INTERIM REPORT

PepsiCo

Cruseli 850g

Report created on 06/09/2022

Disclaimer: This internal document is intended to provide an interim update on the product assessment and grade following the LCA results and outputs from the grading calculator. A final report will be provided at the end of the engagement, including more detailed information, and considering a sensitivity analysis.

HIGH LEVEL SUMMARY REPORT

This report provides a high-level summary of the environmental impacts and preliminary grades for one PepsiCo product: Cruseli 850g

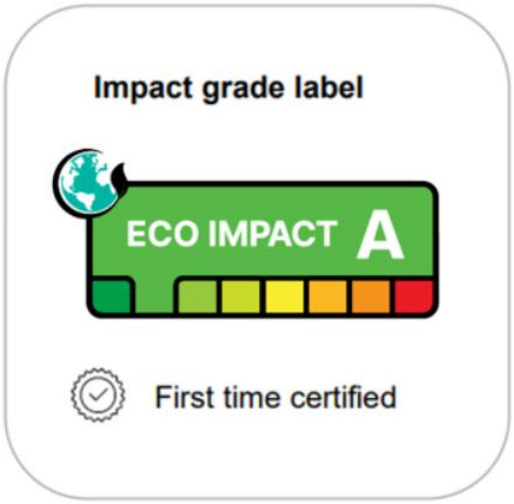
Full assessment information, including detailed grading analyses, will be made available at the end of the full engagement.

ABOUT THE PRODUCT

Cruseli is a breakfast and snack food consisting of rolled oats, nuts and honey. Cruseli is often eaten in combination with yogurt, honey, fresh fruit (such as bananas, strawberries or blueberries), milk or other forms of cereal.

Product net weight: 850g.

Portion size: 45g.



ECOLOGICAL IMPACT

Typical value	Per 100g	Per serving	Grade per serving	Corresponding score
Carbon (g CO_2 eq)	200	90	A+	1.30
Water Usage (L eq)	4000	1800	B	3.04
Water Pollution (g PO_4^{3-} eq)	1.7	0.78	B	2.94
Biodiversity (Species Loss Index)	0.048	0.022	A	3.00

GRADE BREAKDOWN

The following results represent impacts by stage for the assessed product. All impacts and grades are presented per serving of the product on supermarket shelf.

Biodiversity is assessed only for the farming stage, and retail stage is not graded due to high variability in sales channel impacts.

Stages	Carbon		Water Use		Water Pollution		Biodiversity	
	(g CO_2 eq)	Grade per serving	(L eq)	Grade per serving	(g PO_4^{3-} eq)	Grade per serving	(Species loss index)	Grade per serving
Farming	38	**A+**	1800	**B**	0.7	**B**	0.022	**B**
Processing	26	**A**	0.48	**C**	0.051	**B**	-	-
Packaging	7.8	**A+**	0.011	**A**	0.015	**B**	-	-
Transport	9.1	**A**	0.01	**A+**	0.0095	**A**	-	-
Sales	8.6	-	0.025	-	0.013	-	-	-

Table 1 provides a breakdown of the environmental impact of the product by ingredient level and production stage per primary packaged product at retail store. Table 1 also provides the nutritional category of each ingredient.

Table 1 Ingredient Name	Category	Percentage composition	Stage	Biodiversity (Species loss index)	GHG (g CO2 eq)	Water Usage (L eq)	Eutrophication (g PO43- eq)
Rolled Oats	C: Carbs	13%	Farming	0.011	65	12	0.86
Rolled Oats	C: Carbs	3%	Farming	0.00084	43	0	0.25
Rolled Oats	C: Carbs	5%	Farming	0.0026	120	0	0.62
Rolled Oats	C: Carbs	4%	Farming	0.00039	6.6	0	0.28
Rolled Oats	C: Carbs	4%	Farming	0.00096	51	0	0.38
Rice Flour	C: Carbs	2%	Farming	0.11	105	190	1.6
Wheat Flour	C: Carbs	3%	Farming	0.00095	15	0	0.084
Wheat Flakes	C: Carbs	18%	Farming	0.041	120	2.0	1.8
Wheat Glucose	C: Carbs	14%	Farming	0.0015	98	0	0.55
Almonds	F: Fruits	5%	Farming	0.12	-180	31000	1.48
Brazilnut	F: Fruits	1%	Farming	0	0.021	0	0.00012
Chicory	G: Sugar	5%	Farming	0.010	19	220	0.263
Hazelnut	F: Fruits	4%	Farming	0.034	-25	1300	0.26
Pecannut	F: Fruits	2%	Farming	0.0096	21	1400	0.34
Sugar	G: Sugar	9%	Farming	0.0020	30	10	0.44
Sunfloweroil	D: Oils	9%	Farming	0.064	230	4.7	4.0
			Farming Total	0.41	720	34000	13
			Transport	0	170	0.19539	0.18
			Processing	0	500	9.0	0.97
			Packaging	0	150	0.21	0.28
			Retail	0	160	0.48	0.24

Table 2 breaks down the stage grades and provides a breakdown of the farm grade based on the ingredients and its nutritional category. Table 2 is generated using the data from Table 1 and does not include the retail fraction loss or retail impacts.

Reminder: the product is graded based on its serving size.

Table 2

		Carbon		Water Scarcity		Water Pollution		Biodiversity	
Category / Stage	**Composition**	**Grade**	**Score**	**Grade**	**Score**	**Grade**	**Score**	**Grade**	**Score**
C: Carbs	66%	A+	1	B	3	A	2	B	3
D: Oils	9%	B	3	A	2	A	2	A+	1
F: Fruits	11%	A+	1	A	2	A	2	B	3
G: Sugar	14%	A	2	D	5	E	6	A+	1
Farming		A+	1	B	3	B	3	B	3
Transport		A	2	A+	1	A	2		
Processing		A	2	C	4	B	3		
Packaging		A+	1	A	2	B	3		

GRADE BENCHMARK

Cruseli 850g received an overall score of 2.16, corresponding to an A grade. The A grade boundary is between 1.50 and 2.49, meaning the product sits closer to the B boundary than the A+. Significant changes in the supply chain or product composition may be needed to improve the grade.

No similar products have been graded previously.

ASSESSMENT SUMMARY

The following data was provided by PepsiCo and employed in this assessment: supply chain mapping of tier 1 ingredients up to country of origin, resource use and waste treatment at the primary processing at the facility in Rotterdam, type and mass of primary and distribution product packaging, storage and distribution data. In addition, primary data from four oat farms in the UK was used in the assessment.

Gaps in the life cycle inventory post primary data collection were filled using secondary research. This secondary reference data includes raw produce farming impacts and ingredient-level processing, distribution, and packaging data. Additionally, although storage durations at distribution centers (DCs) and retail stores were provided by the client, the resource consumption at DCs and retail stores (per day) were based on secondary data.

HIGH LEVEL OVERVIEW OF MAIN GRADE DRIVERS

Impacts from rolled oats

Rolled oats make up over 30% of the product recipe by mass and contribute to about 28% of the total carbon and 17% of the water pollution impacts associated with the product. While farming of the oats is the main driver of water pollution impacts, both farming and processing of the rolled oats contribute significantly to carbon emissions. Water use and biodiversity impacts associated with the rolled oats however are minimal, due to predominantly rainfed farming of oats in the UK and in parts of Europe where they are sourced from, as well as low incumbent biodiversity in these farming regions.

About 60% of the rolled oats are sourced from within the UK. Among the four assessed oat farms, Hay Farm has almost twice the carbon emissions per kg of oats farmed, compared to East Pitkerie and Shoreswood farms and about three times higher compared to the Leckerstone farm. High impacts from the Hay farm are driven by the higher amounts of fertilizer used compared to the other farms. The Leckerstone uses a mixture of organic compost and two other types of synthetic fertilizers helping keep emissions in check. The Shoreswood farm benefits from higher yields per hectare despite having similar amounts of fertilizer used per hectare as compared to the Hay Farms. Consider working with Oatco to increase your supply from the Leckerstone farm or implement best practices from the Leckerstone farm to other farms. Since oats make up a significant fraction of the recipe and impacts across two categories including carbon, considerable changes within the supply chain could probably move the grading lever.

Impacts from almonds

Almonds account for less than 5% of the product recipe and yet contribute to about 86% of the water use (L eq) associated with the product. This is due to large amounts of water needed at the almond farms over the years of the crop cycle. These impacts are also amplified by the greater dependence of irrigation, in the absence of sufficient rainfall in almond growing regions in Australia and the USA (source of almonds).

Interestingly, almonds are often carbon negative and account for about negative 12% of the carbon impacts associated with the Cruseli, due to the trees being net carbon sinks over the crop cycle which typically spans about 25 years. Considering almonds make up a very high majority of the water use impact associated with the product and the potentially negative carbon across other geographies as well, changes in the almond supply chain could possibly result in the overall grade, especially for water use.

Processing impacts are driven by pre-processed ingredients

Pre-processed ingredients (wheat flakes, glucose syrup, sunflower oil, white sugar, oligofructose and wheat crisps) make up about 60% of the recipe and processing of these ingredients accounts for over 75% of all processing-related carbon impacts associated with the product. Availability and use of primary processing data from the suppliers, such as their energy mixes, could potentially help adjust these impacts.

However, with processing impacts spread across such a large number of ingredients, minor changes to the recipe or the supply chain are unlikely to reduce processing impacts significantly and thereby

are unlikely to move the final grade, especially considering the relatively smaller weightage for processing compared to the farm stage. Impacts from the primary processing facility are minimal across all impact categories due to low energy use per kg of Cruseli compared to other previously assessed PepsiCo products.

GRADING METHODOLOGY

Some key points to be highlighted:

1. Cruseli 850g product is considered a composite product and is therefore graded as such. Its farm-stage impacts fall into multiple food categories, namely: Carbs, Fruits, Sugars and Oils.
2. The serving size for this product is 45g which is also a significant lever in the grading system.
3. The values in this report are presented to 2 significant figures, therefore some values that appear to be the same may not be precisely the same and the underlying stage impacts could vary enough to affect baselined stage grades.