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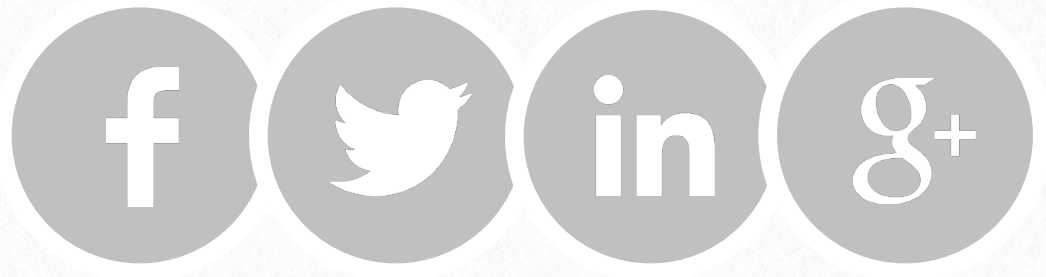
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1



Wheat-pasta, data responding to price transmission mechanisms

Pastaria Centre for
Economic Research



The different timing that marks price formation processes and the consequent inflation transmission mechanisms are endemic factors of economic systems which require a greater accuracy when assessing related phenomena, particularly during supply shock phases, the most atypical ones.

In the wheat-pasta supply chain, where one agricultural and two industrial productive components operate, respectively represented by the milling industry and by pasta manufacturers, price dynamics, as well as responding to non-homogenous variables, follow a consequential timing, given by manufacturing processes that are not concurrent with those for acquiring the raw materials or semi-finished products. In the case of pasta manufacturers, supplies, whether of durum wheat or of semolina flours, generally occur in advance, also in response to markets logics, which in turn depend on pricing expectations and on technical-based choices imposed by manufacturing programs and by the storage capacity of each business.

The same considerations hold true for the offer which, in the case of bullish price expectations, is often accompanied by retention phenomena, a frequent occurrence in raw material markets where financial players also operate for purely speculative purposes.

Given this background, on the basis of Chamber data we can note that the recent falls in prices of durum wheat in the national exchanges mirror a condition of increased supply pressure, also driven by the onset of threshing operations, within a context where harvests have a favourable outlook. The precise opposite of the position detected during the first half of last year, which on the contrary was characterised by a reduced availability of grain on a global scale, mainly caused by the gap of the Canadian offer (the reference is to the 2021 crop failure in Ottawa, which in addition to being the world leader in production is also the main exporter of durum wheat).

In June 2022, when the prices of durum wheat reached the all-time high of 580 euro/ton on the Foggia exchange (the reference is to the “fine” variety, with protein assurance), the price comparison on an annual basis showed an increase of over 90% for the agricultural product. The evidence six months earlier, at the beginning of last year, was also similar, in a market already fully tense due to the imbalance between demand and supply (the conflict in Ukraine

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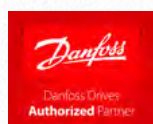
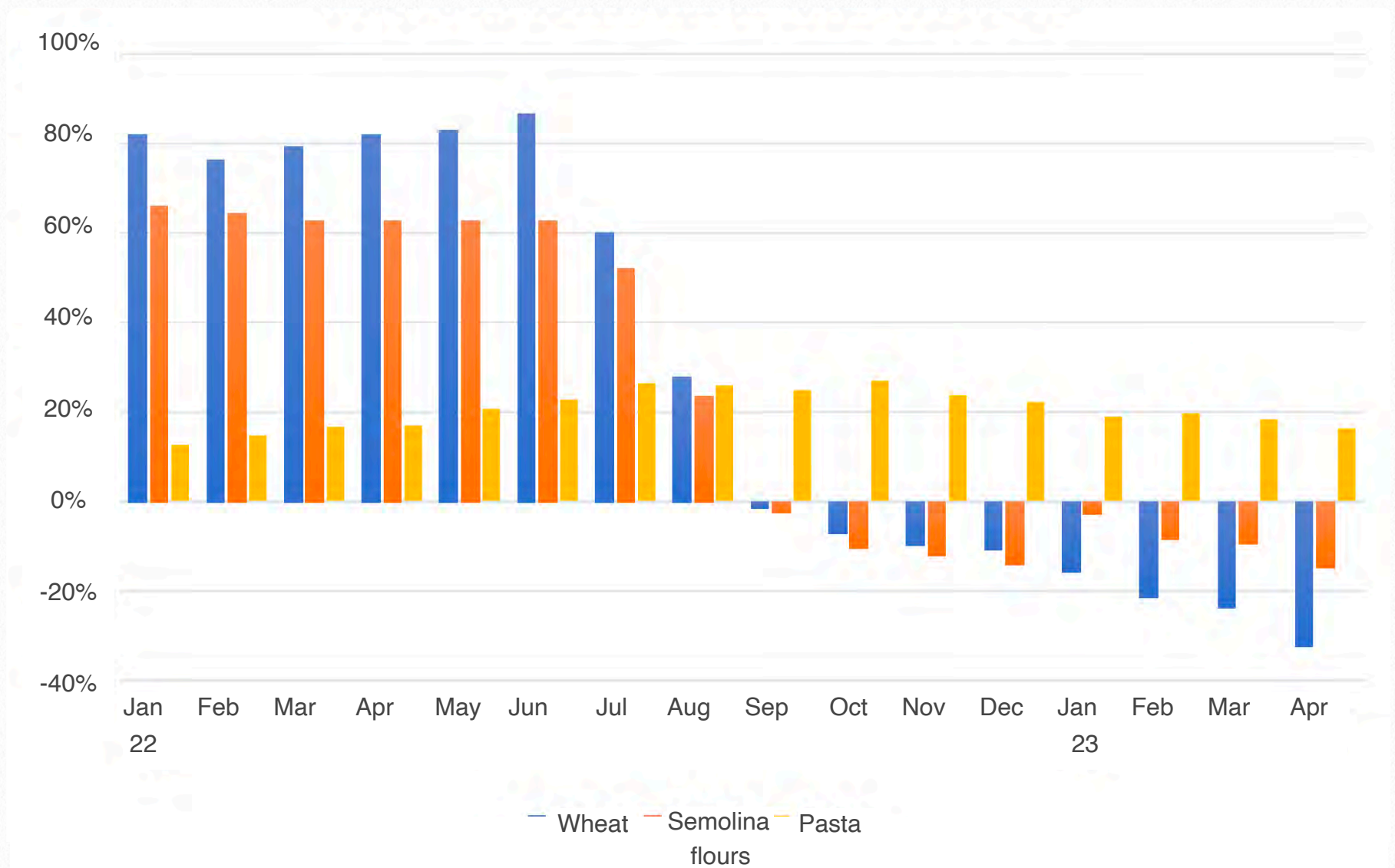


Chart 1 WHEAT, SEMOLINA FLOURS AND PASTA: PRICE TREND CHANGES



Prices of durum “fine” wheat on the Bologna Commodity Exchange (product with min. protein content 13.5%); prices of semolina on the Bologna Commodity Exchange (product with characteristics higher than the legal minimum - min. protein content 13.5%); variation trend of the ISTAT index of consumer prices for pasta (NIC Index, base 2015=100).

Source: Pastaria Centre for Economic Research based on data from ISTAT and the Bologna Commodity Exchange

had not yet blown up), with a price difference which already exceeded 80% compared with January 2021. At that time, durum wheat was traded on the Bologna commodity exchange at around 540 euro/ton, against the 297 euro of the year before. Still in January, the ISTAT surveys on consumer prices of pasta products (NIC index for the entire national

community) certified a year-on-year increase of 12.5%, far from the plus 80% of wheat, which evidently incorporated “ex-factory” price adjustments, given by the increase in raw materials already on-going from Autumn 2021, and by the first knock-on effects in the large-scale distribution points of sale. In sync with grains, semolina flours on the



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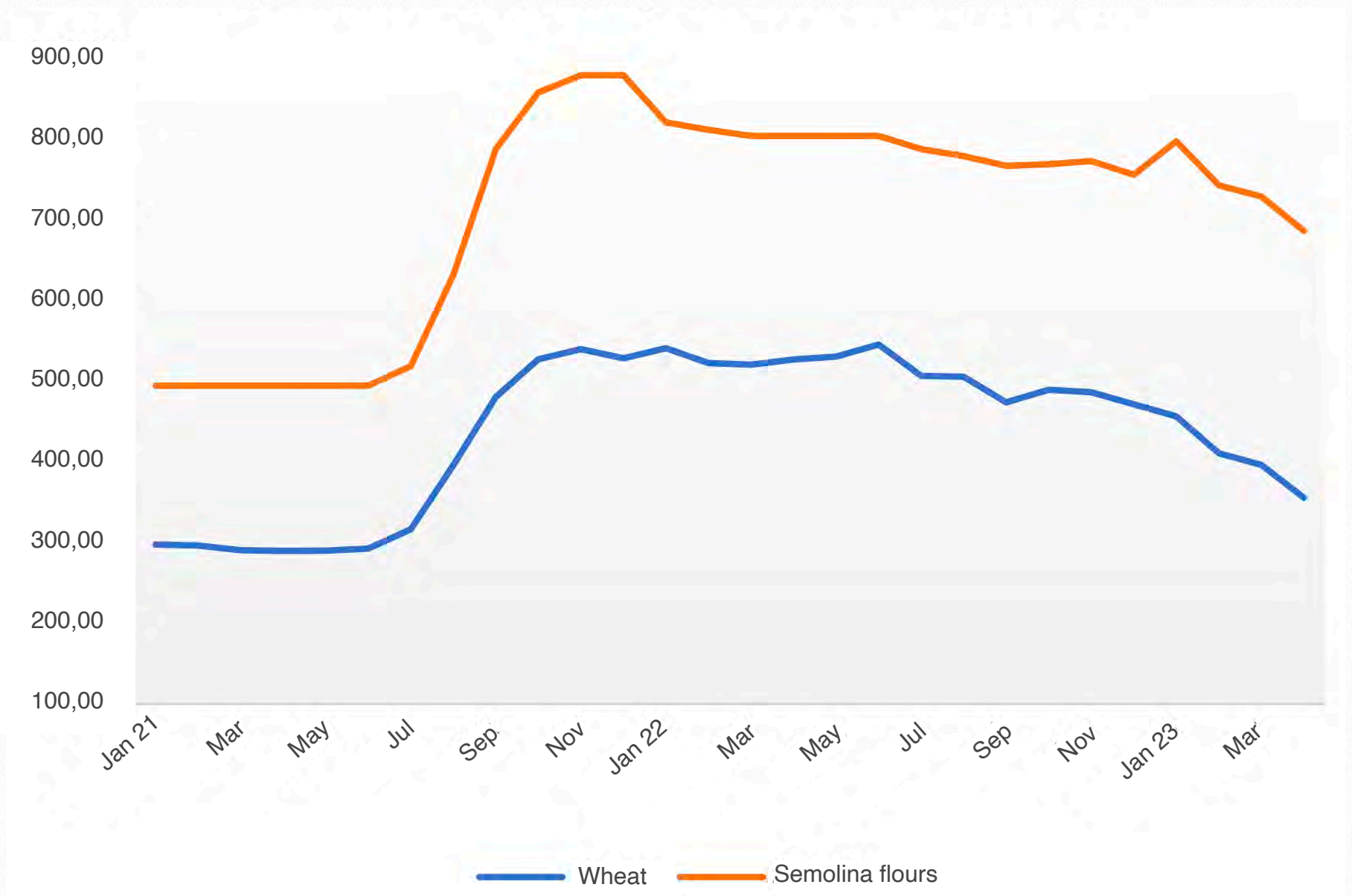


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Chart 2 DYNAMICS OF WHEAT AND SEMOLINA FLOURS PRICES (€/TON)



Prices of durum “fine” wheat on the Bologna Commodity Exchange (product with min. protein content 13.5%); prices of semolina on the Bologna Commodity Exchange (product with characteristics higher than the legal minimum - min. protein content 13.5%).

Source: Pastaria Centre for Economic Research based on data from ISTAT and the Bologna Commodity Exchange

other hand, were traded at plus 66% on an annual basis in January 2022. In this regard, the comparison between the trend variations of wheat and semolina flours (still based on the Bologna exchange index) shows growth rates for the latter constantly lower than those of the raw material up to August. A price trend reversal for both products is noted from

September, but in this case a more significant downturn (after the tension) emerges up to December for semolina flours compared with durum wheat, a reversal to the disadvantage of grains in the first quarter of 2023.

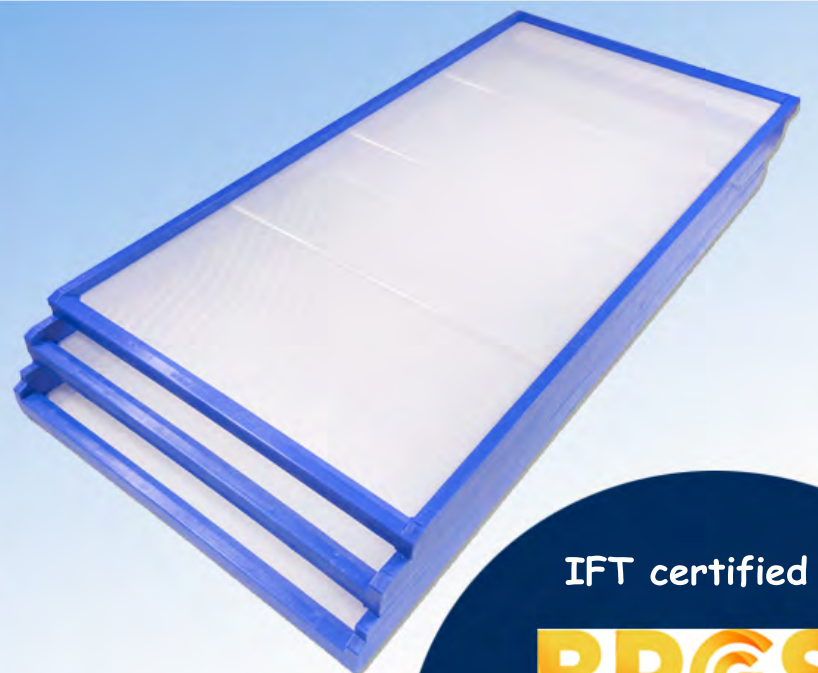
It should be noted that the time shift – which does not characterise, as we have said, the relations between wheat and

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semolina flours, given the basic simultaneity of the raw material price movements and of the milling industry product – is seen in the price forming processes for pasta products, due to the effect of the already mentioned, and reasoned, different timing in supply and manufacture.

The peak consumer price increases of pasta products occurred in October last, when the variation trend of the ISTAT index marked a plus 26.8%, incorporating a more decisive increase of “ex-factory” prices. The situation was that (and the memory is not a long-gone one) of triple-digit energy costs and of the domino effect on the prices of packaging and transport. A stress that affected all exchange phases, from the agricultural one, mainly subject to fuel and fertiliser increases, to the industrial ones, pressured mainly by the high costs for energy and for the supply of raw materials.

In themselves, the data are therefore eloquent: the time lag between the increases in wheat and in semolina flours noted during the preceding months and those (belated) of pasta is symmetrical to the current movements, which, conversely reward pasta products, still increasing (even though the growth of consumer prices has “lightened” in April by 10 points compared with the October peak), and

penalises the agricultural raw material which, still in April, gives up more than 30% on an annual basis (for semolina flours instead the drop was about 15%). The proof of the loss of synchronisation destined to run out in just a few months, as already experienced for the double digit increases, first of grains and then of pasta, recorded during the pre-crisis bubble of 2008-2009.

For the future, except for exogenous shocks (attention is mainly paid to the developments of the conflict in Ukraine), the consumer prices of pasta products will follow the reduction path that has now been on-going for five months. The prices of wheat (and of semolina flours, closely linked to the raw material) could still be affected by the imbalance of the fundamentals, albeit within a phase of lower pressure costs for all players in the supply chain. A consideration that leads off also from the good prospects for the Canadian and European productions and from the lower import needs of North African countries, where the entire area should have better crops available this year compared with the previous season, heavily affected by drought.



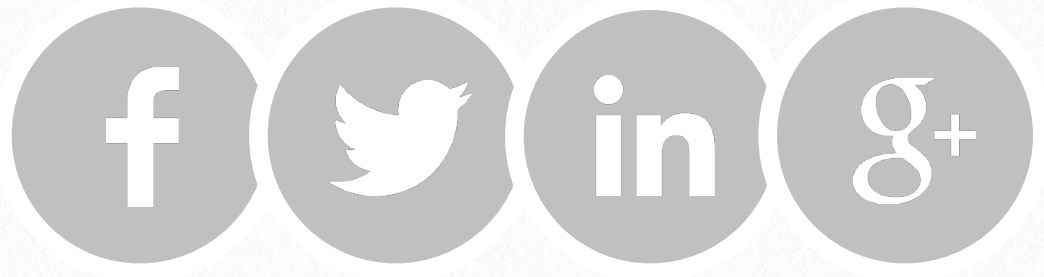
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2023 Meeting of the National Pasta

Association: a bright future for a resilient industry

Editorial staff



Nora Stabert (Philadelphia Macaroni Company) and Carl Zuanelli (Nuovo Pasta Productions), respectively new president and outgoing president of the National Pasta Association

The Annual Meeting of the National Pasta Association, which brings together American pasta makers, came to a successful close in a general climate of confidence. Pastaria was there for this important event.

Resilient and bright. These are the words used by Carl Zuanelli, chair of the National Pasta Association, to describe the pasta industry and the future of the product, respectively, in his impassioned opening speech at the Annual Meeting of the American association, held from 19 to 21 March at Ponte Vedra Beach in Jacksonville, Florida.

Zuanelli noted that the industry's resilience – i.e. the capacity of a system to adapt to change, make adjustments, and return to its original state following adverse situations and disturbances – has been proven by its response to numerous attacks repeatedly seeking to undermine the fate of this exceptional product, dating back almost a century to Filippo Tommaso Marinetti's *Manifesto per la cucina futurista* (Manifesto of Futurist Cooking), which called for an “abolition of pasta, that absurd Italian gastronomic religion”.

Recently, over the past 18 months, new attacks have taken the form of ingredient and equipment cost pressures, and the challenges involved in procuring them. Adverse situations that are not, therefore, tied to consumer disaffection and a decrease in demand, which, on the contrary, has remained high.

The challenge faced by the pasta industry has been to meet increased consumer demand.

Zuanelli continued by observing that the general reduction in gross margin, profits, and investment capacity has inevitably affected the production sector, which adapted to survive. This resulted in a gradual return to normal margins, allowing the sector to move towards a prosperous future.

The challenges of the transition

The United States is the country with the “highest quantitative consumption of pasta per year (albeit not per head [...]. Though we will continue to work towards achieving this accolade too...)”.

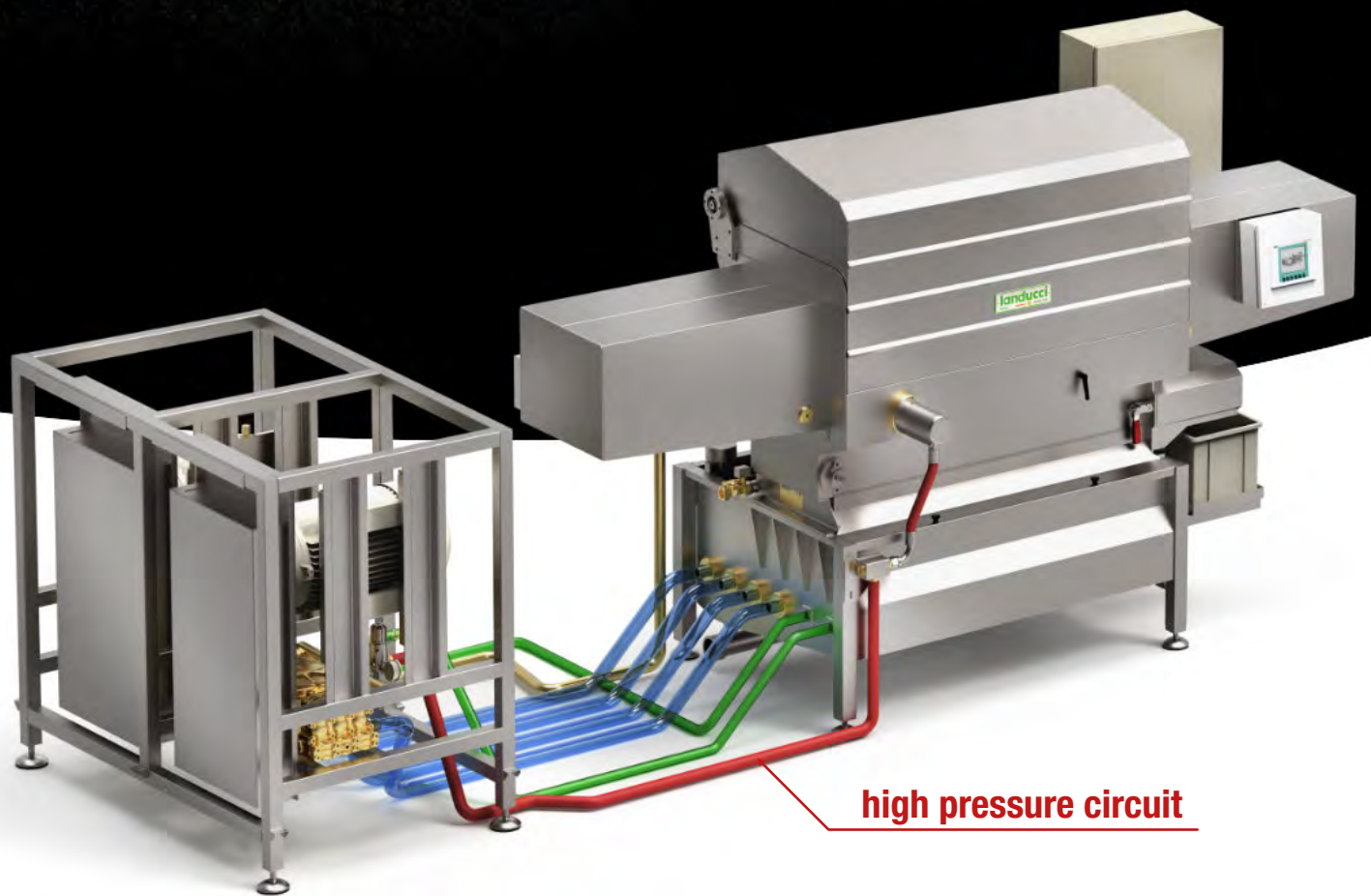
For the industry and this exceptional market, however, the time has come to “transition”.

Speaking at the Annual Meeting of the NPA, Zuanelli noted that an initial transition involves working to understand the new pasta consumer: the Millennial.

“This new target consumer demographic is no longer a ‘hyper carbo-phobic consumer’”. This new generation “is more informed and understands the need for complex carbohydrates in the diet” and appreciates “the virtuous culinary aspects and economic benefits of pasta”.

“This consumer is interested in elevating their at-home cooking experience, while

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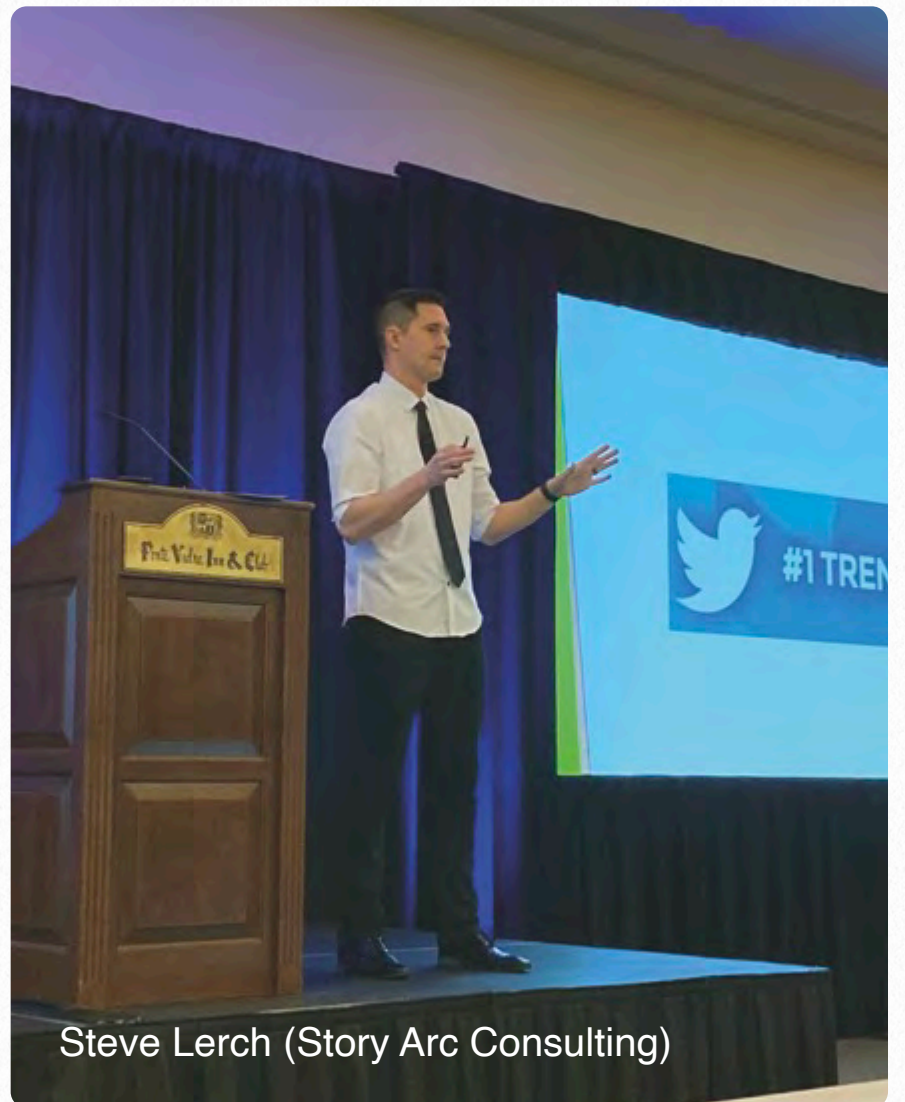
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Carl Zuanelli (National Pasta Association) at the opening of the meeting



Tom Quinn (Nuovo Pasta Productions)



Steve Lerch (Story Arc Consulting)



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This is why “the pasta industry is now poised once again to take its rightful place at the centre of dining tables across America, to be celebrated once again!” Zuanelli asserted.

A second transition involves the National Pasta Association directly, and relates to the rotation of its presidency.

After two terms and four years as chair, Carl Zuanelli officially hands over to Nora Stabert, director at the Philadelphia Macaroni Company, a historical family-run American pasta factory, and the first woman to hold the prestigious role at the NPA.

“This smart, talented and extremely capable young person will help lead the National Pasta Association into its bright future”. Nora Stabert will be supported by the new Vice Chair, Jeff Shriver of 8th Ave Foods, “a professional with extensive and well-established knowledge in the field, who has worked with an iconic American pasta brand that boasts a longstanding history”.

Concluding his speech, Zuanelli reiterated that the future is bright for pasta, while cautioning the pasta industry not to repeat

the mistakes of the past as regards communication.

It will be important to encourage pasta consumption not on the basis that “it’s not harmful”, but instead by drawing on language and concepts that promote the many qualities of this exceptional product: its nutritional characteristics, cost-effectiveness, and convenience, as well as its infinite culinary properties.

“I will be eternally grateful for my time as Chair of the National Pasta Association and I promise to be here to serve this organization as an engaged Board Member for a long time to come”, Carl Zuanelli concluded.

A rich training programme and popular opportunities to socialise

The three days at Ponte Vedra Beach allowed the many sector professionals in attendance (especially those from the United States and North America, but also some from South America and Europe) the opportunity to attend a number of interesting presentations by experts in the field.

In addition to Carl Zuanelli, taking their turn on stage were Tom Quinn (Nuovo Pasta Productions) with a presentation entitled *NPA Government Affairs*

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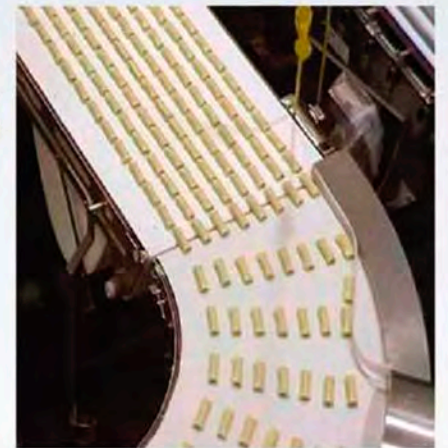
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From the left, Claudio Zanão, President of ABIMAPI (Associação Brasileira das Indústrias de Biscoitos, Massas Alimentícias e Pães & Bolos Industrializados) and Carl Zuanelli, outgoing National Pasta Association President.



From the left,, Giacomo Tosi (Landucci) and Esteban Abascal (Interamerican Foods Corporation - La Moderna USA)



From the left, Samuele Palagiano (Pasta Technologies Group) and Yosé Amin (Fiori Bruna)

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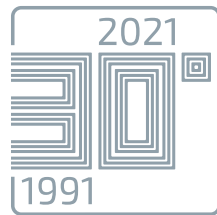
The bocce tournament

Committee Update: Standards of Identity; Chris Kuehl (Armada Corporate Intelligence), which the presentation *2023 Economy Outlook: What now? Recession, recovery or another black swan?*; Steve Lerch (Story Arc Consulting) with the presentation *Understanding and Influencing Modern Consumers*; Diane Wlelland (NPA) and Renee Mellican (Winland Foods) who offered a detailed look at the communications programme of the National Pasta Association; Jim Peterson with the presentation *2023 World & U.S. Durum Situation*; Jenni Harrington (Bühler North America), with her report on *Pasta Solution Trends Using Novelty Ingredients*; and Gary Kushner (Hogan

Lovells US) with a *Legislative & Regulatory Update*.

Also part of this recent meeting were the especially-popular sessions providing the opportunity for managers from the production sector and supplier companies to meet and discuss.

In addition to individual encounters and training opportunities, as always, the meeting agenda also included a number of opportunities – such as golf and bocce – for relaxation and entertainment, but equally as useful for networking.



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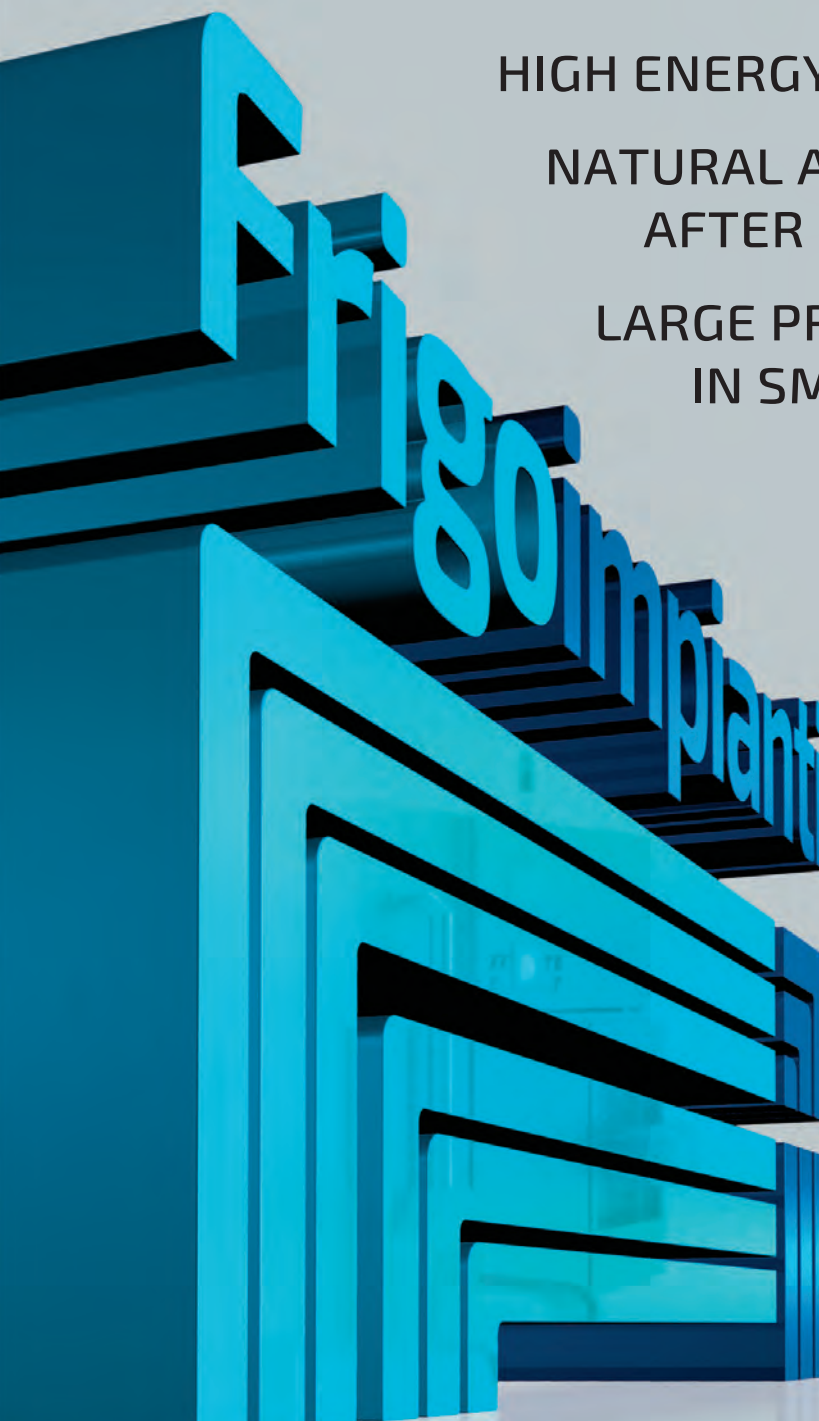
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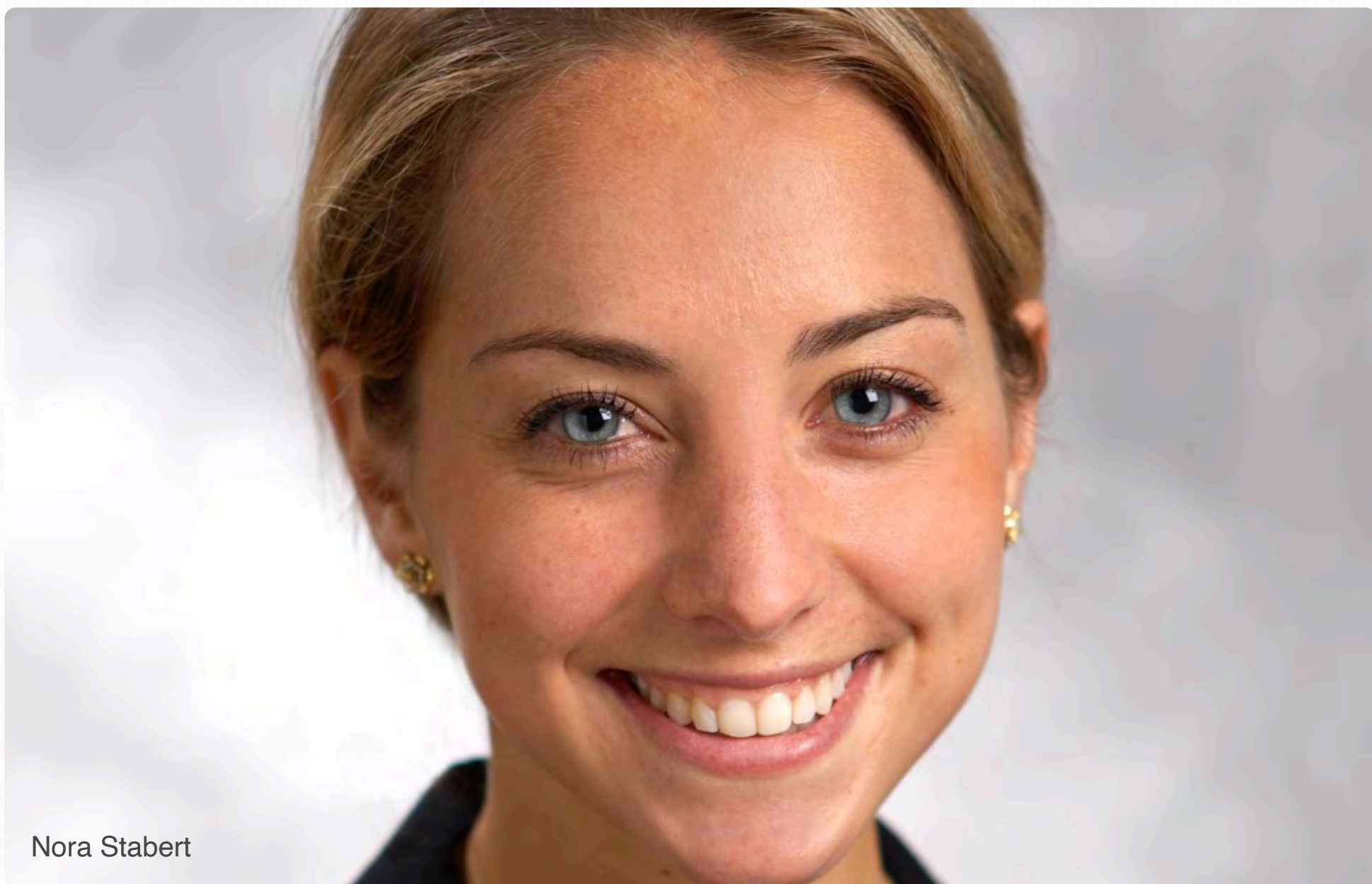


3



The future of pasta and the challenges of the National Pasta Association according to Nora Stabert

Editorial staff



Nora Stabert

A few weeks after her election as president of the National Pasta Association, the association of pasta producers in the United States, Nora Stabert (Executive Vice President of the Philadelphia Macaroni Company) gave Pastaria the interview published in these pages.

Nora Stabert, your role as chair of the National Pasta Association (NPA) is one of major responsibility. How are you feeling?

It is such an honor to take on the role of chair of the NPA, and I am thankful for the opportunity to bring my own strategic perspective to the association. After serving as Vice Chair and working alongside Carl Zuanelli, my predecessor and CEO of Nuovo Pasta Productions, I look forward to building on the progressive momentum he built over the last four years. I have a long connection to the NPA through my family's generations of involvement – my grandfather (Luke Marano Sr.), uncles (Luke Marano Jr. and Mark Marano), father (Bill Stabert), and brother (Sam Stabert) have all been members and advocates of the NPA. It is a very special to fulfill the role of Chair after feeling a deep connection to the NPA through my family's history in the industry.

You are taking the baton from Carl Zuanelli – what is your assessment of the work done by your predecessor?

In his time as Chair, Carl established an incredible, productive momentum to transform the NPA into the organization it is today. I am ready, along with Jeff Schryver (NPA Vice Chair, VP of Pasta Operations at 8th Avenue & Provisions)

and Jim Meyer (NPA Treasurer, President of Italgrani, USA), to build on Carl's progress and advance the NPA's mission to being a valuable industry resource and advocate. I sincerely appreciate Carl's thoughtful leadership and commitment to the association, and I know that he will be a valuable resource for the NPA for many years to come.

What are the forthcoming, most important challenges that the National Pasta Association must address?

Over the last 3 years, the pasta industry has faced a confluence of pandemic-driven demand variations and supply chain disruptions. The NPA has a responsibility to deliver on its role as industry advocate to equip our membership with the network, information, advocacy, and support for a more relevant, resilient, and robust pasta industry.

In his opening speech at the NPA Annual Meeting, your predecessor, Carl Zuanelli, predicted a bright future for pasta. Do you agree?

Carl Zuanelli predicted a bright future during his opening NPA speech which speaks to the widespread recognition of the pasta category as a vibrant and resilient category. The association recognizes the relevance of pasta to the



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consumer whether looking for health and wellness, convenience, indulgence, innovation, or value. Through our work in the association, our members can leverage the network, education and resources to deliver high-quality and safe products that not only satisfy but excite our consumers.

The National Pasta Association has stood out in recent years for its significant campaign to promote pasta, and has collaborated constantly with prestigious associations in other countries. Do you intend to continue in this direction?

Absolutely – strong global pasta demand and a collaborative industry network is good for all. Pasta is an affordable and versatile meal base that can be transformed by local flavors, and NPA has enjoyed working with partners around the world. The National Pasta Association is a member of the International Pasta Organization and looks forward to hosting the 2024 World Pasta Day in the United States. We look forward to engaging closely with the IPO community on all things pasta.

Do you have any advice for Pastaria and the Pastaria Festival?

Early advertisement and communicating the benefits of attending an event to NPA

members. Perhaps including an advertisement in NPA newsletters and / or including a spotlight from an NPA member who has attended Pastaria and found it beneficial.

Would you like to send a message or make an appeal through Pastaria to international pasta producers and the various players involved in the supply chain?

We all benefit from a strong global pasta market – network and learning from each other is our opportunity to deliver quality and safe pasta products to the consumer. We look forward to celebrating PASTA with everyone at the NPA / IPO World Pasta Day Celebration on October 25, 2024 in the United States!

NORA STABERT

Nora Stabert is an Executive Vice President of Philadelphia Macaroni Company (PMC), a fifth-generation family-owned pasta manufacturer headquartered in Philadelphia, PA. Since joining the National Pasta Association (NPA) in 2018, Stabert has taken part in various NPA committees and served as Vice Chair of the Executive Committee. In March 2023, the NPA announced Stabert would be taking over the role of Chair, becoming the first woman to do so.

NATURAL FLAVORINGS WITH GENOVESE BASIL DOP FOR PASTA AND SEASONING



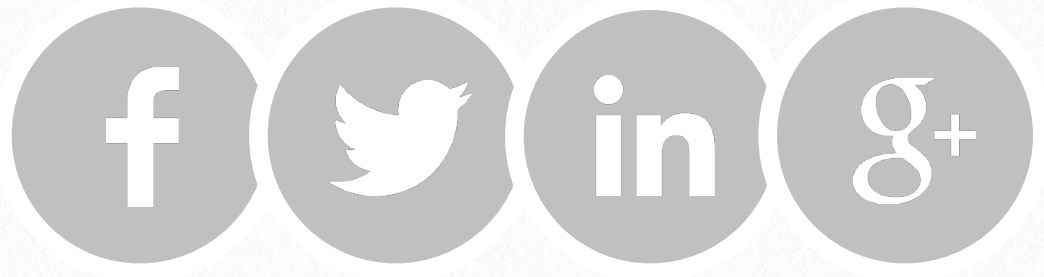
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4



The potential of cellulose packaging for barrier applications

Luciano Piergiovanni
Italian Scientific Group of Food Packaging (GSICA)



A reflection on the state of scientific research in the cellulose packaging sector and its prospects.

Paper, and cardboard shortly thereafter, were the first packaging materials for pasta products to appear on the market, and still represent the leading packaging solutions for this vast and diverse product category. Transformations in the flexible packaging sector, and the widespread use of plastic materials, have only marginally affected the segment.

From the earliest packaging solutions used for long-cut dry pasta (the blue paper wrappers used in the early 1960s) to the current solid cardboard boxes, cellulose packaging has been a mainstay for pasta. It is a particularly well-established choice for dry pasta, though cardboard trays and bowls are beginning to be introduced for fresh and frozen products. It is such a common and conventional choice that it may even seem somewhat strange to consider potential alternatives and innovation in this sector; and it is true that cellulose packaging is a more than satisfactory solution for the standard packaging requirements for pasta products, with no immediately apparent need for innovation.

That said, a critical assessment of the current solutions, coupled with an increased awareness of sustainability issues and, above all, a reflection on the state of research in this field suggest that certain prospects deserve some attention;

these considerations are the motivating factor underpinning this text.

An initial, fairly indisputable, observation is that when it is necessary to ensure specific properties or performance characteristics for cellulose packaging, synthetic products are often used; this may result in a material obtained from renewable resources, that is fully recyclable and compostable (features so inherent to cellulose materials) losing its natural qualities, or having such qualities reduced.

In cellulose material production ([Table 1](#)), the term “non-fibrous raw materials” is commonly used to refer to the set of additives, loads, and processing aids added to paper pulp to ensure that the end product has the desired characteristics. These “raw materials” are very often chemical substances that are anything but natural; other synthetic chemicals, meanwhile, may be used at a post-production stage to paint or coat the surface of cellulose materials, or make them sealable. These materials are referred to as “non-fibrous” because the primary and fundamental component of cellulose materials is “cellulose fibre”: an extraordinary structural composite that has been at the service of human ingenuity for centuries, thanks to the natural evolution and differentiation of plant organisms. It now seems reasonable to be fairly

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optimistic about the prospect of replacing some of these “non-fibrous raw materials”, thanks to new technologies and better use of the natural resources offered by cellulose materials. Based on scientific studies published in recent years, a significant improvement in the properties and characteristics of cellulose materials seems genuinely achievable, by studying and making better use of the fundamental components of cellulose fibres and learning to modify them according to the specific needs of products to be packaged.

Structure and composition of cellulose fibre

In order to understand the great potential of cellulose raw materials, it is worth briefly considering the chemical structure and

physical arrangement of cellulose fibres. Plant cells use a simple sugar (glucose) to create them, and the first step involves the synthesis of a linear polymer, obtained through the bonding of thousands of molecules of the sugar in a specific way. Subsequently, hundreds of these polymer chains group together to form what are known as native nanofibrils, which evolve into micro- and then macro-fibres, thanks to functional stabilisation by two other fundamental components of the fibre, known as hemicelluloses and lignin. The latter two components are indispensable natural additives of cellulose fibres, fundamental to creating those structures that, in their simplicity, represent the true building blocks of the plant kingdom, which can even support plants that are dozens of metres high and weigh multiple

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Table 1 PAPER MANUFACTURING - NON-FIBROUS RAW MATERIALS

Function	Non-fibrous raw material
Mineral charges	kaolin, calcium carbonate, titanium dioxide, talc
Internal sizing	rosin, starch, carboxymethylcellulose, waxes, modified resins
Colourings	colourings, pigments, optical brighteners
Dry resistance additives	starches, rubbers, polyacrylamides, latexes
Humidity resistance additives	urea-formaldehyde resins, melamine-formaldehyde, polyamides
Specific additives and adjuvants	softeners, hardeners, flame retardants, biocides, flocculants, anti-foaming agents, drainage agents

tonnes. This process can be defined as Bottom-Up, from small molecules to complex structures. Its opposite counterpart is the Top-Down approach, which may prove very useful today in achieving the goals referred to above, through a process of cellulose “cracking”. By repeating the process performed by plant organisms to produce cellulose fibre, but in reverse, it is in fact possible to isolate useful micro- and nano-metric cellulose structures, lignin and hemicellulose molecules in pure form, to be usefully employed to improve the functional properties of cellulose materials across the range of packaging applications.

Cellulose nanocrystals

During dimensional growth (from simple sugar to native nanofibrils), sections with

different arrangements can be identified within the structure, leading to cellulose commonly being separated into crystalline and amorphous regions; this is a key point in understanding the various technologies used to obtain nano- and micro-particles of cellulose and their properties. As the amorphous sections are thermodynamically more susceptible to hydrolysis, it is easy to isolate these sections, referred to as cellulose nanocrystals (CNC). They are obtained through partial chemical hydrolysis of the cellulose polymer, starting from any cellulose source ([Figure 2](#)). Many different oxidative acids and agents have been used to product nanocrystals, with varying yields and different effects. In any case, regardless of the means and raw material used to produce them, CNCs always have the potential to provide an interesting



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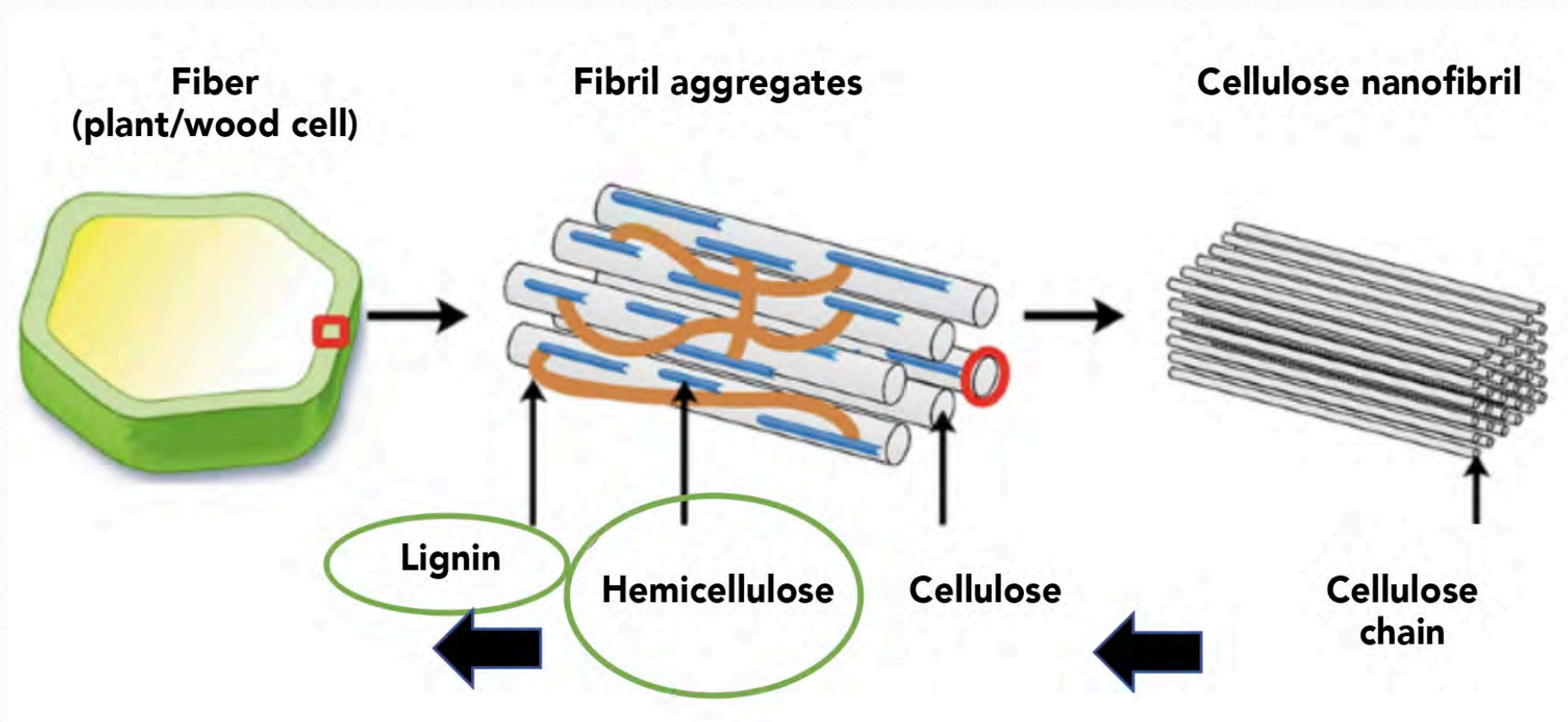


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Figure 1 FROM SIMPLE SUGAR TO FIBRES



Source: <https://link.springer.com/article/10.1007/s10570-020-03674-w>

contribution to the gas-barrier properties of the materials with which they are combined (Figure 3). Indeed, all of properties that significantly contribute to the gas-barrier properties of materials can be found in CNCs. High polarity, absence of non-saturation and lateral chains, high crystallinity and the high glass transition temperature of cellulose nanocrystals all result in extremely low gas permeability, comparable to barrier polymers of synthetic origin.

The only negative feature of cellulose nanocrystals is their sensitivity to humidity; CNCs quickly lose their barrier properties at high relative humidity. That said, this is not all that different to what occurs in the

case of the fossil-based polymers (such as EVOH) used today. There is extensive literature on the gas-barrier properties of CNCs, but unfortunately the number of production sites remains limited (with none in Italy) and currently very few commercial applications.

Cellulose micro/nanofibres

Cellulose micro- and nanofibres can also be obtained from any available source of cellulose (Figure 4). Their dimensions and morphological features differ from those of CNCs, and they are obtained through very different (almost antithetical) processes, but they too have the potential to improve the properties of paper and cardboard.

Figure 2 FIGURE 2. FROM FIBRES TO CELLULOSE NANOCRYSTALS (CNC)

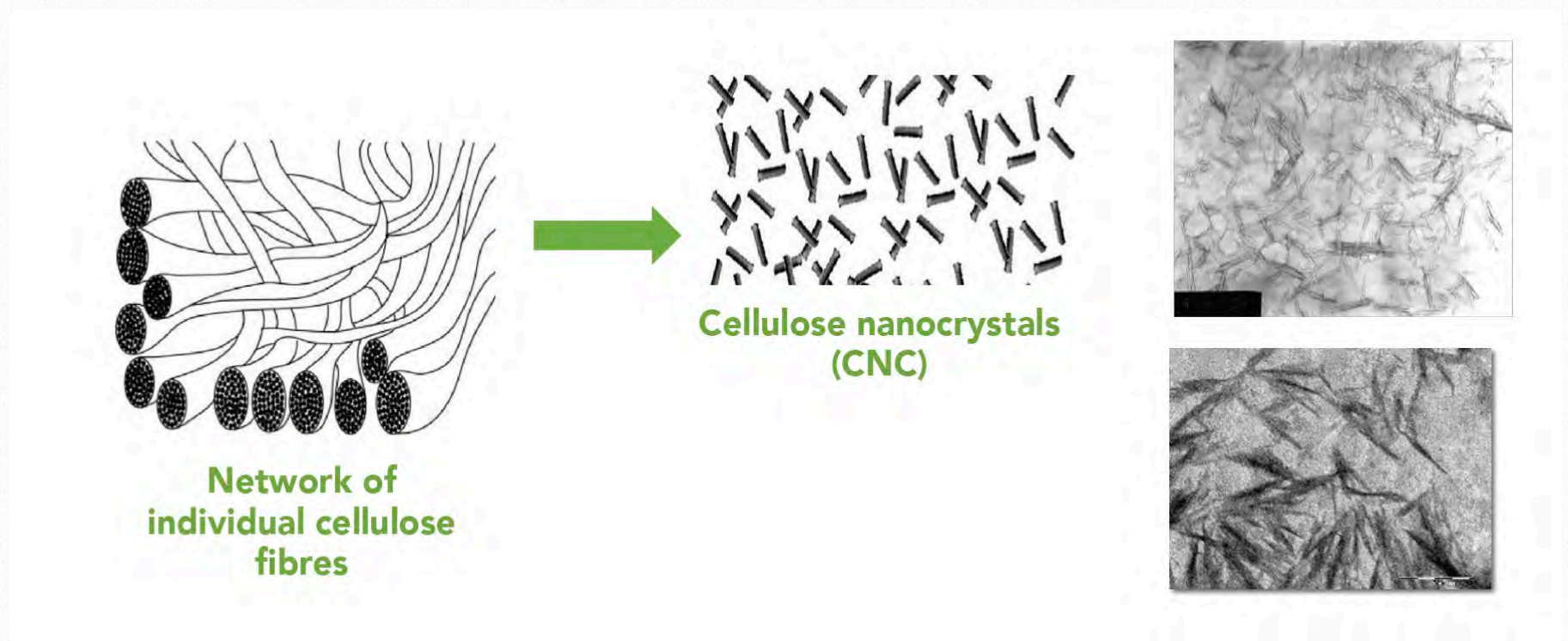
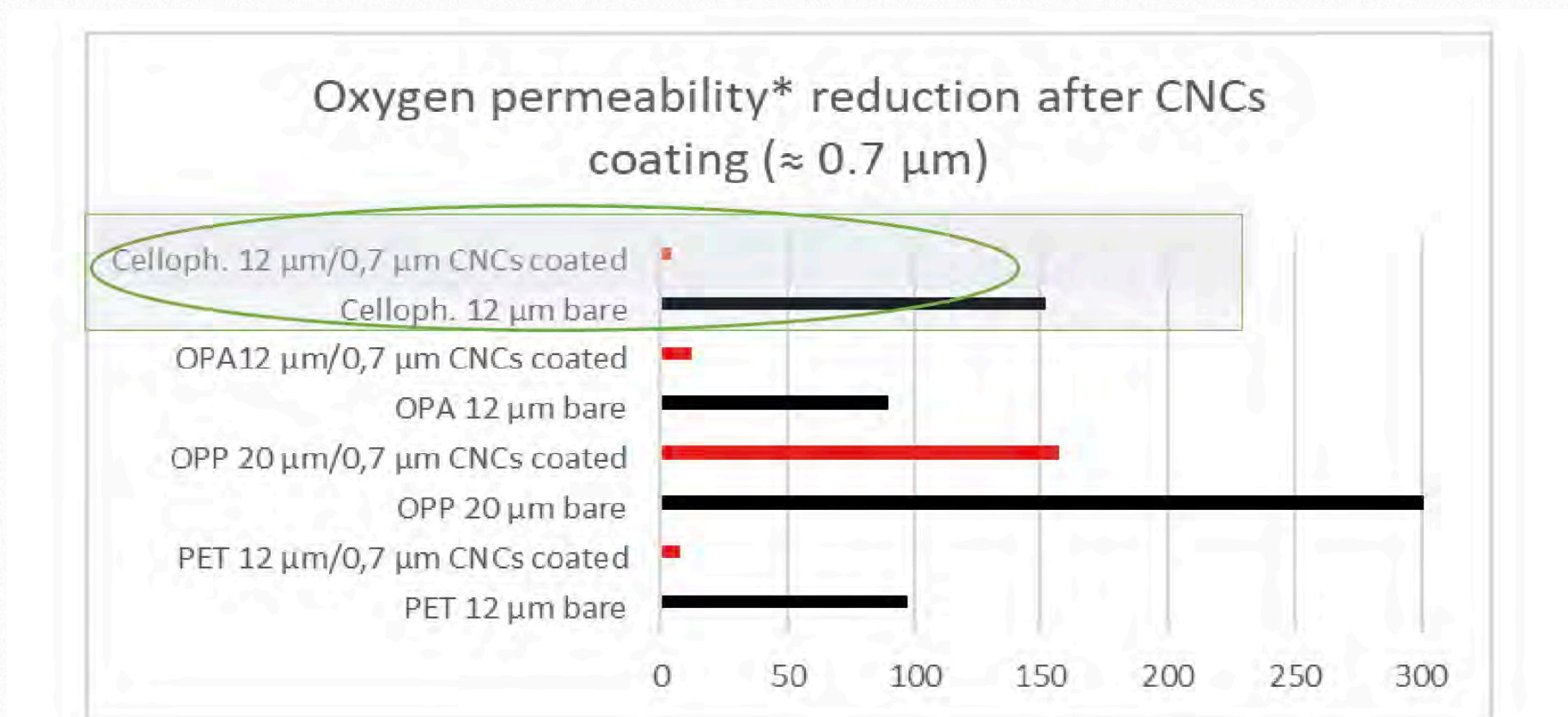


Figure 3 GAS-BARRIER EFFECT OF THIN COATINGS OF CELLULOSE NANOCRYSTALS



Source: Li F, Biagioni P, Bollani M, Maccagnan A, Piergiovanni L (2013), Multi-functional coating of cellulose nanocrystals for flexible packaging applications *Cellulose* 20 2491-2504

Often, they are referred to as CNFs (cellulose nanofibres), but in fact the size range is quite broad, meaning that microfibrils are also found and, in fact,

may be prevalent, depending on the process used.

Cellulose micro/nanofibres are obtained through different processes, almost all of

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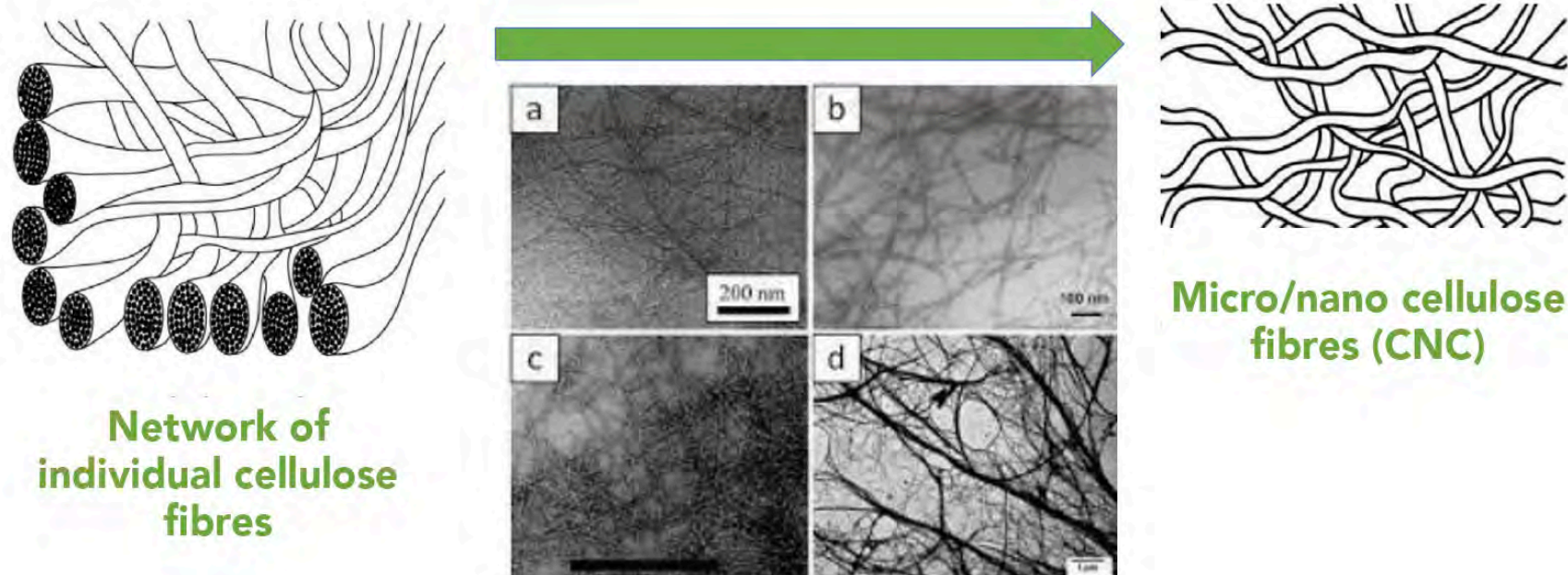
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Figure 4 FROM FIBRES TO MICRO/NANO CELLULOSE FIBRES (CNF)



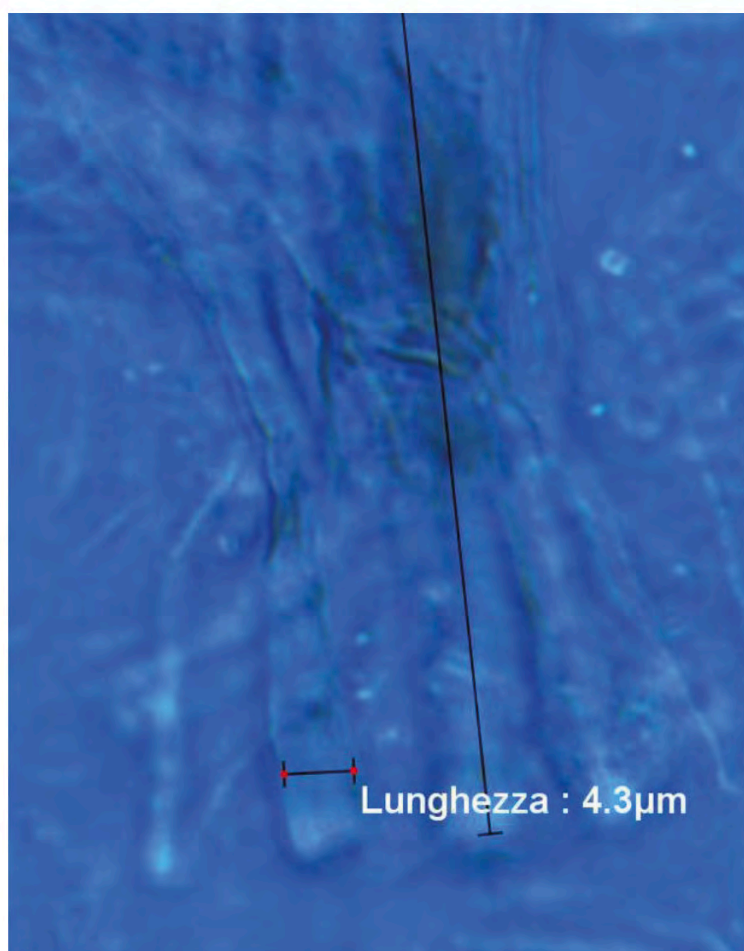
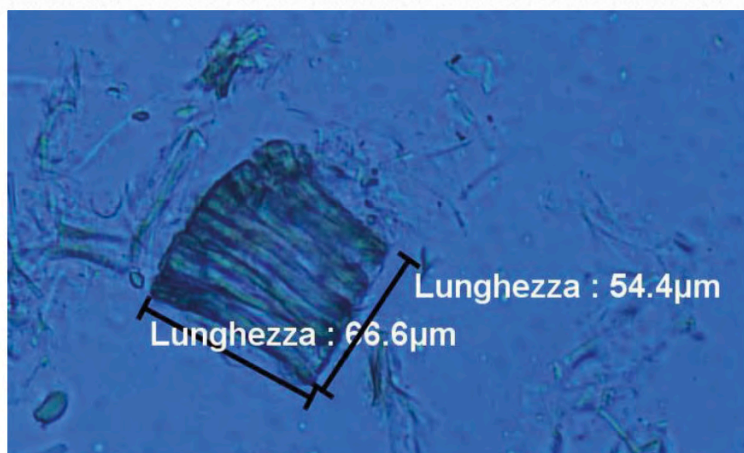
which are physical (in certain cases involving modest enzymatic pre-treatment processes), which can be quite energy-intensive but with little impact. Various companies worldwide have begun producing them from a range of sources, with keen interest in their production and use in Italy too.

Different physical processes have been identified and used, based on different mechanical forces applied to diluted cellulose suspensions, such as microfluidisation and microgrinding. High pressure homogenisation is, however, the most commonly used. A single homogenisation step is never sufficient to achieve the micro/nano size; as such, it is generally repeated a number of times (3-6), at a pressure of between 700 and 1200

bars to achieve the desired degree of fragmentation and the intended properties ([Figure 5](#)).

Micro/nanofibres have variable dimensions. They are larger than CNCs and characterised by a significantly higher “aspect ratio” (the ratio between length and width), something that contributes to their very interesting properties. They can be used both as ingredients and as cellulose material coating. In the former case, they can modify mechanical properties, improving them, while in the latter they can make paper and cardboard materials more resistant to oils and fats, providing an interesting barrier to more hydrophobic substances ([Figure 6](#)). For example, they can create a barrier to aliphatic and aromatic hydrocarbons from

Figure 5 FRAGMENTATION OF GROUPS OF CELLULOSE FIBRES THROUGH HP HOMOGENISATION, OBSERVED USING AN OPTICAL MICROSCOPE



mineral oils (MOAH, MOSH), common and frequent contaminants of paper and cardboard made from recycled pulp. One potential application, therefore, may be to make cardboard and paper made from recycled material suitable for food contact, using what is known as a functional barrier.

However, the prospects for improving the performance of cellulose materials also extend to the smaller components of cellulose fibres, and specifically hemicelluloses and lignin.

Hemicelluloses

Accounting for between 20% and 50% of the weight of cellulose sources, hemicelluloses are branched polymers that are very different from cellulose; they are not made solely from glucose but rather from different sugars, giving rise to a large variety of different hemicelluloses depending on the various sources. They are referred to as “dietary fibres”, as they are edible but only partially digestible. Isolating them, however, is not as simple and cost effective as CNFs.

Hemicelluloses are, by nature, all strongly hydrophilic, quite reactive and easily degradable; as such, it is difficult to isolate them in their pure form, and they have long been overlooked as potential components of innovative materials. That said, new processes have recently been developed to isolate hemicelluloses in their pure form, and new methods have been proposed to modify them to make them more hydrophobic. In particular, ionic liquid/cosolvent extraction systems can release hemicellulose oligomers that can

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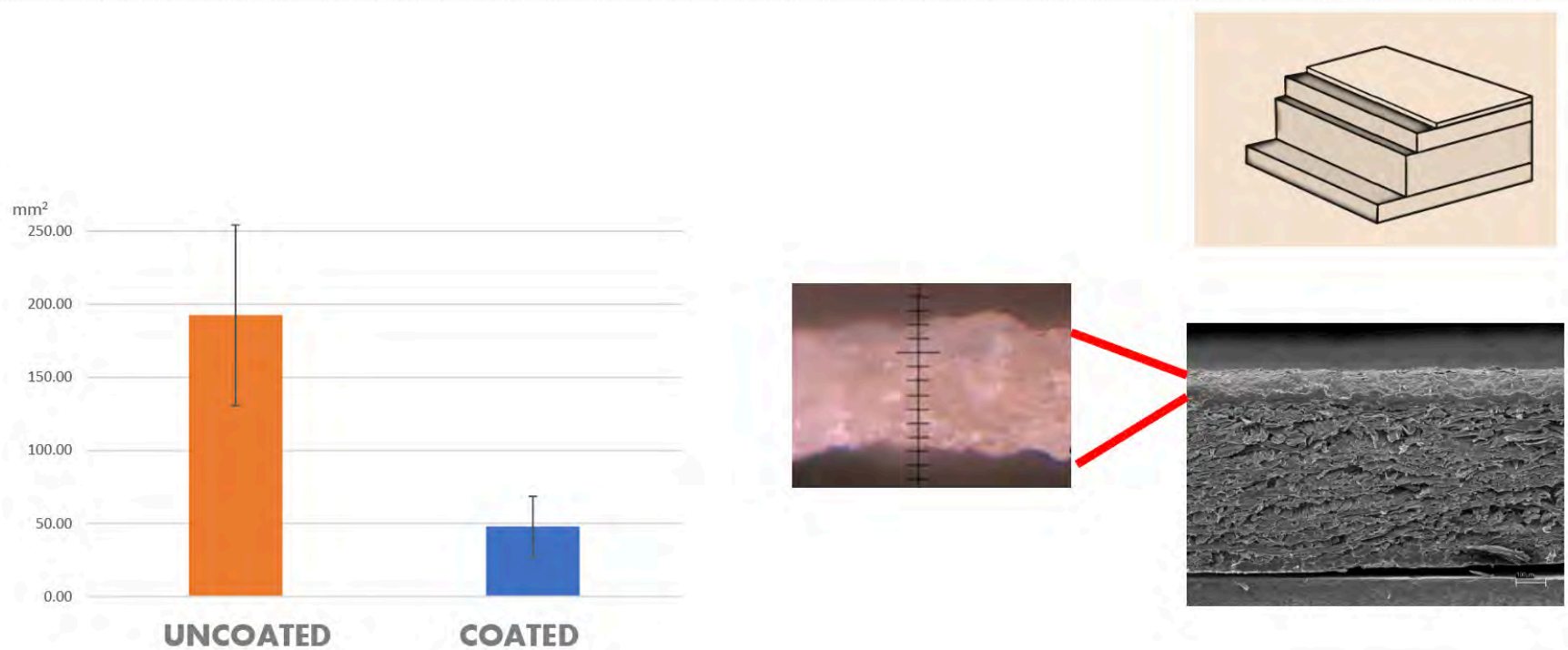


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Figure 6 BARRIER TO HYDROPHOBIC SUBSTANCES OF A THIN LAYER OF MFC



be usefully employed as ingredients and cellulose packaging material coatings. The topic is the subject of increasing attention and scientific literature.

The most original features of hemicelluloses are linked to their film-forming and adhesive properties. Once modified to be more hydrophobic, hemicelluloses develop a gel that is resistant to water, which may potentially be useful for water-resistant coatings or as adhesives. The adhesive strength obtained with such modified hemicelluloses may be greater than that of conventional fossil-based adhesives.

Lignin

Lignin is the aromatic polymer (phenolic) most commonly found in plant biomass; it

is covalently bonded to hemicelluloses to form the cementing agent of cellulose fibrils. Each year, 50 million tonnes of lignin are generated worldwide by the paper and cardboard industry alone. It has, however, generally be regarded as a by-product to be disposed of rather than a resource to be valued. For some time now, various cellulose pulp whitening processes (including with a high environmental impact) have been used to remove it from the raw materials of paper and cardboard. Today, lignin has become the subject of various very interesting studies, exploring its possible uses, thanks also to the extraction process using ionic solvents, which allows it to be obtained in its pure form. There is growing interest in the idea of using lignin, in the food packaging

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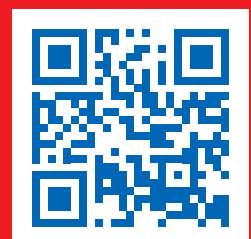
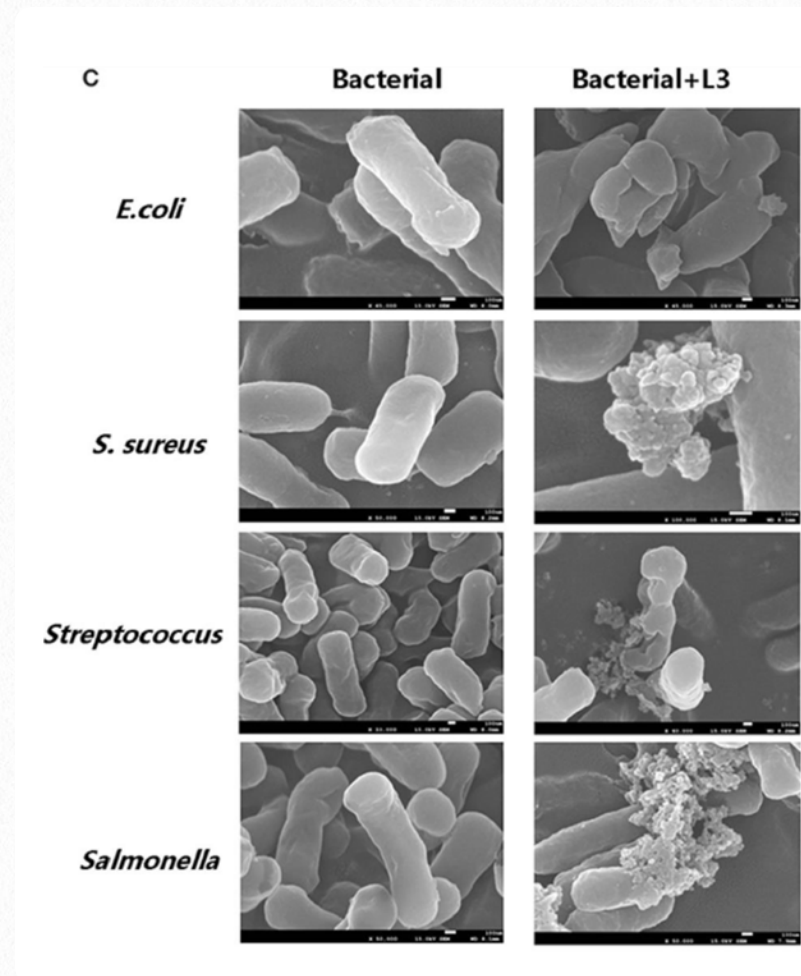


Figure 7 LYSIS OF THE CELLULAR WALL OF CERTAIN BACTERIA BY LIGNIN



Source: Yun, J., Wei, L., Li, W., Gong, D., Qin, H., Feng, X., ... & Yin, B. (2021). Isolating high antimicrobial ability lignin from bamboo kraft lignin by organosolv fractionation. *Frontiers in bioengineering and biotechnology*, 9, 683796

sector among other applications; based on the scientific literature produced in recent years, indeed, it even outweighs the interest in hemicellulose in this regard. It can be regarded as a “multitasking” molecule, which in fact has various useful properties: antioxidant, UV-ray resistant and antimicrobial properties. All of the above properties are highly valued in the context of food packaging materials. The mechanism of its antimicrobial action,

in particular, has been investigated by many, and appears to be related to the capacity of lignin polyphenols to break the cell walls of microorganisms, de-activating them (Figure 7).

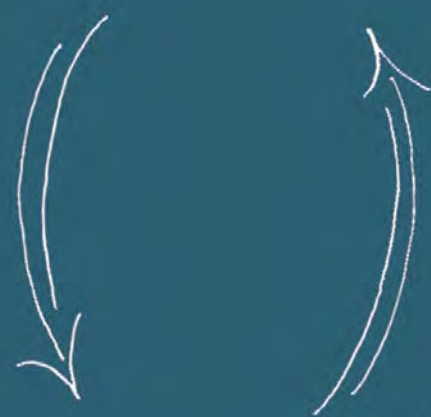
To conclude, it is worth remembering that every year, nature provides humans, in different forms, with approximately 70 billion tonnes of cellulose materials. Perhaps the time has come to regard these “cellulose reservoirs” (more common, more available, and with less impact than fossil-based resources) as precious resources deserving of greater attention and adequate investment, including with a view to obtaining substances that can be used across various sectors, starting with pasta product packaging.

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5



The seventh Pastaria Festival will take place on 29 September 2023

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The date has been announced for Pastaria Festival 2023, the free event dedicated to professional updating on the work of pasta production, organised by Pastaria, in collaboration with associations, universities, professional bodies, companies and sector experts. The event will take place in Parma on Friday, 29 September.

Once again it will be Parma that will host the seventh Pastaria Festival, the free event dedicated to professional updating for Italian and international pasta producers. The event is scheduled to take place on 29 September 2023, when the sector's key players (associations, research institutes, universities, professional bodies, companies and experts) will gather in Parma to share their knowledge and skills on the activity of pasta production, for a day of meetings, workshops, conferences, presentations and exhibition spaces (all free of charge).

“We are confident that the top quality of last year's edition can be matched, if not exceeded, by Pastaria Festival 2023. The schedule for this event is currently being prepared by the numerous teachers and experts from prestigious pasta factories who make up its steering committee”,

asserted Lorenzo Pini, Pastaria's publisher and editor-in-chief.

“In particular, we hope to see an increase in attendance by international pasta makers”, Pini concluded.

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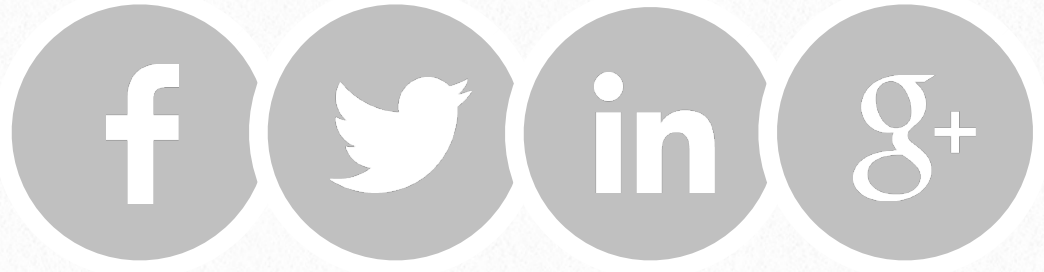
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6



Commodities markets and prospects for pasta producers

Pastaria Centre for
Economic Research



Discussed at the Pastaria Webinar on 17 April last. The session saw participation by various operators in the sector, and provided an opportunity to delve deeper and reflect on the dynamics characterising the markets and the world economies, while also offering an outlook on the variable factors at play for the wheat-pasta supply chain, in light of potential developments in terms of harvest and the 2023/24 trade year.

“Geocrises and distorting effects of the climate on commodities markets: prospects for pasta producers”. This is the title of the Webinar organised by Pastaria that took place on 17 April last, taking stock of the situation on the commodities markets over a year on from the start of the conflict in Ukraine, and in the context of a now “officially” post-pandemic world.

The raw materials market has undergone a number of significant transformations in the wake of the 2022 surge, slackening its grip on inflation in recent months; the underlying rate remains high, however, and subject to the continued scrutiny of central banks, which seek to maintain a restrictive approach to monetary policies.

There is no guarantee that prices, including of food ingredients, will not continue to be affected by further volatility in the current context of uncertainty regarding economic and geopolitical developments, significant climate instability, and in anticipation of a resumption of orders from China following the suspension imposed by Beijing's “zero Covid” policy.

On the supply side, the climate outlook for farming and food commodities remains unfavourable, with the persistence of drought conditions and extreme events, in Europe and beyond, which may discourage investments in certain, potentially strategic, production sectors, considering the potential effects of the climate on agronomic yields.

The Webinar also provided an outlook on the specific variable factors at play for the wheat-pasta supply chain, in light of potential developments in terms of harvest and the 2023/24 trade year.

An analysis of the macroeconomic context highlighted the persistence of certain issues mainly linked to high production costs, a phenomenon that primarily affects sectors with structurally lower margins such as agrifood, primarily, followed by processing. With the upturn in global supply chains (shipping price increases and container shortages are now just a bitter memory), logistics is no longer the factor of concern that it was during the pandemic; geopolitical risk has increased,

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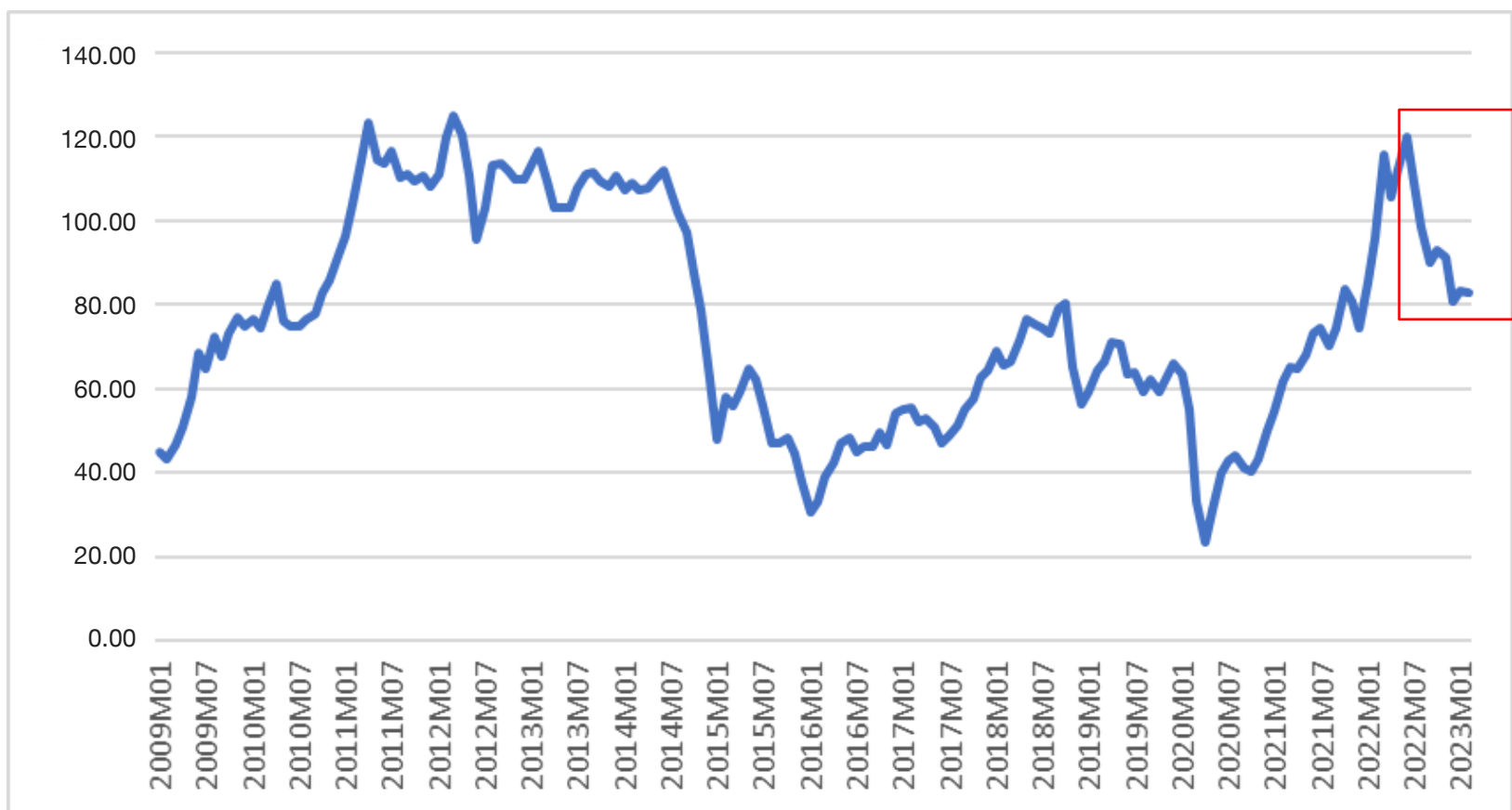
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Chart 1 BRENT CRUDE OIL PRICE \$/BBL



Source: World Bank

however, linked to the fate of the conflict in Ukraine and the U.S.-China tensions over Taiwan.

Also of concern, given its impact on supply chain adaptation costs, is the European Commission's focus on going "packaging free". Compared to the less stringent directive, the legal instrument of the regulation is a source of upheaval for the packaging market, promoting a green approach based on recycling and the use of sustainable materials.

In terms of prospects, 2023 is not set to be a "black swan" year, even if investments are slow to pick up due to the rise in rates and restrictions on

credit, even against the backdrop of a gradual easing of tensions surrounding industrial system costs (and raw material procurement in particular).

In Italy, inflation is expected to be curbed at 5.8% in 2023, down from over 8.1% in 2022, while GDP is set to settle at a growth rate of "barely above zero", following the 3.8% increase seen in 2022, with the risk of a U.S. recession looming on the international stage.

The non-food commodities scenario (up to date as at March 2023) shows a double-digit year-on-year negative trend in the prices of Brent international oil (-32.1%), European natural gas (-67.4%)



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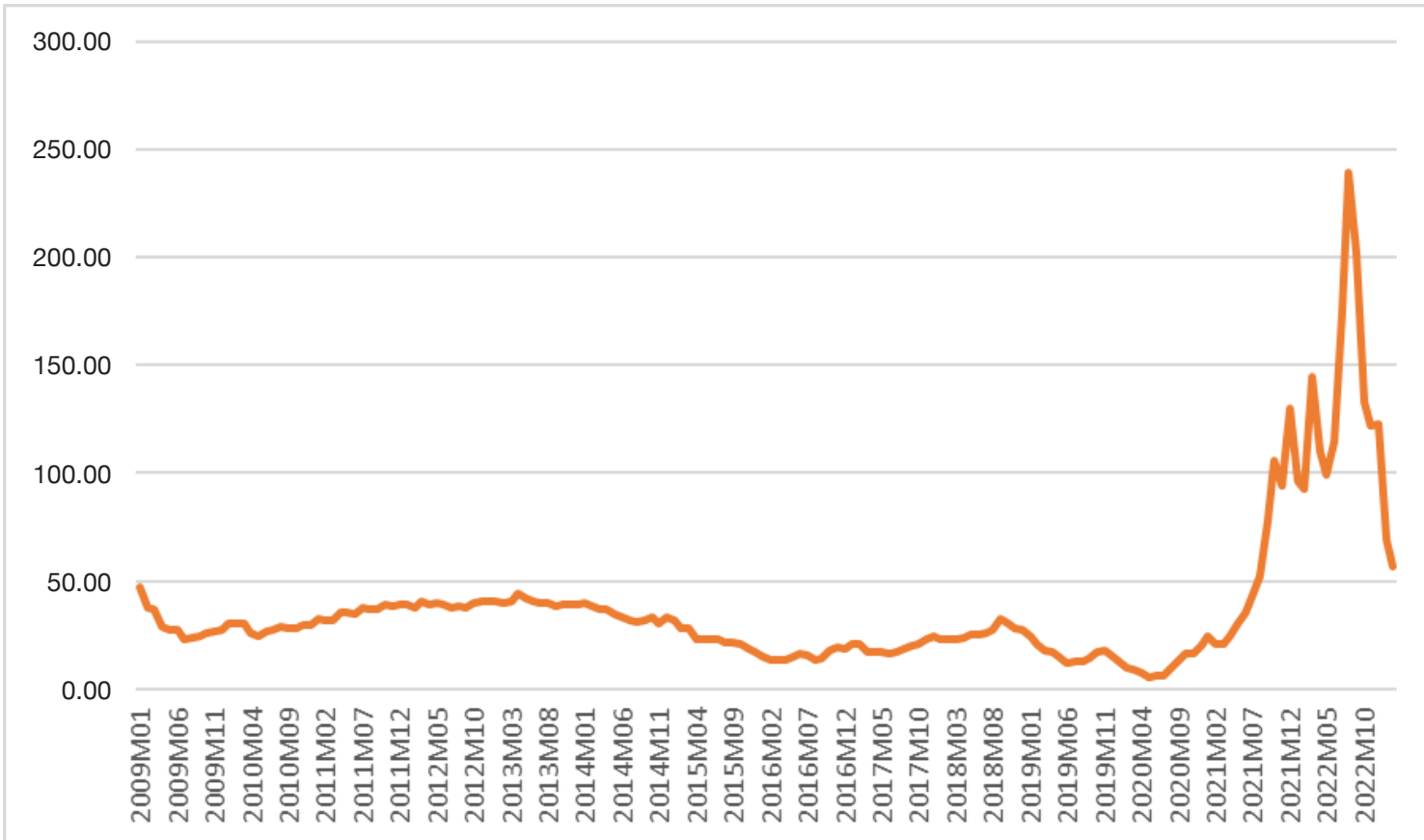
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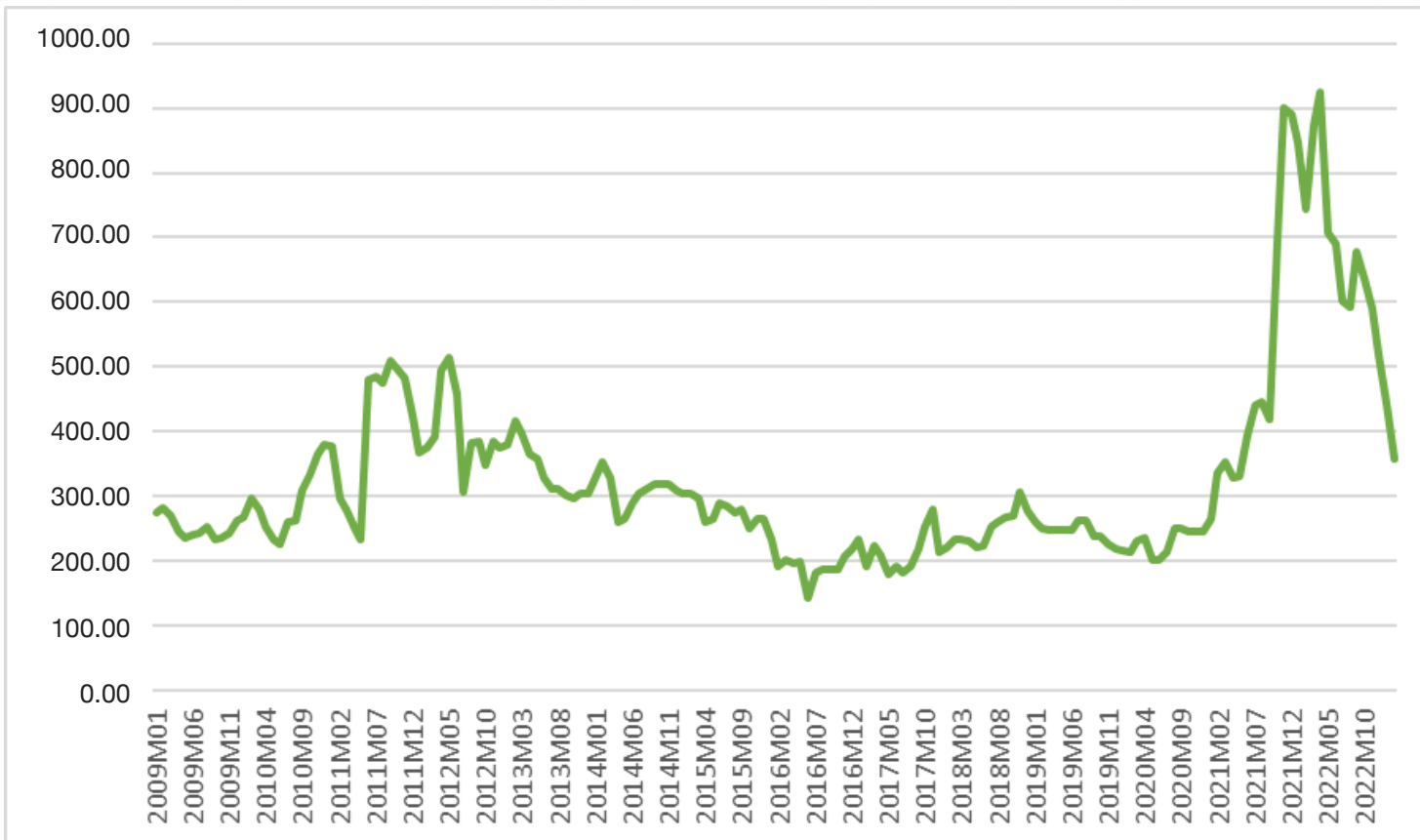
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Chart 2 PRICE OF NATURAL GAS IN EUROPE \$/MWh



Source: World Bank

Chart 3 UREA PRICE \$/TON



Source: World Bank



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Chart 4 SIGNIFICANT PRICE COMPARISONS (VARIATIONS FOR THE SAME MONTH OF THE PREVIOUS YEAR)



	Crude oil <u>brent</u>	Natural Gas Europe	Urea
March 2022	+77.3%	+591.9%	+147.3%
March 2023	-32.1%	-67.4%	-64.1%
March 2023 vs pre-Covid	+42.8%	+375.0%	+46.2%

Source: World Bank

and fertilisers (urea -64.1%), with values nevertheless significantly exceeding pre-pandemic levels. Sea shipping rates are also falling, while the euro/dollar exchange rate has regained momentum, following a very weak phase that pushed the euro below parity, with greater equilibrium restored between the two currencies.

The FAO Food Price Index hit an average of 126.9 points in March 2023, the lowest since July 2021 (the twelfth consecutive drop). Compared to the historic high reached in March of last year, prices fell by 20.5%, with a sharp reversal expected for cereals and vegetable oils in particular.

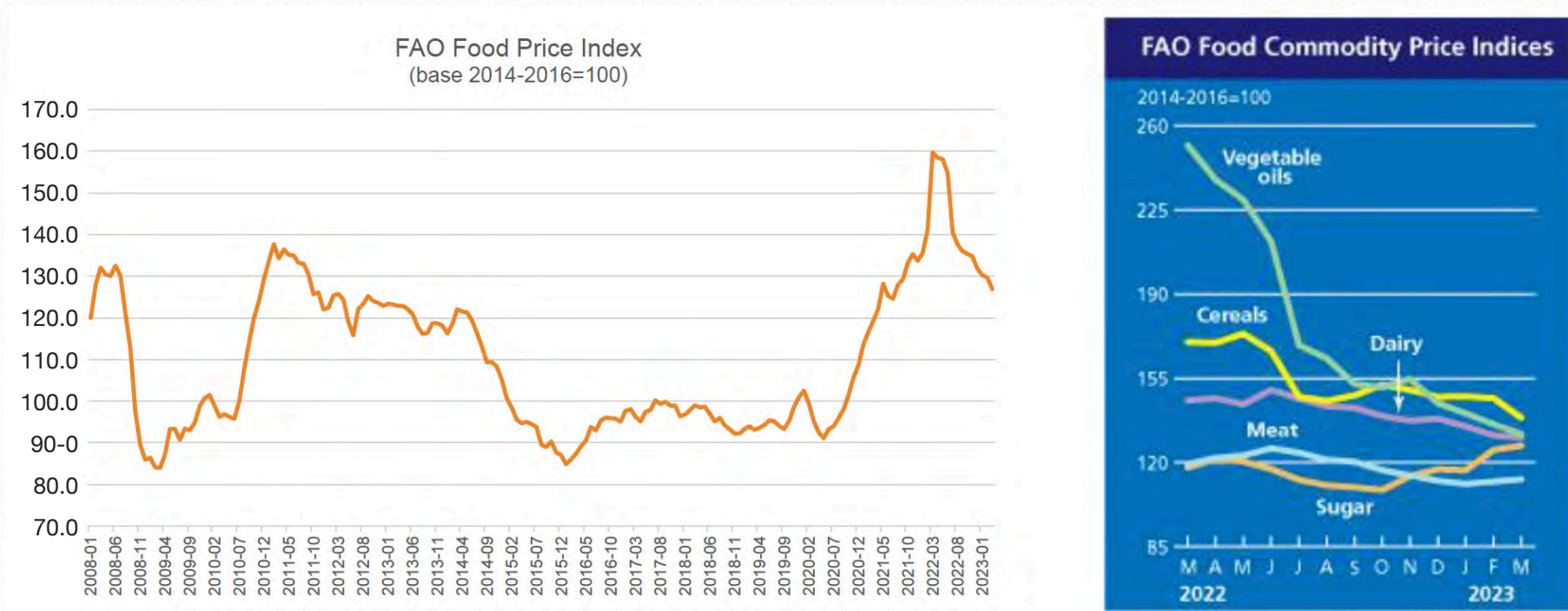
More specifically, double-digit year-on-year decreases were seen in March in the prices of corn, soy and wheat on world markets, with the US HRW wheat benchmark down as much as 36.3%. Food ingredients were also at higher levels than before the Covid-19 health crisis, despite the easing of tensions, a sign of a situation that is yet to fully normalised. The same findings emerge from statistical forecasts by the FAO and world bank regarding meat and dairy prices, which are falling sharply on a year-on-year basis but still higher, in this case, than in January 2022, i.e. before the outbreak of the conflict in Ukraine.

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Chart 5 FOOD COMMODITIES SUMMARY INDICATOR



As regards the wheat-pasta supply chain, projections by the International Grains Council regarding durum wheat for the 2023/24 season currently point towards global production of 32.8 million tonnes, substantially similar to the previous year, against consumption that is expected to reach around 33.4 million. All of this against the backdrop of low stockpiles held by the four leading exporter countries, with an ending stock forecast of just 2.2 million tonnes (5.9 million globally) for the 2023/24 season, the lowest since 2007/08.

In a domestic context of stalled consumption, Italian pasta has however set new export records over the last twelve months, but only in terms of

turnover, with Istat data indicating that revenues leapt to over €3.9 billion in 2022 (+29.9% on 2021). In physical terms, foreign exports increased by 6.3% year-on-year, reaching 2.39 million tonnes, down however on the 2.54 million reached in 2020.

In terms of destinations, the ten leading trade outlets (Germany, the US, the UK, France, Spain, the Netherlands, Belgium, Sweden, Japan and Switzerland) account for almost three-quarters (72.4%) of the market in terms of value. It should also be noted that ten years ago Russia was the eleventh leading market, but 2022 data places Moscow in twenty-eighth position, accounting for just 19.3 billion in export turnover.

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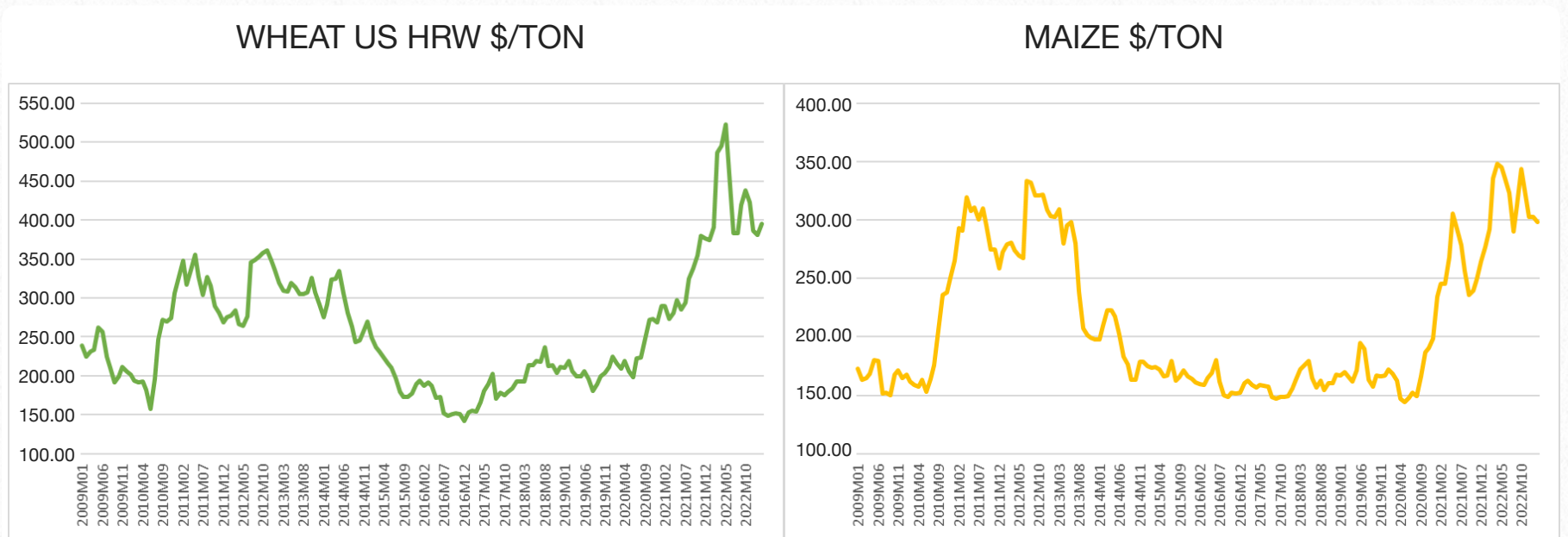
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Chart 6 FOOD COMMODITIES OVERVIEW (2009-2023 PERIOD)



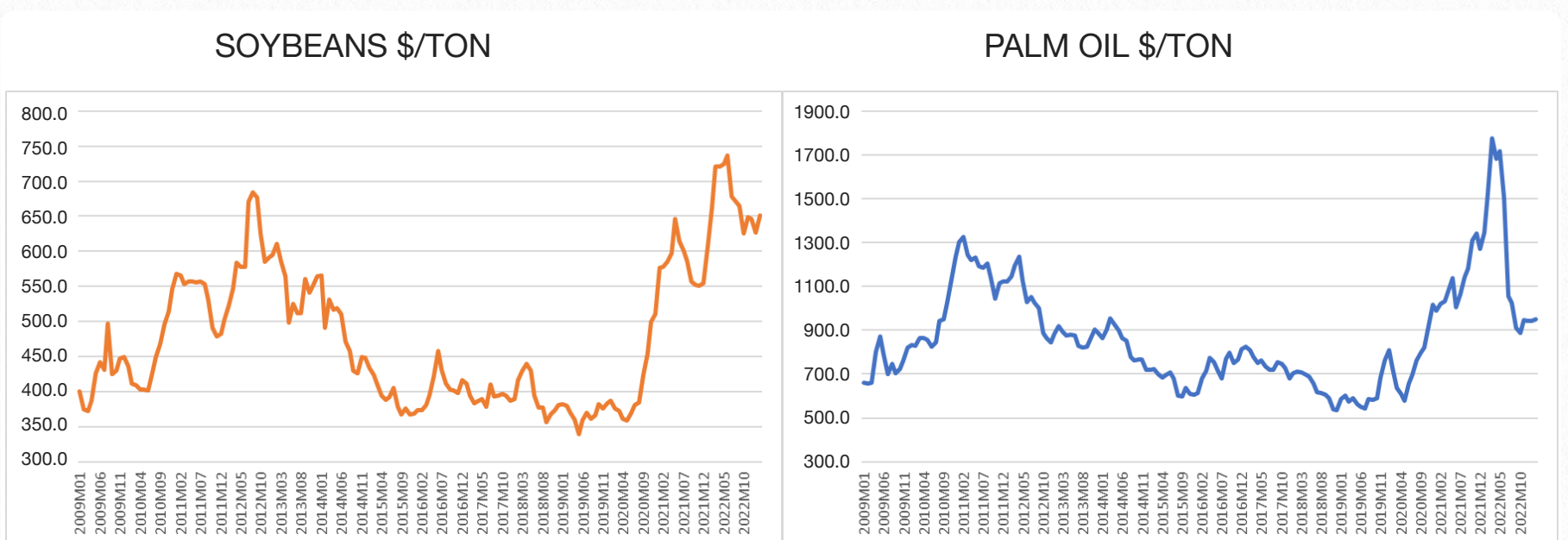
Source: World Bank

If consumption is slowing, it is also due to the soaring prices of pasta on the shelves, with inflation in the sector last October (+26.8%) exceeding the previous historic peak set in 2008 in the height of the financial bubble that preceded the great recession of

2008-2009. This phenomenon has stabilised somewhat, with consumer prices of pasta now at a trend rate of under +20%.

The overall picture, outlined at the end of the Webinar, confirms the prospect of disinflation, both for wheat and its

Chart 7 FOOD COMMODITIES OVERVIEW (2009-2023 PERIOD)



Source: World Bank

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Chart 8 SIGNIFICANT PRICE COMPARISONS (VARIATIONS FOR THE SAME MONTH OF THE PREVIOUS YEAR)



	Wheat US HRW	Maize	Soybeans
March 2022	+63.9%	+36.9%	+23.0%
March 2023	-36.3%	-15.8%	-12.8%
March 2023 vs pre-Covid	+19.1%	+67.4%	+67.3%

Source: World Bank

Chart 9 FOOD COMMODITY PRICE DYNAMICS (VARIATIONS FOR THE SAME MONTH OF THE PREVIOUS YEAR)

	FFPI	Meat	Dairy	Cereals	Vegetable oils	Sugar
March 2022	+34.0%	+18.4%	+24.2%	+37.3%	+58.1%	+22.6%
March 2023	-20.5%	-5.3%	-10.7%	-18.6%	-47.7%	+7.7%
March 2023 vs January 2022	+11.8%	+17.8%	+17.1%	+10.8%	-5.1%	+34.9%

Source: World Bank

derivative products (flours and pasta). In Canada, the world's leading producer and exporter of durum wheat, this year's

harvest is expected to remain around 5.4 million tonnes, while exports are expected to come to a standstill, in

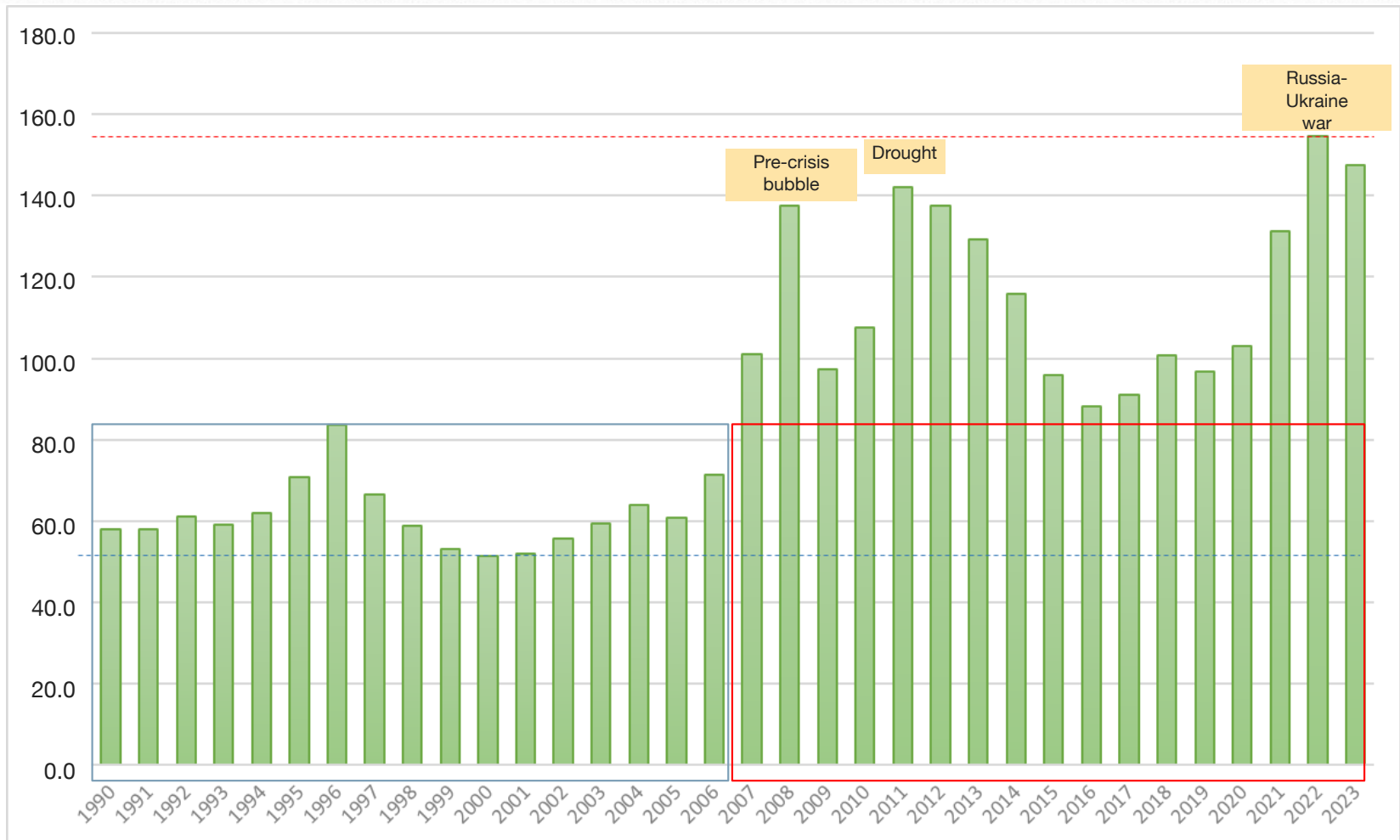


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Chart 10 CEREAL PRICE TRENDS OVER THE PAST THIRTY YEARS FAO SUB-INDEX (BASE 2014-2016 = 100)



Source: World Bank

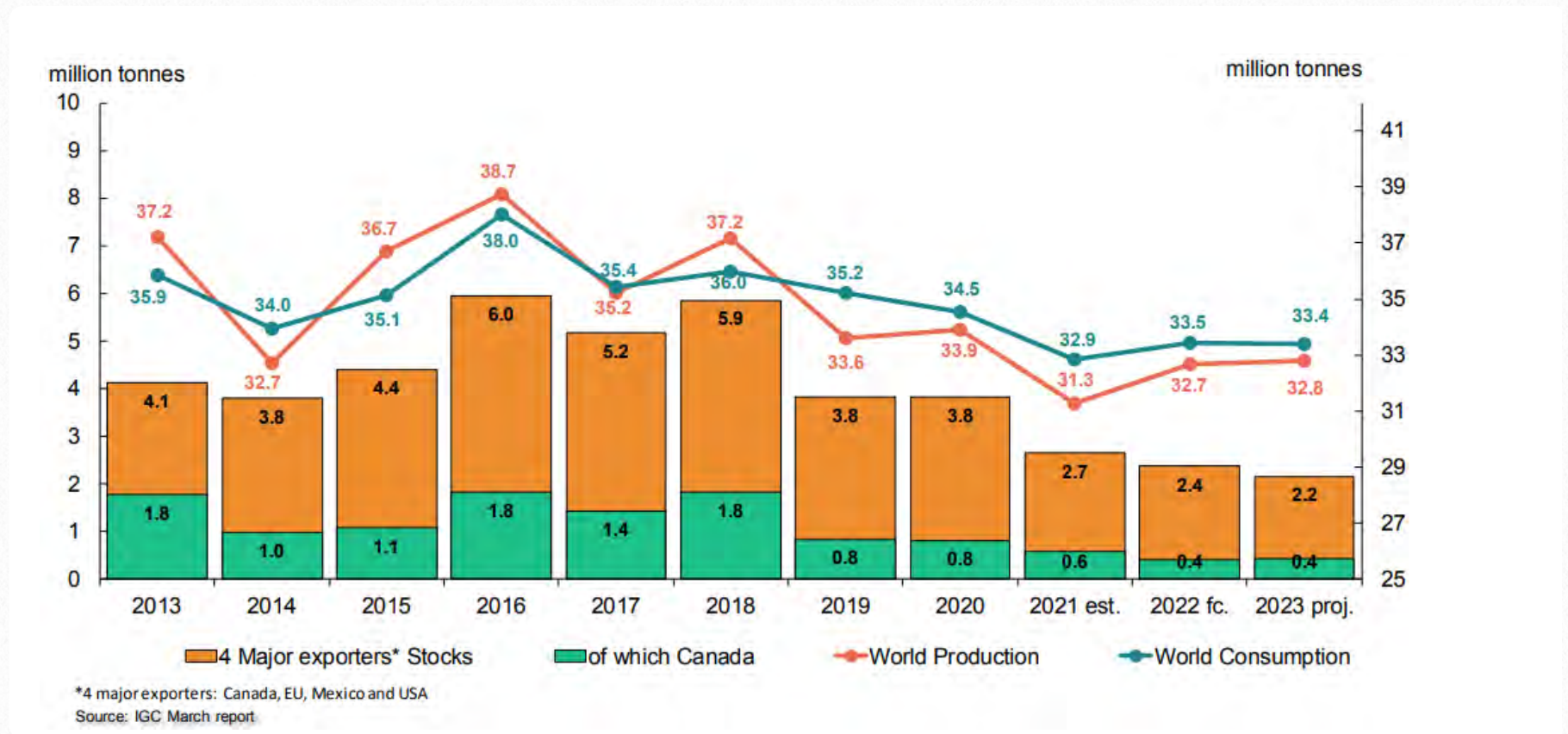
anticipation of greater domestic availability in both Europe and North Africa, where production is expected to rise to 8 million tonnes (compared to 7.1 in 2021) and 3.5-4 million tonnes respectively.

However, low stockpiles will keep world prices above average levels in the past. In Italy, the situation regarding wheat growth appears normal overall, with a forecast harvest of 3.9 million tonnes, compared to 3.6 million last year. But the rapid reversal in wheat prices under way

on the national commodity exchanges could trigger certain disinvestment phenomena as of the next sowing season, including in light of only partial resolution of tensions surrounding production costs.

The worsening of the conflict in Ukraine and, above all, the undetermined fate of the Black Sea grain corridor agreement as the upcoming deadline of 18 May looms, contribute to fuelling uncertainty regarding price developments on international markets. The conditions

Chart 11 WORLD PRODUCTION OF DURUM WHEAT



presented by Moscow for renewing the agreement – which are more restrictive this time and include a request to ease financial restrictions imposed on Russian banks regarding interbank networks – represent an element of unpredictability, making price rises possible in the improbable event of a stall in negotiations or failure to reach an agreement (on the renewal of the agreement, which came after drafting the article and just before the magazine was published, we refer to the article *Black Sea grain deal extended for two months*, editor's note).

Note

Anyone interested in watching the webinar can request the registration link by sending an email to info@pastaria.it.

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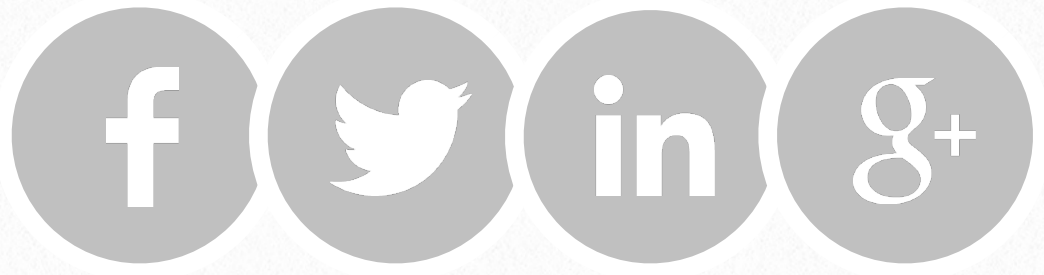
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Unione Italiana Food:
“Appropriate to monitor prices but, to be clear, the increase in the producer price of pasta (+8.4%) is in keeping with inflation”

Unione Italiana Food
Press release



The producer price, which is the average price charged by pasta makers to distributors, has increased by 8.4% in a year (March 2022-March 2023), in keeping with the average inflation recorded for consumer goods. The overall consumer price increase (+16.5%) is attributable to dynamics outside the pasta production sphere. Lots of dynamics impact the final price charged to the consumer, from the cost of raw materials to the logics of large-scale retail.

The producer price of pasta has increased by +8.4% in a year (official ISTAT data, March 2023 compared to March 2022), in keeping, therefore, with the average inflation recorded for consumer goods. Meanwhile, the consumer price increase – attributable to dynamics outside the pasta production sphere – is at +16.5% (not 17.5%, or any other figure incorrectly cited in recent days), in the context of an average increase across all food items of +15% (official ISTAT data, April 2023 compared to April 2022). And so the pasta price increase is one and a half percentage points higher than other food items.

“Italian pasta makers are always on the consumers’ side. We would like to conclude today's proceedings with an acknowledgement that pasta is the solution, not the problem. We are all working at all times to best protect the consumer but, even if costs were to remain as they are now, it is worth remembering that the spending increase per person per year would amount to around € 10, i.e. a 16.5% increase on a product that costs, on average, around € 1.07 per pack (Istat data). This, then, is well below many other price increases, and perfectly in keeping with the cost of inflation. Given that the product in question is a daily staple for Italians, the alarmism of recent days frankly seems very much unjustified. Lots of figures have been mentioned, some of which are incorrect: as pasta makers, all we can do is reiterate that the producer price of pasta has increased by +8.4%, in keeping with average inflation for consumer goods. If the consumer price is up by +16.5%, then this is attributable to dynamics outside of the production sphere”. This is the statement by Unione Italiana Food at the meeting of the Rapid Alert Commission in Palazzo Piacentini in Rome today, called by Adolfo Urso, Minister for Business and Made in Italy and Benedetto Mineo, Price Guarantor, to analyse the pasta price dynamics.

At the meeting, the Ministry for Agriculture noted that checks carried out by the Central Anti-Fraud Inspectorate found no indication of speculative or unlawful phenomena.

“The initial focus of this conference was unfortunate. It amounts to negative propaganda, which is harmful to a sector that is a source of pride



for the Made in Italy world, the mainstay of the Mediterranean diet, a product that drives exports and benefits many other Italian products of excellence. Negative publicity that, unfortunately, was originated from the very ministry that changed its name to focus on protecting businesses and the Made in Italy world”.

According to UIF, though presented as cause for an alert, the increase in the price of pasta is in fact logical and easy to explain. The pasta on the shelves today was produced months ago using durum wheat purchased at prices set even earlier, when energy costs were at their peak due

to the conflict, coupled with high packaging costs (paper and plastic) and logistics costs (fuel, pallets, containers). As such, current prices reflect free negotiation by individual companies with the distribution network. A situation that Unione Italiana Food pasta makers were quick to refer to as a “perfect storm” for the pasta sector, and beyond (other food items have also been affected by such increases). Costs have indeed come down, but have not returned to the levels seen in the past, and remain fairly high compared to those recorded in late 2020 and early 2021.

The price of wheat had risen to almost € 600 per tonne by the start of 2022 (+110% compared to the same period in 2021) and has now dropped significantly, settling at between € 350 and € 380 (still +30% compared to 2019). The same dynamics can be identified with regard to energy costs and other cost items.

When durum wheat was through the roof, nobody was sounding the alarm for the pasta makers. Yet this is a sector with extremely tight margins, given that a 500 g pack of pasta costs little more than a euro, and that euro has to cover all the various cost elements: durum wheat, processing the wheat into semolina, the energy costs of highly energy-intensive companies (electricity and gas), packaging, transport and more besides.

“It is upsetting to see certain agricultural organisations that are very familiar with these mechanisms highlighting the low price of durum wheat in the context of the allegedly high price of pasta, while not doing likewise when conditions are reversed. This approach does not benefit the supply chain” Unione Italiana Food continued. “If pasta prices are higher, there will likely be more margin for growth for durum wheat going forward. What is certain is that if pasta prices are low, the price of durum wheat will be squeezed, and pasta factories will close”.

This phenomenon can already be observed: the number of Italian pasta makers is dwindling (just over 100 today, compared to 500 in the 1970s) and the very small margins in pasta production put serious pressure on the finances of pasta factories and, as a consequence, on the cornerstone of Made in Italy food excellence.

This is the response to the decision by Adolfo Urso, Minister for Business and Made in Italy, to task Benedetto Mineo, Price Guarantor with convening the Rapid Alert Commission to analyse pasta price dynamics.

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8



Black Sea grain deal extended for two months

Editorial staff



The extension of the deal ensures the flow of ships will continue and averts feared tensions on grain prices.

Moscow gave the green light to renewing the Black Sea Initiative which was set to expire on 18 May. The news was given by the British Agency Reuters which, on the eve of the deadline, and thanks to the mediation of Turkey and of the United Nations, announced the extension for a further sixty days of the agreement which has thus far ensured maritime transit in the Black Sea for trading grain and other foodstuffs under safety conditions.

The decision – Maria Zakharova, spokesperson for the Russian Foreign Ministry stated – contributes “not with words but with deeds” to ensure the supply of food and global food security, even though Moscow’s overall assessment of the agreement has not changed.

At the negotiating table, the Kremlin had laid down a series of demands for the extension, asking in particular that restrictions on insurance, logistics and payments should be removed as they created a barrier to exports of grain and fertilisers even though not subject to Western sanctions.

From last July to date, the Black Sea Initiative has allowed Kiev to export more than 30 million tonnes of grain and foodstuffs, including 625 thousand tonnes of food in World Food Programme vessels to Afghanistan, Ethiopia, Kenya, Somalia

and Yemen, countries experiencing war and famine difficulties.

The markets also breathe a sigh of relief. The extension of the deal ensures supplies and guarantees regular maritime traffic for a further two months. Failure to extend the deal on the other hand, would have triggered immediate tension on grain and oil crop prices on worldwide commodity exchanges, with a new risk of supply shock and of a recurrence of speculative demand on the financial markets.

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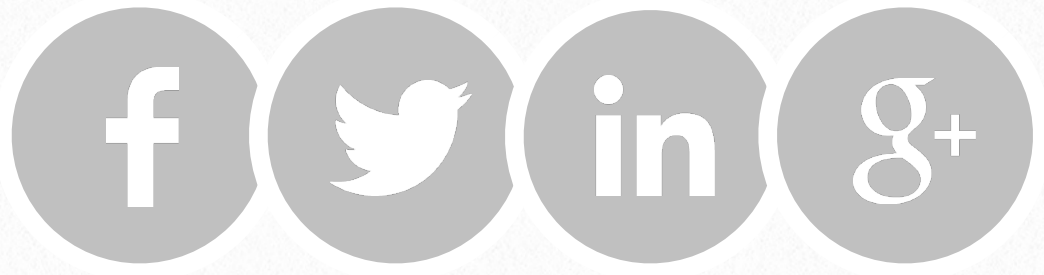


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9



Grants covered by the ISI INAIL 2022 call for proposals: the Pastaria webinar recording is now available

Editorial staff



The purchase of new equipment to replace obsolete machines and plants or to reduce the risk on the manual handling of loads, together with the decontamination of materials containing asbestos, are among the most interesting financeable measures for pasta manufacturers and supply chain operators included in the ISI INAIL 2022 call for proposals illustrated in Pastaria's recent webinar. The recording is now available.

Up to 130,000 euro of contribution for purchasing new equipment with the ISI INAIL 2022 call for proposals: opportunities for pasta manufacturers and supply chain companies is the title of the Pastaria webinar which was held on 27 April and repeated on 12 May.

The recording of the webinar organised in collaboration with ATS Consulenti Associati is now available.

Funding and objectives

INAIL has allocated 333 million euro with the aim of providing an incentive to Italian businesses to implement projects for improving workers health and safety in respect of pre-existing conditions.

Beneficiaries

All companies, including sole proprietorships, throughout the national territory and registered with the Chamber of Commerce, Industry, Crafts and Agriculture and, only as concerns Axis 2, also third sector organisations not registered with the Chamber of Commerce.

Types of financeable projects

The call envisages the possibility of funding:

- Investment projects (purchase of equipment, machines, plants, etc.)
- Projects to reduce the risk on the manual handling of loads MHL (purchase of equipment, machinery, plants, etc.)
- Projects for the decontamination of materials containing asbestos

Intensity of the aid

The non-repayable funding (under the de minimis rule), amounts to 65% contribution for Axis 1, 2 and 3 as above, calculated on the expenses incurred and deemed admissible net of VAT up to a maximum amount of €130,000.00.

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Timeline and method of applications

Applications must be submitted on the INAIL portal from 2 May 2023 to 16 June 2023 and must concern projects that have not yet been implemented.

Funding is provided according to a chronological timeline positive assessment, with the “click day” method.

To watch the Pastaria webinar

If you missed the webinar, you can catch up by watching the recording, published on pastaria.it. [Click here](#) to watch the webinar.



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