INTABIOTECH

Beyond the Shake

How Clear Protein Is Redefining Functional Nutrition — and the Role of ProteoSol™

CLEAR	PLANT-BASED	APPLICATION-ENABLING

A scientific and technological review of transparent protein systems, plant-protein solubilisation, formulation constraints and the emerging ProteoSol™ platform.

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Editorial positioning

Clear protein should not be presented as nutritionally superior merely because it is transparent. Its disruptive value is technological and behavioural: it can remove formulation and sensory barriers that have historically confined protein to opaque, viscous, shake-like formats.

Executive perspective

Clear protein is changing the competitive logic of protein beverages. Instead of asking consumers to accept protein as a thick, creamy nutritional product, clear-protein technology allows protein to enter the sensory territory of flavoured water, isotonic drinks, fruit-style beverages, functional refreshment, powdered hydration and shots. In 2026, industry reporting documented major new clear-protein launches and described a broader move from specialised sports nutrition toward refreshing, lifestyle-oriented formats (FoodNavigator, 2026).

For INTABIOTECH, the strategic opportunity is not to copy clear whey. It is to demonstrate that a properly engineered plant-protein platform can extend clear-protein technology into applications where conventional rice, pea or other plant proteins are constrained by haze, sedimentation, viscosity, poor dispersion or vegetal sensory notes.

KEY SCIENTIFIC POSITION

Clarity is not a nutritional endpoint. It is a measurable expression of protein solubility, colloidal behaviour and processing stability. ProteoSol™ should therefore be differentiated through auditable technical performance first, and through physiological claims only where product-specific evidence exists.

Abstract

Protein supplementation is undergoing a transition in format. For decades, the category was dominated by opaque, milk-like shakes whose technological architecture was largely dictated by whey, casein, soy and conventional plant-protein systems. The rise of clear protein challenges that model by decoupling protein delivery from the visual and textural conventions of a shake. Transparent or near-transparent protein systems can instead be formulated as refreshing waters, fruit-style beverages, sports drinks, functional shots and other low-viscosity formats.

This transition is technically significant because clarity is not merely aesthetic. It emerges from the combined effects of protein solubility, particle size, peptide distribution, aggregation state, pH, ionic strength, thermal history, mineral composition and storage stability. Plant proteins present a particularly demanding case because many conventional isolates show limited solubility and strong aggregation behaviour in acidic or high-protein systems. Enzymatic hydrolysis is one of the principal strategies available to modify this behaviour, although hydrolysis can introduce its own sensory challenge through bitterness and off-notes.

This review examines the scientific basis of clear protein and evaluates the role of ProteoSol™, INTABIOTECH's proprietary platform of highly water-soluble plant proteins. Particular attention is paid to the current ProteoSol™ Rice Clear / Ultra-Clear development platform. Controlled internal documentation reports a rice-protein hydrolysate containing at least 85% protein on a dry basis, at least 80% peptide content and a molecular-weight distribution in which more than 80% of the peptide fraction is ≤2,000 Da. The source specification also describes rapid dissolution and a clear, transparent solution without visible turbidity or sediment. These characteristics are technically relevant, but quantitative optical thresholds, amino-acid quality, comparative digestibility, sensory performance and multi-condition stability should remain part of the evidence-development programme before stronger comparative claims are made.

The central conclusion is that clear protein is a genuine category-enabling technology when clarity, solubility and low viscosity remove formulation and consumption barriers. For ProteoSol™, the most defensible opportunity is not a generic claim of superiority to whey, but an application-specific platform for plant-based, acidic, refreshing and low-sediment protein delivery.

Keywords: *clear protein; ProteoSol™; plant protein; rice protein; protein hydrolysate; enzymatic hydrolysis; protein water; turbidity; functional beverages; sports nutrition; peptide technology.*

1. From protein shake to protein beverage: a category-level change

The conventional protein shake has been one of the most successful delivery formats in sports and performance nutrition, but it carries a strong sensory identity. Consumers expect opacity, body, creaminess and a relatively dense mouthfeel. These attributes fit whey concentrates, isolates, caseins and many plant-protein formulations reasonably well because visible turbidity is not interpreted as a defect.

Clear protein changes the design brief. The product is expected to behave more like water, juice or a sports drink. That immediately raises the technical bar: any haze, flocculation, sediment, powderiness or excessive viscosity becomes conspicuous. A protein ingredient that works perfectly in chocolate or vanilla shake systems may therefore fail completely in a lemon-lime protein water.

The commercial relevance of the shift became increasingly visible in 2026. FoodNavigator reported that clear whey was moving beyond specialist sports nutrition into refreshing functional-drink formats, alongside launches from large nutrition businesses. The importance of this development is not any single brand launch; it is the validation of a new consumption architecture in which protein can be consumed during hydration, refreshment and everyday functional-drink occasions rather than only as a meal replacement or post-workout shake.

"The strategic change is simple: protein no longer has to look, feel or drink like a protein shake."

Figure 1. The architectural shift in protein delivery

Conceptual framework: clarity expands protein from a nutrition format into a broader beverage platform.

2. "Clear" is not a marketing adjective: it is a physicochemical outcome

The word clear is often used imprecisely. Solubility, dispersibility, transparency and storage stability are related but not interchangeable. A powder can disperse rapidly yet later sediment. A protein can be fully soluble by a nitrogen-solubility method while still producing perceptible colour or light scattering. A beverage can appear clear immediately after preparation but develop haze after heat treatment, mineral addition or storage.

For protein systems, optical clarity is governed by the size, concentration and refractive properties of particles or aggregates present in the continuous phase. As protein-protein associations grow, light scattering increases and the beverage becomes opalescent or turbid. This means that a credible clear-protein specification should state not only what the beverage looks like but also the conditions under which the measurement is made.

- Protein concentration and actual protein delivered per serving.
- pH and buffer system.
- Water hardness and ionic strength.
- Mixing energy, hydration time and temperature.
- Turbidity, preferably as NTU, and/or optical transmittance at a defined wavelength.

- Sedimentation after a defined period and, when appropriate, accelerated stress testing.
- Thermal history and cooling conditions.
- Mineral, flavour, sweetener and acid composition.
- Carbonation conditions where relevant.

The controlled ProteoSol™ specification-development programme already reflects this logic. It proposes concentration-defined preparations, testing across pH conditions, turbidity and/or transmittance measurement, sedimentation assessment, and application-specific heat or carbonation challenges. Importantly, it also states that the Ultra-Clear designation should not be treated as a purely verbal improvement over Clear: it should become a measured sub-grade with a formal optical acceptance criterion once sufficient pilot-lot data are available (INTABIOTECH/ND Pharma & Biotech, 2026a).

CRITICAL DISTINCTION

"100% water-soluble", "clear" and "ultra-clear" are three different claims. Each should have its own analytical definition. A strong B2B position is created by measurement, not by adjectives.

3. Why clear plant protein is harder than clear whey

Whey has important structural and nutritional advantages for clear beverage development, particularly in appropriately processed isolate systems. Plant proteins create a different challenge. Their solubility is affected by amino-acid composition, surface hydrophobicity, disulphide bonding, hydrogen bonding, extraction history, drying, non-protein constituents and proximity to the isoelectric region. Gao, Rao and Chen (2024) emphasised that plant-protein solubility is a central determinant of broader functionality and that both intrinsic and extrinsic variables must be controlled if plant proteins are to perform reliably in food systems.

Rice is a particularly relevant example. Yang et al. (2023) reviewed the low solubility of rice protein and linked it to hydrophobic residues, disulphide bonds and intermolecular hydrogen bonding. These structural characteristics help explain why conventional rice-protein concentrates and isolates can be difficult to use in transparent beverages despite the attractiveness of rice as a botanical protein source.

The problem becomes more acute in acidic drinks. As proteins approach regions of low net charge, electrostatic repulsion decreases and protein-protein association can increase. The result may be haze, flocculation or precipitation. This is one reason a plant protein that appears manageable in a neutral shake can become unstable in a fruit-style beverage around pH 3-4.

4. Enzymatic hydrolysis: changing protein architecture rather than hiding the problem

Enzymatic hydrolysis is one of the most important routes for improving the functional behaviour of plant proteins. Proteases cleave peptide bonds and reduce the size of intact protein structures. Depending on the substrate, enzyme system and degree of hydrolysis, this can increase the number of ionisable groups, reduce aggregate size and improve interaction with water.

Experimental work by Shahbal et al. (2023) on pea, rice, hemp and oat proteins showed that controlled enzymatic hydrolysis substantially increased solubility relative to non-hydrolysed controls. The same study also demonstrated an important limitation: high protein concentration can still favour reassociation and reduce apparent solubility. The practical message is that hydrolysis improves the probability of success but does not eliminate the need for concentration-specific validation.

For ProteoSol™, the technological rationale is therefore stronger when expressed as an engineered molecular-distribution platform rather than as a simplistic "hydrolysed protein" claim. The aim is not maximum hydrolysis. It is the peptide architecture that provides the required combination of water compatibility, optical performance, sensory acceptability and nutritional quality.

5. ProteoSol™ Rice Clear / Ultra-Clear: what is currently documented

INTABIOTECH's current controlled technical dossier defines ProteoSol™ Rice as a rice-protein hydrolysate / rice-peptide ingredient obtained from edible rice protein through an enzymatic gradient-hydrolysis concept. The retained source specification describes an off-white to yellowish fine powder, instant solubility under its stated preparation conditions and a clear, transparent solution without visible turbidity or sediment (INTABIOTECH/ND Pharma & Biotech, 2026a).

The currently retained compositional values are technically notable:

- Protein: ≥85.0% on a dry basis.
- Peptide content: ≥80.0% on a dry basis.
- Molecular-weight profile: >80% of peptides reported at ≤2,000 Da.
- Loss on drying: ≤7.0%.
- Total ash: ≤6.0%.
- Shelf life: 24 months under recommended storage conditions.

These data provide a credible molecular basis for a clear-protein development platform. A peptide fraction dominated by low molecular weights is structurally different from a conventional intact rice isolate and is consistent with the intended objective of high aqueous compatibility and reduced sedimentation. Nevertheless, several critical analytical gaps remain before stronger claims are justified: the amino-acid profile, quantitative solubility method, validated NTU/transmittance limits, degree of hydrolysis, sensory profile, digestibility data and matrix-specific stability programme all need formalisation.

Table 1. Evidence status for ProteoSol™ Rice

Parameter	Current evidence position	Scientific / commercial action
Protein content	≥85% dry basis in retained source specification	Confirm analytical method and nitrogen factor in master CoA.
Peptide content	≥80% dry basis	Define analytical method and lot-release rule.
Molecular weight	>80% of peptides ≤2,000 Da	Validate by SEC-HPLC or equivalent and establish reproducibility.
Solution appearance	Clear and transparent; no visible turbidity or sediment	Convert visual description into NTU/%T specification.
Ultra-Clear grade	Development designation	Do not claim superiority until a separate optical threshold is validated.
Amino-acid quality	Pending complete current dataset	Generate aminoacidogram, EAA profile, limiting amino acid and leucine data.
Digestibility / DIAAS	No product-specific superiority established	Use only after suitable analytical or in vivo evidence.

Parameter	Current evidence position	Scientific / commercial action
Sensory	Application-dependent; formal profile required	Map bitterness, vegetal notes, astringency and flavour compatibility.
Heat / acid / mineral stability	Requires application-specific validation	Build pH, thermal, electrolyte and shelf-life stability map.

Source: controlled INTABIOTECH / ND Pharma & Biotech specification-development dossier, 2026. Values should remain subject to approved QA methods and lot documentation.

6. Clear plant protein should not be marketed as "better whey"

The strongest scientific positioning for ProteoSol™ is differentiation, not denial of the strengths of dairy protein. Whey remains a benchmark for indispensable amino-acid quality, leucine delivery and digestibility, and clear whey has already demonstrated that high-quality protein can occupy juice-like or water-like sensory territory. Claiming universal physiological superiority over whey without product-specific DIAAS, amino-acid and kinetic data would weaken rather than strengthen the ProteoSol™ proposition.

The opportunity for clear plant protein is different. It can address plant-based and vegan positioning, dairy avoidance, botanical formulation strategies, selected allergen-management needs, diversification of protein sourcing and beverage applications in which conventional plant proteins are too turbid, too viscous or too sediment-prone. In other words, the question is not "Which protein wins?" but "Which protein architecture is technically appropriate for the intended product, consumer and claim?"

Table 2. Three protein architectures — three different value propositions

Decision factor	Conventional plant isolate	Clear whey / dairy-derived clear protein	ProteoSol™ clear plant platform
Typical optical challenge	Haze, sediment and opacity frequently tolerated in shakes	Clear beverage performance achievable with specialised whey systems	Designed for clear / low-sediment plant-protein applications; matrix validation required
Plant-based positioning	Yes	No	Yes, subject to source and final formulation
Protein quality evidence	Source-dependent and variable	Generally strong for whey	Must be documented for each ProteoSol™ source / blend
Acidic beverage potential	Often challenging	Established in suitable clear-whey systems	Core development territory; pH-specific validation required
Mouthfeel target	Often creamy, particulate or full-bodied	Light / juice-like possible	Light, low-viscosity plant-based target
Primary differentiation	Cost, source, sustainability, nutrition	High protein quality + clear sensory format	Application-enabling plant protein + peptide architecture + clarity potential

This matrix is deliberately non-hierarchical. It identifies different technical territories rather than an overall "winner".

7. The sensory paradox: hydrolysis can solve solubility and create bitterness

The same process that helps make protein soluble can create a new commercial problem: taste. Protein hydrolysates frequently develop bitterness, astringency or off-notes depending on peptide sequence, hydrophobicity, degree of hydrolysis, raw-material composition and processing conditions. This is especially relevant in clear drinks because the sensory system is exposed; there is no cocoa, dairy fat or thick texture to hide defects.

Ramakrishna et al. (2026) reviewed undesirable sensory properties in protein hydrolysates and identified multiple intervention points, including raw-material pretreatment, enzymatic strategy, membrane processes, adsorption, fermentation, microencapsulation and masking. Gao et al. (2026) similarly highlighted the structural basis of bitter peptides and the continuing difficulty of predicting bitterness solely from molecular descriptors.

For ProteoSol™, sensory optimisation should therefore be treated as part of the core technology package. A development grade should not be advanced solely because it achieves low turbidity. The optimum hydrolysis/fractionation window is the one that balances optical clarity with flavour cleanliness, nutritional quality and processing robustness.

FORMULATION PRINCIPLE

Maximum hydrolysis is not the target. The target is maximum useful functionality at an acceptable sensory cost.

8. Protein concentration is the hidden variable

Clear-protein demonstrations are often misleading because they omit concentration. A protein that appears transparent at 0.5% solids may behave very differently at 5% or 10%. Increasing concentration changes intermolecular collision frequency, hydration demand, ionic interactions and aggregation equilibria. Shahbal et al. (2023) observed that hydrolysis improved solubility but also showed that higher protein concentration could reduce solubility in some plant systems.

Commercial application work must therefore specify both ingredient concentration and actual protein delivered per serving. This is especially important when claims such as “high protein” are targeted, because a visually impressive low-dose clear solution may be irrelevant if the final beverage requires substantially greater protein loading.

9. Acid, minerals, heat and carbonation: the real stress test

Protein beverages contain far more than protein and water. Citric acid, malic acid, phosphate or citrate buffers, sodium, potassium, calcium, magnesium, vitamins, botanical extracts, flavours, sweeteners, colours and preservatives can all alter protein behaviour. Divalent minerals can promote bridging interactions; increased ionic strength can screen electrostatic repulsion; heat can expose hydrophobic groups and induce aggregation; carbonation changes the physicochemical environment and may alter foam and haze.

For this reason, a high-value clear-protein platform should be accompanied by an application map rather than a single generic solubility value. At minimum, commercial development should define operating windows for pH, protein concentration, thermal process, electrolyte load and storage conditions.

Table 3. Application-validation matrix recommended for ProteoSol™

Application	Critical variables	Primary failure modes	Recommended evidence
Protein water	pH, flavour acids, protein load, shelf life	Haze, bitterness, sediment	NTU/%T, sensory, real-time stability
Electrolyte / hydration drink	Na/K/Ca/Mg load, acid, osmolarity	Mineral-induced haze, salinity interactions	Mineral challenge matrix + sensory
Acidic fruit-style RTD	pH 3-4, juice solids, heat treatment	Aggregation, colour, flavour clash	HTST/pasteurisation challenge + storage
Functional shot	High solids, botanicals, vitamins	Concentration-driven bitterness / haze	High-load solubility + sensory threshold
Carbonated protein drink	CO_2, acid, pressure, foam	Foam instability, opalescence	Carbonation and package-stability test
0.0% beer concept	Polyphenols, pH, carbonation, flavour	Protein-polyphenol haze, flavour interaction	Bench + pilot stability and sensory
Clear powder stick	Reconstitution water variability	Incomplete dissolution, foam	Hard/soft water reconstitution protocol

10. Why consumers may care: lowering the sensory cost of protein

Protein beverage innovation is not determined only by chemistry. It succeeds when the nutritional payload fits naturally into a desirable consumption experience. Traditional high-protein drinks often carry sensory signals of density: chalkiness, dryness, creaminess, cereal notes, vegetal notes or a "supplement" identity. Clear formats attempt to reduce that sensory cost by presenting protein as refreshment rather than as a nutritional obligation.

Rovai et al. (2025) studied 405 protein-beverage consumers and found that protein amount and protein type were particularly important purchase attributes. Consumers also showed interest in recognisable ingredients and simpler product language, while stabilisers were among the less desirable ingredient categories. This does not mean stabilisers are unnecessary or undesirable from a technical perspective; it means that intrinsically functional proteins may create formulation freedom by reducing the need for heavy suspension or thickening architectures in some applications.

That creates a potentially important clean-label-adjacent opportunity for ProteoSol™, provided communication remains legally disciplined. "Clean label" is not a harmonised legal category in the EU, and the ingredient should not be promoted through vague health implications. The value lies in enabling a simpler beverage architecture where the protein itself contributes more of the required functional performance.

11. Protein quality remains independent of optical clarity

Transparency cannot compensate for a weak indispensable amino-acid profile. Protein quality and protein functionality are separate axes. The FAO's DIAAS framework emphasises digestible indispensable amino acids rather than total protein alone. This matters for plant proteins because limiting amino acids vary by botanical source and processing history.

The prior INTABIOTECH technical review of ProteoSol™ correctly concluded that total solubility and reduced molecular size provide a plausible rationale for improved digestive accessibility but do not establish superior metabolic utilisation. Absorption kinetics, muscle-protein synthesis and overall protein quality depend on amino-acid composition, leucine, digestibility, dose, physiological context and other variables.

A particularly powerful future direction for the broader ProteoSol™ platform is therefore source complementation. A multi-source architecture could, in principle, combine the functional clarity of one plant fraction with the amino-acid strengths of another. Such blends should be designed by digestible indispensable amino-acid profile and measured performance rather than by marketing narratives about a single botanical source.

12. Regulatory communication: strong claims come from disciplined claims

In the European Union, nutrition and health communication for protein is already well defined. Under Regulation (EC) No 1924/2006, “source of protein” requires at least 12% of the food’s energy value to be provided by protein, while “high protein” requires at least 20%. Regulation (EU) No 432/2012 permits authorised claims that protein contributes to growth in muscle mass, maintenance of muscle mass and maintenance of normal bones when the relevant conditions of use are met.

These authorised statements are materially stronger from a regulatory perspective than speculative proprietary claims such as “three times better absorbed”, “instant absorption”, “superior to whey” or “easier on the kidneys”. Comparative digestibility or bioavailability claims would require specific substantiation and careful jurisdictional review.

For ProteoSol™, current communication should therefore prioritise technological descriptors that can be measured and audited: highly water-soluble plant-protein peptide ingredient, low-molecular-weight peptide profile, clear-solution performance under defined conditions, reduced visible sedimentation, low-viscosity beverage orientation and compatibility with selected plant-based applications.

13. From ingredient to platform: where ProteoSol™ can create strategic value

Commodity protein markets are difficult places to defend margin. Protein concentration, source, price and supply dominate the discussion. A specialist clear-protein platform moves the conversation toward application enablement. The economic question becomes not simply “What does the protein cost per kilogram?” but “Which product concepts become feasible because this protein behaves differently?”

This is particularly important in distributor and co-development relationships. The existing ProteoSol™ partner strategy already recognises that the product should not be sold as another rice or pea isolate. Its value proposition is the extension of plant protein into clear, acidic and low-viscosity systems where conventional plant proteins often struggle.

- Protein waters and fruit-style clear RTDs.
- Hydration + protein beverages.
- Clear sports-nutrition powders and sticks.
- Functional shots with controlled protein loading.
- Adult and healthy-ageing beverages requiring lighter sensory formats.
- Selected tea / coffee / botanical systems where protein haze can be controlled.
- Selected carbonated and 0.0% concepts following matrix-specific validation.

14. The evidence roadmap: what should be built next

The most valuable next step for ProteoSol™ is not more marketing language. It is a proprietary evidence package that competitors cannot reproduce easily. The platform should evolve from "clear by description" to "clear by specification, stable by application map and nutritionally characterised by source."

1 · OPTICAL	NTU and % transmittance methods; Clear and Ultra-Clear thresholds; concentration-dependent specification.
2 · MOLECULAR	Degree of hydrolysis; SEC-HPLC peptide distribution; soluble-protein recovery; batch reproducibility.
3 · NUTRITIONAL	Full aminoacidogram; EAA and leucine; limiting amino acid; in-vitro digestibility; DIAAS-oriented development where justified.
4 · SENSORY	Descriptive sensory panel; bitterness threshold; vegetal / cereal notes; masking compatibility; flavour family map.
5 · APPLICATION	pH, electrolyte, heat, carbonation and shelf-life challenge matrix; benchmark comparisons against relevant plant and clear-whey references.

Figure 2. Proposed ProteoSol™ evidence-development ladder. The sequence prioritises measurable performance before stronger comparative or physiological positioning.

15. Clear advantage? A technically qualified answer

Does clear protein provide a clear advantage? Yes — but not because transparency makes protein intrinsically healthier. The advantage is technological and behavioural. Clear systems allow protein to escape the sensory conventions of the shake and enter a broader beverage world. For consumers, that can mean refreshment, portability, lower perceived heaviness and more consumption occasions. For formulators, it can mean access to matrices that were previously difficult to protein-fortify without haze, sediment or undesirable mouthfeel.

For plant proteins, the opportunity is even more important because conventional isolates have historically been restricted by solubility and sensory limitations. ProteoSol™ addresses precisely this interface between protein chemistry and beverage experience. Its current rice platform already contains a technically meaningful peptide architecture and source specifications describing clear, sediment-free solutions. The next phase is to turn these attributes into a rigorous, quantified performance system across concentrations, pH values, minerals, thermal processes and shelf life.

"The clearest advantage of clear protein is not what the consumer sees. It is what clarity allows the product developer — and ultimately the consumer — to do."

Conclusion

The first generation of protein innovation focused on how much protein could be delivered. The next major wave focused on where that protein came from. The emerging clear-protein category is increasingly concerned with how protein is experienced.

This change matters because a protein that is analytically nutritious but sensorially inconvenient has limited practical value in mainstream beverages. Clear-protein technologies use molecular and colloidal control to remove opacity, sediment and excessive viscosity from the consumer experience. The result is a new formulation landscape spanning hydration, fruit-style functional drinks, low-calorie RTDs, shots and other formats that do not resemble traditional shakes.

ProteoSol™ should occupy this territory with scientific discipline. It should not be presented as "better whey" without the evidence required for that comparison. It should be developed as an application-enabling plant-protein platform whose value is demonstrated by measurable solubility, clarity, low sedimentation, sensory performance and stability — supported by a progressively stronger nutritional evidence package.

If that evidence programme is completed, ProteoSol™ can become more than a differentiated rice-protein ingredient. It can become a defensible technology platform for moving plant protein into product categories where consumers did not previously expect meaningful protein delivery to be possible.

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PUBLICATION NOTE

This article is a scientific and technical corporate review. Product-specific values are drawn from the current controlled ProteoSol™ documentation and should be superseded by approved QA specifications or batch-specific certificates where applicable. Final claims and labelling must be assessed for the target jurisdiction and finished formulation.