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6

# Procesado por Altas Presiones Hidrostáticas de Alimentos y Bebidas y Adaptación del Envase

## High Pressure Processing for Food and Beverage and Packaging adaptation

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(HIPERBARIC)

**31 MAYO 2017**

# **High Pressure Processing for Food and Beverage. Packaging adaptation**

**Yareth Hernández HIPERBARIC**

*Food Technologist. Technical Sales and Applications*



# Need for new preservation technologies

Consumer demand for food

More convenient

Environmentally friendly

Fresher

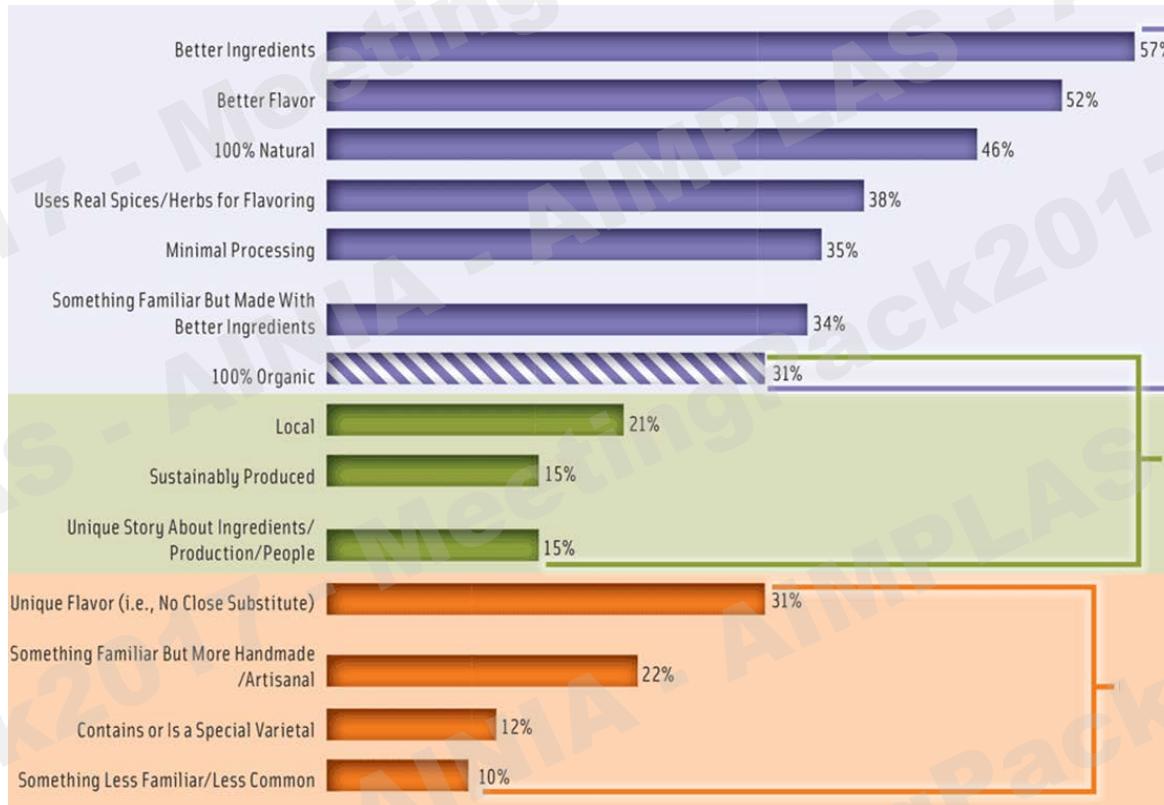
More natural

Healthier

Safer



# A new perspective of Premium



How Consumers Define High Quality Foods and Beverages( (% of adults who said they associated attributes with "higher quality" products

Fresh, Less  
Processed

Transparency

Culinary

Food safety  
Economic

Consumers  
demand

New  
Technologies

# What HPP is?

**Non thermal** technology

**3000 – 6000** bar during  
a few minutes

**Inactivation** of  
microorganisms and  
spoilage enzymes, while  
**keeping** sensorial and  
nutritional quality



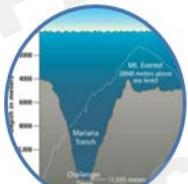
1,03 bar = 0,1 MPa

6.000 x 



2 bar = 0,2 MPa

3.000 x 



1100 bar = 110 MPa

6 x 

# About Hiperbaric

1999

Hiperbaric (formerly NC Hyperbaric) begins its activity designing, manufacturing and marketing industrial High Pressure Processing equipment for food processing

World leaders since 2005!

200+

HPP industrial machines installed in 36 countries and 5 continents



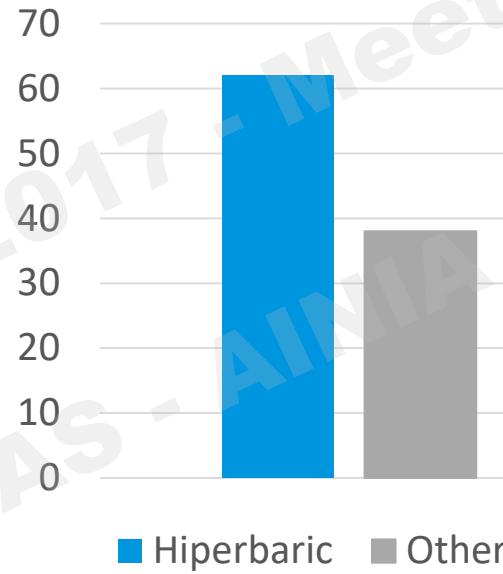
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## Market Penetration

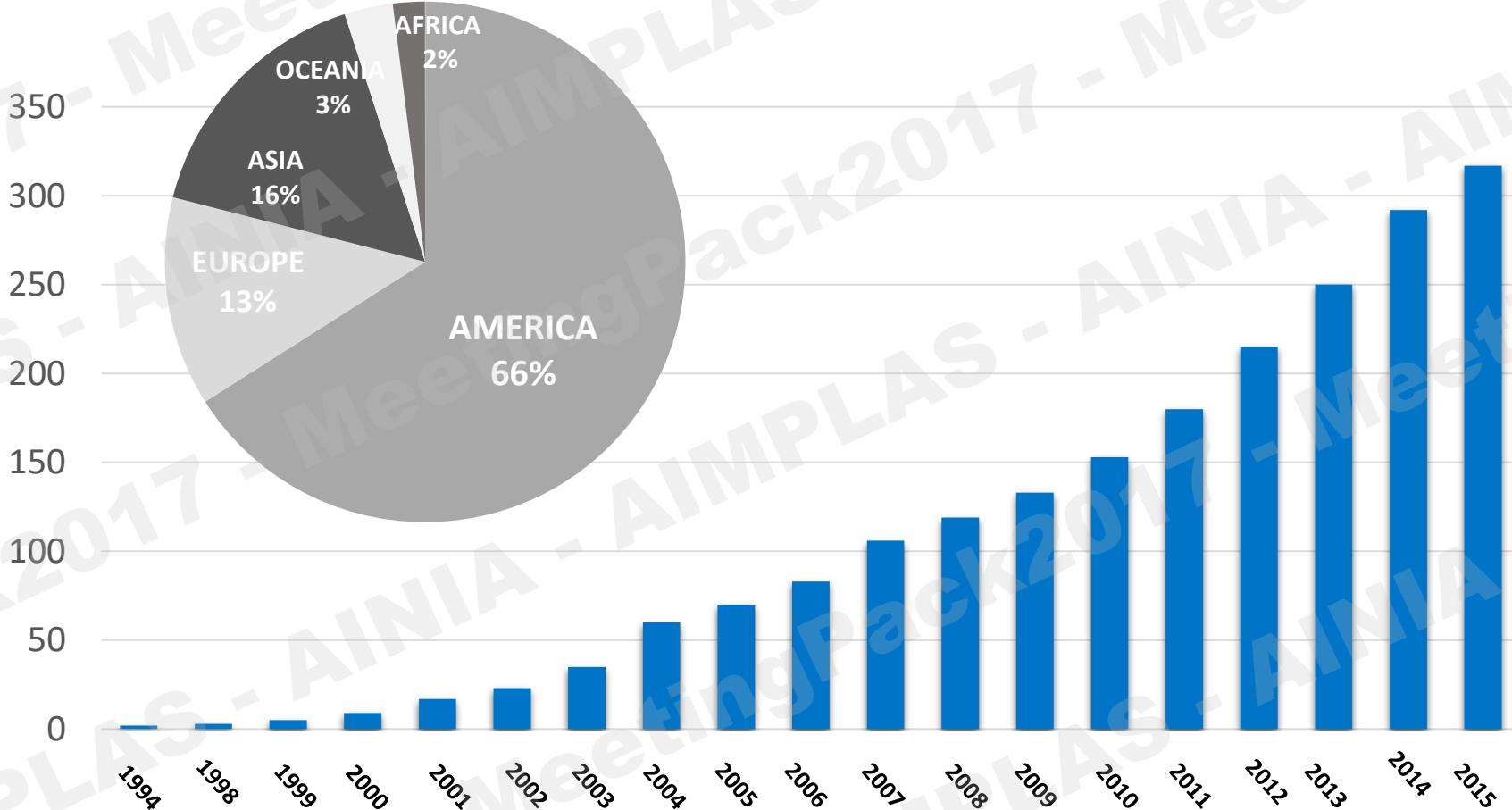


■ Hiperbaric ■ Others

# Evolution of HPP equipment installed



Number of industrial machines in production



# Industrial HPP machines share by food sector (2016)



VEGETABLE PRODUCTS 23%



MEAT PRODUCTS 21%



JUICES & BEVERAGES 19%



TOLL PROCESSORS 16%



RESEARCH CENTERS 8%



SEAFOOD 8%

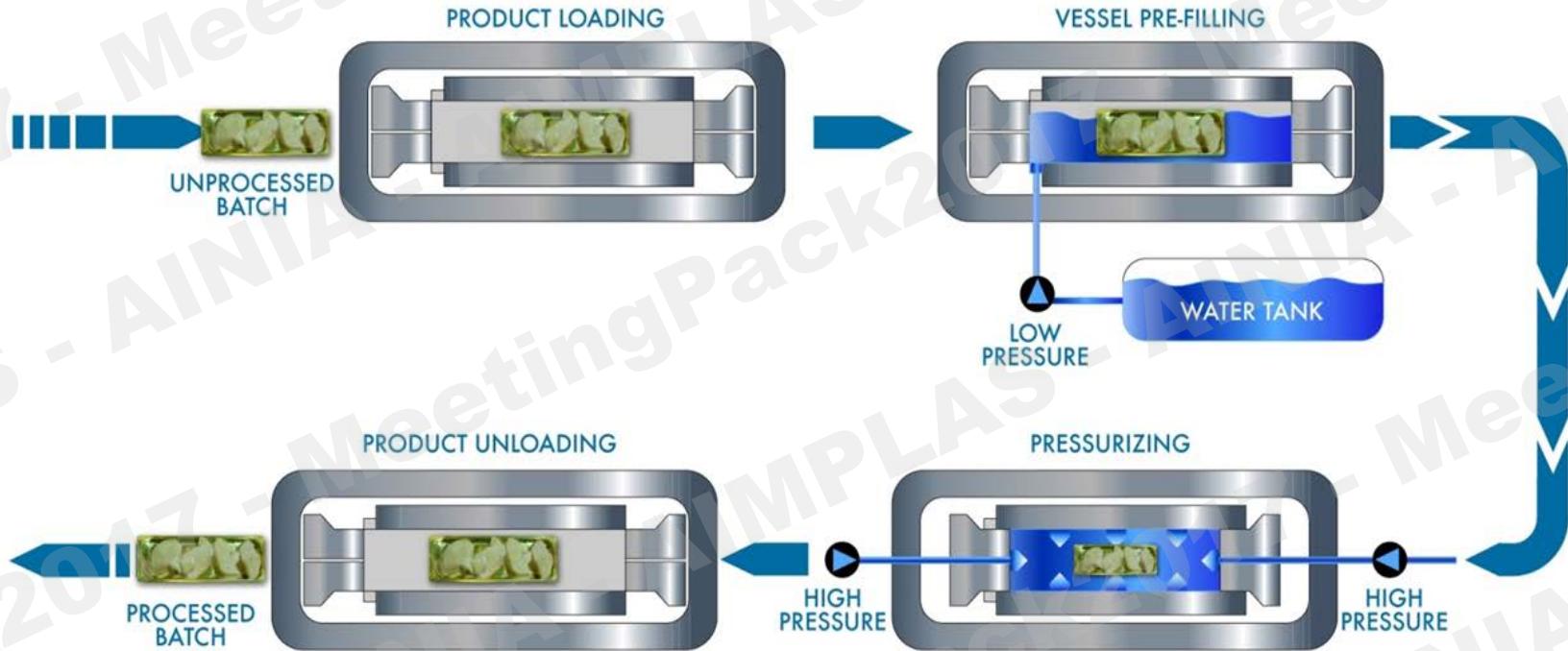


DAIRY & CHEESE 2%



READY TO EAT MEALS 3 %

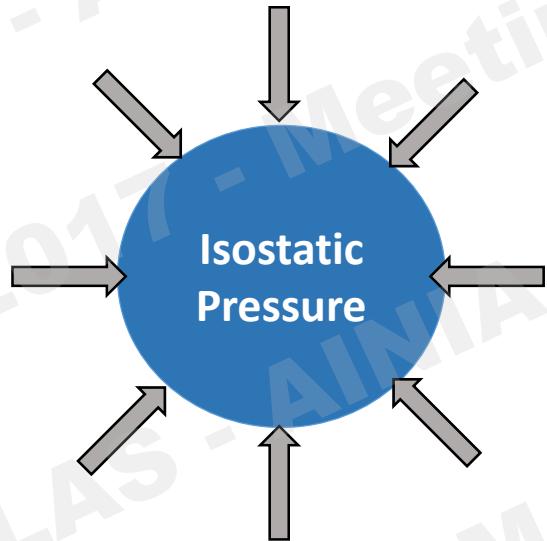
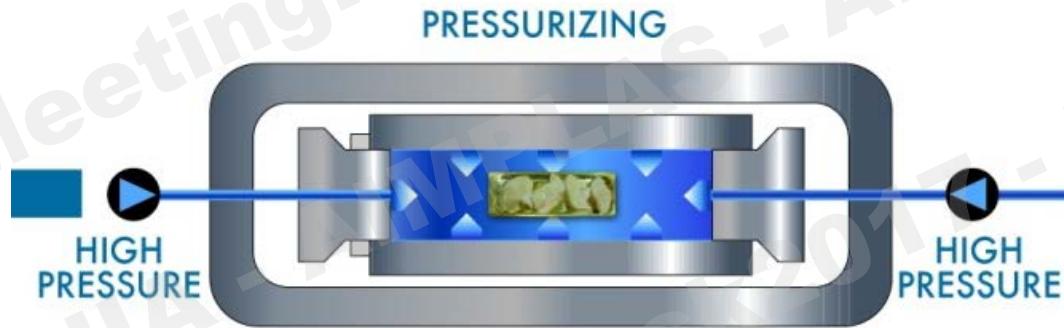
# How does an industrial HPP equipment work?



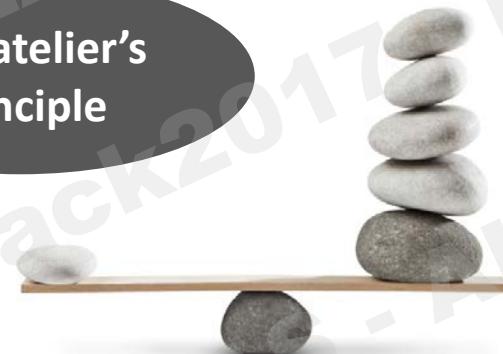
How it Works?: [VIDEO](#)

HIPERBARIC ©2017

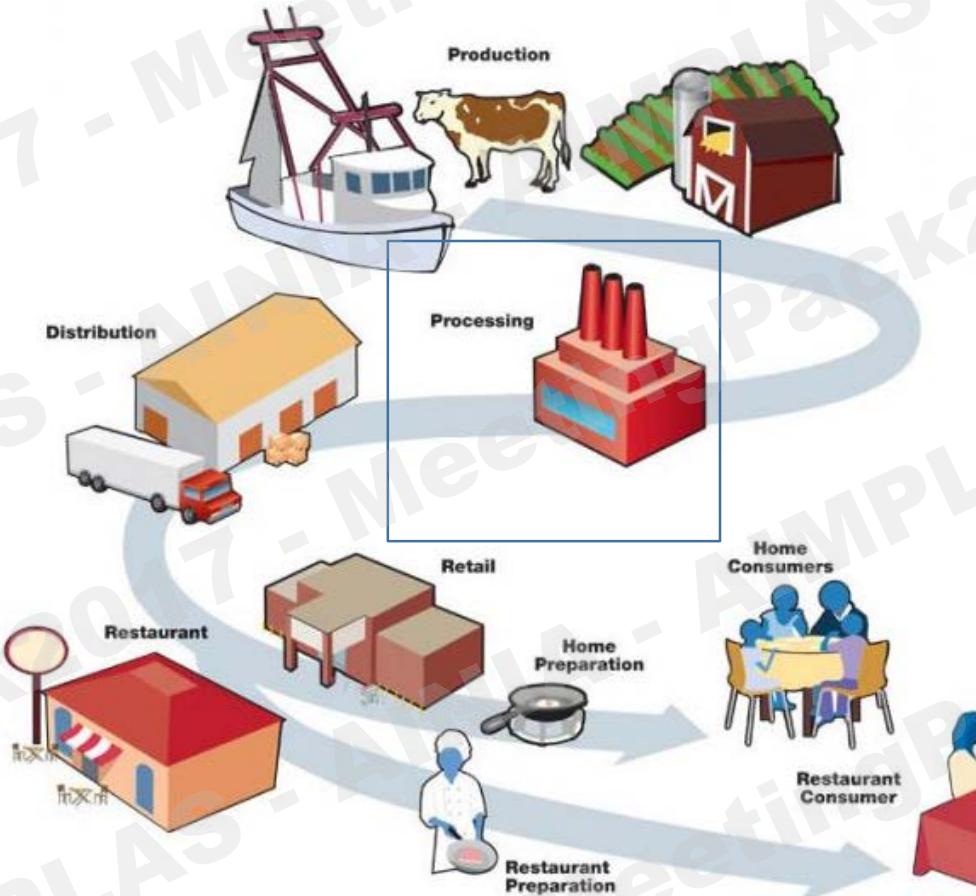
# Principles of the technology



LeChatelier's principle



# Processing techs in “Farm-to-table” approach



A novel processing technology should..

Less impact on nutrients

Use fewer resources

Less processed, no

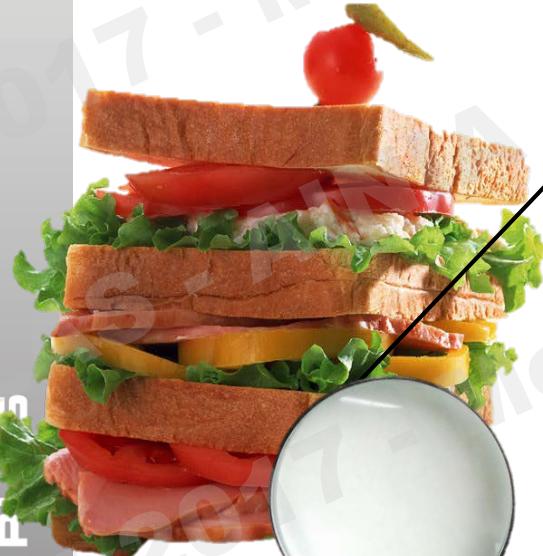
“additives”

Affordable by producer & consumer

Guarantee food safety

# Effects of HPP on the quality of food

What's inside the food?



Low  
molecular  
weight  
compounds

Water

Biopolymers

Microorganisms

# Are the low molecular weight compounds affected by HPP?

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Vitamins

Simple sugars



Aminoacids

Lipids



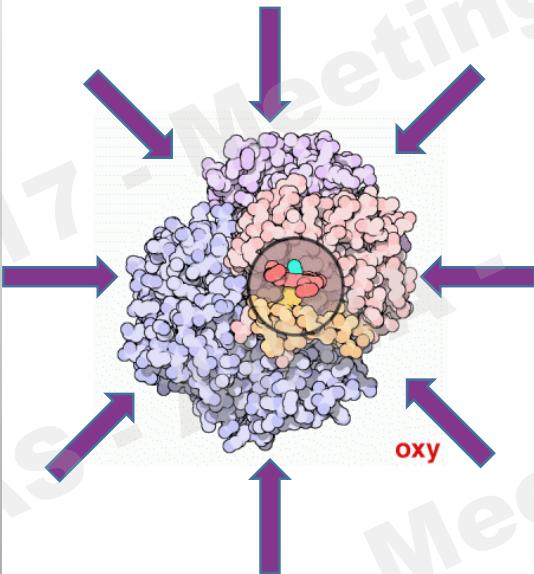
Antioxidants

Volatile  
Compounds



Minimally affected

# What happens to the biopolymers under pressure?



## Protein and complex carbohydrates

- Pressure makes changes on the 3D structure.
- Changes are reversible/irreversible depending on:
  - HPP processing conditions
  - Type of biopolymer
  - Characteristics of the food

## Impact on...

### Microorganisms

Nutritional Properties  
(E.g. Increasing nutrients digestibility)

Sensory properties of the food  
(E.g. Color, texture)

New product development  
(Ej. Less salt content, hypoallergenic)

### Changes of native pork and poultry meat by HPP



# HPP as a food preservation technique

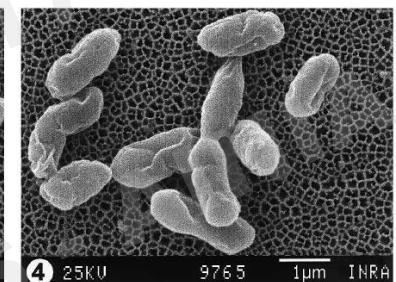
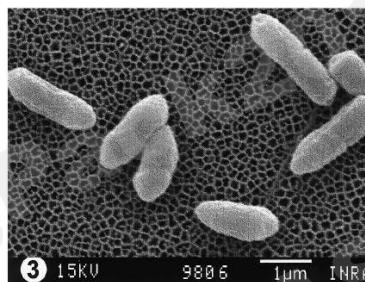
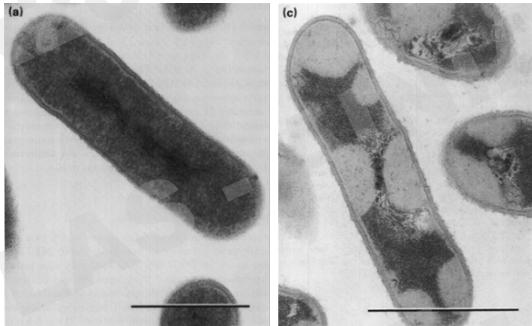
How are the microbes inactivated?



Not like this!



Damages at molecular level

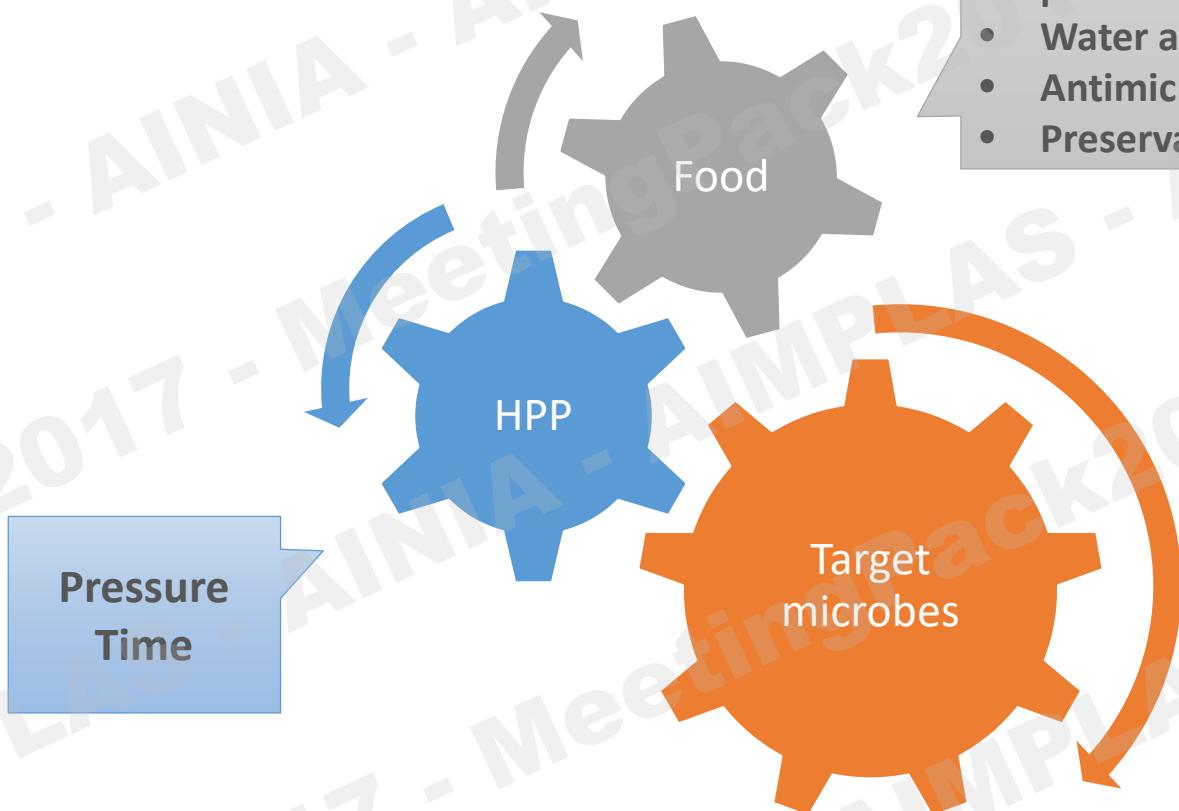


**Fig. 1** Effect of a high hydrostatic pressure treatment on *Listeria monocytogenes* and *Salmonella typhimurium* stationary phase cells. Scanning electron micrographs present cells with and without pressure treatment. (A) *Listeria monocytogenes* cells in sodium citrate (pH 5.6) buffer (1) without pressure treatment [ $\times 16\,000$ ], and (2) after a pressure treatment at 400 MPa (10 min 20 °C) [ $\times 18\,000$ ]. (B) *Salmonella typhimurium* cells in sodium phosphate (pH 7.0) buffer (3) without pressure treatment [ $\times 16\,000$ ], and (4) after a pressure treatment at 325 MPa (10 min 20 °C) [ $\times 16\,000$ ]

# HPP as a food preservation technique

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Not only depends on HPP...



## STRUCTURE

## MASS TRANSFER

## OTHER ASPECTS

# Packaging for HPP



# Shape or size doesn't affect the efficacy of the technology



# Skinpack



LESS MATERIALS



REDUCED TRANSPORT



IMPROVED SHELF LIFE



BETTER LOOKING



IMPROVED FILLING RATIO

# SUCCESS STORIES: MRM

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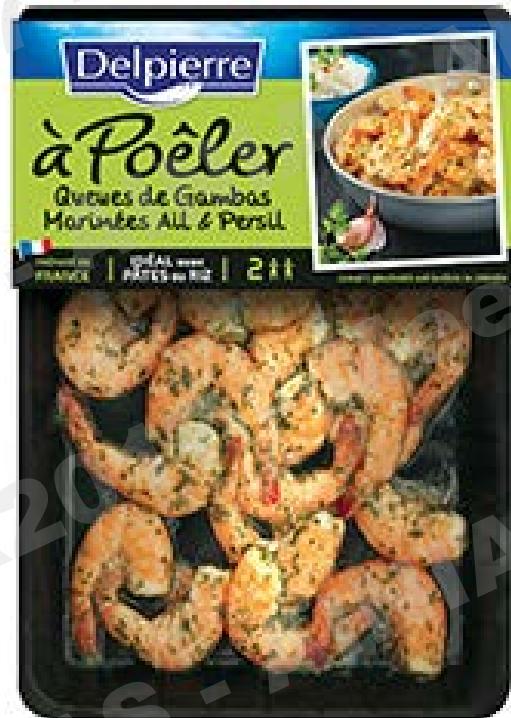
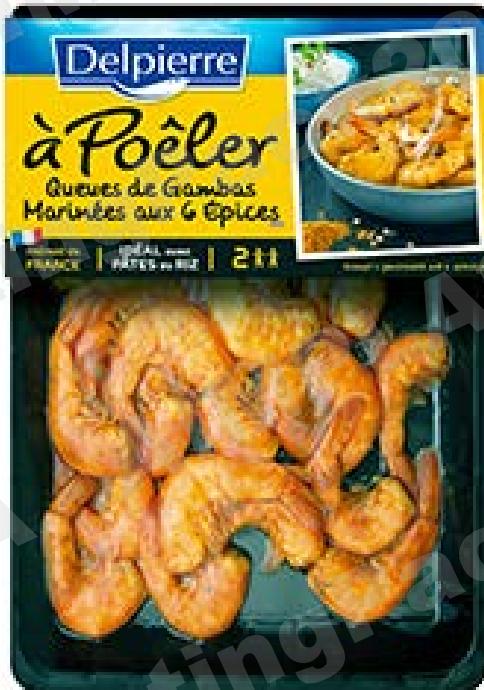
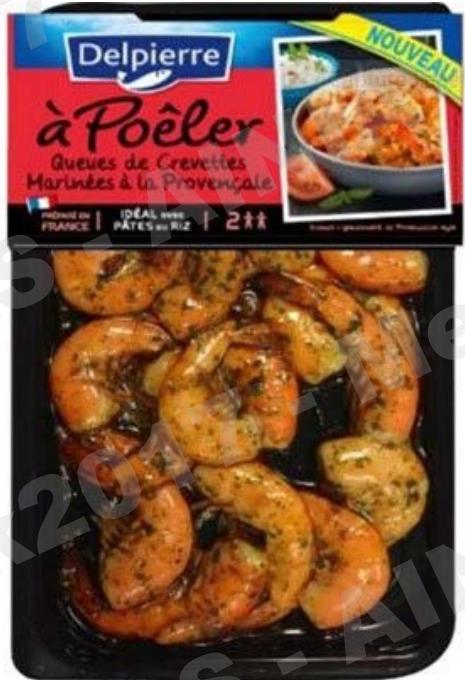


# SUCCESS STORIES: ESPUÑA



# SUCCESS STORIES: DELPIERRE

Delpierre



# SUCCESS STORIES: RODILLA

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ainia AIMPLAS



# SUCCESS STORIES OTHERS



# New Development Ideas

Combine skinpack with marinate on raw meats to minimize color changes

6000bar/5min

BEFORE



AFTER



+ NO COLOR  
CHANGES

+ FLAVOR

+ FAST  
COOKING

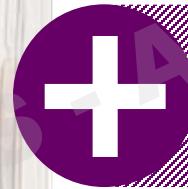
+ MORE  
TENDER

# New Development Ideas

Combine skinpack raw fish halves with skin to reduce and hide changes in ready to cook fish preparations



HIDE COLOR  
CHANGES



FAST  
COOKING



IMPROVED  
SHELF LIFE



INCREASED  
SAFETY

# Avocado Products

Avomix (España)



Goodfoods (Illinois, USA)



DELICIOUSNESS ON THE GO • SINGLE SERVE PODS • COMING SOON!



CHUNKY GUACAMOLE



CHEF  
Earl's  
REAL FRESH



GIARDINIERA HUMMUS  
EXCLUSIVELY AT WHOLE FOODS IN THE MIDWEST.



LIGHT SPINACH DIP

Pressure Foods (Nueva Zelanda)



Verfruco (México)



# Juices



Suja Juice (USA) Zumos Cold Press Orgánicos



Coldpress (UK)

Evolution (USA)

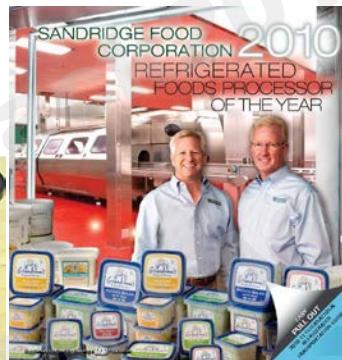


# Ready meals

MRM - España



Sandridge - USA



# Sandwiches Fillings, sauces

Rodilla (España)



**Rodilla**



# Meat products

Espuña - Spain

First HPP cooked ham in 1998



**WLF** West Liberty Foods

Foster Farms - USA



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DEL PLÁSTICO



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