

## The Metabolic Matrix: A Collaborative Design Framework for Metabolic Health

The Metabolic Matrix is a science-based framework designed to guide the development and transformation of food products and portfolios toward optimal metabolic health. It was commissioned by Kuwaiti Danish Dairy Company (KDD) in 2020 and developed by an independent, multidisciplinary team of scientists. This team of scientists has expanded to support the ongoing development and evolution of the matrix.

The mandate was to define what constitutes “healthy,” and create a practical, rigorous, scalable, and replicable framework that could be used to design and reengineer products before they reach the market. Version 1.0 of Metabolic Matrix was completed in 2021 and KDD began applying the framework in 2022.

The Metabolic Matrix was conceived as a dynamic and evolving scientific framework that positions metabolic health as the north star of nutrition. Metabolic health is the body’s ability to efficiently produce, regulate, and use energy to sustain daily function while supporting the long-term health of key systems. It is not intended to be static or frozen in time, but to evolve alongside advances in nutrition and metabolic science, as well as its application across different regions, product portfolios, and product types.

The Metabolic Matrix builds on three foundational pillars of metabolic health: *feed the gut, protect the liver, and support the brain* (the GLB axis is [well supported in science](#)). These pillars reflect the principal interconnected biological systems that underpin healthy metabolism.

These pillars are operationalized through 39 evidence-based criteria, organized into progressive tiers featuring harm reduction, fortification, and value-adds. The tiers are sequential and non-negotiable. Harm reduction criteria must be met before a product can progress to fortification, and fortification must be achieved before value-adds are considered. There are no trade-offs between tiers; reducing harm always comes first. The original criteria were developed with a specific lens on Kuwait and the broader MENA region, reflecting regional dietary patterns and key metabolic health challenges, including having some of the highest rates of metabolic disease in the world.

The framework is explicitly designed to be adaptable, allowing additional criteria to be developed for other regions, portfolios, product types, applications, and needs. A Metabolic Matrix 2.0 version is currently being prepared for release, with future iterations to be developed through multi-disciplinary scientific review and partner collaboration. Multiple technical and scientific partners are being engaged to ensure the evolution of the matrix benefits from multiple disciplines and stakeholders.

The framework is supported by an advanced data science platform that collects a wide range of ingredient and product data, processes, and operationalizes the criteria, enabling highly granular analysis, and delivering detailed reports guiding transformation of products at precise ingredient levels. Ingredient and product innovation is catalyzed by specific recommendations promulgated for every product.

The Metabolic Matrix is an active design tool within the product development process. This distinguishes it from conventional formulation, classification, or labeling systems, such as the Health Star Rating System which are limited due to nutrient trade-offs, evaluation of products only after they are on shelf rather than guiding their design, warning labels, and reliance on narrow sets of nutrient profiles rather than on comprehensive metabolic health criteria. The Metabolic Matrix operates upstream, shaping products and portfolios *before* they reach consumers. Consumers want healthier products, not warning labels.

The Metabolic Matrix is being advanced as a Technology Transfer in collaboration with the Kuwait Foundation for the Advancement of Science and other leading academic and scientific institutions. From the beginning, the entire framework has been open sourced. Extensive details are available at

metabolicmatrix.info, and the Scientific Advisory Team published a highly detailed [methods paper](#) in the peer-reviewed journal *Frontiers in Nutrition* in 2023, currently in the top 5% of all research outputs scored by Altmetric. This openness reflects a core principle of good science: not to prove a model is right, but to rigorously test it through critique and peer review. To date, no substantive scientific critiques have been raised in the peer-reviewed literature; however ongoing evaluation and improvement are actively welcomed—because this is how good science advances.

KDD has applied the Metabolic Matrix across new product development, re-engineering of existing products, and commercial products and partnerships. A key principle is that deliciousness and consumer appeal cannot be sacrificed in the name of health. Some resulting products are marketed under the KDD GOOD FOR ME brand, while others are transformed without special consumer-facing labeling or claims. Early efforts focused heavily on reducing or eliminating added sugars, a high-priority criterion, with continued integration of the full framework underway.

Transforming products and portfolios for mass-market consumers is a complex, multi-year endeavor. The Metabolic Matrix does not require transforming an entire portfolio at once and can be applied at product or category levels in ways that make strategic or operational sense. Adopting metabolic health as a North Star of nutrition represents a fundamental shift in how and why food products are developed. The process involves every key aspect of the manufacturer’s business (reflected in the Functional Gears graphic below). The pending Technology Transfer will help navigate this complexity.

No single company changing the way it designs foods for metabolic health will transform the entire food system. Precompetitive collaboration is not only a good idea – it is essential. The Metabolic Matrix is intended for food manufacturers, researchers, policymakers, and other stakeholders seeking to design and reengineer—not merely label—foods for metabolic health.

For more information, visit <https://metabolicmatrix.info> or contact Wolfram Alderson, Executive Manager of Research and Innovation at KDD ([walderson@kddc.com](mailto:walderson@kddc.com)).

