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DAIRY AS STRATEGIC FOOD INFRASTRUCTURE: FOOD SECURITY, VALUE, AND RESILIENCE IN AN AGE OF VOLATILITY

Dairy as Strategic Food Infrastructure: Food Security, Value and Resilience in an Age of Volatility

Pietro Paganini – President of Competere.eu – highlighted during his speech at the conference "*The Sourcing Challenge – Global Milk Base Outlook*" (TUTTOFOOD Milano, 12 May 2026, powered by the European Dairy Association (EDA) and Assolatte), that behind every liter of milk lies a complex and increasingly volatile system shaped by energy, climate, trade, and consumer expectations—making dairy a true test of Europe's food resilience.

He stressed that the dairy industry should no longer be seen merely as a sector producing milk, cheese, yogurt, or butter, but rather as a key pillar of Europe's food infrastructure.

Not Just Milk – Policy Highlights

The dairy sector is often seen as one of the most stable pillars of the agri-food system. But beneath that surface of continuity lies a market increasingly shaped by shocks, pressure, and deep transformation. Today, dairy is no longer just nutrition – it is economics, geopolitics, sustainability, and trust. To understand milk is to understand a world in flux, and the vulnerabilities that come with it.

- Today dairy is increasingly exposed to environmental pressure: greenhouse gas emissions, methane, water use, soil quality, animal welfare, biodiversity, and land management. The real question is how to transform these constraints into innovation, efficiency, measurement, and reputation.
- The European dairy sector has the possibility to show measurable progress: not by accepting ideological simplifications, but by demonstrating complexity, data, and solutions.
- Regulatory certainty is crucial: dairy companies and farmers need rules that are stable, measurable, proportionate and technologically neutral.
- The nutritional value of dairy should not be overlooked: milk and dairy products provide a combination of nutrients that is difficult to replace in a simple one-to-one substitution.
- Consumers want milk and dairy products to be local, sustainable, nutritious, traceable, safe, affordable, and competitive. Every one of these expectations carries a cost. Who pays for this value, who recognizes it, and who explains it?

1. Why Dairy Matters Beyond Dairy

Milk is no longer only a food category. It is becoming a strategic food infrastructure. It is a test case for Europe's ability to reconcile food security, sustainability, affordability, and competitiveness.

To frame this perspective, it is useful to start from Lucy, the Australopithecus who has accompanied us in "In Lucy's Footsteps. An Evolutionary Journey". The book is intended as an invitation to approach food, nutrition, and animal-source foods with curiosity, scientific evidence, and critical thinking. It is not a technical manual, but an attempt to make scientific evidence accessible to policymakers, media, and citizens in a clear, non-simplistic way.

What is needed today in the debate on dairy is precisely this approach: not slogans or ideological shortcuts, but a balanced discussion on nutrition, sustainability, affordability, and food security. Such a perspective can also support a more informed dialogue among policymakers, media, and stakeholders, as the dairy sector requires not only high-quality products, but also a stronger public understanding.

Lucy did not drink milk. She did not raise animals. She did not live in a dairy economy. But Lucy reminds us that food has always been at the center of human adaptation.

Human beings evolved by learning how to use different sources of nutrition, different environments, and different forms of cooperation.

Milk came later in human history. But when it arrived, it became one of the great cultural and nutritional innovations of pastoral and agricultural societies. It connected animals, land, families, villages, trade, health, and identity. This is the point I would like to make today: dairy is not only about production. It is about civilization, territory, resilience, and trust.

The concept of protein coexistence is often used when discussing animal-source foods. It is preferred to terms such as "transition" or "substitution", as food systems are not shaped through the replacement of one source of nutrition with another based on ideological frameworks. They evolve through balance, adaptation, and diversity. This logic is also reflected in the Mediterranean dietary model: balance rather than prescription, variety rather than exclusion, and attention to portion and frequency rather than moral judgement.

Today, milk is expected to meet multiple and sometimes conflicting expectations: local production, sustainability, nutrition, traceability, safety, affordability, and competitiveness. Each of these dimensions carries a cost and implies trade-offs.

The central question therefore becomes who captures this value, who recognizes it, and who communicates it. In this sense, milk is no longer only a food product. It represents a strategic test for the future of Europe's food systems.

2. Beyond Milk: Dairy as a Signal of Systemic Volatility

We used to look at milk as a stable product: daily, familiar, local, almost taken for granted. But today milk tells us something much bigger.

It tells us how fragile food supply chains have become. It tells us how exposed European food systems are to energy costs, feed prices, climate volatility, regulation, trade disruptions and changing consumer expectations. Milk looks stable on the supermarket shelf. But behind that shelf, the dairy chain is exposed to a level of volatility that consumers rarely see.

This is why the dairy sector is entering a new era: from efficiency to resilience; from abundance to strategic availability; from simple nutrition to consumer trust.

2.1 Price volatility is the first signal

According to the European Commission's Milk Market Observatory, in January 2026 the average EU farm-gate milk price fell to 45.22 cents per kilo: down 5.8% from the previous month and 15.8% below January 2025. Estimates pointed to a further decline in February 2026. But the real point is not only one monthly drop. The real point is the cycle.

Over the last few years, dairy prices have moved through sharp phases of increase and correction. During the 2022–2023 inflationary shock, EU raw milk prices rose to historically high levels. Then prices corrected, while costs, uncertainty and investment needs did not disappear. DG AGRI's dairy dashboard shows this broader movement: a sector no longer operating in a calm price environment, but in a world of wider and faster oscillations.

This matters because volatility does not affect everyone in the same way.

- For farmers, volatility means uncertainty on margins and investment.
- For processors, it means pressure on procurement, contracts, energy, packaging, and planning.
- For retailers, it means tension between price competition and value recognition.
- For consumers, it means confusion: they see price changes, but they do not always understand the complexity behind them.

And this creates the central paradox of dairy today. Consumers want milk and dairy products to be local, sustainable, nutritious, traceable, safe, affordable, and competitive. But every one of these expectations has a cost. So, the question is not only: how can the dairy sector deliver more? The real question is: who pays for this value, who recognizes it, and who explains it?

2.2 Energy, logistics and packaging: dairy is not a simple product

The lesson of 2022 and 2023 is not over. Dairy may look simple to consumers. But milk is not a simple product. It is a high-intensity logistical and technological chain. It depends on energy, feed, water, refrigeration, packaging, processing capacity, transport, storage, quality control and distribution. Every litre of milk carries much more than milk. It carries electricity, fuel, animal nutrition, cold chain infrastructure, packaging materials, labour, regulation, and logistics. This is why global uncertainty matters even when the connection is not immediately visible.

Take the Strait of Hormuz. At first sight, it may seem far away from milk. It is not a dairy issue. It is not about cows, farms, or cheese. But it is about energy. It is about shipping. It is about risk perception. It is about the cost of uncertainty. UNCTAD warned in March 2026 that disruptions in the Strait of Hormuz have ripple effects far beyond the region, affecting energy markets,

maritime transport, and global supply chains. FAO also highlighted the implications of the Hormuz crisis for world food security and agriculture.

This is the new reality of food markets. Sometimes the link is physical: fuel prices, gas prices, transport costs, packaging costs, feed costs. Sometimes the link is financial: insurance, contracts, hedging, procurement strategies.

And sometimes the link is emotional: fear, uncertainty, anticipation, speculation. Even before a shortage reaches a dairy plant or a supermarket shelf, expectations can move prices and decisions. That is why dairy companies, retailers and policymakers cannot look only at the farm gate. They must look at the whole system around milk.

Because milk depends on cows. But the dairy chain depends on energy, logistics, industrial capacity, and trust.

2.3 Climate and water: from pressure to performance

The third factor is climate and water. Dairy is increasingly exposed to environmental pressure: greenhouse gas emissions, methane, water use, soil quality, animal welfare, biodiversity, and land management. But the key point is not to approach this only defensively.

The real question is how to transform these constraints into innovation, efficiency, measurement, and reputation. For the dairy sector, climate and water are no longer external issues. They are becoming core business variables. They affect production costs. They affect investment decisions. They affect access to finance. They affect regulation. They affect how retailers negotiate with suppliers. And they affect how consumers perceive value.

This is where the European dairy sector can change the conversation. Not by denying environmental pressure, but by showing measurable progress. Not by accepting ideological simplifications, but by demonstrating complexity, data, and solutions.

FAO has made clear that options to produce more with lower livestock emissions are available across regions and production systems, but they require access to services, investment, and tailored interventions for farmers. This is essential: transition cannot be imposed only through targets; it must be enabled through innovation and investment.

Water is becoming equally strategic. The European Commission's Water Resilience Strategy links water management directly to competitiveness and innovation, not only to environmental protection. This is important for dairy because water is part of the entire chain: animal health, feed production, farm management, processing, cleaning, hygiene and quality control.

So, the question is not whether dairy must change. Of course, it must. The real question is: what kind of change?

- A punitive transition that weakens farmers and processors?
- Or an innovation-driven transition that helps the sector reduce emissions, manage water better, improve efficiency, protect animal welfare, and strengthen consumer trust?

This is where measurement becomes crucial. If sustainability remains a slogan, the dairy

sector will always be vulnerable to emotional narratives. If sustainability becomes measurable performance, the sector can turn pressure into credibility.

2.4 Regulation and consumers: the value gap

The fourth factor is regulation. The fifth is the consumer. I would put them together because they create the same strategic challenge: the value gap.

On one side, regulation asks the dairy sector to invest more: in sustainability, emissions reduction, water efficiency, animal welfare, traceability, reporting and compliance. On the other side, consumers ask for more value: quality, naturalness, health, sustainability, origin, safety, transparency, and affordability.

Both demands are legitimate. But together they create a difficult question: can the dairy chain deliver more value if regulation is uncertain, and the market does not always recognize the cost of that value? This is where regulatory certainty becomes crucial. Dairy companies and farmers can invest. They can innovate. They can reduce emissions. They can improve water efficiency. They can strengthen animal welfare. They can measure and report progress. But they need rules that are stable, measurable, proportionate and technologically neutral.

Uncertainty is expensive. It delays investment. It increases compliance costs. It weakens planning. It reduces confidence. And eventually it can affect production capacity. This concern is not abstract. European dairy leaders have already warned that uncertainty around environmental rules can hold back investment in food production and contribute to pressure on prices and supply.

EDA has also highlighted challenges for the European dairy industry linked to regulatory divergence, market access and trade tensions, all of which affect competitiveness. But regulation is only one side of the story. The other side is the consumer.

European consumers are under pressure. They want better products, but they are also more price sensitive. They want sustainability, but they face inflation. They want quality and origin, but they still compare prices on the shelf. According to Eurostat's latest inflation overview, food, alcohol, and tobacco prices in the euro area were still rising annually in April 2026, while energy inflation also accelerated sharply. This matters because food choices are made in a broader household budget, not in isolation. And dairy has been part of this pressure. A DG AGRI Milk Market Observatory presentation in 2025 indicated that between 2021 and 2025 food prices increased by 42% in the euro area, compared with 43.4% for dairy products.

This creates the dairy paradox. Consumers ask dairy to be sustainable, nutritious, local, safe, traceable, high-quality, and affordable. Regulators ask dairy to be more compliant, more measurable, more transparent, and more sustainable. Retail often asks dairy to remain competitive on price.

But who pays for all this? If value is created but not recognized, the chain becomes fragile. If sustainability is required but not rewarded, investment slows down. If consumers are asked to choose responsibly but are not helped to understand value, price becomes the only visible

signal. This is why the dairy sector needs not only better regulation, but also better value communication. Because affordability matters. But affordability without value recognition becomes a race to the bottom. And Europe cannot build a resilient dairy sector through a race to the bottom.

3. The nutritional value of dairy: not easily replaceable

There is another dimension that should not be overlooked: the nutritional value of dairy.

Milk and dairy products are not just sources of calories. They provide a combination of nutrients that is difficult to replace in a simple one-to-one substitution: high-quality proteins, calcium, phosphorus, potassium, iodine, vitamin B12 and, in many countries and products, vitamin D.

This does not mean that everyone must consume dairy in the same way. Dietary needs differ according to age, health conditions, culture, preferences, and individual choices. But it does mean that removing dairy from diets, or treating it as an easily interchangeable category, is not nutritionally neutral.

This is why dairy has historically occupied a specific place in food-based dietary guidance.

In the Mediterranean diet pyramid, dairy products, especially yogurt, milk, and cheese, are not excluded or treated as marginal. They occupy a moderate but meaningful position within a broader dietary pattern based on balance, variety, portion, frequency, territory, and culture. Recent work on the Mediterranean diet pyramid also places milk and yogurt among foods recommended for daily consumption, while cheese is generally positioned for less frequent, moderate consumption.

This matters because the Mediterranean diet is not a dogma of exclusion. It is a method of balance.

The same point is visible, from a different perspective, in the recent U.S. debate. The 2025–2030 U.S. Dietary Guidelines have revived the food pyramid as a communication tool, with a new inverted design placing renewed emphasis on whole foods, protein, and dairy. The political and scientific debate around this model remains open, but one point is relevant here: dairy continues to be treated as a distinct nutritional category, not as an easily interchangeable element.

Across very different dietary cultures and guidance systems, the message is therefore similar: dairy should be discussed in terms of balance, quality, and nutritional function, not through exclusion or simplistic substitution.

This is important. Dietary guidance has changed its graphics, its language and sometimes its political framing. The pyramid has been criticized, modified, replaced, and in the United States even partially revived in public debate. But dairy has remained visible because it performs a specific nutritional function.

The point is not to turn dairy into a dogma. The point is to avoid the opposite mistake: pretending that all food categories are nutritionally equivalent and easily replaceable.

A balanced diet is not built through exclusion. It is built through proportion, variety, frequency, and context. This is also the logic of the Mediterranean diet, where dairy products such as yogurt and cheese have traditionally played a moderate but meaningful role within a broader pattern of balance, territory, and food culture.

For this reason, the value of dairy should be discussed not only in terms of production, trade, or price, but also in terms of nutrition and public health. If we ask citizens to make informed choices, we must first help them understand what different foods contribute.

4. Dairy in the wider food system: four lessons from other chains

Dairy is not alone in this new landscape. Other food chains have already experienced similar pressures: geopolitical shocks, raw material uncertainty, substitution problems, cultural narratives, and the difficulty of making value visible to consumers. This is why dairy should not look only at itself. It should also look at what happened to other sectors.

4.1 The first lesson comes from cereals and grain

The war in Ukraine showed how quickly an agricultural commodity can become a geopolitical issue. Grain was no longer just grain. It became security, logistics, ports, insurance, diplomacy, and global food stability. The Black Sea Grain Initiative helped export almost 33 million tons of grain and other foodstuffs by July 2023, showing how closely food markets, war and maritime routes had become connected.

The lesson for dairy is clear: access to food and agricultural commodities can no longer be taken for granted. Dairy too must be discussed not only as a market, but as part of food security.

4.2 The second lesson comes from vegetable oils

The sunflower oil shock after Russia's invasion of Ukraine showed that substitution is much more complex than it looks. If one ingredient becomes unavailable, companies cannot simply replace it overnight. They face changes in formulation, costs, labelling, logistics, quality, consumer perception and regulatory compliance.

The European Parliament Research Service noted that the crisis exposed EU dependencies on products difficult to substitute in the short term, such as sunflower oil, and on imported inputs including energy, feed, feed additives and fertilizers.

The same lesson applies to palm oil, although from a different angle.

For years, palm oil has often been treated in Europe through an ideological and sometimes protectionist lens. It has been used as a negative claim, a symbol of what should be removed, replaced, or avoided. Yet recent market shocks have shown how fragile this approach can be. When sunflower oil supplies were disrupted after the invasion of Ukraine, regulators and food companies had to confront a very practical reality: substitution is not always immediate, and alternative oils have different costs, functions, availability, sustainability profiles and labelling implications.

The lesson for dairy is important: resilience does not come from moralizing against one ingredient, one raw material or one production model. It comes from intelligent diversification, flexibility, traceability, innovation, and supply chain literacy.

Food security requires more than substitution. It requires the ability to understand interdependence.

4.3 The third lesson comes from meat and animal proteins

Meat and dairy share a similar cultural and regulatory pressure. Both are questioned on emissions, health, animal welfare and land use. Both are often placed inside simplified narratives against animal-source foods. But they also share a structural strength: nutritional density, rural economies, territorial identity, agricultural landscapes, knowledge, tradition, and food culture. This is where dairy should avoid a purely defensive position. The sector should not only respond to criticism. It should explain its systemic value.

The message is not that dairy is perfect. No food chain is. The message is that dairy is part of a broader protein coexistence model: different protein sources, different production systems, different traditions and different nutritional roles can coexist in a balanced food system.

4.4. The fourth lesson comes from wine and premium food chains

Wine has done something that many food sectors still struggle to do. It has transformed territory, origin, culture, time, craftsmanship and quality into visible value. Dairy can learn from this. European dairy has strong links with territory, identity, know-how, protected denominations, rural landscapes, and local economies. But dairy also has a difference: milk is not only a premium experience. It is daily nutrition. So, the future of dairy must hold two dimensions together: accessibility and value.

If dairy becomes only cheap, it loses its strategic value. If it becomes only premium, it loses its social role. The challenge is to make value visible while keeping dairy accessible. That is the balance Europe needs.

5. Dairy as strategic food infrastructure

The dairy industry should no longer be seen only as a sector producing milk, cheese, yogurt, or butter. It is increasingly part of Europe's food infrastructure. Dairy connects farmers, land, water, animals, technology, processing capacity, nutrition, logistics, trade, retailers, and consumers. It connects rural territories with urban households, daily nutrition with industrial capacity, local production with global markets, and agriculture with public health.

This is why dairy matters beyond dairy.

In recent years, Europe has learned to speak the language of energy security. It has rediscovered the importance of defense security. It is now investing more attention in technological security, critical minerals, chips, and pharmaceutical supply chains. Yet food security is still too often treated as an emergency issue, to be discussed only when a crisis occurs: a war, a drought, a

disruption, a price shock.

This is no longer sufficient. If Europe is serious about strategic autonomy and long-term competitiveness, it must include food security in that conversation. And dairy belongs to it. A resilient dairy sector means more than stable milk production. It means resilient farms, strong processing capacity, skilled labor, territorial economies, access to nutritious food, reliable trade relations and consumer trust. It also means the ability to produce, transform and distribute essential foods in a world increasingly shaped by geopolitical instability, climate pressure, regulatory uncertainty, and volatile markets.

This does not mean nostalgia. It does not mean protectionism. And it does not mean defensive communication. It means recognizing the strategic value of a sector that sits at the intersection of agriculture, industry, nutrition, trade, and public policy. The future of dairy should therefore be framed around resilience, innovation, competitiveness, and trust. Europe does not need to treat dairy as a fragile tradition to be protected from change. It should treat dairy as a strategic food infrastructure to be modernized, strengthened, and made visible.

That is the political meaning of dairy today: not only producing food, but contributing to Europe's capacity to remain secure, competitive, and capable of feeding its citizens in times of uncertainty.

6. Questions for the discussion

It is worth returning briefly to Lucy. If Lucy reminds us that food has always been about adaptation, then the future of dairy depends on the questions we are willing to ask about adaptation today.

If dairy is becoming part of Europe's strategic food infrastructure, then the debate should not be limited to production volumes, market prices, or consumer trends. We need to ask broader questions about the conditions that allow the sector to remain resilient, competitive, and trusted.

Three strategic dimensions deserve particular attention.

The first is the relationship between production, regulation, water, and climate.

Can we ask dairy farmers and processors to deliver the environmental transition without giving them the regulatory stability, investment certainty and technological neutrality they need to achieve it?

A greener dairy sector cannot be built only through targets, obligations, and compliance. It requires investment, innovation, measurement, and confidence. Environmental transition cannot be only imposed; it must be enabled. This means creating the conditions for farmers and companies to invest in lower emissions, better water management, animal welfare, efficiency, data, and technology.

The second-dimension concerns consumers, retail, price volatility and procurement. European consumers increasingly ask for sustainability, quality, animal welfare, origin, safety, and affordability. Retailers operate in a highly competitive environment. Farmers and processors face volatile markets, rising compliance costs and growing expectations. This creates a central

value gap.

If everyone asks for more value, who pays for it? And if consumers see mainly the final price, who explains the real value behind milk and dairy products?

The risk is that affordability becomes a race to the bottom. Affordability matters, especially in a context of pressure on household purchasing power. But affordability without value recognition can weaken the entire chain. If value is not visible, price becomes the only signal.

The third dimension concerns international sourcing, trade, war, and instability. In a world of disrupted routes, volatile commodities, energy shocks and geopolitical uncertainty, dairy can no longer be treated simply as a normal market. Food is increasingly part of strategic resilience, and dairy belongs to that broader conversation.

Milk may be local, but the system that makes milk available, safe, affordable, and competitive is global. It depends on energy, logistics, packaging, feed, industrial capacity, trade relations and trust.

If milk disappeared from the shelves tomorrow, would we still call it just another food product?

The answer would be clear. We would immediately recognize what it really represents: nutrition, territory, industry, logistics, trade, consumer trust and food security.

That is the meaning of dairy today. Not just milk, cheese, yogurt, or butter, but Europe's food resilience in everyday form.

Conclusion

Milk is no longer just a food product, but a strategic food infrastructure that connects nutrition, public health, sustainability, affordability, and competitiveness.

Yet today it is asked to deliver multiple, sometimes conflicting expectations, each carrying a cost that is often invisible or unrecognized.

The key challenge is therefore not only production, but value recognition, distribution of costs, and communication. Dairy ultimately becomes a lens to understand how Europe can balance security, innovation, and trust.

In this sense, dairy also reflects a broader transformation of food systems, where resilience depends on the ability to integrate science, policy, and market dynamics, while making complexity visible and economically sustainable along the entire chain.

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