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DAIRY: BEYOND THE PRICE

Unlocking the Value of Europe's Strategic Food Infrastructure



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Pietro Paganini – President of Competere.eu – explored dairy's value paradox at the European Dairy Association Annual Convention 2026 in Bratislava, where he set the scene for the panel "Dairy Delivering Nutrition Excellence Across the World." His contribution examined the sector's role in nutrition, innovation, and European food security.

He highlighted the gap between the value dairy creates and what consumers recognize, as artificial intelligence reshapes how people understand food and make choices. He emphasized that closing this gap requires clear, reliable evidence and a strategy centered on nutritional quality, competitiveness, and Protein Coexistence: enabling animal, plant-based, and emerging protein sources to meet diverse needs while supporting innovation and consumer choice.

Closing the Dairy Value Gap – Policy Highlights

Dairy's contribution extends beyond the products on supermarket shelves. It combines nutrition, scientific knowledge, productive capacity, and supply chains that support Europe's food security and competitiveness. Yet much of this value remains poorly understood. As artificial intelligence reshapes consumer choices and nutritional needs evolve, closing the Dairy Value Gap requires accessible evidence, continued innovation, and policies that recognize the sector's broader contribution.

- **Create the conditions for dairy to innovate and compete.** Research, modern processing facilities, and technology adoption can help the sector improve productivity and respond to changing demand. Policy should enable these investments while maintaining access to competitive international markets.
- **Prepare for an AI-mediated food debate.** Generative AI increasingly shapes how consumers compare products and interpret nutritional advice. Scientific institutions and industry should make reliable evidence easier to find, interpret, and verify, including its limitations.
- **Connect nutritional innovation with healthy longevity.** Europe's aging population creates demand for foods that support muscle maintenance, physical function, and diverse dietary needs. Research and product development should address nutritional quality alongside convenience, accessibility, and affordability.
- **Evaluate protein choices in their dietary context.** Replacing one protein source with another can change nutrient intake, cost, and environmental impact. Policy assessments should examine what replaces what, for whom, and within which overall diet.
- **Support innovation across protein sources.** Protein Coexistence allows established and emerging sources to compete and collaborate. Support for fermentation, ingredient development, and nutritional science can generate benefits across sectors while expanding consumer choice.
- **Build trust through measurable results**. More communication alone will not close the Dairy Value Gap. Clear explanations of nutritional contributions and measurable improvements in production and environmental performance should underpin the sector's public engagement.

1. The Value Paradox: Why Dairy Is Worth More Than Its Price

Few products illustrate the difference between price and value as clearly as food. Consumers routinely pay substantial premiums for products and services whose value they immediately recognize: technology, convenience, entertainment, design, identity, or status. Yet food is often evaluated through a much narrower lens. A relatively small increase in the price of a liter of milk can become highly visible, even when the product remains an affordable source of multiple nutrients.

This is not an argument that dairy should cost more. It is an argument that price and value are not the same thing.

The distinction has become particularly important in a period of persistent pressure on household purchasing power. Food price inflation has affected access to healthy diets, especially among lower-income households, while nutritious foods tend to face particular affordability constraints. Food prices influence not only what consumers purchase but also dietary diversity and access to nutrient-dense foods (FAO et al., 2025; Costlow et al., 2025).

Affordability therefore matters. But focusing exclusively on price can obscure a second question: what does the consumer understand that price to represent?

A liter of milk reaching a supermarket shelf is the visible endpoint of a remarkably complex system. Behind it are farming, feed, land, animal health, genetics, veterinary science, labor, energy, processing, food safety, refrigeration, logistics, retail, technology, and regulatory compliance. The chain must simultaneously manage biological, climatic, economic and geopolitical risks. Productivity improvements have made much of this complexity invisible to the final consumer.

In Europe, this complexity also reflects decades of investment in agricultural knowledge, food safety, processing technologies, quality standards, and integrated supply chains, capabilities that contribute to the competitiveness and resilience of the European food economy.

This is one of the paradoxes of modern food systems: the better they become at delivering safe, reliable, and affordable food, the easier it becomes to take that achievement for granted.

Dairy illustrates the paradox particularly well. OECD-FAO projections indicate that dairy remains an important component of diets globally and that consumption is expected to increase as populations and incomes grow, particularly in Asia. At the same time, the sector operates under significant price volatility, regulatory pressure, and environmental constraints (OECD-FAO, 2026). More broadly, demand for livestock products and other nutrient-rich foods is expected to increase particularly in middle-income economies, while access remains considerably more constrained in low-income countries (OECD-

FAO, 2025).

The challenge is therefore not simply to create value. The dairy system already generates nutritional, economic, and social value at multiple levels, while also facing environmental, economic, and societal challenges that require continuous innovation and adaptation. The challenge is to make that value visible and intelligible.

We propose the **Dairy Value Gap** as a framework for understanding the disconnect between the value generated by the dairy system and the value recognized by consumers.

THE DAIRY VALUE GAP

VALUE CREATED → HIGH

VALUE COMMUNICATED → FRAGMENTED

VALUE PERCEIVED → LIMITED

PRICE SENSITIVITY → HIGH

When consumers see only the final product and its price, much of the system behind it disappears. Nutrition competes with price. Innovation becomes invisible. Resilience is noticed mainly when supply fails. Food safety is valued primarily when something goes wrong. The livelihoods and capabilities embedded across the chain rarely enter the purchasing decision at all.

This matters strategically because value that is not understood is difficult to defend. If dairy is perceived primarily as a commodity, competition will naturally concentrate on price and volume. If it is understood instead through the combination of nutrition, quality, safety, innovation, accessibility, and resilience that it provides, the conversation changes.

The objective should not be to persuade consumers that price does not matter. It is to ensure that price is not the only value they can see.

That requires understanding a consumer who is simultaneously more price-conscious, more exposed to information, and more uncertain about what to believe. The Dairy

Value Gap, in other words, is not only an economic problem. It is increasingly a problem of perception and understanding.

2. The New Consumer: Information-Rich, Understanding-Poor

The Dairy Value Gap does not occur in isolation. It is widening at a time when the relationship between consumers and food is becoming increasingly complex. Today's consumer is simultaneously more price-conscious, more exposed to information and more frequently asked to evaluate food through multiple, sometimes competing, dimensions.

Cost remains fundamental. In the European Union, 60% of consumers identify cost as one of the most important factors when purchasing food, ahead of taste, food safety, origin, and nutritional content. Cost has also become more important compared with 2022 (EFSA, 2025). But price is only one part of the decision. Consumers are increasingly confronted with information and claims concerning nutrition, health, environmental impact, animal welfare, origin, processing, ingredients, and food safety.

This creates a paradox. Consumers have never had access to so much information about what they eat, yet more information does not necessarily produce greater understanding.

Food decisions are made in environments where time and attention are limited. Consumers cannot independently assess every nutritional claim, sustainability indicator or production method associated with every product. They therefore rely on signals and cognitive shortcuts: labels, brands, institutional recommendations, media narratives, social networks and increasingly digital platforms.

These shortcuts are not necessarily irrational. They help people navigate complexity and make decisions efficiently. Problems arise when the information used to simplify a choice is incomplete, misleading, or disconnected from its broader context.

Research suggests that choice overload can reduce the accuracy of consumer judgments, while salient information can significantly shape perceptions even when consumers possess prior knowledge (Buratto & Lotti, 2023). Studies examining the simultaneous presentation of nutrition and sustainability information also show that different signals can interact, producing trade-offs, halo effects, or confusion rather than a simple accumulation of knowledge (Jürkenbeck et al., 2024; Sengupta et al., 2026).

MORE INFORMATION ≠ BETTER UNDERSTANDING

Access to information is not the same as the ability to interpret it.

Dairy sits directly at the center of this information-rich environment. A carton of milk, a yogurt or a piece of cheese can now trigger questions extending far beyond taste and price. Is it healthy? How much protein does it provide? What about saturated fat? Lactose? Animal welfare? Greenhouse-gas emissions? Processing? Is a plant-based alternative preferable? Where was it produced? How should its nutritional value be weighed against its environmental footprint?

None of these questions is illegitimate. The difficulty arises when consumers are expected to process them simultaneously, often through simplified and sometimes conflicting messages.

The result is not necessarily an uninformed consumer. It may instead be an **over-informed but under-equipped consumer:** someone surrounded by data, claims, and opinions, but lacking the time, context, or expertise required to assess their relative importance.

This distinction matters. Consumer choice is not a purely rational calculation in which additional information automatically improves decisions. Research on food choice points to the interaction between information, trust, prior beliefs, social norms, price, familiarity and contextual cues. Trust in the source itself can influence how consumers respond to food information, while poorly understood or competing signals may distort perceptions beyond the specific attribute they are intended to communicate (Fuller et al., 2026; Jürkenbeck et al., 2024).

For dairy, this creates a strategic asymmetry. Its value is multidimensional – nutrition, protein quality, safety, affordability, livelihoods, culture, innovation and resilience – but public debates frequently isolate one dimension at a time. A product can consequently be evaluated through its carbon footprint without considering its nutritional contribution, through its fat content without examining its overall nutrient profile, or through its degree of processing without sufficient attention to the purpose or effects of that processing.

The response should not be to give consumers less information. Nor should it be to protect dairy from scrutiny. It should be to make complex information more comprehensible, contextualized, and useful for individual choice.

The objective is not to simplify reality, but to make complexity understandable.

This is increasingly important because the intermediaries performing that task are changing. Consumers once navigated complexity primarily through experts, institutions, traditional media and search engines. Today, generative artificial intelligence can perform much of the searching, filtering, comparing, and synthesizing on their behalf.

The next stage of the Dairy Value Gap may therefore not be a battle for more information or even more attention. **It may be a battle for understanding.**

3. AI and the New Cognitive Infrastructure

The information problem described above is entering a new phase. Consumers are no longer navigating food information only through labels, experts, traditional media, social networks or search engines. Increasingly, they can ask an artificial intelligence system a direct question and receive a single, synthesized answer.

This represents more than another communication channel. Generative AI changes the architecture of information seeking itself. Traditional search generally presents users with sources that they must select, compare, and interpret. Conversational AI can perform much of this work on their behalf: retrieving, filtering, summarizing, contextualizing and explaining information in response to a natural-language question. Recent research describes this emerging environment as a shift toward answer-first information seeking, in which users encounter a synthesized response before, and sometimes instead of, examining the underlying sources (Lund, 2026; Xue et al., 2026).

The potential benefits are substantial. Generative AI can reduce the cognitive burden associated with navigating large quantities of information and make complex subjects more accessible. Experimental research suggests that AI-assisted information seeking can lower cognitive load, while well-designed conversational systems can also encourage exploration and knowledge acquisition (Stadler et al., 2024; Kim & Ji, 2026). In areas such as scientific knowledge, retrieval-augmented systems are demonstrating the potential to identify, combine, and synthesize evidence across very large bodies of literature (Asai et al., 2026).

But convenience introduces a second dynamic: cognitive offloading.

Humans have always delegated cognitive tasks to external tools, from writing and maps to calculators and search engines. Generative AI expands the range of activities that can be delegated, including searching, comparing, summarizing and, increasingly, elements of reasoning and judgment. Emerging empirical research suggests that AI-based cognitive offloading can extend from relatively simple tasks to higher-order cognitive activities, depending in part on users' AI literacy and capacity to evaluate outputs (Jiang & Chen, 2026).

We propose cognitive outsourcing as a broader interpretive concept: not the abandonment of human thinking, but the increasing delegation of parts of the process through which information is selected, interpreted, and transformed into understanding.

The distinction is important. AI can augment human intelligence by reducing unnecessary cognitive effort and allowing users to engage with more information. But reducing effort does not automatically improve judgment. In one experimental comparison, students using an LLM experienced lower cognitive load than those using conventional search, but produced weaker reasoning and argumentation, suggesting that cognitive ease can sometimes come at the expense of deeper engagement (Stadler et al., 2024). Other

studies similarly suggest that the quality of human–AI interaction depends strongly on whether users remain active participants, questioning, contextualizing and evaluating rather than simply accepting generated outputs (Chen et al., 2025; Jiang & Chen, 2026).

COGNITIVE OFFLOADING → COGNITIVE OUTSOURCING

From delegating individual cognitive tasks to delegating parts of the process through which information becomes understanding.

This is why AI should increasingly be understood as part of our cognitive infrastructure. It does not merely transmit information. It can influence which information is surfaced, how competing evidence is synthesized, which distinctions are emphasized, and how complexity is translated into an actionable answer. Research on conversational information seeking already shows that both users' prompting strategies and the way AI systems adapt their responses influence the resulting information experience (Xue et al., 2026).

For dairy, the implications are significant. A consumer may no longer visit several websites to investigate whether milk is healthy, compare dairy with plant-based alternatives, understand protein quality, or examine sustainability claims. They may simply ask:

Should I drink milk?
Is dairy healthy for my children?
What is the best source of protein after exercise?
Is dairy or a plant-based drink more sustainable?.

The answer will inevitably simplify a complex body of evidence. What matters, therefore, is not only whether reliable information about dairy exists, but whether that information is accessible, structured, credible, and sufficiently represented within the knowledge environment from which AI systems generate answers.

This creates a new strategic question for the sector:

WHAT DOES AI UNDERSTAND ABOUT DAIRY?

The question should not lead to attempts to manipulate AI systems or flood the information environment with favorable content. The opposite is required: better evidence, clearer context, transparent sources, and information that can withstand scrutiny.

AI systems do not simply reproduce a fixed body of knowledge. Their responses

depend on multiple factors, including model design, training, retrieval mechanisms, available sources and the questions users ask. Nevertheless, if reliable information about dairy's contributions to nutrition, protein quality, affordability, innovation and food-system resilience remains fragmented or poorly explained, those contributions may be inadequately represented in AI-mediated answers.

The communication challenge is therefore evolving. For decades, companies competed for shelf space. The internet made them compete for search visibility and attention. Generative AI introduces a further competition: not simply to be seen, but to be understood.

SHELF SPACE → ATTENTION → UNDERSTANDING

The next competitive frontier is not only what consumers see, but what they understand.

For dairy, closing the Value Gap will increasingly require engaging with this new cognitive infrastructure — not to control consumer decisions, but to ensure that reliable evidence is available, understandable, and useful for informed choice.

4. From Commodity to Strategic Food Infrastructure

The Dairy Value Gap cannot be closed through communication alone. If dairy is to be understood differently, the sector must also reconsider how it defines itself. For decades, much of the public and policy conversation around dairy has been framed through production volumes, farm-gate prices, commodity markets, and individual product categories. These indicators remain essential, but they capture only part of the system's value.

Dairy is not simply a collection of products. It is a food infrastructure: a network of farms, processing facilities, technologies, skills, logistics, safety systems and trade relationships capable of transforming a highly perishable agricultural product into safe and nutritious foods available to consumers every day.

The scale of this infrastructure is considerable. World milk production exceeded one billion tons in 2025 and is projected to reach around 1.22 billion tons by 2035. Importantly, most future production growth is expected to come from improvements in yields rather than proportional expansion of dairy herds, supported by better animal health, feed efficiency, genetics and production technologies (OECD-FAO, 2026).

This matters because resilience is not simply the ability to produce more. It is the capacity of a system to continue delivering food when economic, environmental or geopolitical conditions change. Dairy must manage biological risks, animal disease, energy and input costs, climate pressures, labor availability, regulation and volatile international markets. At the same time, milk is highly perishable: it must be collected, cooled or processed rapidly, making functioning infrastructure and coordination across

the chain particularly important.

Global dairy markets illustrate this combination of local capacity and international interdependence. Less than 7% of world milk production is traded internationally, largely because of milk's perishability and high water content. Yet processed products such as milk powders allow production to move across regions and help connect areas of surplus with areas where demand exceeds local supply. OECD-FAO projections indicate that dairy consumption in Africa, Southeast Asia and the Near East and North Africa will grow faster than domestic production over the coming decade, increasing the importance of international dairy trade (OECD-FAO, 2026).

This makes dairy relevant to a broader discussion about food resilience. Recent disruptions have reminded governments that efficiency alone does not guarantee security. Resilient food systems also require productive capacity, functioning markets, infrastructure, diversified supply chains and trade. The OECD and FAO emphasize that productivity and rules-based agricultural trade remain important for global food security, affordable healthy diets and the capacity to respond to regional imbalances in supply and demand (OECD-FAO, 2026).

The Energy Lesson: From Commodity Prices to Strategic Resilience

Europe's experience with energy offers a useful parallel. For decades, oil and gas were frequently discussed through production volumes, prices, efficiency, and the cost of supply. These remain fundamental economic indicators. Yet successive geopolitical disruptions, most visibly the energy crisis following Russia's invasion of Ukraine in 2022, demonstrated that energy security cannot be reduced to the price of a barrel of oil or a cubic meter of gas.

The availability of infrastructure, diversification of suppliers, storage capacity, functioning markets and the ability to respond to sudden disruptions became central to Europe's economic and political agenda. Energy was increasingly understood not only as a commodity, but as an essential system underpinning industrial competitiveness, economic stability and societal resilience.

The lesson is not that dairy should be treated like oil or gas. Their markets, production characteristics and strategic risks are different. Nor does it mean that every agricultural product should automatically receive special protection.

The relevant parallel is more fundamental: **the market price of a product does not fully capture the strategic value of the system that makes its reliable supply possible.**

Food deserves a similar perspective. For Europe, this means recognizing that the dairy sector represents more than agricultural production. It encompasses scientific knowledge, technological capabilities, specialized labor, processing infrastructure, food safety systems, logistics and international trade relationships. These assets contribute to the continent's capacity to provide nutritious food, respond to disruptions and compete in global markets.

Importantly, recognizing food as strategic infrastructure should not become an argument for protectionism or permanent market intervention. Resilience does not require isolation. On the contrary, competitive production, diversified supply chains, technological innovation and open, rules-based trade can reinforce one another.

Strategic food infrastructure should be understood as a source of competitiveness, not a justification for shielding an industry from competition.

From Production Volume to Productive Capacity

The social and economic dimension is equally important. Dairy provides regular income and employment across farming, processing and distribution. In many developing economies, livestock can also function as an economic asset and a mechanism for diversifying household risk. FAO has long identified dairy development as a potential contributor to food security, rural income generation and poverty reduction when reliable value chains and supporting infrastructure are in place (FAO, n.d.).

In Europe, the sector's contribution also extends to industrial capabilities, research, processing technologies, quality systems and the economic vitality of rural communities. These assets cannot be understood solely through annual production volumes.

This broader framing changes how innovation should be understood.

Technology in dairy is not merely a means of producing additional liters. Automatic milking, real-time animal monitoring, decision-support systems, improved genetics, better animal health and feed efficiency can increase productivity while helping producers manage labor constraints and resource use. OECD-FAO expects technology adoption and yield improvement to remain central to future dairy production growth (OECD-FAO, 2026).

The strategic shift is therefore **from volume to capacity**: from measuring how much a system produces to understanding what it is capable of delivering, sustaining and adapting over time.

Dairy should continue to measure liters, yields, prices and productivity. But its contribution should also be understood through the nutritional value it delivers, the productive infrastructure it maintains, its capacity to innovate, the livelihoods it supports and its ability to contribute to resilient food supply.

This requires moving beyond a permanently defensive posture. Environmental performance, animal welfare, affordability and nutrition must remain subject to evidence and continuous improvement. But responding separately to every criticism risks allowing others to determine the terms of the debate.

The stronger proposition is to explain what the system is for.

Energy learned to speak not only about barrels and cubic meters, but about security and resilience.

Dairy needs to speak not only about liters, but about food resilience.

Once dairy is viewed as part of food infrastructure rather than simply as a commodity, the next strategic question becomes unavoidable: what kind of nutrition will that infrastructure need to deliver in the decades ahead? Increasingly, the answer leads to protein.

5. The Protein Moment: From Calories to Nutrition

For much of modern food policy, the central challenge was quantitative: producing enough food to meet the energy needs of a growing population. That challenge has not disappeared. But it is increasingly accompanied by another: ensuring that diets provide sufficient nutritional quality, not simply sufficient calories.

This distinction matters because food security and nutrition security are not identical. A diet can provide adequate energy while remaining deficient in essential nutrients or poorly adapted to individual needs. As incomes rise, populations urbanize, and dietary preferences evolve, demand is also shifting from staple foods toward more diversified diets. The OECD-FAO Agricultural Outlook expects this transition to continue across many middle-income economies over the coming decade (OECD-FAO, 2026).

The Scale of the Protein Challenge

The transition from calories to nutritional quality should not obscure the magnitude of the quantitative challenge.

With a global population of approximately 8.3 billion people, even a deliberately conservative calculation reveals the scale of humanity's daily nutritional requirements.

Assuming just **2,000 kilocalories** per person per day, the world's population would require approximately **16.6 trillion kilocalories every day,** equivalent to more than **6 quadrillion kilocalories annually.** This is a simplified benchmark, not a universal nutritional recommendation. Many adults require 2,500 kilocalories or more, depending on their age, body size, and physical activity.

Importantly, these calculations do not account for food loss and waste across the supply chain and at the consumption stage. The actual quantities of food that must be produced and made available are therefore greater than those ultimately consumed.

Protein requirements are equally significant. Using the European Food Safety Authority's reference intake of 0.83 grams of protein per kilogram of body weight per day, a

70-kilogram adult would require approximately 58 grams daily (EFSA, 2012). Applied as a standardized illustrative scenario across 8.3 billion people, this corresponds to approximately **482,000 tons of protein per day,** or **176 million tons annually.** At a population of **9.7** billion, maintaining the same assumptions would imply approximately **19.4 trillion kilocalories and 564,000 tons of protein every day.**

These figures are illustrative, not estimates of actual global nutritional requirements or predictions of future shortages. Individual needs vary according to age, body weight, health status and activity levels. Nevertheless, they demonstrate the scale of the challenge.

The objective is not simply to produce more calories or more protein. It is to ensure that sufficient, nutritious food is available, affordable and accessible, while improving resource efficiency, reducing food loss and waste, and responding to increasingly diverse nutritional needs.

A challenge of this magnitude cannot be reduced to a competition between animal and plant proteins. Different sources contribute different nutritional, environmental, economic, and functional characteristics. Their respective roles depend on production systems, dietary contexts, resource use and individual needs.

The future of protein should therefore be defined not by exclusion, but by diversity, innovation and complementarity.

However, diversity alone is not enough. Meeting the world's growing nutritional needs requires attention not only to protein quantity, but also to protein quality. Proteins differ in their amino-acid composition and digestibility, and therefore in their capacity to provide the indispensable amino acids required by the human body. This is why FAO recommends evaluating protein quality through approaches such as the Digestible Indispensable Amino Acid Score (DIAAS), rather than treating all grams of protein as nutritionally interchangeable (FAO, 2013).

Dairy has a distinctive position in this context. Milk proteins provide all indispensable amino acids and generally have high digestibility. Whey and casein also offer different digestion characteristics and functional properties, which have enabled dairy proteins to move far beyond traditional milk consumption into sports nutrition, clinical nutrition, infant formula and products designed for older consumers.

This evolution is already visible in the market. OECD-FAO identifies growing consumer demand for high-protein products, particularly in Europe and North America, including products such as high-protein yogurt and cottage cheese. Whey powders are also increasingly used in nutritional products, including clinical, infant and elderly preparations (OECD-FAO, 2026).

Healthy Aging and Europe's Changing Nutritional Needs

Aging makes the issue particularly relevant for Europe. Longer lives are one of the

great achievements of economic and medical progress. Yet Europe's demographic transformation also increases the importance of preserving physical function, independence and quality of life across the life course.

Age-related changes in muscle mass and function are particularly relevant. Adequate dietary protein, together with physical activity, contributes to the maintenance of muscle mass and physical function. For older adults, ensuring sufficient protein intake and appropriate nutritional quality can therefore be an important component of strategies supporting healthy aging.

The policy objective should increasingly be **healthy longevity:** extending not only lifespan, but the years lived in good functional health.

This does not mean that every older person requires the same diet, nor that increasing protein intake alone can prevent age-related decline. Nutritional requirements depend on health status, physical activity, overall diet and individual circumstances. The broader point is that an aging society increases the importance of foods capable of delivering high-quality nutrition efficiently and accessibly.

For Europe, this creates a connection between demographic change, nutritional innovation and the competitiveness of its food industry. The capacity to develop nutritious, affordable and convenient products adapted to changing consumer needs is not merely a commercial opportunity. It can also contribute to broader objectives in prevention and healthy aging.

From Standardized Nutrition to Personalized Prevention

The growing importance of nutritional quality also points toward a broader transformation in how health and prevention are understood.

Traditional dietary guidance has generally relied on population-level recommendations. These remain essential for public health, but they cannot fully capture the diversity of individual nutritional needs.

Age, physiological condition, physical activity, health status, dietary patterns and other individual characteristics can influence nutritional requirements and the suitability of different foods.

Advances in nutritional science, digital technologies and data analysis are creating opportunities to understand these differences more precisely. Personalized nutrition may help translate scientific knowledge into more relevant dietary guidance, while emerging approaches to personalized prevention seek to integrate nutrition with broader lifestyle and health information.

These developments remain subject to important scientific, practical and ethical questions. Their effectiveness, accessibility and clinical relevance must be evaluated carefully. Personalization should complement, rather than replace, established population-level recommendations.

Nevertheless, the direction is significant: **the future of nutrition will increasingly require understanding not only what foods contain, but how they contribute to**

the needs of different individuals.
For dairy, this reinforces the importance of nutritional versatility. Different dairy products and dairy-derived ingredients can contribute to different dietary patterns and nutritional requirements, depending on their composition, processing and intended use.
Dairy should therefore resist defining its contribution merely through the number of grams of protein printed on a package.
Its nutritional proposition is broader. Depending on the product, dairy can combine high-quality protein with calcium, phosphorus, vitamin B12 and other micronutrients within familiar foods consumed across different stages of life.

The relevant unit of analysis is consequently not simply protein per gram, but the nutritional contribution of the food as a whole.

Beyond Protein Quantity

This is also why the protein debate should not be reduced to a competition over headline protein numbers.

A resilient nutrition system must consider several dimensions simultaneously:

- Quantity;
- Quality and indispensable amino-acid profile;
- Digestibility;
- Nutrient density;
- Affordability;
- Accessibility;
- Cultural acceptance;
- Suitability for different stages of life.

These dimensions are complementary rather than interchangeable. Protein quality provides important information about a food's capacity to supply indispensable amino acids, but it does not independently determine the overall nutritional value of that food or its suitability within a balanced diet.

The distinction becomes particularly important when comparing foods and designing public policy. Counting calories helped societies address one dimension of food security. Counting grams of protein alone risks repeating the same reductionism in a different form.

For dairy, the opportunity is therefore not simply to participate in a growing high-protein market. It is to help move the discussion from protein quantity to nutritional quality.

The challenge is not simply enough calories or even enough protein.
it is accessible, affordable, and high-quality nutrition.

This reframing also helps explain why dairy proteins are likely to remain relevant even as the range of available protein sources expands. OECD-FAO expects global dairy consumption to continue growing over the coming decade, while high-protein products are emerging as a distinct source of demand in mature markets (OECD-FAO, 2026).

The strategic implication is straightforward. Dairy should no longer think of protein as merely one nutritional attribute among many. High-quality protein is becoming one of the bridges between dairy's traditional role as a food and its emerging role in healthy aging, active lifestyles and personalized nutrition.

Yet the scale and diversity of future nutritional needs make one conclusion increasingly clear: no single protein source can be assumed to provide the optimal solution for every population, individual or dietary context.

The future of protein should not be defined by a war between animal and plant sources, but by their capacity to coexist, compete, innovate and contribute to better nutrition.

This is the principle of **Protein Coexistence.**

6. Protein Coexistence: Beyond the False Food War

The growing importance of protein has often been accompanied by an unnecessarily binary debate. Animal versus plant. Traditional versus alternative. Natural versus technological.

In policy discussions, this is sometimes translated into the idea of a protein transition: a progressive substitution of animal proteins with plant-based or alternative sources. This framing is too simple for a complex nutritional and food-security challenge.

Protein sources are not interchangeable commodities. They differ in amino-acid composition, digestibility, micronutrient content, environmental footprint, affordability, cultural acceptance and suitability for different populations. As discussed in the previous chapter, nutritional assessment therefore requires looking beyond grams of protein alone. At the same time, plant foods such as pulses provide protein alongside fiber, minerals and other beneficial dietary components and can contribute to diversified and sustainable diets (OECD-FAO, 2026).

The relevant question is consequently not whether animal or plant protein should "win." It is which combinations of foods can best meet different nutritional needs, in different places, for different people.

Global dietary trends themselves suggest diversity rather than convergence toward a single protein model. OECD-FAO projections indicate that rising incomes in middle-income countries will continue to diversify diets and increase consumption of livestock and fish products, while pulses remain important sources of protein in many regions

and their consumption is also projected to expand. Dietary patterns therefore continue to reflect income, geography, agricultural capacity, culture and consumer preferences (OECD-FAO, 2026). **This is the basis for what we define as Protein Coexistence.**

Protein Coexistence: Diversity, Not Equivalence

Protein Coexistence starts from a simple principle: a resilient food system benefits from a plurality of protein sources rather than dependence on a single pathway.

Dairy, meat, eggs, fish, pulses and other plant proteins can coexist with emerging sources developed through fermentation and other technologies. They need not perform identical functions or compete for identical consumers.

Coexistence does not imply equivalence. Different protein sources have different nutritional properties, production requirements, environmental impacts and economic characteristics. Their contributions must be evaluated according to the outcomes they deliver, rather than through predetermined assumptions about which categories should expand or disappear.

Nor does coexistence eliminate competition. On the contrary, competition between different foods, ingredients, production systems and technologies can stimulate innovation, improve efficiency and encourage producers to respond more effectively to consumer needs.

The objective is therefore neither to preserve existing production systems unchanged nor to replace them according to a predetermined technological or dietary model.

It is to create the conditions in which different protein sources can improve, innovate and compete while contributing to better nutritional, environmental and economic outcomes.

Such diversity can generate three advantages.

1. **Nutritional complementarity.** Different foods provide different combinations of proteins, micronutrients, fats, carbohydrates, fiber and bioactive compounds. Research comparing animal- and plant-based protein sources increasingly cautions against evaluating the issue as a simple binary, emphasizing instead individual foods, dietary patterns and the nutritional consequences of specific substitutions (Mariotti et al., 2026).
2. **System resilience.** Food systems operate across radically different climates, agricultural structures, income levels and resource endowments. A protein strategy appropriate for Northern Europe will not necessarily be appropriate for Southeast Asia or Sub-Saharan Africa.

Maintaining multiple productive pathways can help food systems adapt to economic, climatic and geopolitical shocks rather than relying excessively on any one source or technology.

This diversity also extends to agricultural resources and production systems. Different forms of agriculture can make use of different land characteristics, climatic conditions, feed resources and processing byproducts. Where appropriately managed, livestock and crop production can interact through nutrient cycles, resource recovery and the valorization of materials that are not directly suitable for human consumption.

These interactions do not eliminate environmental trade-offs. They do, however, demonstrate why food-system performance cannot always be understood by evaluating individual products or production categories in isolation.

3. **Innovation and consumer choice.** Competition between protein sources can stimulate better products, improved production methods and new nutritional applications. Innovation should expand the range of choices available to consumers rather than become an instrument for administratively selecting one protein system over another.

Emerging technologies may also create opportunities for collaboration across traditional sectoral boundaries. Advances in fermentation, ingredient functionality, processing and nutritional science can benefit multiple protein industries, including dairy.

In this perspective, technological innovation is not necessarily a substitute for established food systems. It can also become a means of improving them.

From Protein Substitution to Better Outcomes

This approach does not imply that every protein source has the same nutritional, economic or environmental characteristics. Nor does coexistence mean avoiding difficult questions about emissions, land use, animal welfare, nutrition or affordability.

These impacts should be measured and improved using the best available evidence.

It means rejecting a predetermined hierarchy in which entire categories of food are treated as inherently belonging to either the past or the future.

This distinction is particularly relevant for dairy.

The sector does not need to oppose plant proteins or emerging technologies to demonstrate its own value. Its stronger position is to continue improving its environmental and productive performance while demonstrating where dairy provides distinctive nutritional and functional benefits.

Indeed, simplistic substitution can itself generate trade-offs. Recent modeling reviews find that replacing animal-source foods with plant alternatives can improve some health and environmental indicators, while potentially reducing intake of particular nutrients depending on which foods are removed, what replaces them, and whether alternatives are fortified (Auclair et al., 2026).

The policy lesson is not that substitution is inherently desirable or undesirable. **It is that the consequences depend on what is substituted, by what, for whom, and**

within which overall diet.

This principle has direct implications for European policymaking.

Europe faces the challenge of improving the sustainability of its food system while maintaining nutritional quality, affordability, agricultural productivity, industrial competitiveness and consumer choice. These objectives cannot necessarily be achieved through a single dietary or technological pathway.

A more effective approach would encourage measurable improvements across different production systems, support research and innovation, and assess the nutritional, environmental and economic consequences of policy choices.

This requires evaluating technologies and products according to their performance rather than assuming that belonging to a particular food category is, in itself, evidence of superiority or inferiority.

Protein Coexistence therefore offers an alternative to one-size-fits-all protein policy. It shifts attention from replacing categories to improving outcomes: better nutrition, greater productivity, lower environmental impacts, stronger resilience, continued innovation and wider consumer choice.

For dairy, this is an opportunity rather than a compromise. A more diverse protein economy can create new combinations of foods, ingredients and technologies while allowing dairy to compete on the qualities it genuinely delivers.

The future is not animal protein versus plant protein.
The future is protein coexistence.

The strategic task for dairy is therefore not to win a protein war. It is to define and continuously improve its place within a more diverse protein system.

That requires a final shift: **from defending dairy to leading with its value.**

7. From Defense to Leadership: A New Dairy Strategy

The previous chapters point to a strategic conclusion. Dairy does not suffer from an absence of value, but from a gap between the value it creates and the value that consumers, policymakers and increasingly digital information systems are able to recognize.

Closing this Dairy Value Gap requires more than better communication. It requires a change in posture.

Dairy communication has often been reactive. When challenged on emissions, the sector responds with environmental data. When questioned about nutrition, it provides scientific evidence. When animal welfare is criticized, it explains improvements in

farming practices. Each response may be necessary, but a permanently reactive strategy has a structural weakness: someone else is choosing the question.

Leadership means defining the conversation around the contribution dairy intends to make to future food systems.

Five strategic shifts can help achieve this.

1. From Volume to Nutritional Value

Production volumes, yields and market shares remain essential business indicators, but they do not fully capture dairy's contribution.

The sector should increasingly demonstrate the nutritional value it delivers: high-quality protein, essential amino acids, micronutrients and products adapted to different stages of life.

As Europe ages and interest in healthy longevity grows, dairy has an opportunity to connect its nutritional capabilities with emerging consumer needs and innovation.

The question is no longer only how much milk is produced, but what nutritional value that production delivers.

2. From Commodity to Resilience

Efficiency remains indispensable, but recent disruptions have highlighted the strategic importance of productive capacity, diversified supply chains and functioning international markets.

Dairy should make visible the infrastructure behind its products: farming knowledge, animal health, processing capacity, cold chains, food safety, logistics and technological innovation.

For Europe, maintaining and strengthening these capabilities is also a question of competitiveness and food-system resilience.

Resilience does not require protectionism. Productivity, innovation and open, rules-based trade remain essential to food security (OECD-FAO, 2026).

The objective is resilient openness: strong productive capacity combined with diversified and competitive international markets.

3. From Isolated Claims to an Evidence Ecosystem

In an increasingly AI-mediated information environment, credibility depends not only on generating evidence, but on making it accessible, understandable and verifiable.

Dairy already produces substantial scientific knowledge and market information. Yet much of it remains fragmented across institutions, research organizations and companies.

The sector needs a more connected evidence ecosystem: transparent scientific sources, accessible data, comparable information and clear explanations of both established findings and remaining uncertainties.

This is not about influencing AI to favor dairy. It is about ensuring that consumers, researchers, policymakers and digital information systems can access and evaluate reliable evidence.

The future competitive advantage may belong not to those who communicate the most, but to those whose value is easiest to understand and verify.

4. From Standardized Messaging to Consumer Relevance

There is no single dairy consumer.

An older adult concerned with maintaining muscle function, an athlete interested in protein, a family managing its food budget and a consumer evaluating environmental performance may all look for different forms of value.

Digital technologies and advances in personalized nutrition offer opportunities to provide more relevant information, while respecting scientific limitations and individual preferences (Ordovas et al., 2018).

The objective should not be to persuade everyone to consume more dairy, but to help individuals understand where different dairy products may fit within their diets, needs and lifestyles.

Relevance, not repetition, should become the foundation of dairy communication.

5. From Protein Competition to Protein Coexistence

Dairy should resist answering food polarization with more polarization.

Plant proteins, fermentation technologies and emerging food products are expanding the protein economy. They do not automatically eliminate the nutritional or economic relevance of dairy.

The sector should compete through nutritional quality, taste, affordability, functionality, environmental improvements and innovation, rather than seeking to exclude alternatives.

Protein Coexistence offers a framework in which different protein sources compete, complement one another and improve within a diversified food system.

For European policymakers, this implies supporting innovation and measurable improvements across production systems rather than prescribing a predetermined hierarchy of protein sources.

From Strategy to Leadership

These five shifts share a common principle: dairy should spend less time explaining what it is not and more time demonstrating what it contributes.

This does not mean avoiding difficult questions. Environmental performance must improve. Animal welfare matters. Affordability matters. Nutritional claims must withstand scientific scrutiny.

But leadership also requires the right conditions for investment, research, technological innovation and industrial competitiveness. European policy should enable the sector to improve and compete, rather than treating its future primarily as a question of managing decline or substitution.

The dairy industry already possesses many of the assets required for this transition: scientific knowledge, productive capacity, sophisticated processing systems, established supply chains and a long nutritional history.

The challenge is to connect these assets into a coherent proposition for consumers, policymakers and society.

FROM PRICE TO VALUE.
FROM VOLUME TO NUTRITION.
FROM COMMODITY TO RESILIENCE.
FROM INFORMATION TO UNDERSTANDING.
FROM DEFENSE TO LEADERSHIP.

The Dairy Value Gap identified at the beginning of this paper is therefore not simply a problem to be corrected. It is an opportunity to redefine dairy's contribution to Europe's food economy.

The sector cannot control every narrative that surrounds it. But it can take greater responsibility for the value it creates, the improvements it delivers and the future it intends to build.

Conclusions – Making Dairy's Value Visible

Dairy enters the coming decade from a position of paradox. It is technologically sophisticated, nutritionally important and deeply embedded in food systems around the world. Yet much of this value becomes invisible by the time the product reaches the consumer.

This paper has described that mismatch as the Dairy Value Gap. Closing it does not mean convincing consumers to ignore price, environmental impacts or legitimate questions about health and animal welfare. It means ensuring that dairy is evaluated through a sufficiently complete understanding of what it provides, and of the trade-offs involved.

That challenge is becoming more important as the information environment changes. Consumers have access to unprecedented amounts of information while increasingly relying on intermediaries, including artificial intelligence, to filter and interpret it. In this environment, credibility will depend less on producing more messages and more on making reliable evidence accessible, contextualized and understandable.

At the same time, the nutrition debate is evolving. The challenge ahead is not simply to produce sufficient calories, but to provide diverse populations with accessible, affordable and high-quality nutrition. Dairy has an important role to play because of the nutritional quality and versatility of its proteins and products, particularly as societies age and interest grows in healthy longevity and personalized nutrition.

That role does not require a new food war. Protein Coexistence offers a more resilient framework: animal, plant and emerging protein sources competing, complementing one another and innovating within a diverse food system. The objective should not be to determine which protein wins, but to improve the nutritional, environmental, economic and technological performance of the system as a whole.

For Europe, this is also a question of competitiveness. Preserving and strengthening dairy's productive capacity, scientific expertise and technological capabilities requires investment, innovation and a policy environment that enables the sector to improve and compete. Sustainability, nutritional quality and competitiveness should reinforce one another rather than be treated as competing objectives.

For dairy, closing the Value Gap ultimately requires a change of posture: from defending its products to demonstrating its contribution; from reacting to criticism to shaping the future of food.

The dairy industry already knows how to produce milk with remarkable levels of efficiency, safety and technological sophistication. Its next challenge is different.

Don't just produce milk. Make the world understand why it matters.

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