

**Nutrition
Centre**

By TATE & LYLE

A top-down photograph of a cup of coffee and a cinnamon roll. The coffee is in a light-colored ceramic cup with a dark rim, filled with a frothy, light-brown beverage. The cinnamon roll is golden-brown with a spiral pattern, resting on a piece of brown parchment paper. The background is a solid teal color. A white diagonal line runs from the top left to the bottom right, separating the coffee from the cinnamon roll and the text.

**Exploring stevia
and its role as an
alternative to sugar**

In recent years, we've seen an increase in health concerns related to diabetes and obesity⁽¹⁾

The World Health Organization (WHO) has identified excessive consumption of 'free sugars' as one of the leading causes of the problem. As a result, WHO has made a global recommendation to reduce free sugar consumption to the equivalent of 10% or less of daily calories, with added health benefits if free sugars consumption is reduced to less than 5% of daily calories⁽²⁾.

As a result of global health initiatives to increase consumer awareness around this issue, a growing number of people are looking for ways to reduce their intake of free sugars. One way to do this is to choose products with sweeteners instead of sugars.

Stevia is up to 200-300 times sweeter than sugar

Stevia is the generic term used to refer to different forms of the sweetener, including the whole plant stevia and the leaves where the sweet compounds are found⁽⁴⁾. The leaves of the stevia plant contain chemical compounds called steviol glycosides, with stevioside (9.1%), rebaudioside A (3.8%), and rebaudioside C (0.6-1.0%) being present in the greatest concentrations⁽⁵⁾. Steviol glycosides can be up to 200-300 times sweeter than sugar⁽⁶⁾.

At Tate & Lyle, we're committed to growing our portfolio of low-and no-calorie, great tasting ingredients, including sweeteners, that consumers can enjoy in the products they love. In this brochure, we're taking a look at the ingredients in our rapidly expanding stevia range – a naturally-sourced sugar alternative.



What are 'free sugars'?

According to the WHO, free sugars refer to monosaccharides (such as glucose and fructose) and disaccharides (such as sucrose or table sugar) added to foods and drinks by the manufacturer, cook, or consumer and sugars naturally present in honey, syrups, fruit juices, and fruit juice concentrates⁽²⁾.

This definition of free sugars excludes the sugars naturally present in milk (lactose and galactose). However, any lactose or galactose added separately to foods as an ingredient rather than as part of milk would be classified as a free sugar^(2, 3).

A naturally sweet history for a better future

Stevia, or Stevia Rebaudiana Bertoni is a perennial shrub used for many years as a sweetener in South American and Asian countries ⁽⁴⁾.

Today, stevia is widely used as a sweetener across the globe. A naturally-sourced calorie-free, sweet-tasting alternative to sugar, stevia is an ingredient of choice for many food and beverage manufacturers, for use in baked goods*, hot and cold drinks and even ice cream.



What are the benefits?

Regarding the benefits of stevia, the current research and emerging data are both exciting and promising.

This is particularly the case when it comes to controlling blood glucose levels (known as the glycaemic response), helping to reduce calories, which can support weight management and the management of type 2 diabetes.

We take a closer look at these benefits in the following pages.



What is the Glycaemic Response?

The glycaemic response is the effect of food or a meal on blood glucose levels after consumption.

The glycaemic response is managed naturally by the body – and it's important to manage it effectively to ensure that you maintain a healthy blood glucose level.

Alongside other factors such as genetics, sleep and stress, what you eat has a big impact on blood glucose levels. A healthy and balanced diet is key, as too many free sugars can cause blood glucose levels to spike. Restricting caloric intake from free sugars has become an important public health strategy for weight management and the prevention of related health issues.

Replacing free sugars with low- and no-calorie sweetener (LNCS) options such as stevia can reduce energy intake, therefore supporting healthy blood glucose levels ^(7,8).



Weight Management

Research has shown that replacing dietary sugars with LNCS, like stevia, as part of an energy-controlled diet and healthy lifestyle can reduce overall energy intake and support weight management ⁽⁹⁻¹²⁾.

According to a recent systematic review, body weight control was found to be more significant when LNCSs are used as a substitute for dietary sugars, especially in the adult population, in people who are overweight or obese, and in those who follow an unrestricted diet ⁽¹⁰⁾. The results showed that using LNCS, including stevia, instead of sugar reduced body weight by approximately – 1,3kg for the total population and by – 2,5kg for overweight or obese people ⁽¹⁰⁾. A WHO-supported review also reported a reduced body weight by approximately – 2kg when LNCS are used as sugar substitutes by overweight and obese people ⁽¹²⁾.



Overall, emerging data suggests that replacing dietary sugars with LNCS could potentially play a part in weight management programs when used with other strategies, such as reducing the amount of calorific foods consumed and drinking more water ⁽¹³⁾.

Diabetes

Because stevia can help manage the glycaemic response, it also has the potential to support the management of type 2 diabetes, a growing global problem.

Type 2 diabetes is a chronic disease that occurs when blood glucose (sugar) levels are raised because the body cannot effectively use the insulin the pancreas produces⁽¹⁴⁾. It can seriously impact health, including increasing the risk of heart disease and stroke and a number of other associated health concerns⁽¹⁴⁾.

What is insulin?

Because it doesn't raise blood glucose or insulin levels^(15, 16, 17), diabetes-related organisations globally, including the American Diabetes Association (ADA), the Diabetes and Nutrition Study Group of the European Association for the Study of Diabetes (EASD), Diabetes UK, Diabetes Canada, and the Latin-American Association of Diabetes (Asociación Latinoamericana de Diabetes – ALAD) recognise that stevia, along with other LNCS, can be safely used to replace dietary sugars and be a useful tool in the nutritional management of diabetes⁽¹⁸⁻²¹⁾.



Diabetes affects **537 million** people worldwide⁽¹⁴⁾



Enjoy without question in products consumers love

Because stevia has such a wide safety margin, there's no indication that any population worldwide has overused it. Its use in food, beverages and tabletop sweeteners is approved by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), the European Food Safety Authority (EFSA), Health Canada and the Food and Drug Administration (FDA)⁽²²⁻²⁴⁾.

What is the acceptable daily intake?

JECFA established an Acceptable Daily Intake (ADI) for steviol glycosides at 4 mg for every kg of body weight per day⁽²⁵⁾. For an adult with an average weight of 70 kg this equates to 280 mg of stevia (around 3.5 litres of stevia-sweetened soft drink) per day. According to the EFSA, ADI is an estimate of the amount of a substance in food or drinking water that can be consumed daily in the diet over a lifetime without presenting an appreciable risk to health. This includes pregnant and breastfeeding women and children over the age of 3 years⁽²⁶⁾.

Stevia consumption and dental health

Because stevia doesn't contain the fermentable carbohydrates responsible for making dental tissue more acidic, it doesn't reduce the pH in dental plaque and, therefore, doesn't contribute to tooth decay in children or adults⁽²⁷⁻²⁸⁾.

Bringing our expertise to your table

Here at Tate & Lyle, our growing range of stevia solutions fit seamlessly into the everyday products consumers love whilst offering a number of potential benefits for health – all without compromising on taste, texture and enjoyment.

Take a closer look at the range:

TASTEVA® Stevia Sweetener

Delivers a clean, sweet taste with no bitter aftertaste – even at higher usage levels.

TASTEVA® D Stevia Sweetener

A Rebaudioside D (Reb D) that has a clean, sugar-like taste profile and works well in combination with other steviol glycosides, allulose, erythritol and monkfruit.

TASTEVA® M Stevia Sweetener

A Rebaudioside M (Reb M) that provides a taste that's remarkably clean and sugar-like, without any bitterness or lingering.

TASTEVA® SOL Stevia Sweetener

A premium tasting stevia with over 200x the solubility of Reb M and D products on the market.

ALTESSE STEVIA® Sweetener

A high purity Rebaudioside A (Reb A) that offers taste and performance refinement.

GREENESSE STEVIA® Sweetener

This SG95 family offers cost-effective stevia solutions for lower levels of sugar replacement.

DUAL STEVIA® Sweetener

Can substitute high purity Reb A stevia extracts for improved taste and a lower cost in use.

SWEETESSE STEVIA® Sweetener

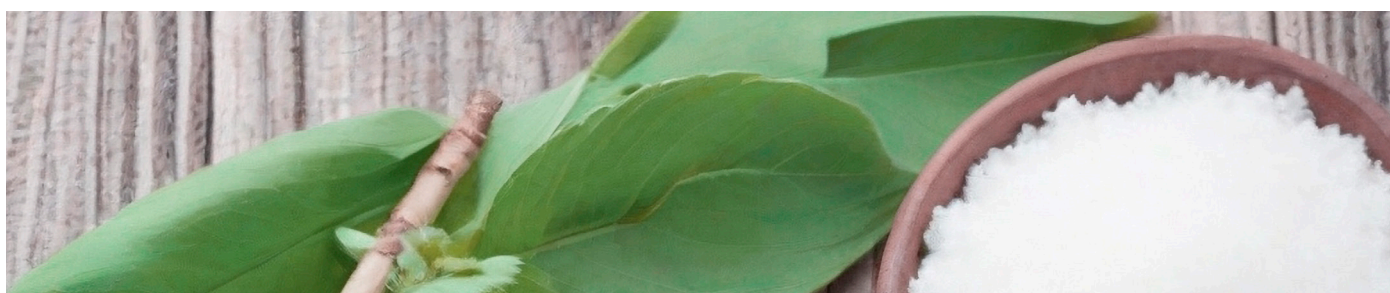
A range of high purity Rebaudioside A (Reb A) products for mid to high levels of sugar replacement.

OPTIMIZER STEVIA® Sweetener

Offers proprietary compositions with similar taste and quality to Reb A 97, but at a better cost in use.

OMEGA™ Stevia Sweetener

Ideal for medium to high sugar replacement, Omega Stevia provides sugar-like sweetness with a clean finish.





References

1. World Health Organization (WHO). 2021. Obesity and overweight factsheet. Available at: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>.
2. World Health Organization. (2015). Guideline: sugars intake for adults and children. World Health Organization. Available at <https://apps.who.int/iris/handle/10665/149782>.
3. Swan GE et al. 2018. A definition of free sugars for the UK. *Public Health Nutr.* 21(9):1636-1638.
4. Ashwell M. 2015. Stevia, Nature's Zero-Calorie Sustainable Sweetener: A New Player in the Fight Against Obesity. *Nutrition today*, 50(3), 129–134.
5. Purkayastha, S., and Kwok D. 2020. Metabolic fate in adult and pediatric population of steviol glycosides produced from stevia leaf extract by different production technologies. *Regulatory toxicology and pharmacology* : RTP, 116, 104727.
6. Commission Regulation (EU) No 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012R0231>.
7. Nichol A, et al. 2018. Glycemic impact of non-nutritive sweeteners: a systematic review and meta-analysis of randomized controlled trials. *Eur J Clin Nutr.* 72(6):796-804.
8. Rogers PJ, et al. 2016. Does low-energy sweetener consumption affect energy intake and body weight? A systematic review, including meta-analyses, of the evidence from human and animal studies. *Int J Obes.* 40(3):381-94.
9. Rogers PJ and Appleton KM. 2021. The effects of low-calorie sweeteners on energy intake and body weight: a systematic review and meta-analyses of sustained intervention studies. *Int J Obes*;45(3):464-478.
10. Laviada Molina H, et al. 2020. Effects of nonnutritive sweeteners on body weight and BMI in diverse clinical contexts: Systematic review and meta analysis. *Obes Rev.* 21(7).
11. Miller P and Perez V. 2014. Low-calorie sweeteners and body weight and composition: a meta-analysis of randomized controlled trials and prospective cohort studies. *Am J Clin Nutr.* 100(3):765-777.
12. Toews I, et al. 2019. Association between intake of non-sugar sweeteners and health outcomes: systematic review and meta-analyses of randomised and non-randomised controlled trials and observational studies. *BMJ* 363: k4718.
13. Catenacci VA, et al. 2014. Low/No calorie sweetened beverage consumption in the National Weight Control Registry. *Obesity.* 22(10): 2244-2251.
14. International Diabetes Federation (IDF). *IDF Diabetes Atlas*, 10th edition, 2021. Available at: <https://diabetesatlas.org>.
15. Tey S, et al. 2016. Effects of aspartame-, monk fruit-, stevia- and sucrose-sweetened beverages on postprandial glucose, insulin and energy intake. *Int J Obes.* 41(3):450-457.
16. Ajami M, et al. 2020. Effects of stevia on glycemic and lipid profile of type 2 diabetic patients: A randomized controlled trial. *Avicenna J Phytomed.* 10(2):118-127.
17. Anton SD, et al. 2010. Effects of stevia, aspartame, and sucrose on food intake, satiety, and postprandial glucose and insulin levels. *Appetite.* 55(1), 37-43.
18. Diabetes UK. 2018. The use of low or no calorie sweeteners. Position Statement. Available at: <https://www.diabetes.org.uk/professionals/position-statements-reports/food-nutrition-lifestyle/use-of-low-or-no-calorie-sweeteners>.
19. Diabetes and Nutrition Study Group (DNSG) of the European Association for the Study of Diabetes (EASD). 2023. Evidence-based European recommendations for the dietary management of diabetes. *Diabetologia.* 66(6):965-985.
20. Dyson PA, et al. 2018. Diabetes UK evidence-based nutrition guidelines for the prevention and management of diabetes. *Diabet Med.* 35(5):541-547.
21. Laviada-Molina H, et al. 2018. Consenso de la Asociación Latinoamericana de Diabetes sobre uso de edulcorantes no calóricos en personas con diabetes [Consensus of the Latin-American Association of Diabetes on low calorie sweeteners in persons with diabetes]. *Rev ALAD.* 8:152-74.
22. Younes M, et al. 2021. Safety evaluation of steviol glycoside preparations, including rebaudioside AM, obtained by enzymatic bioconversion of highly purified stevioside and/or rebaudioside A stevia leaf extracts. *EFSA J.* 19(8).
23. FDA. GRAS Notice (GRN) No. 768 [Internet]. Available at: <https://www.fda.gov/media/119340/download>.
24. Younes M, et al. 2022. Safety evaluation of glucosylated steviol glycosides as a food additive in different food categories. *EFSA J.* 20(2).
25. JECFA (Joint FAO/WHO Expert Committee on Food Additives), 2009. Steviol glycosides (addendum). In: Toxicological evaluation of certain food additives. Sixty ninth report of JECFA, June 17 26-29, 2008, Rome. WHO Food Additives series, No. 60, 183–219.
26. Safety evaluation of certain food additives: prepared by the Eighty-second meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA 2017). Geneva: World Health Organization; (WHO Food Additives Series, No. 73).
27. Ma MS, Blanksma, NG. 2015. Stevia in the fight against dental caries. *Ned Tijdschr Tandheelkd.* 122(1): 51–55.
28. Cocco F, et al. 2019. Effect of a Daily Dose of Snacks Containing Maltitol or Stevia rebaudiana as Sweeteners in High Caries Risk Schoolchildren. A Double-blind RCT Study. *Oral Health Prev Dent.* 17(6): 515–522.

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