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1



Childhood obesity: pasta is not to blame

Press release
Unione Italiana Food



Following the BBC's report on rising overweight among Italian children, the pasta producers of the Unione Italiana Food have drawn attention to the scientific evidence: obesity is a multifactorial condition and pasta, when part of a balanced diet, is not associated with an increased risk.

With reference to the article published by the BBC (*Pizza, pasta, potatoes, protein – how Italian children became so overweight*, dated 25 July, *Editor's note*) on the subject of childhood obesity, the pasta producers of Unione Italiana Food believe it is important to steer the debate back onto a strictly scientific footing.

In fact, current evidence does not attribute a causal role to pasta, or to any other staple foods of the Mediterranean tradition, in the onset of childhood overweight and obesity. On the contrary, the international literature is unanimous in acknowledging that these are complex, multifactorial phenomena, influenced by the overall balance of the diet, lifestyle, physical activity and a multitude of environmental and behavioural factors, rather than by the consumption of a single food.

When consumed in appropriate quantities and as part of a varied and balanced diet, pasta is one of the pillars of the Mediterranean Diet. The latest scientific evidence confirms its contribution to the nutritional adequacy of the diet and to metabolic and cardiovascular well-being, as well as its ability to promote complete and balanced meals when combined with vegetables, legumes and other plant-based foods.

This is also confirmed by the latest evidence compiled in the *“Healthy Pasta Meal” Consensus Statement*, updated in 2025 by the Unione Italiana Food in cooperation with the Italian Society of Food Science (SISA) and CEPEA. The document, signed by 29 scientists from 9 countries, reaffirms the role of pasta within a balanced diet, highlighting that its consumption is not linked to obesity and can contribute to metabolic, cardiovascular and nutritional well-being.

“When addressing sensitive issues such as childhood obesity, it is vital to avoid oversimplifications that risk diverting attention from the real causes of the problem. As a food industry, we believe it is our duty to promote accurate information, grounded in scientific evidence and a culture of balanced eating. Pasta has always been one of the symbols of the Mediterranean Diet and continues to be a food that is fully consistent with a healthy lifestyle, as part of a varied and balanced diet,” says Margherita Mastromauro, President of the pasta producers of Unione Italiana Food.



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Margherita Mastromauro, President of the pasta producers of Unione Italiana Food

“Current evidence confirms that pasta, when consumed as part of a balanced diet, contributes to nutritional adequacy, metabolic well-being and environmental sustainability,” comments Silvia Migliaccio, President of the Italian Society of Food Science (SISA) – “Pasta consumption has also been linked to a reduced risk of cardiovascular disease, without increasing the incidence of diabetes, while improving satiety and providing both antioxidant and prebiotic properties. Ongoing research suggests possible chronobiological effects, such as improved sleep and circadian regulation, particularly when pasta is consumed at dinner. Overall,

pasta emerges as a nutritionally valuable, culturally significant and environmentally friendly food that supports both human health and the health of the planet when incorporated into a balanced diet.”

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2



Evaluation of the effect of thermal drying treatment of pasta using proteomic approaches

Imma De Sena

Università degli Studi di Napoli
Federico II



The research awarded the Pastaria 2026 Prize for Best Master's Thesis examines the effects of semolina quality and drying conditions on the structure and digestibility of proteins in whole-wheat pasta.

Introduction

Pasta is a cornerstone of the Mediterranean dietary model and a symbol of the Italian gastronomic tradition. Its global success can be attributed to a combination of factors, such as its long shelf life, versatility of use, affordability and excellent structural properties. From a nutritional standpoint, its consumption is promoted at international (e.g. *World Pasta Day*) and national level: SINU (Società Italiana di Nutrizione Umana – Italian Society of Human Nutrition), in its recent revision of the food pyramid, recommends the regular consumption of pasta, particularly in its whole-grain form, as a privileged source of complex carbohydrates, plant protein and fibre, in line with the principles of a balanced and sustainable diet.

Specifically, whole-durum-wheat semolina pasta stands out from its refined counterpart for its superior nutritional profile. The preservation of the outer kernel components (bran and germ) ensures a higher intake of fibres, micronutrients, and bioactive phytochemical compounds. These include phenolic acids, alkylresorcinols, flavonoids, lignans and phytic acid: molecules that, acting synergistically, give the product a high functional value.

In legislative terms, production in Italy is regulated by Italian Presidential Decree No. 187 of 9 February 2001 (and subsequent amendments and additions, including Italian Presidential Decree No. 41 of 5 March 2013). This regulation defines “whole-durum-wheat semolina pasta” as the product obtained by extruding, sheeting and drying pasta dough prepared exclusively with whole-durum-wheat semolina and water, and prohibits the addition of soft-wheat flours in order to maintain compliance with the national production tradition.

Although the raw materials play a fundamental role, the final quality of the pasta is strongly affected by the transformation processes. Among the unit operations in the industrial production of pasta, drying plays a crucial role. This thermal treatment serves a dual purpose: to reduce residual moisture below the legal limit of 12.5%, guaranteeing microbiological stability and an extended shelf-life, and to consolidate the protein structure (gluten network), which is decisive for texture and firmness during cooking.

However, the application of high temperatures, combined with the progressive reduction in water activity, promotes the onset of the Maillard Reaction. The initial phase of this reaction

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leads to the formation of Amadori products (e.g. fructosyl-lysine and maltulosyl-lysine), intermediate compounds absent in the native semolina and generated during drying.

Analytically, the presence of these intermediates is assessed through the quantification of furosine. Furosine is formed by acid hydrolysis of Amadori products, and its concentration is directly correlated with the intensity of the thermal treatment (time/temperature combination), making it the marker of choice for assessing early heat damage.

As the reaction progresses, there is a reduction in the bioavailability of lysine (an essential amino acid) and the formation of Advanced Glycation End-products (AGEs) such as hydroxymethylfurfural (HMF), glucosylisomaltol and pyrralin. Although these compounds contribute to the development of desirable sensory attributes (amber colour, aroma), they also indicate severe heat damage that can partially jeopardise the biological value of the finished product.

While the technological and nutritional effects deriving from the drying of refined semolina pasta are well established in literature, the study of the wholewheat matrix is, in comparison, still fragmentary. There is, therefore, a clear need to fill this knowledge gap by thoroughly investigating

the impact of processing variables on protein quality and on the bioavailability of nutrients in wholewheat pasta.

This paper is situated within this scientific scenario, as an integral part of the PRIN (Progetti di Rilevante Interesse Nazionale – Projects of Significant National Interest) research project entitled “CALIMERO”, financed by MUR and coordinated by the University of Milan.

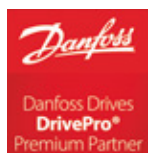
The primary objective of the study was to evaluate the synergistic effect exerted by the thermal drying regime and the qualitative characteristics of the raw material on the molecular profile of proteins and on their digestibility *in vitro*. To this end, the experimental investigation examined wholewheat pasta samples produced from commercial semolina of different quality classes (Alta e Media – High and Medium), subjected to drying protocols with differentiated time/temperature combinations.

Materials and methods

The analyses were conducted on four wholewheat spaghetti samples produced at the Department of Food, Environmental and Nutritional Sciences (DeFENS) of the University of Milan. Samples were obtained from two commercial durum wheat semolina batches, classified as AQ



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(Alta Qualità - High Quality) and MQ (Media Qualità - Medium Quality), and characterised by different protein, fat, fibre and ash contents. The pasta was subjected to two separate drying cycles: high temperature (HT, 85 °C for 6 h) and low temperature (LT, 50 °C for 21 h). Thermal damage was assessed through the quantification of furosine, following the method described by Resmini et al. (1990).

Sequential protein extraction and quantification

The characterisation of the protein profile by means of electrophoresis was carried out directly within the experimental activity of this thesis. Sequential extraction (1:10 w/v): first step with non-reducing buffer (Urea 6 M, Thiourea 1 M, AMBIC 0.05 M; 1 h, RT), followed by pellet extraction with reducing buffer (+ DTT 0.1 M and urea). Quantification was performed using Enzytec™ Total Protein kits on the Imagic M9 system.

Protein profile analysis by electrophoresis

SDS-PAGE analysis was conducted on samples solubilised in Laemmli buffer and denatured (101 °C, 10 min). Aliquots of 12.5 µg were resolved on 12% gels (Mini-PROTEAN® Tetra system, Bio-Rad),

applying 120 V for 15 min, followed by 200 V. The gels, fixed in 24% TCA for 12 h, were stained with QC Colloidal Coomassie Stain (Bio-Rad) for 24 h.

Sample preparation for mass spectrometry analysis

The proteins were reduced (DTT 50 mM, 60 °C, 30 min), alkylated (iodoacetamide 100 mM, RT, 30 min) and digested with chymotrypsin (1:50 ratio, 14 h), and the reaction was stopped with 1 M HCl.

The peptides, purified by SPE on C18 Sep-Pak cartridges (Waters) according to standard protocol, were eluted with 70% ACN and 0.1% formic acid, then stored at -20 °C.

Mass spectrometry analysis

Analytical determinations by liquid chromatography coupled with tandem mass spectrometry were performed at the Institute of Sciences of Food Production (ISPA-CNR). LC-MS/MS analyses were conducted on the UHPLC-ESI-Q-Exactive Plus system (Thermo) in DDA mode.

Separation on an Acclaim PepMap100 C18 column (3 µm, 100 Å, 1×150 mm; 60 µL/min) followed a 15-40% linear gradient of solvent B (ACN/H₂O 80:20, 0.1% FA), according to Pilolli et al. (2018). As a non-experimental step, data processing



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was carried out using PEAKS Studio for protein identification and differential quantification (LFQ).

***In vitro* digestion**

As an integral part of the experimental work conducted for this thesis, the assessment of pasta digestibility was performed by applying the standardised static INFOGEST protocol (Brodkorb et al., 2019), which reproduces the physiological conditions of the three phases of human digestion (oral, gastric and intestinal). Prior to digestion, the pasta samples were cooked in salted water following the methods described in the literature (Mamone et al., 2015) and subsequently topped up with extra virgin olive oil in order to simulate a complex food matrix representative of a real meal. The process at 37 °C included: the oral phase (SSF, 3 min), gastric phase (SGF, pepsin, pH 2.7, 2 h) and intestinal phase (SIF, pancreatin/bile salts, pH 7.0, 2 h). The supernatant, separated by centrifugation and deproteinised (TCA 20%), was subjected to acid hydrolysis (HCl 6 M, 110 °C, 16 h). The amino acids released were quantified (Enzytec™ Alpha-amino Nitrogen kit) to calculate the Degree of Hydrolysis (DH):

$$\text{DH (\%)} = [(C_{\text{sh}} - B_{\text{sh}}) / F_{\text{h}}] \cdot 100$$

where $C_{\text{sh}} - B_{\text{sh}} - F_{\text{h}}$ indicate the concentration of alpha-amine nitrogen (after acid hydrolysis) in the soluble duodenal digest of the sample, in the soluble duodenal digest of the blank (non-protein matrix) and in the total cooked pasta, respectively

Results and discussion

The extent of thermal stress on the protein component was assessed through the quantification of furosine. The results obtained make it possible to estimate the impact of the drying treatment on the nutritional quality of wholewheat pasta, showing a clear dependence on the thermal regime applied. As expected, the high-temperature (HT) cycle induced a marked increase in furosine levels compared to the low-temperature (LT) treatment for both types of pasta.

Specifically, in the samples produced with AQ semolina, values rose from 262 mg/100 g protein in the LT cycle to 626 mg/100 g in the HT cycle. Similarly, for MQ semolina, there was an increase from 158 mg/100 g (LT) to 537 mg/100 g (HT).

However, the comparative analysis confirmed the decisive impact of the raw material/process combination.

Although the absolute values are higher in AQ semolina, MQ semolina exhibited a

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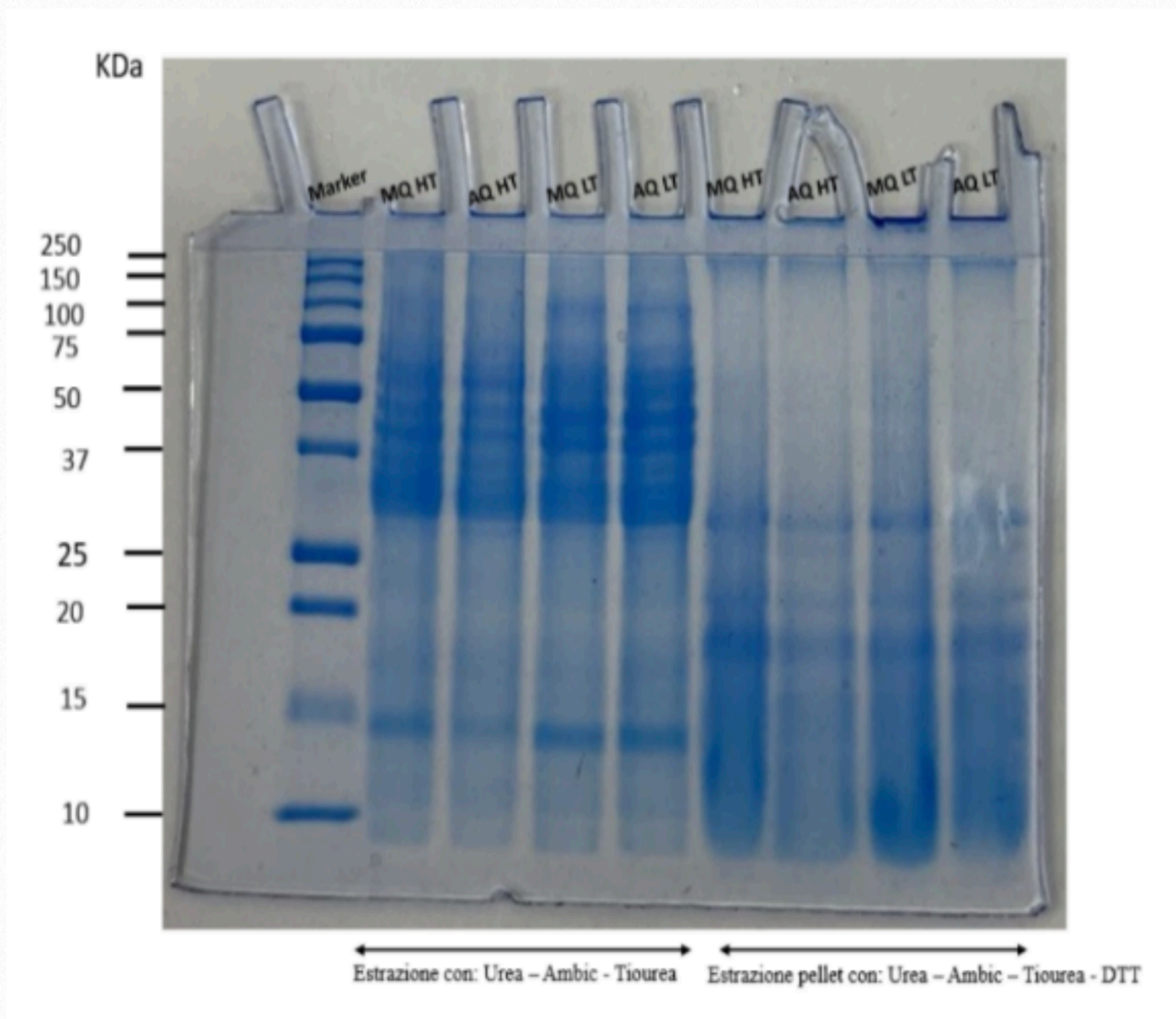


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Figure 1 ELECTROPHORETIC PROFILE OF THE PROTEIN FRACTIONS OF THE PASTA SAMPLES (IN ORDER: MQ-HT, AQ-HT, MQ-LT, AQ-LT).



From the left: molecular marker; non-reducing extracts (urea, thiourea, AMBIC); pellets extracted under reducing conditions (urea, thiourea, AMBIC, DTT).

significantly higher relative susceptibility to heat damage: the percentage increase from LT to HT was in fact +240% for MQ, compared to +139% observed for the AQ variant. These findings, consistent with the relevant literature (Marti et al., 2013; Resmini et al., 1994), support the hypothesis of a different thermal stability of

protein matrices depending on the intrinsic quality of the semolina used.

Electrophoretic investigation enabled the detailed characterisation of the soluble and insoluble protein fractions ([Figure 1](#)). At a macroscopic level, the electrophoretic profiles show a substantial qualitative similarity among the different samples

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analysed. The molecular profile obtained allowed the identification of the main protein classes of the wheat: the high-molecular-weight glutenin subunits (HMW-GS, 65-90 kDa), the omega-gliadins (55-70 kDa), the low-molecular-weight subunits (LMW-GS, ~50 kDa) and the alpha, beta, gamma-gliadins (~30-37 kDa). Particularly noteworthy is the comparison based on extraction assisted by reducing agents. The analysis conducted under non-reducing conditions (absence of DTT) revealed the presence of high-molecular-weight aggregates ($M_r > 150$ kDa) exclusively in the samples processed at low temperature (LT), suggesting preservation of the native or aggregate structure. Conversely, the application of reducing extraction conditions (presence of DTT) resulted in the cleavage of intra- and intermolecular disulphide bonds. This process led to the depolymerisation of the aggregates and to the presence of signals in the lower-molecular-weight regions, enabling the identification of well-resolved bands at around 30 kDa (attributable to gliadins and LMW-GS) and around 20 kDa. The shotgun proteomic approach provided a highly detailed characterisation of the molecular profile of the two semolina types used. In total, 178 protein families were identified: of these, 92 were common to both matrices, while 70 were found

exclusively in the AQ semolina and 16 were peculiar to the MQ semolina. Specifically, the AQ semolina is characterised by the unique presence of high-molecular-weight glutenin subunits (HMW-GS). These proteins play a critical structural role in the formation of the gluten network, giving the dough superior rheological properties that result, in the finished product, in a better “al dente” texture, reduced stickiness and optimal cooked firmness. In contrast, the profile of MQ semolina appears to be dominated by metabolic enzymes, including those involved in the biosynthetic pathways of essential amino acids. These differences reflect the complexity of protein expression in *Triticum durum* and confirm how the different relative abundance of gliadins and glutenins directly influences the technological performance of the raw material. The analysis conducted on the milled pasta samples revealed the presence of chemical modifications affecting amino-acid residues. The alterations observed, such as oxidation and deamidation phenomena, although potentially influenced by sample handling, display a systematic recurrence that supports their predominant attribution to the thermal stress experienced during drying. With regard to Maillard-reaction

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markers, a differential distribution of adducts emerged as a function of both the treatment (thermal treatment) and the matrix (semolina type): i) the hexose-derived adducts were only found in the samples subjected to the high temperature (HT) cycle; ii) adducts such as fructosyl-lysine, formyl-lysine and carboxyethyl-lysine (CML) were detected almost exclusively in the AQ sample processed at low temperature (AQ-LT); iii) the methylglyoxal-derived adduct appeared only in the MQ samples, irrespective of thermal conditions, suggesting an intrinsic propensity of this raw material to generate this specific intermediate. In order to explore the overall variability of the dataset, the spectral data were processed using Principal Component Analysis (PCA). As illustrated in [Figure 2](#), the first principle component (PC1) separates samples on the basis of semolina quality, while the second (PC2) discriminates them according to thermal treatment. The analysis of the score plot highlights a divergent pattern: in the AQ samples, the reduced dispersion along the principal components indicates that the thermal treatment exerts a comparatively minor effect on the global protein profile. Conversely, the MQ samples show a marked dispersion, indicating a greater

sensitivity to drying conditions.

Confirmation that the divergences observed were attributable to thermal stress was obtained by manual annotation of the MS/MS fragmentation spectra of the discriminant peptides, which revealed the presence of specific adducts derived from Maillard-reaction intermediates.

This biochemical evidence is fully reflected in the analytical data on the quantification of furosine mentioned above.

Protein digestibility was subsequently quantified by calculating the Degree of Hydrolysis (DH%), the values of which showed a variability dependent on experimental factors. The sample produced with Medium Quality semolina and dried at low temperature (MQ-LT) had the highest average digestibility (DH = 63%), followed by samples AQ-HT (56%) and AQ-LT (45%). The lowest value was observed in the MQ-HT sample (33%), suggesting that, for this specific raw material, high-temperature treatment may drastically impact hydrolytic efficiency. The data indicate a general trend towards greater availability of peptides and free amino acids in low-temperature processes, especially for medium-quality semolina. It should, however, be pointed out that the statistical analysis (one-way ANOVA) did not reveal any significant differences between the groups ($p > 0.05$).



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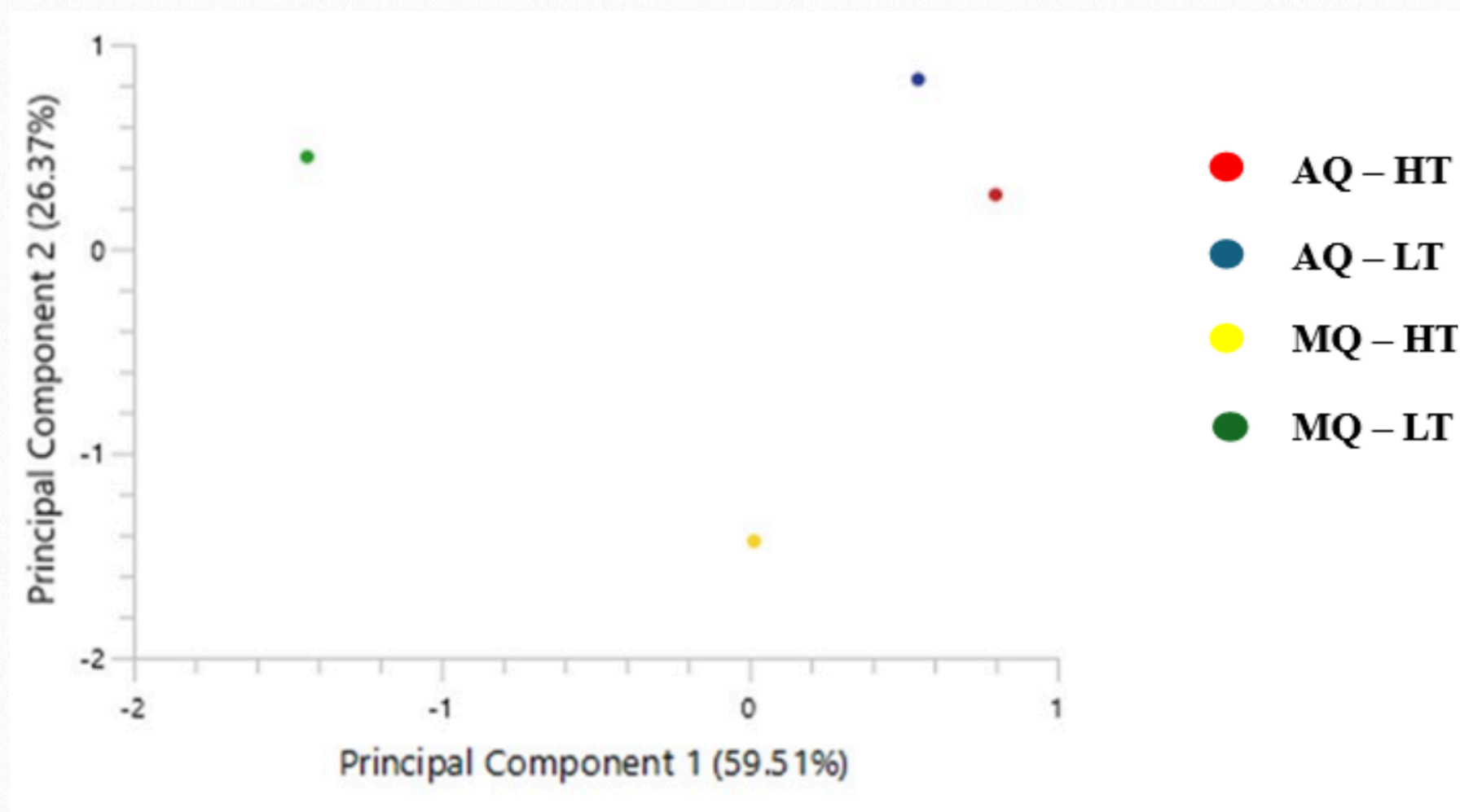


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Figure 2 PRINCIPAL COMPONENT ANALYSIS (PCA) OF WHOLEWHEAT PASTA SAMPLES



The graph was processed using the LFQ module of the PEAKS Studio software, including only the proteins identified with a minimum of 3 peptides in the dataset. The four experimental groups are shown: AQ-HT, AQ-LT, MQ-HT and MQ-LT. Each point in the plot represents a single biological replicate, resulting from triplicate digestion of the same sample under the specific treatment conditions.

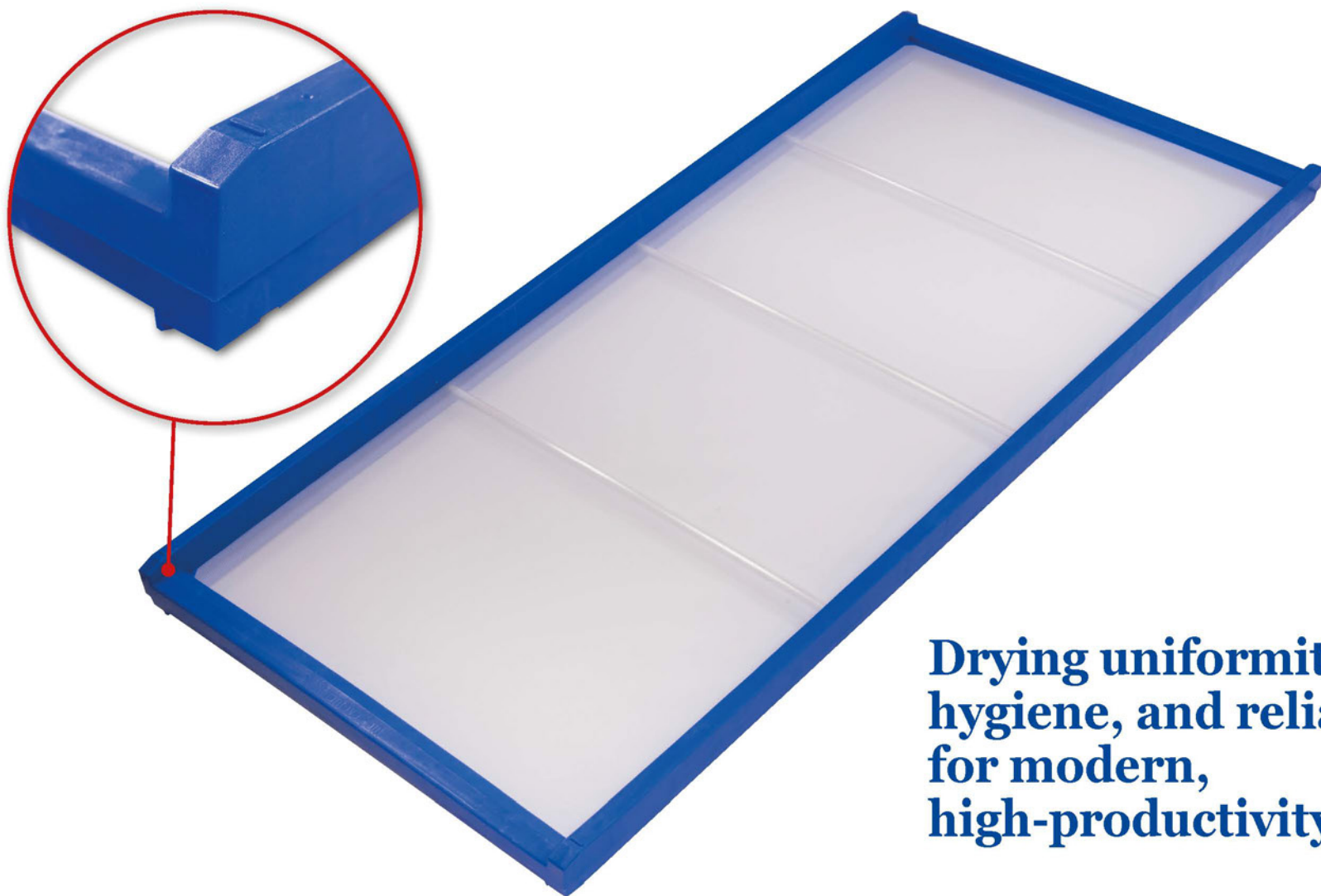
This outcome suggests a high intrinsic variability of the data, likely attributable to the heterogeneity of the wholewheat matrix and to the complexity of the simulated digestive system. Finally, it should be underlined that the degree of hydrolysis provides an overall estimate of protein degradation, but does not necessarily reflect the actual bioavailability of the individual amino acids. To this end, further investigations are currently underway, including amino-acid analysis and an expansion of the number of experimental replicates, aimed at reducing

the variability of the method and confirming the trends observed.

Conclusions

The results suggest raw-material quality as a primary determinant of the final properties, as it can significantly modulate the response to technological stresses. At the same time, high-temperature drying, while conferring structural stability, induces marked thermal damage, as indicated by the accumulation of furosine and Maillard-reaction adducts, and tends to reduce protein digestibility due to the

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formation of resistant aggregates.

Thus, synergetic optimisation between the selection of high quality semolina and the control of process parameters emerges as the key strategy for balancing technological performance with the preservation of nutritional value.

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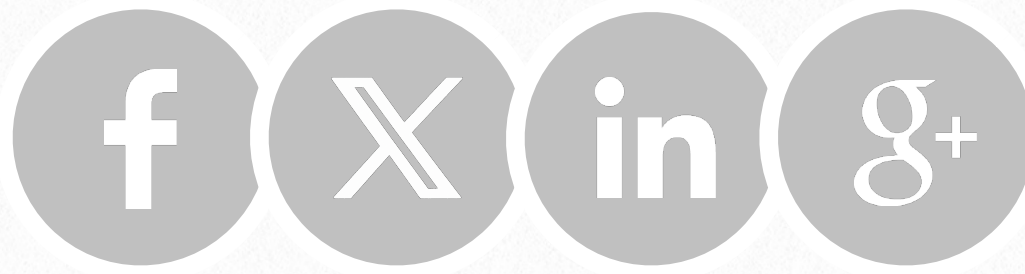
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3



Consumers and consumption: pasta in Italy

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NielsenIQ



Key findings from the NielsenIQ research presented at Pastaria Festival 2026: how consumers, retail and the pasta market are changing.

Beyond inflation: five years that changed the consumer

Between 2020 and 2025, the food market went through one of the most complex periods in its recent history. The pandemic, geopolitical tensions, supply-chain disruption, rising energy costs, inflation, difficulties in sourcing raw materials, climate change and demographic shifts all acted simultaneously on the same lever: household purchasing behaviour.

Looking at sales trends alone is therefore no longer enough. Behind the FMCG figures lies a deeper change in the way consumers assign value to food. Before the pandemic, the European market operated in a relatively stable environment; from 2020 onwards, that balance disappeared. Meals moved back into the home, product safety and availability became priorities and, once the health emergency had passed, inflation eroded purchasing power.

The main effect was not simply a reduction in consumption, but a transformation in decision-making. Consumers learned to compare prices, promotions, perceived quality, convenience, nutritional benefits and brand reliability. Value for money became a more complex concept.

A different kind of crisis

In traditional recessions, the main problem is falling income. Between 2022 and 2024, by contrast, many households maintained relatively stable incomes while seeing their real purchasing power decline. When income falls, people tend to spend less; when the cost of living rises rapidly, they continue to buy but redefine their priorities.

Every purchase becomes comparative: is it worth paying more? Is the benefit tangible? Is there an alternative offering better value for money? Many of the changes seen in FMCG can be explained through this logic.

Why food proved more resilient

The food sector proved more resilient than many others because it represents an essential component of household spending. Families switch brands, seek promotions, postpone less necessary purchases and reduce waste, but they

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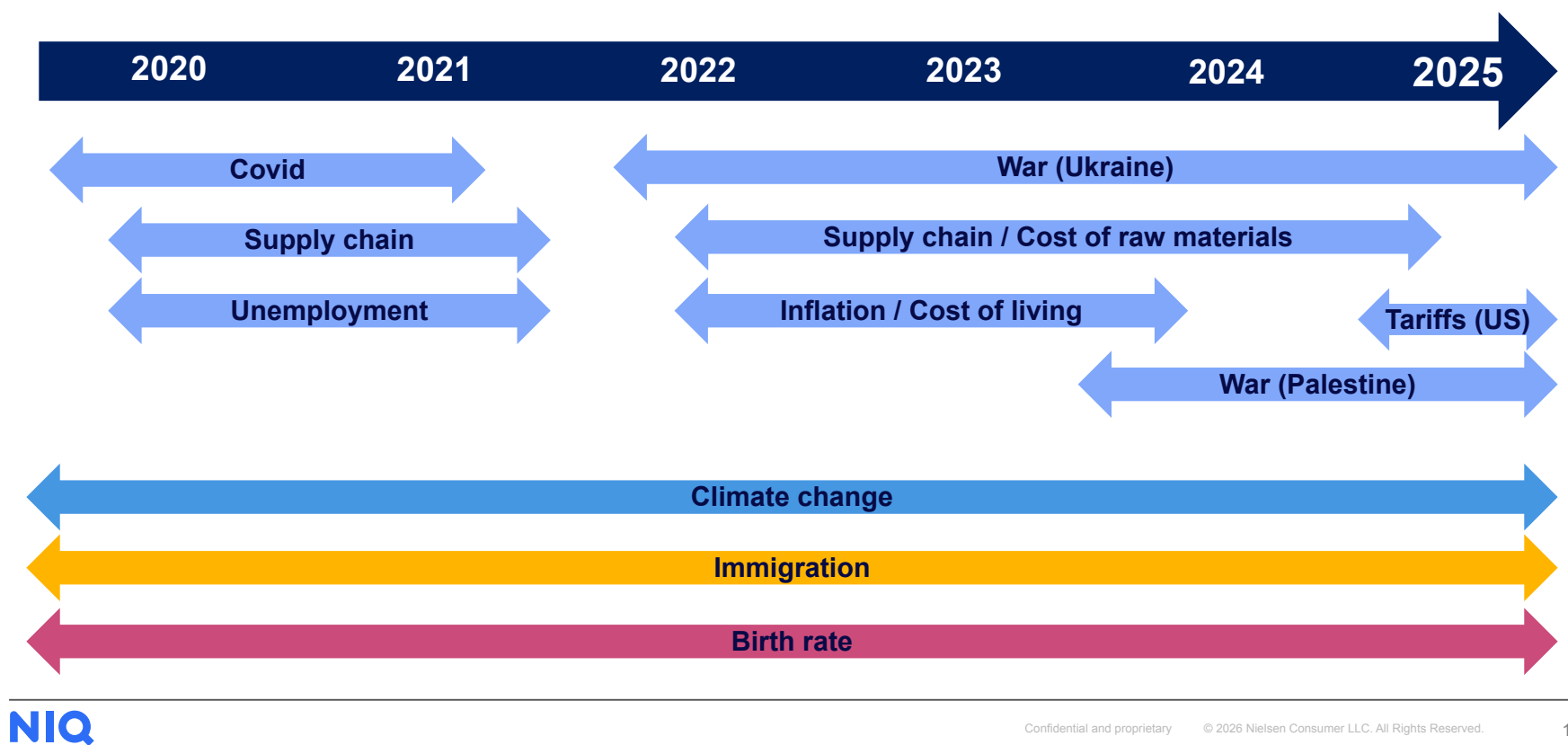


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The last few years have been challenging...



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The events that have reshaped the food market between 2020 and 2025 – the pandemic, geopolitical tensions, inflation, supply chain crises, climate change and demographic shifts – have profoundly changed consumer behaviour, creating an unprecedented scenario for the consumer goods sector.

continue to fill their shopping baskets. This stability does not mean an absence of change. On the contrary, FMCG has become one of the most sensitive areas in which to observe social change: demographic, cultural and economic shifts are reflected directly in food choices.

Europe returns to growth. Italy proves more resilient than expected

In 2025, European FMCG entered a new phase. Growth continued, but its composition changed: after two years in which turnover had been driven mainly by

prices, volumes began to contribute again. In Western Europe, grocery sales grew by 2.8% in value and 0.6% in volume, while average prices increased by 2.2%. Demand is therefore once again joining inflation as a driver of the market. The picture is not uniform, but the common trend is one of remarkable resilience. For companies, this shift is crucial: turnover growth accompanied by falling volumes is fragile, whereas a recovery in quantities suggests that the inflationary shock is gradually being absorbed.

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2025 : The consumer goods sector is still on an upward trend in Italy

Over the last 5 years, inflation has not hindered growth in volumes

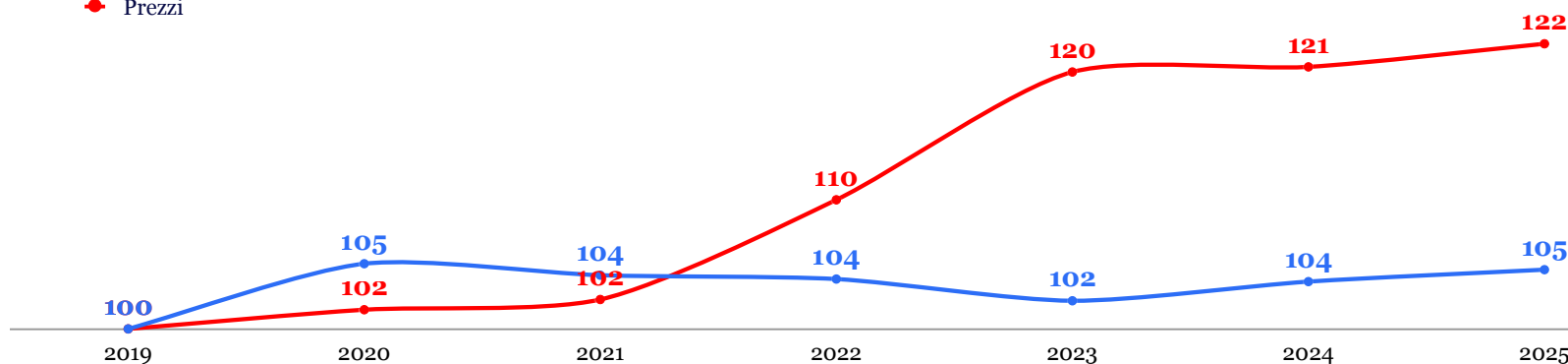
LCC - Total Italy Omnichannel

(2019 = 100)

Western Europe
Value +2.8%
Volume +0.6%

PRICE
+2.2%

• Volumi
• Prezzi



Total Store Turnover
(including PV and non-food items)

+3.2% +1.9%
in 2024

LCC values

+2.4% +1.9%
in 2024

LCC volumes

+0.9% 1.5%
in 2024

LCC Price Variation
(inflation + mix)

+1.5% 0.4%
in 2024

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Source: NielsenIQ Discover – Total Store and Total LCC; Italy Omnichannel – Year 2025 and Year 2024

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The trend in prices and volumes in the Italian fast-moving consumer goods (FMCG) sector from 2019 to 2025 played out in three distinct phases: expansion in consumption during the pandemic, subsequent growth driven by inflation and, finally, the gradual return of volume growth as the driving force behind market development.

Italy above the European average

Italy grew by 2.1% in value and 0.9% in volume, with average prices up 1.3%. Compared with Spain, which recorded +4.1% in value and +2.0% in volume, the Italian result may appear less impressive; in fact, Italy shows a very balanced dynamic. Price growth is among the lowest in Western Europe, while volumes are growing faster than the European average and faster than in markets such as the United Kingdom and Germany, where growth still depends mainly on price effects.

The main indication is therefore clear: Italy is not growing simply because prices are rising, but because consumers are gradually buying more again.

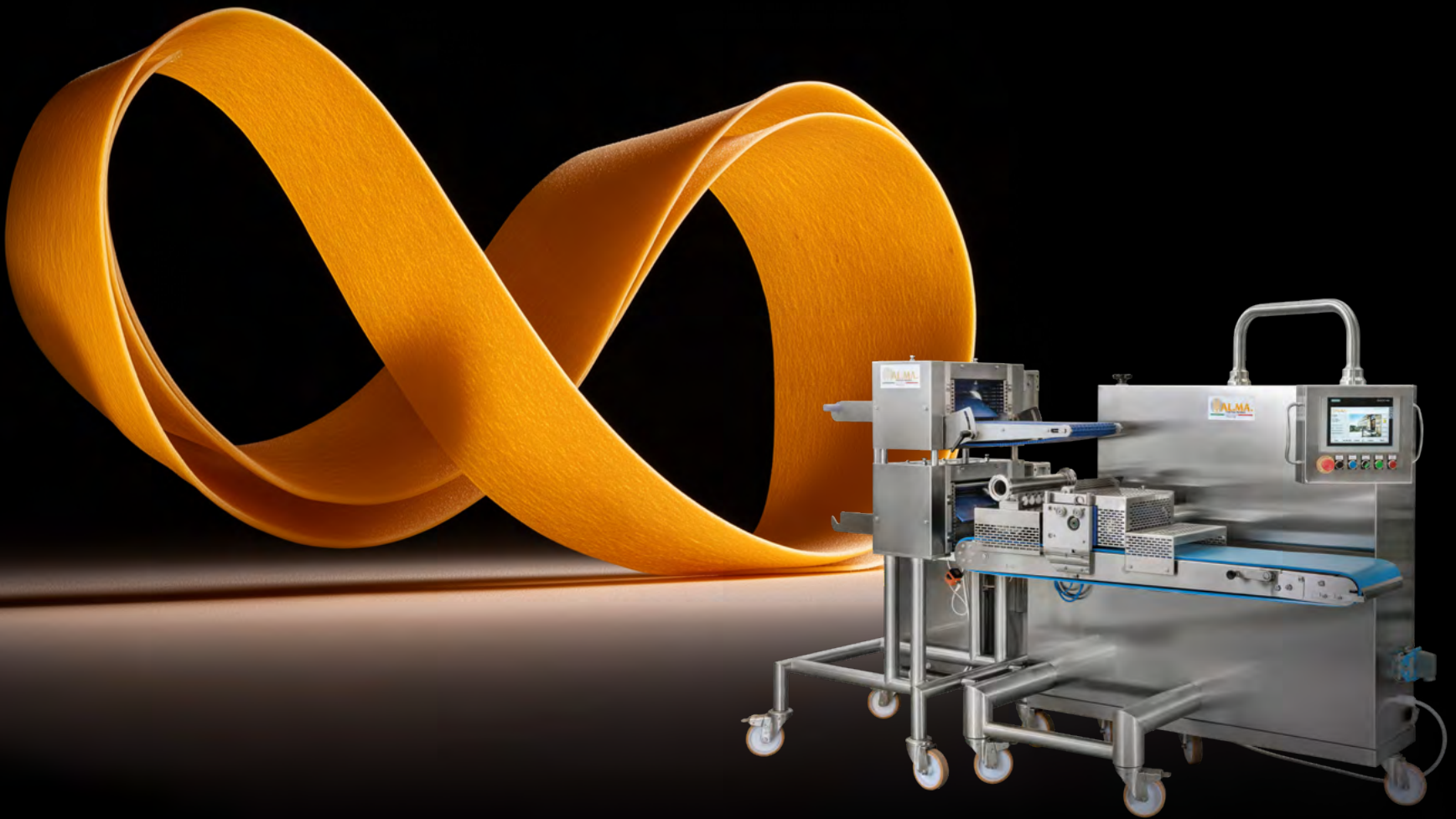
The return of volumes changes how the market should be read

In 2025, Italian packaged FMCG grew by 2.4% in value and 0.9% in volume; the combined effect of inflation and sales mix was 1.5%, while Total Store turnover increased by 3.2%.

The NielsenIQ historical series illustrates the change more clearly. Taking 2019 as

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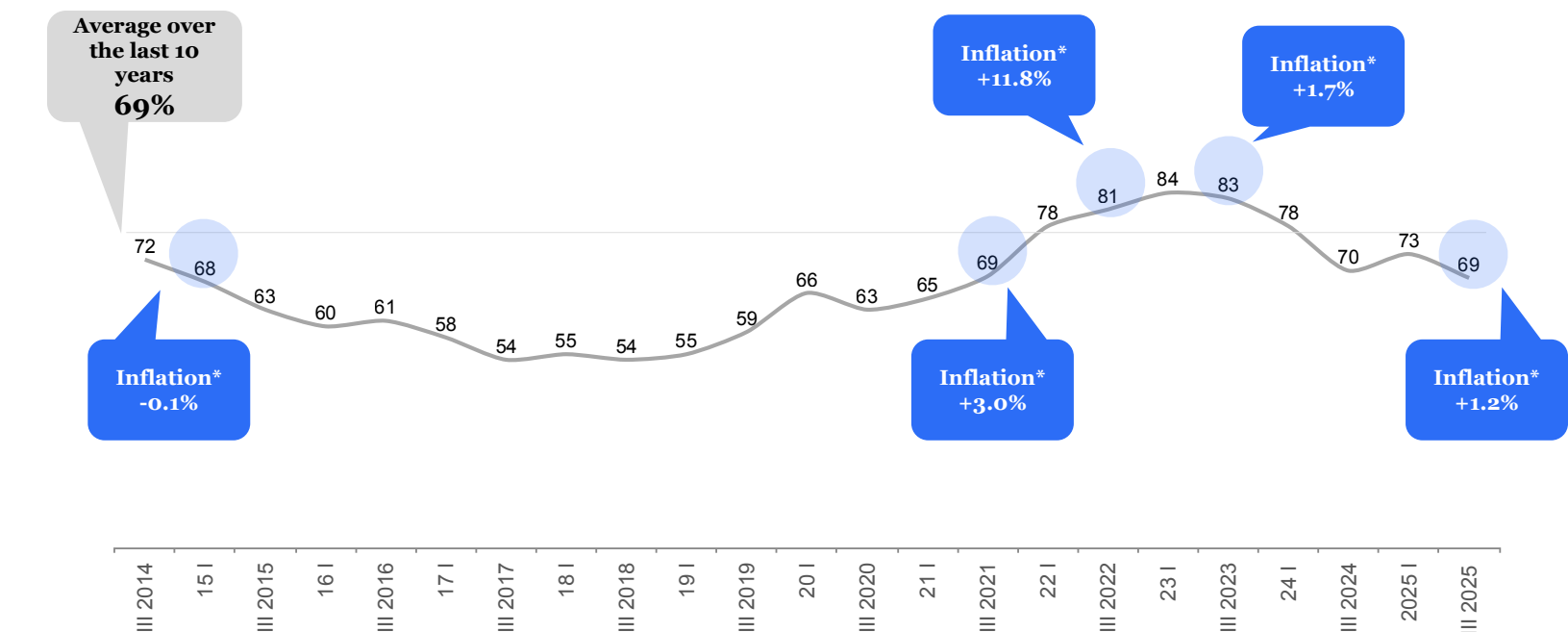
alma-pasta-machinery.com

Price sensitivity is gradually easing

But consumers are still cautious about spending



Level of Attention* to Prices Among Italian Consumers



NIQ

Source: NIQ Consumer Trends 2025 | NIQ Social and Consumer Climates

* Year-on-year change (More attentive...) | The NIC is the national consumer price index for the whole population and is calculated by Istat on the basis of a basket of goods and services, which measures inflation across the entire economy.

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Italian consumers' attention to prices has eased compared with the exceptionally high levels reached during the period of inflation, but it is still above the historical average. Inflation is easing, but heightened consumer awareness in purchasing decisions still persists.

100, volumes, after the pandemic peak and subsequent decline, reached an index of 104.6 in 2025. Prices followed a different path: after years of stability, they accelerated in 2022–2023, rising from 102.3 in 2021 to more than 122 in 2025. The two curves describe three phases. During the pandemic, growth was driven by quantities purchased and the return of meals to the home. Between 2022 and 2024, inflation dominated while volumes slowed. In 2025, inflation eased and quantities began to grow slowly again. This is not a return to pre-pandemic conditions, but it is a clear sign of

normalisation.

A balance that remains fragile

The 2025 consumer is not the 2019 consumer. The inflation years taught households to plan purchases, compare prices and assess the relationship between cost and benefit more critically. The recovery in volumes therefore does not mean a return to previous behaviour, but the beginning of a new phase: consumers are buying again, but according to different criteria. For the food industry, understanding what “value” means today is therefore



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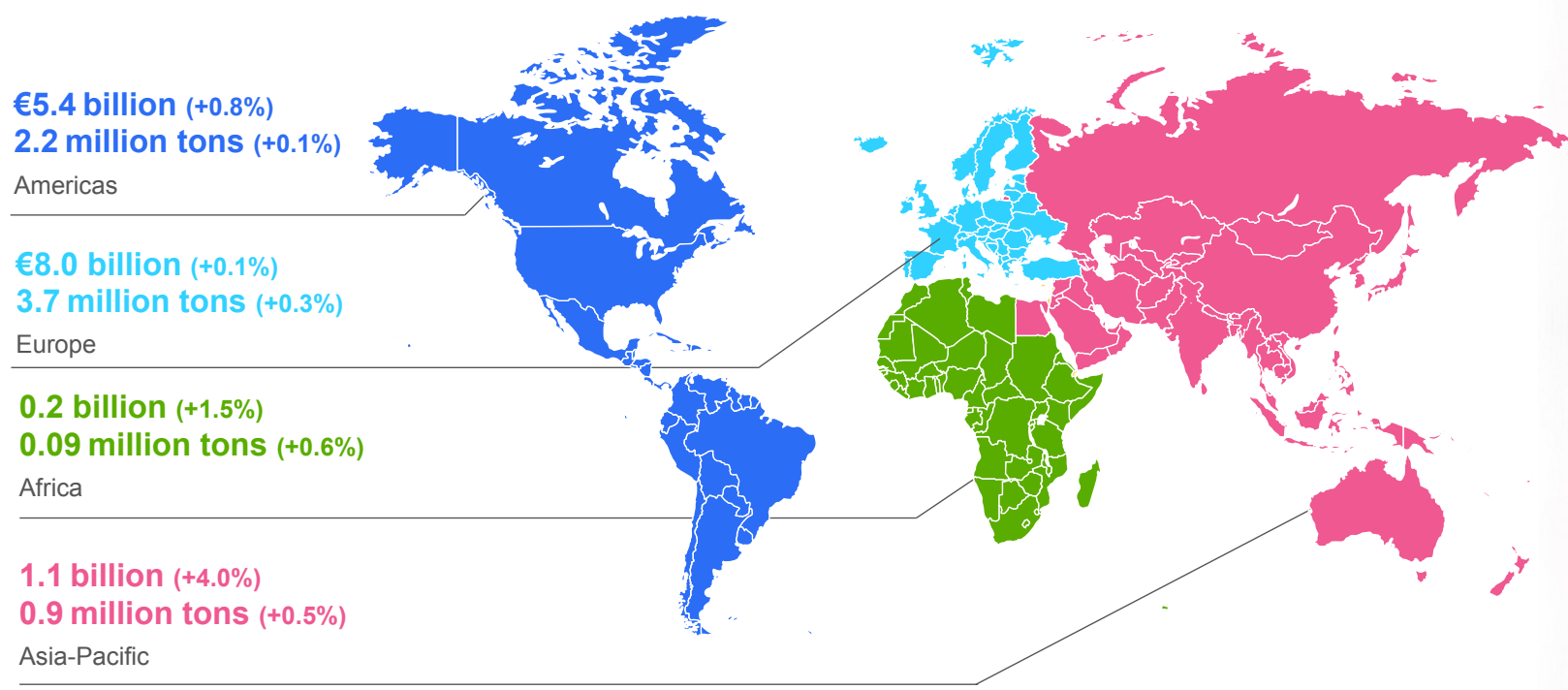
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The turnover of Dry Pasta sold in the retail channel globally reached €14.7 billion (+0.7% vs ya) in 2025. Over 7.2 million tonnes sold, a growth of +0.3%



Source: NIQ Strategic Planner Global dataset | Total coverage of 60 countries | Year 2025

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For 2025, global retail market figures for dry pasta are set to reach €14.7 billion and over 7.2 million tonnes. Europe remains the world's largest market, but growth is also continuing in the Americas, the Asia-Pacific region and Africa.

becoming more important than simply measuring prices.

From price to value: the new Italian consumer

The most significant transformation highlighted by NielsenIQ concerns the very concept of value. For more than two years, the debate was dominated by inflation; today, rising prices remain a sensitive issue, but they are no longer the only variable guiding choices. Consumers have become more knowledgeable. They compare products, brands and categories, assessing not only

how much they spend but what they receive in return. The most lasting legacy of inflation is therefore that it taught consumers to spend better, not simply less.

Price sensitivity is easing, but remains high

NielsenIQ data show that attention to prices is declining from the peaks reached in 2022–2023, in parallel with slowing inflation. It nevertheless remains above the average of the past decade. Consumers still watch prices closely, but they do not automatically seek the cheapest product:

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-  Cooling
-  Cookers



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-  Drying
-  Cooling
-  Sterilisation
-  Freezing
-  Leavening

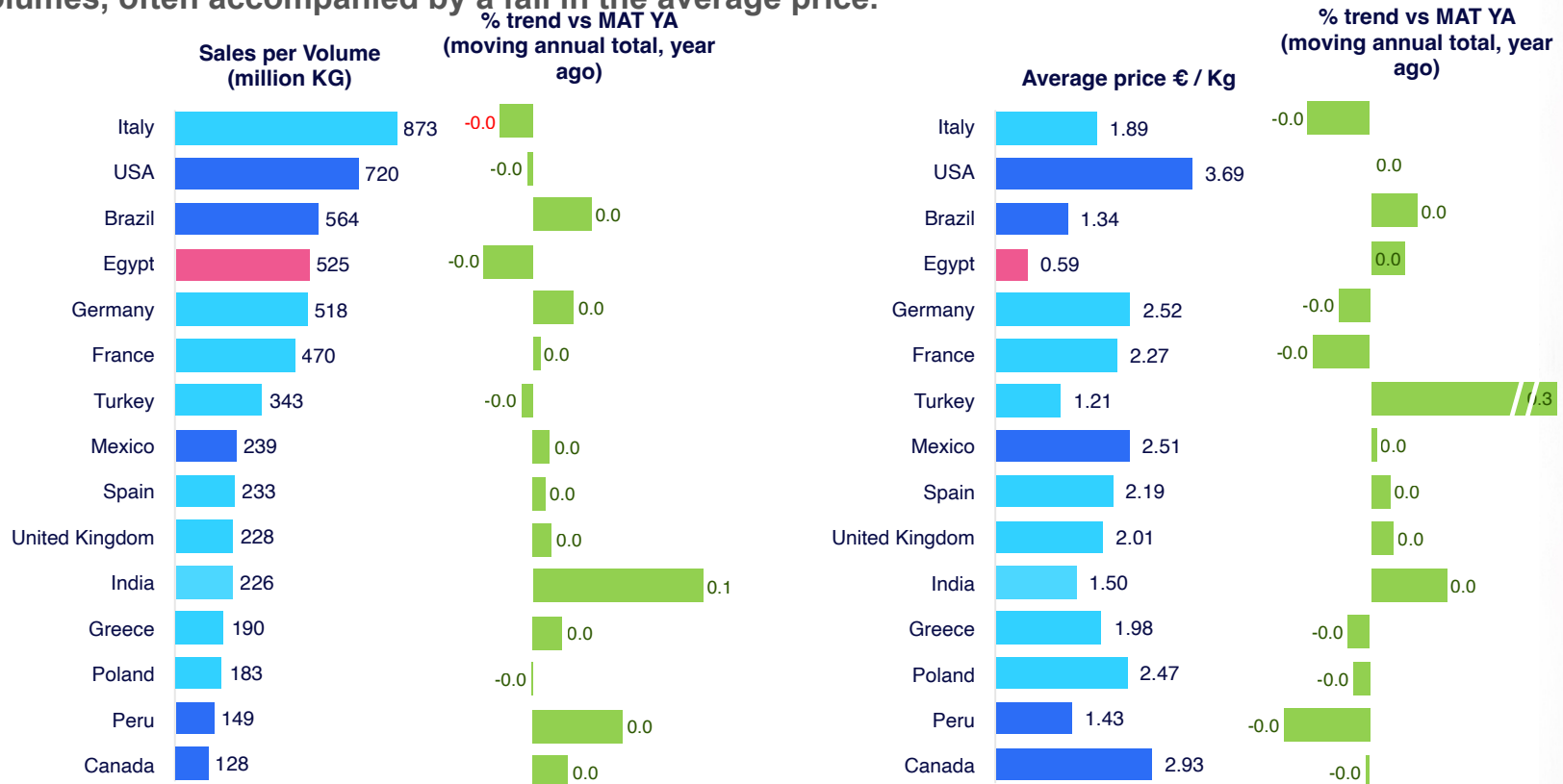


MACHINES FOR PASTA, RAVIOLI AND GNOCCHI

- Extrusion presses
- Forming machines
- Sheeting machines
- Nesting machines
- Automatic cutters
- Gnocchi machines
- Packaging machines



With the exception of Italy and Egypt, the other main countries have generally seen a recovery in volumes, often accompanied by a fall in the average price.



Source: NIQ Strategic Planner Global dataset | Total coverage of 60 countries | Year 2025

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In most of the world's major markets, pasta sales volumes are rising again, while the average price is stabilising or tending to fall. Italy is an outlier, owing to the extraordinary maturity of this sector in the domestic market.

they assess whether the price is justified by the perceived benefit.

The logic of simple saving is giving way to a broader evaluation: is it worth paying more? What tangible advantage does the product offer? Is the price consistent with the quality?

The search for value replaces the search for the lowest price

This transformation is reflected in purchasing choices. Among the most dynamic categories are products priced above their category averages: coffee capsules, Greek yogurt and skyr, nut spreads, tuna in glass jars, high-protein

products and yellow kiwifruit. These are very different segments, but all offer a recognisable benefit for which consumers are willing to pay.

Consumers do not reject premium products: they reject premium products without substance. When they perceive a real advantage in terms of quality, convenience, health, experience or taste, price becomes less central. Value is the relationship between cost and perceived benefit.

Quality, wellness and enjoyment

The categories being rewarded do not all answer the same need. Some address

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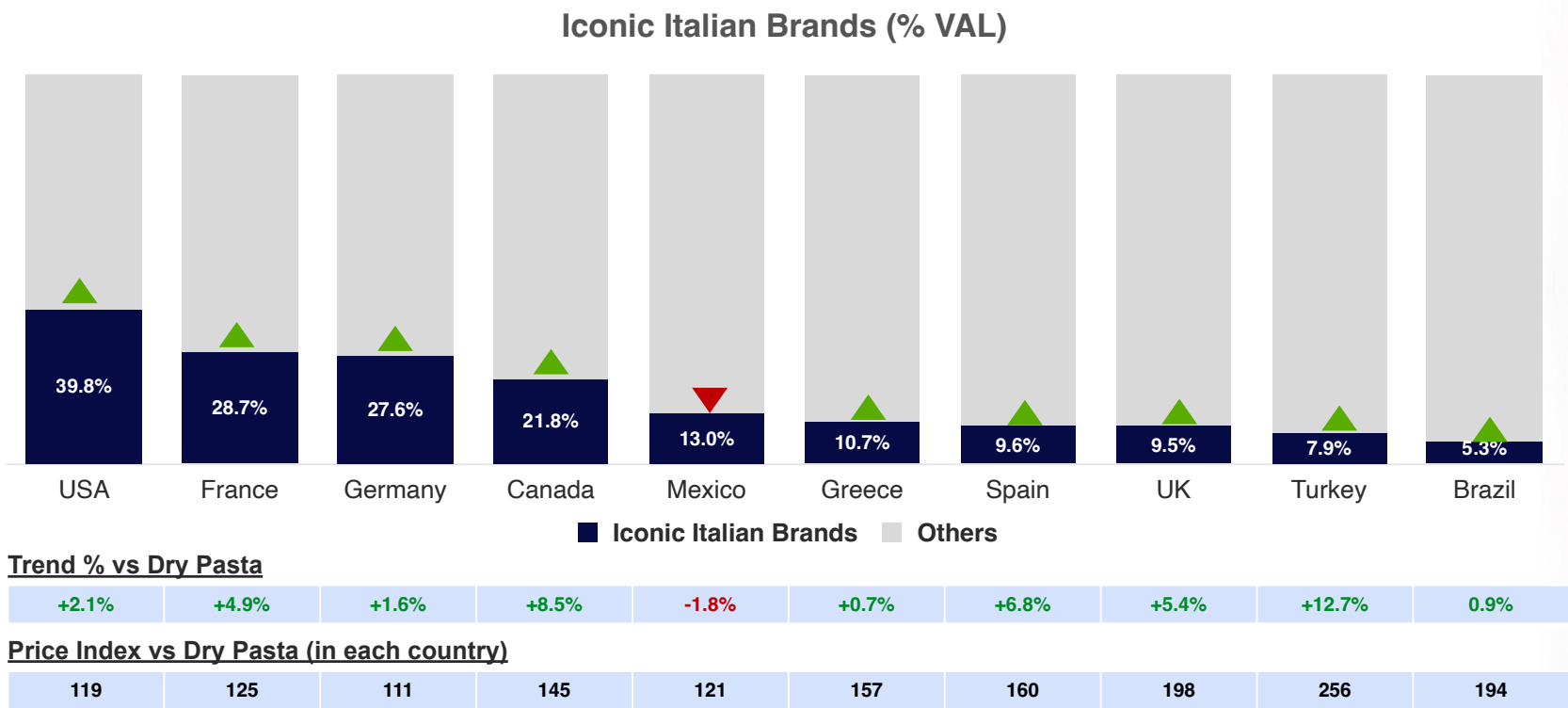
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Iconic Italian brands are performing well in all the major countries (with the exception of Mexico): their more dynamic growth in value compared with the rest of the category is helping them gain market share, consolidating their premium positioning.



Source: NIQ Strategic Planner Global dataset | Total coverage of 60 countries | Year 2025

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In the major international markets, iconic Italian brands are outperforming the category average, consolidating their premium positioning and strengthening the competitive edge of Italian-made products.

nutritional wellness, others convenience, and others enjoyment or the quality of raw materials. What unites them is their ability to create value.

For pasta, this means that raw materials, brand and price remain fundamental, but are no longer enough. Convenience, ease of preparation, nutritional profile, reliability and adaptability to different lifestyles are becoming increasingly important.

A society that continues to value food

Sinottica data cited by NielsenIQ confirm the central role of food: 51% of Italians say

that a great deal of time and attention is devoted to cooking in their household; 47% are willing to spend on food; one Italian in two prefers first courses to main courses; and around 13 million people eat pasta every day.

Food is not becoming less important, but the way it is experienced is changing. The growth of snacking, driven by fresh fruit, yogurt and nuts, expands eating occasions without replacing traditional meals. The table remains central, but becomes more varied.

For the pasta industry, the question is not whether Italians will continue to eat pasta,



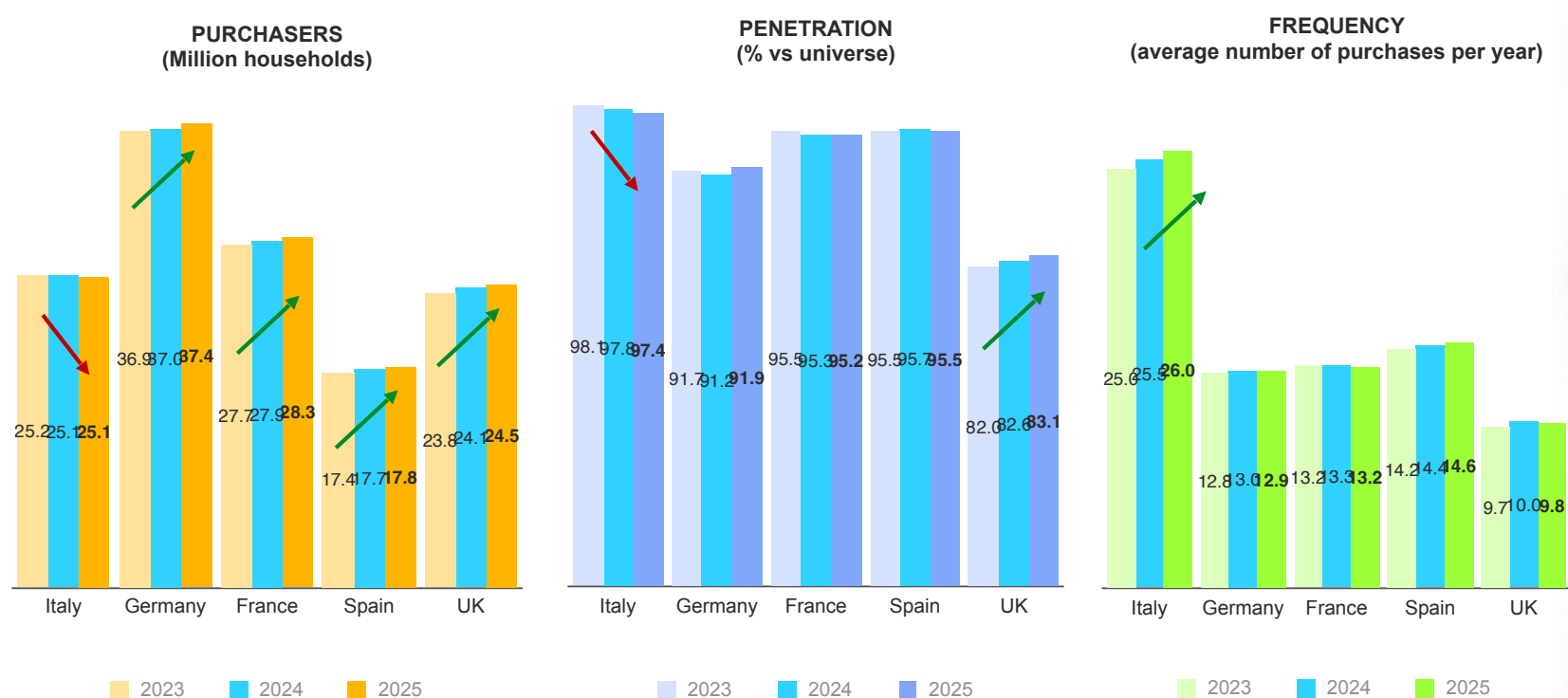
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Unlock innovation

Over the past two years, the number of Dry Pasta purchasers has increased in the main European countries, with the exception of Italy, which nevertheless maintains a purchasing frequency (every two weeks) that is double that of the others



Source: NIQ Discover IT NDH POD dataset | Year 2025

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In the main European markets, the number of households buying dry pasta is on the rise, while Italy presents a special case: market penetration for this category is already close to saturation (98.1% of households) and purchasing frequency averages 26 times a year, roughly double that of other major European countries.

but which pasta they will choose and which needs they will want it to satisfy.

to local cuisines and a wide range of consumption occasions.

Pasta goes increasingly global: a market growing beyond tradition

Pasta is no longer only an Italian symbol. Over the past twenty years it has become a global category, firmly established in the habits of consumers from different cultures, traditions and income groups. Its strength lies in this dual nature: it remains associated with Italian excellence, while also being a universal food that can adapt

A mature global market

In 2025, the global retail market for dry pasta was worth €14.7 billion and exceeded 7.2 million tonnes. Growth was moderate (+0.7% in value and +0.3% in volume), but it confirms the stabilisation of the sector following the sharp increases in raw-material and energy costs. This is not a stagnant market, but a mature one. A category already widespread across almost every continent grows more slowly because it has reached high levels



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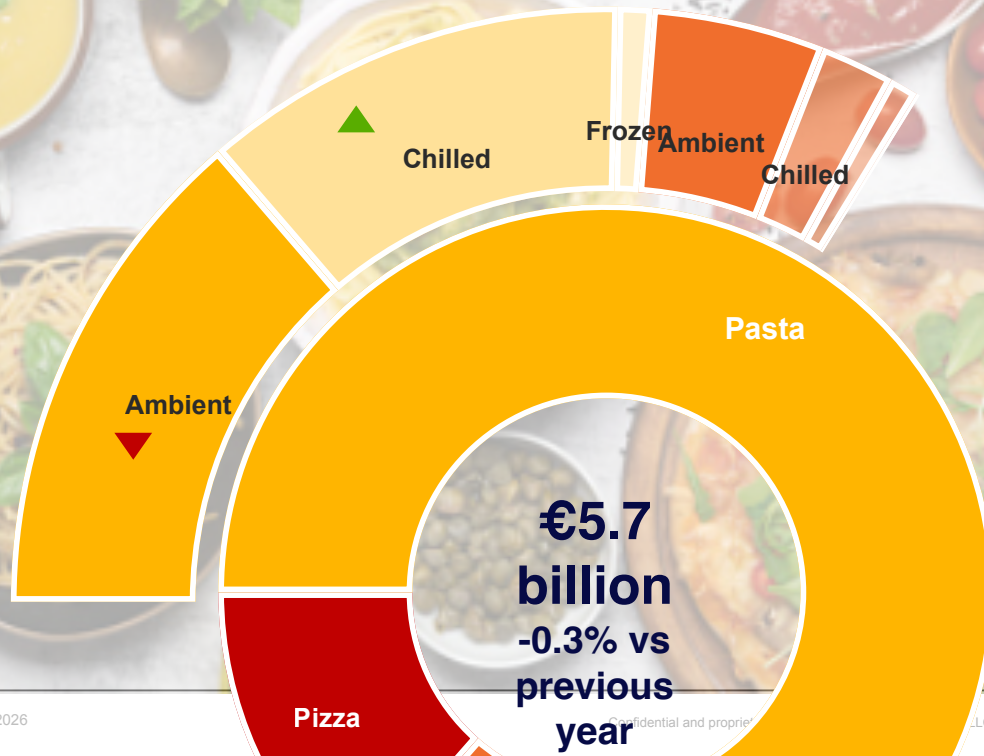
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Pasta – Queen of the Primo Piatto – a title to defend
7 out of 10 Italians say that they could never do without pasta!



67%
of the turnover of the
“Primo Piatto”
market*
is generated by
Pasta with
Sauce



€5.7 billion
-0.3% vs previous year

* Italy Retail Channel – Total Food including Discount

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Source: NIQ Discover IT NDH RMS dataset | MAT Feb 2026
NIQ Consumer Panel Service

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The Italian “primo piatto” (first course) market confirms the extraordinary central role played by pasta in the nation’s dietary habits. The high market penetration of this product category is accompanied by an increasingly diversified range of products and consumption opportunities.

of penetration. Opportunities therefore shift from acquiring new consumers to creating greater value.

Europe remains the heart of the category

With sales of around €8 billion and 3.7 million tonnes, Europe still accounts for more than half of the global dry pasta market. It is where production tradition, high per-capita consumption, major industrial groups and modern retail are concentrated.

Other macro-regions are also advancing. The Americas exceed €5 billion, while

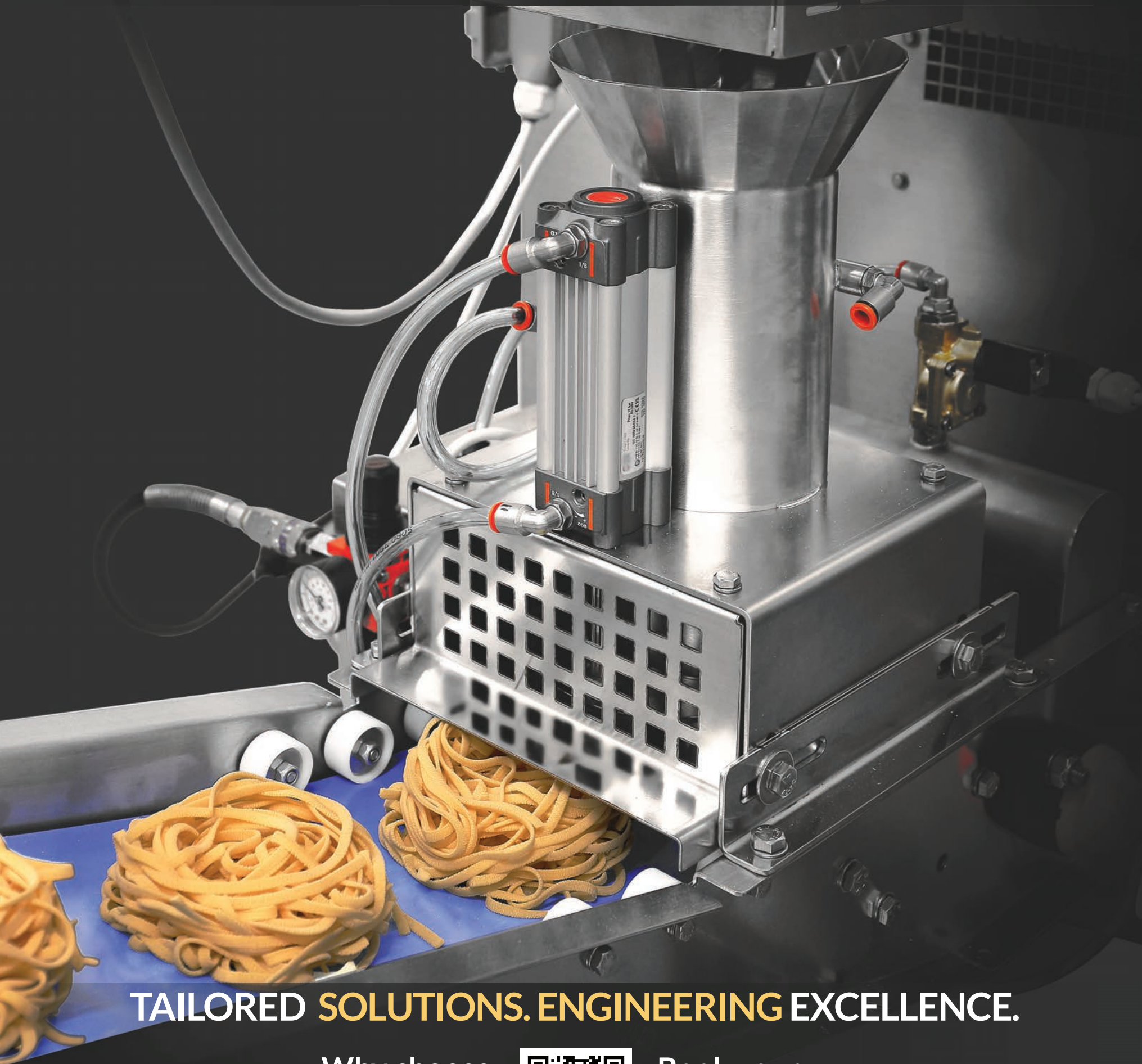
Asia-Pacific and Africa are increasing their share. This is not merely a demographic effect: tourism, foodservice, supermarkets and media are making eating habits more international, and pasta is benefiting fully from this transformation.

Growth is once again being driven by consumption

During the inflationary period, pasta turnover had grown mainly because of higher prices. In 2025, with the exception of Italy and Egypt, volumes recovered across the main international markets, often alongside a reduction in average prices.



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Growth is therefore once again being generated by real demand.

India shows the highest growth rates, confirming the potential of a still relatively young market. Brazil, Peru, Canada, Germany and the United Kingdom also record increases in quantities purchased. Italy is different: the slight decline in volumes does not indicate structural weakness, but reflects penetration and purchase-frequency levels that are already significantly higher than in other European countries.

The competitive advantage of Made in Italy

In the main international markets, iconic Italian brands outperform the rest of the category and strengthen their premium positioning almost everywhere, with Mexico the only exception.

Italian brands are not growing simply by competing on price, but because consumers assign them greater value. Italian origin continues to evoke manufacturing expertise, authenticity, culinary tradition and quality raw materials. This is an extraordinary reputational asset, but it cannot be taken for granted. Preserving it requires continuous investment in innovation, sustainability, industrial quality and the ability to

communicate the product. Made in Italy remains an advantage only if the industry continues to earn consumers' trust.

A leadership position that goes beyond volumes

Over the past two years, the number of households buying dry pasta has increased in the main European markets. Italy is the only exception, but this reflects saturation: more than 97% of Italian households already buy dry pasta. With around 26 purchase occasions per year, Italians also buy pasta roughly every two weeks, almost twice as often as consumers in the other major European markets.

Italy's real exception therefore lies not only in the number of consumers, but in the intensity of their relationship with the category. If new segments and consumption models grow in such a mature market, the change concerns not pasta's presence in Italian homes, but how it is chosen, purchased and consumed.

The first course is changing: how consumption is evolving in Italy

In Italy, the challenge is no longer to increase penetration, which is already close to the total number of households,



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but to interpret new needs, create new consumption occasions and develop higher-value segments.

The first course remains at the heart of the Italian table

The growth of snacking, less time devoted to cooking and the increasing influence of international eating patterns have not erased the role of the first course. Pasta maintains a broad presence across age groups, income levels and household types, with penetration close to universal and a very high purchase frequency.

Many traditional categories are losing relevance among younger consumers; pasta, by contrast, retains its ability to span generations. It is a cultural asset before it is a commercial one.

Pasta remains central, the way it is consumed is changing

Pasta is not losing importance: it is becoming more diverse. Today's consumer seeks simplicity and quality, speed and enjoyment, nutritional awareness and continuity with everyday eating habits. Alongside traditional formats, products offering greater convenience, innovation or nutritional specialisation are growing.

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Growth is shifting towards high-value segments

The most dynamic categories are not necessarily the cheapest. High-protein pasta, functional specialities, premium products, wellness-oriented ranges and solutions that simplify meal preparation are growing.

There is therefore room for innovation, but it must be recognisable and address a concrete need. A novelty without a perceptible benefit is unlikely to generate willingness to pay.

Demographics and new household structures

Ageing, falling birth rates and the rise in single-person households are changing purchasing and consumption patterns. Smaller households require different pack sizes and portions; older consumers may prioritise digestibility, simplicity and nutritional profile; younger generations seek versatility, speed and products aligned with dynamic lifestyles.

Demographic change does not necessarily reduce pasta consumption, but it does redefine how the offer should be designed.

Modern retail as a laboratory for innovation

The point of sale is where producers and

consumers meet and where genuinely useful innovations are rewarded. It is here that willingness to recognise greater value is measured and where trends destined to become established begin to take shape. For this reason, sell-out data do more than record what has been sold: they help anticipate how the market is evolving.

Outlook for the category

NielsenIQ's evidence portrays pasta as one of the most solid categories in food FMCG. Its strength comes from the balance between deep cultural roots and the ability to adapt to social, economic and demographic change.

In a context in which consumers seek value, quality, reliability and wellness, pasta combines attributes that few categories possess at the same time. Important challenges remain: innovation, sustainability and dialogue with increasingly informed and selective consumers. But these are not threats; they signal a new stage of market maturity.

Conclusions

NielsenIQ's analysis goes beyond a snapshot of the market and shows a sector capable of navigating one of the most difficult economic periods of recent decades without losing its central role.

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Conclusions



Trends in the food world

- In an unstable economic climate, Italian consumers remain price-sensitive but are increasingly willing to spend if they perceive value.
- The shopping basket expands... While eating habits are changing, with a focus on well-being, and new products are emerging, 7 out of 10 Italians say that pasta is a dish they simply cannot do without!



Pasta Global Overview

- The turnover of Dry Pasta sold in modern distribution channels worldwide was **€14.7 billion** (+0.7% vs. ya) in the year 2025
- In almost all the top countries, volume growth is widespread, often accompanied by a fall in the average price.
- Italian brands worldwide are driving the category's value growth



Pasta, Queen of the *Primo Piatto*

- The retail turnover related to the “Primo Piatto” in the retail channel totals to € 5.7 billion (stable), 67% of which focuses on Pasta consumed with ready-made sauces.
- The pasta category as a whole is, however, slowing down, due to the adverse effect of durum wheat Semolina Dry Pasta.
- Segments with a high focus on service and well-being (particularly gluten-free products) continue to grow, attracting households with high spending power.



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First courses generate €5.7 billion in retail sales, demand for high-value-added products is growing, and Italian brands continue to drive growth in the global pasta market. In Italy, consumers remain price-sensitive but increasingly favour products that combine quality, health and wellness benefits, and convenience.

Inflation has changed the way people shop, making consumers more aware, demanding and attentive to the relationship between price and benefit. This new attitude rewards companies that can innovate without betraying the category's fundamental values: quality, reliability, taste and simplicity. Internationally, pasta is consolidating its role as a global food, while Made in Italy retains a strong competitive advantage. In the domestic market, which is now saturated in penetration terms, the challenge is to respond to increasingly differentiated needs through products,

services and meaningful value.

The future of pasta will not depend on changing its identity, but on its ability to evolve with consumers while preserving the values that have made it one of the world's most universal foods and one of the most representative expressions of Italy's food heritage.

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Entrata raffreddatore
Cooler inlet

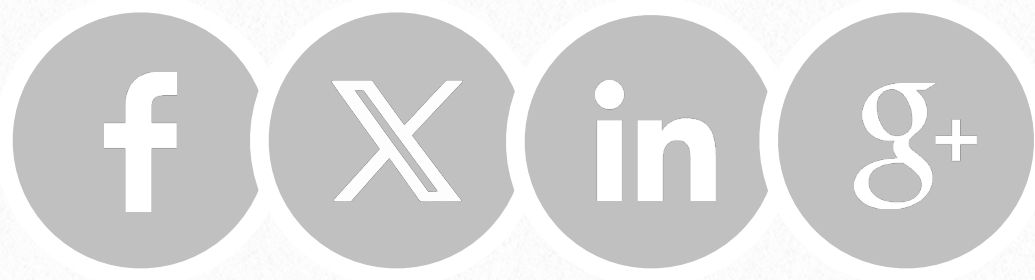


Interno raffreddatore
Inside of the cooler

Uscita raffreddatore
Cooler outlet



4



Commodity price observatory 3/2026

Pastaria Centre for Economic Research



Pastaria’s four-monthly feature on the prices of the main raw materials used by pasta manufacturers.

There has not - at least for the time being - been a new widespread surge in prices as in 2022, but the trend in commodity markets has been an upward shift in the risk bar, with energy, cereals and animal feed potentially capable of causing new tension on food supply chains over the coming months.

There are a number of unknowns and potential sources of pressure. The energy sector is once again in turmoil, with an autumn that looks set to get even hotter in terms of energy bills. European harvests have been compromised by high temperatures, hail and drought, grain prices are on the rise again, and drastically reduced fodder supplies are reshaping the entire cost structure of farms – a trend that could spill over into the food and beverage supply chains this autumn.

The first signs of this are coming from the international markets. In August, the FAO Food Price Index rose by a further 1.9% month-on-month, to 133.3 points, widening the year-on-year increase to 2.5%. The index level remains well below (-16.8%) the peak reached in March 2022, but the underlying components are all on the rise, with the cereals index up 2.2% over the past month and back at its highest level since May 2024.

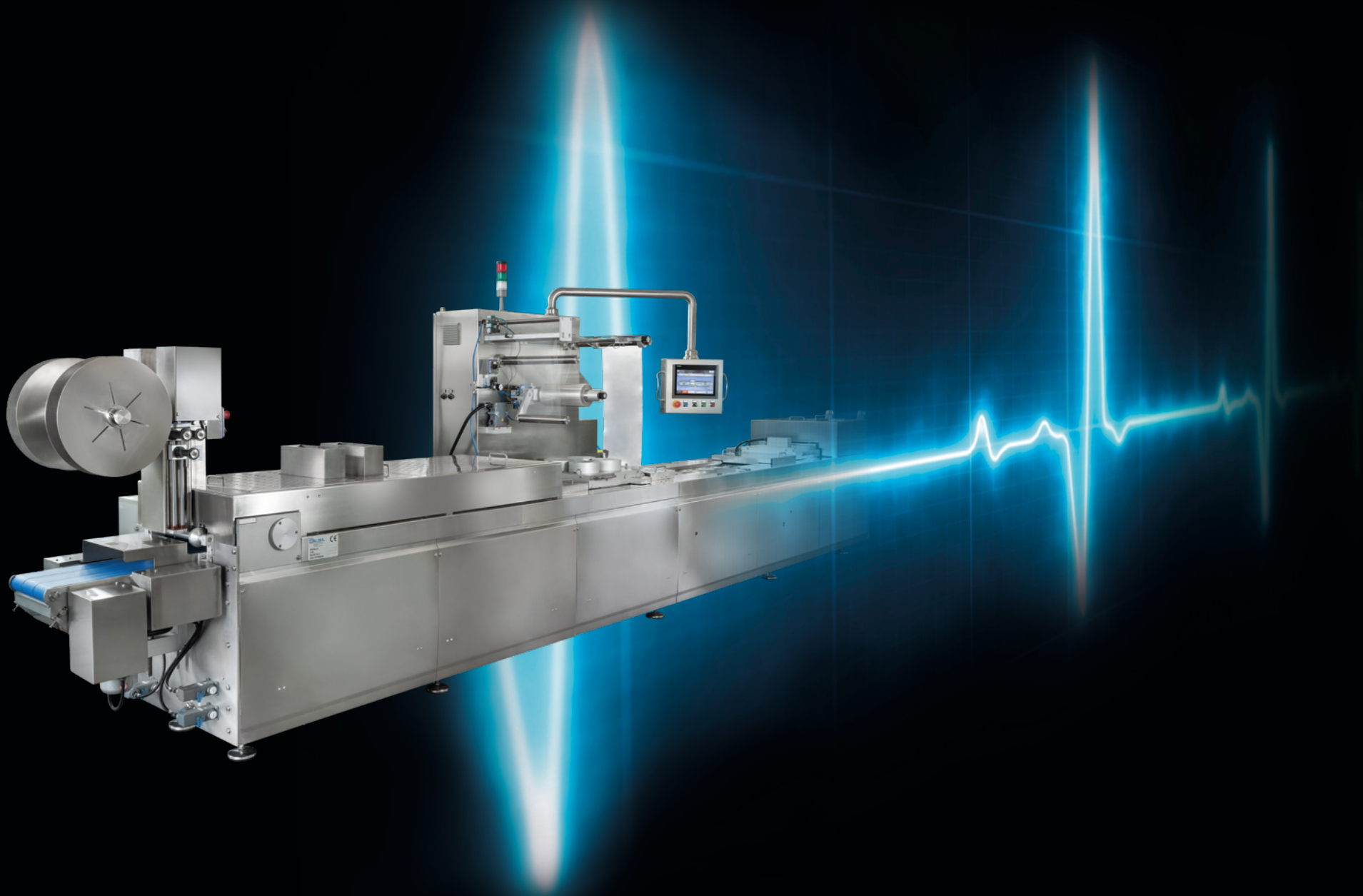
Prices have been driven upwards by the escalation of tension in the Black Sea, resulting in severe restrictions on maritime traffic, by the damage caused by heatwaves, and, in the case of maize, by concerns about the dry weather in certain parts of the US Corn Belt, as well as in Europe.

These signs are confirmed by the prices observed on international benchmark markets. In August, American hard red winter wheat reached \$330 per tonne FOB, 6.5% higher than in July and 42.8% higher than in the same month of 2025. US No. 2 Yellow maize has risen to \$224 per tonne, representing a 5% increase month-on-month and a 20.8% increase year-on-year.

August also saw some significant fluctuations on Italian markets, with domestic soft wheat (fine varieties) jumping to €240/tonne, up almost 8% on July, and high-protein durum wheat from the north climbing to €292.5%, up 3.4% on the figures a year ago.

Weather remains the key factor in assessing the situation between now

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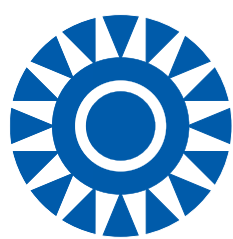
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PRICES AND TRENDS OF CERTAIN FOOD RAW MATERIALS (AUGUST 2026)				
National fine common wheat	Price (€/ton)	Monthly variation	Annual variation	Forecast
	240	7,9%	-0.2%	▲
Fine durum wheat from North Italy	Price (€/ton)	Monthly variation	Annual variation	Forecast
	292.5	0%	3.4%	▲
00 type common wheat flour	Price (€/ton)	Monthly variation	Annual variation	Forecast
	485	1%	-3%	▲
Semolina above min. leg. req.	Price (€/ton)	Monthly variation	Annual variation	Forecast
	527.5	0%	-5.4%	=
Eggs M	Price (€/100 pcs)	Monthly variation	Annual variation	Forecast
	22.3	9.2%	15.1%	=
Pork hams for Prosciutto 12 kg and over	Price (€/kg)	Monthly variation	Annual variation	Forecast
	4.95	5.3%	-1.2%	=
Beef – veal meat half-carcass, prime quality	Price (€/kg)	Monthly variation	Annual variation	Forecast
	7.76	-3.6%	0.6%	▲
Raw milk	Price (€/100 kg)	Monthly variation	Annual variation	Forecast
	44.5	-5.7%	-24.9%	=
Centrifuged butter	Price (€/kg)	Monthly variation	Annual variation	Forecast
	3.98	1.8%	-43.1%	=
Grana Padano aged for 9 months or more	Price (€/kg)	Monthly variation	Annual variation	Forecast
	9.8	1.7%	-10.3%	▲
Extra virgin olive oil	Price (€/kg)	Monthly variation	Annual variation	Forecast
	4.55	0%	-52.8%	▼
Source: Centro Studi Economici Pastaria elaboration based on various data sources. Grain, flours and semolina: Granaria, Bologna; Eggs: CCIAA, Forlì; Pork and beef: Commodity Exchange, Modena; Milk, butter and Grana Padano: Commodity Market, Milan; Olive oil: CCIAA, Bari.				



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PRICE MONITORING				
FAO Food Price Index	Price (2014-2016=100)	Monthly variation	Annual variation	Forecast
	133.3	1.9%	2.5%	▲
Hard Red Winter US Gulf port	Price (USD/ton)	Monthly variation	Annual variation	Forecast
	330	6.5%	42.8%	▲
Mais, U.S. No. 2 Yellow FOB US Gulf port	Price (USD/ton)	Monthly variation	Annual variation	Forecast
	224	5%	20.8%	▲
Fao Food Price Index, Hard Red Winter, Mais: August 2026				

and autumn. In August, the Mars Bulletin, published by the European Commission’s Joint Research Centre, already reported a significant deterioration in the outlook for the 2026 summer season. The revision of yields, revised downwards again following the July adjustments, shows figures below the five-year average for all summer crops monitored in the EU, with deviations of up to -14% and more significant losses for maize and soya, which have suffered severely not only from high temperatures, but also from the effects of the prolonged water shortage.

In the European Union – based on the latest assessments by analysts and research centres – the maize harvest is expected to be around 50 million tonnes, if not even lower, with losses of over 35% in France, a leading producer that has seen its output significantly reduced. A poor European harvest, which is now a

certainty, will force the EU-27 to rely more heavily on imports, albeit at higher costs due to the effects of deglobalisation brought about by restrictive policies on world trade and geopolitical crises.

It should be noted that this summer’s scorching heat has taken a heavy toll not only on maize, but also on grassland and pastures across large areas of Western and Central Europe. The combined effect of reduced availability of maize and forage, increased reliance on commercial feed and higher energy costs could exert growing pressure on production costs in the coming months, particularly for dairy products, eggs and meat, and especially beef and poultry, which are currently in greatest demand amongst European consumers.

Some alerts are already appearing in Chamber of Commerce bulletins. In August, the price of Category M eggs

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recorded in Forlì-Cesena reached €22.30 per hundred, a rise of 9.2% over the month and more than 15% compared with August 2025. Pork (fresh pork leg for prosciutto) has risen by 5.3% since July. Although beef prices have fallen slightly over the past month, they remain at historically high levels. The risk of a new bull market is not confined to Europe: in the United States, years of drought, wildfires and high animal feed costs have reduced cattle herds to their lowest levels in the last 75 years, creating a structural supply shortage that continues to prop up prices, just as in Europe.

There is also a second channel of transmission that regards energy. The World Bank's Pink Sheet (monthly commodity price bulletin) shows that, following the pullback in July, oil prices took a sharp turn upwards (+5.7%), while natural gas prices surged again (+10.1%) just one month later. The outlook remains alarming, with the World Bank Outlook projecting an average 24% rise in energy prices for 2026 – the highest since 2022 – and a 16% increase in commodity prices.

These challenges facing European agriculture mean that a difficult autumn lies ahead. Gas, in particular, not only affects energy bills, but is also one of the

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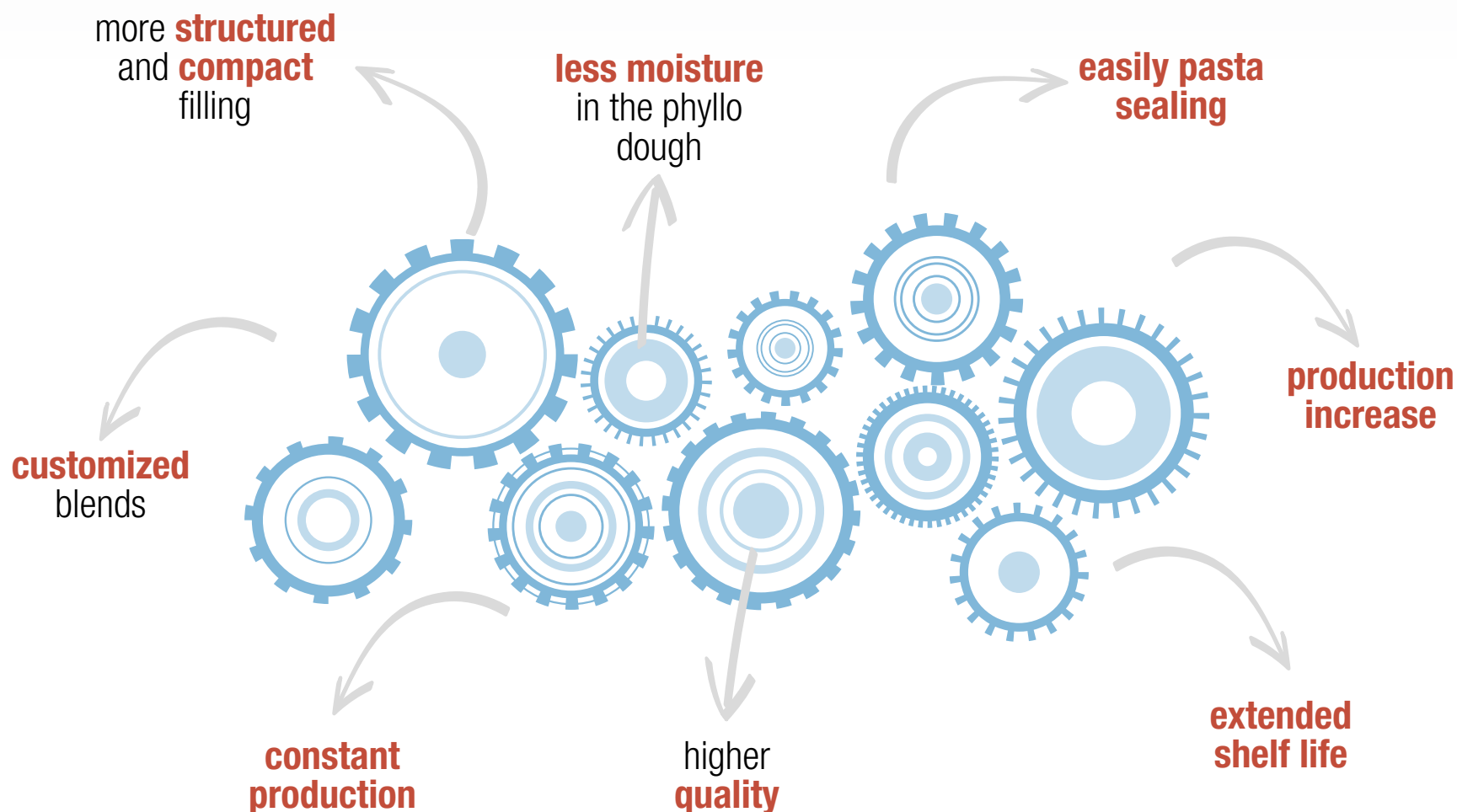
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main factors determining the cost of nitrogen fertilisers, the price of which rose until June and may face further price pressure in the autumn. In Italy, this problem is compounded by the sharp rise in the price of diesel – now more expensive than jet fuel – resulting from the halt in supplies from Russia and reduced domestic refining capacity.

At least for the time being, the inflationary factor does not affect all sectors of production. Milk and dairy products continue to undergo a correction. In August, spot prices for Italian milk were around 25% lower than a year earlier, churned butter 43% lower, and Grana Padano more than 10% lower.

Even more telling is the case of extra virgin olive oil, which has fallen to around €4.55/kilo on the Baria market – less than half the €9.64 price recorded in August 2025. This sudden fall follows two years of severe pressure caused by supply shortages in Spain, which pushed prices to record levels. Developments between now and the end of the year will depend on the outcome of the new olive harvest, amidst uncertainty regarding weather conditions that could compromise yields and quality, but could also lead to a recovery in the autumn, more than two months after the start of the harvest.

Generally speaking, price trends in Europe

will be influenced by three key variables.

The harvest outlook is the most critical factor, but we must also consider developments on energy markets and the ability of EU countries to offset production shortfalls with increased imports, without paying an excessive premium to international suppliers.

These are factors that could potentially lead to a further squeeze on the margins of agricultural businesses. With a few months' delay, this scenario could feed through to downstream stages, ultimately driving up the final cost of food and the cost of living – a trend that the ECB in particular fears may see a more pronounced resurgence as early as the next few months.

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