Pastaria international

The professional information network magazine for pasta manufacturers

- www.pastaria.it
- www.pastariahub.com
- www.pastabid.com

1
2022

Pasta machines and equipment since 1955

From small pasta shops and artisanal pasta makers to industrial pasta factories

EP150

MC320

CASTIGLIONI NEDO

ITALIAN FOOD AND PACKAGING MACHINES SINCE 1955

Scan the QR code and visit the website

Follow us on:

Via Resegone, 2, Locate Varesino CO, 22070

Tel +39 0331 823 222 - Fax +39 0331 823 221 - www.castiglioninedo.it - info@castiglioninedo.it

Cod.Fisc. e P.IVA 02544010131

Colophon

Pastaria International DE
1/2022
January

PUBLISHER
Kinski Editori S.r.l.
registered office
Via Possioncella 1/1 • 42016 Guastalla
operational headquarters
Via Dall'Aglio 21/2 • 43122 Parma (Italy)
tel. +39 (0)521 1564934
fax +39 (0)521 1564935
Email redazione@pastaria.it
ROC no. 23238

EDITOR-IN-CHIEF
Lorenzo Pini

INTERNET SERVICE PROVIDER (ISP)
xPlants.it (Levata di Curtatone, Mantova)

PASTA TECHNOLOGIES GROUP

Filled Pasta Equipment

Special Forming Machine FJS300

Cappelletti Forming Machine FA

Ravioli Forming Machine FAD

- Easy access for cleaning and maintenance
- Made of stainless steel AISI 304 and fully wash-down with high-pressure water and detergent.
- Control panel with user-friendly interface to control the recipes and the production parameters of the machine and its accessories
- Hygienic design
- Quick die change with no tools
- Lubricating system with central unit placed on the cover, easily accessible.

Via Martiri delle Foibe 13 - 35019 Tombolo (PD) - Italy
Phone: 0039 049 7968840 - Fax: 0039 049 7968841
Email: info@pastatechgroup.com - Website: www.pastatechgroup.com

Patrons & Sponsors

Patrons

Pastaria has obtained the patronage of the most prestigious national and international pasta manufacturer associations.

Pastaria patrons

abimapi
Associação Brasileira das Indústrias de Biscoitos, Massas Alimentícias e Pães & Bolos Industrializados

APPAFRE
Associazione produttori pasta fresca della piccola e media impresa

appf
Associazione Produttori Pasta Fresca

IPO INTERNATIONAL PASTA ORGANISATION

MÜSAD
MAKARNA ÜRETİCİLERİ VE SANAYİCİLERİ DERNEĞİ

NATIONAL PASTA ASSOCIATION

Unión de Industriales Fideeros de la República Argentina
UIFRA

UN.A.F.P.A.
Union des Associations de Fabricants de Pâtes Alimentaires de l'U.E.
Union of Organizations of Manufacturers of Pasta Products of the E.U.

Unione Italiana Food
qualità, gusto e piacere


THE SHAPES
MATTER
Sandoré
SHAPES YOUR FOOD
www.sandore.com

Sponsors

The information and professional update resources that are part of the Pastaria network are freely distributed without charge thanks to the collaboration and support of leading companies operating on an international level to supply ingredients, semi-processed products, equipment and systems for manufacturing fresh/dried pasta, gnocchi and ready meals.

Pastaria sponsors

Main sponsor

MOLINO GRASSI
Creiamo qualità

dal 1877 mininni Industria Molitoria

Leading sponsor

ANSELMO
MACHINES AND SYSTEMS FOR PASTA FACTORIES

CASTIGLIONI
ITALIAN FOOD AND PACKAGING MACHINES

Frigoimpianti

Km. Kappa Emme Zero

LEBEN INGREDIENTS

LYCO Manufacturing, Inc.


Save the Date
NATIONAL PASTA ASSOCIATION
2022 Annual Meeting
March 6 - 8, 2022
LaPlaya Beach & Golf Resort
Naples, FL
Visit ilovepasta.org for information

Leading sponsor

Molino Dallagiovanna

PAMA ROMA

NEW FLAVOURS ITALIAN SENSATIONS

PASTA TECHNOLOGIES GROUP

Sandore Food Machines

Sponsor

AL.MA. Fresh Pasta Machinery

biofresh fresh thinking in crop storage

CUSINATO Innovative Conveying and Storage Technologies

DEMACO

FOODTECH S.R.L. FOOD PROCESSING EQUIPMENT

ITALGI

landucci SINCE 1925

MartinoRossi SpA

MOLINO DeVita

MOLINO PASINI

Opima

PENTA ENGINEERING Machines and Plants for fresh pasta Dry Pasta - Cooked pasta - Ready meals

RAM ELETTRONICA

SAPORITO Denmark Salmon

SARP FOOD TECHNOLOGIES

staedler

ZINDO Pasta Machines & Processing

NEW **FLAVOURS**®
ITALIAN SENSATIONS

Natural artichoke flavouring

scan the QR code
with your smartphone
to discover the difference
a natural artichoke flavouring
can make

starting
from **Nature**

to arrive
at the **Essence**

NEW **FLAVOURS SRL**
Via dell'Artigianato 7 • zona Ind.le Gioiello • 06010 Monte Santa Maria Tiberina (PG) • ITALY
info@new-flavours.com • Tel. +39 075.857.82.95 • www.new-flavours.com

1

Fresh pasta produced from fermented durum wheat flours: technological and nutritional aspects

Pasquale Catzeddu, Simonetta Fois, Manuela Sanna, Piero Pasqualino Piu, Tonina Roggio.
Porto Conte Ricerche (Alghero)

Below is a summary of the presentation by Pasquale Catzeddu at the 2021 edition of Pastaria Festival, describing the technological, sensory and nutritional properties of fresh pasta made using semolina and whole wheat semolina subjected to a fermentation process using yeasts and lactic bacteria.

Pasta is a food typical of the Mediterranean diet, widely consumed across the world. Italy is the world's leading producer, at 3.5 million tonnes/year, and boasts the highest per capita consumption rate, at 23 kg/year (Source IPO, https://internationalpasta.org). Pasta is a good source of carbohydrates and proteins and, despite its high carbohydrate content (approximately 75%), is considered a low glycaemic index food. To retain their leadership position in the sector, companies that produce pasta seek to diversify their range with innovative products containing new ingredients (pulse flours, ancient grains, etc.) or items aimed at specific consumers, such as gluten-free pasta. Many of these new formulations aim to improve the nutritional and health properties of pasta. The use of pulse flours is currently very common and provides an opportunity to increase fibre and protein content (Rawat and Indrani, 2015). Recent years have seen an increase in the production of whole wheat pasta, with a high fibre content, which has benefits for human health. Some authors (Li et al., 2014) state that pasta with a high fibre content, made from wheat or other ingredients such as pulses or other cereals, has a lower glycaemic index. Others assert that consuming foods with a high fibre content can reduce daily calorie intake, prevent hypertension and the onset of colon tumours and type 2 diabetes (Aune et al., 2011; Kumar et al., 2011; Li et al., 2014), as well as stimulate the growth of probiotic microorganisms in the colon and the production of short-chain fatty acids, which have positive health benefits (Giacco et al., 2016). Increased fibre quantity can have also negative effects, however, including an increase in the quantity of phytic acid. Phytic acid is primarily concentrated in the outermost parts of the caryopsis, and is considered an anti-nutritional compound, because it can chelate mineral ions such as Ca^{2+}, $Fe2^{+}$, Mg^{2+}, Zn^{2+}, and therefore limit their bioavailability (Hemery et al., 2007). Ingredients added to improve the health and nutritional properties of pasta can, however, negatively affect the quality of the pasta (Li et al., 2014). Some authors (Aravind et al., 2012) have noted a deterioration in the sensory properties and texture after cooking of spaghetti made using high percentages of bran (30%).

Likewise, the addition of organic acids to improve the shelf life of fresh pasta can change the quality of the pasta, weakening the gluten network (Shiau and Yeh, 2001).
Traditionally, pasta-making involves an initial step of imbibition of water by the semolina, followed by an extrusion step. Pasta production technology does not provide for microbial fermentation, a common practice, instead, in bread-making, using mother dough and compressed yeast. Many studies have identified the sensory, nutritional and technological benefits of using mother dough in bread-making (Chavan & Chavan, 2011). Bread made with mother dough contains more resistant starch and has a lower glycaemic index (Scazzina et al., 2013). The use of bran that has undergone fermentation notably improves the sensory quality of whole wheat bread and lowers the phytic acid content (Poutanen et al., 2009). The vast bibliography on the properties of bread made with mother dough inspired researchers to apply microbial fermentation to the fresh pasta production process, and study its effects on the product in terms of technological, sensory and nutritional quality.

Microbial fermentation applied to fresh pasta production

Fermented semolina and pasta preparation method

The study was carried out at Porto Conte Ricerche, a company which is part of the Sardinia Science and Technology Park. Remilled semolina (Extra Arancio, Selezione Casillo S.r.l., Corato, Bari, Italy) and whole wheat semolina (Integrale, Selezione Casillo S.r.l., Corato, Bari, Italy) were subjected to fermentation, with the aid of yeasts and lactic bacteria, using dedicated equipment (fermenter) that allows times and temperatures to be set for both fermentation and storage. Daily refreshes were performed using one part fermented product, one part flour and one part water (dough yield 200). The product used to prepare the pasta had the following characteristics: pH of 4.0 - 4.2, titratable acidity (TTA) of 10 (ml NaOH N/10 per 10 g of dough) in the fermented semolina and 13 in the fermented whole wheat semolina.
The pasta was prepared in a laboratory, mixing semolina with fermented semolina in a bench-top mixer (Dolly, La Monferrina, Italy) equipped with a bronze die. The pasta was pasteurised, packaged in a tray

Siamo i principali produttori
di pasta fresca e gnocchi
in Italia, in Europa e nel Mondo
E questo non è casuale.

Associazione Produttori Pasta Fresca

Unisciti a Noi

"Il Presidente"
Giovanni Rana

parsifaldesign.it

Tra le nostre
specialità da oggi
piatti pronti

I NOSTRI OBIETTIVI

- Ottimizzare il mercato italiano ed inserirsi maggiormente in quello europeo con l'incentivazione e l'adozione anche nel mondo della pasta fresca dei **"piatti pronti o da cuocere a base di pasta fresca"**.
- Per tutelare pasta fresca e gnocchi, anche da un punto di vista legislativo nel loro progressivo inserimento nei mercati europei attraverso **ECFF** (European Chilled Food Federation).

I NOSTRI SERVIZI

- **Una guida anticipata sui trend di mercato e su quelli tecnici**.
- Un appoggio sicuro su problemi legislativi generali ed aziendali dove A.P.P.F. è tradizionalmente informata.
- Una gestione associativa concorde e non burocratizzata dove il Presidente e gli Associati hanno diritto ad un voto e la segreteria è sempre vicina.

appf

via Dei Borromeo, 16
Padova - Italy
T. +39 049 8760941

E. info@appf.it
W. **www.appf.it**

SOSTENITORI FORNITORI

- EUROVO S.r.l.
- IBERCHEM AROMAS S.r.l.
- KERRY INGREDIENTS & FLAVOURS S.p.A.
- NEW FLAVOURS S.r.l.
- DI CURZIO S.r.l.
- IDA S.r.l.
- PARMOVO S.r.l.
- SALUMIFICIO LANZARINI S.r.l.
- CEREAL BROKER - SARTIRANA CONSULTING S.r.l.
- BAYERNLAND S.r.l.

Table 1 COOKING PROPERTIES OF GNOCCHETTI MADE USING FERMENTED SEMOLINA

	OCT*	Cooking Loss**	Swelling Index***	Firmness (N)
Control	4.25[a]	4.36[a]	1.61[b]	1.48[a]
Experimental	3.05[b]	3.68[b]	1.59[b]	1.42[a]

Different letters in the same column a indicate significant difference ($P<0.05$)
** Optimum cooking time (min)*
***Loss of solids during cooking (g/100 g of uncooked pasta)*
****Water absorbed (g/g of dried pasta)*
(Extract from Fois et al., 2018)

Table 2 COOKING PROPERTIES OF SPAGHETTI MADE USING FERMENTED WHOLE WHEAT SEMOLINA

	OCT*	Cooking Loss**	Swelling Index***	Protein loss in water****	Firmness (N)
Control	7	4.61[a]	1.34[a]	0.36[a]	6.88[b]
Experimental	7	5.27[b]	1.36[a]	0.45[b]	5.64[a]

Different letters in the same column indicate a significant difference ($P<0.05$).
** Optimum cooking time (min)*
***Loss of solids during cooking (g/100 g of dried pasta)*
****Water absorbed (g/g of dried pasta)*
*****Proteins in cooking water (g/100 g of dried pasta)*
(Extract from Fois et al., 2019)

under modified atmosphere conditions (CO_2/N_2, 30:70), and stored at 4°C. More detailed information on the experimental procedures can be found in Fois et al. (2018), Fois et al. (2019) and Fois et al. (2021).

Characteristics of the pasta

Pasta produced using fermented semolina is naturally characterised by pronounced acidity. The pH of uncooked fresh pasta can vary between 4.5 and 4.9 and its titratable acidity between 4 and 5 (ml of NaOH N/10 per 10 g of pasta). The organic acids produced during the fermentation process pass into the cooking water during cooking; as such, acidity in the cooked pasta decreases to a value of 2. It is well known that the cooking properties of pasta depend on various factors, including the quantity and quality of gluten, the shape of the pasta, and the production technology. The fermentation process can affect the cooking properties of pasta, as the enzymes produced by the microorganisms perform proteolytic action on the gluten proteins, as evinced by the value of free amino acids present in the

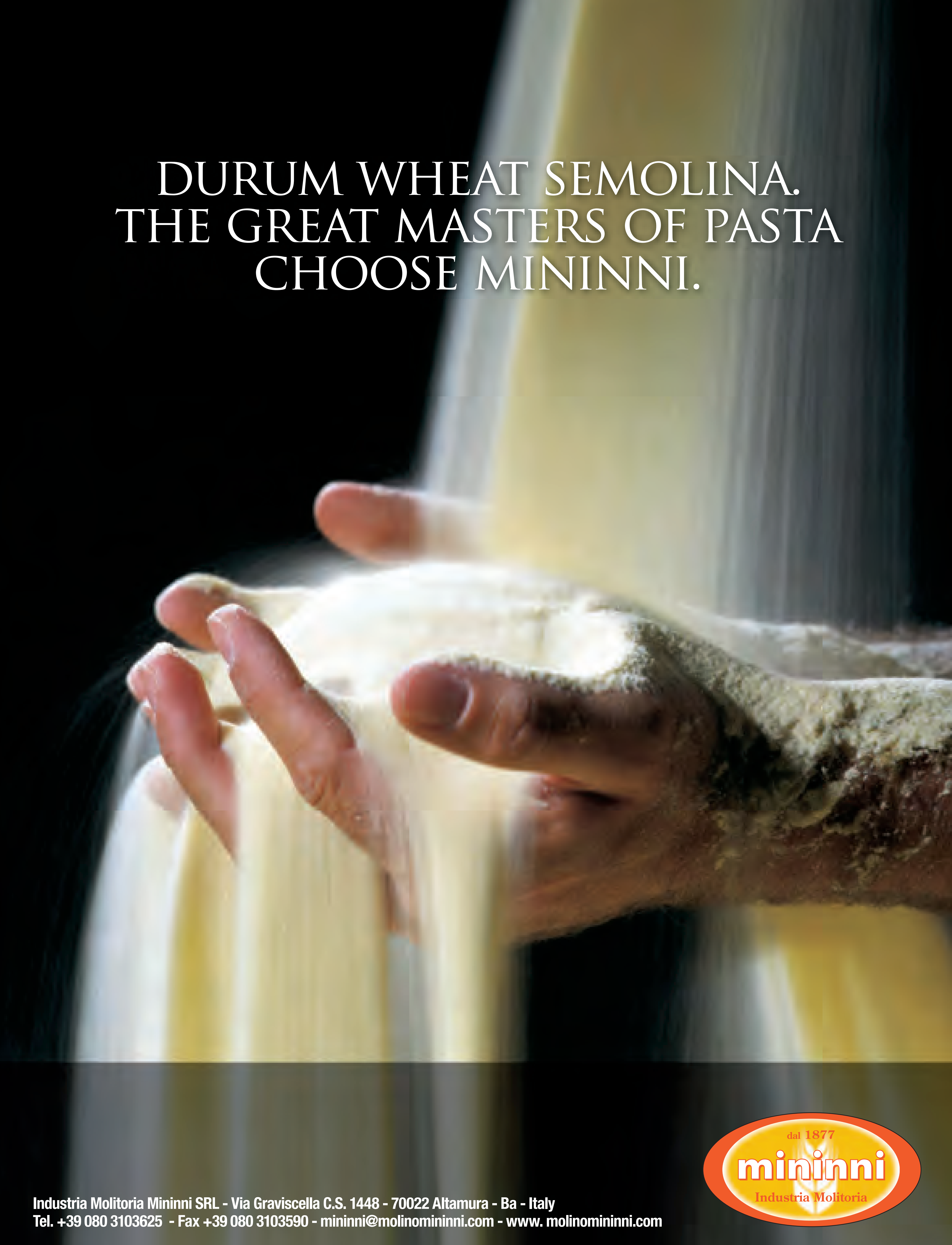

DURUM WHEAT SEMOLINA.
THE GREAT MASTERS OF PASTA
CHOOSE MININNI.
dal 1877
mininni
Industria Molitoria
Industria Molitoria Mininni SRL - Via Graviscella C.S. 1448 - 70022 Altamura - Ba - Italy
Tel. +39 080 3103625 - Fax +39 080 3103590 - mininni@molinomininni.com - www. molinomininni.com

Table 3 **COOKING CHARACTERISTICS OF GNOCCHETTI PREPARED USING SEMOLINA, FERMENTED WHOLE WHEAT SEMOLINA, FERMENTED WHOLE WHEAT SEMOLINA WITH EGG YOLK AND WITH WHOLE EGG**

	Average uncooked weight (g)	Acidity (pH)	OCT (min/sec)	Cooking residue (%)
Control	0.48	6.53	5'15"	4.24
Fermented whole wheat semolina	0.44	4.61	5'00"	4.91
Fermented whole wheat semolina + yolk	0.44	4.73	6'00"	5.15
Fermented whole wheat semolina + whole egg	0.44	4.98	7'00"	5.63

pasta made with fermented semolina compared to the control sample (171.9 vs. 153.4 mg/100 g cooked pasta, respectively). For the reasons set out above, when fermenting semolinas for pasta-making, it is essential to use semolinas with a high protein content.
Tables 1 and 2 set out the results of the cooking tests performed on gnocchetti sardi made using fermented semolina (Table 1) and spaghetti made using fermented whole wheat semolina (Table 2). It can be noted that, by changing the ingredients and the shape of the pasta, the cooking properties of the pasta made with fermented semolina change compared to the control sample.
To improve the cooking properties of the pasta made with fermented semolina, tests were performed in which egg yolk and whole egg, both in powdered form, were added to the mix. The results set out in Table 3 indicate a decrease in optimal cooking time (OCT) for pasta made with fermented whole wheat semolina compared to the control sample containing only semolina, while the addition of egg yolk leads to an increase in cooking time, which is further increased with the addition of the whole egg. The use of fermented semolina leads to an increase in organic residue in the cooking water. The consistency of the pasta at the OCT, expressed as resistance to cutting, was found to be better in all cases in the control compared to the samples made using fermented semolina (Figure 1) but, of the latter, those featuring egg had the better consistency. These tests show that the use of egg, and whole egg in particular,

can help improve the cooking properties of pasta made with fermented semolina. An interesting aspect of adding fermented semolina is its capacity to increase the yellow colour of the pasta. Laboratory tests show that the yellow index (b*) increases from a value of 30.45 in the control sample to 32.67 in the pasta made with fermented semolina (Fois et al., 2018), while analyses performed on dough prepared at a pasta factory indicate that the b* value of dough prepared using fermented semolina, found to be 36.39, is higher than that of the dough prepared using just semolina (33.99) and that prepared using (non-fermented) semolina and egg yolk (35.38).

Shelf life of filled fresh pasta

Fresh pasta is an easily perishable product, due to its high moisture content and high water activity levels that facilitate the development of microorganisms. This problem is amplified in the case of filled

Figure 1 **CONSISTENCY OF GNOCCHETTI PREPARED USING VARIOUS INGREDIENTS. TESTS USING THE OPTIMAL COOKING TIME ARE MARKED IN GREEN, WHILE TESTS IN WHICH THE PASTA WAS COOKED FOR 1 MINUTE LONGER THAN THE OPTIMAL TIME ARE MARKED IN YELLOW**

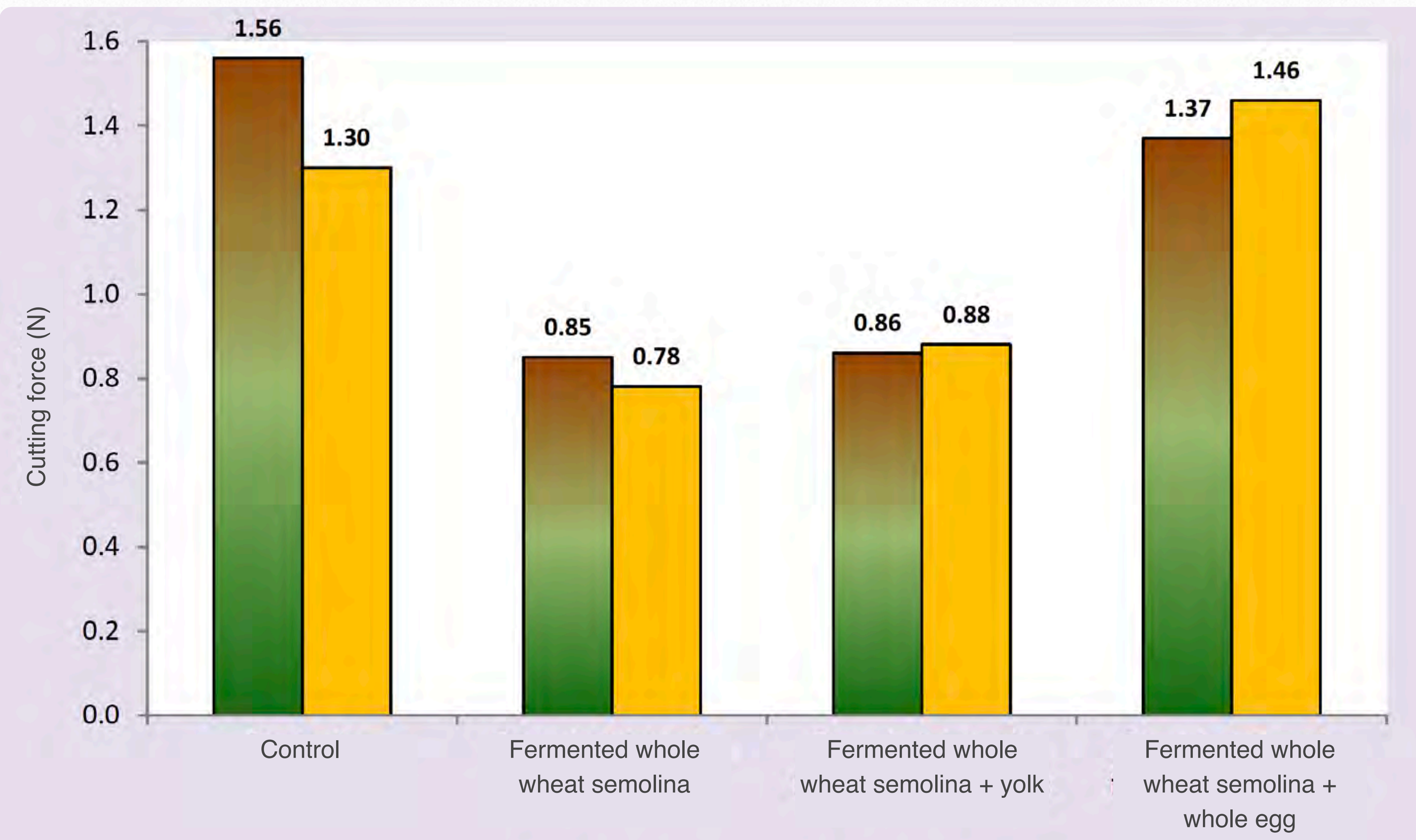
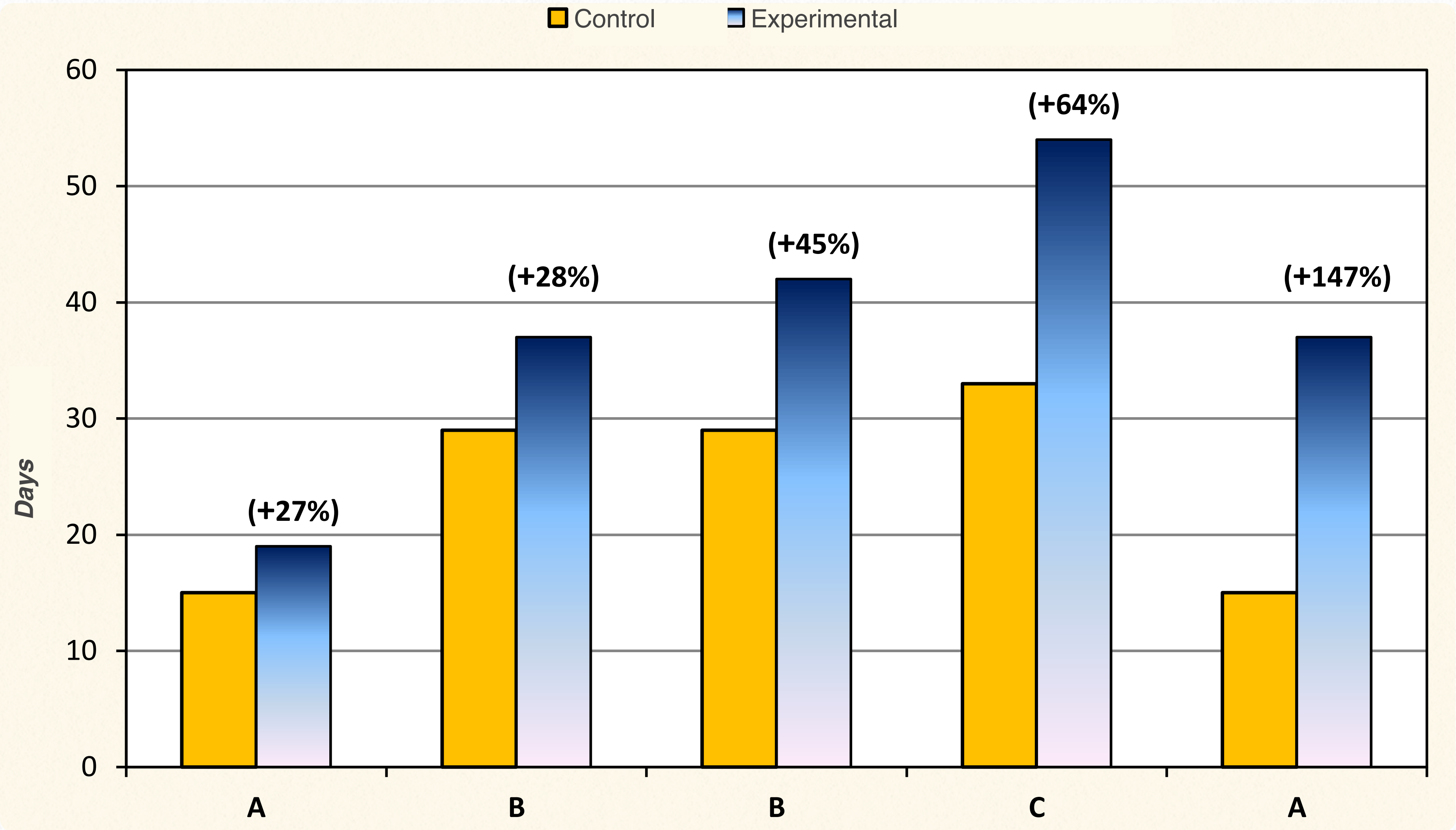
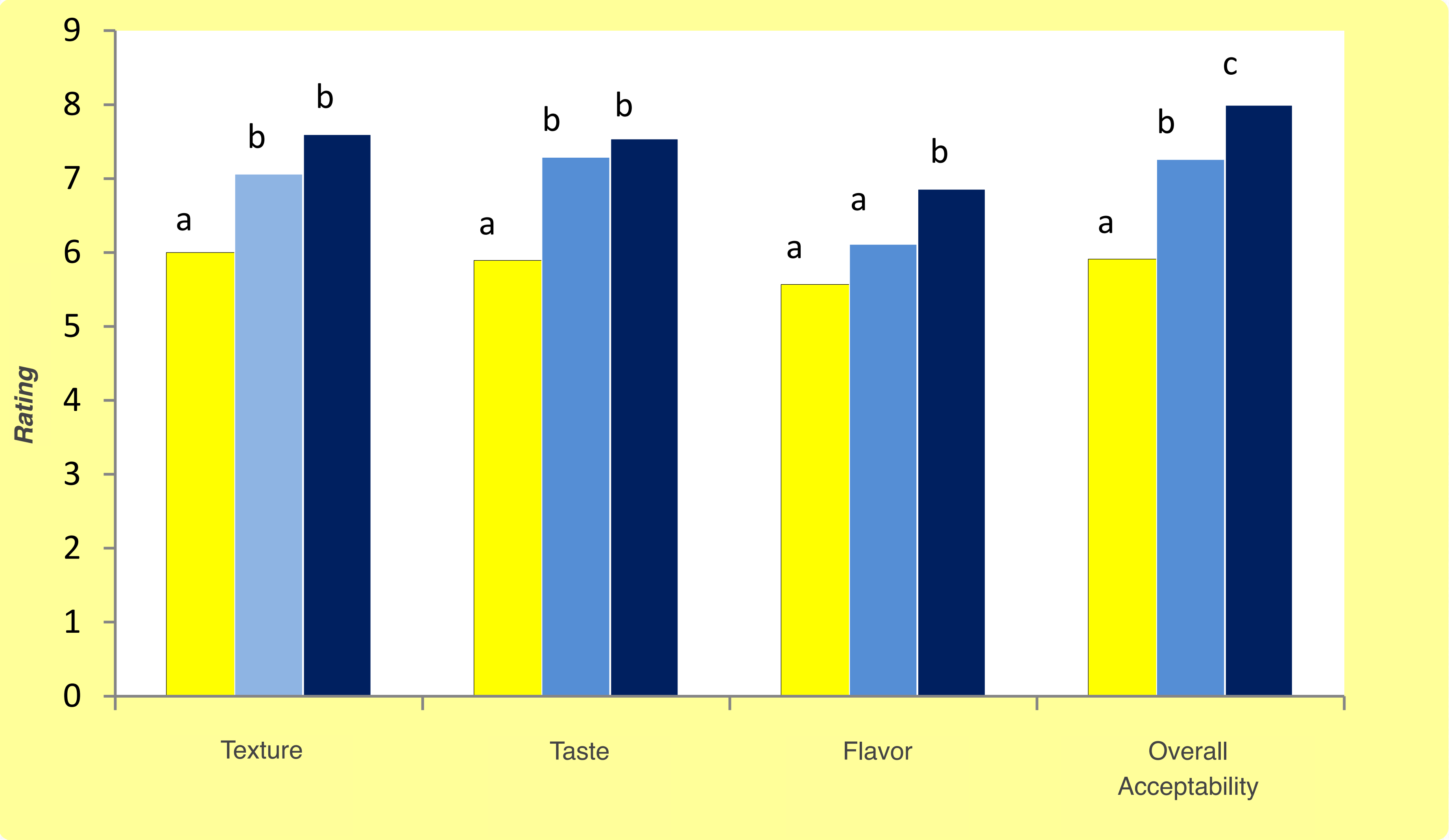


Figure 2 **SHELF LIFE OF FILLED FRESH PASTA PRODUCED AT THREE DIFFERENT PASTA FACTORIES (A, B, C). THE CONTROL FILLED FRESH PASTA IS MARKED IN YELLOW, WHILE THE FILLED FRESH PASTA PREPARED USING FERMENTED SEMOLINA IS MARKED IN BLUE. THE INCREASE IN THE SHELF LIFE OF PASTA MADE WITH FERMENTED SEMOLINA IS INDICATED IN PARENTHESIS**



fresh pasta, as the filling transfers moisture to the dough, facilitating the development of microorganisms on the dough itself, and moulds in particular, reducing the shelf life or commercial life of the product. Pasteurisation and modified atmosphere packaging are the techniques used to reduce microorganisms and slow their development. Pasta-making tests carried out at three different pasta factories, located in Sardinia, showed an increase in the shelf life of pasta made with fermented semolina compared to the control sample. To perform these tests, ricotta ravioli were prepared using dough made with fermented semolina and a control dough. All samples underwent pasteurisation heat treatment at the factory. Two of the pasta factories (referred to as B and C in Figure 2) packaged the ravioli under modified atmosphere conditions, while pasta factory A (Figure 2) packaged the ravioli under ordinary atmosphere conditions. The ravioli stored at 5°C were analysed to

Figure 3 **RESULT OF THE ACCEPTABILITY TEST PERFORMED ON TWO SPAGHETTI SAMPLES. YELLOW IS USED FOR THE CONTROL SAMPLE, PREPARED WITH WHOLE WHEAT SEMOLINA. TWO SHADES OF BLUE ARE USED FOR THE SPAGHETTI PREPARED WITH FERMENTED WHOLE WHEAT SEMOLINA; IN THE CASE OF THE LIGHTER BLUE, THE SAMPLE WAS PROVIDED TO THE CONSUMER WITHOUT ANY INFORMATION ON THE PRODUCT, WHILE IN THE CASE OF THE DARKER BLUE, THE SAMPLE WAS PROVIDED TO THE CONSUMER WITH INFORMATION ON HOW IT WAS PREPARED**



Extract from Fois et al., 2021

determine the total microbial count, and the count of yeasts and moulds. The end of shelf life was defined as the point that 10^6 colony forming units (CFUs) is exceeded, in relation to the total microbial count, or individual mould colonies form on the surface of the product. Figure 2 shows the percentage increase in the shelf life of samples made with fermented semolina compared to the control samples. In the case of the latter, the shelf life specified by the company was used. As can be seen in the histogram, there was an increase in shelf life for all samples produced using fermented semolina. The use of fermented semolina to prepare the dough can therefore serve as a valid tool to improve the shelf life of products and

LYCO Manufacturing, Inc.

THE *EXPERTS* IN INNOVATIVE FOOD PROCESSING MACHINERY

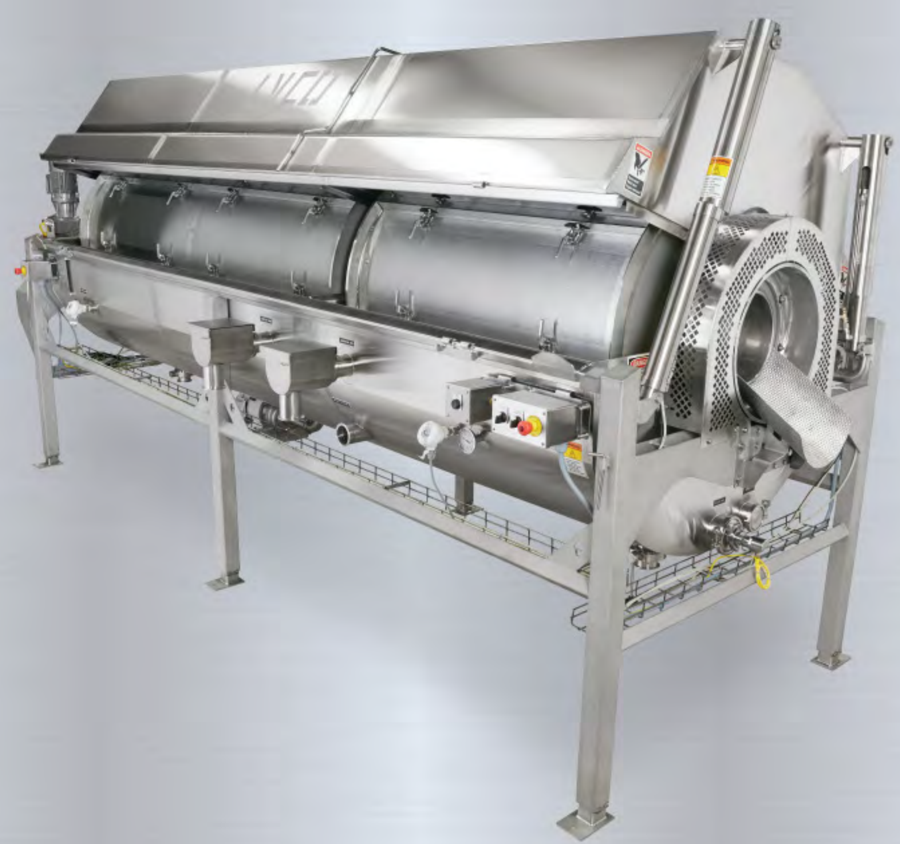
Columbus, Wisconsin
920-623-4152
sales@lycomfg.com
www.LycoMfg.com

SAVE SPACE WITH COOKING AND COOLING IN ONE MACHINE

Lyco's innovative close coupled design eliminates the need for an intermediate conveyor between two separate hot and cold machines. Simplifying and saving on clean-up and maintenance. Since 1995, we have sold over 200 Combination Cooker-Coolers.

COMBINATION COOKER-COOLER

- **Higher productivity**
- **Zero losses from clumping**
- 5-10% higher yield compared to belt systems
- Common CIP system
- Zero labor to run one main drive



HYDRO-FLOW® AGITATION KEEPS SPAGHETTI SUSPENDED AND MOVING

36 INCH COOKER-COOLER PASTA COOK TIMES

PASTA COOK TIME / MINUTE	8	9	10	11	12	13	14	15
Pasta Short PPH	2,350	2,100	1,850	1,700	1,500	1,400	1,300	1,200
Pasta Long PPH	1,450	1,300	1,150	1,050	950	900	800	750

SUGGESTED APPLICATIONS

PASTA

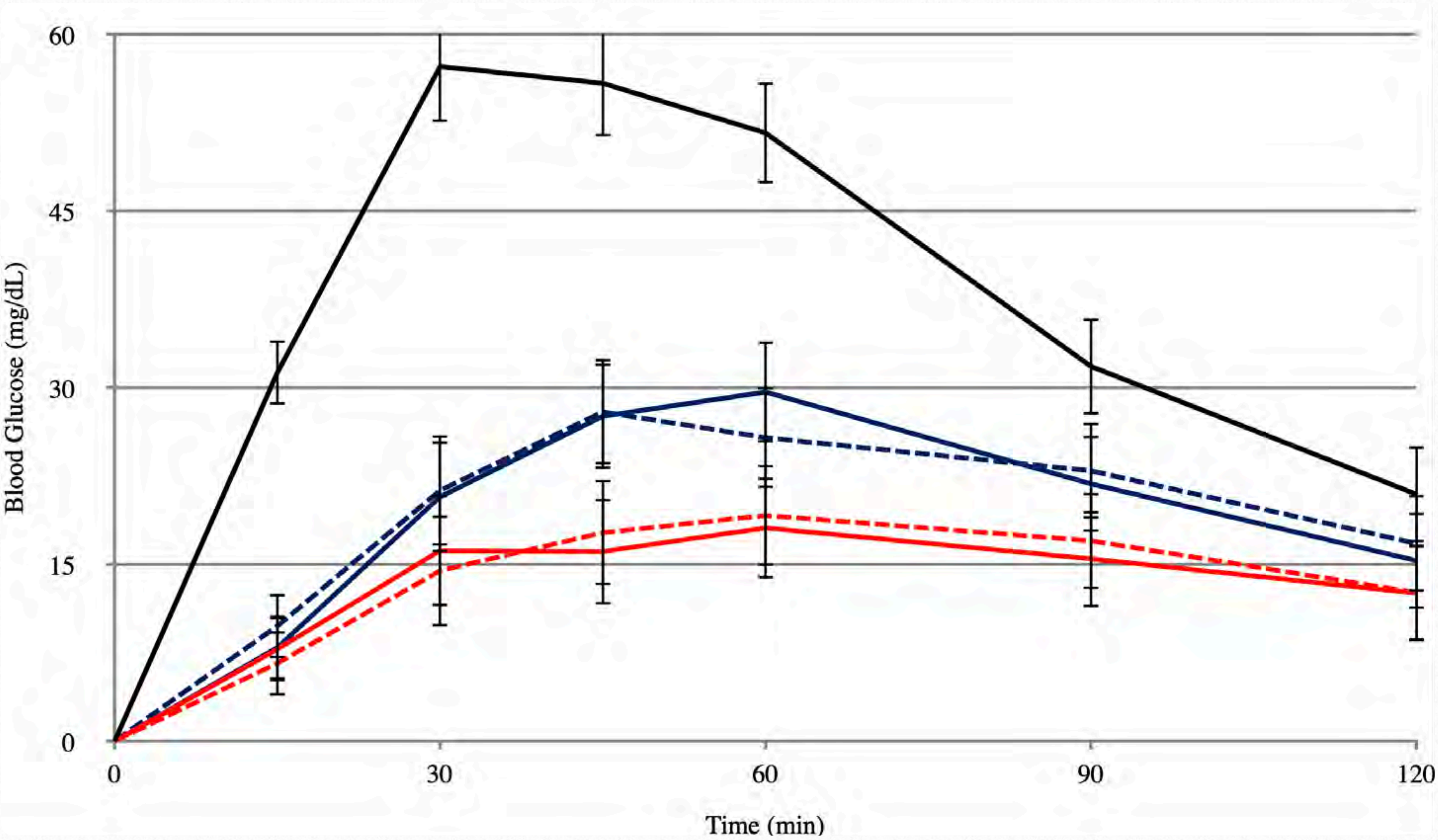
RICE

VEGETABLES

DRYBEANS

think GREEN
Lyco innovations save energy and reduce waste

Figure 4 POSTPRANDIAL GLUCOSE TREND FOR 4 TYPES OF PASTA: WITH SEMOLINA (SOLID RED LINE), WITH FERMENTED SEMOLINA (DASHED RED LINE), WITH WHOLE WHEAT SEMOLINA (SOLID BLUE LINE), WITH FERMENTED WHOLE WHEAT SEMOLINA (DASHED BLUE LINE). THE BLACK LINE INDICATES THE CONTROL GLUCOSE SOLUTION



Extract from Fois et al., 2021

guarantee their wholesomeness, provided that the product undergoes pasteurisation. Indeed, the microbiological analyses performed on fresh, unpasteurised gnocchetti sardi showed that after six days of storage at 5° C, pasta made with fermented semolina had higher microbial counts compared to the control (Fois et al., 2018), due to microorganisms that ferment the semolina.

Sensory properties

The addition of fermented semolina affects the sensory properties of the pasta. A sensory analysis discrimination test (triangle test, UNI EN ISO 4120:2008) carried out on fresh ravioli made with fermented semolina and the control ravioli (without fermented semolina), made by the same company, found a statistically significant difference between the two products. The hedonic scale method set

out in ISO 4121 (2003) was used to evaluate the acceptability level of the pasta. Consumers were asked to rate spaghetti made using fermented whole wheat semolina, and control spaghetti, using a nine-point hedonic scale. The results, set out in Figure 3, show that the average ratings given to spaghetti made with fermented whole wheat semolina are significantly higher than those given to the control sample. The test was performed under both blind and non-blind conditions. It is interesting to note that when consumers were informed of the pasta preparation method, using fermented semolina, the acceptability rating increased significantly (Fois et al., 2019).

Nutritional properties

As described by Fois et al. (2019), the fermentation process leads to an increase in free amino acids, total phenols and antioxidant capacity in pasta made with fermented whole wheat semolina

Frigoimpianti
italian food technology

2021 30° 1991

Custom designed and manufactured machines

Pasteurisation tunnels with temperature and humidity control
Ideal for fresh pasta

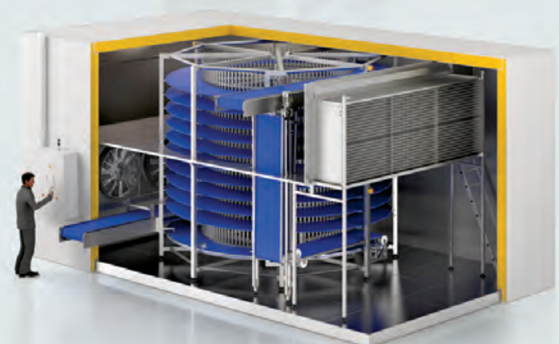
HIGH ENERGY EFFICIENCY

NATURAL APPEARANCE AFTER TREATMENT

LARGE PRODUCTIONS IN SMALL SPACES

PASTEURISER "P.V.R."

DROP TUNNEL "D"



SPIRAL TUNNEL

SPIRAL PASTEURISER "COMPACT"

FRIGO IMPIANTI s.r.l.
Via dei Lecci, 18 - Bastia Umbra - Perugia - Italia
Tel. + 39 075 801 04 89 - info@frigoimpianti.it

www.frigoimpianti.it

Table 4 ANALYSIS OF THE DIGESTIBILITY OF THE CARBOHYDRATES PRESENT IN PASTA

	Glycaemic Index	Glycaemic load[1]	Available carbohydrates (%)	Resistant starch[2]
Semolina	38.0[b]	23.9[c]	39.24[a]	45.6[b]
Fermented semolina	41.0[b]	21.8[d]	33.28[b]	56.7[a]
Whole grain semolina	57.0[a]	31.3[a]	34.27[b]	40.8[c]
Fermented whole wheat semolina	55.5[a]	27.8[b]	31.32[c]	45.0[b]
Glucose solution	100			0

1. glycaemic index per available carbohydrates
2. % of total starch

Extract from Fois et al., 2001

compared to unfermented whole wheat semolina. As regards the glycaemic response to pasta consumption, the results of the study carried out on four pasta samples (pasta with semolina, pasta with fermented semolina, pasta with whole wheat semolina and pasta with fermented whole wheat semolina), set out in Figure 4, show that ingestion of pasta made with whole wheat semolina, whether fermented or unfermented, leads to a higher increase in the blood glucose level compared to pasta made with semolina, whether fermented or unfermented. Furthermore, there are no substantial differences in the glycaemic response produced by the fermented and unfermented product. Consequently, the glycaemic index value is higher in pasta containing fibre (Table 4).

As such, it can be concluded that the presence of fibre in pasta promotes the digestive enzyme action and, therefore, an increase in blood glucose levels. The same table also sets out the glycaemic load values, obtained by multiplying the value of the glycaemic index by the available carbohydrates in a portion of cooked pasta (equal to 160 g). In this case, the glycaemic load is lower in pasta with fermented semolina and fermented whole wheat semolina, because the quantity of available carbohydrates is lower in these products. The quantity of resistant starch, i.e. starch that is not digested in the small intestine and that feeds the gut microbiota, is higher in pasta made with fermented semolina (Table 4). It can therefore be concluded that pasta made with fermented

semolina has greater nutritional properties compared to the control sample, because the same portion has a lower glycaemic load and a higher quantity of resistant starch.

Conclusions

Microbial fermentation can be applied to fresh pasta production with certain benefits, including extending its shelf life, improving its sensory properties, particularly in the case of products containing fibre, and improving its nutritional properties. It should, however, be noted that the fermentation process affects the technological properties of the gluten and, therefore, the quality of cooked pasta. As such, appropriate strategies must be adopted to ensure that the quality of the product remains high, including, for example,

fermenting flours with a high protein content or using ingredients (such as egg) to improve the consistency of the end product.

Bibliography

Aravind, N.; Sissons, M.; Egan, N.; Fellows, C. 2012. *Effect of insoluble dietary fibre addition on technological, sensory, and structural properties of durum wheat spaghett*i. Food Chem. 130, 299–309.

Aune, D.; Chan, D.S.M.; Lau, R.; Vieira, R.; Greenwood, D.C.; Kampman, E.; Norat, T. 2011. *Dietary fibre, whole grains, and risk of colorectal cancer: Systematic review and dose-response meta-analysis of prospective studies*. BMJ, 343:d6617, doi:10.1136/bmj.d6617.

Chavan, R.S. and Chavan, S.R. 2011. *Sourdough Technology - A Traditional Way for Wholesome Foods: A Review*. Compr. Rev. Food Sci. Food Saf. 10, 170-183.

Fois, S.; Piu, P.P.; Sanna, M.; Roggio, T.; Catzeddu, P. 2018. *Starch digestibility and properties of fresh pasta made with semolina-based liquid sourdough*. LWT - Food Sci. Technol. 89, 496-502.

Fois, S.; Campus, M.; Piu, P.P.; Siliani, S.; Sanna, M.; Roggio, T.; Catzeddu, P. 2019. *Fresh pasta manufactured with fermented whole wheat semolina: physicochemical, sensorial, and nutritional properties*. Foods. 8, 422-434.

Fois, S.; Piu, P.P.; Sanna, M.; Roggio, T.; Catzeddu P. 2021. *In vivo and in vitro starch digestibility of fresh pasta produced using semolina-based or wholemeal semolina-based liquid sourdough*. Foods. 10, 2507. https://doi.org/10.3390/foods10102507

Giacco, R.; Vitale, M.; Riccardi, G. 2016. *Pasta: Role in Diet*. In Encyclopedia of Food and Health; Elsevier BV: Berlin, Germany, Volume 4, pp. 242–245.

Hemery, Y.; Rouau, X.; Lullien-Pellerin, V.; Barron, C.; Abecassis, J. 2007. *Dry processes to develop wheat fractions and products with enhanced nutritional quality.* J. Cereal. Sci., 46, 327–347.

ISO 4121:2003. *Sensory analysis (*Guidelines for the use of quantitative response scales).

Kumar, P.; Yadava, R.K.; Gollen, B.; Kumar, S.; Verma, R.K.; Yadav, S. 2011. *Nutritional Contents and Medicinal Properties of Wheat: A Review.* Life Sci. Med. Res. 22, 1-10.

Li, M.; Zhu, K.; Guo, X.; Brijs, K.; Zhou, H. 2014. *Natural Additives in Wheat-Based Pasta and Noodle Products: Opportunities for Enhanced Nutritional and Functional Properties*. Compr. Rev. Food Sci. Food Saf. 13, 347-357.

Rawat, N.; Indrani, D. 2015. *Functional ingredients of wheat-based bakery, traditional, pasta, and other food products*. Food Rev. Int. 31, 125-146.

Poutanen, K.; Flander, L.; Katina, K. 2009. *Sourdough and cereal fermentation in a nutritional perspective*. Food Microbiol. 26, 693–699.

Scazzina, F.; Siebenhandl-Ehn, S.; Pellegrini, N. 2013. *The effect of dietary fibre on reducing the glycaemic index of bread*. Br, J. Nutr. 109, 1163–1174.

Shiau, S.; Yeh, A. 2001. *Effects of alkali and acid on dough rheological properties and characteristics of extruded noodles*. J. Cereal Sci. 33, 27–37.

UNI EN ISO 4120:2008. Analisi sensoriale-Metodologia- Metodo triangolare.


BRAZILIAN
BISCUITS, PASTA
AND INDUSTRIALIZED
BREADS & CAKES
ASSOCIATION
TOGETHER WE
ARE STRONGER
We represents more than 40 billion in sales per year, 3.5 million tons of products consumed and 158k tons of brazilian Biscuits, Pasta and Industrialized Breads & Cakes around the World.
abimapi
.COM.BR
Brazilian Manufacturers Association of Biscuits, Pasta and Industrialized Breads & Cakes
BRAZIL IS IN THE TOP 10
IN THE BAKERY INDUSTRY
3rd place for biscuits in the world;
3rd place in the dried pasta in the world;
9th package bread in the world.
Follow us on:

2

Pasta, Bakery & Milling back in the spotlight at Ipack-Ima 2022

Press release

The consumption of pasta and other grain-based products will double in 10 years, in the period 2010-2020, from almost 9 to about 17 million tonnes per year. This was revealed by the Italian Food Union, which recently illustrated the figures for the dish that is the symbol of Italian cuisine. Italy, in the panorama of pasta, remains the reference point for production (3.9 million tonnes) and exports (2.4 million tonnes).
These data show a dynamic market that excels technologically and is represented at Ipack-Ima, the international exhibition dedicated to processing and packaging solutions, scheduled from 3 to 6 May 2022 at Fiera Milano Rho.
All players have confirmed their presence at the show, including Axor, Brambati, Bühler, BVT, Cavanna, Comek, Fava, FRITSCH Bakery Technologies, Gruppo Gea, HDG, Houdijk Holland, Italpast, Niccolai Trafile, Nuova Euromec, Ocrim, Omas Industries, Polin, Livetech, Tecnopool, Vacuum and many other companies specialising in this segment. Ipack-Ima is visited by more than 74,000 professionals and buyers from 146 countries, 17% of whom come from the grain-based products market, who will find cutting-edge solutions at the show, from weighing, packaging and palletizing lines, milling, cleaning and flour handling systems, mixing, kneading, extrusion machines, dies and cutting systems to industrial baking systems for biscuits and bakery products.
In addition to technologies for these sectors, Ipack-Ima adds an increasingly distinctive element for the industry: packaging materials. More than 200 exhibitors will give substance to the Ipack-Mat project, the Ipack-Ima brand dedicated to innovative materials - an element of particular interest to the marketing teams of manufacturing companies looking for new product ideas, where packaging plays an increasingly central role.
Special attention will be devoted to sustainability, materials in contact with food, product safety and product preservation. In addition to Ipack-Mat, a second special area will deal with this topic: Ipack-Ima lab, an exhibition section dedicated to research laboratories, certification institutes, and centres specialising in conformity standards.

The event will also host the awards ceremony of the prestigious WorldStar event, the Global Packaging Awards promoted by the World Packaging Organisation (WPO) as well as the Best Packaging Awards organised by the Italian Packaging Institute, to promote the innovation offered by the Italian packaging industry.
Ipack-Ima is therefore the first face-to-face meeting for the main players in the processing and packaging world, with industry-wide previews of future consumer trends. Technological offerings must respond to new consumer demands: for example, there is a move towards diversification of pasta, produced with raw materials with a high protein content and greater added value, such as legume flours, lentils, chickpeas, beans and peas, or towards whole-wheat, gluten-free and rice pasta, as requested by consumers who are increasingly interested in "alternative" pasta.
Mark your calendar for Ipack-Ima from May 3 to 6, 2022, held at Fiera Milano

where strict safety protocols will be ensured by a hub that has hosted 4.5 million visitors, 36,000 companies every year from all over the world, including 80 exhibitions and 160 congresses. Concurrently with Ipack-Ima with other thematic exhibitions dedicated to instrumental mechanics, as part of “The Innovaton Aliance” project: Intralogistica Italia, focusing on goods handling and warehouse management, Print4All, dedicated to industrial printing, converting and labelling technologies, and the first edition of Greenplast, focusing on the plastics and rubber supply chain with a focus on environmental sustainability, energy efficiency, Reduce-Reuse-Recycle and circular economy.


advertising: ADV Task
From raw material to finished product
with efficiency and reliability
ANSELMO
MACHINES AND SYSTEMS FOR PASTA FACTORIES
ANSELMO IMPIANTI - Via Fossano, 33 - BENE VAGIENNA (CN) - ITALY - www.anselmoitalia.com

3

Commodity price observatory 1/2022

Pastaria Centre for Economic Research

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

Following twelve months characterised by a strong economic recovery, but even more so by the corollary atypical price increases affecting industrial raw materials across the board, the legacy of 2021 will, to some extent, influence macro-economic developments this year.
Coupled with these factors is the uncertainty of the global epidemiological situation linked to the Covid-19 crisis, as new variants of the virus spread.
The latest considerations by the ECB (European Central Bank) provide a useful starting point for understanding the context; they identify the inflationary effect triggered by the major increases in gas and oil prices, which quickly spread diffusely to other costs, as among the leading critical elements. A domino effect saw significant increases in transport costs, starting with sea freight rates, while there has also been a considerable hike in the prices of packaging materials (paper and cardboard first and foremost), metal and microchips and – even more worrying in terms of the potential implications downstream of the production system – across the entire food commodity sector.
As well as the knock-on effects of the energy situation, there is also a logistics element, with operational difficulties at loading and delivery ports, and supply chain bottle necks. Container management, an area that saw issues arise following the inefficiencies caused by the first lockdown, is struggling to return to normal. Yet analysts' fears primarily centre on the potential impacts of higher energy and food costs on household spending power.
To summarise, persistent supply bottle necks, increased raw material prices and the emergence of the Omicron variant of the coronavirus continue to weigh on the prospect of short-term growth.
According to the ECB, an early and more rapid tightening of the monetary policy in advanced economies could, among other things, have significant implications on financial conditions in emerging market economies, an element that could potentially hinder global growth.
Italy appears to be facing continued inflationary pressures and spread risk, with a gradual return to a situation of monetary normality, better

PRICES AND TRENDS OF CERTAIN FOOD RAW MATERIALS (DECEMBER 2021)

National fine common wheat	Price (€/ton)	Monthly variation	Annual variation	Forecast
	326	1.2%	52.7%	▼
Fine durum wheat from North Italy	Price (€/ton)	Monthly variation	Annual variation	Forecast
	527.5	-2.1%	76.4%	=
00 type common wheat flour	Price (€/ton)	Monthly variation	Annual variation	Forecast
	665	2.5%	51.1%	=
Semolina above min. leg. req.	Price (€/ton)	Monthly variation	Annual variation	Forecast
	877.5	0%	76.6%	=
Eggs M	Price (€/100 pcs)	Monthly variation	Annual variation	Forecast
	14.6	8.1%	4.3%	▲
Pork hams for Prosciutto 12 kg and over	Price (€/kg)	Monthly variation	Annual variation	Forecast
	4.12	0.7%	31.6%	▼
Beef – veal meat half-carcass, prime quality	Price (€/kg)	Monthly variation	Annual variation	Forecast
	5.92	2.2%	17%	▲
Raw milk	Price (€/100 kg)	Monthly variation	Annual variation	Forecast
	47.63	2.3%	35.6%	=
Centrifuged butter	Price (€/kg)	Monthly variation	Annual variation	Forecast
	5.57	4.7%	65.8%	=
Grana Padano aged for 9 months or more	Price (€/kg)	Monthly variation	Annual variation	Forecast
	7.1	1%	-4.1%	=
Extra virgin olive oil	Price (€/kg)	Monthly variation	Annual variation	Forecast
	3.97	-8.1%	-17.3%	▼

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.

PRICE MONITORING				
FAO Food Price Index	Price (2014-2016=100)	Monthly variation	Annual variation	Forecast
	133.7	-0.9%	23.1%	▲
Soft Red Winter FOB US Gulf port	Price (USD/ton)	Monthly variation	Annual variation	Forecast
	327.8	-2%	30.5%	▲
Mais, U.S. No. 2 Yellow FOB US Gulf port	Price (USD/ton)	Monthly variation	Annual variation	Forecast
	265.5	6.8%	33.6%	▼
Fao Food Price Index, Soft Red Winter, Mais: December 2021				

known as tapering.

For companies in the food sector, and milling and the pasta industry in particular, the double-digit inflation that, in recent months, has characterised the initial stages of price formation, has set in motion a chain reaction of increases, unavoidable to protect operating margins, which are low as standard across the industrial food sector.

The high price of cereals and oilseeds – a phenomenon, as we know, also affected by the worsening climate situation – has led, as a result of higher animal feed costs, to considerable increases in the livestock production sector too. Similar phenomena have affected sugar and vegetable oil prices. A combination of factors that has already materially impacted upon consumer price dynamics, leading to increases across the agri-food area and affecting pasta in particular.

Suffice to consider that category inflation, in relation to pasta, increased from zero in August to almost 11% in December.

According to Istat calculations, by the end of last year, food inflation (including non-alcoholic beverages) touched 3%, but in June the situation was one of deflation, with prices down 6 tenths of a percentage point year-on-year.

For the stages upstream of consumption, 2021 left as its legacy a 28.1% average increase in agricultural and food commodity prices, according to the Price Food Index prepared by the FAO in relation to the international prices of a set basket of ingredients. The sub-categories of the index, which recorded the highest levels seen in 10 years, included increases of 31.3% for wheat and 44.1% for corn, against a backdrop of strong demand and low global stocks. Increases in vegetable oil prices were even more

FROM THE LAND OF WHEAT
· SINCE ·
PASTA ARGENTINA
· 1860 ·

La mejor Pasta de Sudamérica

VIENE DE
NUESTRO TRIGO

SALE DE
NUESTRO CORAZÓN

pronounced (+65.8% compared to 2020), while increases of 16.9% and 12.7% were recorded for dairy and meat respectively. Sugar reached its highest levels since 2016, up an average of 37.5% year-on-year over the last twelve months. Looking ahead, energy prices may be expected to stabilise, albeit in the context of uncertainty due to various factors, including geopolitical considerations, while food could contribute to keeping consumer prices high.

4

Formulation of egg pasta fortified with tannins: evaluation of antiradical activity and cholesterol oxidation

Ambra Bonciolini
Agricultural, Forestry and Food Sciences Department(DISAFA),
University of Turin

Lipids and cholesterol, found in fresh egg pasta, can be exposed to complex oxidative phenomena during processing. In particular, cholesterol leads to the formation of compounds that are harmful to human health known as oxysterols – cholesterol oxidation products (COPs). This study, among the winners of the Pastaria Awards 2021 in the "degree thesis on pasta" category, examines the formation of oxysterols in two fresh egg pasta shapes fortified with condensed tannins at various concentrations, investigating their potential cholesterol-binding activity.

Fresh egg pasta is a typical Italian product (regulated by Italian Presidential Decree no. 187 of 2001) containing cholesterol, an organic sterol molecule essential for numerous vital functions that, however, if present in high levels in the blood, is correlated with the onset of atherosclerotic phenomena.[1] Eggs are the food with the highest cholesterol content (approximately 200 mg per egg[2]); as such, it is commonly believed that consuming them is correlated with an increase in plasmatic cholesterol, though various studies have not confirmed this hypothesis.[3,4] Instead, the real issue with cholesterol arises from its oxidation products (COPs), compounds that are damaging to human health[5]. Stages in the pasta production process such as mixing, drawing, and cooking can represent critical stages in terms of triggering oxidation reactions, both due to the temperatures involved (autoxidation) and to exposure to light (photo-oxidation).[6,7]
The correlation between oxysterols and pathophysiological conditions in humans is a topic that has attracted ever-greater attention, with increasing numbers of studies carried out to determine their presence in foods.[8] Indeed, it is known that oxysterols contribute to neurodegenerative diseases (Alzheimer's, Parkinson's and Huntington's) and are also linked to mutagenic effects.[9] As such, the addition of antioxidants to food products represents a promising strategy to prevent oxidation reactions.[10] Tannins are water-soluble, plant-based compounds that are easily extracted from food industry by-products,[11] and have many beneficial properties.[12] Their use remains limited, however, both due to their capacity to bind proteins (an antinutritional factor)[11], and due to the astringency for which they are responsible.

The aim of this study was to assess the capacity of two different types of tannins to combat the oxidation of cholesterol in both uncooked and cooked fresh egg pasta, considering two different pasta shapes; the potential capacity of tannins to bind with cholesterol was also determined.

Materials and methods

Materials

The pasta was prepared using tannin powder consisting of ellagic acid esterified with glucose (D); and tannins consisting of gallic acid esterified with quinic acid (E) supplied by a local company. All other ingredients used were bought at the local market (Turin, Italy).

Preparation of the pasta

The pasta was prepared by mixing 140 g of soft wheat flour (type 00), 60 g of durum wheat semolina flour, 80 g of pasteurised egg product and 20 ml of water in a pasta maker (Pastamatic PM 1400 N1, SIMAC, Italy). The tannins were added to the flour based on various percentages of the overall quantity (*p/p*): 0.25 % (concentration 1); 0.50 % (concentration 2); and 1.00 % (concentration 3). An extrusion machine (”Dolly”, Imperia & Monferrina S.p.A., Moncalieri, Italy) was used to produce two pasta shapes: a square shape (Q) and fettuccine (F), with the same volume but different surface areas. At the same time, tannin-free samples (control) of each of the shapes were prepared; finally, the samples were cooked in ultrapure water, at a pasta/water (*p/p*) ratio of 1:10 for 4 minutes. Each experiment was carried out twice (n=2).

Extraction of the antioxidant compounds

The pasta was freeze-dried in a freeze-drier (Lio 5P, SAVATEC) and then ground, and the resulting powder was used to extract the antioxidant compounds in accordance with Fares et al. (2010)[13] with certain modifications. Twenty millilitres of a methanol:water solution (80:20; *v/v*) acidified using formic acid (pH 2.5) were added to 1 g of powder and agitated in the dark for 2 hours. The sample was then centrifuged (12,900 x g, 15 min, 5 °C) and the supernatant was filtered (PTFE filter, 0.45 µm) and stored in amber glass vials at 4°C until the subsequent analyses.

Total phenolic substance content

The total phenolic content (TPC) was determined using the Folin-Ciocalteu colorimetric method described by Cantele et al.,[14] adapted to a 96-well spectrophotometric microplate reader (BioTek Synergy HT, BioTek Instruments, Milan, Italy). The analysis was performed in triplicate and the results are expressed as milligrams of gallic acid equivalent (GAE)/gram of pasta.

Radical-scavenging activity

The radical-scavenging activity (RSA) was carried out through inhibition of the 2.2-

PASTO-DRYER

ONLY ONE MACHINERY
DOUBLE TECHNOLOGY

- Pasteurizing
- Pre-drying

Able to thermic treatments of fresh pasta to be packed in ATM.

- Increasing markets and sales distribution
- Minimal investiment
- Minimal amount of space
- Hight quality of the finish product
- Easy to clean

ZINDO
Pasta Machines & Processing

la baresina

via Foggia 71/73 - 76121 Barletta Italy - tel. +39 0883 510672 fax +39 0883 510741 info@zindo.it www.zindo.it

diphenyl-1-picrylhydrazyl (DPPH•) free radical, using the method described by Gadow et al.[15] with certain modifications[18] to adapt it to a 96-well microplate reader. The analysis was performed in triplicate. Results were expressed in mmol of Trolox Equivalent (TE)/gram of pasta.

Determination of the total sterol content

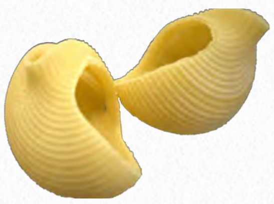
The unsaponifiable portion was isolated as described by Kuczyńska et al.,[16] with certain modifications. Three ml of KOH 4M containing BHT (5 mg/ml) were added to 100 mg of powdered free-dried sample with 1.00 mg of 5α-cholestane and 0.50 mg of 19-hydroxycholesterol, used as internal standards, respectively, to quantify the sterols and COPs. The samples were left to agitate in the dark for 18 hours at room temperature (25°C). Later, the unsaponifiable portion was isolated, adding 10 ml of chloroform and 10 ml of citric acid solution (0.1%; *p/v*) and, following centrifugation (3,600 x g for 15 minutes at 10°C), the organic phase was collected; the extraction was repeated a second time and the organic phases were combined. The unsaponifiable portion was then derivatized: 200 μL of the unsaponifiable portion was evaporated to dryness, then 200 μL of pyridine and 180 μL of BSTFA + 1% TCS (30 min. at 60 °C) were added. Finally, 1 μL of sample was analysed using GC/MS Shimadzu Q2010 Plus (Shimadzu, Kyoto, Japan) equipped with a fused silica capillary column (RXi-5ms, 10 m, 0.1 mm i.d., 0.1 μm film thickness; Restek, Bellefonte, PA). The oven temperature was programmed to between 220 °C and 330 °C (10 °C/min) and maintained at 350 °C for 2 min. using helium as a carrier gas with linear velocity of 47 cm/s. The injection was performed in split mode (1:30 ratio); the signal was obtained in TIC (*Total Ion Current*) mode and quantification in SIM (*Single Ion Monitoring*) mode.

Determination of the lipid content in cooking water

After cooking the pasta, the water was collected, weighed and transferred to a separatory funnel. The lipids were extracted using the method described by Folch et al. (1957); the organic phases were filtered using a paper filter (Whatman, grade 1) and then the solvent was removed using a rotary evaporator at 37°C. The lipid phase was dissolved in 200 μl of *n*-hexane:isopropanol (3:2 *v/v*) containing 10 μg of 5α-cholestane and 1 μL was injected into a GC-FID (GC-2010 Plus, Shimadzu, Kyoto, Japan) equipped with a Rtx-5 capillary column (10 m x 0.10 mm i.d., thickness 0.10 μm; Restek, Bellefonte, PA) in split mode (1:50 ratio). Separation of the main lipid classes (free

L.T.A.

In the sector of equipment production dry pasta, ANSELMO IMPIANTI is distinguished in the segment of semi automatic with LTA. Productivity, reliability and simple use of ma-chi-nery characterize LTA, specialized in design, installation and construction of machinery for special dry pasta production like nests and lasagne.



ANSELMO

MACHINES AND SYSTEMS FOR PASTA FACTORIES

L.T.A - Viale dell'Industria, 11 - 03616 Thiene (VI) Italia - Tel. + 3 9 0 1 7 2 6 5 4 7 5 5-
email: A N S E L M O @ A N S E L M O I T A L I A . C O M - W W W . A N S E L M O I T A L I A . C O M

fatty acids, monoglycerides, free and esterified sterols, diglycerides, and triglycerides) was carried out using a programme set to between 100 and 350°C (5°C/min); the temperature of the injector and the FID were set to 350°C. Helium was used as the gas carrier with a linear velocity of 47.0 cm/sec and each lipid class was identified by way of a comparison with a commercial standards mix analysed under the same analytical conditions as described in previous works.[17]

Determination of the cholesterol oxidation products

The cholesterol oxidation products (COPs) were purified from the unsaponifiable portion as indicated by Rose-Sallin et al.18 Approximately 9/10 of the unsaponifiable portion was added to the SPE-NH_2 cartridge, activated with 3 ml of *n*-hexane. The sample was then eluted with 6 ml of *n*-hexane:ethyl acetate (95:5; *v/v*) and 10 ml of n-hexane:ethylacetate (90:10; *v/v*); the COPs were collected with 10 ml of acetone. The latter was removed with a nitrogen flow. The COPs were derivatized as described in paragraph *Determination of the total sterol content* and dissolved in 100 µL of *n*-hexane, then analysed using GC/MS Shimadzu Q2010 Plus GC/MS (Shimadzu, Kyoto, Japan), equipped with a RXi-5ms fused silica capillary column, as described by Cardenia et al.[19] The injection (1 µL) was carried out in splitless mode (1 min.) and the separation was performed at a temperature programme set to between 250 and 325°C (20°C/min). The injector temperature was set to 325°C, and the transfer line to 340°C. Helium was used as the gas carrier at a linear velocity of 43 cm/s.

The COPs were identified by comparing the mass spectrum (TIC) with that obtained from commercial standards and quantified via SIM analysis.

The extent of cholesterol oxidation was calculated using the following formula [(ΣCOPs – cholesterol)/cholesterol]*100; where cholesterol represents the cholesterol content in the pasta sample and ΣCOPs represent the total content of cholesterol oxidation products.

Statistical analysis

The results were processed statistically using SPSS Statistics software (version 25.0; IBM, Chicago). The analysis of variance (ANOVA) and the Duncan post-hoc test, with a 95% confidence level, were used to identify the significant differences between the average values of the samples, in relation to various tannins, their concentrations, the pasta shape and the effect of cooking.

Kronos®

Better a seed than a ship.

The Kronos project. It originated from a collaboration with Albert Carlton, an American breeder, father of Desert Durum from Arizona, the durum wheat of high quality, imported from the best Italian pasta factories to produce premium pasta. Molino Grassi since 1992 has managed to have the exclusive copyright to reproduce the seeds and cultivate them in Italy, adopting and improving farming techniques adapted to the Mediterranean climate, thus keeping the organoleptic features intact. Kronos is a durum wheat with an unique protein content, resistance to cooking, taste and color, ideal for tasty and always al dente pasta.

Per saperne di più: www.molinograssi.it

MOLINO GRASSI

Results and discussion

Total polyphenol content and antioxidant activity

Determination of the total polyphenol content (TPC) and radical-scavenging activity (RSA) enabled an initial assessment of the performance of the two tannins at the three concentrations in relation to the two shapes, considering both uncooked and cooked pasta, while also assessing their loss following cooking.

Results show that uncooked tests present TPC and RSA values of 1.21 mg GAE/g and 0.79 µmol TE/g respectively. As the concentration of tannins increases, an increase is recorded in both of the parameters, albeit with different performances. Both shapes presented similar values, the D tannin presented a TPC of 1.56–2.46 mg GAE/g, and the E tannin of 2.76–6.31 mg GAE/g; the RSA, meanwhile, was between 4.11–12.78 µmol TE/g for the D tannin and 25.14–81.27 µmol TE/g for the E tannin. As such, it is possible to state that the type of pasta shape does not influence the behaviour and absorption of the tannins.

A comparison between pre- and post-cooking values was carried out to assess the loss of phenolic compounds following exposure to high temperatures and contact with water. TPC in the Q shape presented a significant decrease ($p<0.05$) for all percentages of tannin tested; furthermore, the loss was found to be more notable in samples fortified with the D tannin. Taking the RSA into consideration, after cooking, the E tannin, on the other hand, showed a significant increase ($p<0.05$) in radical-scavenging activity. These results show that at high concentrations, tannins can develop structural changes responsible for the hydrolysis of phenolic substances capable of resulting in increased radical-scavenging activity.

Total sterol content

The sterol component was characterised in both uncooked and cooked pasta, with a range of concentrations of between 21.98 mg/g (Q shape control) and 50.52 mg/g (concentration 3, E tannin, Q shape). Five different sterols were identified and quantified: cholesterol (19.72–36.08 mg/g), β-sitosterol (1.20–2.12 mg/g), campesterol (0.41–0.76 mg/g), stigmastanol (0.17–0.69 mg/g) and campestanol (0.13–0.41 mg/g). Cholesterol represents approximately 91.49 % of the total sterol content, while the phytosterols identified represent less than 10% of the total.

In the uncooked Q shape, interesting

DEMACO Titan Series

TITAN

Superior Pasta Quality

FLOW X

FLOW X is **DEMACO's** proprietary dough processing and rheology system for optimized pasta quality.

We make the most of your raw materials.

DEMACO

behaviour was observed: as the tannin concentration increased, an increase in cholesterol content was detected, particularly in the case of the E tannin (21.18–53.59 mg/g). Such an increase was not identified, however, in the uncooked F shape. This behaviour may be a sign of the potential capacity of tannins to interact with cholesterol. That hypothesis is supported by the literature, and in particular by the study conducted by Zeng et al. (2020)[20], which put forward the hypothesis of a possible hypocholesterolemizing effect of tannins, by way of direct interaction between the two components. Comparing the results with those obtained from the cooked samples, a significant decrease ($p<0.01$) of 33% was observed in the cholesterol content of the Q shape prepared with the E tannin. Based on the results obtained, it can be hypothesized that the E tannin is capable of interacting with cholesterol, modifying its hydrophilicity.

Cholesterol content in cooking water

In order to verify the hypothesis of potential surfactant activity by the tannins in relation to cholesterol, the presence of sterol substances in the cooking water was determined. The same analysis was also performed on the tannin powder, to verify its purity and the potential presence of sterol substances in the tannin itself. The cooking water used for the control samples, of both shapes, presented a

cholesterol quantity of 0.35 μg/g water. However, when the E tannin was added when preparing the pasta, a significant increase ($p<0.05$) in the cholesterol content of the cooking water was observed, positively correlated with the concentration of tannin; the D tannin, on the other hand, did not lead to significant variations ($p>0.05$).

Cholesterol oxidation products (COPs)
Because the tannins used demonstrated significant radical-scavenging activity, their capacity to combat the formation of oxysterols was verified. The COPs determined were: 7α-hydroxycholesterol, 7β-hydroxycholesterol, 7-ketocholesterol. Traces of 5.6 α/β-epoxycholesterol, triol and 25-hydroxycholesterol were also detected. The total content of COPs was between 0.16±0.01 and 0.74±0.08 μg/g; in the uncooked samples, differences were identified linked to both the type of tannin and the pasta shape: in the F shape, as the quantity of the E tannin increased, a progressive decrease in the content of COPs was observed, presenting content 60% lower than the control; for the D tannin, meanwhile, values went from 0.41±0.04 μg/g (control) to 0.65±0.07 μg/g (0.25% tannin concentration); in the square shape, meanwhile, the D tannin showed pro-oxidising behaviour, leading to an increase in the presence of COPs. To better understand the oxidation of cholesterol, the oxidation factor was also calculated, determining the quantity of non-oxidised cholesterol that remained within the sample. 1.00% of E tannin in the F shape presented the lowest formation of COPs (0.5%), followed by the Q shape, confirming the antioxidant activity of the E tannin. On the contrary, the D tannin led to an oxidation factor of 2.1% (F shape; concentration 0.25%). It is important to highlight that ellagitannins such as the D tannin are protective agents for plants[21] because, if subject to particular conditions (pH and temperature), they divide, releasing quinonic forms capable of producing species that react with oxygen.[22] This could explain the different behaviour of the two tannins in combating cholesterol oxidation. Finally, it was observed that cooking (4 min.) did not significantly affect the formation of COPs in either shape.

Conclusions
The formation of cholesterol oxidation products (COPs) plays a key role in the loss of quality and nutritional properties of products containing animal fats. Furthermore, regular studies are carried out in the field of public health on

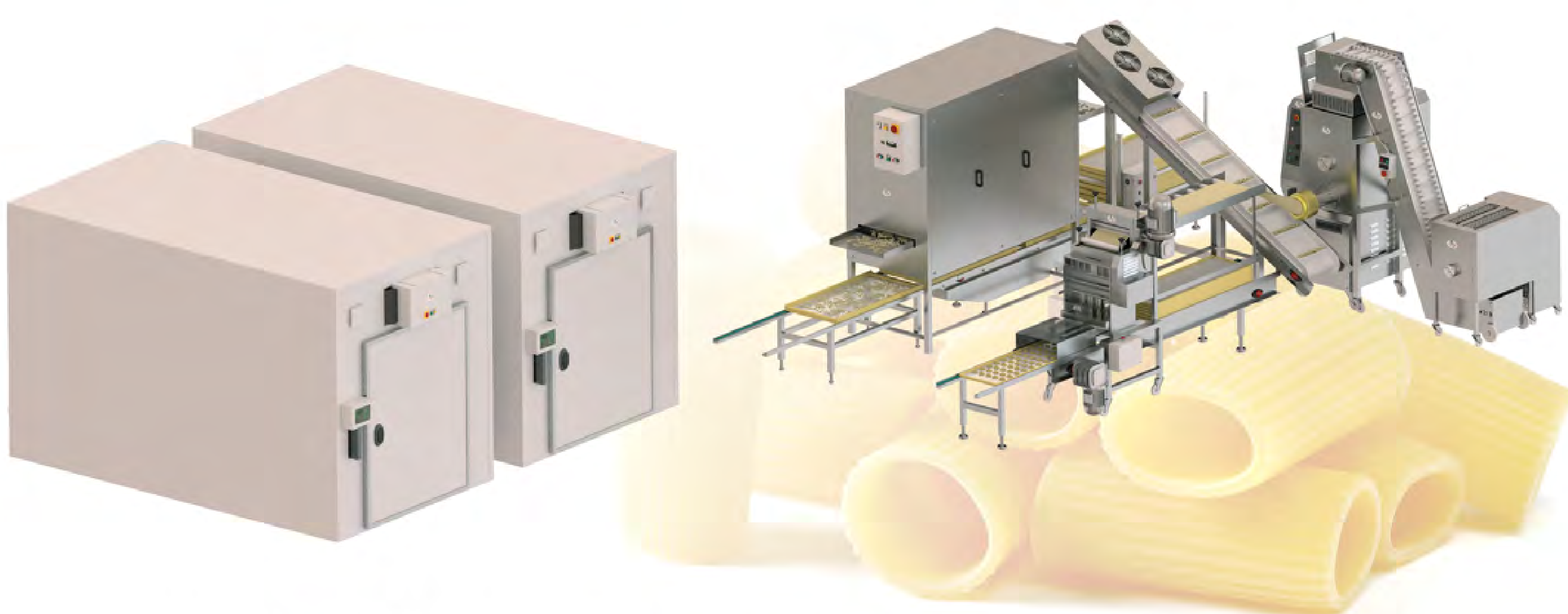
consumption of oxidised lipids and COPs, because it is now known that there are correlations between consumption of COPs and damaging effects on human health. The application of antioxidants is the main tool used to prevent or reduce cholesterol oxidation. Tannins are compounds with potential antioxidant activity capable of inhibiting the formation of such compounds by removing the main triggers through their radical-scavenging activity. This thesis project found that the gallic acid ester is the best performing in egg pasta, with its high radical-scavenging capacity performing a preventive role in relation to the formation of cholesterol oxides. Supplementing with 1 % tannin in uncooked fettucine reduced the quantity of COPs by 60% compared to the control

sample value, while less of a reduction in cholesterol oxides was found in the square shape. These results suggest that the different micro-structure of the pasta shapes affects the distribution of macro- and micro-nutrients, as well as their interaction. This study has shown that it is possible to fortify fresh egg pasta with gallic acid in order to improve its nutritional qualities, offering greater protection against the oxidation reactions triggered during preparation.

Finally, tannins could have significant potential in reducing the quantity of cholesterol consumed through foods thanks to their ability to bind it, increasing its level of solubility in water.

Bibliography

1. Mortensen, M.B.; Nordestgaard, B.G. The Lancet 2020, 396, 1644–1652.
2. Clayton, Z.S.; Fusco, E.; Kern, M. Nutrition 2017, 37, 79–85.
3. Miranda, J.M.; Anton, X.; Redondo-Valbuena, C.; Roca-Saavedra, P.; Rodriguez, J.A.; Lamas, A.; Franco, C.M.; Cepeda, A. Nutrients 2015, 7, 706–729.
4. R hault-Godbert, S.; Guyot, N.; Nys, Y. Nutrients 2019, 11.
5. Cardenia, V.; Rodriguez-Estrada, M.T.; Boselli, E.; Lercker, G. Biochimie 2013, 95, 473–481.
6. Cardenia, V.; Massimini, M.; Poerio, A.; Venturini, M.C.; Rodriguez-Estrada, M.T.; Vecchia, P.; Lercker, G. Meat Science 2015, 105, 126–135.
7. Verardo, V.; Riciputi, Y.; Messia, M.C.; Marconi, E.; Caboni, M.F. European Food Research and Technology 2017, 243, 817–825.
8. Ms, G.; Ramiah, S.K. Molecules 2020, 25,4978.
9. Malaguti, M.; Cardenia, V.; Rodriguez-Estrada, M.T.; Hrelia, S. Journal of Steroid Biochemistry and Molecular Biology 2019, 193.
10. Colorado, Q.; Parameters, C.; Mello, A.S. Foods 2020, 9, 667.
11. Smeriglio, A.; Barreca, D.; Bellocco, E.; Trombetta, D. British Journal of Pharmacology 2017, 174.
12. Fares, C.; Platani, C.; Baiano, A.; Menga, V. Food Chemistry 2010, 119, 1023-1029
13. Cantele, C.; Bertolino, M.; Bakro, F.; Giordano, M.; Jędryczka, M.; Cardenia, V. Antioxidants 2020, 9.
14. Gadow, A.V.; Joubert, E.; Hansmann, C.F. Food Chemistry 1997, 60.
15. Barbosa-Pereira, L.; Guglielmetti, A.; Zeppa, G. Food and Bioprocess Technology 2018, 11.
16. Kuczyńska, A.; Cardenia, V.; Ogrodowicz, P.; Kempa, M.; Rodriguez-Estrada, M.T.; Mikołajczak, K. Plant Physiology and Biochemistry 2019, 141, 215–224.
17. Luise, D.; Cardenia, V.; Zappaterra, M.; Motta, V.; Bosi, P.; Rodriguez-Estrada, M.T.; Trevisi, P. Journal of Agricultural and Food Chemistry 2018, 66, 12911–12920.
18. Rose-Sallin, C.; Huggett, A.C.; Bosset, J.O.; Tabacchi, R.; Fay, L.B. Journal of Agricultural and Food Chemistry 1995, 43.
19. Cardenia, V.; Rodriguez-Estrada, M.T.; Baldacci, E.; Savioli, S.; Lercker, G. Journal of Separation Science 2012, 35.
20. Zeng, X.; Du, Z.; Ding, X.; Jiang, W. Food Chemistry 2020, 309.
21. Eghbaliferiz, S.; Iranshahi, M. Phytotherapy Research 2016, 1379–1391.
22. Moilanen, J.; Karonen, M.; T htinen, P.; Jacquet, R.; Quideau, S.; Salminen, J.P. Phytochemistry 2016, 125, 65–72.



5

Pastificio Svevo

Editorial staff


From the left, Giuseppe Paradiso, Enrico Soria, Patrick Laterza, Donato De Marinis

A huge number of shapes, lots of colours and a range of product lines: the dried pasta produced by the four enterprising young owners of Pastificio Svevo.

A historical name, evoking the period, eight hundred years ago, when the Swabians ("Svevi", in Italian) travelled south from Germany to Southern Italy. Their ruler, Frederick II, discovered ideal locations for long hunts but, in the kitchens of his court, the game was served after pasta, the typical local dish that effortlessly won over the palates of the emperor and his children. And it is to him – *Puer Apuliae*, Son of Apulia – that four young pasta makers have chosen to dedicate their products.
Pastificio Svevo is relatively new to the market, but its owners, though young, boast a certain amount of experience in the sector, having been colleagues and employees at a local pasta factory for a dozen or so years before deciding to back themselves and start their own business.
Individuals with life stories that overlap at points, and diverge significantly at others, whose paths crossed at various stages: one left Apulia before deciding to return with great enthusiasm; one studied and gained significant experience in the sector; one was so passionate that he quickly moved from production, to packaging, to the marketing department in just a few years. And one transformed a small family-run farm into

For information

Pastificio Svevo
www.pastificiosvevo.it
info@pastificiosvevo.it


We wish you
Happy Holidays
and a
SAPORITO
Denmark Salmon
New Year!
www.denmarksalmon.com
saporito@denmarksalmon.com
Langballevej, 109
8320 Mårslet - Denmark
+45 23 40 95 10
+39 331 248 853 4

a business that is breaking into international markets. For the time being, they have made an active decision not to hire staff, and each has his own well-defined role. They are Giuseppe Paradiso, master pasta-maker; Enrico Soria, responsible for quality control; Donato De Marinis, who handles business matters and Patrick Laterza, in charge of packaging. The team also includes a small independent wheat farmer that supplies the pasta factory with approximately 20% of the ingredient used. The rest of the semolina is sourced locally or within the region. And the company catalogue is also regional, featuring around twenty shapes, with a focus on those typical to Apulia, including some that are

coloured or flavoured with vegetables or spices.
The white pasta range, made with just semolina, includes Paguri, Calamarata, Bucaneve, Quadrotti, Strascinate, Fainelle, Capunti, Maccheroncini al Ferretto, Orecchiette, Strozzapreti, Cavatelli, Trofie, Rustiche and Spaghetti. The Trottole, Fusilloni, Zucchette, Paccheri Rigati, Spugnole and Cuori shapes are available in white and coloured versions, with spinach, beetroot, turmeric or bell pepper, and are a colour explosion, making them as much of a treat for the eye as for the taste buds. The flavoured pasta line includes Linguine with radicchio, basil, lemon, “olivotto” sweet olive paste or squid ink. But the pasta factory also offers a “Rainbow” option, featuring Sombreri, Farfalle, Lingue di Suocera and the Svevo Mix, a bag that draws them all together, bringing joy and novelty to the table with its mix of countless shapes, all in the one pack.
The pasta comes in 500 g packs consisting of a cardboard base and transparent bag, so that the product can be seen.
The Svevo agricultural pasta factory defines its production using six concepts. Traceable, certified every step of the way, from the field to the table and always and only local or, at most, regional. Safe, the sort of safety that comes from transparent processes. Wholesome, because the pasta is simple and flavourful, even with just a light sauce. Special, as the catalogue is packed with shapes in lots of colours and various flavours and, therefore, delicious too, with a time-honoured taste, perfect for special occasions yet never boring, and suitable for daily consumption. And finally, highly innovative, without ever abandoning or betraying local tradition.
The figures, though not significant in absolute terms, are certainly impressive for such a young business. They have already achieved one thousand kg of daily production, 150 hectares of wheat fields, 28,000 kg of wheat harvested to date, 16,800 kg of high-quality semolina used, and 15,120 kg of pasta produced. Pasta that, thanks to small-scale importers and online sales, is not only available on the Italian market, but also in many other countries around the world.

AL.MA.SSIMO
of protection

The packaging of a food product is essential to preserve its excellence.

AL.MA. thermoforming packing machines guarantee the correct conservation of the exceptional chemical-physical and organoleptic properties of fresh pasta.

Discover our thermoforming machines for the packing of fresh pasta in modified atmosphere.

The high quality journey deserves the best protection.

AL.MA. Packing and Packaging Machinery

AL.MA. Fresh Pasta Machinery

almapackaging.com

6

The fresh pasta industry at the seventh APPF workshop event

Editorial staff

The fresh pasta and gnocchi industry met on 26 November in Verona for the seventh APPF Workshop event. Organic and natural flavours, the colour of eggs, environmental labelling and contamination with mustard were the topics explored in detail by sector experts over the course of the event organised by the Association presided over by Giovanni Rana.

The anticipated workshops organised by the Association of Fresh Pasta and Gnocchi Producers (APPF) returned, following a break of nearly two years due to the Covid-19 pandemic.
In keeping with tradition, the most recent workshop day, held in Verona on 26 November last, was opened by chairman Giovanni Rana who, having outlined the difficulties and uncertainties of the times (between the continuation of the pandemic and the rise in prices of key raw materials), invited all pasta producers in attendance to continue to work, as always, with a focus on quality and diligence, which can ensure further progress for the fresh pasta and gnocchi industrial production sector.
A number of speakers presented over the course of the day, introduced by secretary Gherardo Bonetto.
Organic flavours and natural flavours were the topics covered by Monia Floridi of New Flavours, who outlined the changes that will be introduced with the entry into force of Regulation (EU) 848/2018 on 1 January 2022.
Federico Lionello of Eurovo talked about eggs and their colour, with a presentation titled *How the colour of eggs will change (Reg. (EU) 2020/1400 concerning the authorisation of ethyl ester of β-apo-8'-carotenoic acid as a feed additive for laying hens, among other species)*.
Silvia Gonzaga (Logos Avvocati Associati) discussed environmental labelling on packaging, competently and clearly presenting the relevant regulatory framework and, using various legal cases as examples, warning against the pitfalls of careless use of green claims on food product packaging.
Finally, Andrea Paolillo of Neotron gave a detailed presentation and compared the various methods of analysis used to detect contamination with mustard, an issue currently of great interest to pasta producers.
The annual meeting of association members took place after the presentations.
The traditional social dinner in the dining rooms of the Leon d'Oro hotel restaurant in Verona, was a nice end to the seventh, well-attended and interesting edition of the APPF Workshop event, which was also attended by the Pastaria editorial team.