Environmental Product Declaration

In accordance with ISO 14025 for:

Alberta Peas

Alberta Pulse Growers (APG)

Programme:	The International EPD® System www.environdec.com
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Geographical scope:	Alberta, Canada

Alberta Pulse Growers (APG)

Alberta Pulse Growers (APG) Commission is a non-profit organization that supports over 6,000 Alberta farmers who grow pulses, including dry pea, dry bean, chickpea, lentil, soybean and faba bean. The APG is a provincial grower association and continually strives to demonstrate leadership and commitment in environmental sustainability. The APG conducts research, administrative, marketing, and extension activities on behalf of its members. The APG promotes the benefits of including pulses in a sustainable crop rotation and in a healthy diet through research and marketing initiatives, all in an effort to increase the sustainability and profitability of pulse production in Alberta.

The mission of APG is to provide leadership, increasing the competitiveness, profitability, and sustainability of pulse production as well as promoting the health and environmental benefits of pulses. To gain a comprehensive understanding of sustainability performance and identify opportunities for improvement, the APG has collaborated with Alberta Agriculture and Forestry (AF) to conduct an Alberta pea environmental footprint assessment using life cycle assessment (LCA).

Dry Peas

Dry peas are one of the most common types of pulses which are high in protein and fibre and low in fat. Peas, like other pulses, are recognized as a healthy food choice in a number of ways. Peas can also be used in a number of livestock feed rations. Peas are rich in protein, lysine and starch, and able to provide both amino acids and energy requirements for livestock. Peas, like other pulses, play a major role in improving environmental sustainability and mitigating climate change due to its biological nitrogen fixation capability that results in a lower fertilizer requirement and a lower environment impact in a cropping system.

Both yellow and green pea varieties are grown in Alberta. Peas are grown in the black, grey, dark brown and brown soil zones in Alberta. The majority of peas are grown on dryland (i.e. rain fed growing conditions). Crop yield data were used from the weighted average of soil zones based on farm survey data for the 2015 crop year. The study considered farmers utilized the conservation farming practise of direct seeding for pea production with none or minimal tillage.

Product contents

Peas are rich in protein, dietary fibre, vitamins and minerals such as iron, zinc, magnesium, calcium and folate. They have a low glycemic index, low fat and high fibre. Health benefits of eating peas include improved metabolic control and decreased risk for cardiovascular disease, obesity and diabetes. Detailed nutritional properties of dry peas are described in Table 1.

Table 1. Nutritional properties of dry peas per 100 g dry matter

Nutrient	Unit	Amount
Energy	kcal	352
Protein	g	23.8
Carbohydrates	g	63.7
Sugars, total	g	8
Total lipid (fat)	g	1.16
Fibre, total dietary	g	25.5
Calcium	mg	37
Iron	mg	4.82
Zinc	mg	3.55
Magnesium	mg	49
Potassium	mg	823
Folate	µg	274

Functional unit

The functional unit is 1 kg of dry peas at the farm gate stored at an average moisture level of 16%.

Data sources

Farm data from Alberta pea growers was collected for the 2015 crop year on crop yield, farm inputs (seed, inoculant, fertilizer, herbicide, fungicide and desiccant), farm operations (seeding, chemical application, harvesting and field emissions associated with fertilizer application) and transportation distances for farm activities. Additional information and data for the life cycle inventory modelling came from regional sources (emission factors) as well as international life cycle inventory database, ecoinvent.

General system boundaries

Upstream processes	Core stream processes	Downstream processes
Crop inputs 	**Field emissions and farm operations** 	**Storage and transportation** 
Seed production Inoculant production Fertilizer production Herbicide production Fungicide production Desiccant production	Emissions related to fertilizer application Land preparation Seeding Agro-chemicals application Harvesting	Grain drying Storage Transportation

Environmental performance

Environmental performance of Alberta peas was assessed based on the Product Category Rules for arable crops (2013:05 Arable crops, version 2.0). Four potential environmental impacts – global warming potential, acidification potential, eutrophication potential and photochemical oxidant creation potential were quantified using EPD (2013) from SimaPro 8.2 LCA software. Water use (water withdrawal) was calculated using IMPACT 2002+ Version 2.21 from SimaPro 8.2 LCA software.

Crop inputs and farm operations were major contributors to greenhouse gas emissions and other environmental impacts of Alberta pea production. P_2O_5 fertilizer production and associated field emissions accounted for a majority of the environmental impacts. Fuel consumption and emissions associated with fuel combustion from farm operations contributed to a large proportion of the environmental impacts from farm operations. Grain drying and storage contributed to a lesser degree of environmental impacts compared to crop inputs and farm operations. Environmental impacts associated with transportation were quite negligible, accounting for less than one per cent of total environmental footprints.

GHG emissions from Alberta peas were 198 g CO_2-e/kg of peas. Alberta pea production contributed to lower GHG emissions than other crops such as wheat, barley and canola because of less nitrogen fertilizer required. Less nitrogen fertilizer requirement for pea production reduces nitrous oxide emissions (which is more potent than carbon dioxide), resulting in lower GHG emissions. Improvements in the tillage management system and

nutrient management system were identified as potential mitigation strategies for reducing overall environmental impacts of Alberta pea production.

Use of resources

Non-renewable resources per 1 kg of Alberta peas

		UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
			Crop inputs	Field emissions and farm operations	Storage and transportation	
Material	Calcite	g	3.4	3.61	2.87	9.88
	Clay	g	2.16	0.74	0.78	3.69
	Fluorine	g	1.31	<0.01	<0.01	1.31
	Gravel	g	18.2	13.1	16.2	47.5
	Gypsum	g	7.00	<0.01	0.05	7.05
	Iron	g	1.29	6.19	0.36	7.84
	Peat	g	1.57	<0.01	<0.01	1.57
	Phosphorus	g	5.24	<0.01	<0.01	5.24
	Potassium chloride	g	7.55	<0.01	<0.01	7.55
	Sodium chloride	g	1.87	0.08	0.08	2.03
Energy	Coal	g	11.4	8.84	12.1	32.3
	Crude oil	g	6.12	21.8	0.71	28.6

Renewable resources per 1 kg of Alberta peas

		UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL

			Crop inputs	Field emissions and farm operations	Storage and Transportation	
Energy	Biomass	MJ	0.91	0.02	0.01	0.94
	Hydro	MJ	0.02	0.02	0.01	0.05
	Wind	MJ	<0.01	<0.01	<0.01	<0.01

Water use[a]	Total water use in the life cycle	0.01 m^3
	Direct use in the crop inputs and farm operations	0.01 m^3

[a] water use includes fresh water use evaporated, consumed or released again downstream, without water turbined (i.e. water flowing through hydropower dams). It considers drinking water and water for and in industrialized processes.

Potential environmental impacts per 1 kg of Alberta peas

	UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
		Crop inputs	Field emissions and farm operations	Storage and transportation	
Global warming potential	g CO_2e	70	94	34	198
Acidification potential	g SO_2e	0.88	0.94	0.13	1.95
Eutrophication potential	g PO_4e	0.67	0.47	0.05	1.19
Photochemical oxidant creation potential	g C_2H_4e	0.03	0.02	0.01	0.06

Programme-related information and verification

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com
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Product category rules (PCR): PCR 2013:05 Arable crops, version 2.0
PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Maurizio Fieschi Contact via infor@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006: ☐ EPD Process Certification (internal) ☒ EPD Verification (external)
Third party verifier: *Geoffrey Guest* *Ecogamut Consulting Inc.* *Ottawa, Canada* *Approved by the International EPD® System*

Mandatory statements

Waste associated with packaging from crop inputs were not considered for the study due to a lack of data. According to the canola production LCA in Alberta (Quantis 2014), environmental impacts of waste from crop input packaging were negligible, accounting for less than 1% of the total impacts of canola production in Alberta. Peas require less fertilizer

than canola production. Therefore, it is more likely to have less waste associated with crop input packaging for pea production compared to canola production. Assuming the impacts of waste from crop input packaging contribute to less than 1% of total impacts of Alberta peas, waste from crop input packaging were excluded from the study.

EPDs within the same product category but from different programmes may not be comparable.

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References

General Programme Instructions of the International EPD® System. Version 2.01.

PCR 2013:05 Arable crops, version 2.0 Valid until: 2020-06-23, UN CPC 017

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Quantis Canada, Life cycle assessment of Alberta canola production 2014, Prepared for Alberta Agriculture and Rural Development, Alberta, Canada (2014)