IUFoST World Congress 2026

Rethinking Ultra-Processed Food: Outcomes of the Pro2Phy Session Series

Comprehensive Report based on Session Outcomes, Programme and Scientific Foundations
Hong Kong, 30 October 2026

1. Introduction and Session Series Overview

At the IUFoST World Congress 2026 in Hong Kong (26–29 October), the IUFoST Task Force on Processing for Nutrition, Diet and Health organised a dedicated seven-session series entitled “Rethinking Ultra-Processed Food” (ReUPF-1 to ReUPF-7). The series was designed didactically to present the scientific foundations of the Task Force’s Pro2Phy (From Processing to Physiology) framework, discuss practical limitations of categorical UPF classifications (notably NOVA), engage external experts, conduct an interactive work session with applied examples, initiate project matching, and conclude with a plenary roundtable synthesising outcomes and addressing open questions.

The sessions were well attended and generated substantial positive resonance and discussion interest. They were complemented by other congress elements and provided a platform for advancing an evidence-based, quantitative alternative to ambiguous ultra-processed food categorisations. The Pro2Phy modules — NOURISH, PRISM, SLIM and the outlook DAME — received strong approval and expressions of implementation interest.

2. The Pro2Phy Framework

Contemporary food classification systems such as NOVA primarily address nutritional quality at the level of ingredient formulation (or perceived processing degree) but neither separate formulation from processing impacts nor extend to the consumption phase, where eating behaviour determines actual energy and nutrient intake. The IUFoST Task Force’s coupled framework spans the extended food value chain from ingredient selection and manufacturing through the point of purchase to intake and, prospectively, to digestion and health outcomes.

The quantitative triad (often referred to as PRINS) consists of NOURISH, PRISM and SLIM; DAME forms the outlook module. Each component occupies a defined position: NOURISH at formulation and processing, PRISM at the point of purchase (six quality facets), SLIM at intake (linking densities and eating rate to overeating/under-nourishment), and DAME at digestion, absorption and evidence-graded health outcomes. Feedback loops close the chain (e.g., satiation efficiency informing reformulation targets; bioavailability correcting nutrient content changes).

3. Core Modules in Detail

3.1 NOURISH: Separating Formulation and Processing Impacts

NOURISH (Nutritional Optimization Under Responsible Ingredient Selection and Handling) quantifies nutritional value using the Nutrient Rich Food Index (NRF9.3). Formulation is measured by the baseline NRF9.3(1) of the raw or base product; processing is quantified by

the change ΔNRF9.3 = NRF9.3(2) − NRF9.3(1). The Formulation and Processing Food Index is simply the processed-product score: FPFI = NRF9.3(2).

This separation is visualised in the NOURISH Map (Figure 1), where open symbols represent formulation baselines (ΔNRF = 0) and filled symbols the processed products, with arrows indicating processing vectors. Background colour encodes nutritional quality. Examples drawn from USDA FoodData Central demonstrate both improvements (e.g., germination of mung beans, mild cooking of broccoli, fortification effects in corn flakes when properly attributed to formulation) and deteriorations (e.g., frying of potatoes or chicken, refining of whole-wheat flour). Processing is conceptualised as an engineering toolbox governed by the Process–Structure–Properties (S-Pro²) principle.

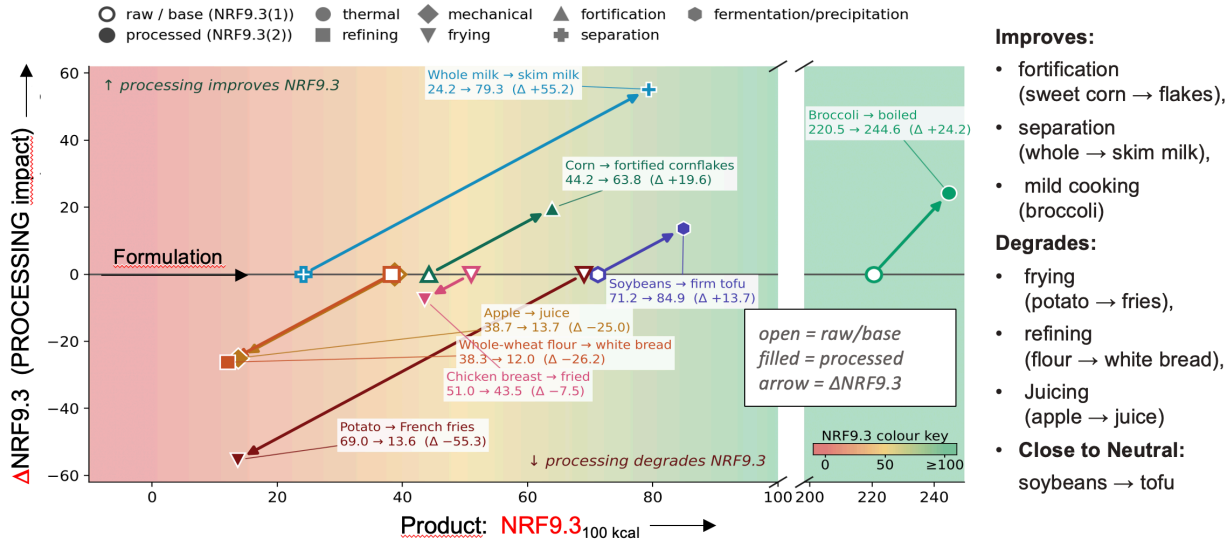


Figure 1. Illustrative NOURISH Map: Formulation (x-axis) and processing (y-axis / vectors) impacts on nutritional value (NRF9.3). Colour scale indicates nutrient density. (Based on Task Force methodology)

3.2 PRISM: Multi-Facet Assessment at the Point of Purchase

PRISM (Product Rating Integration System for Multi-characteristics) extends evaluation at the point of purchase to six facets, each applying the formulation–processing separation principle:

- **NOURISH**: nutrition (NRF and ΔNRF or FPFI = NRF(1) + ΔNRF)
- **EARTH**: sustainability (e.g., GWP/ΔGWP); to be developed quantitatively in 2027
- **SHIELD**: safety and shelf life
- **VALUE**: affordability (critical in LLMIC contexts for fortification and food security)
- **EASE**: convenience & consumption control (incl. satiation efficiency SE = 1/Π)
- **TASTE**: palatability / sensory quality (linked to texture-driven eating rate)

Product development navigates a multi-dimensional Pareto frontier rather than summing scores. Intensive processing may improve SHIELD and convenience while reducing NOURISH; energy-dense reformulation may enhance TASTE but increase overeating risk. Figure 2 illustrates contrasting facet profiles.

3.3 SLIM: Linking Densities and Eating Rate to Intake Outcomes

SLIM (Satiation Lag Intake Model) bridges the point of purchase to the consumption phase. It operates on two parallel tracks derived from the water-extended nutrient profile (NRF*W): an energy track predicting the Overeating Fraction OE(ξ, δ) and a nutrient track predicting the

Under-Nourishment Fraction UN. The governing dimensionless group is Π = ξ^p · δ, where ξ is the eating-rate ratio and δ the energy-density ratio relative to a reference (whole milk). OE follow a saturating exponential function, with OEmax ≈ 120 % reflecting physiological limits

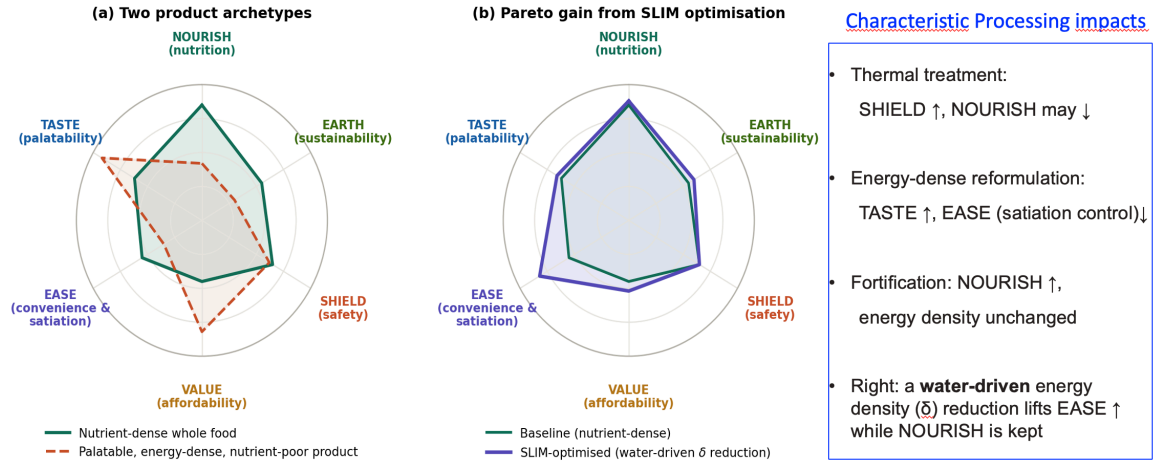


Figure 2. Illustrative PRISM radar chart showing six quality facets and contrasting profiles of a nutrient-dense whole food versus an energy-dense processed product. (Conceptual representation based on the framework.)

Four physiological satiation pathways with distinct time constants are considered: gastric distension (~2 min), oro-sensory/cephalic (~3 min), CCK (~22 min) and GLP-1/PYY (~60 min). Structure (water content and aeration) is a first-order design variable: identical oat formulations differing only in water and gas content can change energy ingested at satiation by a factor of approximately 2.2. Satiation efficiency SE = 1/Π quantifies the consumption-control component of the EASE facet. Figure 3 shows the characteristic saturating relationship between the governing parameter Π and the overeating fraction.

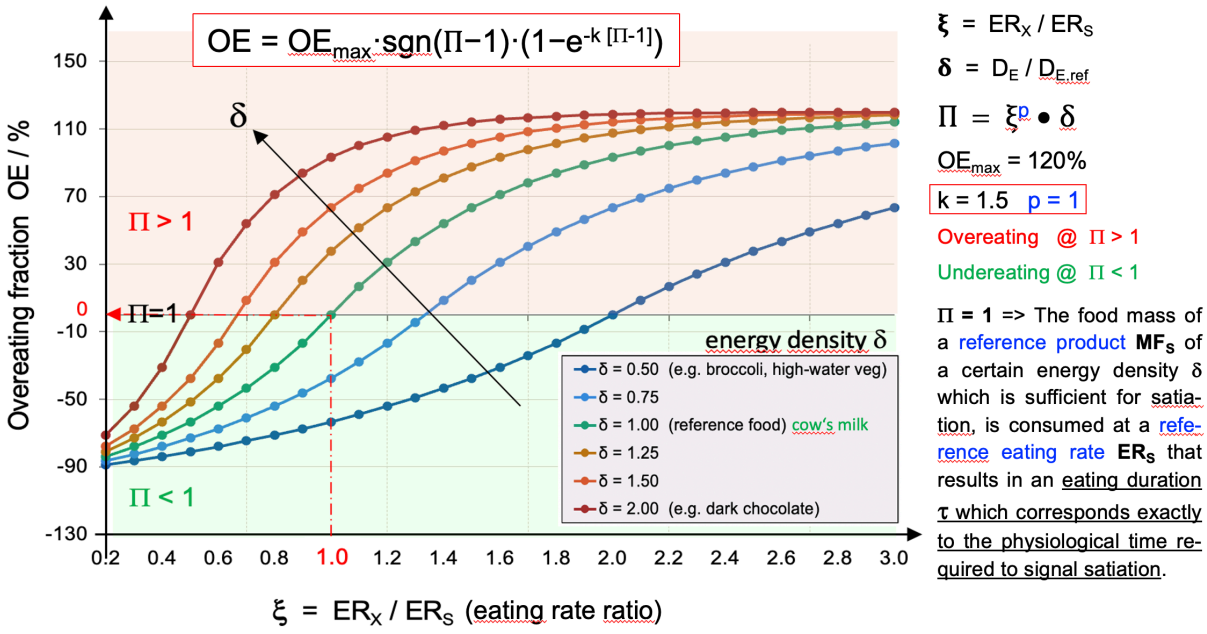


Figure 3. Illustrative SLIM relationship: Overeating Fraction OE (%) as a function of the governing parameter Π = ξ^p · δ. Reference whole milk at Π = 1 yields OE = 0. The curve saturates at the physiological limit. (Representative of the calibrated model.)

4. Session Outcomes and Key Discussions

The series opened with scientific foundations (ReUPF-1: NOURISH by B. Schneeman, PRISM by H. Chen, SLIM by E. Windhab). Subsequent sessions examined real-world consequences of UPF classification — regulatory experience in South America, risks to fortification strategies, and potential stigmatisation of plant-based processing innovations (ReUPF-2) — and showcased UNIDO–IUFoST collaboration on circular cocoa value-chain valorisation and fortification (ReUPF-3).

A science-industry-legislation panel (ReUPF-4) debated pathways toward measurable, legislation-ready frameworks. The interactive work session (ReUPF-5) trained participants on applying the modules using USDA data, constructing NOURISH Maps, deriving energy and nutrient densities, and calculating overeating/under-nourishment fractions via SLIM, including the four satiation mechanisms. Project matching (ReUPF-6) initiated three pilot domains: NOURISH datasets from FoodData Central and verified recipes; a shared eating-rate/satiation protocol on an oat matrix; and paired INFOGEST and human response data. The closing roundtable (ReUPF-7) synthesised congress reflections and defined future to-dos across science, practice and policy.

Throughout, emphasis was placed on the need for validation and extension by diverse research groups, with explicit encouragement of collaboration between food technologists/engineers and nutrition experts. IUFoST and IUNS welcome such concerted actions.

5. Current Work, Outlook and Call to Action

Current Task Force work focuses on further development of the SLIM model in the context of NOURISH and PRISM. Expertise in eating behaviour and sensory science has been strengthened by the September 2026 accession of Prof. Ciaran Forde (Wageningen University). The DAME module is being configured around existing methodologies (static/dynamic INFOGEST, wearable sensors, cell models, stable-isotope labelling for absorption detection); experts are being invited to an Advisory Board.

A further extension planned for 2027 is quantitative treatment of the EARTH (sustainability) facet within PRISM, assessing formulation and processing impacts on resource throughput and handling. Expert consultations will begin in late 2026.

The architecture of the Pro2Phy / PRINS framework is established and database-compatible (USDA FoodData Central). Remaining priorities include calibration of model parameters (exponents, pathway sensitivities), validation against biomarkers, prediction of eating rates from texture, and experimental build-out of DAME. The Task Force invites research groups to engage with the pilot projects initiated in Hong Kong and to contribute to refining this continuous, quantitative pathway from recipe design to intake and, prospectively, health outcomes — thereby providing a scientifically robust alternative to categorical ultra-processed food labels.

E. Windhab, on behalf of the IUFoST Task Force on Processing for Nutrition, Diet and Health (L. Ahrné, H. Chen, C. Forde, J. Henry, B. Schneeman), 1. Nov. 2026