation (for example, BASF AgBalance), certification (for example, CanadaGAP and Food Alliance certification), or license fees (for example, to access The Sustainability Consortium Product Toolkits), cost may potentially present a barrier for some producers.

**Figure 3. "Accessibility" scores (ranked from lowest to highest) for each of the reviewed sustainability schemes.**



## Reliability

Reliability is a function of methodological transparency and rigor vis-à-vis best available practices. Figure 3 presents the ranked scores for reliability for each scheme.

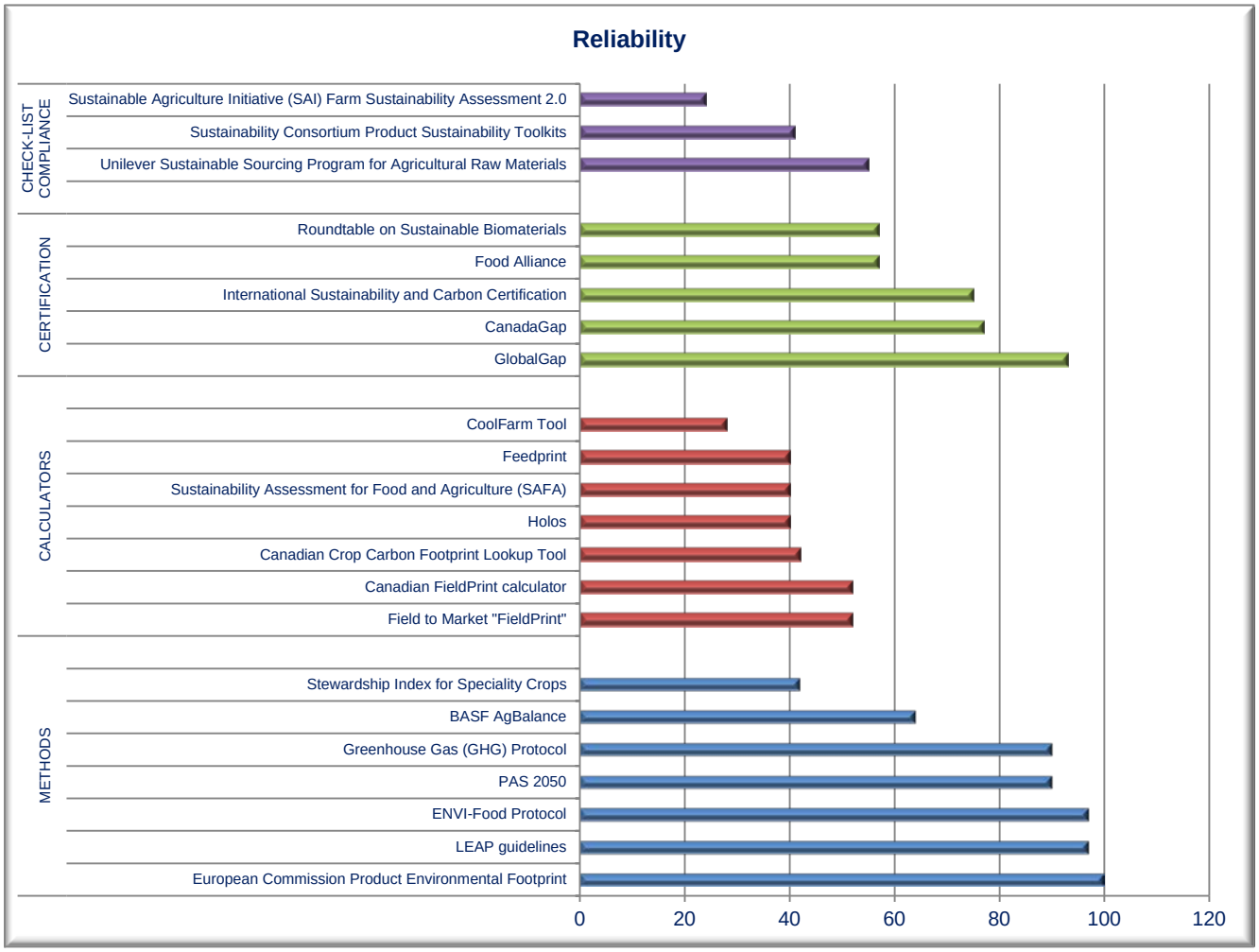
Assessing the reliability of each sustainability scheme considered required examining publically available supporting documentation and evaluating the schemes for each reliability sub-criterion based on the reviewer's own knowledge of sustainability assessment methods norms (it should be noted here that, in the case of the Canadian Crop Carbon Footprint Lookup Tool, reliability was assessed based on a methods report that is not currently publically available, but which was provided under condition of non-disclosure for the purpose of the current analysis). Low scores may reflect a low level of methodological prescription. In the reviewer's experience, schemes that provide flexibility in methodological choice are considerably less likely to provide for robust, consistent, and reproducible results than are schemes where users are not required to choose among methodological alternatives. Calculator tools tend to be most reliable in this sense in that the majority of methodological decisions have already been made and built into the calculator algorithms. However, if the calculator methodologies are not, themselves, consistent with best practice, the schemes cannot be considered to be reliable.

Another important consideration for reliability is the extent to which choices of analytical boundaries or score levels may be subjective. This risk is particularly high for certification and checklist compliance schemes, whether self or third-party assessment is required.

Although perhaps most important amongst the three criteria of applicability, accessibility, and reliability in terms of ensuring the effectiveness of a given sustainability scheme, reliability is arguably the least important criterion for market access. Outside of regulatory initiatives, where methodological reliability will likely be prioritized, market access considerations will largely be determined by the extent to which participation in specific sustainability schemes are required by supply chain partners. Interestingly, the reliability scores assigned in this analysis tend to be lowest for those schemes that are most likely to be required by supply chain partners and also have the broadest participation levels.

Differences in the preferred approach to sustainability schemes that is observed between North America and Europe likely reflect important political and social differences with respect to sustainability management. Regulatory solutions are more likely to be favoured in Europe, compared to industry-led, market-based initiatives in North America.

**Figure 4. "Reliability" scores (ranked from lowest to highest) for each of the reviewed sustainability schemes.**



### Average Scores by Scheme and Scheme Type

Figure 4 presents the unweighted, average scores for the three criteria for each scheme. Overall scores vary widely across the 21 sustainability schemes that were evaluated from as low as 46% (BASF AgBalance) to as high as 81% (GlobalGAP certification). Other high scoring schemes included the EC PEF methods (methodologically robust and likely required in association with future EU policy initiatives), the Fieldprint calculators (likely to be required by some supply chain partners), ISCC and CanadaGAP certification programs (already required by some supply chain partners), and the check-list compliance programs of major food processors and retailers.

Examining scores by scheme type, scores for each criterion were not consistently higher for one scheme type over the others. For example, methods schemes received the highest scores for reliability, but the lowest scores for applicability. Certification schemes did, however, score highest for applicability and accessibility, and second highest for reliability. Certification schemes also received the highest overall average score, while calculator schemes received the lowest overall average score. Figure 5 presents the unweighted average scores for “applicability,” “accessibility,” and “reliability” by scheme type.

It may be desirable, however, for AARD to apply internally-derived weightings for each criterion. These might be based on policy priorities for approaches to furthering sustainability objectives for food and agriculture in Alberta, or for supporting Alberta agri-food producers in maintaining and improving market access. Any such weighting scheme may result in different overall scores and prioritization amongst schemes than are indicated by the current analysis.

**Figure 5. Unweighted, average scores (ranked from lowest to highest) for the criteria "applicability," "accessibility," and "reliability" by scheme.**

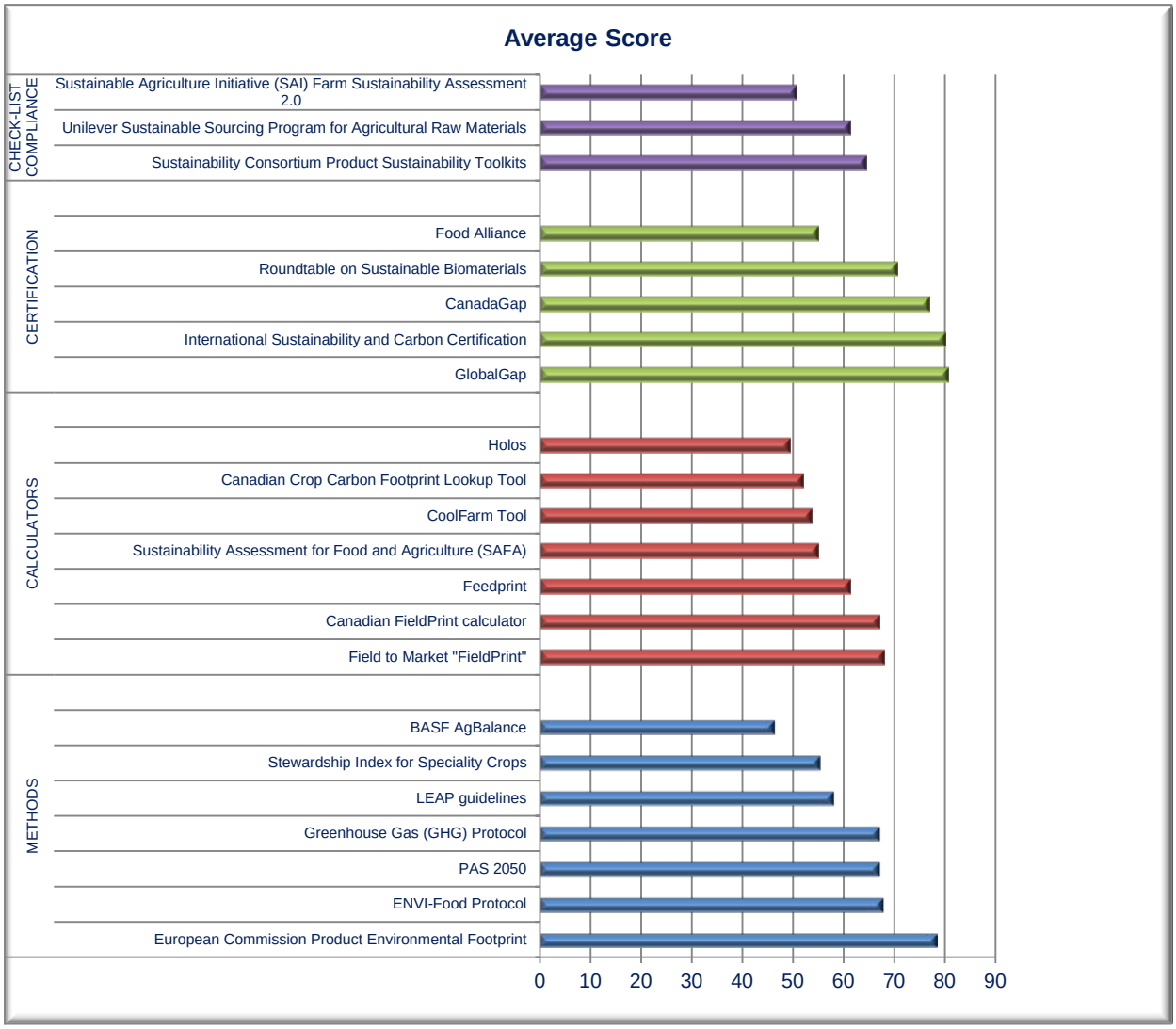
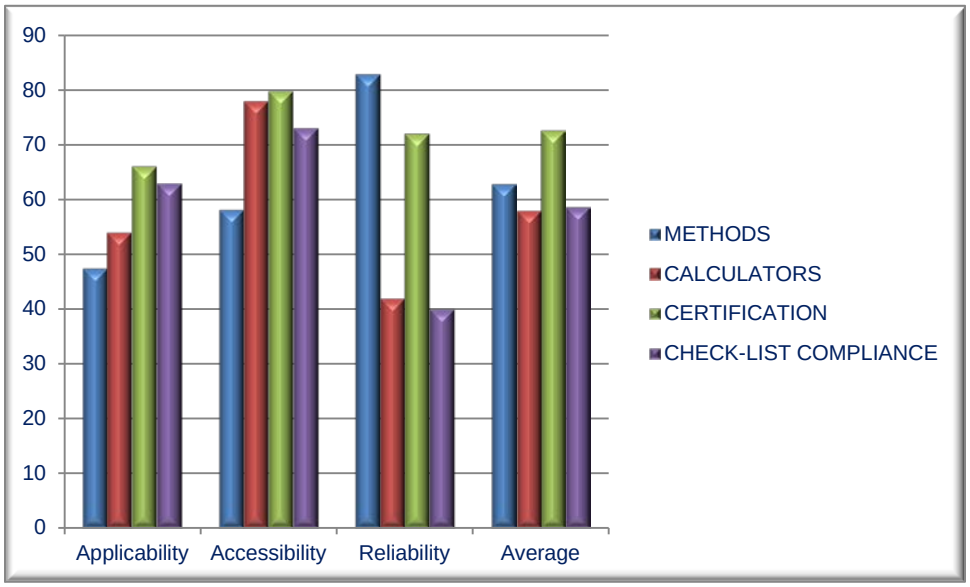


**Figure 6. Unweighted, average scores for the criteria "applicability," "accessibility," and "reliability" by scheme type.**



## Priority Indicators

Table 6 and Figure 6 summarize the indicators employed in each of the 21 sustainability schemes that were evaluated, and a summary of indicator counts. Almost all of the schemes reviewed included a greenhouse gas emissions indicator, and five of the schemes included only this indicator. The GHG emission indicator was, by a considerable margin, the most popular indicator across sustainability schemes.

Most of the schemes, however, also included multiple other indicators. Moreover, only six of these referred strictly to resource and environmental indicators. The most popular resource and environmental indicators were greenhouse gas emissions, water use, energy use, soil, and biodiversity. In contrast, seven of the schemes also referred to a variety of socio-economic sustainability indicators, in particular indicators related to local communities, labour rights and human rights.

In sum, while greenhouse gas emissions is clearly the priority sustainability indicator associated with Alberta agri-food-relevant sustainability schemes, also clear is that multi-criteria sustainability schemes that address a combination of resource, environmental, and socio-economic considerations are the norm. Given that this broad indicator approach is, in particular, associated with the certification and compliance checklist approaches employed by supply chain partners including major processors and retailers, it is likely that maintaining and improving market access for Alberta agri-food producers will increasingly require a similarly broad approach to assessing and communicating sustainability performance.

It should be noted that, for the purpose of summarizing the indicators employed, similar indicators were grouped by theme (for example, all indicators associated with labour rights such as right to strike, freedom of association, etc. were aggregated under a single labour rights indicator heading). While useful for the purpose of the current analysis, this grouping masks the considerable heterogeneity of indicators and supporting methods employed. Some schemes (for example, BASF AgBalance and the SAFA Indicators), employ very large indicator suites, and it is apparent that a common approach to indicator nomenclature is lacking. Such heterogeneity in methods and terminology in life cycle-based environmental accountancy, and the potential burdens this creates for industry, was a key motivating factor behind on-going methodological harmonization efforts internationally. It is likely (and desirable) that similar harmonization efforts will occur for sustainability assessment methodologies as a whole.

**Table 6. Indicators used in each of the 21 reviewed sustainability schemes.[1,2]**

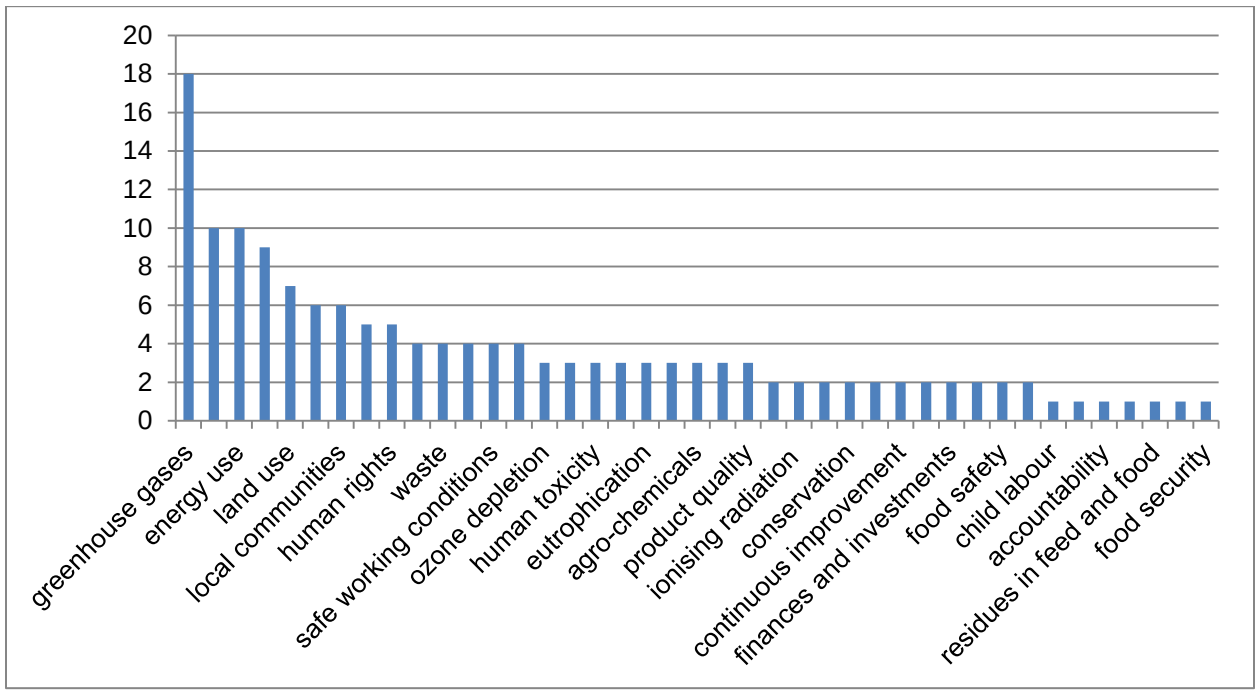
| | EC PEF | ENVIFood Protocol | LEAP | PAS 2050 | GHG Protocol | SISC | BASF AgBalanace | Cool Farm Tool | FeedPrint | Holos | Fieldprint | Canadian Fieldprint | Canadian Crop Carbon Footprint Lookup Tool | SAFA Indicators | Food Alliance | ISCC | GlobalGAP | Canada Cap | Roundtable on Sustainable Biomaterials | Unilever SAC | SAI Platform | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| greenhouse gases | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | | x | x | x | 18 |
| ozone depletion | x | x | | | | | x | | | | | | | | | | | | | | | 3 |
| eco-toxicity | x | x | | | | | x | | | | | | | | | | | | | | | 3 |
| human toxicity | x | x | | | | | x | | | | | | | | | | | | | | | 3 |
| particulate matter | x | x | | | | | | | | | | | | | | | | | | | | 2 |
| ionising radiation | x | x | | | | | | | | | | | | | | | | | | | | 2 |
| photochemical ozone formation | x | x | | | | | x | | | | | | | | | | | | | | | 3 |
| acidification | x | x | x | | | | x | | | | | | | | | | | | | | | 4 |
| eutrophication | x | x | x | | | | | | | | | | | | | | | | | | | 3 |
| water use | x | x | | | | x | x | | | | x | | | x | x | | | | x | x | x | 1 |
| energy use | x | x | x | | | x | x | | | | x | x | | x | x | | | | | x | | 10 |
| non-renewable resource use | | | | | | | x | | | | | | | x | | | | | | | | 2 |
| land use | x | x | x | | | | x | | | | x | x | | x | | | | | | | | 7 |
| waste | | | | | | | x | | | | | | | | x | | | | | x | x | 4 |
| | | | | | | | | | | | | | | | | | | | | | | |
| biodiversity | | | | | | x | x | | | | | | | x | x | x | | | | x | | 6 |
| conservation | | | | | | | x | | | | | | | | x | | | | | | | 2 |
| animal welfare | | | | | | | | | | | | | | x | x | | | | | x | x | 4 |
| | | | | | | | | | | | | | | | | | | | | | | |
| nutrient management | | | | | | x | x | | | | | | | | | | | | | | x | 3 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **soil** | x | | | x | x | x | x | x | | | x | x | x | 9 |
| **agro-chemicals** | | | | | | | x | | | | | x | x | 3 |
| **Good Agricultural Practices** | | x | | | | | | | x | | | | | 2 |
| **continuous improvement** | | | | | | | x | | | | x | | | 2 |
| | | | | | | | | | | | | | | |
| **safe working conditions** | | x | | | | | x | | | | | x | x | 4 |
| **fair salaries** | | x | | | | x | x | | | | | x | | 4 |
| **labour rights** | | x | | | | | | x | | | x | x | x | 5 |
| **human rights** | | x | | | | | x | x | | | x | x | | 5 |
| **child labour** | | x | | | | | | | | | | | | 1 |
| **training, research and development** | | x | | | | | | | | | x | | | 2 |
| **local communities** | | x | | | | | x | x | | | x | x | x | 6 |
| | | | | | | | | | | | | | | |
| **finances and investments** | | x | | | | x | | | | | | | | 2 |
| **management and planning** | | | | | | | x | | | | x | | x | 3 |
| | | | | | | | | | | | | | | |
| **corporate ethics** | | | | | | | x | | | | | | | 1 |
| **accountability** | | | | | | | x | | | | | | | 1 |
| **rule of law** | | | | | | | x | | | | x | | | 2 |
| | | | | | | | | | | | | | | |
| **traceability** | | | | | | | x | | | | | | | 1 |
| **residues in feed and food** | | x | | | | | | | | | | | | 1 |
| **GMOs** | | x | | | | | | | | | | | | 1 |
| **product quality** | | x | | | | x | x | | | | | | | 3 |
| **food safety** | | | | | | | | | x | x | | | | 2 |
| **food security** | | | | | | | | | | | x | | | 1 |
| **fair trade** | | x | | | | x | | | | | | | | 2 |
| | | | | | | | | | | | | | | |

(1) note: similar indicators have been aggregated by theme.

(2) The Sustainability Consortium indicators were not included in this summary, as an overall list of indicators employed in the Product Sustainability Toolkits and Key Performance Indicators was not located.

**Figure 7. Indicator usage (ranked from highest to lowest) among the 22 reviewed sustainability schemes.[1]**




(1) note: similar indicators have been aggregated by theme.

## Priority Schemes and Market Access Considerations by Commodity Cluster

None of the 21 schemes that were reviewed were specific to a single commodity, and few were specific to a narrow subset of commodities only. With the exception of methods schemes most were, however, specific to food and agriculture. For this reason, market access considerations for Albert agri-food commodities that may arise in association with the reviewed sustainability schemes are discussed at the level of commodity cluster (for example, grains, pulses and oilseeds) rather than individually.

Also of note here is that few of the schemes were specific to priority geographical markets for Alberta agri-food commodities. For example, whereas China is the priority market (by economic value of exports) for Alberta canola, no market access requirements for China related to sustainability schemes were identified. Moreover, few of the schemes reviewed are actually associated with public policy and regulation in market destination countries. The notable exception here, of course, is current and potential future EU policy initiatives including the EU RED and PEF-related initiatives. In general, it seems unlikely that sustainability schemes linked to public policy initiatives will be of primary importance for the Alberta agri-food sector. This observation is reinforced by the political culture of Alberta's major export partners (i.e. USA and China). For the former, industry-led, market-based sustainability initiatives seem more likely (and are, in fact, more prevalent) than do regulatory initiatives. For the latter, the implementation of state-supported sustainability scheme requirements is unlikely to be a near-term possibility. Moreover, lack of clarity and potential difficulties with respect to World Trade Organization rules in general further reduce the potential for regulation-backed sustainability scheme requirements that may imply market access restrictions.

Rather, it is likely more useful to focus on market access in terms of supply chain partner requirements – in particular the implementation of certification and compliance checklist programs by major food processors and retailers. Such initiatives will likely be the most important for Alberta agri-food producers in terms of ensuring market access over time. Indeed, numerous large food sector organizations are already partners in the development of, or are actively implementing, supply chain sustainability scheme requirements.

### *Grains, Pulses and Oilseeds*

Of the priority Alberta agri-food commodities identified for analysis, the Grains, Pulses and Oilseeds cluster refers to wheat, canola seed, canola/mustard oil, oilseed cake and meal, barley (and malt), and peas. Already of direct relevance for crop materials exported as bioenergy feedstocks into EU markets are the International Sustainability and Carbon Certification scheme and the Roundtable on Sustainable Biomaterials. Also relevant in this context is the Canadian Crop Carbon Footprint Lookup Tool. The former two schemes achieved a high overall average score (taking into account applicability, accessibility and reliability). These schemes may be used to demonstrate regulatory compliance with sustainability criteria for bioenergy feedstocks exported into EU markets. Future policy initiatives using the PEF

methods, possibly supported by the ENVIFood Protocol and/or FeedPrint tool, may impose additional sustainability requirements for Alberta producers.

The US and Canadian Fieldprint initiatives are similarly likely of high relevance for this cluster, and scored well among the 21 schemes reviewed. Indeed, the industry associations representing these commodity clusters are directly involved in development of the Canadian initiatives. Pulse Canada and the Canola Council of Canada appear to be particularly active with respect to sustainability schemes with potential market access implications. Reporting using the Fieldprint metrics may potentially be required of Alberta producers by supply chain partners in the future.

The checklist compliance programs of The Sustainability Consortium (Product Sustainability Toolkits are now available for grains, peas, beans and lentils, seed oil, beer, bread, pasta, and packaged cereals), and Unilever may also become (or already be – for example, with respect to sourcing potatoes, canola oil and eggs) relevant. Demonstrating compliance with the Unilever schemes may require that producers also provide information regarding socio-economic sustainability variables.

### *Livestock Products*

The livestock products cluster refers to beef, pork, chicken, eggs, hides and skins, tallow, semen, and also livestock feeds (for example, oilseed cake and meal, hay and fodder, wheat, etc.). Given that the livestock sector is increasing recognized as a key driver of environmental change, is critical to the livelihoods and nutrition of a significant fraction of the world's population, and also faces mounting pressure with respect to animal welfare concerns, it can be anticipated that sustainability schemes with market access implications may become widespread. Interestingly, only two of the twenty-one schemes that were reviewed are specific to livestock sector products – the LEAP guidelines for environmental assessment of livestock supply chains, and the FeedPrint tool for calculating GHG emissions for livestock feed input supply chains. Both may be considered reasonably applicable and reliable. Neither of these is currently linked to regulatory initiatives, nor to private sector sustainability schemes. It is possible, however, that the FeedPrint tool may be used in support of future PEF-related initiatives in the EU, since it currently represents the most detailed and robust, publically available data source for modeling GHG emissions for livestock feed inputs in Europe.

Although detailed criteria and metrics are not yet available, the activities of the Global Round Table for Sustainable Beef and related Canadian Round Table will likely prove relevant in terms of market access considerations for the Alberta beef sector over time. This is particularly pertinent in light of McDonald's involvement in these initiatives, and its commitment to begin sourcing verified sustainable beef in 2016 (an Alberta pilot project of this initiative is already underway). Similarly important is Unilever's commitment to source 100% cage-free eggs by 2020. If other major food processors and retailers follow suit, this may drive substantial changes in the Alberta egg sector. Already, Tim Hortons has signaled an intention to source eggs and pork from alternative housing systems due to animal welfare concerns, and

the Retail Council of Canada (which includes eight of the largest Canadian retailers) has suggested that both of these industries will be required to change practices. Taken together, these emerging supply chain partner requirements (or regulatory requirements – Europe is transitioning towards cage free systems) linked to animal welfare criteria may therefore become increasingly important for the Alberta chicken and pork sectors.

Among the schemes reviewed, Food Alliance certification (standards are available for livestock production), GlobalGAP, and the checklist compliance programs of Unilever, The Sustainability Consortium (Product Sustainability Toolkits have been developed for beef, chicken, eggs, pork, and pet food), and the Sustainable Agriculture Initiative may be directly relevant – in particular among supply chain partners.

### *Potatoes*

Several of the reviewed sustainability schemes refer specifically (although not exclusively) to potatoes. The Sustainability Consortium has developed a Product Sustainability Toolkit for potatoes, which will likely be applied by Walmart and, potentially, other major food processors and retailers. The US Fieldprint calculator also refers specifically to potatoes among the subset of crops it currently addresses. For food safety certification only, which is an important but limited aspect of sustainability, CanadaGAP for potatoes is already required by several Canadian food processors and retailers, including McCain. The Pepsico/FritoLay Sustainable Farming Initiative, which was not evaluated due to lack of availability of detailed information, will likely also have market access implications for Alberta potato producers.

# Conclusions

The plethora of existing and emerging sustainability schemes for food and agriculture, including methods, calculators, certification programs, and checklist compliance initiatives, points towards a rapidly evolving market access landscape for agri-food producers and their supply chain partners. The remarkable diversity of these schemes, and their widely variable applicability, accessibility, and reliability, present distinct challenges for agri-food producers and those mandated to support them in leveraging improved social license and market access. Which among these schemes are most important? How best to prioritize among them, and to educate and prepare constituents in order to ensure that Alberta agri-food producers will remain competitive and enjoy improved social license over time? How best to minimize the burdens of the potential multiple demands imposed by sustainability schemes championed by different stakeholders and supply chain partners?

By screening a broad spectrum of food system-relevant sustainability schemes and systematically evaluating a subset of these for their ***applicability, accessibility, and reliability***, this analysis lays the foundation for Alberta producers, industry associations and regulators to develop a coherent response and strategy. The results of the analysis provide several high-level insights, as well as detailed information at the sustainability scheme and commodity levels.

**1**. First is that current sustainability schemes are largely private-sector driven rather than public policy/regulatory in nature. With the exception of EU regulatory initiatives, which have already imposed sustainability requirements on Alberta bioenergy feedstock producers and may, in the future, similarly impact on other agri-food exports, the bulk of activity is resulting from the corporate social responsibility initiatives of major food processors, retailers, and other stakeholders. This includes initiatives related to methods development and standardization as well as sustainability calculators, but is more strongly concentrated in the area of certification and compliance checklist schemes.

The nature and scope of these schemes are testament to the new paradigm of supply chain management, which requires attention to trade-offs among a multitude of environmental and socio-economic sustainability criteria for supply chain activities. The high level of partnerships in sustainability scheme initiatives similarly reflects a growing recognition of the importance of engaging supply chain partners in order to ensure effectiveness in the pursuit of improved sustainability outcomes. Based on a review of the sustainability commitments of several major food processors and retailers, and the sustainability strategies and related schemes they have adopted, it is clear that Alberta agri-food producers will be required to participate.

**2.** Second is that, although managing supply chain greenhouse gas emissions is an obvious priority across sustainability schemes, several other indicators have also come to the fore. These include resource use efficiencies for water, land, soil and energy, but also social sustainability criteria related to labour rights, human rights, and impacts on local communities. The diversity of indicators and methods employed across the reviewed schemes highlights the need for more harmonized, standardized approaches to sustainability measurement and management. Such harmonization will be important both to ensuring robustness and effectiveness, as well as minimizing burdens on industry. In particular, harmonized, widely accepted methods for supply chain social sustainability assessment are currently under-developed.

**3**. Third is that some commodity groups are attracting much more attention than others. Numerous of the schemes considered are specific to field crops and, despite the disproportionate share of resource and environmental impacts attributable to the livestock sector, surprisingly few are livestock-specific to date. This may reflect, in part, that many of the important environmental impacts associated with non-ruminant livestock systems are typically concentrated at the level of feed input production. The on-going Global Round Table for Sustainable Beef and the more recent Canadian Round Table will, however, likely provide criteria for sustainable beef production that customers such as McDonald's will apply in sourcing Alberta beef. The Retail Council of Canada, which includes eight of the largest Canadian retailers, has similarly signaled that primary producers of poultry and pork will be required to change practices in line with growing consumer concerns for animal welfare. Along similar lines, Tim Hortons has announced intentions to source eggs and pork from alternative housing systems. Taken together, these initiatives suggest that animal producers may expect increasing attention and requirements with respect to sustainability schemes.

Many of the priority commodities that were identified based on economic relevance in Alberta or otherwise requested for consideration by AARD are not specifically considered by any of the reviewed schemes – for example, honey, and raw hides and skins. Others, like potatoes, are the targets of multiple initiatives.

**4.** Overall, sustainability certification schemes were evaluated to have the highest, aggregate performance according to the applicability, accessibility, and reliability criteria considered, followed by methods and check-list compliance initiatives. Check-list compliance initiatives scored poorly for reliability, however. This is notable given that check-list compliance programs, along with certification programs, are seemingly the preferred approaches by food processors and retailers to implementing their sustainability strategies. This seeming preference, however, likely reflects a desire to ensure that sustainability schemes to be imposed on supply chain partners are both user-friendly and create as little

burden on participants as possible. Whereas international initiatives to develop standards and norms for sustainability assessment have resulted in the availability of robust methods and supporting materials, these are the least accessible and applicable of the schemes reviewed, in large part due to the expert knowledge and probable costs to implement them.

In sum, sustainability is fast become an important priority in the food sector. As methods and initiatives for food sector sustainability schemes continue to evolve and be popularized, it is incumbent on all stakeholders to participate. Indeed, in terms of social license and market access, those at the leading edge will benefit most from the opportunities that emerge. Key next steps to consider include:

- developing and disseminating “horizon” bulletins to industry associations regarding emerging sustainability schemes that will likely impact their constituents, including indication of current participation by supply chain partners
- supporting industry associations in communicating with their constituents and preparing them to participate in emerging sustainability schemes of relevance for their commodities
- evaluating the supporting information that is available for relevant sustainability schemes in order to prepare “briefing note” materials for educating industry associations and their constituents regarding the requirements for participation
- developing “briefing note” materials regarding the nature and importance of emerging sustainability indicators that are used by sustainability schemes and that will likely impact specific commodity groups (for example, social issues and animal welfare)
- developing a timeline of actionable items and measurable benchmarks for improving the social license and market access opportunities of Alberta agri-food producers vis-à-vis emerging sustainability schemes

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# Appendix A. Detailed Evaluation Results

## METHODS

### European Commission Product Environmental Footprint

**Table 7. Detailed evaluation results for the European Commission Product Environmental Footprint**

| GENERAL | |
|---|---|
| Scheme | European Commission Product Environmental Footprint methods |
| Scheme Type | LCA methods |
| Description | General guidance document, providing prescriptive methods/requirements for life cycle assessment of products/services. More specific, product Environmental Footprint Category Rules (PEFCRs) are now being developed based on these methods, including for agri-food commodities. |
| Mandate | common European method for LCA of products/services, intended to provide for robust consistency and reproducibility in LCA studies in support of potential European Commission policy initiatives |
| Indicators | 12 default mid-point environmental footprint impact categories and specified impact assessment models with impact indicators. The impact categories are: climate change, ozone depletion, eco-toxicity–freshwater, human toxicity–cancer effects, human toxicity–non-cancer effects, particulate matter/respiratory inorganics, ionising radiation–human health effects, photochemical ozone formation, acidification, eutrophication–terrestrial, eutrophication–aquatic, resource depletion–water, resource depletion–fossil, and land use. Any exclusion of categories for a study must be explicitly justified |

| | | | | | |
|---|---|---|---|---|---|
| | and is subject to review. | | | | |
| Target Audience | EU companies and policy makers | | | | |
| Target Products (of Alberta relevance) | relevant for all agri-food commodities | | | | |
| Target Markets (of Alberta relevance) | EU-28 markets | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | general method, relevant for all agri-food commodities | | | | **X** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not a priority market, but requested by AARD | | | | **X** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | not currently, but could potentially become required by EU customers due to EC policy initiatives | | **X** | | |
| **(4) specifically fulfills regulatory requirements** | Not currently, but likely will do so for EU | | **X** | | |

| | | | | | |
|---|---|---|---|---|---|
| | customers in the future | | | | |
| **(5) is widely recognized at the product/sectoral level** | is now the reference EC method | | | | **X** |
| **(6) is widely recognized by the public** | relatively new | | | **X** | |
| **(7) has or likely will have broad participation** | will likely be used widely in EU | | | | **X** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **X** |
| Totals | | | **2** | **1** | **5** |
| Weighted Applicability Score | | | **11/16 = 69%** | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | details in guidance document, websites and policy documents | | | | **X** |
| **(2) provides clear guidance documents in support of its implementation** | PEF guide is general. PEFCR guides now being developed at | | | | **X** |

| | | | | | |
|---|---|---|---|---|---|
| | product category level | | | | |
| **(3) is accessible to a non-methods expert audience** | intended to be "user friendly", but methods expertise still required | | | **X** | |
| **(4) requires data that is reasonably accessible** | third-party data for supply chain activities may be difficult to procure | | | **X** | |
| **(5) has supporting tools/software that facilitate its implementation** | may be implemented using LCA software | | | **X** | |
| **(6) does not have high enrolment costs** | | | | | **X** |
| **(7) does not have high implementation costs** | Time-intensive, external experts may be necessary | | | **X** | |
| **(8) has streamlined recertification requirements** | | **X** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | **X** | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | EC reference standard, based on ISO 14044 | | | | **X** |
| Totals | | **1** | **1** | **4** | **4** |

| | | | | | |
|---|---|---|---|---|---|
| Weighted Accessibility Score | | | **12/18 = 66%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | based on ISO-14044, with stakeholder input and testing | | | | **X** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | applicable throughout EU for all products/services | | | | **X** |
| **(3) has a clearly define purpose** | | | | | **X** |
| **(4) has a clearly defined scope** | | | | | **X** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **X** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **X** |
| **(7) clearly defines requirements for cut-off criteria** | | | | | **X** |

| | | | | | |
|---|---|---|---|---|---|
| **(8) provides detailed guidance regarding allocation** | | | | | **X** |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | | **X** |
| **(10) provides clear requirements regarding data quality** | | | | | **X** |
| **(11) provides clear requirements for data collection** | | | | | **X** |
| **(12) provides clear requirements for data validation** | | | | | **X** |
| **(13) provides clear requirements for data gap filling** | | | | | **X** |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **X** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | indicators selected based on peer-review of existing methods | | | | **X** |
| **(16) provides clear requirements regarding communication of results** | | | | | **X** |
| **(17) specifies requirements for results to be disclosed to the public** | | | | | **X** |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | does not support comparative assertions. This will be supported by PEFCRs only | **X** | | | |
| **(19) is subject to third-party** | | | | | **X** |

| | | | | | |
|---|---|---|---|---|---|
| **verification** | | | | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | | | **X** |
| **(21) is administered by a recognized authority** | may be used by any organization | **X** | | | |
| Totals | | **2** | **0** | **0** | **19** |
| Weighted Reliability Score | | | **38/38 = 100%** | | |

## ENVIFood Protocol

**Table 8. Detailed evaluation results for the ENVIFood Protocol**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | ENVIFood Protocol | | | | |
| Scheme Type | LCA methods guidance for food and drink products | | | | |
| Description | harmonized LCA guidance documents for assessment of food and drink products | | | | |
| Mandate | harmonize the environmental performance assessment and monitoring of food and drink supply chains in Europe | | | | |
| Indicators | climate change, ozone depletion, eco-toxicity–freshwater, human toxicity–cancer effects, human toxicity–non-cancer effects, particulate matter/respiratory inorganics, ionising radiation–human health effects, photochemical ozone formation, acidification, eutrophication–terrestrial, eutrophication–aquatic, resource depletion–water, resource depletion–fossil, and land use | | | | |
| Target Audience | LCA practitioners/technical experts assessing food and drink products | | | | |
| Target Products (of Alberta relevance) | all | | | | |
| Target Markets (of Alberta relevance) | EU-28 | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy | Somewhat satisfies the | Satisfies the criterion |

| | | | | | |
|---|---|---|---|---|---|
| | | | the criterion (weight = 0) | criterion (weight = 1) | (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | refers to assessment of all food and drink products | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | EU-28 | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | **x** | | |
| **(4) specifically fulfills regulatory requirements** | may in future fulfill requirements in EU-28 | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | may become widely recognized | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **4** | **2** | **3** |
| Weighted Applicability Score | | | **8/16 = 50%** | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | **x** | | |
| **(4) requires data that is reasonably accessible** | | | **x** | | |
| **(5) has supporting tools/software that facilitate its implementation** | | | **x** | | |
| **(6) does not have high enrolment costs** | method freely available | | | | **x** |
| **(7) does not have high implementation costs** | expert consultants likely necessary | | | **x** | |
| **(8) has streamlined recertification requirements** | not a certification scheme | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **(9) is supported by FAQ responses and similar support resources** | | | | **x** | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | refers to ISO 14044 and EC PEF | | | | **x** |
| Totals | | **1** | **3** | **2** | **4** |
| Weighted Accessibility Score | | | **10/18 = 56%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | multi-stakeholder development and review, also largely based on ISO 14044 and PEF | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | multi-stakeholder development and review, also largely based on ISO 14044 PEF | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | | | | | **x** |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | | **x** |
| **(10) provides clear requirements regarding data quality** | | | | | **x** |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | | | **x** |
| **(13) provides clear requirements for data gap filling** | | | | | **x** |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for results to be disclosed to the public** | | | | | **x** |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | does not support comparative assertions, | **x** | | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | **x** | | | |
| **(21) is administered by a recognized authority** | administered by Food Round Table, but may be used by any party | **x** | | | |
| Totals | | **3** | **1** | **0** | **17** |
| Weighted Reliability Score | | | **35/36 = 97%** | | |

## Livestock Environmental Performance and Assessment Partnership (LEAP)

**Table 9. Detailed evaluation results for the Livestock Environmental Performance Assessment Partnership (LEAP)**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | LEAP (draft) guidelines for environmental performance assessment of livestock supply chains | | | | |
| Scheme Type | LCA methods guidance | | | | |
| Description | draft, harmonized LCA guidance documents for environmental assessment of livestock supply chains (feed, poultry, and small ruminant supply chains) | | | | |
| Mandate | harmonize the environmental performance assessment and monitoring of livestock supply chains on a global scale | | | | |
| Indicators | climate change, acidification, eutrophication, land use, fossil energy use | | | | |
| Target Audience | LCA practitioners assessing livestock systems | | | | |
| Target Products (of Alberta relevance) | chicken, oilseed cake and meal, wheat, canola, canola/mustard oil, animal feed preparations; raw hides and skins, barley, hay and fodder, tallow, peas, eggs, pulse crops, livestock semen | | | | |
| Target Markets (of Alberta relevance) | no specific markets | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the | Somewhat satisfies the | Satisfies the criterion (weight |

| | | | | | |
|---|---|---|---|---|---|
| | | | criterion (weight = 0) | criterion (weight = 1) | = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | **x** | | |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | may become widely recognized | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **4** | **2** | **2** |
| Weighted Applicability Score | | | **6/16 = 38%** | | |
| | | | | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | **x** | | |
| **(4) requires data that is reasonably accessible** | | | **x** | | |
| **(5) has supporting tools/software that facilitate its implementation** | | | **x** | | |
| **(6) does not have high enrolment costs** | | | | | **x** |
| **(7) does not have high implementation costs** | expert consultants likely necessary | | | **x** | |
| **(8) has streamlined recertification requirements** | not a certification scheme | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | refers to ISO 14044 and international GHG accounting methods | | | | **x** |
| Totals | | **1** | **4** | **1** | **3** |
| Weighted Accessibility Score | | | **7/18 = 39%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | multi-stakeholder development and review, also largely based on ISO 14044 | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | multi-stakeholder development and review, also largely based on ISO 14044 | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | | | | | **x** |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | | **x** |
| **(10) provides clear requirements regarding data quality** | | | | | **x** |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | | | **x** |
| **(13) provides clear requirements for data gap filling** | | | | | **x** |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **results to be disclosed to the public** | | | | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | | | **x** |
| **(19) is subject to third-party verification** | if comparative assertions are made | | | **x** | |
| **(20) specifies criteria and requirements for auditors and auditing** | | **x** | | | |
| **(21) is administered by a recognized authority** | administered by FAO, but may be used by any party | **x** | | | |
| Totals | | **2** | **0** | **1** | **18** |
| Weighted Reliability Score | | | **37/38 = 97%** | | |

## PAS 2050

**Table 10. Detailed evaluation results for PAS 2050**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | PAS 2050 | | | | |
| Scheme Type | methodological standard and guidance document | | | | |
| Description | method for assessing the life cycle greenhouse gas (GHG) emissions of goods and services | | | | |
| Mandate | Allow organizations of all sizes and types, in any location, to assess the climate change impact of the products they offer | | | | |
| Indicators | GHG emissions | | | | |
| Target Audience | producers and other supply chain stakeholders | | | | |
| Target Products (of Alberta relevance) | any agri-food product | | | | |
| Target Markets (of Alberta relevance) | potential customers of Alberta agri-food products | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food** | may be used to assess any agri- | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **commodities based on economic relevance or a specific AARD request** | food commodity | | | | |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not specifically recognized in particular markets | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | may potentially be requested by customers | | | **x** | |
| **(4) specifically fulfills regulatory requirements** | not linked to regulation | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | **x** | | |
| **(6) is widely recognized by the public** | among the better know carbon footprinting standards | | | | **x** |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **3** | **2** | **3** |
| Weighted Applicability Score | | | **8/16 = 50%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does | Somewhat | Satisfies |

| | | | not satisfy the criterion (weight = 0) | satisfies the criterion (weight = 1) | the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | detailed guidance document | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | **x** | | |
| **(4) requires data that is reasonably accessible** | | | **x** | | |
| **(5) has supporting tools/software that facilitate its implementation** | LCA software available | | | **x** | |
| **(6) does not have high enrolment costs** | free to download | | | | **x** |
| **(7) does not have high implementation costs** | expert consultants likely necessary | | **x** | | |
| **(8) has streamlined recertification requirements** | not a certification system | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | detailed guidance document | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | refers to ISO 14040 and 14044 | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| Totals | | **1** | **3** | **1** | **5** |
| Weighted Accessibility Score | | | **11/18 = 61%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | refers to ISO 14044 and 14064, multi-stakeholder development | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | intended to have global applicability | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(7) clearly defines requirements for cut-off criteria** | | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | | | | | **x** |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | | **x** |
| **(10) provides clear requirements regarding data quality** | | | | | **x** |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | | **x** | |
| **(13) provides clear requirements for data gap filling** | | | | | **x** |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for results to be disclosed to the public** | | | | | **x** |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | | | **x** |
| **(19) is subject to third-party** | optional third- | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **verification** | party or self-verification depending on application, wit guidance provided by Carbon Trust | | | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | administered by British Standards Institute | | | | **x** |
| Totals | | **0** | **1** | **2** | **18** |
| Weighted Reliability Score | | | **38/42 = 90%** | | |

## Greenhouse Gas (GHG) Protocol

Table 11. Detailed evaluation results for the Greenhouse Gas (GHG) Protocol

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | GHG Protocol | | | | |
| Scheme Type | methodological standard and guidance document | | | | |
| Description | method for assessing the life cycle greenhouse gas (GHG) emissions of goods and services | | | | |
| Mandate | Allow organizations of all sizes and types, in any location, to assess the climate change impact of the products they offer | | | | |
| Indicators | GHG emissions | | | | |
| Target Audience | producers and other supply chain stakeholders | | | | |
| Target Products (of Alberta relevance) | any agri-food product | | | | |
| Target Markets (of Alberta relevance) | potential customers of Alberta agri-food products | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic** | may be used to assess any agri- | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **relevance or a specific AARD request** | food commodity | | | | |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not specifically recognized in particular markets | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | may potentially be requested by customers | | | **x** | |
| **(4) specifically fulfills regulatory requirements** | not linked to regulation | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | **x** | | |
| **(6) is widely recognized by the public** | among the better know carbon footprinting standards | | | | **x** |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **3** | **2** | **3** |
| Weighted Applicability Score | | | **8/16 = 50%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not | Somewhat satisfies | Satisfies the |

| | | | satisfy the criterion (weight = 0) | the criterion (weight = 1) | criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | detailed guidance document | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | **x** | | |
| **(4) requires data that is reasonably accessible** | | | **x** | | |
| **(5) has supporting tools/software that facilitate its implementation** | LCA software available | | | **x** | |
| **(6) does not have high enrolment costs** | free to download | | | | **x** |
| **(7) does not have high implementation costs** | expert consultants likely necessary | | **x** | | |
| **(8) has streamlined recertification requirements** | not a certification system | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | detailed guidance document | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | refers to ISO 14044 and 14064 | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| Totals | | **1** | **3** | **1** | **5** |
| Weighted Accessibility Score | | | **11/18 = 61%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | refers to ISO 14044 and 14064, multi-stakeholder development | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | intended to have global applicability | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(7) clearly defines requirements for cut-off criteria** | | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | | | | | **x** |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | | **x** |
| **(10) provides clear requirements regarding data quality** | | | | | **x** |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | | **x** | |
| **(13) provides clear requirements for data gap filling** | | | | | **x** |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for results to be disclosed to the public** | | | | | **x** |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | | | **x** |
| **(19) is subject to third-party** | optional third- | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **verification** | party or self-verification | | | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | administered by WBCSD and WRI | | | | **x** |
| Totals | | **0** | **1** | **2** | **18** |
| Weighted Reliability Score | | | **38/42 = 90%** | | |

## Stewardship Index for Specialty Crops

**Table 12. Detailed evaluation results for the Stewardship Index for Specialty Crops**

| GENERAL | |
|---|---|
| Scheme | Stewardship Index for Speciality Crops |
| Scheme Type | metrics for assessment of farm and crop-specific environmental performance |
| Description | a collection of relevant metrics and indicators for assessing resource use and emissions associated with farms producing specialty crops (fruits, vegetables and nuts) |
| Mandate | "To advance both optimal production and strong environmental protection by offering a suite of science-driven metrics empowering producers to measure on-farm practices (i.e. water use, nitrogen use, etc.) accurately and consistently. Metric data give consumers, food buyers, and producers a common language for discussing the impact of farming practices – and the meaningful stewardship activities of U.S. farmers. By developing, refining and promoting farmer-tested tools that anyone can use to measure performance, SISC is aligned with many other initiatives globally in advocating for **measuring specific outcomes** rather than endorsing the use of less accountable 'checklists of practices' that many businesses have been asked to use." |
| Indicators | Applied Water Use Efficiency; Energy Use; Nitrogen Use; Phosphorus Use; Soil Organic Matter;<br><br>currently under development: Biodiversity and Ecosystem; Greenhouse Gas; Simple Irrigation Efficiency |
| Target Audience | producers and consumers |

| | | | | | |
|---|---|---|---|---|---|
| Target Products (of Alberta relevance) | potatoes | | | | |
| Target Markets (of Alberta relevance) | any company that may potentially request producers to apply SISC metrics | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | peas | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | may potentially be requested by customers in the future | | **x** | | |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | emerging metrics in US | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(7) has or likely will have broad participation** | likely buy-in from US producers | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **4** | **1** | **3** |
| Weighted Applicability Score | | | **7/16 = 44%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | detailed website and downloads | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | explanatory materials and guidance sheets for each metric | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | provides references for publically available data | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(5) has supporting tools/software that facilitate its implementation** | free Excel-based calculator | | | | **x** |
| **(6) does not have high enrolment costs** | free to use | | | | **x** |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | website provides guidance documents | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | | | **x** | | |
| Totals | | **1** | **1** | **0** | **8** |
| Weighted Accessibility Score | | | **16/20 = 80%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference** | metrics based on | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **sustainability standard that has been developed through a credible, multi-stakeholder process** | various sources | | | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | may potentially become reference indicators for specialty crops | | **x** | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | | | | | **x** |
| **(9) provides specific requirements regarding documentation of assumptions** | | **x** | | | |
| **(10) provides clear requirements regarding data quality** | | | **x** | | |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **data gap filling** | | | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | | | **x** | | |
| Totals | | **2** | **12** | **0** | **8** |
| Weighted Reliability Score | | | **16/38 = 42%** | | |

## BASF AgBalance

**Table 13. Detailed evaluation results for BASF AgBalance**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | BASF AgBalance | | | | |
| Scheme Type | Proprietary sustainability assessment method | | | | |
| Description | trade-marked agriculture-specific sustainability assessment method developed and implemented by BASF | | | | |
| Mandate | evaluate the sustainability of processes and practises along the entire food value chain | | | | |
| Indicators | 69 indicators, each specific to one of the three pillars of sustainability, are calculated based on almost 200 evaluation factors | | | | |
| Target Audience | farmers, food industry stakeholders, policy makers | | | | |
| Target Products (of Alberta relevance) | relevant for all agri-food commodities | | | | |
| Target Markets (of Alberta relevance) | intended for application anywhere (i.e. global) | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |

| | | | | | |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | general method for evaluating production of agri-food commodities | | | | **X** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not associated with any specific market requirements | | **X** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | **X** | | |
| **(4) specifically fulfills regulatory requirements** | | | **X** | | |
| **(5) is widely recognized at the product/sectoral level** | relatively well known as an agri-food sustainability assessment method | | | **X** | |
| **(6) is widely recognized by the public** | | | **X** | | |
| **(7) has or likely will have broad participation** | not linked to specific market requirements, complex | | **X** | | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **X** |
| Totals | | | **5** | **1** | **2** |
| Weighted Applicability Score | | | **5/16 = 31%** | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | BASF provides detailed information on the development and purpose of the method | | | | **X** |
| **(2) provides clear guidance documents in support of its implementation** | Technical document is available, but is lacking in details. Implemented by BASF | | | **X** | |
| **(3) is accessible to a non-methods expert audience** | Requires implementation by BASF experts | | **X** | | |
| **(4) requires data that is reasonably accessible** | Very data intensive, much of which is not readily available | | **X** | | |
| **(5) has supporting tools/software that facilitate its implementation** | BASF has in-house software | | | **X** | |
| **(6) does not have high enrolment** | | **X** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **costs** | | | | | |
| **(7) does not have high implementation costs** | Cost details not available, but proprietary and likely expensive | | **X** | | |
| **(8) has streamlined recertification requirements** | not a certification program | **X** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **X** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | based, in part, on several reference methods, other BASF methods, and new BASF developments | | | **X** | |
| Totals | | **2** | **3** | **3** | **2** |
| Weighted Accessibility Score | | | **7/16 = 44%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been** | based, in part, on a variety of | | | **X** | |

| | | | | | |
|---|---|---|---|---|---|
| **developed through a credible, multi-stakeholder process** | standards, with expert consultation | | | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | based, in part, on a variety of standards having global applicability | | | **X** | |
| **(3) has a clearly define purpose** | | | | | **X** |
| **(4) has a clearly defined scope** | | | | | **X** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **X** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **X** |
| **(7) clearly defines requirements for cut-off criteria** | intended for implementation by BASF, hence not specified in publically-available technical document | **X** | | | |
| **(8) provides detailed guidance regarding allocation** | intended for implementation by BASF, hence not specified in publically-available technical document | **X** | | | |
| **(9) provides specific requirements** | intended for | **X** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **regarding documentation of assumptions** | implementation by BASF, hence not specified in publically-available technical document | | | | |
| **(10) provides clear requirements regarding data quality** | intended for implementation by BASF, hence not specified in publically-available technical document | **X** | | | |
| **(11) provides clear requirements for data collection** | intended for implementation by BASF, hence not specified in publically-available technical document | **X** | | | |
| **(12) provides clear requirements for data validation** | intended for implementation by BASF, hence not specified in publically-available technical document | **X** | | | |
| **(13) provides clear requirements for data gap filling** | intended for implementation by BASF, hence not specified in publically- | **X** | | | |

| | | | | | |
|---|---|---|---|---|---|
| | available technical document | | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | **X** | |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | **X** | |
| **(16) provides clear requirements regarding communication of results** | has a systematic basis for reporting results | | | **X** | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **X** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | | | **X** |
| **(19) is subject to third-party verification** | | | | | **X** |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **X** | | |
| **(21) is administered by a recognized authority** | is administered by BASF, which is a relatively well-known company | | | **X** | |
| Totals | | **7** | **2** | **6** | **6** |
| Weighted Reliability Score | | | **18/28 = 64%** | | |

# CALCULATORS

## Cool Farm Tool

Table 14. Detailed evaluation results for the Cool Farm Tool

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | Cool Farm Tool | | | | |
| Scheme Type | on-line GHG emissions calculator | | | | |
| Description | user-friendly, farm-level GHG calculator | | | | |
| Mandate | to allow farmers to easily evaluate farm-level GHG emissions in order to identify mitigation options | | | | |
| Indicators | GHG emissions | | | | |
| Target Audience | farmers | | | | |
| Target Products (of Alberta relevance) | any agricultural raw material | | | | |
| Target Markets (of Alberta relevance) | PepsiCo, Marks & Spencer, Sysco, Unilever | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food** | may be used on any farm, hence | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **commodities based on economic relevance or a specific AARD request** | relevant for all agri-food commodities | | | | |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not specific to a country, but rather to specific retailers | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | specifically recognized and may be requested by PepsiCo, Marks & Spencer, Sysco, Unilever | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **3** | **2** | **3** |
| Weighted Applicability Score | | | **8/16 = 50%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does | Somewhat | Satisfies |

| | | | not satisfy the criterion (weight = 0) | satisfies the criterion (weight = 1) | the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | designed to be user-friendly for farmers and sourcing companies | | | | **x** |
| **(4) requires data that is reasonably accessible** | designed to use data that farmers can readily access | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | calculator tool available | | | | **x** |
| **(6) does not have high enrolment costs** | free for farmers, fees for companies | | | **x** | |
| **(7) does not have high implementation costs** | not time or resource intensive | | | | **x** |
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference** | developed in- | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **sustainability standard that is publically available either freely or for purchase** | house by Unilever and University of Aberdeen | | | | |
| Totals | | **1** | **1** | **1** | **7** |
| Weighted Accessibility Score | | | **15/18 = 83%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | does not refer to a reference standard | | **x** | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | | | **x** | | |
| **(3) has a clearly defined purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(6) requires clear and systematic definition of system boundaries** | up to user what to include, hence not suitable for comparing results between farms | | **x** | | |
| **(7) clearly defines requirements for cut-off criteria** | | | **x** | | |
| **(8) provides detailed guidance regarding allocation** | some guidance, but not best practice recommendations | | **x** | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | | **x** | | |
| **(10) provides clear requirements regarding data quality** | | | **x** | | |
| **(11) provides clear requirements for data collection** | | | | **x** | |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for data gap filling** | | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **results to be disclosed to the public** | | | | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | not intended for comparative assertions | **x** | | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | | | | **x** | |
| Totals | | **1** | **13** | **3** | **4** |
| Weighted Reliability Score | | | **11/40 = 28%** | | |

## FeedPrint

**Table 15. Detailed evaluation results for FeedPrint.**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | FeedPrint | | | | |
| Scheme Type | LCA-based GHG emissions calculator | | | | |
| Description | software-based tool for estimating supply chain GHG emissions of materials sourced for animal feeds | | | | |
| Mandate | carbon footprint tool for the Dutch compound feed industry | | | | |
| Indicators | GHG emissions (to be expanded to full LCA in line with European Commission Product Environmental Footprint methods) | | | | |
| Target Audience | compound feed producers | | | | |
| Target Products (of Alberta relevance) | any agri-food product potentially sourced for compound feed (for example, wheat, canola, peas, potatoes, etc.) | | | | |
| Target Markets (of Alberta relevance) | currently Dutch markets, eventually EU-28 markets and, potentially, American markets | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |

| | | | | | |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | wheat, canola, peas, potatoes | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | Netherlands, potentially EU-28 in future | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | **x** | | |
| **(4) specifically fulfills regulatory requirements** | may, in the future, help fulfill EC requirements | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | gaining recognition in the animal feeds sector | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **3** | **2** | **3** |
| Weighted Applicability Score | | | **8/16 = 50%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |

| Evaluation Criteria | | **Score** | | | |
|---|---|---|---|---|---|
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | detailed web-based information available | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | instructions for calculator use are available | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | downloadable calculator | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high implementation costs** | free | | | | **x** |
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | refers to ISO 14044, but uses tailored-for-purpose modeling norms | | | **x** | |
| Totals | | **1** | **0** | **1** | **8** |
| Weighted Accessibility Score | | | **17/18 = 94%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | refers to ISO 14044 and PAS 2050, stakeholder involvement | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | refers to reference standards, not itself a reference method for feeds | | | **x** | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **for measurement, certification or reporting** | | | | | |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | | | **x** | |
| **(8) provides detailed guidance regarding allocation** | presents results using alternative options | | | **x** | |
| **(9) provides specific requirements regarding documentation of assumptions** | all models described in reports | | | **x** | |
| **(10) provides clear requirements regarding data quality** | triangulates third-party data | | | **x** | |
| **(11) provides clear requirements for data collection** | | | | **x** | |
| **(12) provides clear requirements for data validation** | uncertainty assessed using EcoInvent pedigree matrix | | | **x** | |
| **(13) provides clear requirements for data gap filling** | MEXALCA method | | | **x** | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | GHG emissions only, but to be expanded to full LCA | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | based on ISO 14044 and IPCC 2006 | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | | | **x** | | |
| Totals | | **0** | **6** | **8** | **7** |
| Weighted Reliability Score | | | **22/42 = 40%** | | |

## Holos 2.1.1

Table 16. Detailed evaluation results for Holos 2.1.1.

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | Holos 2.1.1 | | | | |
| Scheme Type | Canadian farm-level GHG emissions calculator | | | | |
| Description | Software-based model for estimating farm-level GHG emissions using a combination of farm-specific data and model data previously collected for Canadian farms | | | | |
| Mandate | Facilitate quantification of Canadian farm-level GHG emissions and test scenarios for emissions reduction | | | | |
| Indicators | GHG emissions | | | | |
| Target Audience | farmers, industry associations | | | | |
| Target Products (of Alberta relevance) | primary production of all agri-food commodities | | | | |
| Target Markets (of Alberta relevance) | likely restricted to Canada | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |

| | | | | | |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | may be used for any farm production | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | relevant in Canada | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | **x** | | |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | recognized in Canada | | **x** | | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | **x** | | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | GHG emissions | | | | **x** |
| Totals | | **0** | **5** | **0** | **3** |
| Weighted Applicability Score | | | **6/16= 38%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |

| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | some documentation/guidance available | | | **x** | |
| **(3) is accessible to a non-methods expert audience** | intended to be user-friendly for farmers | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmers need only characterize their own activities | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | downloadable tool | | | | **x** |
| **(6) does not have high enrolment costs** | can be freely downloaded | | | | **x** |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | **x** | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or** | largely based on IPCC 2006, with tailored | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **for purchase** | methods norms | | | | |
| Totals | | **1** | **1** | **2** | **6** |
| Weighted Accessibility Score | | | **14/20 = 70%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | largely based on IPCC 2006, but tailored method for Canadian farms developed by experts | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | largely based on IPCC 2006, but tailored method developed by experts | | | **x** | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **definition of system boundaries** | | | | | |
| **(7) clearly defines requirements for cut-off criteria** | | | **x** | | |
| **(8) provides detailed guidance regarding allocation** | | | **x** | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | | **x** | | |
| **(10) provides clear requirements regarding data quality** | | | **x** | | |
| **(11) provides clear requirements for data collection** | | | **x** | | |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for data gap filling** | | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | detailed report available | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | detailed report available | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **be advanced** | | | | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | **x** | | | |
| **(21) is administered by a recognized authority** | administered by AAFC | | | | **x** |
| Totals | | **1** | **11** | **2** | **7** |
| Weighted Reliability Score | | | **16/40 = 40%** | | |

## Field to Market (US) "Fieldprint"

**Table 17. Detailed evaluation results for the US Fieldprint.**

| GENERAL | | |
|---|---|---|
| Scheme | Field to Market Fieldprint Calculator | |
| Scheme Type | farm-level environmental performance calculator | |
| Description | "Management information entered into the tool are analyzed and transformed into a "Fieldprint", which graphically represents the farmer's unique operation. It helps farmers visualize and assess how efficiencies and environmental impacts fluctuate based on various management decisions. Farmers can also compare their performance against local, state and national averages developed using publically available data." | |
| Mandate | "create opportunities across the agricultural supply chain for continuous improvements in productivity, environmental quality, and human well-being" | |
| Indicators | Land Use; Conservation; Soil Carbon; Irrigation Water Use; Water Quality; Energy Use; Greenhouse Gas Emissions | |
| Target Audience | farmers, food processors, public, policy makers | |
| Target Products (of Alberta relevance) | wheat, potatoes | |
| Target Markets (of Alberta relevance) | Cargill, Bunge, General Mills, Kellogg, McDonald's Corp, Coca-Cola, Unilever and Walmart | |
| | | |
| APPLICABILITY | | |
| Evaluation Criteria | | **Score** |

| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | wheat and potatoes | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | gaining recognition in US and Canada | | | **x** | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | Cargill, Bunge, General Mills, Kellogg, McDonald's Corp, Coca-Cola, Unilever and Walmart | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| Totals | | | **2** | **2** | **4** |
| Weighted Applicability Score | | | **10/16 = 63%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | detailed web resources | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | FAQs, directions, on-line resources | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | designed to be user-friendly | | | | **x** |
| **(4) requires data that is reasonably accessible** | uses farmers own data and publically available data | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | on-line tool | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **implementation costs** | | | | | |
| **(8) has streamlined recertification requirements** | not a certification scheme | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | | | **x** | | |
| Totals | | **1** | **1** | **0** | **8** |
| Weighted Accessibility Score | | | **16/18 = 89%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | methods developed with stakeholder input | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | default allocation method provided, but not consistent with best practice (i.e. ISO 14044) | | | **x** | |
| **(9) provides specific requirements regarding documentation of assumptions** | | | | **x** | |
| **(10) provides clear requirements regarding data quality** | | | | **x** | |
| **(11) provides clear requirements for data collection** | | | | **x** | |
| **(12) provides clear requirements for data validation** | | | | **x** | |
| **(13) provides clear requirements for data gap filling** | | | | **x** | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | Administered by Keystone Alliance | | | **x** | |
| Totals | | | **6** | **8** | **7** |
| Weighted Reliability Score | | | **22/42 = 52%** | | |

## Canadian Field Print Calculator

**Table 18. Detailed evaluation results for the Canadian Fieldprint**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | Canadian Field Print Calculator | | | | |
| Scheme Type | farm-level environmental sustainability calculator | | | | |
| Description | software-based calculator tool that using farm-specific input data and Canadian-specific background data | | | | |
| Mandate | allow farmers to assess their practices, identify mitigation options, and demonstrate improvement over time | | | | |
| Indicators | land use efficiency, soil erosion risk, energy use, climate impact, soil carbon release | | | | |
| Target Audience | farmers, food industry | | | | |
| Target Products (of Alberta relevance) | wheat, canola, pulse crops | | | | |
| Target Markets (of Alberta relevance) | Cargill, Bunge, General Mills, Kellogg, McDonald's Corp, Coca-Cola, Unilever and Walmart | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |

| | | | | | |
|---|---|---|---|---|---|
| | | | = 0) | | |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | may become relevant for the Canadian and US markets | | | **x** | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | being developed in partnership with major processors and retailers | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | new, but will likely be recognized | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | **0** | **2** | **2** | **4** |
| Weighted Applicability Score | | | **10/16 = 63%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |

| Evaluation Criteria | | **Score** | | | |
|---|---|---|---|---|---|
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | under development | **x** | | | |
| **(3) is accessible to a non-methods expert audience** | intended to be user-friendly | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmers own data | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | downloaded calculator | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | under development | **x** | | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for** | not a reference method, algorithms based | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **purchase** | on Holos and other Canadian research | | | | |
| Totals | | **3** | **1** | **0** | **6** |
| Weighted Accessibility Score | | | **12/14 = 86%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | refers to US Fieldprint, Holos, and other Canadian ag research | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | refers to US Fieldprint, Holos, and other Canadian ag research | | **x** | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or** | limited information available at | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **reporting** | present | | | | |
| **(6) requires clear and systematic definition of system boundaries** | limited information available at present | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | limited information available at present | | | | **x** |
| **(8) provides detailed guidance regarding allocation** | limited information available at present | | | **x** | |
| **(9) provides specific requirements regarding documentation of assumptions** | limited information available at present | | | **x** | |
| **(10) provides clear requirements regarding data quality** | limited information available at present | | | **x** | |
| **(11) provides clear requirements for data collection** | limited information available at present | | | **x** | |
| **(12) provides clear requirements for data validation** | limited information available at present | | | **x** | |
| **(13) provides clear requirements for data gap filling** | limited information available at | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| | present | | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | | | | **x** | |
| Totals | | **9** | **6** | **8** | **7** |
| Weighted Reliability Score | | | **22/42 = 52%** | | |

## Canadian Crop Carbon Footprint Lookup Tool

**Table 19. Detailed evaluation results for the Canadian Crop Carbon Footprint Lookup Tool.**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | Canadian Crop Carbon Footprint Lookup Tool | | | | |
| Scheme Type | calculation tool | | | | |
| Description | tool for estimating region-specific crop carbon footprint estimates | | | | |
| Mandate | provide easy to access, regional estimates of crop-specific carbon footprints for Canadian crops | | | | |
| Indicators | GHG emissions | | | | |
| Target Audience | farmers, biofuel supply chain stakeholders | | | | |
| Target Products (of Alberta relevance) | barley, canola | | | | |
| Target Markets (of Alberta relevance) | EU-28 for RED compliance | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **relevance or a specific AARD request** | | | | | |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | | | **x** |
| **(5) is widely recognized at the product/sectoral level** | | | **x** | | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | **x** | | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | **0** | **3** | **0** | **5** |
| Weighted Applicability Score | | | **10/16 = 63%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion | Somewhat satisfies the criterion (weight = | Satisfies the criterion (weight = 2) |

| | | | (weight = 0) | 1) | |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | no publically available information provided | | **x** | | |
| **(2) provides clear guidance documents in support of its implementation** | no publically available information provided | | **x** | | |
| **(3) is accessible to a non-methods expert audience** | very simply to use | | | | **x** |
| **(4) requires data that is reasonably accessible** | | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | downloadable tool | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high implementation costs** | free | | | | **x** |
| **(8) has streamlined recertification requirements** | | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | **x** | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | | | **x** | | |
| Totals | | **1** | **4** | **0** | **5** |

| | | | | | |
|---|---|---|---|---|---|
| Weighted Accessibility Score | | | **10/20 = 50%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | based on several relevant methods documents, some of which were developed through multi-stakeholder processes | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | based on several relevant methods documents with broad applicability | | | **x** | |
| **(3) has a clearly defined purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **definition of system boundaries** | | | | | |
| **(7) clearly defines requirements for cut-off criteria** | | | **x** | | |
| **(8) provides detailed guidance regarding allocation** | | | **x** | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | | **x** | | |
| **(10) provides clear requirements regarding data quality** | | | | **x** | |
| **(11) provides clear requirements for data collection** | | | | **x** | |
| **(12) provides clear requirements for data validation** | no documentation of methods was located | | **x** | | |
| **(13) provides clear requirements for data gap filling** | no documentation of methods was located | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | Canola Council of Canada and AAFC | | | | **x** |
| Totals | | | **10** | **4** | **7** |
| Weighted Reliability Score | | | **18/42 = 43%** | | |

## Sustainability Assessment of Food and Agriculture Systems (SAFA) Indicators

**Table 20. Detailed evaluation results for the Sustainability Assessment of Food and Agriculture Systems (SAFA) Indicators.**

| GENERAL | |
|---|---|
| Scheme | Sustainability Assessment of Food and Agriculture Systems (SAFA) Indicators |
| Scheme Type | calculator tool |
| Description | integrated sustainability assessment calculator for food and agriculture systems |
| Mandate | to provide a universal, harmonized framework for sustainability assessment of food and agriculture in support |

| | | | | | |
|---|---|---|---|---|---|
| | of Agenda 21 | | | | |
| Indicators | 118 indicators, grouped into 21 themes and 58 sub-themes, corresponding to the environmental, social, economic, and governance dimensions of sustainability | | | | |
| Target Audience | food and agriculture supply chain participants – producers, in particular | | | | |
| Target Products (of Alberta relevance) | any food or agriculture system | | | | |
| Target Markets (of Alberta relevance) | intended to have global applicability | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | may be used on any farm, hence relevant for all agri-food commodities | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not specific to a country or market | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **food commodity producers** | | | | | |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | **x** | | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | relatively new, but may become popularized | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | **0** | **5** | **1** | **2** |
| Weighted Applicability Score | | | **5/10 = 50%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | detailed supporting documents available | | | | **x** |
| **(2) provides clear guidance** | detailed guidance | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **documents in support of its implementation** | for indicators, defining scores, using calculator, etc. | | | | |
| **(3) is accessible to a non-methods expert audience** | designed to be user-friendly | | | | **x** |
| **(4) requires data that is reasonably accessible** | many indicators require easily available data, some are much more challenging | | | **x** | |
| **(5) has supporting tools/software that facilitate its implementation** | calculator tool available | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high implementation costs** | depends on scope of assessment | | | **x** | |
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | excellent support documentation | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | freely available, but not based on a reference standard | | | **x** | |
| Totals | | **1** | **0** | **3** | **6** |
| Weighted Accessibility Score | | | **15/20 = 75%** | | |
| | | | | | |

| RELIABILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | does not refer to a reference standard | | **x** | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | | | **x** | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | up to user what to include, hence not suitable for comparing results between farms | | **x** | | |
| **(7) clearly defines requirements for cut-off criteria** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(8) provides detailed guidance regarding allocation** | | | **x** | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | | **x** | | |
| **(10) provides clear requirements regarding data quality** | has mandatory data quality reporting system | | | | **x** |
| **(11) provides clear requirements for data collection** | | | | **x** | |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for data gap filling** | | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for results to be disclosed to the public** | primarily intended for internal use, not to be considered a certification or endorsement | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be** | not intended for comparative assertions | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **advanced** | | | | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | FAO | | | | **x** |
| Totals | | **1** | **11** | **2** | **7** |
| Weighted Reliability Score | | | **16/40 = 40%** | | |

# CERTIFICATION

## Food Alliance

**Table 21. Detailed evaluation results for Food Alliance.**

| GENERAL | | |
|---|---|---|
| Scheme | Food Alliance | |
| Scheme Type | Certification program for agricultural producers, processors and distributors | |
| Description | Provides third-party verified certification with respect to a variety of environmental and social indicators, requires compliance with specified best practices | |
| Mandate | Improve the environmental and social sustainability of food production, processing and distribution through certification | |
| Indicators | soil, water, wildlife habitat, biodiversity, energy conservation, waste reduction and recycling, pesticide reduction, transparent, traceable supply chains, safe and fair working conditions, food product integrity, animal welfare, continuous improvement | |
| Target Audience | agricultural producers, food processors, distributors/retailers, consumers | |
| Target Products (of Alberta relevance) | crops and livestock, food handling | |
| Target Markets (of Alberta relevance) | US | |
| | | |
| APPLICABILITY | | |
| Evaluation Criteria | | **Score** |

| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | standards for crops, livestock, horticulture, general food handling | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | may be relevant in US market | | | **x** | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | may be recognized by some use consumers and retailers | | | **x** | |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | **x** | | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | **x** | | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **4** | **2** | **2** |

| | | | | | |
|---|---|---|---|---|---|
| Weighted Applicability Score | | | **6/16 = 38%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmers own information | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | | | **x** | | |
| **(6) does not have high enrolment costs** | | | | **x** | |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | | | **x** | | |
| Totals | | | **2** | **2** | **6** |
| Weighted Accessibility Score | | | **14/20 = 70%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | | | **x** | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | | | **x** | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | compliance rather than measurement method | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | compliance rather than measurement method | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | compliance rather than measurement method | **x** | | | |
| **(10) provides clear requirements regarding data quality** | compliance rather than measurement method | **x** | | | |
| **(11) provides clear requirements for data collection** | compliance rather than measurement method | **x** | | | |
| **(12) provides clear requirements for data validation** | compliance rather than measurement method | **x** | | | |
| **(13) provides clear requirements for data gap filling** | compliance rather than measurement | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| | method | | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | indicators are clear | | | **x** | |
| **(15) provides clear and robust methods for performance assessment for each indicator** | performance assessment may be subjective | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | | | **x** |
| **(19) is subject to third-party verification** | | | | | **x** |
| **(20) specifies criteria and requirements for auditors and auditing** | | | | | **x** |
| **(21) is administered by a recognized authority** | administered by a private entity | | **x** | | |
| Totals | | **7** | **5** | **2** | **7** |
| Weighted Reliability Score | | | **16/28 = 57%** | | |

## International Sustainability and Carbon Certification

**Table 22. Detailed evaluation results for the International Sustainability and Carbon Certification.**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | International Sustainability and Carbon Certification | | | | |
| Scheme Type | certification of practices in accordance with requirements of EU RED | | | | |
| Description | independent certification system for sustainability and greenhouse gas emissions for biomass and bioenergy products | | | | |
| Mandate | demonstrate compliance with sustainability requirements from authorities, business customers and final consumers | | | | |
| Indicators | greenhouse gas emission reduction; biomass not produced on land with high biodiversity value or high carbon stocks; good agricultural practices (soil, water, air); human rights; labour rights; land rights | | | | |
| Target Audience | biomass producers; biofuel producers; regulators | | | | |
| Target Products (of Alberta relevance) | canola | | | | |
| Target Markets (of Alberta relevance) | EU-28 | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the | Somewhat satisfies the | Satisfies the criterion (weight |

| | | | | | |
|---|---|---|---|---|---|
| | | | criterion (weight = 0) | criterion (weight = 1) | = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | EU-28 | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | required by EU-28 importers of biofuel feedstocks | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | | | **x** |
| **(5) is widely recognized at the product/sectoral level** | | | | | **x** |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | producers wishing to export to EU biofuels market | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **1** | **1** | **6** |
| Weighted Applicability Score | | | **13/16 = 81%** | | |
| | | | | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmer needs to provide detailed information and records | | | **x** | |
| **(5) has supporting tools/software that facilitate its implementation** | | **x** | | | |
| **(6) does not have high enrolment costs** | | | | | **x** |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | spot audits of participants | | | **x** | |
| **(9) is supported by FAQ responses** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **and similar support resources** | | | | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | | | | | **x** |
| Totals | | **1** | **0** | **2** | **7** |
| Weighted Accessibility Score | | | **16/19 = 84%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | multi-stakeholder process | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | recognized for all countries exporting biomass for biofuel to EU-28 | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **for measurement, certification or reporting** | | | | | |
| **(6) requires clear and systematic definition of system boundaries** | | **x** | | | |
| **(7) clearly defines requirements for cut-off criteria** | | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | **x** | | | |
| **(10) provides clear requirements regarding data quality** | | **x** | | | |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for data gap filling** | | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | **x** | |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for results to be disclosed to the public** | | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | **x** | | | |
| **(19) is subject to third-party verification** | | | | | **x** |
| **(20) specifies criteria and requirements for auditors and auditing** | | | | | **x** |
| **(21) is administered by a recognized authority** | | | | | **x** |
| Totals | | **7** | **2** | **3** | **9** |
| Weighted Reliability Score | | | **21/28 = 75%** | | |

## GlobalGAP

**Table 23. Detailed evaluation results for GlobalGAP.**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | GlobalGAP | | | | |
| Scheme Type | umbrella standards and certification for farms | | | | |
| Description | standards and certification system for farms regarding “Good Agricultural Practices | | | | |
| Mandate | create private sector incentives for agricultural producers worldwide to adopt safe and sustainable practices; advance voluntary standards for the certification of agricultural products around the globe against which other standards can be benchmarked | | | | |
| Indicators | assesses compliance with a broad suite of farm-level and production system-specific best practices for agriculture | | | | |
| Target Audience | farmers, food industry, consumers | | | | |
| Target Products (of Alberta relevance) | crops, livestock, compound feed inputs | | | | |
| Target Markets (of Alberta relevance) | any customer requiring GlobalGAP certification | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight | Somewhat satisfies the criterion (weight = | Satisfies the criterion (weight = 2) |

| | | | = 0) | 1) | |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | relevant for all farm types and products | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | relevant across markets | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | widely recognized, may be requested by customers | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | | **x** | |
| **(6) is widely recognized by the public** | | | | **x** | |
| **(7) has or likely will have broad participation** | | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | does not highlight specific criteria, but rather assesses compliance with broad suite of best practices | | | **x** | |
| Totals | | | **1** | **3** | **4** |
| Weighted Applicability Score | | | **11/16 = 69%** | | |
| | | | | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | informative website and downloads | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmer-supplied data | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | downloadable assessment tools | | | | **x** |
| **(6) does not have high enrolment costs** | free to use, but need to pay certifier | | | | **x** |
| **(7) does not have high implementation costs** | free to use, but need to pay certifier | | **x** | | |
| **(8) has streamlined recertification requirements** | unclear from available materials | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | is its own reference standard | | | | **x** |
| Totals | | **0** | **2** | **0** | **8** |
| Weighted Accessibility Score | | | **16/20 = 80%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | multi-stakeholder development | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | ambition is to provide global reference standards | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | **x** | | | |
| **(10) provides clear requirements regarding data quality** | | **x** | | | |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | **x** | | | |
| **(13) provides clear requirements for data gap filling** | | **x** | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | interpretation may be subjective | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **results to be disclosed to the public** | | | | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | **x** | | | |
| **(19) is subject to third-party verification** | | | | | **x** |
| **(20) specifies criteria and requirements for auditors and auditing** | | | | | **x** |
| **(21) is administered by a recognized authority** | may be administered by an accredited body | | | | **x** |
| Totals | | **7** | | **1** | **13** |
| Weighted Reliability Score | | | **26/28 = 93%** | | |

## CanadaGAP

**Table 24. Detailed evaluation results for CanadaGAP.**

| | | | | | |
|---|---|---|---|---|---|
| GENERAL | | | | | |
| Scheme | CanadaGAP | | | | |
| Scheme Type | food safety standards and certification system for Canadian farms that produce, pack and store food | | | | |
| Description | create private sector incentives for Canadian agricultural producers to adopt food safety practices | | | | |
| Mandate | assesses compliance with farm-level food safety practices | | | | |
| Indicators | farmers, food industry, consumers | | | | |
| Target Audience | any customer requiring CanadaGap certification | | | | |
| Target Products (of Alberta relevance) | potatoes | | | | |
| Target Markets (of Alberta relevance) | umbrella food safety standards and certification for Canadian farms | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously** | potatoes | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | | | | | |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | relevant in Canada | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | | | **x** |
| **(6) is widely recognized by the public** | | | | **x** | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | **0** | **1** | **2** | **5** |
| Weighted Applicability Score | | | **11/16 = 69%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy | Somewhat satisfies the | Satisfies the criterion |

| | | | the criterion (weight = 0) | criterion (weight = 1) | (weight = 2) |
|---|---|---|---|---|---|
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | checklists, manuals, etc. | | | | **x** |
| **(6) does not have high enrolment costs** | audit fees and annual fees | | | **x** | |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | | | **x** | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | food safety guidelines based on HACCP assessment | | | | **x** |
| Totals | | **0** | **1** | **1** | **8** |

| | | | | | |
|---|---|---|---|---|---|
| Weighted Accessibility Score | | | **17/20 = 85%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | developed by industry with government input | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | benchmarked to Global Food Safety Initiative (GFSI) | | | | **x** |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | | | | **x** |
| **(7) clearly defines requirements for cut-off criteria** | | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **(8) provides detailed guidance regarding allocation** | | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | **x** | | | |
| **(10) provides clear requirements regarding data quality** | | **x** | | | |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | | **x** | | |
| **(13) provides clear requirements for data gap filling** | | **x** | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | | | | | **x** |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | **x** | | | |
| **(19) is subject to third-party verification** | | | | | **x** |
| **(20) specifies criteria and** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **requirements for auditors and auditing** | | | | | |
| **(21) is administered by a recognized authority** | | | | | **x** |
| Totals | | **6** | **3** | **1** | **11** |
| Weighted Reliability Score | | | **23/30 = 77%** | | |

## Roundtable on Sustainable Biomaterials

**Table 25. Detailed evaluation results for the Roundtable on Sustainable Biomaterials.**

| GENERAL | | | | | |
|---|---|---|---|---|---|
| Scheme | Roundtable on Sustainable Biomaterials | | | | |
| Scheme Type | standards and certification | | | | |
| Description | standards and certification system for biomaterials | | | | |
| Mandate | "Provide and promote the global standard for socially, environmentally and economically sustainable production and conversion of biomass; provide a global platform for multi-stakeholder dialogue and consensus building; ensure that users and producers have access to credible, practical and affordable certification; support continuous improvement through application of the standard" | | | | |
| Indicators | legality; planning, monitoring and continuous improvement; greenhouse gases, human and labor rights; rural and local development; food security; conservation; soil; water; air; technology; land rights | | | | |
| Target Audience | operators producing, converting, processing, or trading biomass, bio-chemicals and bio-products; customers of biomaterials | | | | |
| Target Products (of Alberta relevance) | all crops and livestock but, primarily, biomass for bioenergy | | | | |
| Target Markets (of Alberta relevance) | biomass for bioenergy customers, EU-28 | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does | Somewhat | Satisfies |

| | | | not satisfy the criterion (weight = 0) | satisfies the criterion (weight = 1) | the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | canola | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | satisfies EU RED requirements | | | | **x** |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | satisfies EU customers, may potentially be requested by other customers | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | satisfies EU RED requirements | | | | **x** |
| **(5) is widely recognized at the product/sectoral level** | | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | | | | **x** | |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |
| Totals | | | **1** | **2** | **5** |
| Weighted Applicability Score | | | **12/16 = 75%** | | |

| ACCESSIBILITY | | | | | |
|---|---|---|---|---|---|
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | informative website and supporting downloads | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | informative website and supporting downloads | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmer-supplied data | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | on-line GHG calculator | | | | **x** |
| **(6) does not have high enrolment costs** | $500 enrolment "processing fee" | | **x** | | |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification** | unclear regarding | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **requirements** | recertification | | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | based on own standard which may be downloaded | | | | **x** |
| Totals | | | **2** | | **8** |
| Weighted Accessibility Score | | | **16/20 = 80%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | based on own standard, developed through stakeholder process | | | | **x** |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | intended to be globally applicable for biomaterials | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | | **x** |
| **(6) requires clear and systematic definition of system boundaries** | | **x** | | | |
| **(7) clearly defines requirements for cut-off criteria** | | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | | **x** | | | |
| **(10) provides clear requirements regarding data quality** | | **x** | | | |
| **(11) provides clear requirements for data collection** | | | | | **x** |
| **(12) provides clear requirements for data validation** | | **x** | | | |
| **(13) provides clear requirements for data gap filling** | | **x** | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | may be subjective | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | | | **x** |
| **(20) specifies criteria and requirements for auditors and auditing** | | | | | **x** |
| **(21) is administered by a recognized authority** | must be certified by accredited third-party certifier | | | | **x** |
| Totals | | **7** | **3** | **2** | **9** |
| Weighted Reliability Score | | | **20/35 = 57%** | | |

## CHECK-LIST COMPLIANCE

### Unilever Sustainable Sourcing Programme for Agricultural Raw Materials

**Table 26. Detailed evaluation results for the Unilever Sustainable Sourcing Programme for Agricultural Raw Materials.**

| GENERAL | |
|---|---|
| Scheme | Unilever Sustainable Sourcing Programme for Agricultural Raw Materials (based on Unilever Sustainable Agriculture Code) |
| Scheme Type | check-list compliance program |
| Description | Program that requires suppliers to adhere to specified agricultural best practices and demonstrate continuous improvement |
| Mandate | Unilever aims to sustainably source 100% of its agricultural raw materials by 2020. Sustainable sourcing is defined based on the Unilever Sustainable Sourcing Programme for Agricultural Raw Materials and the Unilever Sustainable Agriculture Code. |
| Indicators | agrochemicals and fuels; soils; water; biodiversity; energy; waste; social and human capital; animal welfare; value chain & local economy; training |
| Target Audience | producers and processors supplying agricultural raw materials to Unilever |
| Target Products (of Alberta relevance) | any agricultural raw materials (crops and livestock) sourced by Unilever from Alberta processors |
| Target Markets (of Alberta relevance) | Unilever |
| | |
| APPLICABILITY | |

| Evaluation Criteria | | **Score** | | | |
|---|---|---|---|---|---|
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | | **x** | | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | required by Unilever | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | recognized amongst Unilever suppliers | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | is required of Unilever suppliers | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **highly relevant by stakeholders** | | | | | |
| Totals | | **1** | **2** | **1** | **4** |
| Weighted Applicability Score | | | **9/14 = 64%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | general documents available on website, some specific technical guidance provided | | | **x** | |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | | | | | **x** |
| **(6) does not have high enrolment** | no enrolment | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **costs** | fees | | | | |
| **(7) does not have high implementation costs** | minimum 30 farms must be sampled by processors, hence likely time and resource intensive | | **x** | | |
| **(8) has streamlined recertification requirements** | | | **x** | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | Unilever's own standard, can be downloaded from Unilever website | | **x** | | |
| Totals | | **0** | **3** | **1** | **6** |
| Weighted Accessibility Score | | | **13/20 = 65%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |

| | | | | | |
|---|---|---|---|---|---|
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | Unilever's own, in-house development | | **x** | | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | | | **x** | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | check-list compliance rather than measurement approach | **x** | | | |
| **(6) requires clear and systematic definition of system boundaries** | check-list compliance rather than measurement approach | **x** | | | |
| **(7) clearly defines requirements for cut-off criteria** | check-list compliance rather than measurement approach | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | check-list compliance rather than measurement approach | **x** | | | |
| **(9) provides specific requirements regarding documentation of** | check-list compliance | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **assumptions** | rather than measurement approach | | | | |
| **(10) provides clear requirements regarding data quality** | check-list compliance rather than measurement approach | **x** | | | |
| **(11) provides clear requirements for data collection** | check-list compliance rather than measurement approach | **x** | | | |
| **(12) provides clear requirements for data validation** | check-list compliance rather than measurement approach | **x** | | | |
| **(13) provides clear requirements for data gap filling** | check-list compliance rather than measurement approach | **x** | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | compliance assessment, may be subjective | | | **x** | |
| **(16) provides clear requirements regarding communication of results** | | | | | **x** |
| **(17) specifies requirements for** | | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **results to be disclosed to the public** | | | | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | **x** | | | |
| **(19) is subject to third-party verification** | may be verified by Unilever | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | conducts random audits | | | **x** | |
| **(21) is administered by a recognized authority** | administered by Unilever | | | **x** | |
| Totals | | **11** | **3** | **3** | **4** |
| Weighted Reliability Score | | | **11/20 = 55%** | | |

## The Sustainability Consortium Product Sustainability Toolkits

**Table 27. Detailed evaluation results for The Sustainability Consortium Product Sustainability Toolkits.**

| GENERAL | | |
|---|---|---|
| Scheme | The Sustainability Consortium Product Sustainability Toolkits | |
| Scheme Type | sector/product category-specific sustainability information kits and performance check-lists | |
| Description | interactive tools that highlight environmental and social issues by product category, along with key performance indicators that companies can use internally or to query their suppliers | |
| Mandate | "To drive more sustainable consumer products through the design and implementation of credible, transparent and scalable tools and services that are science-based, stakeholder-informed, focused on impact, and accessible for all producers, retailers, and users of consumer products" | |
| Indicators | variety of environmental and social indicators, not specified on website | |
| Target Audience | retailers, manufacturers, and suppliers along the value chain | |
| Target Products (of Alberta relevance) | beef, barley and malt, wheat, chicken, beans/lentils/peas, eggs, bread, grains, potatoes, pork | |
| Target Markets (of Alberta relevance) | Walmart, other major retailers in US, Canada, Europe and elsewhere | |
| | | |
| APPLICABILITY | | |
| Evaluation Criteria | | **Score** |

| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
|---|---|---|---|---|---|
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | beef, barley and malt, wheat, chicken | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | may be relevant in US and Canada | | | **x** | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | Walmart, potentially others | | | | **x** |
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | gaining recognition | | | **x** | |
| **(6) is widely recognized by the public** | fair level of popular media attention | | | **x** | |
| **(7) has or likely will have broad participation** | | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| Totals | | | **1** | **3** | **4** |
| Weighted Applicability Score | | | **11/16 = 69%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | | | | | **x** |
| **(2) provides clear guidance documents in support of its implementation** | | | | | **x** |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | | | | | **x** |
| **(6) does not have high enrolment costs** | $700 license | | | **x** | |
| **(7) does not have high implementation costs** | | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(8) has streamlined recertification requirements** | not a certification program | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | | | **x** |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | methods developed by Sustainability Consortium working group, not publically available | | **x** | | |
| Totals | | **1** | **1** | **1** | **7** |
| Weighted Accessibility Score | | | **15/18 = 83%** | | |
| | | | | | |
| RELIABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | multi-stakeholder development, documentation not readily available | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **recognized as being applicable within an entire sector, country, or as having global applicability** | | | | | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | cannot assess, as documentation is not publically available | **x** | | | |
| **(6) requires clear and systematic definition of system boundaries** | cannot assess, as documentation is not publically available | **x** | | | |
| **(7) clearly defines requirements for cut-off criteria** | cannot assess, as documentation is not publically available | **x** | | | |
| **(8) provides detailed guidance regarding allocation** | cannot assess, as documentation is not publically available | **x** | | | |
| **(9) provides specific requirements regarding documentation of assumptions** | cannot assess, as documentation is not publically available | **x** | | | |
| **(10) provides clear requirements regarding data quality** | cannot assess, as documentation is not publically available | **x** | | | |
| **(11) provides clear requirements for data collection** | cannot assess, as documentation is not publically | **x** | | | |

| | | | | | |
|---|---|---|---|---|---|
| | available | | | | |
| **(12) provides clear requirements for data validation** | cannot assess, as documentation is not publically available | **x** | | | |
| **(13) provides clear requirements for data gap filling** | cannot assess, as documentation is not publically available | **x** | | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | | | | | **x** |
| **(15) provides clear and robust methods for performance assessment for each indicator** | cannot assess, as documentation is not publically available | **x** | | | |
| **(16) provides clear requirements regarding communication of results** | | | | **x** | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | Administered by University of Arkansas and | | | **x** | |

| | | | | | |
|---|---|---|---|---|---|
| | Arizona State University | | | | |
| Totals | | **10** | **5** | **3** | **3** |
| Weighted Reliability Score | | | **9/22 = 41%** | | |

## Sustainable Agriculture Initiative (SAI) Farm Sustainability Assessment 2.0

**Table 28. Detailed evaluation results for the Sustainable Agriculture Initiative (SAI) Farm Sustainability Assessment 2.0.**

| GENERAL | |
|---|---|
| Scheme | SAI Farm Sustainability Assessment 2.0 |
| Scheme Type | spreadsheet compliance assessment/calculator |
| Description | "Farm Sustainability Assessment (FSA 2.0) is a tool to support companies in sourcing sustainably produced agricultural raw materials, and for farmers to assess their farms' sustainability. FSA 2.0 is compliant with SAI Platform's Principles and Practices for sustainable agriculture, and covers environmental, social and economic aspects. Live stock, greenhouse production, and wild harvest are not covered" |
| Mandate | "provide a tool for farmers and other stakeholders to assess and improve farm sustainability; provide a single benchmark for comparing existing certification and company-specific schemes; provide sustainable agriculture guidance for companies who don't have their own code; provide a tool that supports aggregating sustainable farming data across regions, countries, commodities, and suppliers" |
| Indicators | Legal Compliance; Financial Stability; Farm Management; Planting; Soil Management; Nutrient Management; Crop Protection; Agro-chemicals ; Waste Management; Water Management; Biodiversity; Air; Greenhouse Gas Emissions; Market Access; Labor Conditions; Health & safety; Local Community. These are subsequently aggregated into "People, Planet, and Profit" scores |
| Target Audience | farmers, processors, retailers |
| Target Products (of Alberta relevance) | all agricultural crops |

| | | | | | |
|---|---|---|---|---|---|
| Target Markets (of Alberta relevance) | no specific markets, but the Arable and Vegetable Working Group of SAI that developed this calculator includes Agrana, ABinBev, AgrarFrost, Agrifirm, Agroalimentare Sud, Agroterra, Aviko, Bacardi, Boortmalt, C. Thywissen, CIO Parma, Coca-Cola, FarmFrites, General Mills, HEINEKEN, Ingredion, Hero, Kellogg, Lamb Weston, Land O'Lakes, Mars, McCain Foods, McDonald's, Mondelez International, Muntons, PepsiCo, Pulse Canada, Unilever, SVZ, Walter Rau, and Yakima Chief | | | | |
| | | | | | |
| APPLICABILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) refers to one of the previously identified priority Alberta agri-food commodities based on economic relevance or a specific AARD request** | all agricultural crops | | | | **x** |
| **(2) is relevant in a priority export or domestic market, or for a market otherwise specifically requested by AARD** | not country-specific markets, rather specific corporate customers | | **x** | | |
| **(3) is specifically recognized and/or requested by customers or other supply chain partners of Alberta agri-food commodity producers** | specifically recognize by numerous large food companies | | | | **x** |

| | | | | | |
|---|---|---|---|---|---|
| **(4) specifically fulfills regulatory requirements** | | | **x** | | |
| **(5) is widely recognized at the product/sectoral level** | | | | **x** | |
| **(6) is widely recognized by the public** | | | **x** | | |
| **(7) has or likely will have broad participation** | will likely be requested by numerous corporate customers | | | | **x** |
| **(8) refers to sustainability criteria that are or likely will be considered highly relevant by stakeholders** | diverse criteria | | | | **x** |
| Totals | | | **3** | **1** | **4** |
| Weighted Applicability Score | | | **11/16 = 56%** | | |
| | | | | | |
| ACCESSIBILITY | | | | | |
| Evaluation Criteria | | **Score** | | | |
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) provides clear information as to its purpose and applicability** | website and publications | | | | **x** |
| **(2) provides clear guidance documents in support of its** | limited guidance in tool itself | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **implementation** | | | | | |
| **(3) is accessible to a non-methods expert audience** | | | | | **x** |
| **(4) requires data that is reasonably accessible** | farmer's own data | | | | **x** |
| **(5) has supporting tools/software that facilitate its implementation** | online or downloadable Excel-based tool | | | | **x** |
| **(6) does not have high enrolment costs** | free | | | | **x** |
| **(7) does not have high implementation costs** | | | | | **x** |
| **(8) has streamlined recertification requirements** | not a certification scheme | **x** | | | |
| **(9) is supported by FAQ responses and similar support resources** | | | **x** | | |
| **(10) is, or is based on, a reference sustainability standard that is publically available either freely or for purchase** | based on SAI Principles, which were developed by multiple stakeholders and are freely available | | | **x** | |
| Totals | | **1** | **2** | **1** | **6** |
| Weighted Accessibility Score | | | **13/18 = 72%** | | |
| | | | | | |
| RELIABILITY | | | | | |

| Evaluation Criteria | | **Score** | | | |
|---|---|---|---|---|---|
| **The scheme...** | Notes | NA | Does not satisfy the criterion (weight = 0) | Somewhat satisfies the criterion (weight = 1) | Satisfies the criterion (weight = 2) |
| **(1) is, or is based on, a reference sustainability standard that has been developed through a credible, multi-stakeholder process** | based on SAI Principles, which were developed through stakeholder process | | | **x** | |
| **(2) is, or is based on, a reference sustainability standard that is recognized as being applicable within an entire sector, country, or as having global applicability** | based on SAI Principles, which are intended to be global in scope | | | **x** | |
| **(3) has a clearly define purpose** | | | | | **x** |
| **(4) has a clearly defined scope** | | | | | **x** |
| **(5) requires clear and systematic definition of a relevant unit of analysis for measurement, certification or reporting** | | | | **x** | |
| **(6) requires clear and systematic definition of system boundaries** | unclear how single cropping systems are demarcated | | **x** | | |
| **(7) clearly defines requirements for cut-off criteria** | no details available | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(8) provides detailed guidance regarding allocation** | no details available | | **x** | | |
| **(9) provides specific requirements regarding documentation of assumptions** | no details available | | **x** | | |
| **(10) provides clear requirements regarding data quality** | no details available | | **x** | | |
| **(11) provides clear requirements for data collection** | no details available | | **x** | | |
| **(12) provides clear requirements for data validation** | no details available | | **x** | | |
| **(13) provides clear requirements for data gap filling** | no details available | | **x** | | |
| **(14) provides clear and robust criteria and indicators for performance assessment** | diverse criteria, some based on recognized methods | | | **x** | |
| **(15) provides clear and robust methods for performance assessment for each indicator** | no details available, may be subjective | | **x** | | |
| **(16) provides clear requirements regarding communication of results** | | | **x** | | |
| **(17) specifies requirements for results to be disclosed to the public** | | | **x** | | |
| **(18) specifies third-party critical review requirements in the event that comparative assertions are to be advanced** | | | **x** | | |
| **(19) is subject to third-party verification** | | | **x** | | |

| | | | | | |
|---|---|---|---|---|---|
| **(20) specifies criteria and requirements for auditors and auditing** | | | **x** | | |
| **(21) is administered by a recognized authority** | administered by SAI | | | | **x** |
| Totals | | | **14** | **4** | **3** |
| Weighted Reliability Score | | | **10/42 = 24%** | | |

# Appendix B. About Nathan Pelletier and Global Ecologic

Understanding and managing the environmental and social costs and benefits of economic activity has become a defining challenge of the modern era. This challenge provides the nucleus for the rapidly evolving field of sustainability measurement and management. Nathan Pelletier, principal of Global Ecologic, is an independent sustainability consultant specializing in environmental and social performance measurement and management strategies in food and other industrial systems. His work proceeds from the recognition that sustainability is the first principle of responsible management, whether at the level of private enterprise, regional, national or global governance.

Pelletier works closely with clients to build an understanding of supply chain environmental and social sustainability performance and mitigation opportunities using a variety of cutting edge modeling frameworks. These include environmental and social life cycle assessment, environmental footprinting, supply-chain greenhouse gas accounting, energy analysis, and ecological footprint analysis. He is dedicated to delivering high-quality, cost-effective consulting services to meet the demands of citizens, firms and organizations committed to furthering sustainability objectives.

Pelletier established Global Ecologic in 2006. He has since continued to expand his broad experience base in food system sustainability consulting services, working with a variety of small and large organizations to further their sustainability initiatives both at home and abroad. Having researched and modeled over 150 agricultural crop, animal husbandry, fisheries and aquaculture production, processing and distribution supply chains using ISO 14044-compliant life cycle assessment (LCA), Pelletier is recognized as an international expert in LCA of food systems, and a leader in the field. Examples of recent and on-going consulting projects include:

- social and environmental life cycle assessment of the Canadian egg industry, including assessment of alternative housing technologies, for Egg Farmers of Canada
- life cycle assessment of greenhouse gas emissions for egg production and processing supply chains in the United States for the American Egg Board
- comparative life cycle assessment of the environmental performance (including GHG emissions) of the US national egg sector in 1960 and 2010 for the American Egg Board, Egg Industry Council, and United Egg Producers
- development of a supply chain ecological footprint and greenhouse gas accounting tool incorporating LCA-based models of agricultural, fisheries and animal husbandry product supply chains for a major international aquafeeds company (EWOS) to facilitate least-environmental-cost feed sourcing (seven projects since 2006)

- life cycle assessment of tilapia aquaculture production in lake and pond-based systems, including processing and transportation to market ports for the leading global tilapia producer, Regal Springs
- development of a supply chain greenhouse gas accounting tool for SeaFish Industry Authority (UK) for profiling high-volume seafood supply chains
- provision of life cycle impact assessment data and advice to support strategic decision making for environmentally preferable product packaging for a microbrewery
- Provision of food product greenhouse gas emissions intensity data for Bon Appétit Management Foundation Company (Compass Food Service), to be used in educating their institutional chefs as well as their on-line food product GHG calculator as part of the Low Carbon Diet Initiative

Pelletier has similarly constructed and published LCA models of US national broiler poultry production, high and low-profitability conventional and niche swine operations in the mid-western United States, as well as three competing mid-western beef production technologies. All of these models are constructed using an ISO 14044-compliant LCA modelling platform developed by Pelletier for the purpose of high-resolution analyses of crop and animal husbandry systems. This includes customized sub-models based on internationally recognized protocols and best-available scientific practice. Because the platform enables the use of identical modelling principles and parameters for context-specific applications, it ensures direct and robust comparability of model results within and across production systems and technologies.

He also recently developed a macroscale screening-level social LCA using 28 social risk categories for trade-based consumption in the European Union (taking into account flows of internationally traded commodities) for the European Commission Joint Research Centre. This model characterized the social risks attributable to the trade-based consumption patterns of the average EU-27 consumer, as well as for EU-27 trade-based consumption in aggregate.

Pelletier similarly recently completed drafting the life cycle-based European Commission Product and Organization Environmental Footprint methods, which will become the reference methods linked to any voluntary or mandatory applications associated with European Commission policy, as well as the European Sustainability Footprint framework.