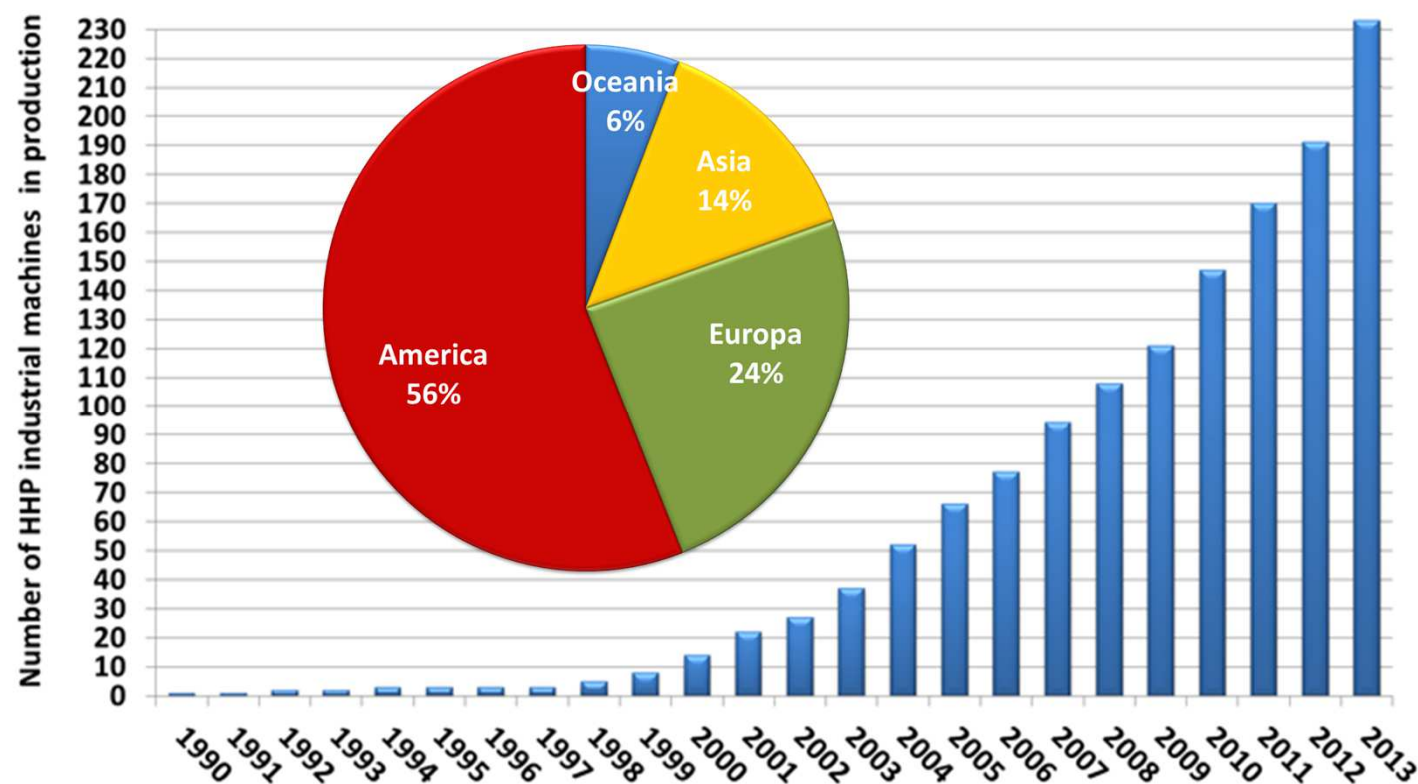

HIGH PRESSURE PROCESSING FOR FRUIT AND VEGETABLE JUICES: EVOLUTION FROM NOVEL TO... MAINSTREAM?

Francisco Purroy, Hiperbaric S.A.
February 2014

Evolution of total number of HPP industrial machines



Total machine number in production end 2013 : 235

Not included : 15 dismantled machines (all installed before 2003)

Value propositions of an emerging technique

The NATURAL appeal

- **CLEAN LABEL**
 - No artificial ingredients: meet new standard of identity
 - Consumers associate natural with quality
-

Address spoilage and returns

- **Reduced costs from product failures and returns**
 - Through abuse, lengthy supply chain, or retail overstocking
 - Identify % of production that is causing return of bad goods
-

Exploit capacity

- **Increase factory utilisation by square curving production**
 - Reach new markets from existing factory
 - Extend supply chain and leverage existing supplies

Value propositions (II)

FOOD SAFETY

- Destruction of pathogens
- Brand protection
- Safest alternative for high risk products

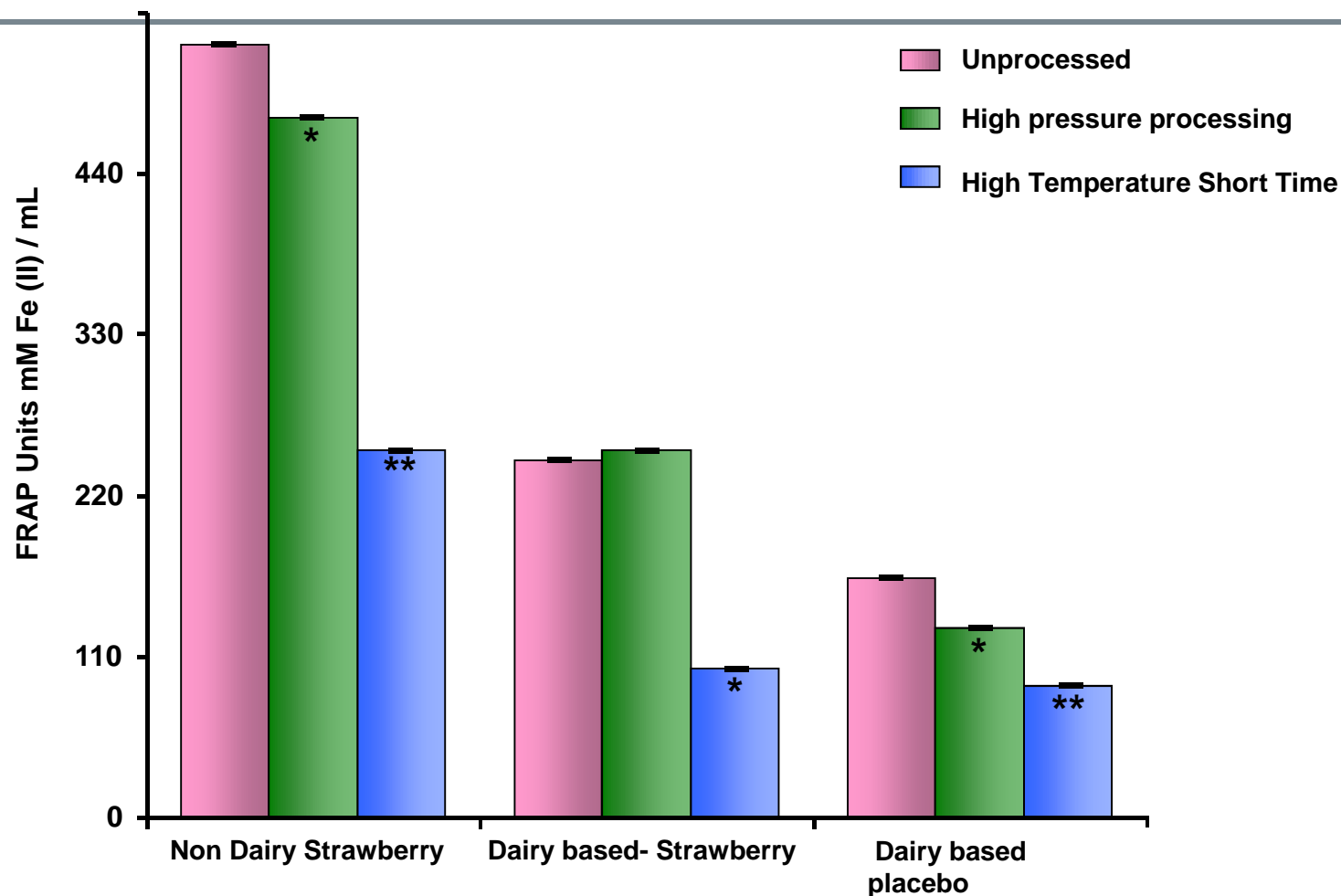
EXPORTS

- Secure your authorisation to the most demanding countries
 - USA, Japan
- EU becoming more restrictive on *Listeria* etc

NPD OPPORTUNITIES

- New, unique products further than packaging changes
- Think about things that you could not do before
- Access value added niche markets

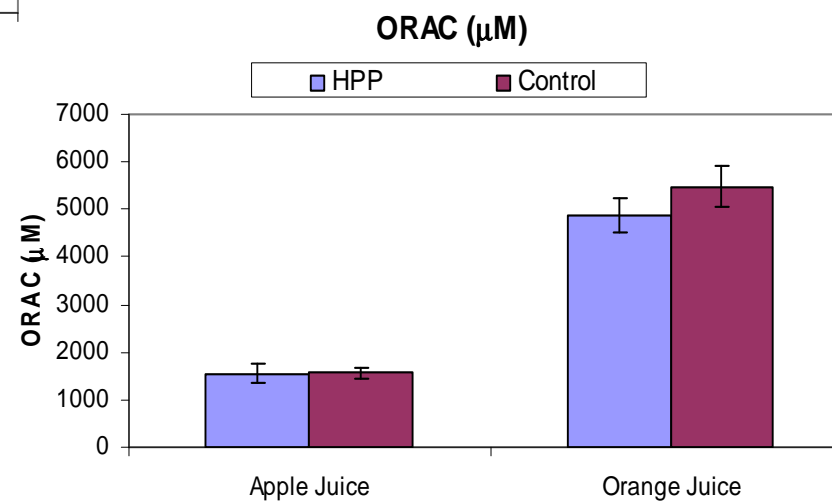
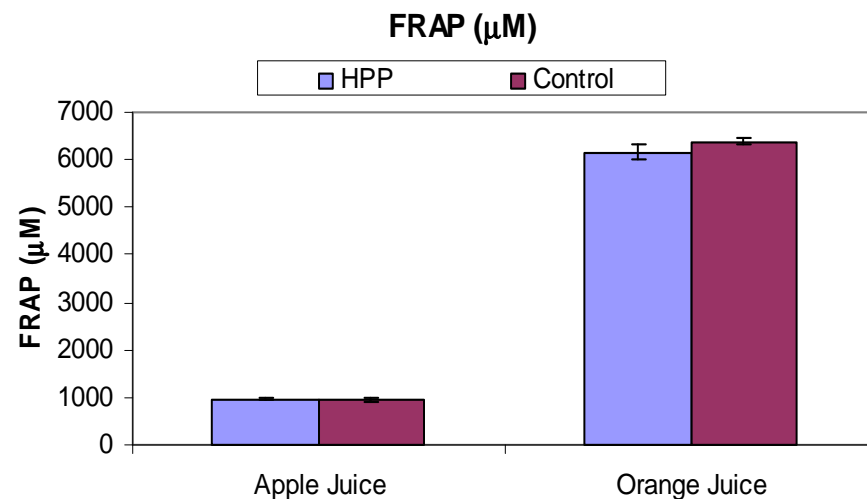
Effect of Processing on Ferric Reducing Antioxidant Power (FRAP)



Analyzed by one way ANOVA (*Significant difference ($P < 0.05$); ** Significant difference ($P < 0.01$) between Unprocessed and HPP & HTST

Edirisinghe & Burton-Freeman, NCFST

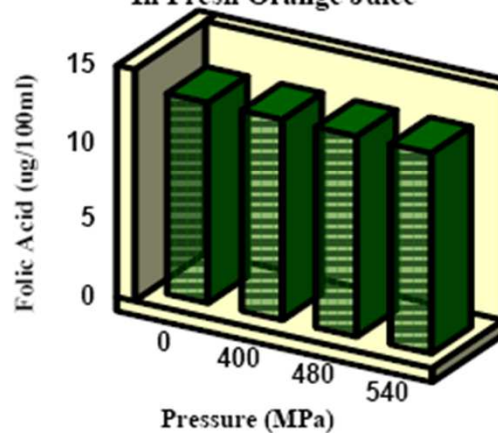
Antioxidant Retention



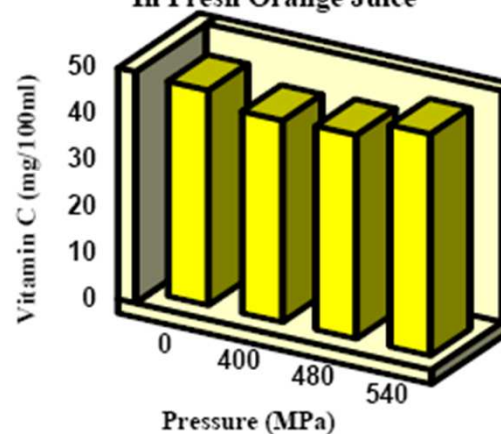
Innovative Food Science & Emerging Technologies Journal, 2006

Vitamin Retention

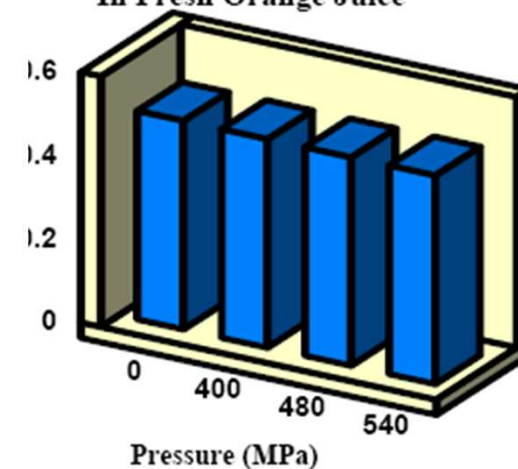
**Effects of Pressure on Folic Acid
In Fresh Orange Juice**



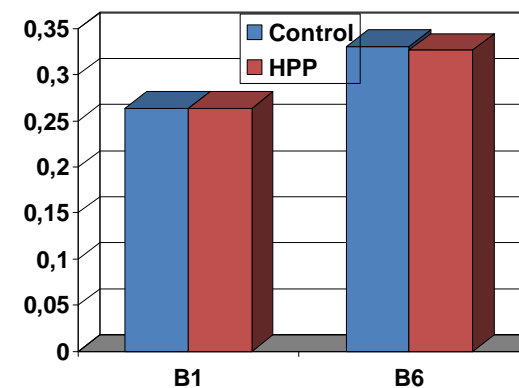
**Effects of Pressure on Vitamin C
In Fresh Orange Juice**



**Effects of Pressure on Niacin
In Fresh Orange Juice**

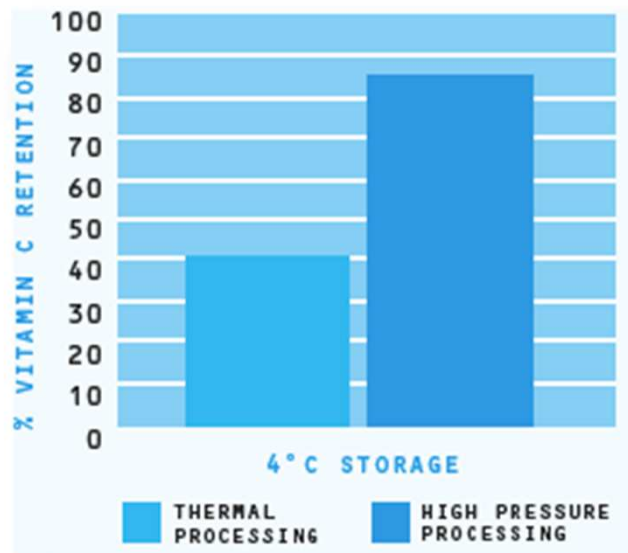


Effect of pressure on B1 and B6 in milk



Bignon, 1996 Donsí et al, 1996

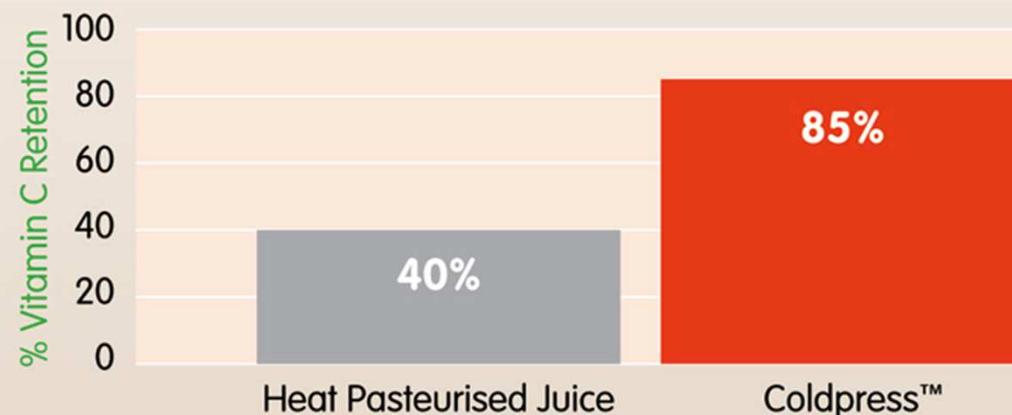
Vitamin Retention



HPP Valencia Orange Juice retains 85% of its Vitamin C when stored at 4°C for 20 weeks compared to heat pasteurised juice which only retains 40% Vitamin C.*

* Source: University of Leuven, Belgium, thermal processing 98°C/10 seconds, HPP 500MPa 90 seconds.

Coldpress Vitamin Retention



Independent University tests have proven that HPP juices such as Coldpress™ retain 85% of the naturally occurring Vitamin C and other antioxidants compared to heat pasteurised juices that only retain 40% after 20 weeks of storage.

Courtesy of  **coldpress**

HPP Commercial Products

Juices & smoothies

- Shelf-life increase.
- Preservation of colour, flavour and vitamins.
- Destruction of pathogens and spoiling microorganisms.



Country	Product
France	Citrus juices
Portugal	Apple & citrus blended apple juice
Italy	Fruit and vegetable juices
Czech Republic	Broccoli & apple, beetroot, carrot juices
USA	Juices and superfood smoothies
Spain	Smoothies & juices
Australia	Smoothies & juices
Northern Ireland	Wheatgrass & broccoli sprout juices
The Netherlands	Smoothies & Juices
USA	Citrus juices
Korea	Juices and smoothies
Italia	Smoothies
UK	Apple juices
USA	Coconut water
USA	Super fruit and vegetable juices
Korea	Citrus juices

Ulti (France) – The European pioneers



ATA (Italy)

Pioneers in specially designed packaging for HPP!



Frubaça – So Natural (Portugal)

Pioneers in HPP juice exports



BESKYD FRYCOVICE (Czech Republic)

Pioneers in HPP vegetable juices with functional components

PROCESSING UPDATE

HPP processed apple-broccoli drink

An unusually healthy juice product has been introduced as a result of a collaboration between Beskyd Frycovice, a producer in the Czech Republic, and scientists from the Food Institute Prague, reports Dr Milan Houska, head of department of food engineering at the Institute.

"A vegetable rich diet is recommended by nutritionists to combat the genotoxic activities produced by some contaminants (both natural and as a result of processing) in foods," explained Dr Houska.

The best vegetables for this purpose are cruciferous vegetables such as cauliflower, Brussels sprouts, cabbage and especially broccoli. Broccoli is a rich source of glucosinolates that are precursors of bio-active substances called isothiocyanates, and the enzyme myrosinase is also stored in its cells. Sulforaphane, which is

produced when the cells break down, has been shown in some studies to have antigenotoxic and properties and may help to prevent cancer.

To consume the amounts necessary to have any effect, however, one would have to eat 300g of fresh broccoli, so the idea of broccoli juice was suggested by the Czech scientists working on this project. The fact that broccoli juice keeps its antimutagenic effect after processing via High Pressure Processing (HPP) was a plus point, as was the fact that this type of treatment has no effect on the sulforaphane content.

To make the juice more palatable, apple and orange juices were mixed with the broccoli juice, along with some lemon juice. "Lemon juice provides a much fresher taste, and enable the pH value to be lowered to below 4.2, which is



A novel mixture of broccoli and fruit juices is the first product in the Czech Republic to be produced using High Pressure Processing

necessary to eliminate the germination of spores of pressure resistant microorganisms," explained Dr Houska.

The novel juice mixture is produced on a commercial scale and is available in Ahold -Cz's retail chain, Hypernova, in the Czech Republic. The product has been recognised by the Ministry of Public Health of the Czech Republic as a

food supplement, exhibited during research tests the anti-genotoxic activity, and has been awarded the Czech quality mark, 'Glasa'. The recommended dose for adults is one 300ml bottle per day. This is the first HPP product on the Czech food market, and has a 10 day shelf life in chilled conditions.

Food Research Institute,
Czech Republic 000

From : Food & Beverage Industry - April 07 p 36

INVO (Spain)

Pioneers in HPPing at a toll processing facility

INVO⁺
zumos + smoothies



Preshafruit (Australia) - 2008



Hiperbaric 300

Preshafruit with its HPP juices wins:

- Best new juice or juice drink
- Best new concept

At Beverage Innovation Awards ceremony, Drinktec 2009



http://www.youtube.com/watch?v=srtDF8hCA_M

Our equipment on site

All Natural
Never Heated



Preshafood (Australia)

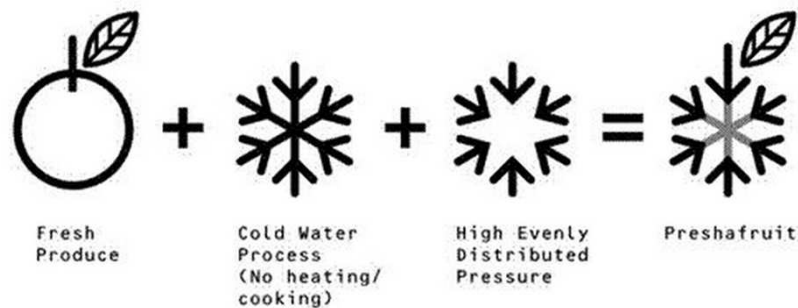
Hiperbaric 300 for juices



UTILISING REVOLUTIONARY
HIGH PRESSURE
PROCESSING
TECHNOLOGY



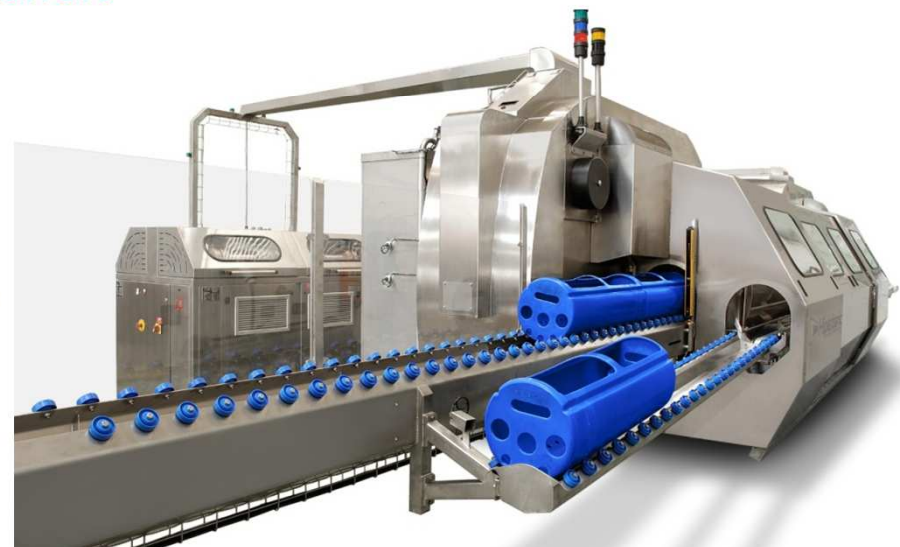
NO PRESERVATIVES, CONCENTRATES
OR ANYTHING ADDED



COLD
PRESSURISED
NEVER
HEAT PASTEURISED



Preshafood (Australia)



Coldpress (UK)

Clarified apple juices



cold pressure. pure taste
coldpress™

Best Innovator
**FoodBev.com
Awards
2011
WINNER**

Best New Drink Brand
**FoodBev.com
Awards
2011
FINALIST**

FAROC – Villa de Patos (Mexico)

Miel de Maguey



Pulmuone (Korea)



Macè (Italy) - 2010



L'USINE DU MOIS

HAUTES PRESSIONS

Depuis un an et demi, l'industriel a investi dans les hautes pressions. Il s'est doté, en juin dernier, d'une nouvelle ligne Hiperbaric capable de traiter à 6000 bars 800 litres de jus de fruits par heure, 18 heures par jour (1,5 M€ invest). Macè propose également des purées de fruits traitées par cette technologie de stabilisation à froid (+ 4 °C).

Macè mise sur les hau

SPREMUTA DI ARANCIA FRESCA FRUTTA DA BERE

La spremuta di Arancia Fresca Macè è ottenuta solo dalla polpa di arance fresche, senza aggiunta di acqua e senza concentrati, puree e conservanti. È preparata con le migliori varietà di arance disponibili e, secondo la stagione, può essere rossa o bionda. Il particolare trattamento ad alta pressione, cui viene sottoposta, mantiene inalterati i valori nutrizionali delle arance e inibisce lo sviluppo dei microorganismi senza l'utilizzo di procedimenti di pastorizzazione. La sua freschezza si vede già dalla bottiglia: come in tutte le spremute di frutta fresca non pastorizzata, la polpa tende a depositarsi separandosi dalla parte liquida. Ma basta agitare la confezione e il mix torna perfetto.



Hiperbaric 135 for juices and smoothies

vending

spremute

- arancia
- pompelmo rosa
- arancia banana fragola
- arancia banana mango
- arancia banana kiwi

250 ml - 500 ml

scarica
la scheda



100%
Frutta
Fresca



azienda

tutti i prodotti

distribuzione moderna

vending

vaschetta

spremute

fruit bag

ho.re.ca & banqueting

contatti

elementi
di quotidiano
benessere

CJ (Korea) - 2012

Fruit juices



EVOLUTION FRESH - USA

2010



Evolution Fresh (USA) - 2012

All Natural
Never Heated



Starbucks Acquires Evolution Fresh to Enter Wellness Space

With this acquisition, Starbucks will reinvent the \$1.6 billion super-premium juice segment, its significant next step in entering the larger \$50 billion Health and Wellness sector.

Press Release Nov 2011



1.

SQUEEZED FRESH

We start with delicious fruits and vegetables. Then we crack, peel and squeeze them to bring out everything that's good about them.

2.

BOTTLED COLD

Heat can rob juices of flavors and nutrients. So we use cold pressure to help maintain their natural taste.

3.

ENJOYED EXUBERANTLY

With more vitamins, enzymes and nutrients to enjoy in every sip, you're ready to Squeeze Life™ for everything it's got.



Blueprint (USA) - 2011

Processing raw fruit & vegetal juices



BlueprintJuice®
 From the makers of BluePrintCleanse®

Blueprint and Harmless Harvest Put Pressure on the Raw Beverage Industry

High Pressure Pascalization Applied to Raw Juice and Coconut Water

March, 2012—With demand for unaltered juices shifting into the mainstream, pioneering beverage companies Blueprint and Harmless Harvest have turned towards a technology called HPP to safely deliver the nutrition of raw ingredients without modifying the taste in any way. HPP, which uses high pressure instead of heat to inhibit microflora growth in fresh food, is achieving significant results in the fresh raw



BluePrintCleanse®

Cleanse

Maintain

Cleanse Levels

Renovation

Renovation Cleanse

Renovation Type | Overview | Nutritional Info



RebootYourLife (Australia)



How...

How do we do it? The unique process we use to make our juice, HPP (High Pressure Processing) uses cold pressure, not heat - which means that unlike other companies, we don't cook our juices before we bottle

Harmless Harvest (USA) - 2011

Processing coconut water in Millard (3 x Hiperbaric 420)



HARMLESS HARVEST
POSITIVE FEEDBACK LOOPS BETWEEN PEOPLE & PLANTS

**"WE DID IT! INTRODUCING THE
WORLD'S FIRST RTD RAW &
ORGANIC COCONUT WATER."**



Evolution Fresh (USA)



We believe in following nature's lead. We're not taking credit for what's been perfected, just making it a little easier to get. You deserve to drink something you feel good about, because it makes you feel good. Here's to your vibrant energy, it's your time to thrive!

- Natural
- 100% Juice
- Kosher
- High Pressure Processed



Invo (UK, Spain)

Thai coconut water



INVO
AGUA DE COCO

ES EL PRIMER AGUA DE COCO FRESCO EN EUROPA
Y POR FIN ESTÁ EN ESPAÑA

AGUA DE COCO PURA
AGUA DE COCO LIMA Tailandesa
AGUA DE COCO CON PÍÑA

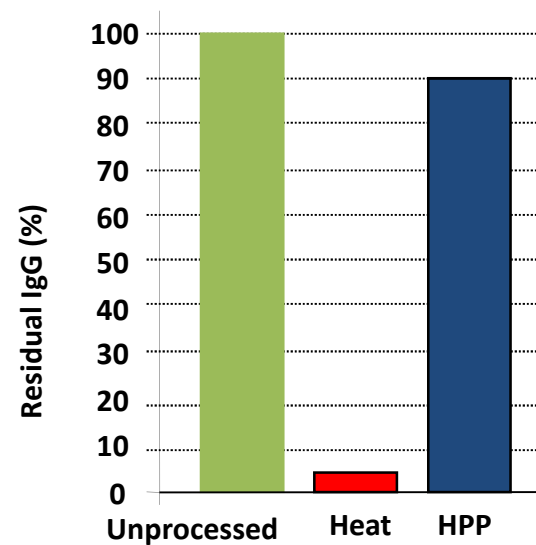
- 100% NATURAL. Sin AZÚCAR AÑADIDO
- EL AGUA DE COCO ES BAJO EN CALORÍAS (MENOS DE 20 CALORÍAS POR 100ML)
- CONTIENE LOS MINERALES POTASIO, CALCIO, MAGNESIO Y OTROS MINERALES Y ELECTROLITOS QUE PROMUEVEN UNA RÁPIDA HIDRATACIÓN
- ES NATURALMENTE BAJO EN AZÚCAR Y UNA BUENA FUENTE DE VITAMINA C Y VITAMINAS DEL GRUPO B
- FORMATO: 300ML



Col+ (New Zealand)



Colostrum



Fly 1Above (New Zealand)



Frutas el Remolino – Frutaful (Spain)

Frutaful: Spanish fruit purees



frutaful®
fresh berries

‘Frutas del bosque frescas trituradas, contenidas en un nuevo envase procedentes de 3 productores españoles’

- > Recolectado a mano en su punto de madurez
- > Productores españoles
- > 100% fruta fresca
- > No sometido a proceso de calor
- > Sin azúcares añadidos
- > Sin conservantes ni otros aditivos

[Ver el folleto](#)
[Contact](#)

Clic aquí  **La Conostita**
QUALITY BERRIES

Clic aquí  **FRUTAS REMOLINO**

Clic aquí  **SelBerry**



Moras / Blackberries

frutaful®
fresh berries

MORAS de La Conostita

natural & lleno de sabor

cosechada a mano en su punto óptimo de maduración

Descubra más sobre el productor
Find out more about the producer



Moras / Blackberries

En Lucena del Puerto, entre alcornoques y olivares, se encuentra la plantación de zarzamora de los Hnos. Javier y Daniel Velo, con dedicación y esmero producen zarzamoras muy saludables con un fuerte compromiso medioambiental. "El sol de Andalucía da a la zarzamora el punto óptimo de madurez y sabor".



Romantics's Smoothie/drinking yoghurt



Cascina Belmonte - d'Uva (Italy)

Grape juice



Il nostro sogno è portare sulle tavole il vero, incredibile sapore dell'uva appena colta, senza alcool, con tutte le eccezionali proprietà di questo frutto.



*“Siamo riusciti a sviluppare un protocollo che associa il freddo alle **alte pressioni**, escludendo le alte temperature e l'aggiunta di qualsivoglia sostanza chimica. Il risultato è qualcosa di assolutamente innovativo. Frutta fresca, integra e buonissima”.*

<http://blog.d-uva.com/lidea>

<http://blog.d-uva.com/dUVAMerlot>

Coldpress (UK)

2011

Clarified apple juices

cold pressure. pure taste
coldpress™

Best Innovator
FoodBev.com
Awards
2011
WINNER

Best New Drink Brand
FoodBev.com
Awards
2011
FINALIST



6 months extended shelf life at 4°C

2012

2013

Launching of a shelf-stable juice



The Grocer
New Product Awards

September 2012 | London



cold pressure. pure taste
coldpress™

Our Range

Our fruit is crushed and pressurised cold using high pressure processing (HPP).

Coldpress juices retain the flavour, colour and aroma of fresh fruit.

Coldpress juices contain 100% EU fruit which means no concentrates, no preservatives, no added sugar, no sweeteners or added colours.

Coldpress juices have an extended shelf of up to 6 months (no exploding bottles!).

Coldpress juices retain twice the Vitamin C and other antioxidants of heat pasteurised juices.

All Coldpress juices are available in a 750ml size.



ICOKefir (UK)

Coconut Kefir: fermented coconut milk

ICOKefir

- ✳ **Dairy free**, soya free, gluten free and suitable for vegan diets.
- ✳ **Tropical coconut and fruits** bottled within 24 hrs of harvesting in the country of origin at the peak of their nutritional life cycle. Only 100% photosynthesized plant ingredients no added water! over 25% real fruit in our mango and passion fruit blend!
- ✳ **HPP** - hydrostatic pressure processing, new innovative natural food technology, food preservation, no more heating products to inactivate food spoilage bacteria. Simply cold water pressure that crushes the spoilage bacteria before they get to work, simultaneously leaving nature's good stuff behind. Tastes fresh and heightens the nutritional benefits whilst extending the shelf life.
- ✳ **ICO** - naturally isotonic ingredients; raw coconut water, raw sugar cane juice with whole plant phytonutrients and minerals, electrolyte salts such as potassium, magnesium, calcium, phosphorus, manganese, zinc, cobalt, chromium and sodium.
- ✳ **Kefir** - naturally selected probiotic* bacteria: *Lactobacillus acidophilus*, *Lactobacillus rhamnosus* and *Lactobacillus paracasei* from kefir cultures, traditionally farmed. * **On average Each 275g bottle contains over 100 billion probiotic bacteria.**
- ✳ **Certified allergen free production site** - our ethical manufacturing partners have received numerous awards for sustainable social and economic development.

ICOKefir Something special

On average Each 275g bottle contains over 100 billion probiotic bacteria.

MARIGOLD CODE 9546
(LIME)

ICOKefir 



HARNESSING A FORCE OF NATURE

We use HPP - Hydrostatic Pressure Processing COLD WATER PRESSURE IMAGINE a TROPICAL DESERT ISLAND where a YOUNG GREEN COCONUT falls from its tree to the depths of the surrounding ocean. It is at these great depths that HYDROSTATIC PRESSURE exists. NATURAL FOOD TECHNOLOGY discovered that this pressure INACTIVATES the gram negative bacteria that cause food to spoil whilst NATURALLY selecting the more pressure resistant GRAM POSITIVE  BACTERIA to SURVIVE. Our SPECIALLY FARMED LACTIC ACID GRAM POSITIVE BACTERIA (KEFIR CULTURES) are then able to thrive on the complex RAW SUGARS contained within. These sugars also have a LOW GLYCEMIC EFFECT in their NATURAL FORM when the WHOLE plant's RAW MINERALS & PHYTO-NUTRIENTS are present thus slowly ABSORBING into the blood which eliminates the normal sugar spiking HIGHS & LOWS. Coconut contains LAURIC ACID also found as an IMPORTANT NUTRIENT with anti-bactericidal activity for the IMMUNE SYSTEM.

→ HPP PRESSURE →



INGREDIENTS: COCONUT MILK (COCONUT WATER, COCONUT MEAT), SUGAR CANE JUICE, AGAVE NECTAR, LIME JUICE, KEFIR CULTURES: *LACTOBACILLUS ACIDOPHILUS*, *LACTOBACILLUS RHAMNOSUS*, *LACTOBACILLUS PARACASEI*

NUTRITIONAL VALUES PER 100G	*RDA%
ENERGY 295 KJ Kcal 70	
PROTEIN	0.4g
CARBOHYDRATES	12.3g
OF WHICH ARE SUGARS	11.5g
FAT	2.0g
OF WHICH ARE SATURATES	1.7g
FIBRE	0.6g
SODIUM	TRACE
MAGNESIUM	14 MG 5%
CALCIUM	9 MG 1.5%
PHOSPHORUS	12 MG 2%
POTASSIUM	173 MG 5%
VITAMIN C	1 MG 2.5%
LAURIC ACID	900 MG

*Percentage of recommended daily allowance per 2000 Kcal intake. Nutritional values may vary with seasonality of fruits.

KEEP REFRIGERATED
between 0°C and 5°C
ONCE OPENED CONSUME WITHIN 3 DAYS SEE LABEL FOR USE BY DATE
WWW.ICOKEFIR.COM
MADE IN GHANA FOR:
COCADA FRESCO UK LTD DA144BG
USE BY

275g e



INGREDIENTS: COCONUT MILK (COCONUT WATER, COCONUT MEAT), SUGAR CANE JUICE, MANGO, PASSION FRUIT, KEFIR CULTURES: *LACTOBACILLUS ACIDOPHILUS*, *LACTOBACILLUS RHAMNOSUS*, *LACTOBACILLUS PARACASEI*

NUTRITIONAL VALUES PER 100G	*RDA%
ENERGY 295 KJ Kcal 71	
PROTEIN	0.5g
CARBOHYDRATES	11.5g
OF WHICH ARE SUGARS	10.3g
FAT	1.3g
OF WHICH ARE SATURATES	1.1g
FIBRE	0.5g
SODIUM	TRACE
MAGNESIUM	12 MG 4%
CALCIUM	14 MG 2%
PHOSPHORUS	17 MG 3%
POTASSIUM	210 MG 6%
VITAMIN C	1 MG 2.5%
LAURIC ACID	800 MG

*Percentage of recommended daily allowance per 2000 Kcal intake. Nutritional values may vary with seasonality of fruits.

KEEP REFRIGERATED
between 0°C and 5°C
ONCE OPENED CONSUME WITHIN 3 DAYS SEE LABEL FOR USE BY DATE
WWW.ICOKEFIR.COM
MADE IN GHANA FOR:
COCADA FRESCO UK LTD DA144BG
USE BY

275g e



MARIGOLD CODE 9645

Too Good Too Waste – Tommies (The Netherlands)

Gazpacho

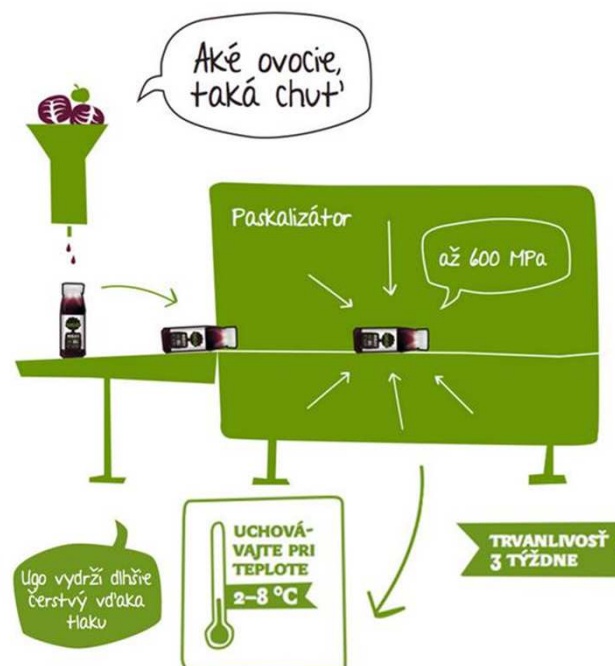


http://www.youtube.com/watch?v=NwZB3RtOce8&goback=%2Eanp_1785303_1355741956052_1#

Our equipment on site

Kofola (Czech Republic)

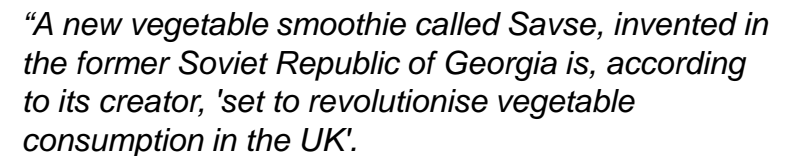
Hiperbaric 55 for vegetable juices



kofola 
drinks. life. emotion.

<http://company.kofola.cz/>

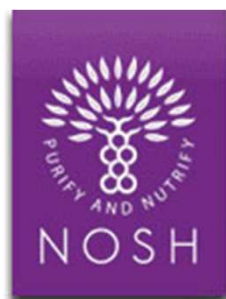
<http://www.ugo.cz/>



http://www.just-drinks.com/news/savses-savse-broccoli-beetroot-and-strawberry-smoovies_id109543.aspx
<http://www.foodbev.com/news/savse-broccoli-smoothie#.USXJzWfTD2k>

Noshdetox (UK)

Juices and smoothies



<http://www.foodbev.com/news/nosh-detox-raw-smoothies#.Uc7E6vn0F8F>
<http://www.foodbev.com/news/the-raw-fruity-cold-pressed-juice-from-n#.Uc7FPvn0F8G>

[www.noshdetox.com/
productdetails.aspx?productid=P2](http://www.noshdetox.com/productdetails.aspx?productid=P2)

HOME PAGE / FOOD / FOOD NEWS / GIVE YOURSELF A NATURAL BOOST WITH THE FIRST RAW SMOOTHIE

Give yourself a natural boost with the first raw smoothie

Anna Berrill, Friday 07 September 2012



Kick-start your weekend and rejuvenate your system with the first raw and unpasteurised smoothies from Nosh.

If you've overdone it this summer or indulged in a few too many glasses of wine or scoops of ice cream, give yourself a natural boost with the first raw and unpasteurised fresh fruit smoothies from detox company Nosh.

Already popular amongst celebrities Gwyneth Paltrow and Georgia May Jagger, the smoothies aren't heated so they are naturally packed full of vitamins, mineral and anti oxidants. Using a HPP process (which is normally used for giving meats and cheese a longer shelf-life), the unpasteurised and vibrant drinks are packed full of superfoods.

The Coconut, Banana and Chia smoothie, with its round and creamy flavour, was the Red

favourite, while the thick Almond, Banana, Chia and Oat smoothie with a hint of cardamom would pair well with Indian food. The tangy mango smoothie and zingy apple smoothie had a tart kick to it, perfect for a thirst quenching hit.

So as the raw food craze continues, will you be trying one of Nosh's new smoothies?

Nosh's raw smoothies are available now from Planet Organic, Wholefoods and online at Therawsmoothie.com, £3.49.

MY T JUICE - AUSTRALIA

my t juice



SUJA JUICE – USA



PHD CLEANSE – NEW ZEALAND



Dietox (Spain)



DIETOX[®]

Depura tu cuerpo
con la nueva terapia alimentaria que consiste en ayunar tomando licuados durante 1 o 3 días seguidos



www.dietox.com/

LUMI JUICE - USA



Step 1



Prep & Grind

Step 2



Press

Step 3



You Down With HPP?

Step 4



Enjoy

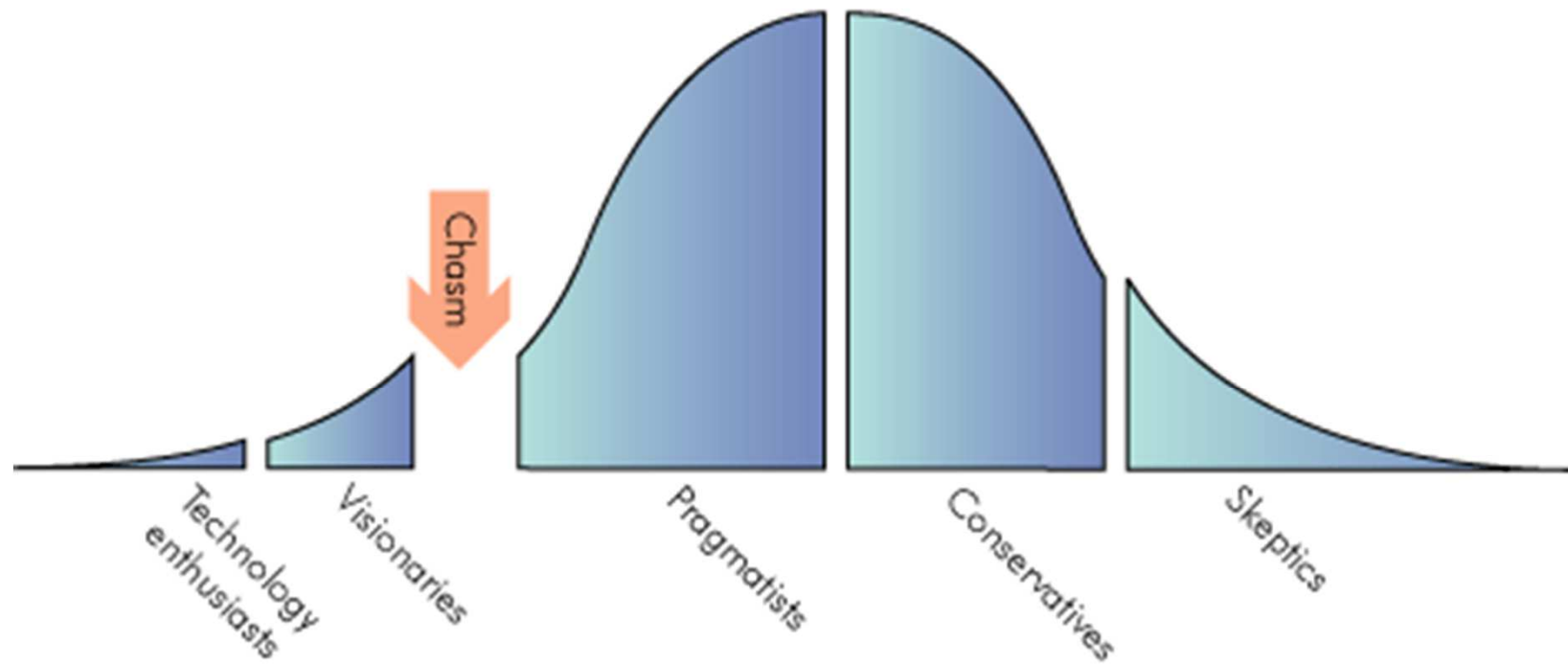


PLENISH CLEANSE- UK

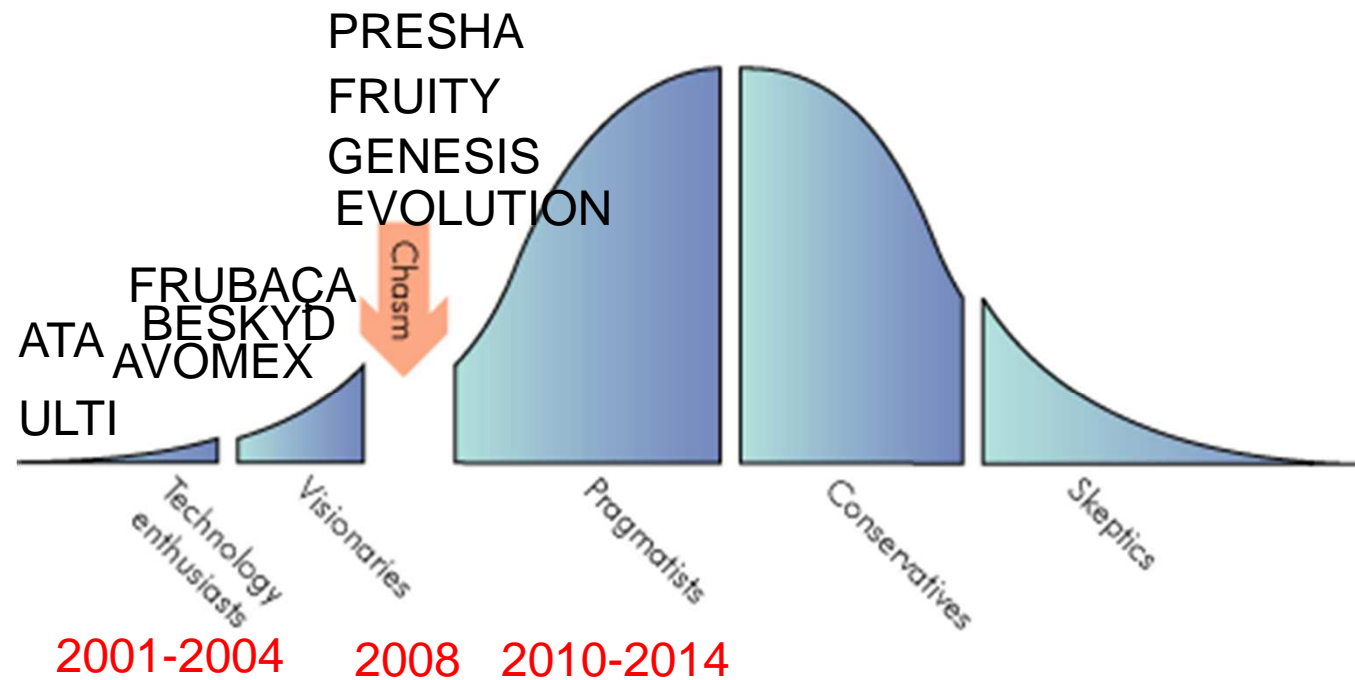
PLENISH.



Technology Adoption Cycle

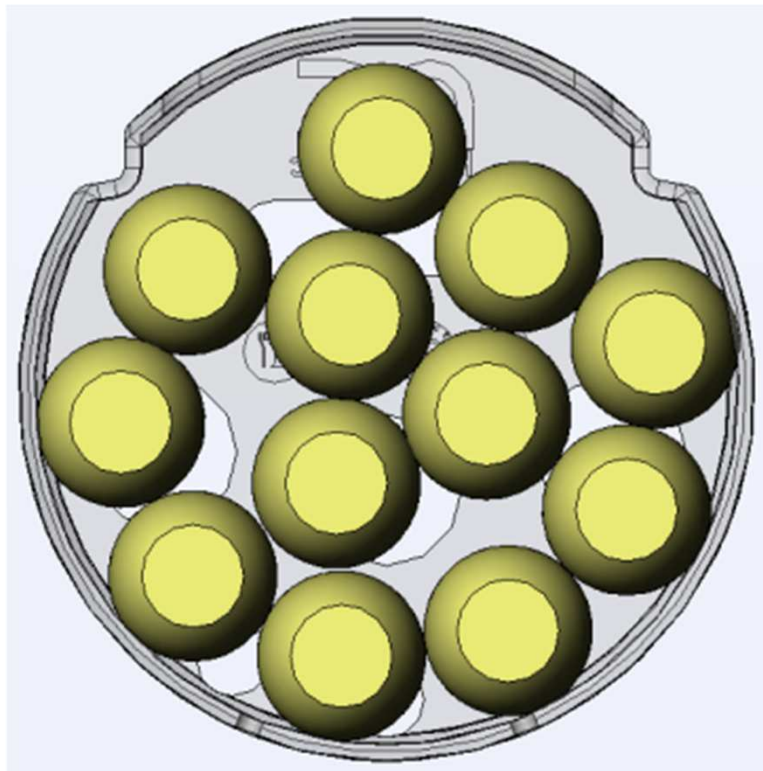


HPP JUICES

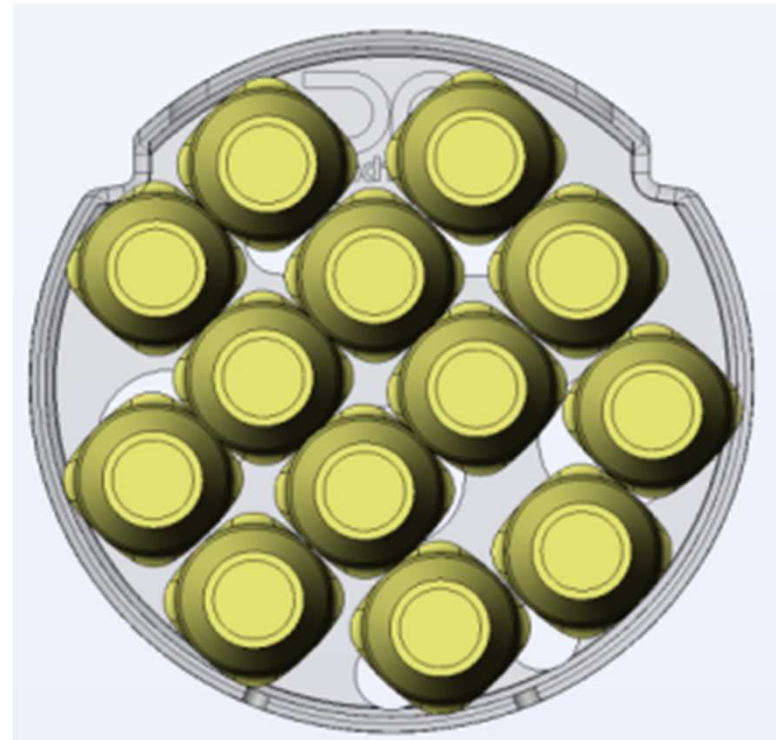


Round bottles versus square bottles (500 mL – height : 182 mm)

Round: 12 bottles / row : 44%

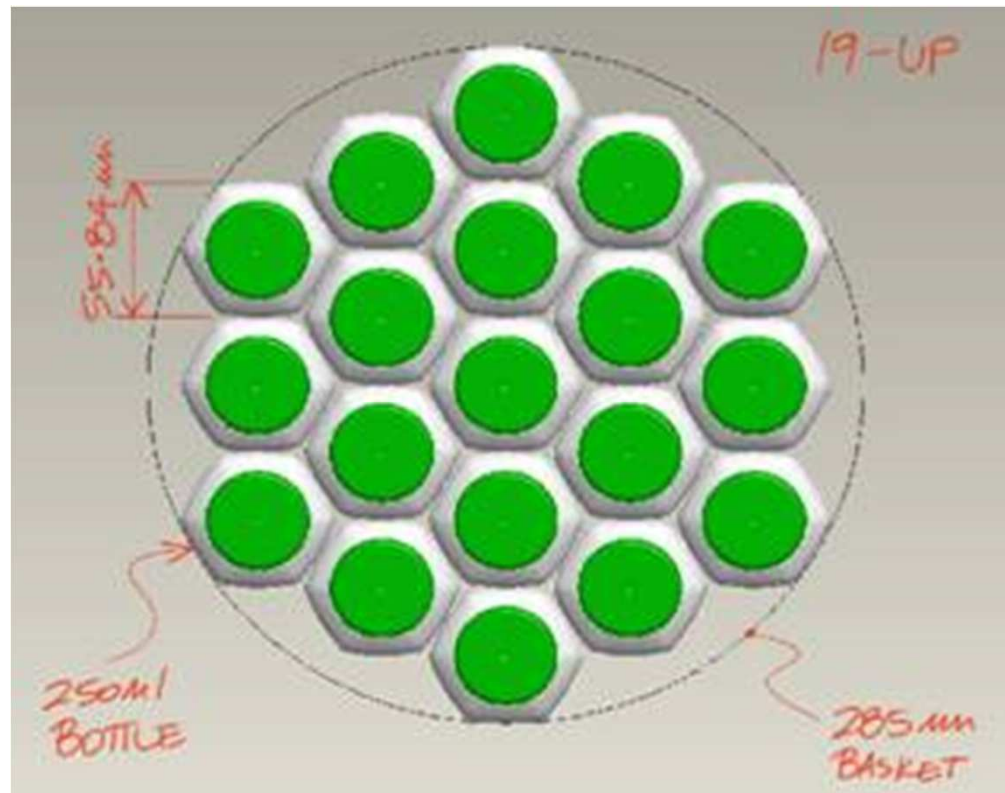


Square: 13 bottles / row : 48%



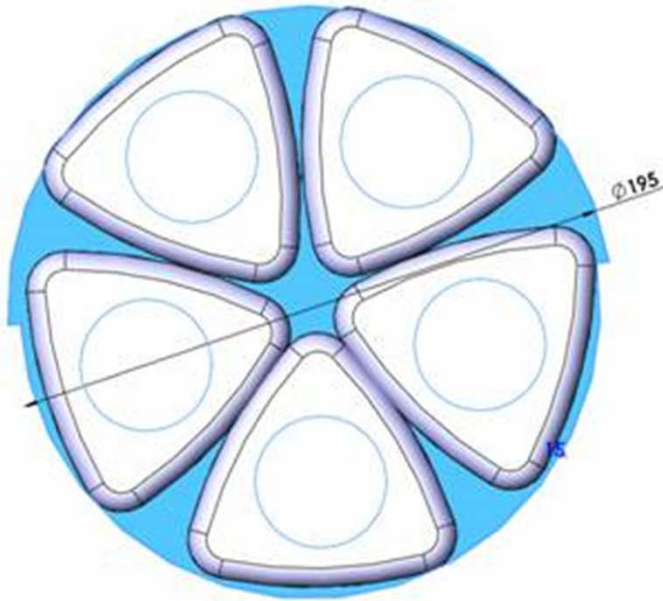
Hexagonal bottle (250 mL)

Hexagonal bottles: 50 – 54%



Triangular bottles

1 L bottle in a 55 L machine: 70% filling ratio



Hiperbaric thanks

Thanks to all our clients in Europe, America, Asia and Oceania who made Hiperbaric the world market leader of HPP industrial food equipment, since 2005.

