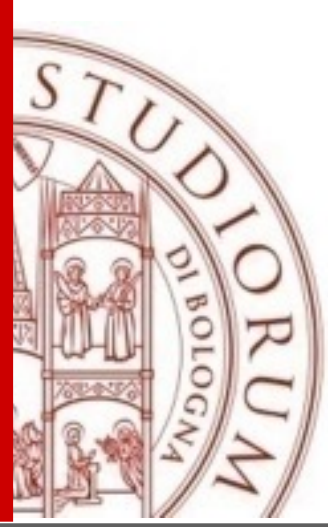




Quality management of fruits processing: research advancement and case studies

Traditional and Innovative food technologies in the Italian and Mediterranean area

MARCO DALLA ROSA

*Former Head of the Interdepartmental Centre for Agri-Food Industrial Research
Department of Agricultural and Food Sciences
Alma Mater Studiorum - Università di Bologna*





Alma Mater Studiorum Università di Bologna

THE STUDIUM FROM OVER 900 YEARS

1088

STUDIUM
IN BOLOGNA

**THE STUDIUM IN
BOLOGNA WAS
CREATED BY
STUDENT AND
FOR STUDENTS.**

**IT IS THE OLDEST
UNIVERSITY IN
THE WESTERN
WORLD**

1988

MAGNA CHARTA
UNIVERSITATUM

**THE *MAGNA
CHARTA
UNIVERSITATUM*
CONFIRMS THE
ESSENTIAL ROLE
OF THE
UNIVERSITY IN
CONTEMPORARY
SOCIETY**

1999

DECLARATION
OF BOLOGNA

**SIGNATURE OF
THE BOLOGNA
DECLARATION
CREATING THE
EUROPEAN
HIGHER
EDUCATION
AREA**

BOLOGNA PROCESS

2012

NEW STATUTE

**THE ENTRY INTO FORCE
OF THE NEW STATUTE
(11 JANUARY)
CONCLUDES THE
PROCESS OF
UNIVERSITY REFORM
WICH BEGAN IN 2010,
AND THE
IMPLEMENTATION
OF THE NEW
UNIVERSITY
ORGANISATION BEGINS**

UNIBO: MULTI-CAMPUS

MULTI-CAMPUS UNIVERSITY

Alma Mater Studiorum Università di Bologna is a multi-campus university based in Bologna, Cesena, Forlì, Ravenna, and Rimini.

University Statute, Constituent Principles, Art. 1 para. 2

1088 - 1988

Celebrating the Alma Mater's ninth centenary, the Rectors of 500 European universities meet in Bologna to sign the Magna Charta Universitatum to confirm the essential value and autonomy of universities.



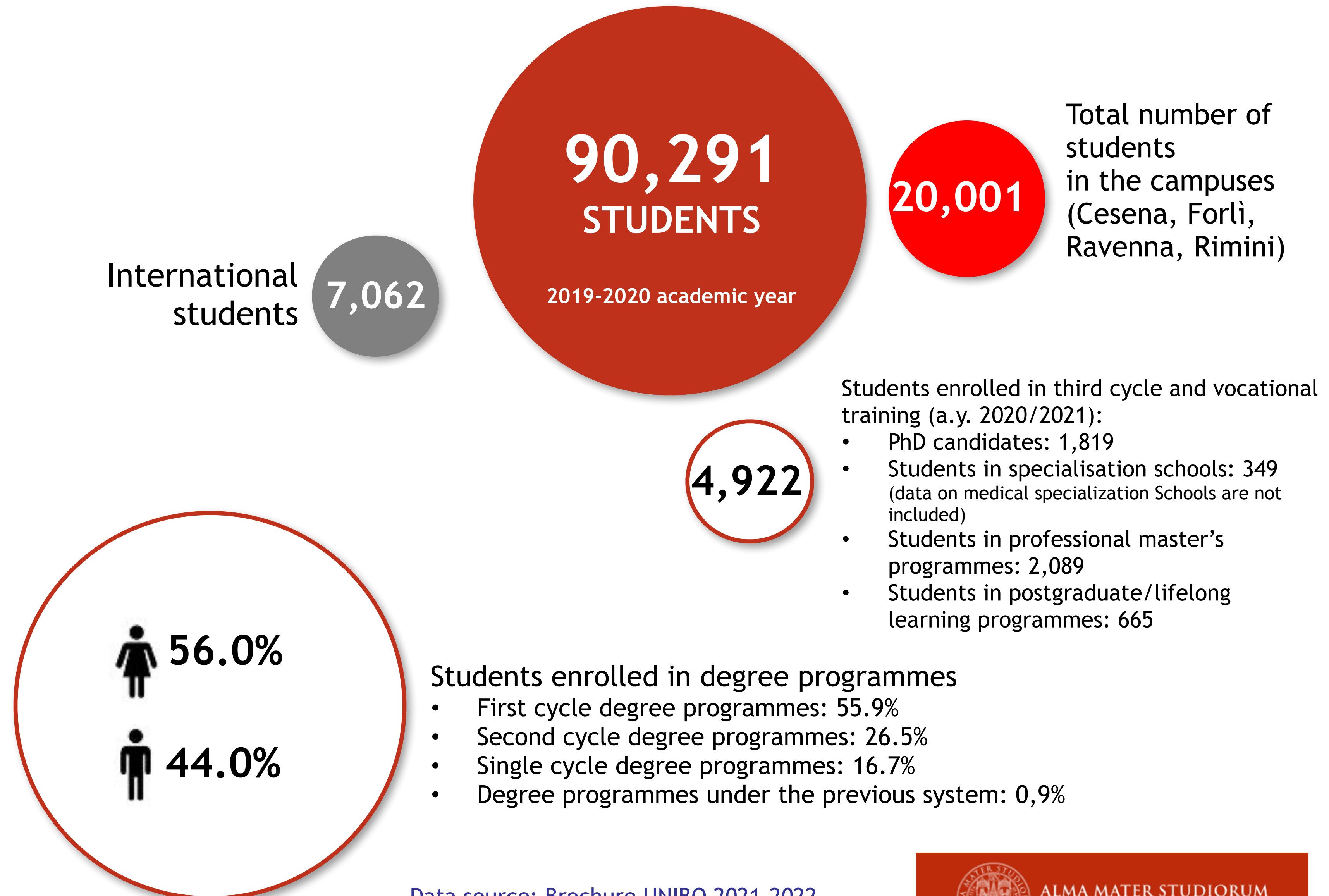
**Buenos
Aires**



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

UNIBO: STUDENTS ENROLLED IN DEGREE PROGRAMMES AND IN THIRD CYCLE AND VOCATIONAL TRAINING

STUDENTS



Data source: Brochure UNIBO 2021-2022

<https://www.unibo.it/en/university/who-we-are/university-today/university-today>

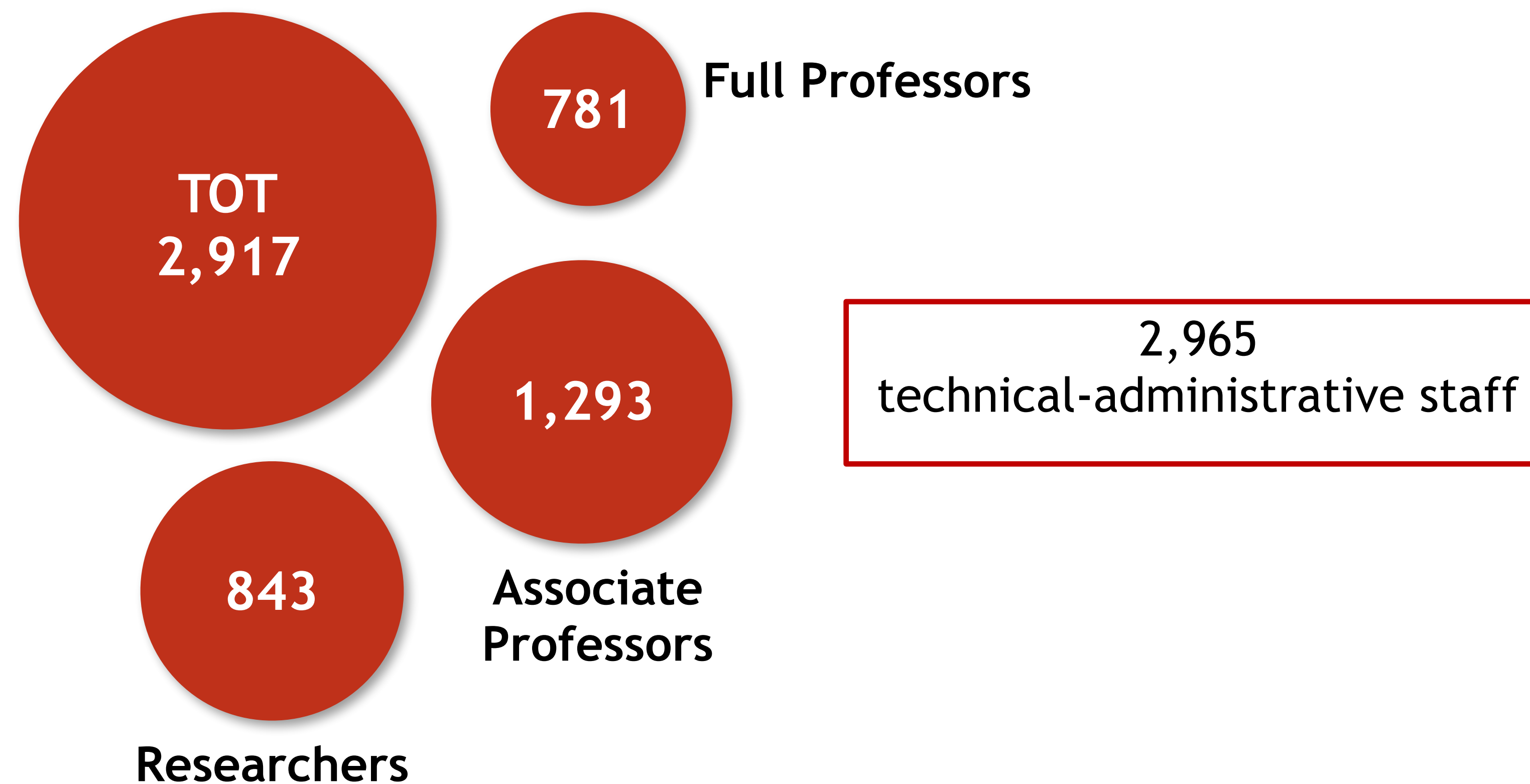


ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

UNIBO: TEACHING STAFF

Data source: Brochure UNIBO 2021-2022

HUMAN RESOURCES



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

UNIBO: PROGRAMME CATALOGUE

Data source: Brochure UNIBO 2021-2022

EDUCATION

243
DEGREE
PROGRAMMES
(a.y. 2021-2022)

97

First cycle degree programmes

132

Second cycle
degree programmes

14

Single cycle
degree programmes

of which

96

international

187

THIRD CYCLE
PROGRAMMES

48

PhD/ Doctoral programmes

55

Specialization School

95

Professional Master's
programme

of which

19

international



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

UNIBO: STUDENTS MOBILITY

STUDENT MOBILITY

Data source: Brochure UNIBO 2021-2022



FROM BOLOGNA TO EUROPE
(ERASMUS + COUNTRIES)

1,908



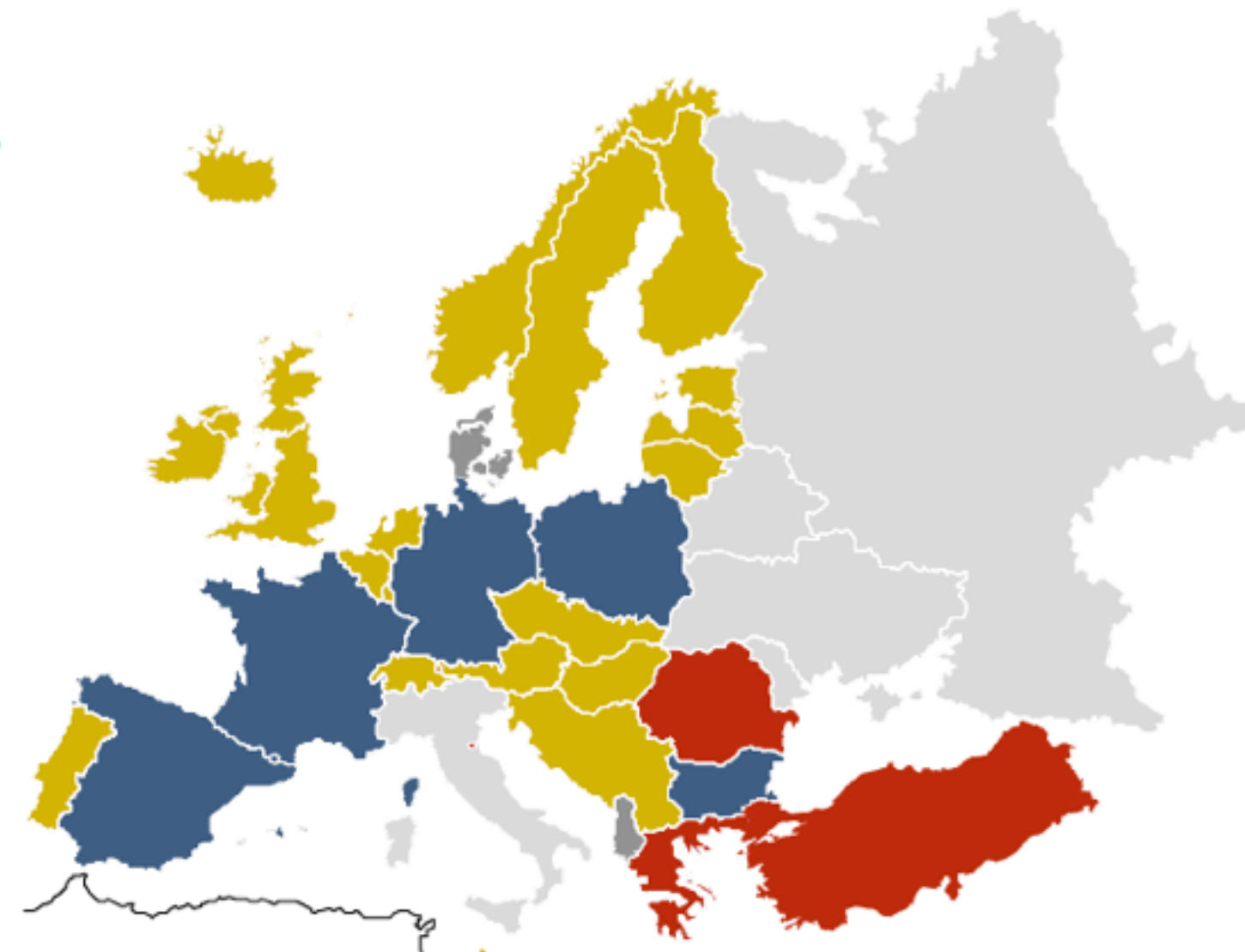
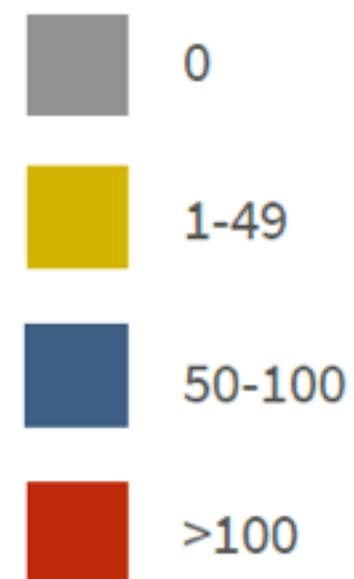
FROM EUROPE (ERASMUS+
COUNTRIES) TO BOLOGNA

1,321



EUROPEAN STUDENTS
(ERASMUS+ COUNTRIES)
ENROLLED ON DEGREE PROGRAMMES

1,937



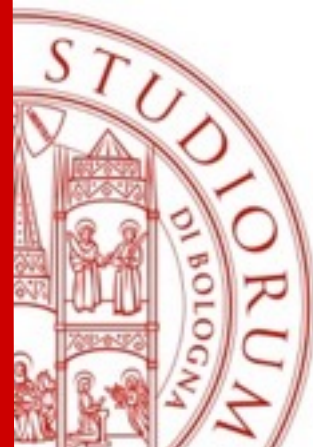
STUDENTS FROM
NON-EUROPEAN COUNTRIES ENROLLED
ON DEGREE PROGRAMMES

4,543

- ASIA 1,612
- AFRICA and the MIDDLE EST 1,335
- BALKANS, NEAR EST and RUSSIAN FEDERATION 1,035
- LATIN AMERICA 421
- NORTH AMERICA 90
- OCEANIA 10

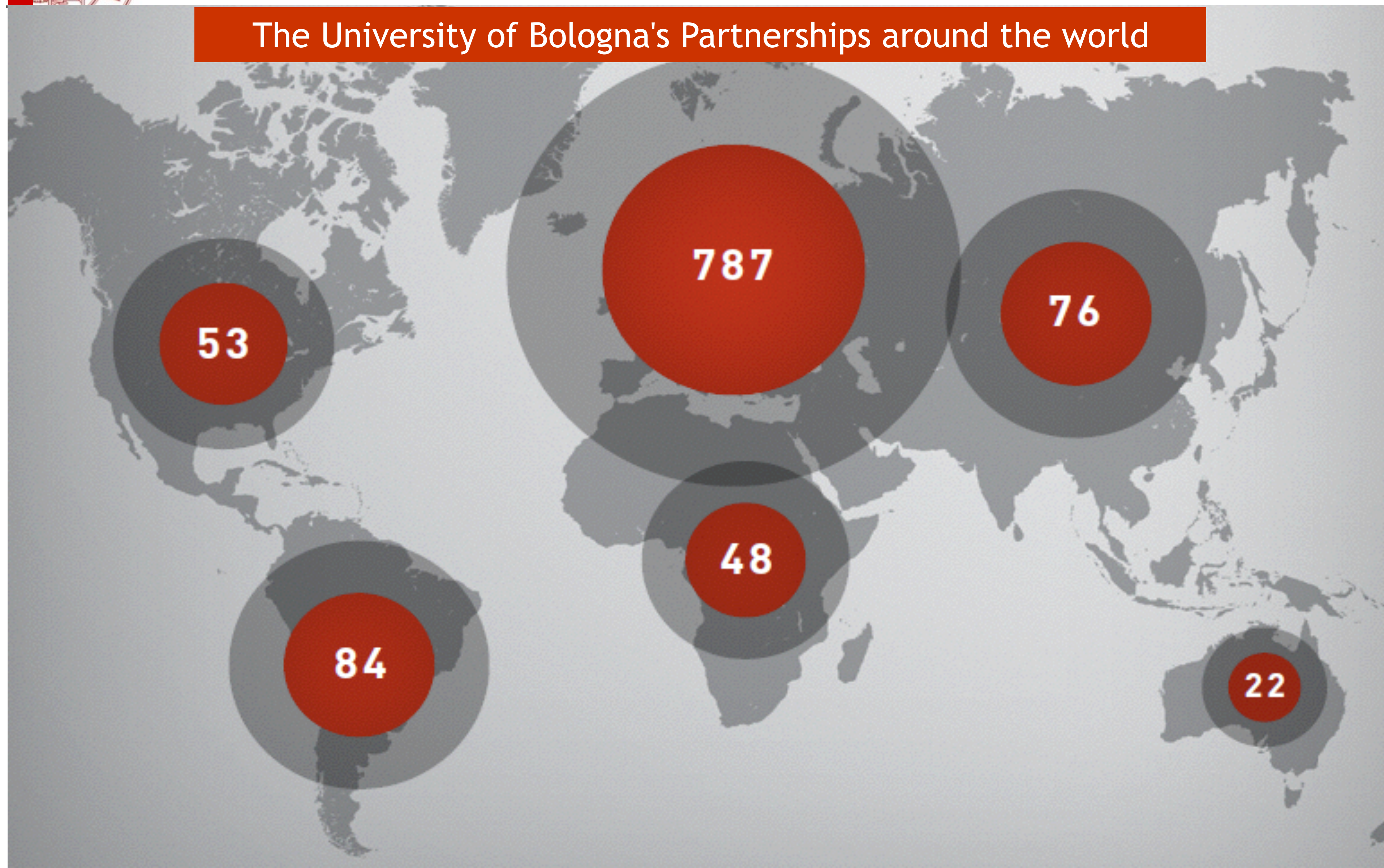


ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



INTERNATIONAL

The University of Bologna's Partnerships around the world



PRODOTTI TIPICI

AMATORIALI

AREA PICCOLISSIMA
PRODUZIONE LIMITATISSIMA
IMPORTANZA ECONOMICA TRASCURABILE
IMPORTANZA CULTURALE ALTA



TRADIZIONALI

AREA PICCOLA
PRODUZIONE LIMITATA
IMPORTANZA ECONOMICA LIMITATA MA IN CRESCITA
IMPORTANZA CULTURALE ALTA

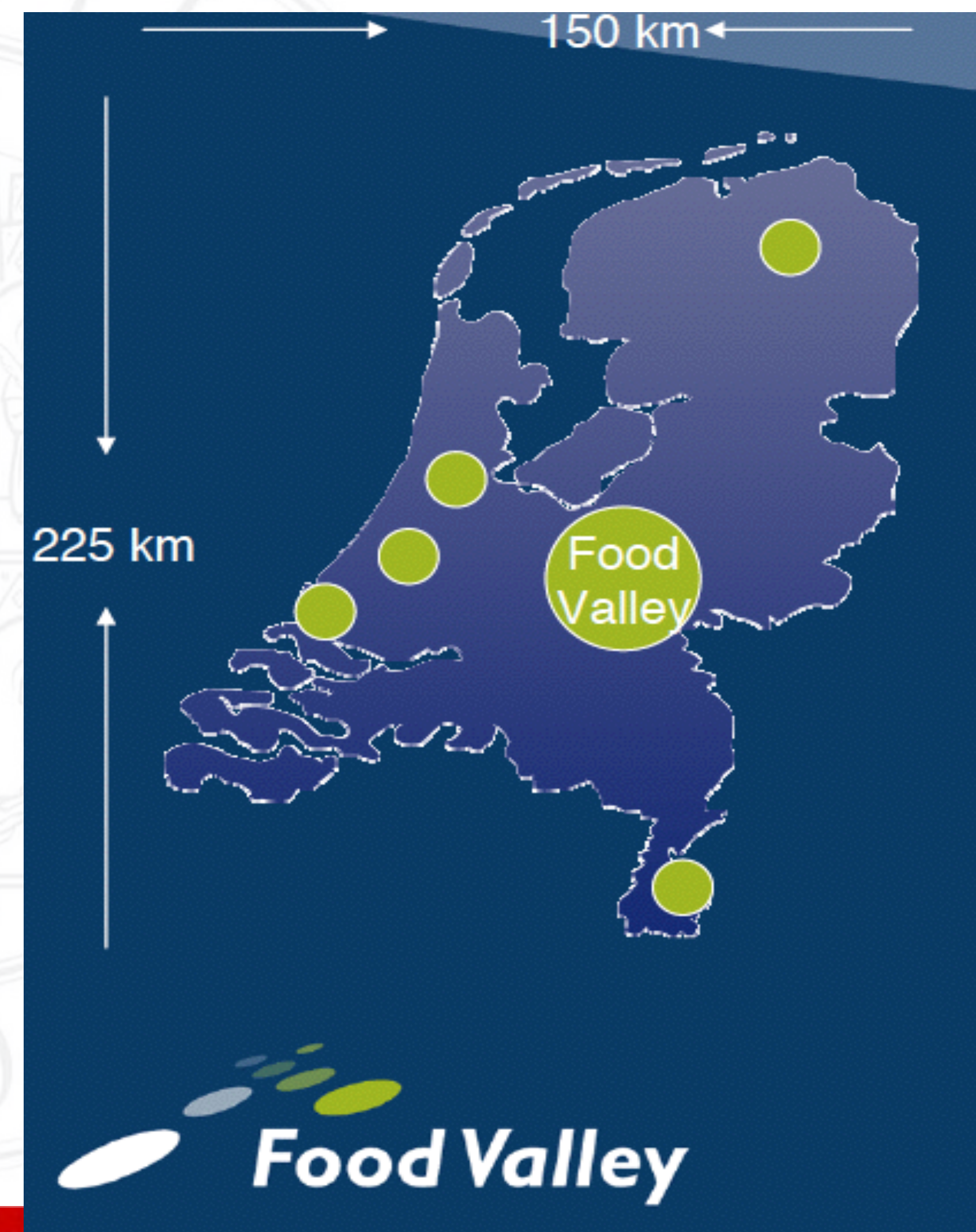
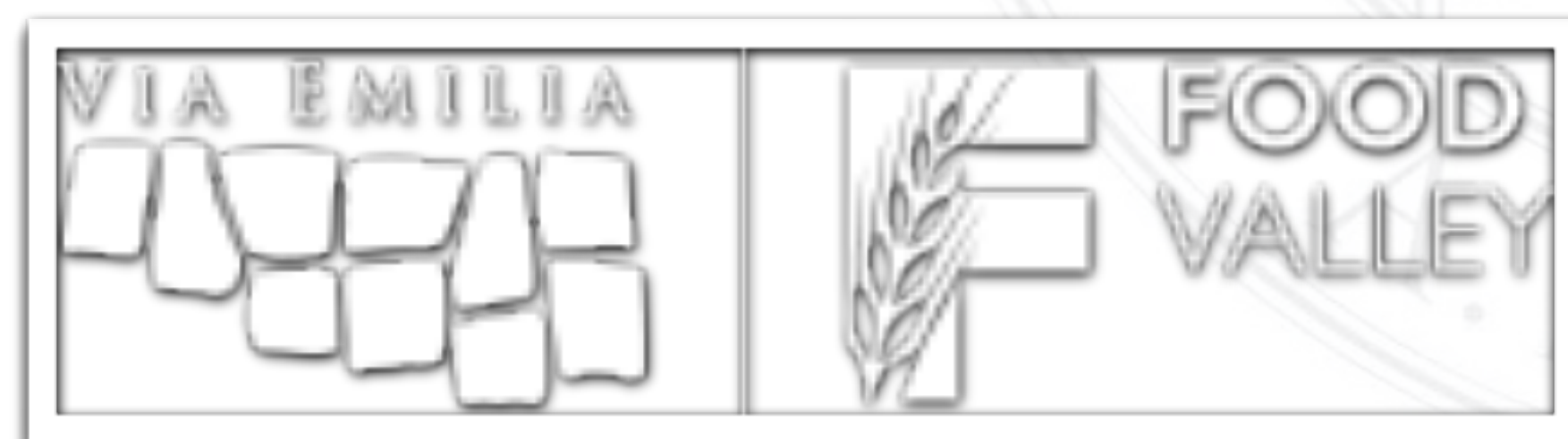
D.O.P.
I.G.P.



AREA MEDIA
PRODUZIONE LIMITATA
IMPORTANZA ECONOMICA ALTA
IMPORTANZA CULTURALE ALTA

modello dei 7

e dei 5 giorni



ITALY and Emilia Romagna Region: On the Top in Traditional Food Culture in EU



**324: Highest number of EU certified
Geographical Designations,
Indications and Traditional
Specialities**

+

**405 Vini DOP
118 Vini IGP**

48 In Emilia-Romagna

Geographical indications

TSG, PDOs and PGIs protect the name of a product, which is from a specific region and follow a particular traditional production process. However, there are differences between the 3, linked primarily to how much of the raw materials come from the area or how much of the production process has to take place in the specific region.

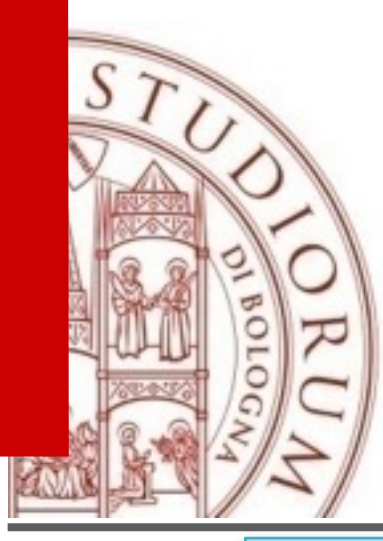
Protected designation of origin (PDO)

Product names registered as PDO are those that have the strongest links to the place in which they are made.

Examples

Grana Padano / Parmigiano Reggiano / Prosciutto di Parma / Prosciutto san Daniele





Prodotto D.O.P

PDO (Protected Designation of Origin)

Name of a place designating a product;

Originating in that place

The quality or characteristics of which are due essentially or exclusively to the geographic environment including natural and human factors, and the production, processing and elaboration of which take place in the geographical delimited area.

It means a product originating in a region and country whose qualities and characteristics are essentially, or exclusively, due to the geographical environment in which it is produced. "Geographical environment" refers to both natural factors (such as climate) and human factors (production techniques handed down over time and craftsmanship) that, combined together, result in a product that is inimitable outside the production area. All production, processing and processing of the product must take place in the defined area. The PDO mark extends the protection of the product to the entire European territory and with the international agreements of the World Trade Organization (or WTO), also to the rest of the world.

Protected geographical indication (PGI)

PGI emphasises the relationship between the specific geographic region and the name of the product, where a particular quality, reputation or other characteristic is essentially attributable to its geographical origin.

For most products, **at least one of the stages of production, processing or preparation takes place in the region.**

Examples

Patata di Bologna - Piadina Romagnola



Prodotto I.G.P.



PGI (Protected Geographical Indication)

Name of a place designating a product;

Originating in that place

Of which a specified quality, reputation or other characteristic can be attributed to the geographical origin and whose production and/or processing and/or preparation take place in the specified geographical area.

unlike the PDO, it is sufficient for only one of the production, processing and preparation stages to take place in the defined geographical area. In other words, a PGI product can, for example, be prepared in a particular geographical area, but with a raw material that has a different origin.

Traditional speciality guaranteed

Traditional speciality guaranteed (TSG) highlights the traditional aspects such as **the way the product is made or its composition, without being linked to a specific geographical area**. The name of a product being registered as a TSG protects it against falsification and misuse.



Products

Food and agricultural products

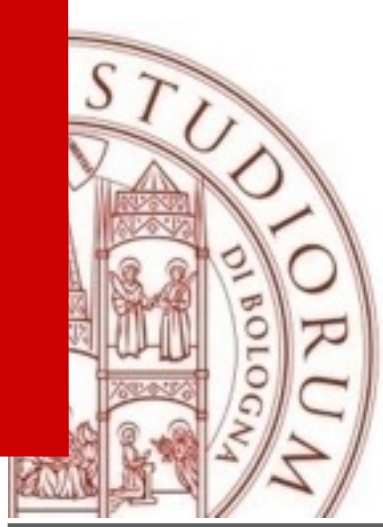
Example

Gueuze TSG is a traditional beer obtained by spontaneous fermentation. It is generally produced in and around Brussels, Belgium. Nonetheless, being a TSG, **its production method is protected but could be produced somewhere else.**

Pizza Napoletana

Label

Mandatory for all products



Prodotto TSG

The TSG mark - Traditional Specialty Guaranteed - guarantees only the typical recipe or traditional production method (i.e., in existence for at least 30 years) of a given product, but without a territorial constraint. This means that the TSG product can be prepared in any EU country as long as the production complies with the relevant specification and is certified by an accredited inspection body.

In the event that the production technique differs from the protected specification, the product can still be marketed under the identical name without, however, being able to place the yellow-blue "TSG" logo on the labeling.

AIMS

- **Promote diversification of production to achieve a better balance between supply and demand in the market;**
- **Can ensure for rural areas:**
 - **Improved income;**
 - **permanence of the population;**
- **Consumers prefer quality to quantity when quality is well recognized**



Recognition of a Protection Consortium (“Consorzio di Tutela”)

Protection Consortia play a key role in the protection, promotion and enhancement of Denominations.

For this reason, the Ministry provides a specific procedure both for their recognition (representativeness, statutes and organization, application procedures, etc.) and in terms of characteristics and preservation of the mandate over time.

<https://dopigp.politicheagricole.gov.it/consorzio-di-tutela>



Consorzio Tutela Formaggio Asiago - Asiago di Asiago 7 Comuni
www.asiagodop.it



Consorzio Tutela Vini Matera DOC - Consorzio di Tutela dei Vini della Provincia di Matera
www.vinimatera.it



Consorzio Tutela Limone di Siracusa IGP - Consorzio di Tutela dei Vini della Provincia di Siracusa
www.vinimatera.it

Consorzio di Tutela della Finocchiona IGP - Consorzio di Tutela dei Vini della Provincia di Grosseto
www.finocchiona.it

Consorzio Tutela Vini di Sicilia - Consorzio di Tutela dei Vini della Provincia di Sicilia
www.vinidisicilia.it

Consorzio Tutela Vini di Sicilia - Consorzio di Tutela dei Vini della Provincia di Sicilia
www.vinidisicilia.it

Consorzio di Tutela Vini di Sicilia - Consorzio di Tutela dei Vini della Provincia di Sicilia
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www.vinidisicilia.it

Consorzio Tutela Vini di Sicilia - Consorzio di Tutela dei Vini della Provincia di Sicilia
www.vinidisicilia.it



https://www.consorziodituteladelsalamedivarzi.it/wp-content/uploads/2019/08/logo1.png



Colli Euganei
Consorzio Tutela Vini





Procedures

1.Entity eligible to apply

A group consisting of producers and/or processors falling within a delimited territory and processing the same product that is the subject of the application for registration.

2.Application for registration

must be submitted to the Ministry of Agriculture, Food, Forestry and Tourism and the region(s) in whose territory the production subject to registration falls.

3. Characteristics of the specification

- **the name to be protected; the description of the product, including the raw materials, as well as the main physical, chemical, microbiological or organoleptic characteristics**
- **the definition of the delimited geographical area;**
- **evidence that the product originates in the delimited geographical area;**
- **the description of the method of obtaining the product and, where appropriate, local, fair and constant methods, as well as information on packaging;**
- **the elements establishing the link between the product and the geographical environment;**
- **the name and address of the inspection body;**
- **any specific rules for labeling the product in question.**



Procedures

4. National assessment of the demand

5. Public assessment meeting

6. Decision on registration

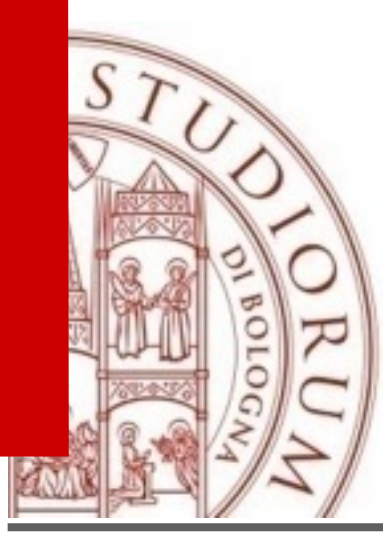
The Ministry, after 30 days have elapsed from the publication of the specification in the Official Gazette of the Italian Republic with no admissible objections received, adopts a favorable decision on registration,

7. Transitional national protection

shall be labeled exclusively with the name under protection followed by the words "under transitional national protection." The use of Community symbols and/or the terms Protected Designation of Origin/Protected Geographical Indication and their abbreviations PDO/PGI is prohibited.

8. Examination by the European Commission

The European Commission examines the application within 6 months of receiving the file from the Ministry. In the course of the procedure at the EU level, if comments are received on the application, the Ministry sends notice to the applicant for the purpose of resolving the issues highlighted.



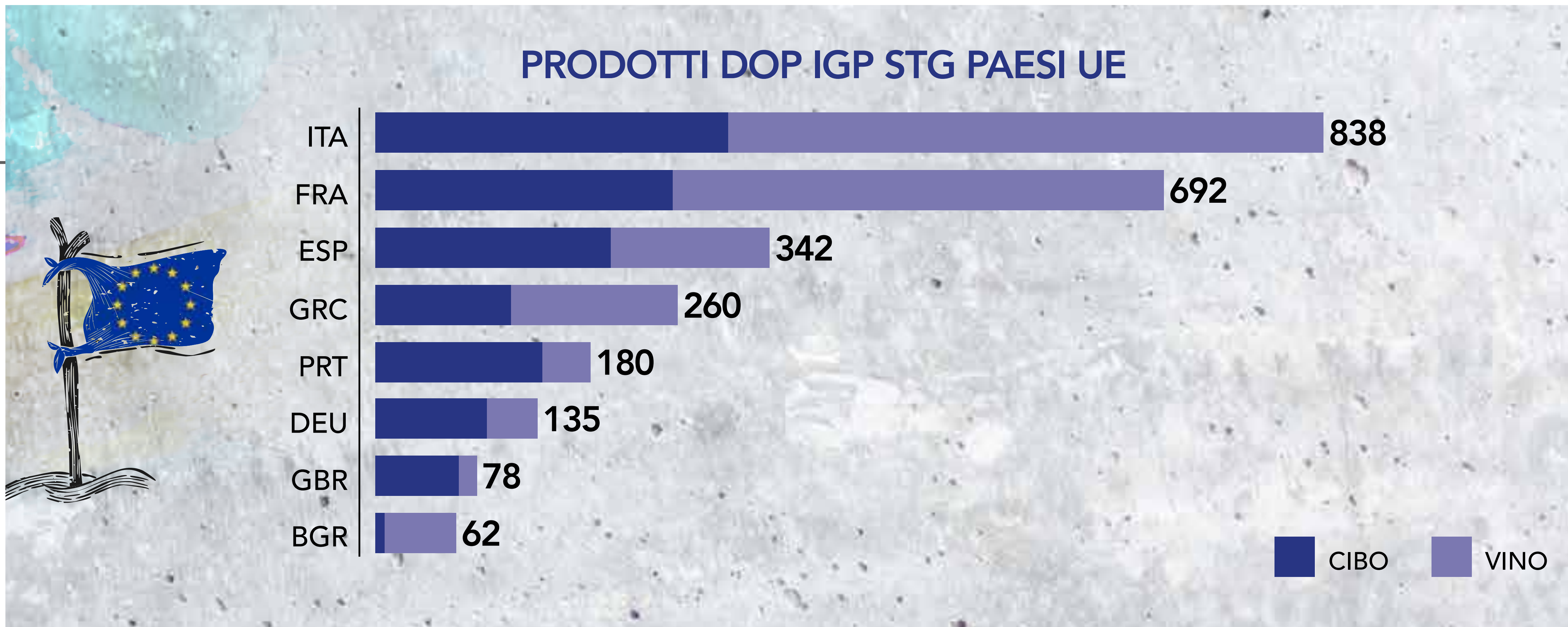
324 prodotti DOP, IGP, STG

526 vini DOCG, DOC, (DOP) IGT (IGP)

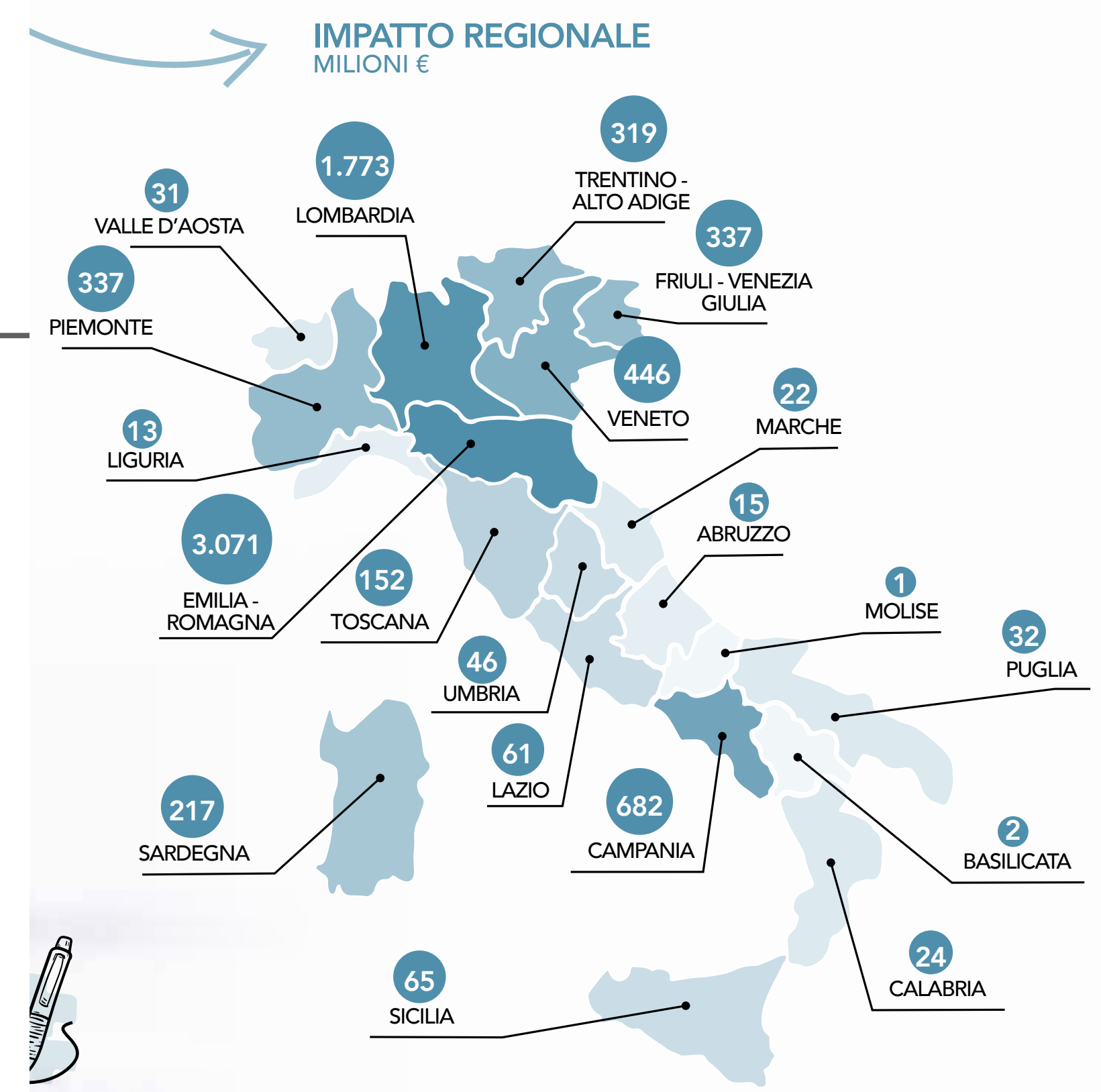
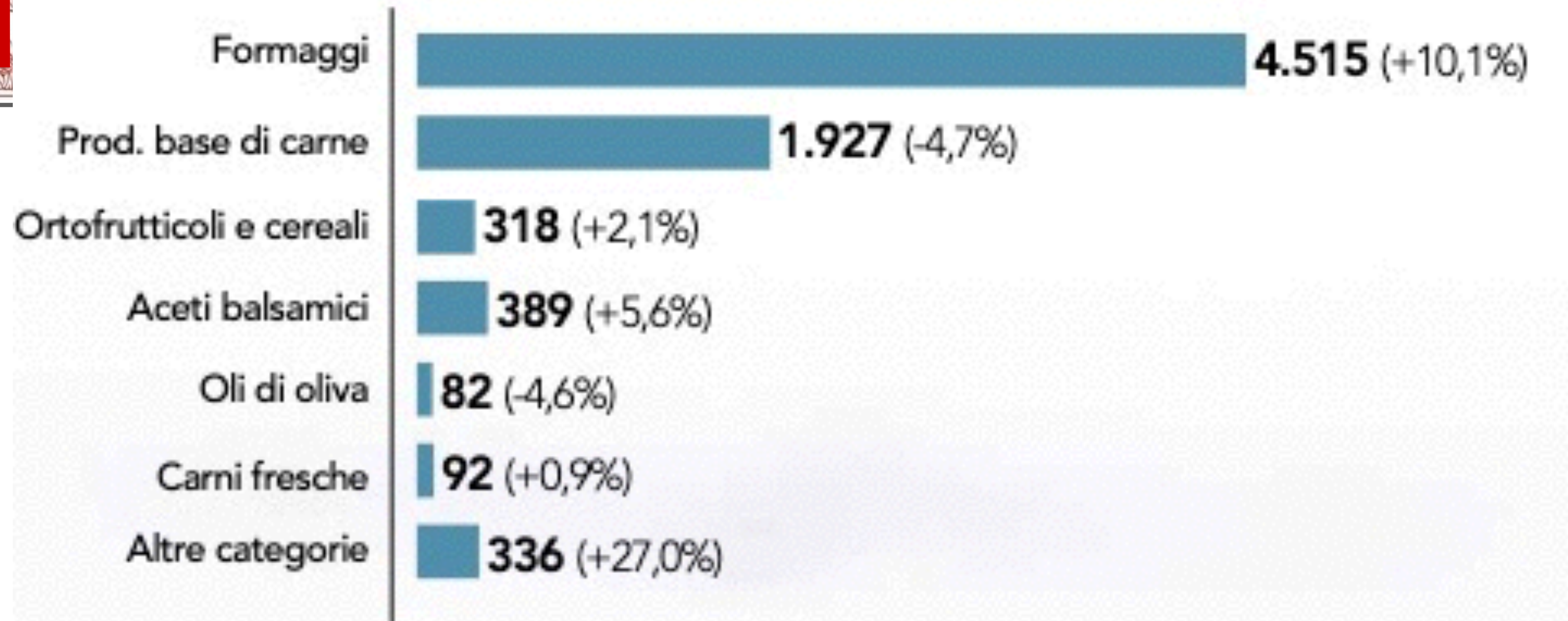
Italy is the European country with the highest number of agri-food products with designation of origin and geographical indication recognized by the European Union. This is a further demonstration of the high quality of our production, but above all of the strong bond that links Italian agri-food excellence to its territory of origin.

The EU Geographical Indication system, in fact, favors the productive system and the economy of the territory; it protects the environment, because the indissoluble link with the territory of origin requires the safeguarding of ecosystems and biodiversity; it supports the social cohesion of the whole community.

At the same time, EU certification offers greater guarantees to consumers, with a higher level of traceability and food safety than other products.



VALORE PRODUZIONE CATEGORIE MILIONI €



PRODOTTI		PRODUZIONE CERTIFICATA (migliaia di tonnellate)		
Categorie	DOP IGP STG	2018	2019	Var 19/18
Formaggi	56	544	549	+1,0%
Prodotti a base di carne	43	204	210	+3,2%
Ortofrutticoli e cereali	116	382	513	+34,3%
Aceti balsamici	3	91	96	+5,7%
Oli di oliva	48	13	11	-11,2%
Carni fresche	6	14	14	+1,4%



ITALIA DOP IGP STG

838

**PRODOTTI
DOP IGP STG**
agroalimentari e
viticicoli in Italia

16,9

**mld €
VALORE ALLA
PRODUZIONE**
crescita del +4,2%
su base annua

19%

**PESO VALORE
DOP IGP**
sul settore
agroalimentare*

9,5

**mld €
VALORE
ALL'EXPORT**
crescita del +5,1%
su base annua

21%

**PESO EXPORT
DOP IGP**
sull'export
agroalimentare

285

**CONSORZI
DI TUTELA**
riconosciuti
dal Mipaaf



CIBO DOP IGP STG

312

**PRODOTTI
DOP IGP STG**
agroalimentari
registrati in Italia

7,7

**mld €
VALORE ALLA
PRODUZIONE**
crescita del +5,7%
su base annua

15,3

**mld €
VALORE AL
CONSUMO**
crescita del +6,4%
su base annua

3,8

**mld €
VALORE
ALL'EXPORT**
crescita del +7,2%
su base annua

+5,3%

**VENDITE GDO
PESO FISSO**
crescita su
base annua

163

**CONSORZI
DI TUTELA**
riconosciuti
dal Mipaaf



VINO DOP IGP

526

**PRODOTTI
DOP IGP**
viticicoli
registrati in Italia

3,2

**mld
bottiglie
PRODUZIONE
IMBOTTIGLIATA**
crescita del +4,1%
su base annua

9,2

**mld €
VALORE ALLA
PRODUZIONE**
dell'imbottigliato
+2,9% su base annua

5,6

**mld €
VALORE
ALL'EXPORT**
crescita del +3,7%
su base annua

+4,0%

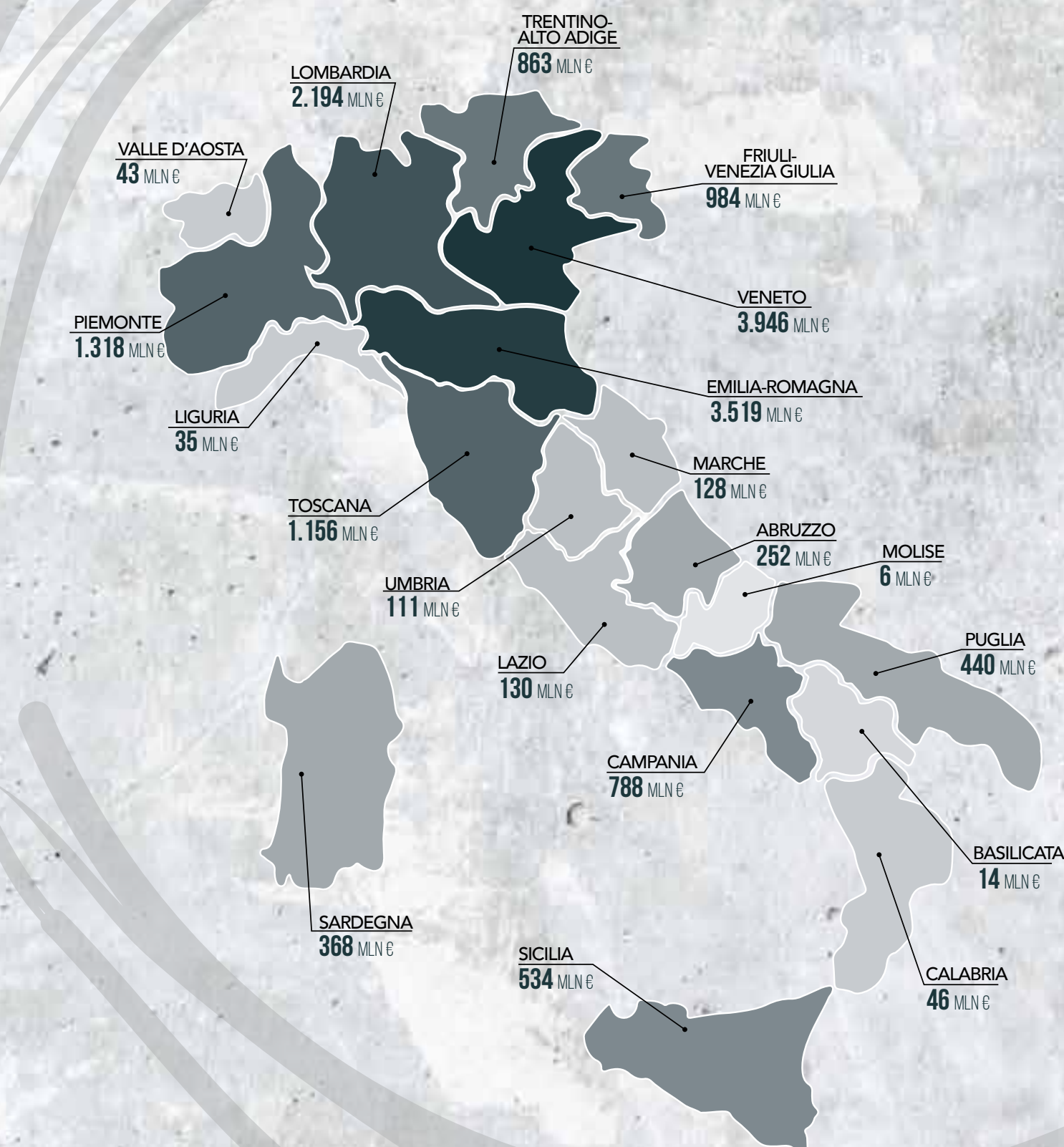
**VENDITE
CANALE GDO**
crescita su
base annua

122

**CONSORZI
DI TUTELA**
riconosciuti
dal Mipaaf

16,9 MILIARDI €

VALORE ALLA PRODUZIONE
DEL PANIERE ITALIANO
DOP IGP STG DISTRIBUITO SU
TUTTO IL TERRITORIO NAZIONALE



* Il rapporto è calcolato sulla Produzione a prezzi di base agricola 2019 + Valore aggiunto dell'industria alimentare 2019.
[838 prodotti registrati al 10.12.2020. I dati economici del Rapporto sono riferiti agli 826 prodotti DOP IGP STG registrati al 31.12.2019]

:: PRIMI 15 CIBI DOP E IGP PER VALORE PRODUZIONE



1°



Grana Padano DOP
1.562 milioni €

2°



Parmigiano Reggiano DOP
1.556 milioni €

3°



Prosciutto di Parma DOP
721 milioni €

4°



Mozzarella di Bufala Campana DOP
426 milioni €

5°



Aceto Balsamico di Modena IGP
383 milioni €

6°



Gorgonzola DOP
368 milioni €

7°



Prosciutto di San Daniele DOP
313 milioni €

8°



Mortadella Bologna IGP
296 milioni €

9°



Pasta di Gragnano IGP
247 milioni €

10°



Bresaola della Valtellina IGP
235 milioni €

11°



Pecorino Romano DOP
173 milioni €

12°



Speck Alto Adige IGP
117 milioni €

13°



Asiago DOP
110 milioni €

14°



Mela Alto Adige IGP
84 milioni €

15°



Mela Val di Non DOP
56 milioni €

isma

FONDAZIONE
QUALIVITA

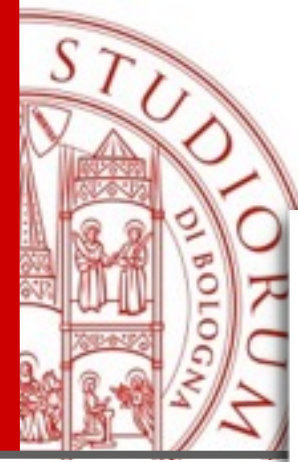
RAPPORTO 2020
ISMEA - QUALIVITA



f #RAPPORTODOPIGP2020

RAPPORTO
ISMEA-QUALIVITA
2020

isma QUALIVITA 20



Italian Origin Certified Cheeses - Formaggi Certificati EU

1.3 Formaggi

1. Asiago DOP
2. Bitto DOP (12.18 MB)
3. Bra DOP (4.61 MB)
4. Burrata di Andria IGP (1.41 MB)
5. Caciocavallo Silano DOP (14.73 MB)
6. Canestrato di Moliterno IGP (15.18 MB)
7. Canestrato Pugliese DOP (1.87 MB)
8. Casatella Trevigiana DOP (2.49 MB)
9. Casciotta d'Urbino DOP (4.71 MB)
10. Castelmagno DOP (5.1 MB)
11. Fiore Sardo DOP (682.28 KB)
12. Fontina DOP (3.18 MB)
13. Formaggella del Luinese DOP (2.02 MB)
14. Formaggio di Fossa di Sogliano DOP (4.75 MB)
15. Formai de Mut dell'Alta Valle Brembana DOP (1.92 MB)
16. Gorgonzola DOP (1.55 MB)
17. Grana Padano DOP (2.11 MB)
18. Montasio DOP (399.97 KB)
19. Monte Veronese DOP (490.69 KB)
20. Mozzarella di Bufala Campana DOP (4.77 MB)
21. Murazzano DOP (1.74 MB)
22. Nostrano Valtrompia DOP (3.15 MB)
23. Ossolano DOP (4.1 MB)
24. Parmigiano Reggiano DOP (1.53 MB)
25. Pecorino Crotonese DOP (4.1 MB)
26. Pecorino delle Balze Volterrane DOP (379.77 KB)

27. Pecorino di Filiano DOP (7.26 MB)
28. Pecorino di Picinisco DOP (35.4 MB)
29. Pecorino Romano DOP (2.48 MB)
30. Pecorino Sardo DOP (8.37 MB)
31. Pecorino Siciliano DOP (1.97 MB)
32. Pecorino Toscano DOP (4.55 MB)
33. Piacentinu Ennese DOP (624.87 KB)
34. Piave DOP (2.09 MB)
35. Provolone del Monaco DOP (307.76 KB)
36. Provolone Valpadana DOP (813.52 KB)
37. Puzzone di Moena/Spretz Tzaori DOP (21.36 MB)
38. Quartirolo Lombardo DOP (2.92 MB)
39. Ragusano DOP (742.77 KB)
40. Raschera DOP (2.27 MB)
41. Robiola di Roccaverano DOP (4.33 MB)
42. Salva Cremasco DOP (3.22 MB)
43. Silter DOP (2.09 MB)
44. Sprezza delle Giudicarie DOP (15.9 MB)
45. Squacquerone di Romagna DOP
46. Stelvio o Stilfser DOP
47. Strachitunt DOP
48. Taleggio DOP
49. Toma Piemontese DOP
50. Valle d'Aosta Fromadzo DOP
51. Valtellina Casera DOP
52. Vastedda della Valle del Belice DOP



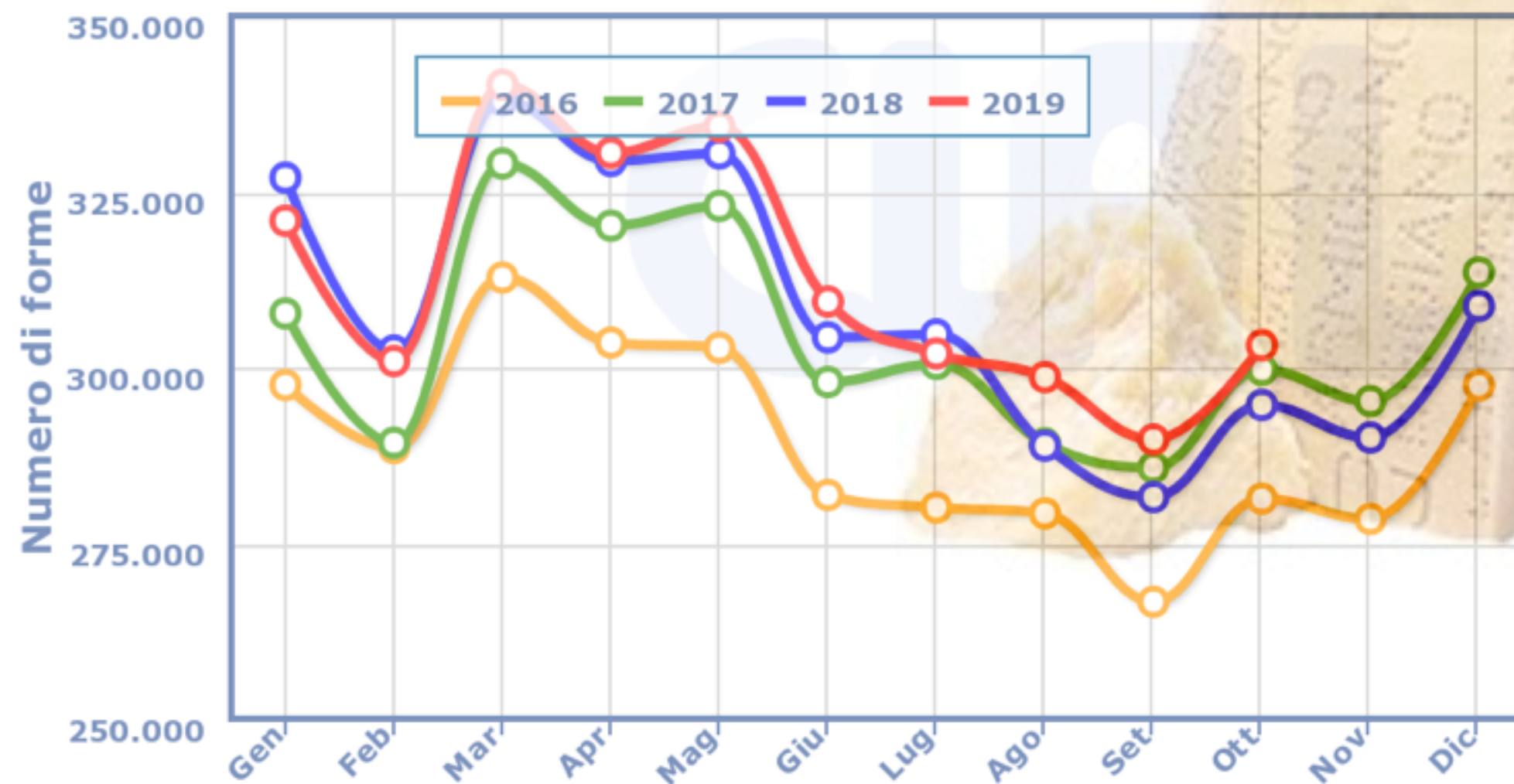
PARMIGIANO
REGGIANO
FIGURES
3.699.701
FORMS in 2018

Production
area and
Processing



- Parmigiano Reggiano is produced exclusively in the provinces of **Parma, Reggio Emilia, Modena and part of the provinces of Mantua and Bologna**, between plains, hills and mountains enclosed between the Po and the Rhine.
- It is in this area that the **four thousand farms** are concentrated in which the cows are fed with fodder produced in this area.
- The feeding of the animals is treated in compliance with a strict regulation that **prevents the use of silage and fermented food**.
- Absolutely **free of additives or preservatives**.

Italia - Quadriennale Produzioni di Parmigiano Regg.
Fonte: Consorzio per la Tutela del Parmigiano Reggiano



‘PARMIGIANO REGGIANO’

EU No: PDO-IT-02202 — 14.11.2016

PDO (X) PGI ()

1. Name(s)

‘Parmigiano Reggiano’

2. Member State or Third Country

Italy

3. Description of the agricultural product or foodstuff

3.1. Type of product

Class 1.3. Cheeses

3.2. Description of the product to which the name in (1) applies

‘Parmigiano Reggiano’ is a hard cheese made from raw cow’s milk, which is partially skimmed by allowing the cream to rise to the surface. The cheese is scalded and slowly matured. The milk must not undergo any heat treatment and has to come from cows fed primarily on fodder obtained in the area of origin. The cheese must be matured for at least 12 months. ‘Parmigiano Reggiano’ can be sold whole, in portions or grated.



‘Parmigiano Reggiano’ has the following characteristics:

- The cheeses are cylindrical with a slightly convex or virtually straight heel and flat faces with a slightly raised edge.
- The flat faces have a diameter of 35 cm to 45 cm and the heel height is 20 cm to 26 cm.
- The minimum weight of each cheese is 30 kg.
- The outer rind is a natural straw colour.
- The rind is approximately 6 mm thick.
- The body of the cheese is between light straw-coloured and straw-coloured.
- The cheese’s characteristic aroma and taste are fragrant, delicate and flavoursome without being pungent.
- The body of the cheese is fine-grained and flaky in texture.
- The minimum fat content in dry matter is 32 %.
- The cheese contains no additives.
- It has a cyclopropane fatty acid ratio of less than 22 mg per 100 g of fat (already accounting for uncertainty of measurement, gas chromatography-mass spectrometry (CG-MS) method).



3.3. *Feed (for products of animal origin only) and raw materials (for processed products only)*

The cows are to be fed primarily on fodder from the defined geographical area, specified by quantity and quality.

At least 75 % of fodder dry matter must be produced within the geographical area.

Feedstuffs may make up at most 50 % of the dry matter of the feed ration.

The use of silage of any kind is banned.

Cow's milk, salt, calf rennet.

A long list of forbidden feeds is reported in the Italian version

The milk is from cows reared in the defined geographical area.

Production:

the milking time for the milk destined for the PDO, for each of the two daily milk buds allowed, including the relative transport to the dairy, must be kept within seven hours.

The milk from the evening milking and the morning milking are delivered intact to the dairy within two hours of the end of each milking. The milk cannot be subjected to centrifugation processes.

The milk can be cooled immediately after milking and stored at a temperature not lower than 18°C.

The evening milk is partially skimmed by natural separation by surfacing of the fat in open-air steel tanks. Morning milk, after delivery to the dairy, is mixed with the semi-skimmed milk from the previous evening; it can also be subjected to a partial skimming for natural surfacing of the fat.

The fat / casein ratio of the milk in the boiler, calculated as the weighted average value of the boiler batches on the processing day, cannot exceed 1.1 + 12%.

Why silage are forbidden: late blowing defect prevention

Clostridium sporogenes, Clostridium butyricum, Clostridium beijerinckii, and less frequently Clostridium cochlearium, Clostridium perfringens, Clostridium septicum. All these microorganisms, alone or in association, have been related during time to the blowing problem



Clostridium tyrobutyricum spores survive pasteurisation or cooking and are the cause of late-blowing defect (LBD) in hard and semi-hard cheeses.



To reduce losses connected to clostridia spoilage, preservatives such as nitrate and lysozyme, which consistently modify the cheese environment in which microorganisms survive and multiply, are added to milk during hard cheese manufacture **but not for PR cheese**

The use of nitrate in milk to prevent late blowing defect was also common in hard cheesemaking, particularly in Emmental production but its employ was banned after the European Food Safety Authority (EFSA) proposed to reduce levels of nitrosamines in food products



Grano Padano DOP

PRODUCTION AREA OF GRANA PADANO D.O.P. :

provinces of Alessandria, Asti, Biella, Cuneo, Novara, Torino, Verbania, Vercelli, Bergamo, Brescia, Como, Cremona, Lecco, Lodi, Mantova a sinistra del Po, Milano, Monza, Pavia, Sondrio, Varese, Trento, Padova, Rovigo, Treviso, Venezia, Verona, Vicenza, Bologna a destra del Reno, Ferrara, Forlì Cesena, Piacenza, Ravenna e Rimini, + few municipalities of the province of Bolzano: Anterivo, Lauregno, Proves, Senale-S. Felice e Trodena.



GRANA PADANO FIGURES

4932996 FORMS in 2018

1938328 FORMS EXPORTED in 2018

128 CHEESEMAKING FACTORIES

40000 WORKERS

Feeding:

- **Fresh fodder** - fresh fodder from stable or artificial or cut grassland.
- **Hays:** obtained by drying in the field, with aero-drying or dehydration techniques, forage essences that can be used as green fodder.
- **Straws:** of cereals such as wheat, barley, oats, rye, triticale.
- **Silage**, *not allowed for the production of the Trentingrana type:*
 - - corn shredded;
 - - silo hays.



Specifications

The use of lysozyme is allowed, except for Trentingrana, up to a maximum of 2.5 g per 100 kilograms of milk.

- The **specific amino acid composition** of GRANA PADANO D.O.P. it is deposited with the Consortium for the Protection of GRANA Cheese PADANO and at the Ministry of Agricultural, Food and Forestry Policies and determined through the use of ion-exchange chromatography with post-column photometric detection with ninhydrin.
- The **specific isotopic composition** of GRANA PADANO D.O.P. it is deposited with the Consortium for the Protection of GRANA Cheese PADANO and at the Ministry of Agricultural, Food and Forestry Policies and determined with mass spectrometry methods on isotopic ratios (IRMS).
- The content of **lysozyme** in the finished product - when used in cheesemaking - measured by reverse phase liquid chromatography and fluorescence detection, must correspond to the quantity declared and verified in the cheesemaking process.



Consorzio Produttori
Aceto Balsamico
Tradizionale di Modena



Aging concentration



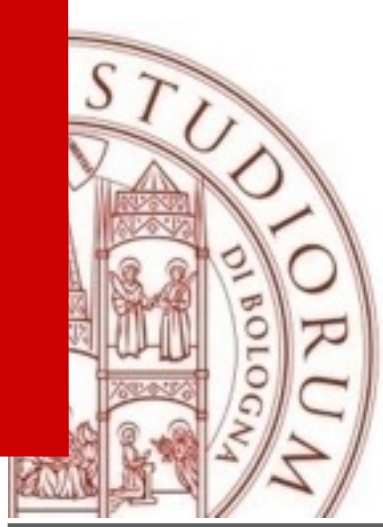
[Consorzio Aceto
Balsamico di
Modena \(CABM\)](#)

2023 nuova denominazione

Aceto Balsamico di Modena IGP “Invecchiato”.

“Technological” concentration and addition

Cooked must and 10-year-old vinegar



Certified primary agricultural productions



Definition:

- area of production
- genetics and cultivation environment
- (soil, climate, cultivation technique, type of storage)
- irrigation
- fertilization
- pesticide protection
- historical references of land vocation





Products certified EU as ingredients with added value

Prodotti trasformati con ingredienti DOP IGP



INDUSTRIA E ARTIGIANATO ALIMENTARE ITALIANO

81.618

Aziende

145 mld €

Fatturato



22.169

Industria alimentare



39.100

Artigianato alimentare



20.349

Artigianato con somministrazione

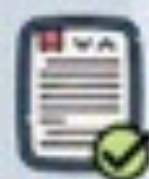
Fonte: Elaborazione Qualivita su dati CNA-Infocamere (2021)

DOP IGP COME INGREDIENTI DI PRODOTTI TRASFORMATI



13.000

Autorizzazioni rilasciate



4.600

Autorizzazioni attive - anno 2020



1.600

Imprese coinvolte - anno 2020



260 mln €

Valore DOP IGP destinati a trasformati



PRODOTTI TRASFORMATI CON DOP IGP PER TIPOLOGIA

CIBO (4.200 autorizzazioni attive)



1°

Primi piatti (52%)



2°

Condimenti (45%)



3°

Gelati (31%)

VINO (400 autorizzazioni attive)



1°

Salumi (48%)



2°

Formaggi (40%)

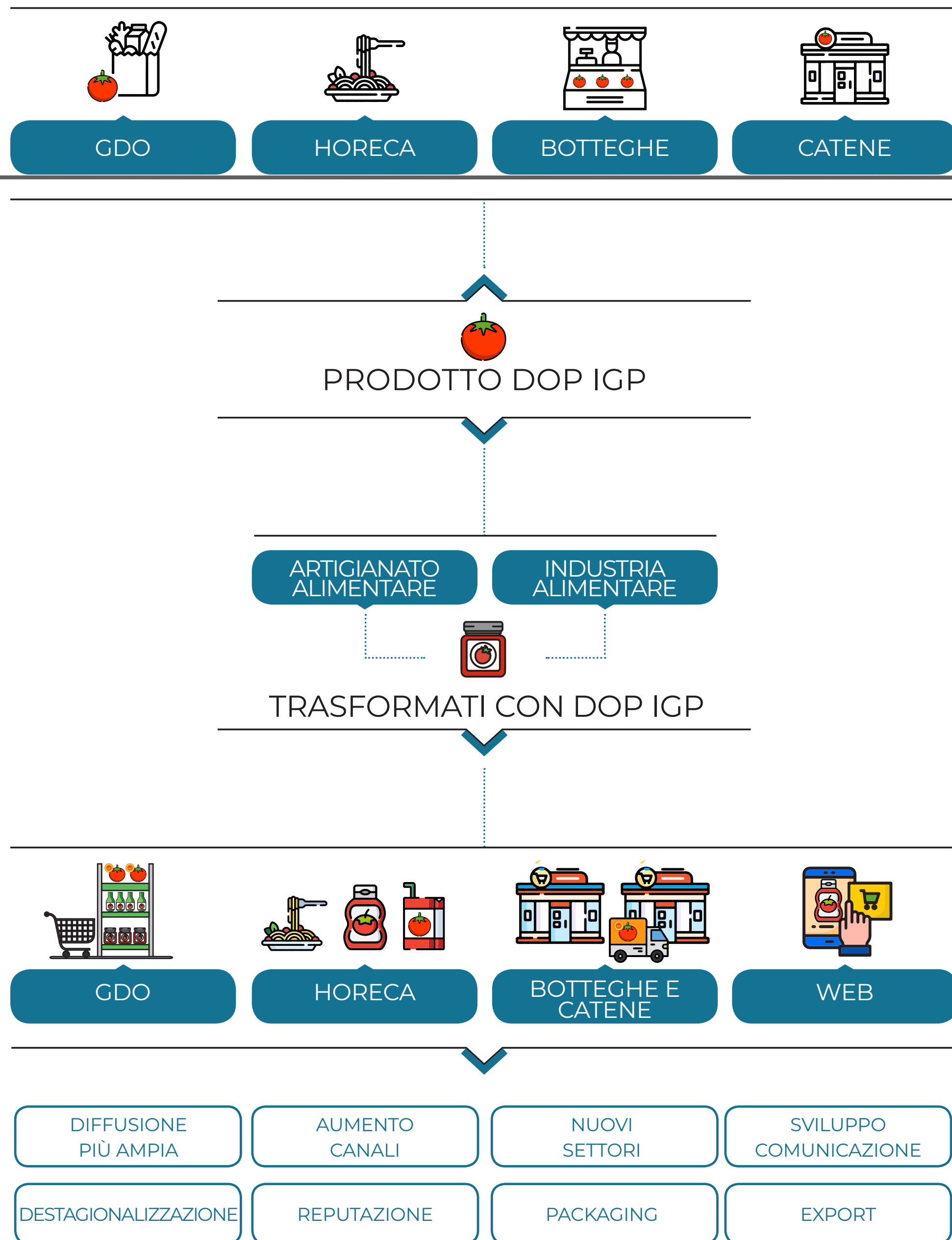


3°

Dolci (32%)

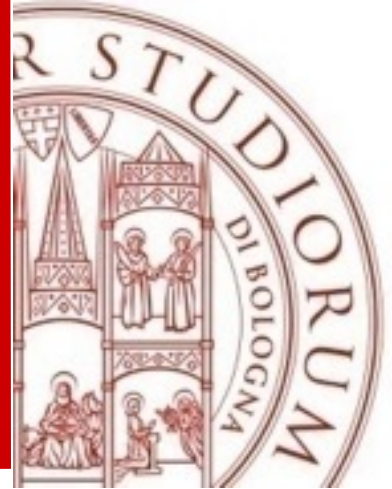
Products certified EU as ingredients with added value



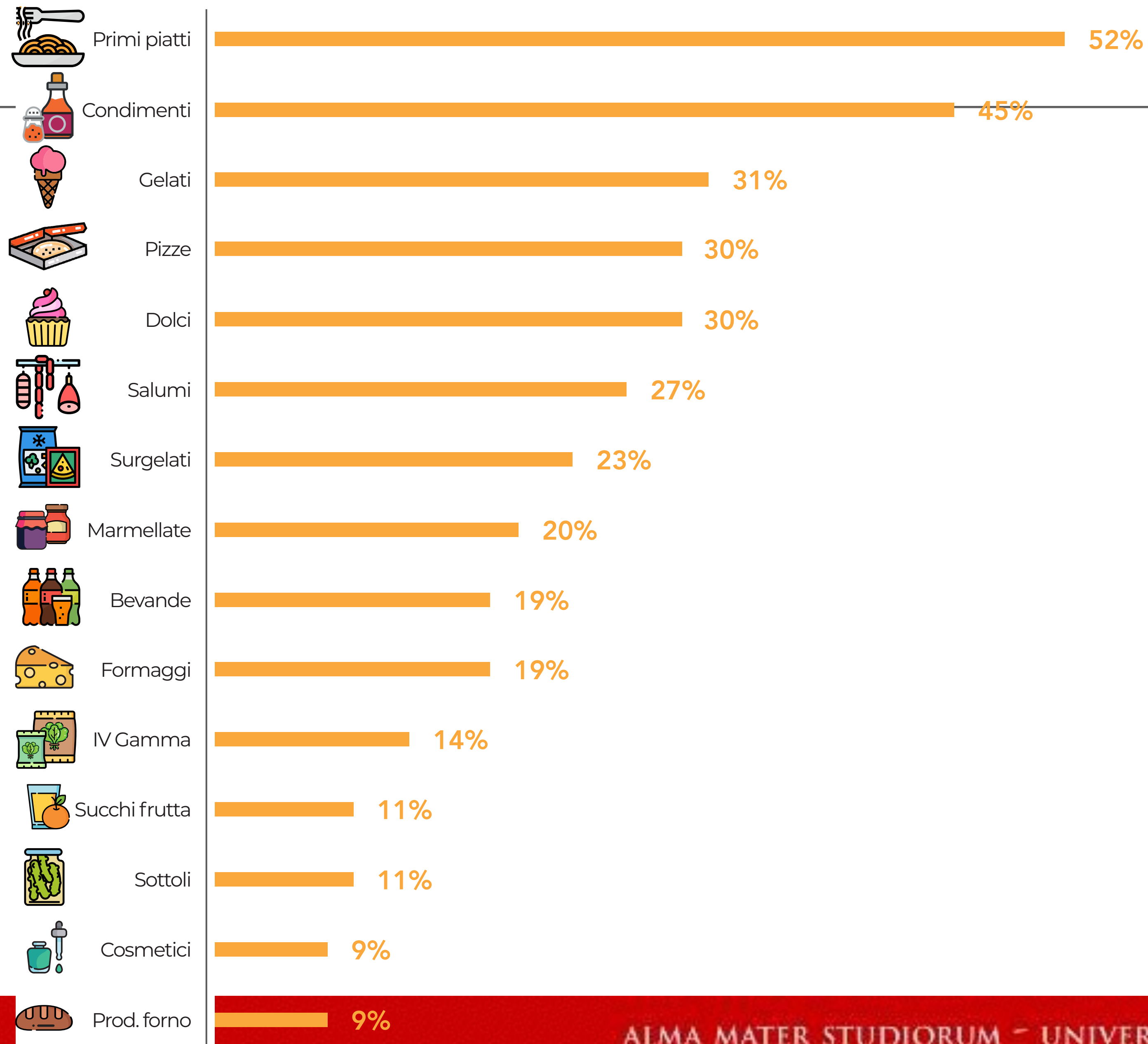


Comparto	Autorizzazioni totali	Autorizzazioni attive nel 2020	Autorizzazioni imprese nel 2020
Formaggi	1.387	1.111	438
Ortofrutticoli	1.777	1.352	570
Carni fresche	958	507	170
Prodotti a base di carne	238	120	63
Oli	83	22	18
Altri prodotti	7.714	974	133
Vino	456	340	195
Totale	12.613	4.426	1.597

Protection consortia must issue authorizations for the use of the name and trademark



Food with PDO / PGI ingredient authorized by protection body





STG Pizza Napoletana





STG Pizza Napoletana



Description of the agricultural product or foodstuff bearing the name indicated in Section 3.1

"Pizza Napoletana" TSG is presented as a round baked product, with a variable diameter not exceeding 35 cm, with a raised edge (cornicione) and with the central part covered by the filling. The central part will be 0.4 cm thick with a permitted tolerance of $\pm 10\%$, the cornicione 1-2 cm. The pizza as a whole will be soft, elastic, easily foldable into a "booklet" shape.

The "Pizza Napoletana" STG is characterized by a raised, golden-colored crust, typical of baked goods, soft to the touch and taste; a center with the filling, where the red of the tomato stands out, to which the oil has been perfectly blended and, depending on the ingredients used, the green of the oregano and the white of the garlic; the white of the mozzarella in more or less close patches, the green of the basil in leaves, more or less dark for cooking.

The texture of the "Pizza Napoletana" should be soft, elastic, easily bendable; the product is soft when cut; with a characteristic, savory flavor resulting from the crust, which has the typical taste of well-grown and well-baked bread, mixed with the sour flavor of tomato, the aroma, respectively, of oregano, garlic or basil, and the flavor of cooked mozzarella. The pizza, at the end of the baking process, will give off a characteristic, fragrant, fragrant smell; the **tomato**, having lost only its excess water, will remain dense and consistent; the **mozzarella di bufala campana DOP or STG mozzarella** will be melted on the surface of the pizza; the **basil as well as the garlic and oregano** will develop an intense aroma, appearing unburned to the eye.

Descrizione del metodo di ottenimento del prodotto che reca il nome indicato al punto 3.1

Le materie prime di base caratterizzanti la «Pizza Napoletana» sono: farina di grano tenero tipo «00» con l'eventuale aggiunta di farina tipo «0», lievito di birra, acqua naturale potabile, pomodori pelati e/o pomodorini freschi, sale marino o sale da cucina, olio d'oliva extravergine. Altri ingredienti che possono essere utilizzati nella preparazione della «Pizza Napoletana» sono: aglio e origano; mozzarella di bufala campana DOP, basilico fresco e mozzarella STG.

Le caratteristiche della farina sono le seguenti:

— W:	220-380
— P/L:	0,50-0,70
— Assorbimento:	55-62
— Stabilità:	4-12
— Value index E10:	max 60
— Falling number:	300-400
— Glutine secco:	9,5-11 g %
— Proteine:	11-12,5 g %

Salumi italiani DOP e IGP



I salumi italiani a marchio IGP

Bresaola della Valtellina
Ciauscolo
Coppa di Parma
Cotechino Modena
Finocchiona
Lardo di Colonnata
Mortadella Bologna
Mortadella di Prato
Porchetta di Ariccia
Prosciutto Amatriciano
Prosciutto di Norcia
Prosciutto di Sauris
Salama da Sugo
Salame Cremona
Salame d'Oca di Mortara
Salame Sant'Angelo
Salame Felino
Salame Piemonte
Speck Alto Adige
Zampone Modena

I salumi italiani a marchio DOP

Capocollo di Calabria
Coppa Piacentina
Crudo di Cuneo
Culatello di Zibello
Lard d'Arnad (Val d'Aosta)
Pancetta di Calabria
Pancetta Piacentina
Prosciutto di Carpegna
Prosciutto di Modena
Prosciutto di Parma
Prosciutto di San Daniele
Prosciutto Toscano
Prosciutto Veneto Berico-Euganeo
Salame di Varzi
Salame Brianza
Salame Piacentino
Salamini Italiani alla Cacciatora
Soppressata di Calabria
Sopressa Vicentina
Salsiccia di Calabria
Jambon de Bosses (Val d'Aosta)



Case Study

IL PROSCIUTTO DI SAURIS

Localizzato nel
Comune di **Sauris**
a 1200m s.l.m.



Caratterizzato da:

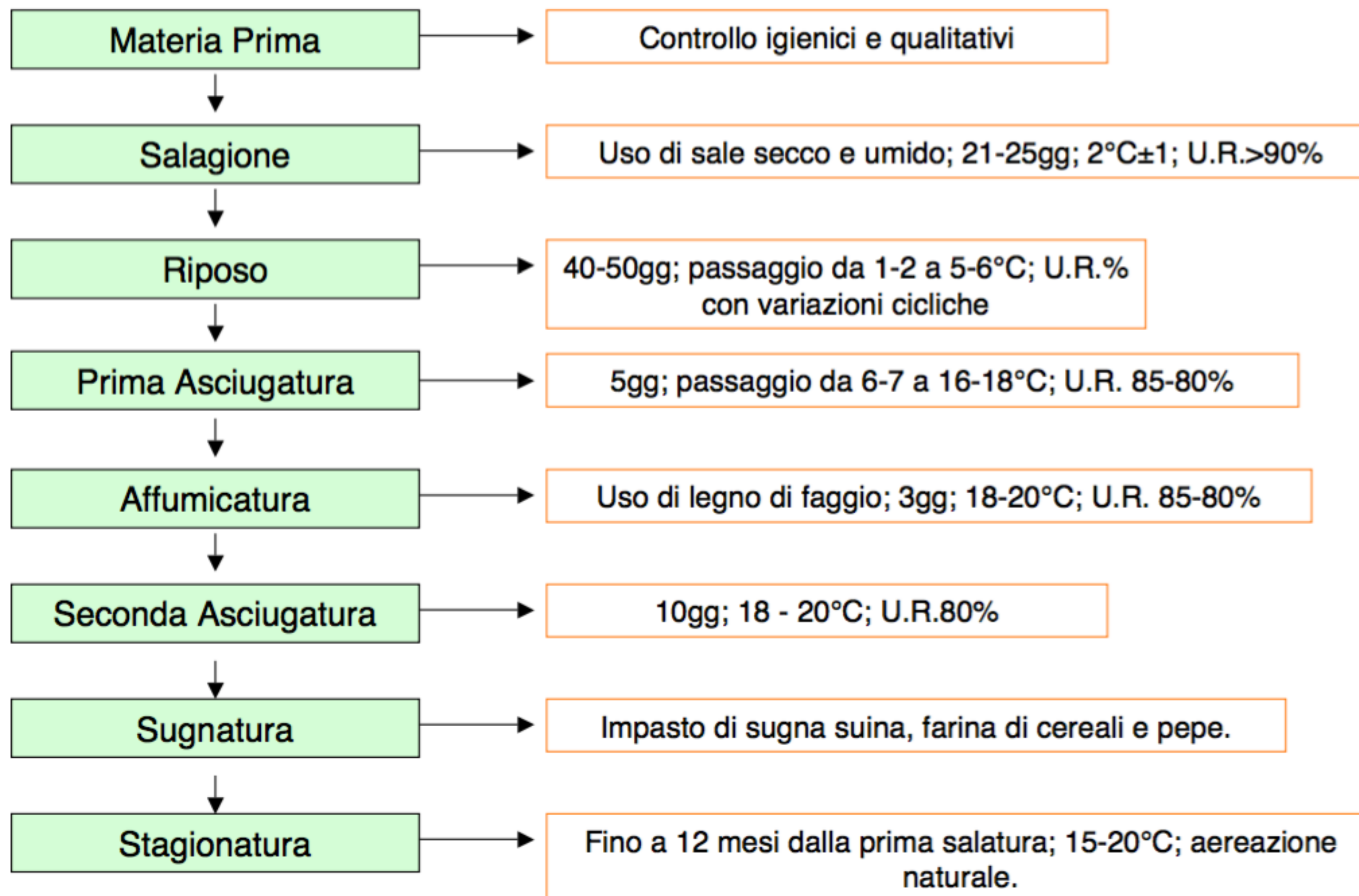
- Salatura leggera (tipo Parma)
- Affumicatura con legna di faggio
- Stagionatura naturale

Richiesto il riconoscimento I.G.P.





Procedimento di Produzione del Prosciutto Crudo Affumicato



DRY SALTING



Aspersion of NaCl to cover
the exposed muscular surface
NO PRESERVATIVES

SMOKING

Combustione legna di faggio,
Immissione fumo naturale o forzata
Temperatura più o meno
elevata (30-60°C)



Pre-Seasoning - Drying





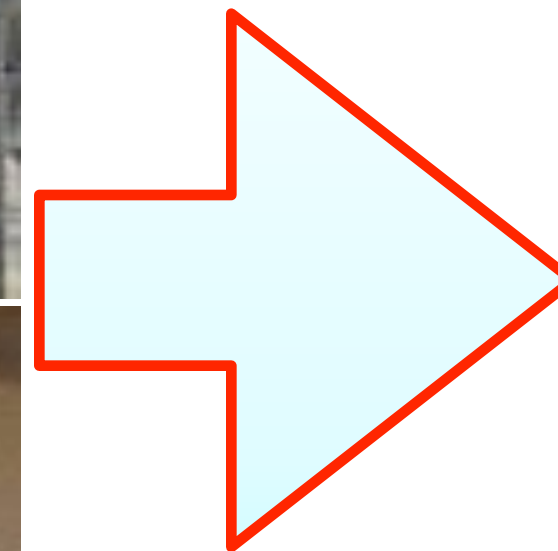
almeno dieci mesi

Seasoning
minimum 10
months



e.g. recent PGI status for “Piadina Romagnola”

artesanai product **NO IGP**



PIADINA ROMAGNOLA IGP



Piadina
Romagnola

Indicazione Geografica Protetta

Protezione Transitoria concessa dal M.I.P.A.A.F.
con decreto 27 dicembre 2012
Certificato da Organismo di Controllo Autorizzato
dal Ministero delle Politiche Agricole Alimentari e Forestali

Industrial product: debate on packaging

Piadina IGP

.....e non IGP



Regime di Refrigerazione



Non refrigerata



Bitto (Storico) DOP



BITTO

- esclusivamente con latte vaccino crudo
- alimentazione delle bovine lattifere solo erba di pascolo degli alpeggi
- eventuale aggiunta di latte caprino crudo in misura non superiore al 10%
- lavorazione entro un'ora dal termine della mungitura

.....e non DOP

Consorzio Salvaguardia Bitto Storico

STORICO



RIBELLE



Produzioni agricole primarie certificate



Definizione:

- zona di produzione
- genetica e ambiente di coltivazione
- (suolo, clima, tecnica colturale, tipologia di conservazione)
- irrigazione
- concimazione
- protezione antiparassitaria
- riferimenti storici della vocazione territoriale



Which role of traditional products in the Food Industry Scenario?

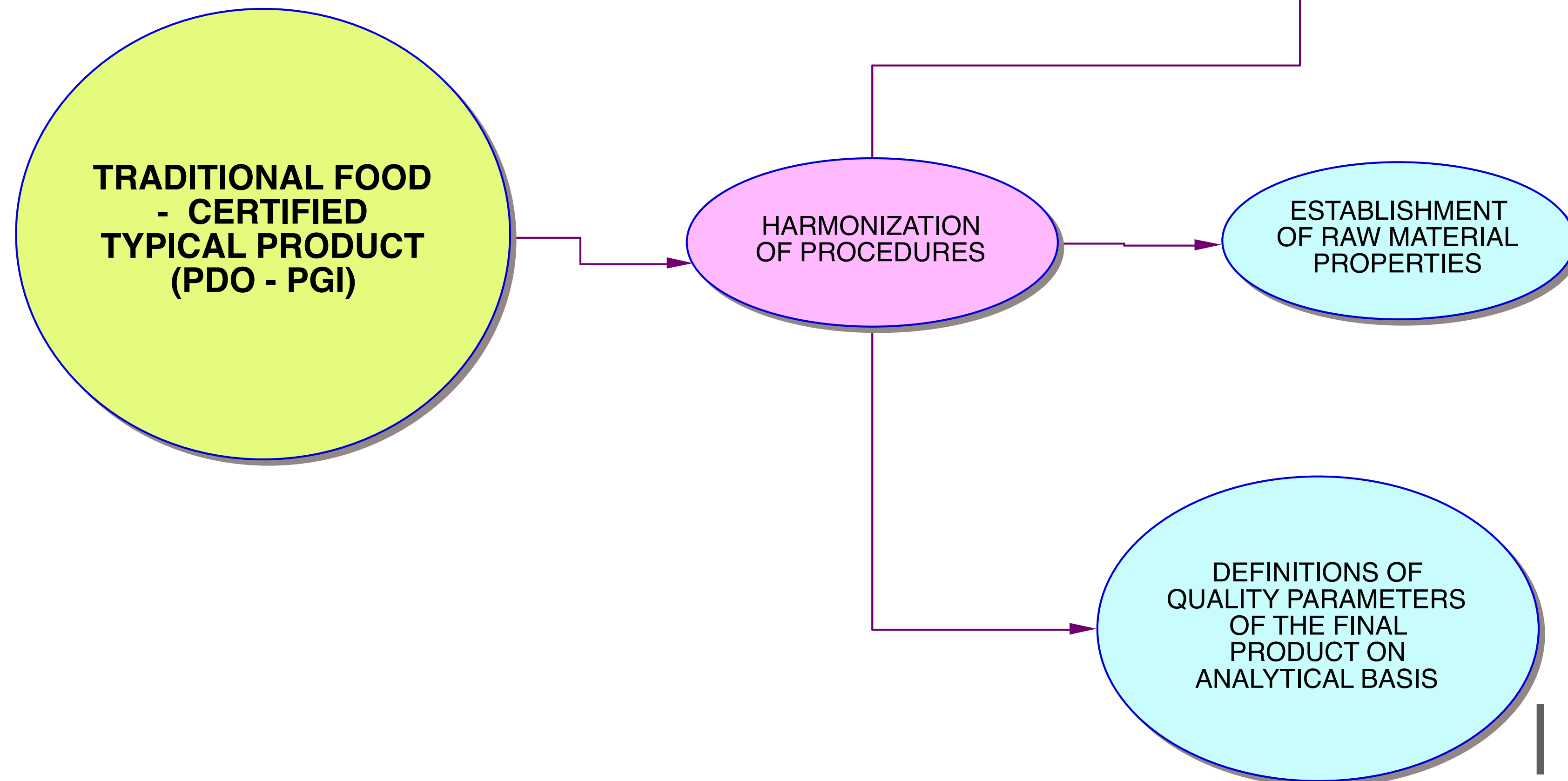
- "Product of high value-added"
- "Based on cultural values of tradition"
- Valuable products by cultural, ethnic, sensorial aspects --> typical foods
- "Critical for the need of using selected raw materials"
- "Fulcrum of the traditions of the local high valuable (e.g. Mediterranean) diet"

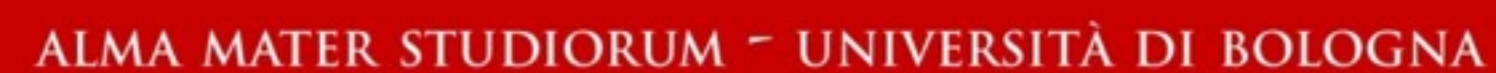


FOOD SCIENCE & TECHNOLOGY ACTIONS TO IMPROVE TRADITIONAL FOODS



PDO PGI TSG







Scientific interest in traditional food production

- Often not enough investigated production from scientific viewpoint --> small industrial scale food production
- Poor knowledge of specific characteristics of traditional food

CASE STUDIES AND SMART TECHNOLOGIES

- ☒ Cherry perishability
- ☒ Mind Map of traditional and innovative cherry processing technologies
- ☒ Development of mild technologies in cherry processing and preservation
- ☒ Emerging technologies to assure cherry safety and improving processing kinetics
- ☒ Packaging technologies and shelf-life prolongation
- ☒ Next research opportunities @ UNIBO on cherry processing





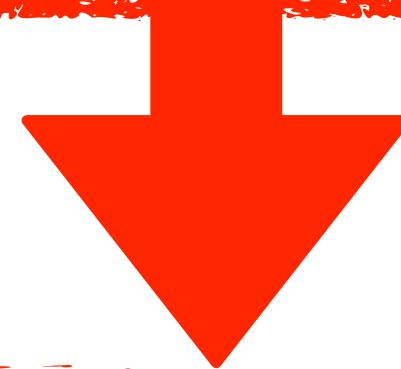
HIGH PERISHABILITY DUE TO

- ★ high rate of transpiration and respiration,
- ★ mechanical damages
- ★ microbial infections
- ★ dramatically reduction storability and marketing acceptability after harvest.



© dionisvera / iStock / Thinkstock

*Short shelf-life of 2–4 weeks at 0°C with 90–95% relative humidity, but **traditional cold storage method** generally causes some **physiological disorder**, such as surface pitting and anthocyanins degradation*



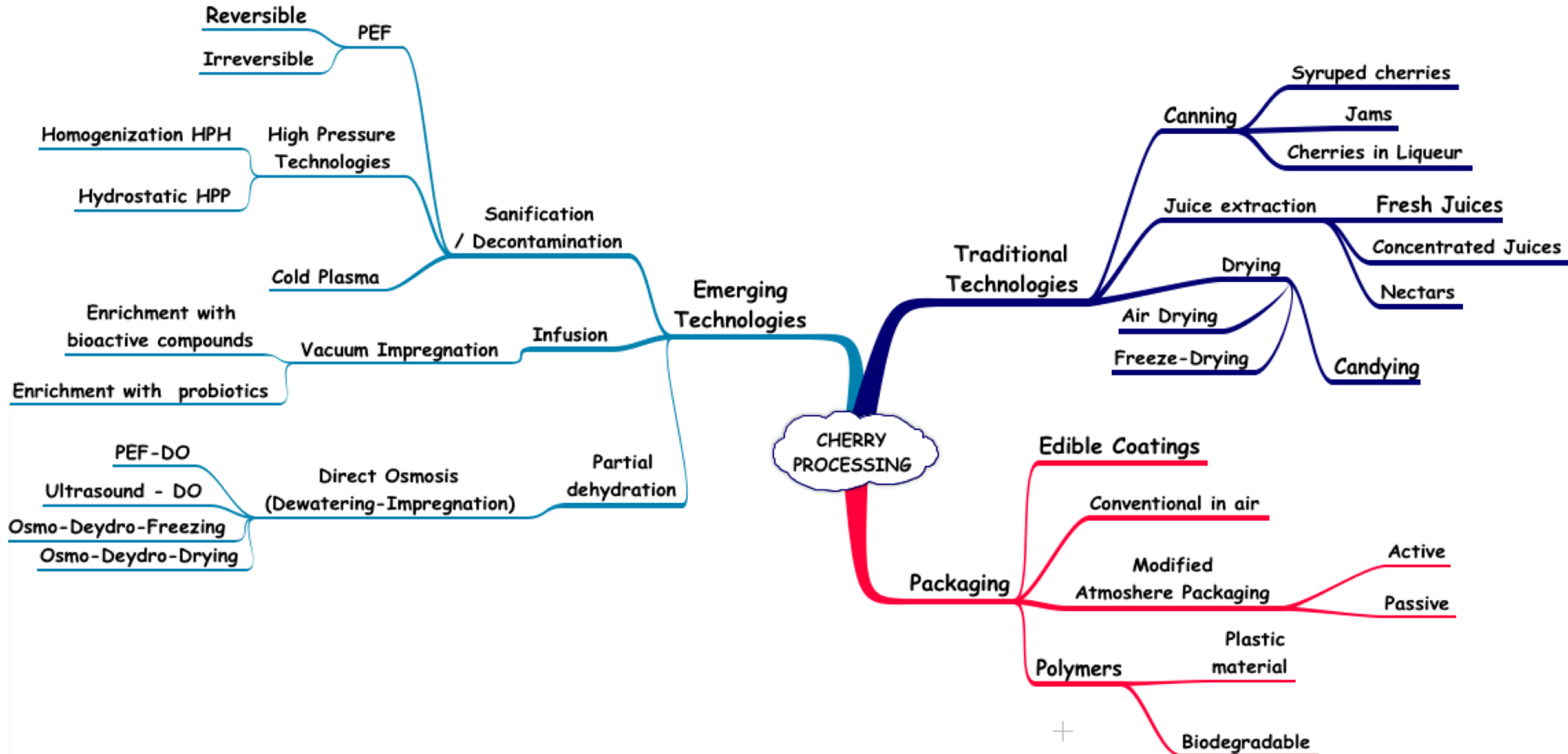
processing of cherries to prolong the shelf life is an important way to offer a diverse array of the products year-round.





Mind Map of traditional and innovative cherry processing technologies

2019



Traditional cherry processing technologies

- Traditional pasteurization techniques
- jams, syrup cherries and juices.
- Thermal processing of fruit (e.g. jams) caused a **loss of 70% of the vitamin C content**



- 📌 **3 months** of storage at 20°C, antioxidant capacity of cherry jams from both and sour cherries does not induce statistically significant changes in FRAP antioxidant activity
- 📌 Total phenolics, monomeric anthocyanins, vitamin C were changed with statistical significance.

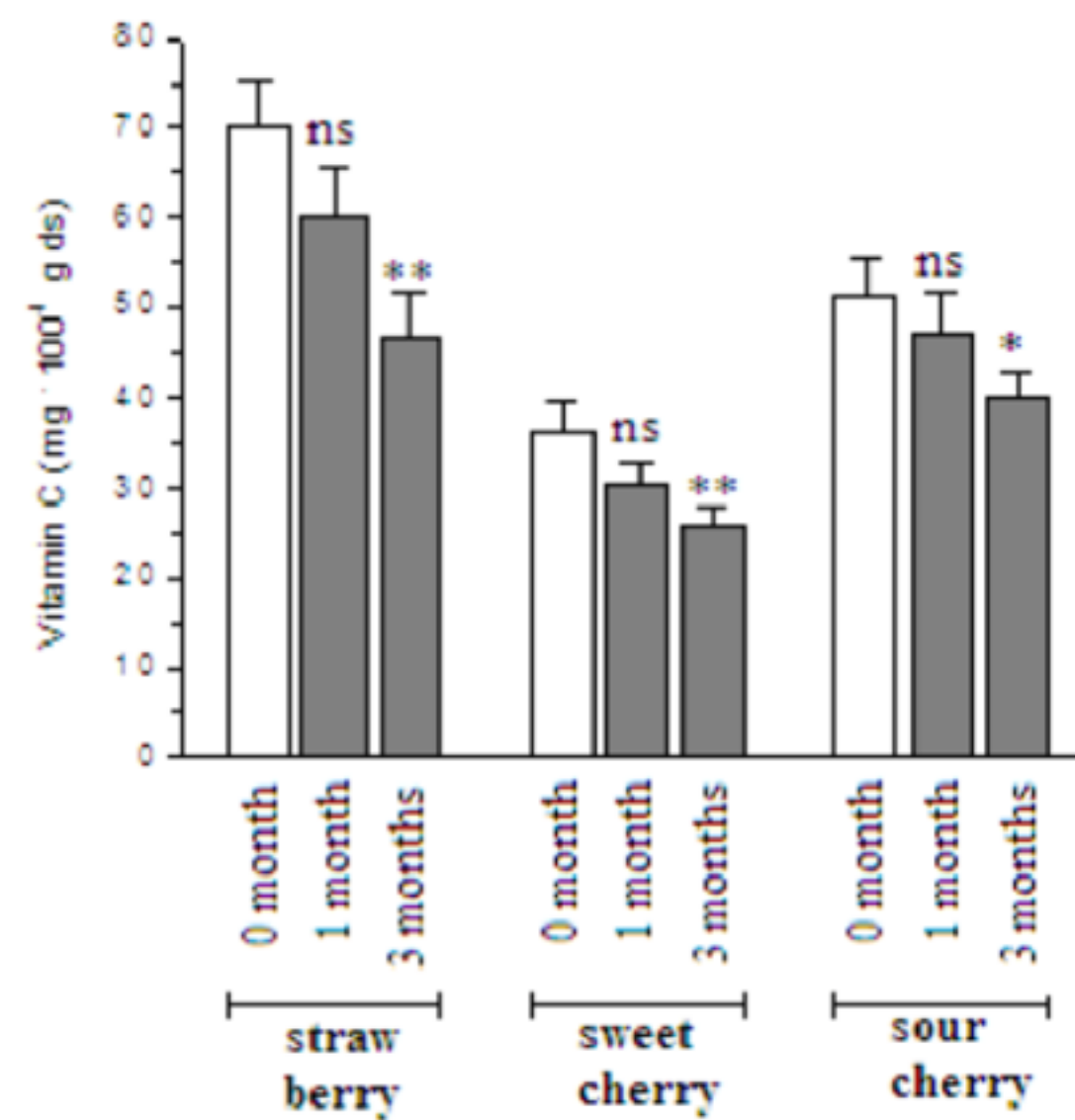


Traditional cherry processing technologies

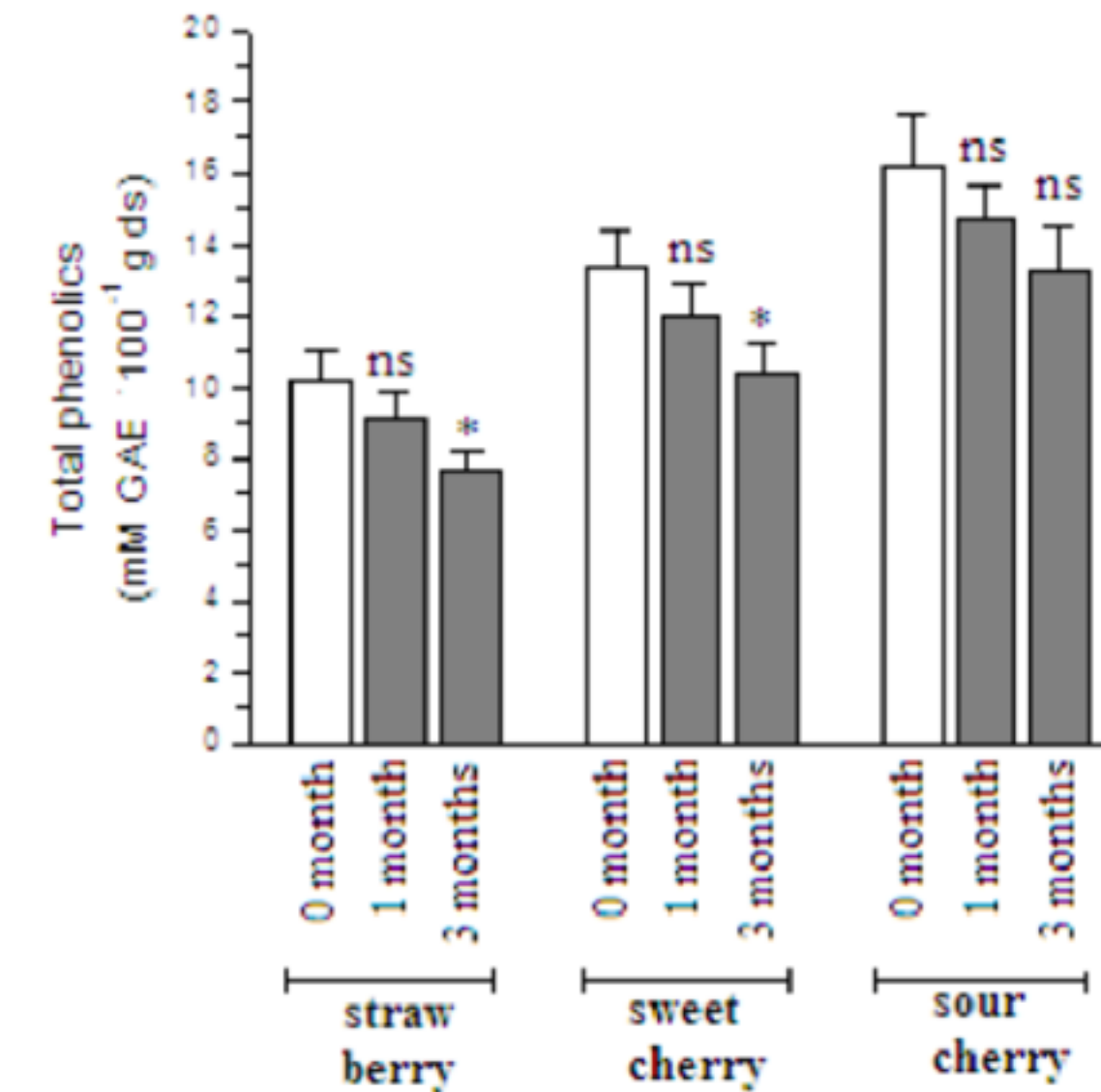
3 months of storage led to significant and **highly significant alterations**. Thermal processing of jam (sweet cherries and sour cherries) resulted in significant losses of antioxidant capacity (30-41%), phenolics compounds (25- 43%), vitamin C content (54-78%)

the **better tolerance by the sour cherry jam** was found (Poiana et al., 2011)

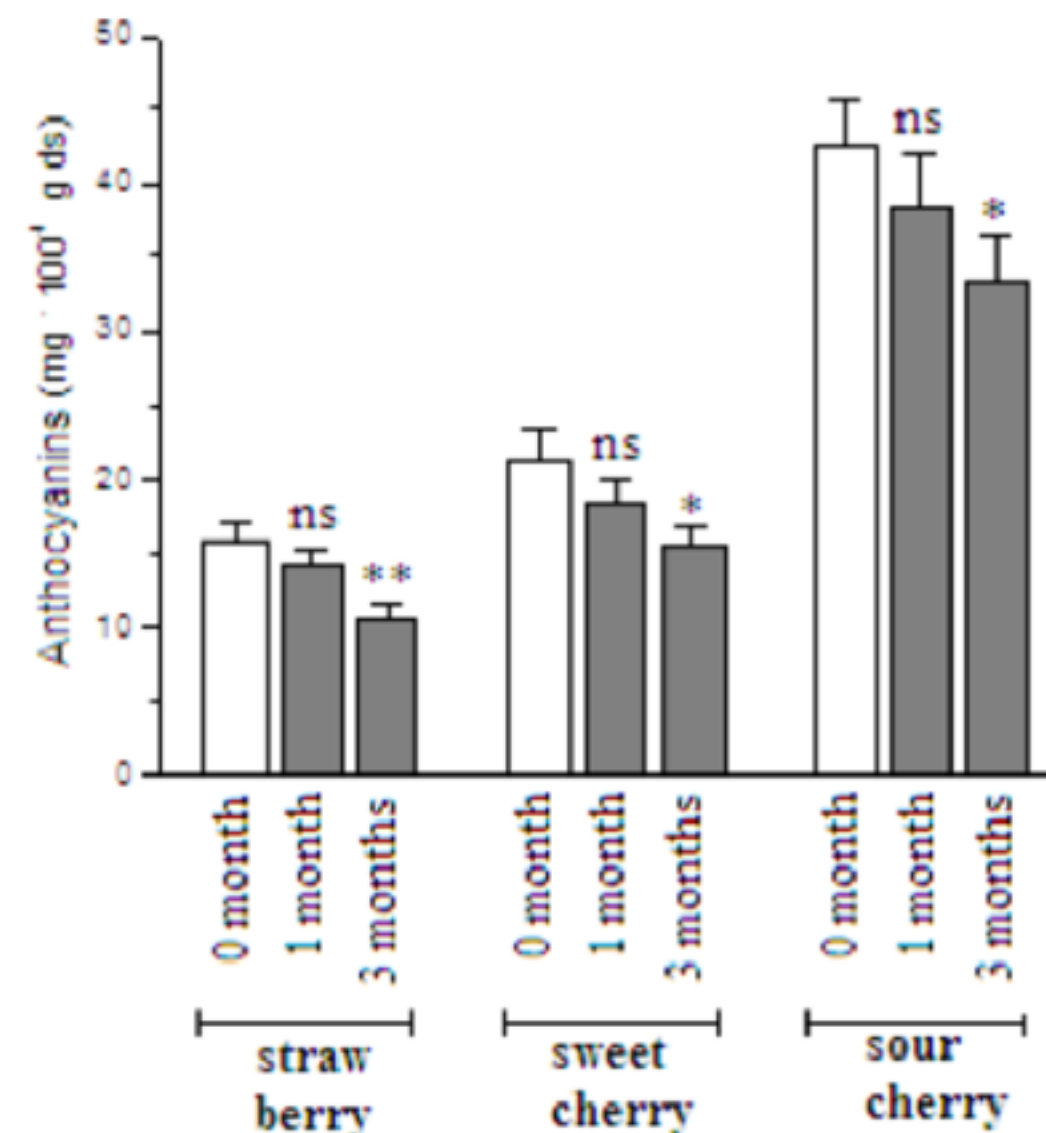
As a consequence, the **optimization of the thermal treatments and storage time** is a fundamental **key point** to improve the quality of processed cherries in jams or canned products (Jensen, 2017).



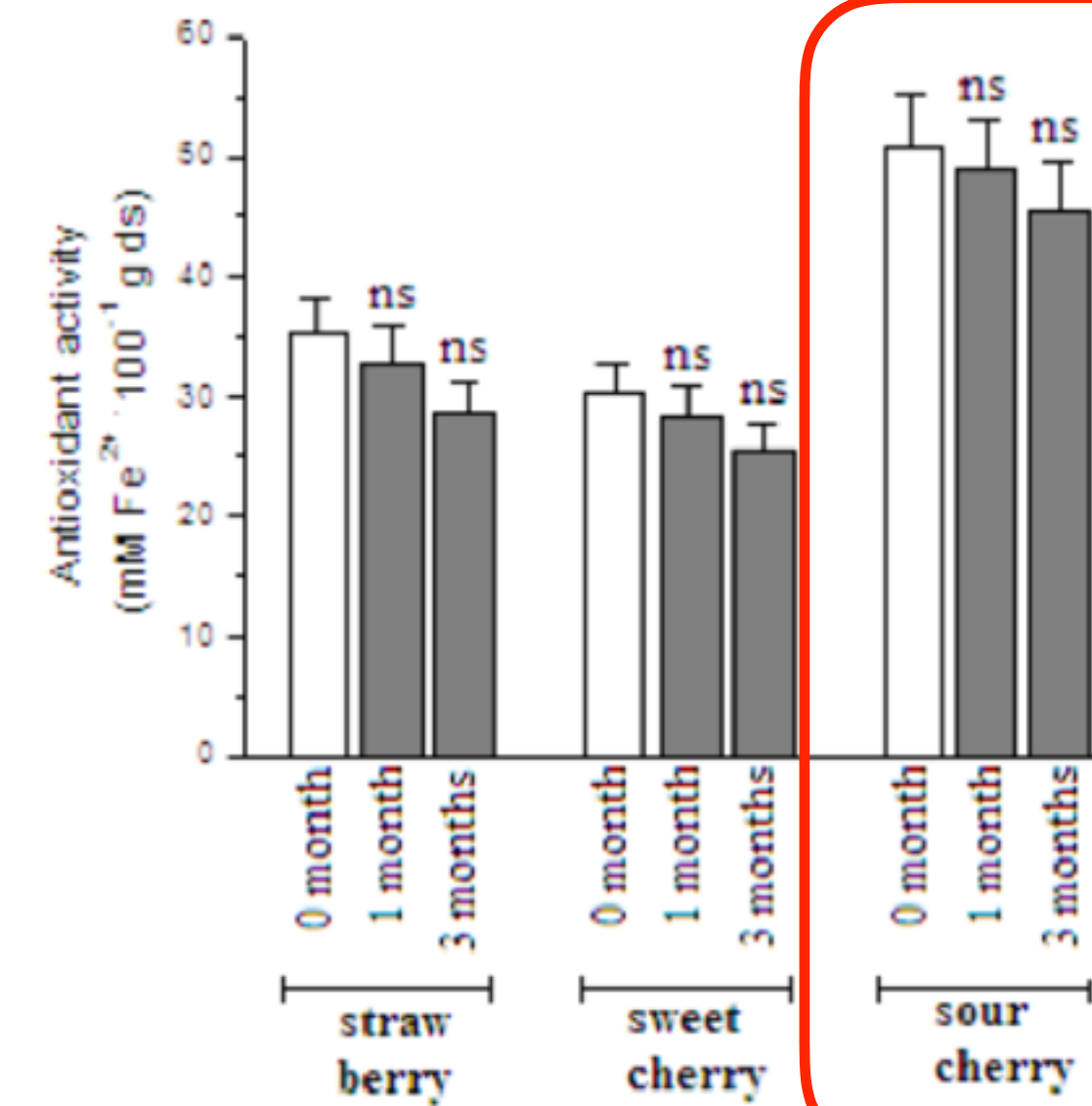
a



b



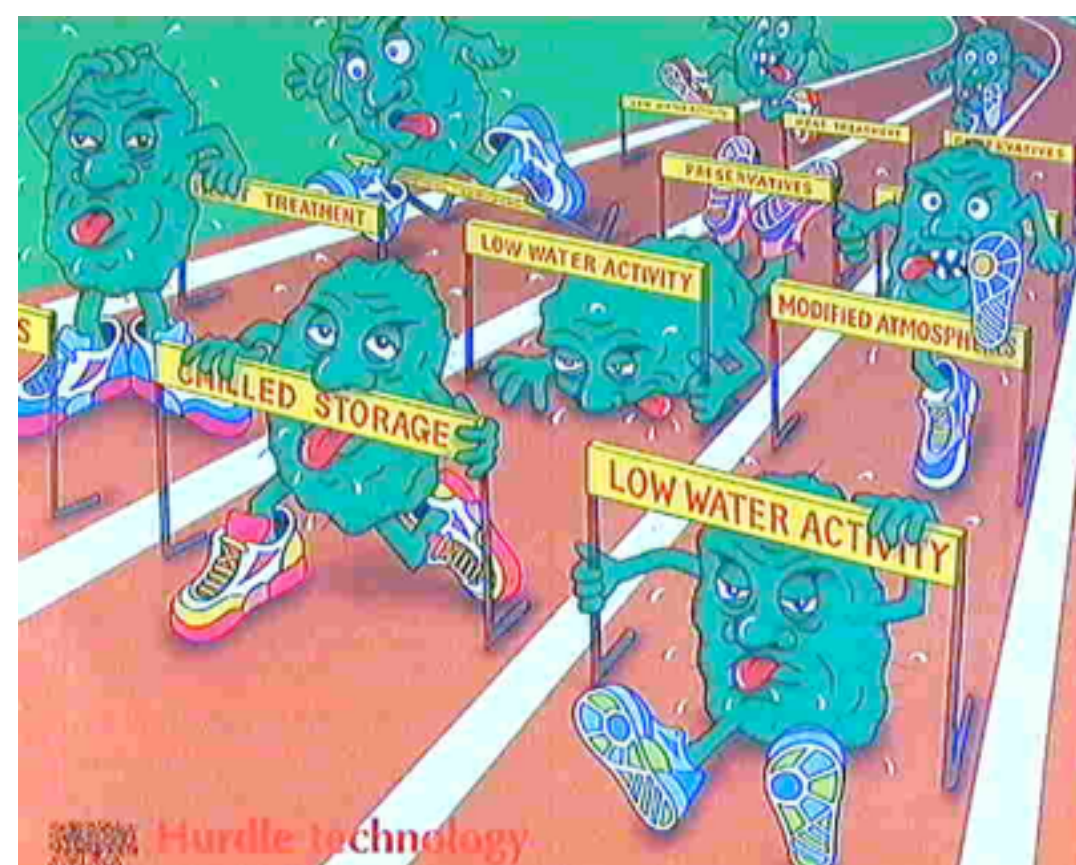
c



d

Cherry processing by mild technologies

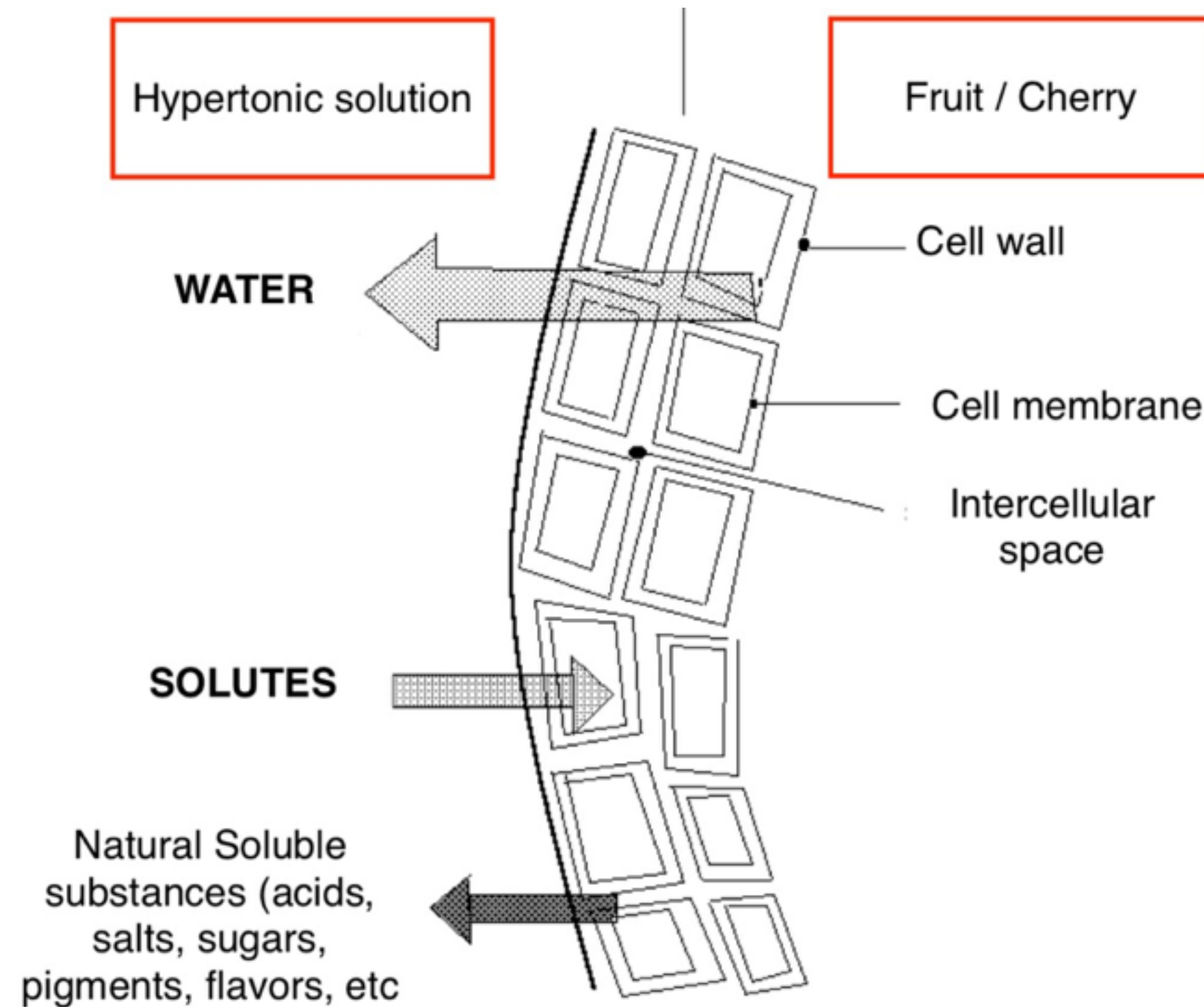
- **Hurdle technology approach** could be assumed in order to reduce the impact of the processing on the product's quality
- **combination of a mild heat treatment with other technologies** like partial dehydration, freezing and / or refrigerated storage;
- in **processing Juices**, membrane filtration technologies such as ultrafiltration, microfiltration or nanofiltration can be used to obtain stable products other than for clearing or concentrating juice;
- this result can be obtained with filter with a pore size of less than 45 μm in order to remove bacteria, yeasts and fungi





Osmotic dehydration

Osmotic dehydration (OD) is a partial dewatering impregnation process carried out by the immersion of cellular tissue in hypertonic solution



Osmotic dehydration (OD) is a pre-treatment commonly applied prior to air-drying or other stabilization techniques like freezing, in the last case resulting an osmo-dehydration-freezing process

Main results OD application: uptake of solids from the osmotic solutions, increasing in sugar / solutes content, partial protection from enzymatic activity, low energy demand for water removal, improvement in flavor, taste and color of the final product

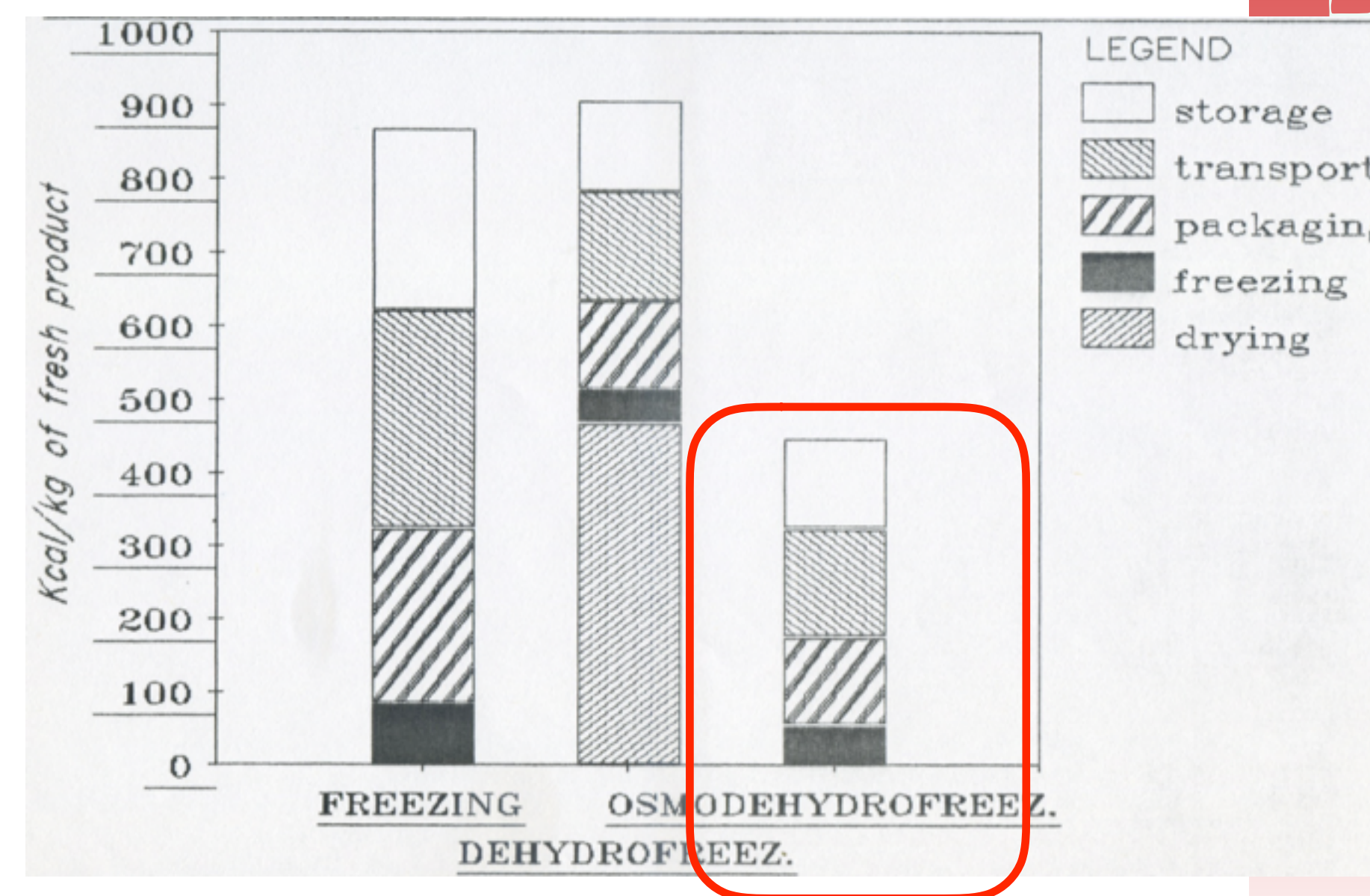


Osmo-dehydro-freezing

Dalla Rosa 2019

Pitted cherries were able to loss up to 40% of the initial water after 8 hours of osmotic treatment and around 55% after 16 hours.

- reduction of total latent heat of freezing;
- higher freezing rate;
- increasing of micro crystallization owing to the lower solids/crystals ratio;
- weight and volume reduction of frozen fruit;
- better texture and taste of the thawed fruit;
- less drip loss at thawing.



Less Energy demand

(Pinnavaia, Dalla Rosa and Lerici, 1988)



Osmo-dehydro-freezing

- ★ OD Frozen cherries showed **higher sensorial score for better taste, flavor, color and a more rich aroma profile** than the fresh fruit.
- ★ Other than the consumption facilitation, the **stone removing is useful to improve the mass transfer** since the cherry waxy skin
- ★ osmo-dehydro-frozen cherries **showed a well-firm texture but still pleasant to consume** them and thus successfully used as an ingredient in low temperature final product as into an ice-cream formulation



Osmotic dehydration + convective drying

- ✓ process combination to enable to reduce the air drying to reach water activity values close to 0.75 reducing the risk of microbial spoilage

Benefits:

- ✓ Better maintenance of natural color, flavor, aroma, and the reduction of the oxidative reactions and enzymatic degradation reactions.
- ✓ In particular for sour cherries, the osmotic water removal is able to improve the dried sour cherry consumers' acceptability
- ✓ Easy to obtain high value cherry snacks



Ultrasound pre-treatment

Purposes:

- ★ osmo-convective drying is time-consuming and energetically demanding
- ★ cherry skin, offering a serious barrier against effective diffusion during both osmotic dehydration and the drying process
- ★ ultrasound (US) pretreatments can improve the process efficiency (osmo and drying kinetics) in term of time consumption and mass transfers.

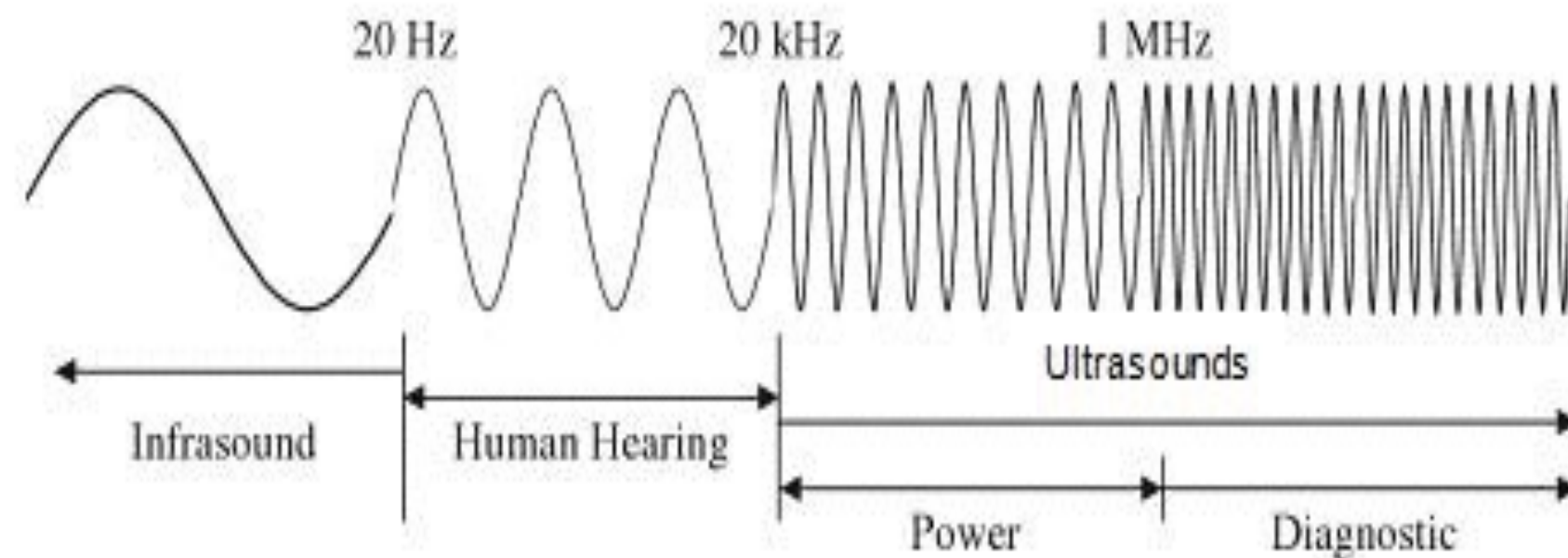
Actions:

- ☆ Since fruits are rich in water content, power ultrasound promotes alternately compression and expansion of material (“sponge effect”), rupture of the native cellular structure of the material and microchannels formation.
- ☆ The microstructural changes enhance the mass and/or heat transfer based processes



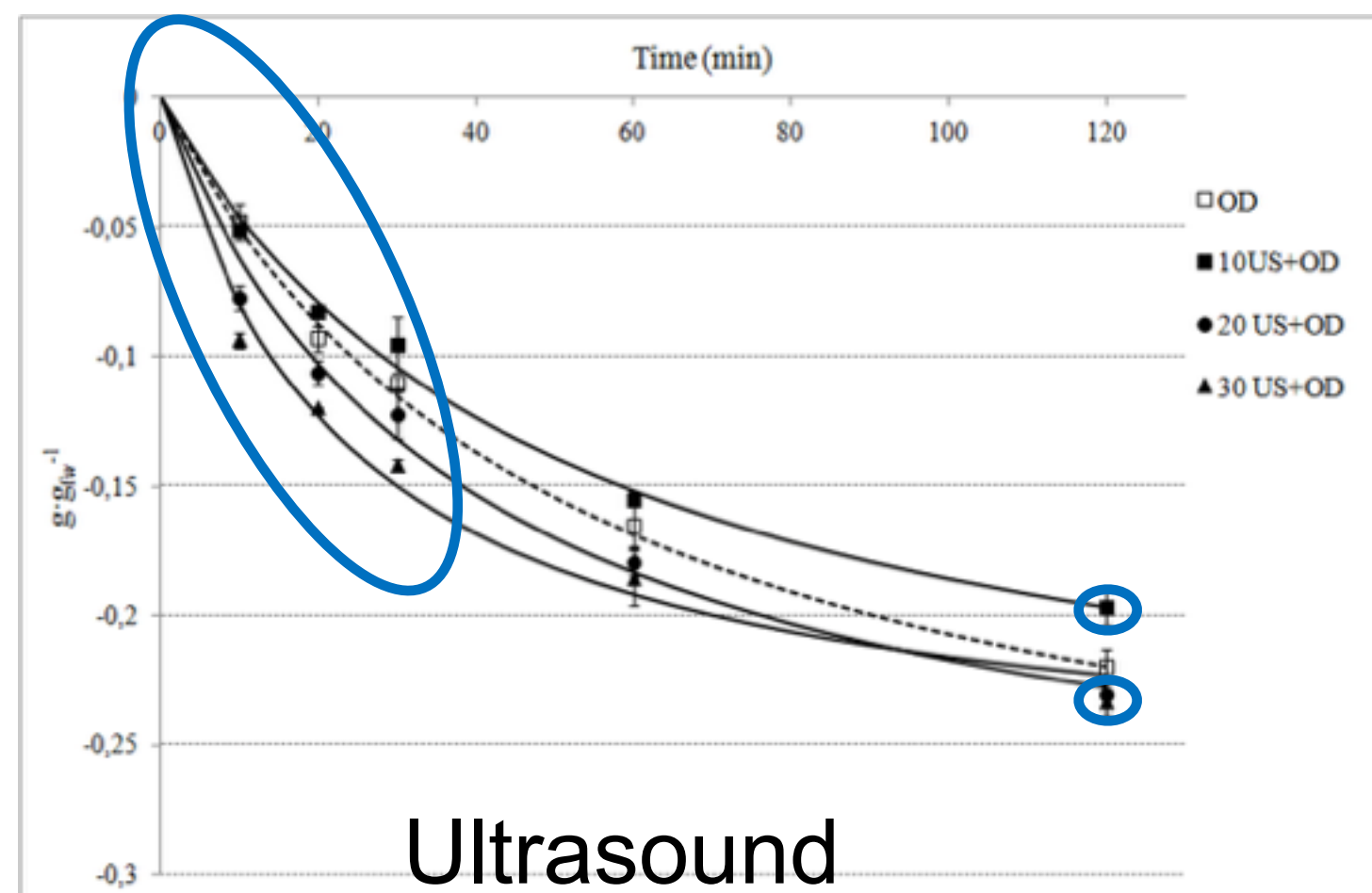


Ultrasound pre-treatment

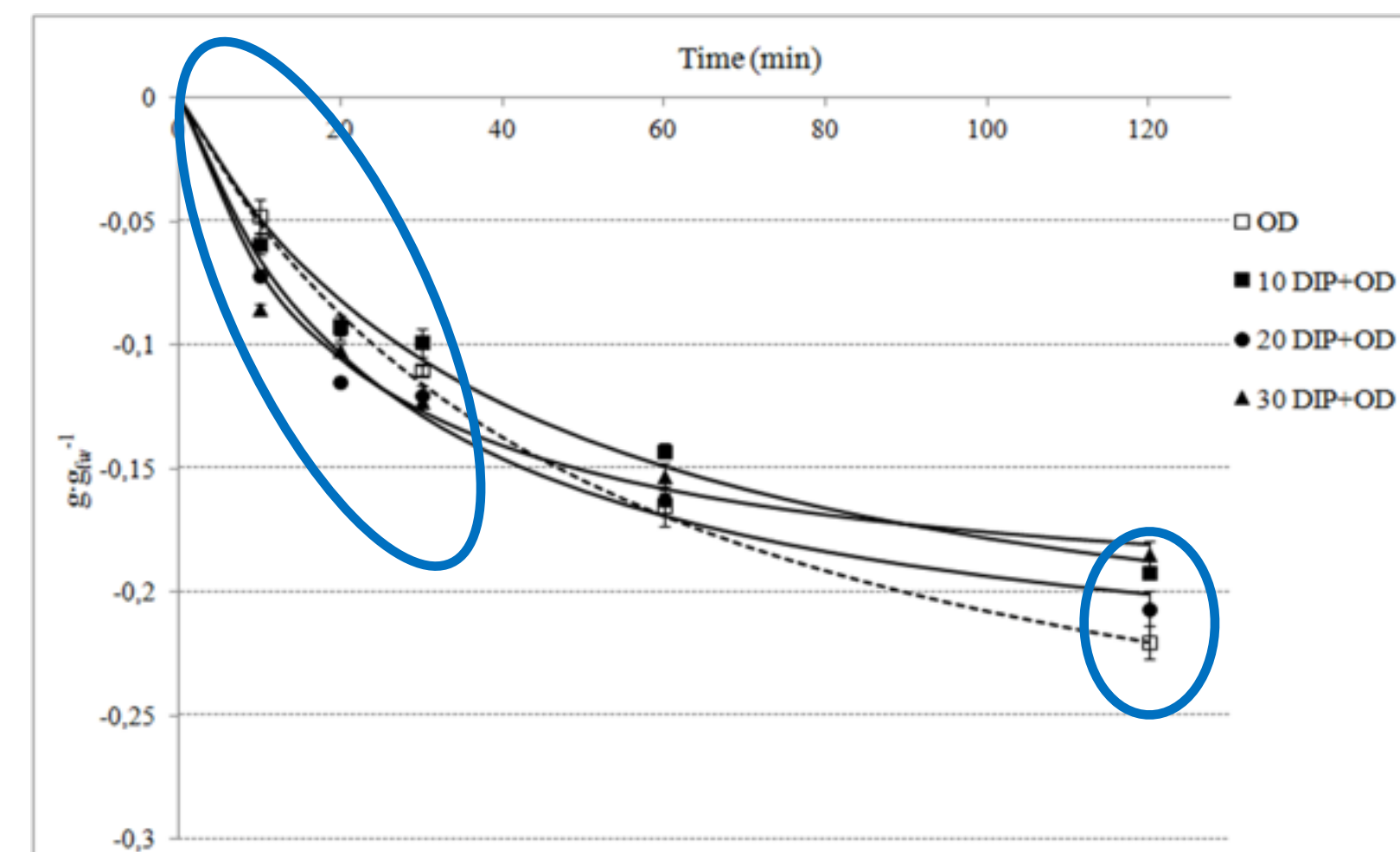


- homogenization
- separation
- inactivation of microbes and enzymes
- extraction of enzymes, protein & antioxidant compounds ect.

Mass transfer improvement



Ultrasound
treatment +OD



Dipping + OD

Nowacka M.¹, Tylewicz U.², Laghi L.^{2,3}, Dalla Rosa M.^{2,3}, Witrowa-Rajchert D.¹

International Cherry Symposium 22-05-2019

7th, International Conference on Water in Food, June 3-5th, 2012 Helsinki, Finland



Contents lists available at [ScienceDirect](#)

LWT - Food Science and Technology

journal homepage: www.elsevier.com/locate/lwt

The effects of ultrasound on quality of sour cherries during shelf-life

K. Siucińska*, D. Konopacka, M. Mieszczak

Research Institute of Horticulture, Department of Fruit and Vegetable Storage

Journal of
Food Science

A Publication of
the Institute of Food Technologists

C: Food Chemistry |  Full Access

Effects of Ultrasound Assistance on Dehydration Processes and Bioactive Component Retention of Osmo-Dried Sour Cherries

Karolina Siucińska✉, Monika Mieszczakowska-Frąć, Aleksandra Połubok, Dorota Konopacka

- The application of US at the stage of dried sour cherry production resulted in the **enhancement of mass transfer** after osmotic dehydration, which led to a **higher dry matter content and lower water activity**
- On **bioactive components**, US assistance could generally be considered as neutral for bioactive component retention but excessive sonication time can lead to some anthocyanin degradation

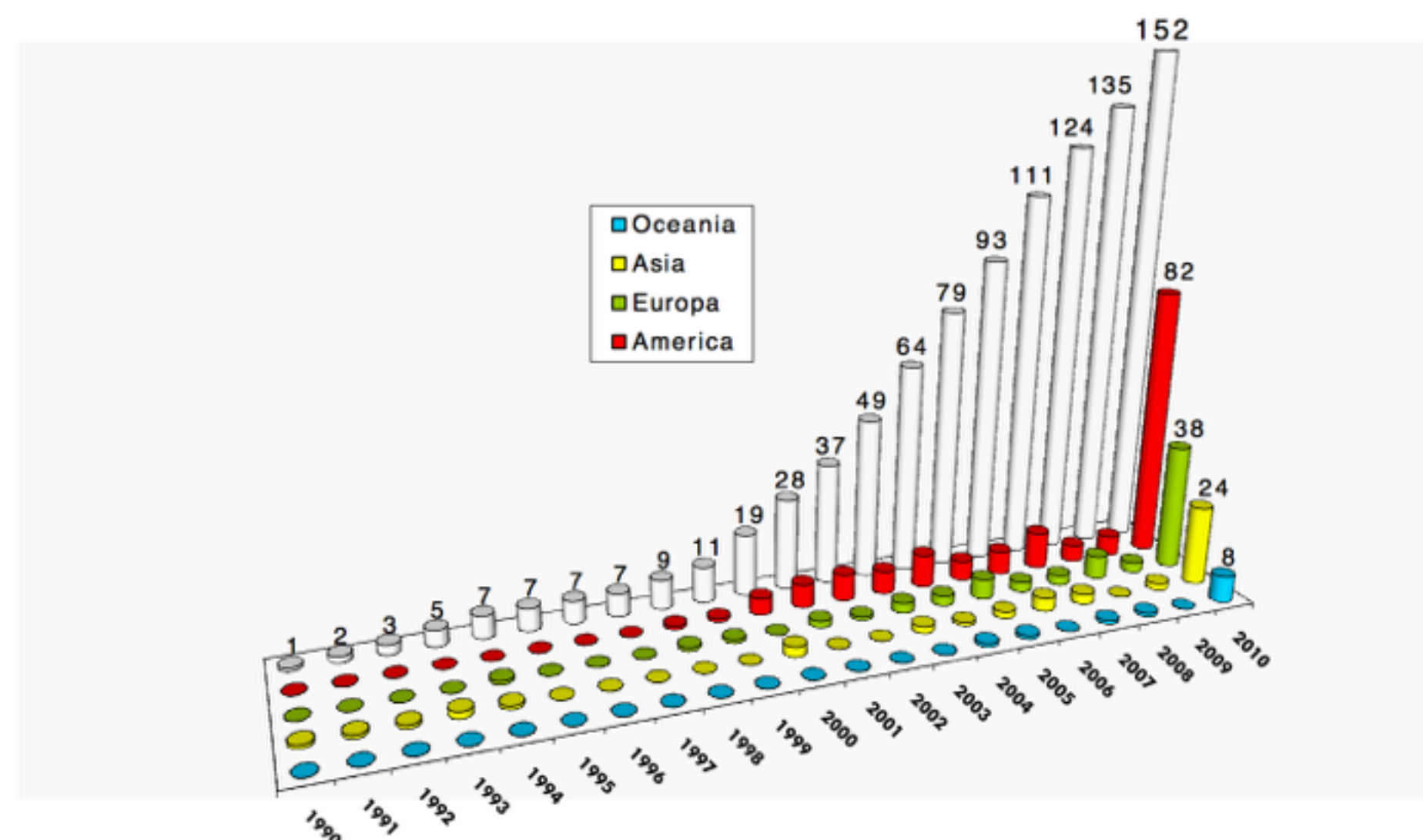
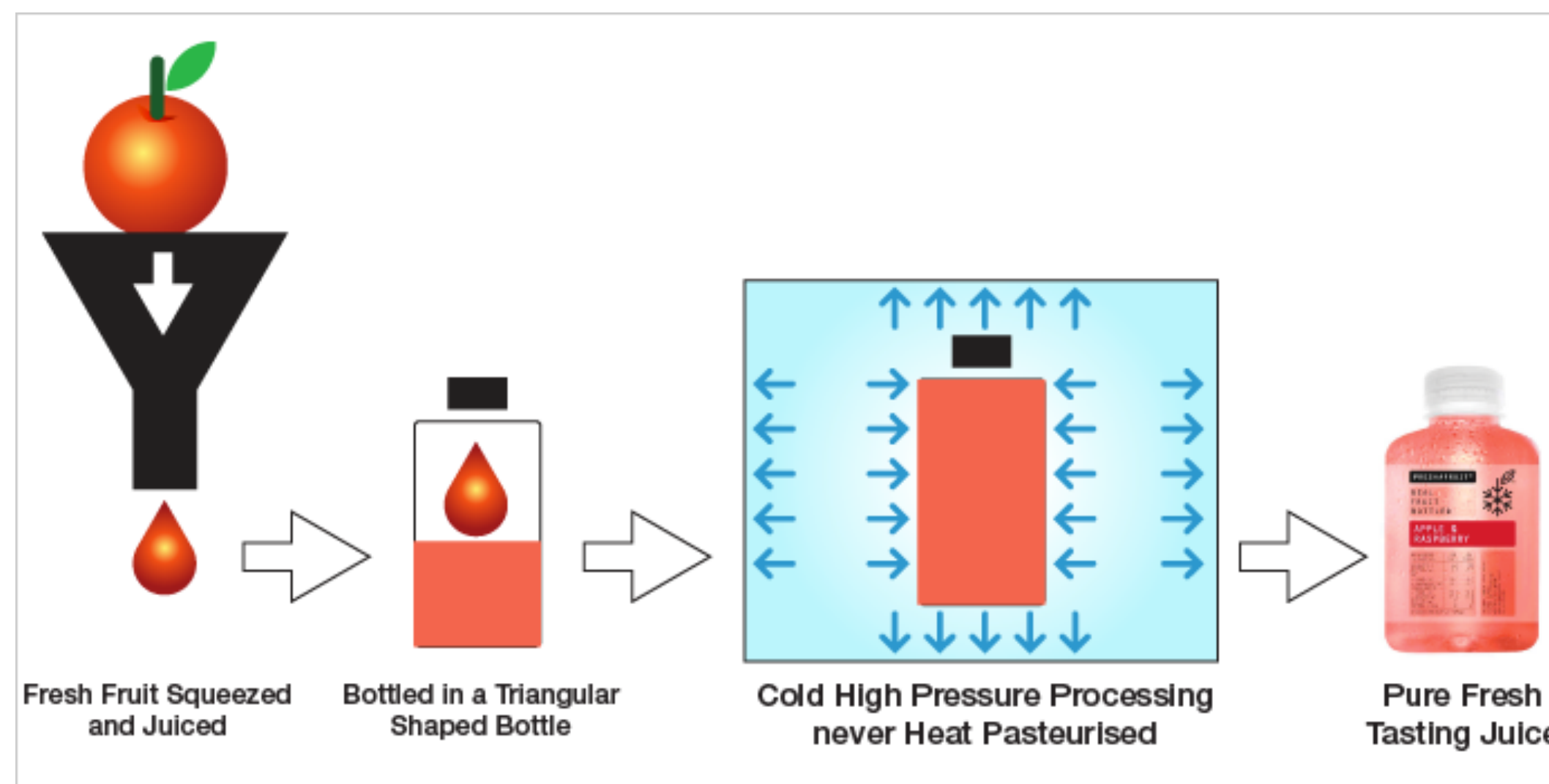




High Pressure Processing

Fully emerged technology

Fresherized Foods™
Leaders in Food Safety, Quality and Innovation



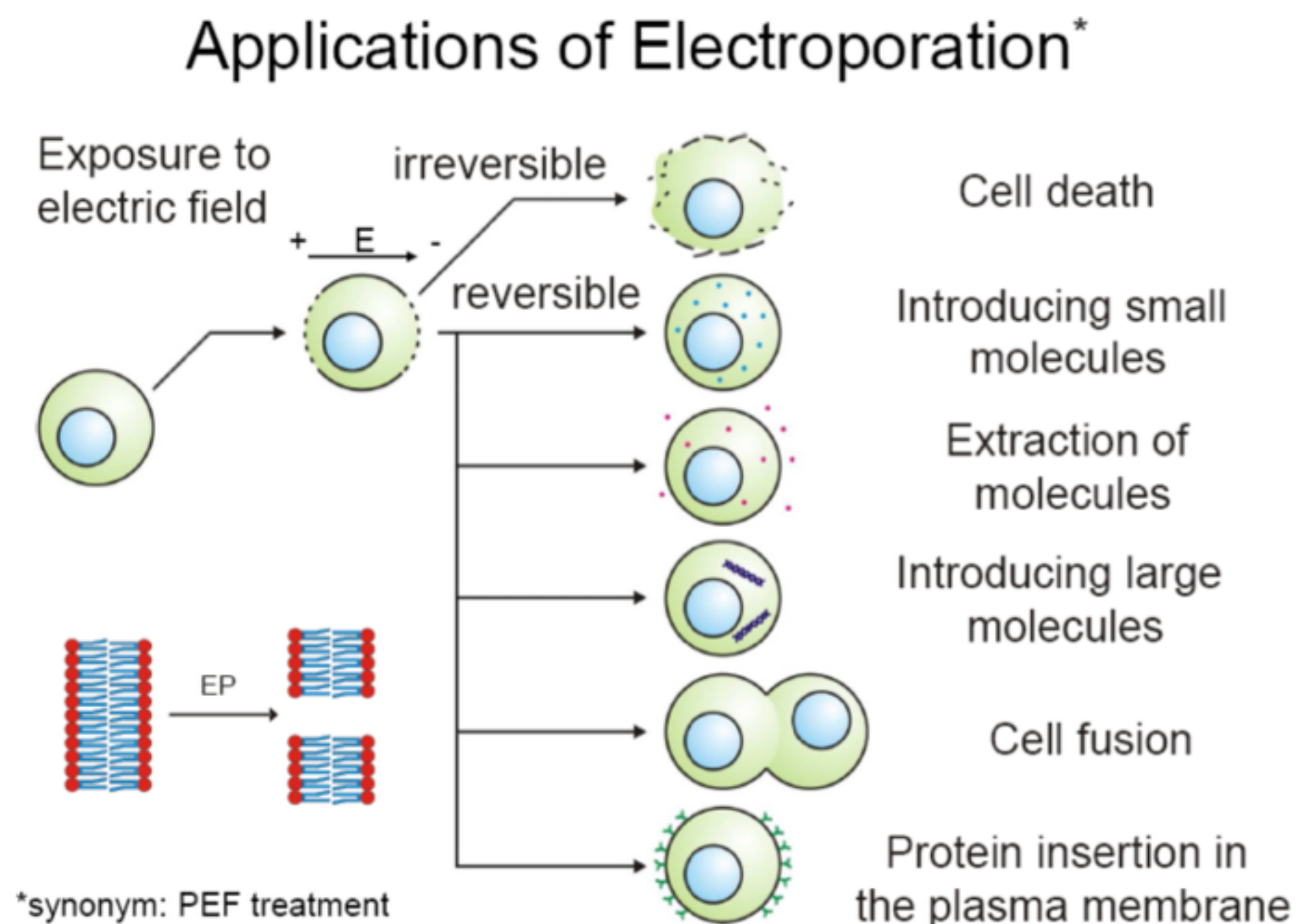
- Treatment of HPP at 550 MPa/2 min had no significant effect on cherry juice pectin, total phenol, vitamin C, pelargonidin-3,5-diglucoside, and the content of catechol improved 4.6%
- The total number of bacteria after HPP and HTST sterilization was less than 100 CFU/m L, and the mould and yeasts were not detected.
- HPP cherry juice had a better sensory quality in the aroma, taste, color than HTST cherry juice
- HPP cherry juice maintained a better quality during storage at 4°C
- Peng, P., Hou, Z., Xu, Z., Liao, X. (2018)
- Queirós, R.P., Rainho, D., Santos, M.D., Fidalgo, L.G., Delgadillo, I. and Saraiva, J.A. (2015)





Pulsed Electric Fields (PEF)

new electro-technology introduced as a method for **pasteurization of juice and inactivation of enzymes**



Reversible electroporation as a mild PEF intensity treatment can facilitate extraction of bioactive compounds such as anthocyanins and polyphenolics

© M. Dalla Rosa 2019

non-thermal and preservation technology consisting in applying **electric pulses** through a biological tissue placed **between two electrodes** (nano, micro- to milli-seconds), causing **structural changes in the cell membrane**

Pulsed Electric Fields (PEF)

PEF treatment mainly
used on cherry juices

growth of different
bacteria and fungi

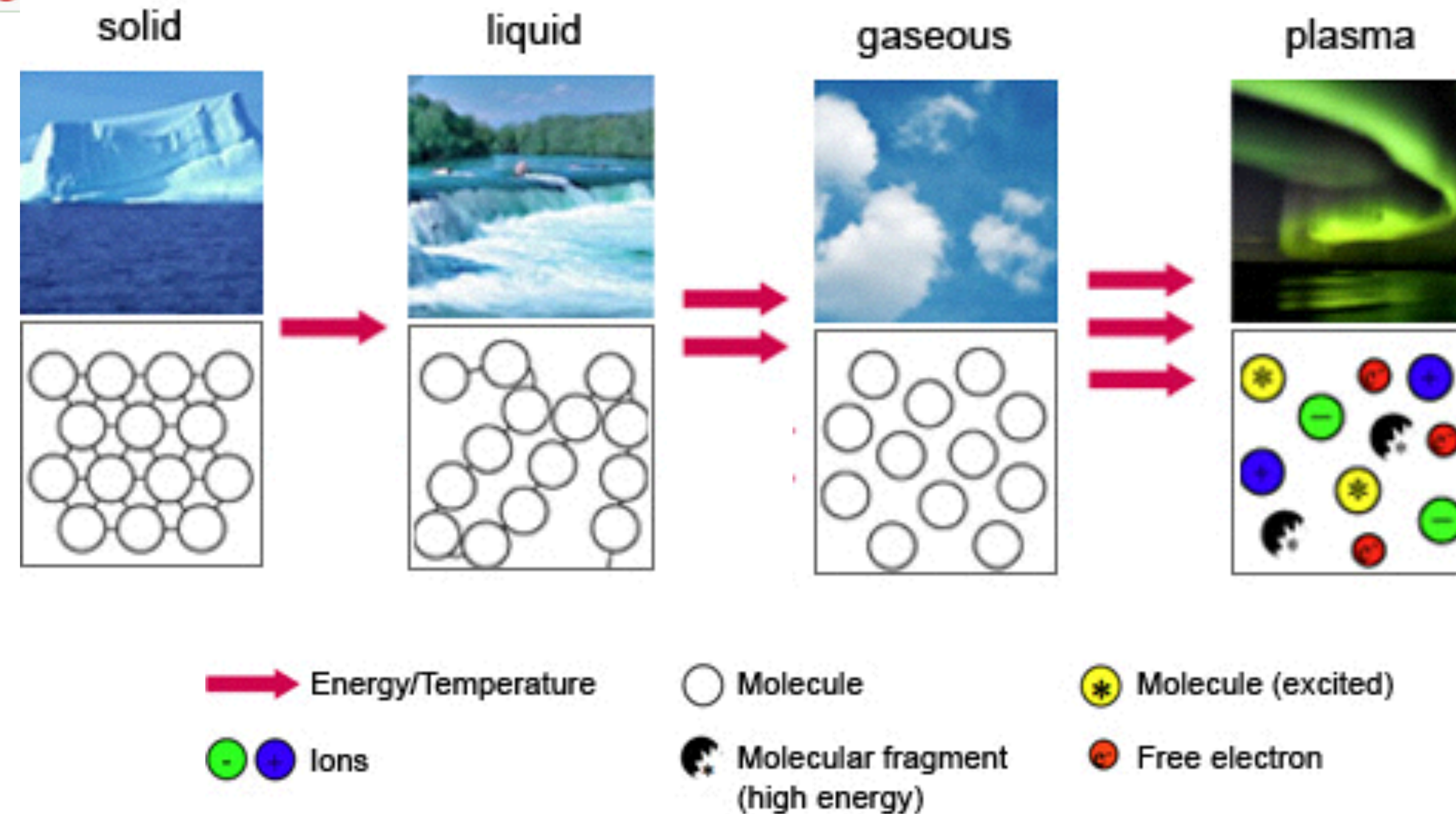
quality of the juice

- Sour cherry juice at pH 3.1 inoculated with *Penicillium expansum* and treated with a PEF at 30 kV cm⁻¹ field strength for 218 μs completely inhibited spore germination.
- PEF treatment of sour cherry juice at 20 kV cm⁻¹ for 123 μs inhibited spore germination of *Botrytis cinerea* inoculated into the juice.

**conditions were not enough to completely eliminate most of the
pathogen species**



Cold Plasma



Gas partially or totally ionized, consisting of:
free electrons, cations, anions, excited molecules, free radicals

Plasma technology ensures microbial safety to maintain natural flavors and nutritional value of the original food material.

A short exposure of 3 min to an argon gas phase including a resultant heating to about 50°C of sour cherry juice reporting a higher content of anthocyanins and phenolic acids than by a traditional pasteurization at 80°C for 2 min.



MAPackaging

Lower levels of oxygen (O_2) and higher levels of carbon dioxide (CO_2) in the storage atmospheres have been shown to reduce respiration rates, chemical oxidation rate, and growth of aerobic microorganisms thus to improve the storage life of cherries

- ★ Active O_2 -enriched MAP has also been reported to effectively delay the respiration peak of cherry fruits, retarding ethylene production, and maintaining firmness and soluble protein and sugar contents in the fruits.
- ★ Primary effects of low O_2 and high CO_2 suppressing cherry fruit respiration rate, changes in the levels of O_2 and CO_2 can also affect other quality parameters such as pigment metabolism, phenolic metabolism and volatile compound metabolism



Active Packaging

Rosa 2019



Active packaging has been experimented by using



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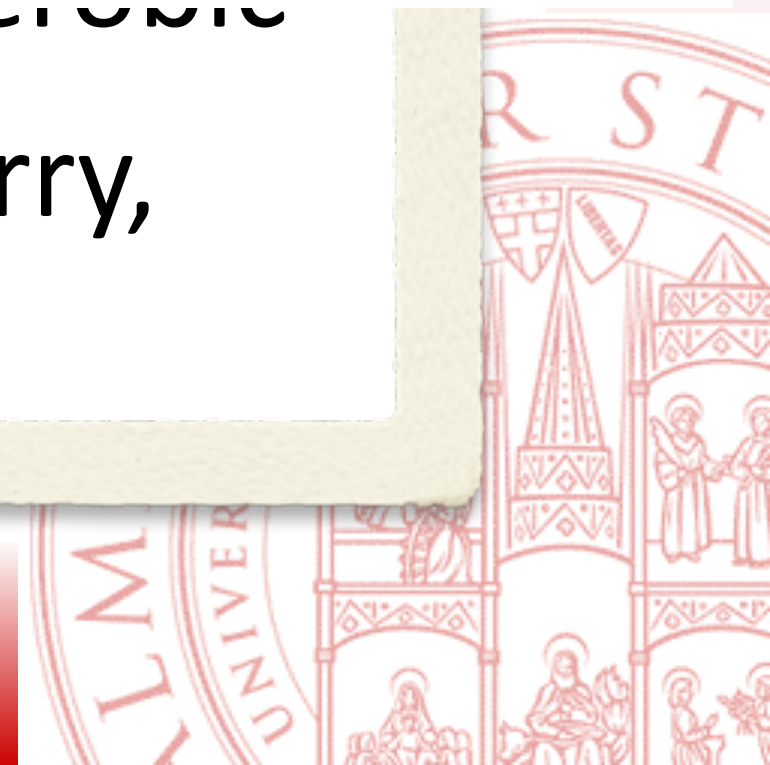
journal homepage: <http://www.journals.elsevier.com/trends-in-food-science-and-technology>

Review

Sweet cherry: Composition, postharvest preservation, processing and trends for its future use

Suwimol Chockchaisawasdee ^{a,*}, John B. Golding ^{a,b}, Quan V. Vuong ^a,
Konstantinos Papoutsis ^a, Costas E. Stathopoulos ^c

Reducing the proliferation of molds, yeasts, and aerobic
mesophilic bacteria during the storage of sweet cherry,
Chockchaisawasdee et al. (2016)



Edible coatings

-  Slowing post-harvest ripening process
-  Control of metabolic gas exchange
-  Modification of internal atmosphere
-  Shelf-life prolongation

Alginate treatments at 1% and 3% can be used as natural postharvest treatments to improve cherry quality after harvest delaying weight and acidity losses, softening and color changes in the cultivars Big Lory and Grace Star

Chiabrando* And G. Giacalone, Ital. J. Food Sci., Vol. 27 - 2015

Sucrose ester, fatty acid are used in commercial products for cherry coating (SEMPERFRESH™)



Conclusions

- 📌 Sweet & sour cherries contain high levels of nutrient and non-nutrient compounds useful for human health
- 📌 technologies for preservation and processing should be improved to better maintain their quality attributes to approach the increasing of the global market value, the production and the harvested area
- 📌 valorization of market-second grade cherries is an important component to add-value to this currently under-utilised resource
- 📌 using new or emerging technologies with lower process impact on the fruit quality more research and development on cherry preservation and processing is needed

