

GLOBAL ASEPTIC PACKAGING 2015 - Extracts from Report

Warrick Research and Zenith International

A. EFFECTIVENESS OF PACKAGING STERILISATION SYSTEMS

The various aseptic packaging systems use different methods to eliminate micro-organisms and achieve pack sterility. The different methods achieve different organism reduction rates, which can be measured precisely when carried out under repeatable controlled conditions.

Most systems use hydrogen peroxide, which may be applied by immersion, spraying or vaporisation and then activated and dried off with hot air. The precise technique used will have an effect on the rate of kill of micro-organisms.

The current methods of application of hydrogen peroxide solution used by major equipment manufacturers will achieve a count reduction of the order of 10^6 to 10^8 (one part per million to one part per 100 million). Similar reduction can be achieved by the use of wet heat. With other systems such as dry heat or infra-red radiation, a lower count reduction (10^4 or 10^5) is usually obtained.

However, even though the organism reduction rate of a system can be calculated with some confidence and precision, this cannot be used to give a precise measure of the proportion of non-sterile packs that will be produced by the systems.

There are a number of reasons for this:

- The proportion of non-sterile packs will vary according to pack size. The larger the pack, the higher proportion that will be non-sterile at a given rate of organism reduction.
- The condition of the packaging before sterilisation will also affect the incidence of non-sterile packs. The more contaminated the packaging, the more organisms that will be left on it after sterilisation, and the higher the incidence of non-sterile packs.
- Most important, the failure of the sterilisation process to kill the bacteria is not the only, or even the most important, cause of pack non-sterility. Other causes include physical defects in the packs, particularly in seals and seams, and technical failure in the aseptic packaging system.

Equipment suppliers may be able to predict in theory the maximum occurrence of non-sterile packs, assuming the system works exactly as is intended. However, they cannot predict these other causes of non-sterility with the same precision as they can predict the effectiveness of the sterilising method used.

B. COLOMBIA - White Milk

Total white milk fluid consumption reached 2,930 million litres in 2014, 21 million litres less than in 2011.

In 2014 UHT milk accounted for 48% of total white milk and it is expected that it will overtake pasteurised milk in 2015. The increasing demand of UHT milk will deepen this difference and in 2020 it is forecast that there will be around 800 million litres more UHT milk than pasteurised. All of the top producers in the country now offer UHT milk with Alpina and Colanta leading the category.

Consumption of pasteurised milk remained strong, particularly outside the main urban centres, and reached 1,524 million litres in 2014 down from a peak of 1,741 million litres in 2011. These levels are forecast to decline by an annual rate of 4% to 2020 as more aseptic lines commence operation and replace pasteurised milk. Producers are confident that the investment will pay off and that they will benefit from much longer shelf life and more cost effective distribution options.

Consumption of white milk (million litres) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR% 15-20
Short life Chilled:						
Pasteurised	1,741	1,524	1,458	1,163	-4.3	-4.4
ESL	0	0	0	0	-	-
Long life Ambient:						
UHT	1,210	1,406	1,487	1,961	5.3	5.7
Sterilised	0	0	0	0	-	-
TOTAL WHITE MILK	2,951	2,930	2,945	3,124	-0.1	1.2

Source: Zenith International/Warrick Research

Suppliers

The Colombian dairy industry is considerably more diversified than in neighbouring Peru and there are several key players. The leading producer is Colanta, with an overall market share of approximately 17.6%. Colanta is a dairy cooperative from Antioquia which has expanded throughout the main milk producing regions of central Colombia. The company sells a broad range of white milk products and has a modern UHT processing plant in Funza Cundinamarca, just outside Bogotá. Within pasteurised milk Colanta is the main player, including more dairy products in its portfolio such as cheese, yogurt and cream.

Alqueria-Danone ranks the second most important manufacturer within white milk and is the leader in the UHT segment. It has a dominant presence in Bogotá and the state of Cundinamarca, with a 14.6% share.

The company owns the most modern ultra-pasteurisation plant (UHT) in the Colombia and also commercialises pasteurised milk in addition to UHT products.

Alpina is the number three player within the white milk market with around a 10% share. The company is very well established in Cundinamarca and Boyacá as well as in other areas of the country. Alpina exports milk products including UHT milk and cheese to Ecuador, Venezuela, Peru and the Caribbean. Alpina not only produces UHT milk but also cheese, yogurt, fermented milk, desserts, juices and nectars amongst others. The company has been operating a plant in the USA since 2012.

Parmalat-Proleche is another important player through its range of UHT milk, pasteurised milk and other products. Parmalat-Proleche has around a 6% share in the white milk category. It also focuses on higher added value products, particularly UHT and APP (aseptic pouch pack), both fast growing segments in Colombia. Parmalat has been improving its position by promoting more actively its Zymil lactose free milk.

Other important players include Algarra, which is owned by Grupo Gloria of Peru, and Conlema, with the brand La Gran Vía.

UHT Milk and Use of Aseptic Packaging

UHT milk is one of the most rapidly growing segments in the dairy industry of Colombia. With a total volume at 1,406 million litres in 2014, the category has grown faster than initially expected and it is overtaking pasteurised milk.

In 2014 Tetra Pak created a new packaging exclusively for the Colombian market, named Bolsa Pack, for the milk products of Celema. Celema is the leader in the dairy sector in the Eje Cafetero region. The new pack was designed for consumers who looked for economy when drinking milk, due to their high consumption, but were also aware of the importance of nutrition, especially in the dairy category. The Bolsa Pack may be perceived as practical and combining the best of both worlds: low price and high quality milk and packaging. The new pack was launched in a 900ml pouch and was first available in Manizales, Pereira and Armenia.

Alqueria has also innovated with the launch of Practijarra, a new pouch pack that does not require scissors to open, as it has a pre-cutting. It also has a convenient handle for easy pouring, a practical clip that closes the bag after opening and a base to sustain the pack.

UHT cartons stood at 650 million litres in 2014 with the large majority being 1 litre packs and only 38 million litres being under 500ml in volume. UHT cartons are growing faster than pouches and are expected to account for almost 52% of all volume of aseptically packaged white milk in 2020.

UHT white milk Aseptic Packaging use by Pack Type/Size (million litres) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR%15-20
Cartons - Family (0.5 litre and over)	472	612	658	940	8.7	7.4
Cartons - Portion (up to 499ml)	30	38	42	73	8.7	11.6
HDPE Bottles (0.5 litre and over)	0	0	0	0	-	-
HDPE Bottles (up to 499 ml)	0	0	0	0	-	-
PET Bottles (0.5 litre and over)	0	0	0	0	-	-
PET Bottles (up to 499ml)	0	0	0	0	-	-
Plastic pouches (0.5 litre and over)	520	560	582	720	2.8	4.4
Plastic pouches (up to 499ml)	188	197	205	228	2.2	2.2
Plastic pots (over 50ml)	0	0	0	0	-	-
Plastic pots (under 50ml)	0	0	0	0	-	-
Bag in Box	0	0	0	0	-	-
Other - glass, cans, aerosols, stick	0	0	0	0	-	-
TOTAL	1,210	1,406	1,487	1,961	5.3	5.7

Source: Zenith International/Warrick Research

C AFRICA AND MIDDLE EAST

The Use of Aseptic Packaging - By Product

In 2014, 13 billion litres of product were aseptically filled in Africa and the Middle East, using over 24 billion packs. The use of aseptic packaging grew by 4.6% per annum between 2011 and 2015. The number of litres aseptically packaged is expected to grow at around 3.5% per annum in the period 2015 to 2020, and by 2020 volumes are forecast to have gained over 42% from the 2011 volume.

White milk and beverages are the most common products aseptically packaged, claiming 62% and 29% of the volume in 2014, respectively. Other dairy products grew at a rate of 8.9% per annum from 2011 to 2015, primarily driven by the increase in flavoured milks and desserts, though the market remains small at only 8% of the market in 2014.

Aseptic Packaging use by Product (million litres) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR%15-20
White Milk	7,167	8,098	8,296	9,576	3.7	2.9
Other Dairy Products	731	978	1,030	1,298	8.9	4.7
Beverages	3,251	3,823	4,018	5,001	5.4	4.5
Food Products	124	138	141	166	3.2	3.4
TOTAL	11,274	13,037	13,484	16,042	4.6	3.5

Source: Zenith International/Warrick Research

Aseptic Packaging use by Product (million units) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR%15-20
White Milk	9,438	11,319	11,689	13,638	5.5	3.1
Other Dairy Products	2,599	3,653	3,832	4,815	10.2	4.7
Beverages	6,392	8,710	9,120	11,393	9.3	4.5
Food Products	690	747	749	850	2.1	2.6
TOTAL	19,120	24,429	25,391	30,695	7.3	3.9

Source: Zenith International/Warrick Research

D. THAILAND - BEVERAGES

Market Size and Trends

Thailand is one of the largest consumers of energy drinks in the world and Sports and Energy drinks accounted for a large share of the total beverage market. The largest consumers for energy drinks were the low to middle income segments of the Thai population such as taxi drivers, construction workers and labourers. Energy drinks were less expensive to purchase than other beverages and were viewed as being drinks that could provide workers with the energy to work longer hours. The Sports and Energy drinks segment saw minimal decline in 2014 due to political deadlock and months of massive protests in the first half of 2014. This resulted in a slowdown of the Thai economy which led to a decline in the consumption of energy drinks from low income consumers. M-150 from Osotspa, Carabao Dang from Carabao Tawandang, and Kratingdaeng from TC Pharmaceuticals remained the largest energy drink manufacturers in Thailand. These companies used aggressive advertising and prize promotions to boost sales volume among target consumers, particularly taxi drivers, bus drivers, and factory workers.

The RTD tea and coffee was valued at 712 million litres in 2014, the largest and fastest growing segment in the beverages market. This sector mainly targeted teenagers and young adults and the product was mostly available in smaller size, brightly coloured carton packs and PET bottles for impulsive and on-the-go consumption.

Juices and Nectars had a market size of 100 million litres in 2014 whilst Juice Drinks enjoyed a market size of 377 million litres. Cartons were generally used for packaging Juices and Nectars and PET & HDPE bottles were used for Juice Drinks. Orange was the most popular flavour in the Juices and Nectars market. Both Tipco and Malee, in keeping with consumer preferences, offered a 100% orange juice product. The Juices and Nectars category is expected to enjoy steady growth of 3% a year to 2020 as more consumers switch to healthier drinks. Juice Drinks are expected to grow at a higher rate of 7%

Beverage Consumption (million litres) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR%15-20
RTD Tea & Coffee	623	712	787	1,362	6.0	11.6
Juice and Nectars	76	100	102	120	7.9	3.2
Juice Drinks	364	377	391	539	1.8	6.6
Sports & Energy	437	497	502	592	3.5	3.4
Total Beverages	1,499	1,685	1,782	2,613	4.4	7.9
Short Life	11	12	12	13	2.2	1.7
Long Life	1,488	1,673	1,770	2,599	4.4	8.0

Source: Zenith International/Warrick Research

Suppliers

Osotspa Co Ltd remained the market leader in the energy drinks market with a 47% market share with its brands M-150, Lipovitan-D, Shark, 357 and Look Toong. However, TC Pharmaceuticals continued to dominate the sport drinks market with approximately a 70% market share from its Sponsor brand.

The RTD tea and coffee segment was dominated by Asian Brands. Oishi and Ichitan collectively held an 80% market share in the RTD tea segment. In addition, Ajinomoto dominated RTD coffee with a 60% market share with its Birdy and Birdy Primo.

Tipco and Malee Sampran continued to be the leading players in Juices and Nectars in 2014 because of a premium brand image, aggressive marketing activities and promotions in all modern retailers nationwide. For Juice Drinks, the market was very fragmented because of many manufacturers from multinational firms and domestic companies. Coca-Cola Thailand and Food Star were the leading players in this sector, and these companies held a market share of around 10% and 12% respectively. Minute Maid Pulpy, Minute Maid Splash, Deedo, and Mansome remained the most popular brands. However, Tropicana from PepsiCo was no longer in the market as the company withdraw Tropicana in 2013.

Use of Aseptic Packaging

Small size PET bottles were used to package sports and energy drinks, RTD tea and coffee and Juice Drinks, whilst aseptic cartons were the most widely used type of packaging in Juices and Nectars. PET bottles were viewed as being convenient and easy to carry, and were very popular amongst teenagers and young adults. Small size PET bottles and portion sized cartons are expected to dominate the market in the future.

Aseptic Packaging Use by Pack Type/Size - Beverages (million units) 2011-2020

	2011	2014	2015	2020	CAGR% 11-15	CAGR%15-20
Cartons - Family (0.5 litre and over)	35	45	46	50	7.3	1.7
Cartons - Portion (up to 499ml)	334	360	347	339	1.0	-0.5
HDPE Bottles (0.5 litre and over)	0	0	0	0	-	-
HDPE Bottles (up to 499ml)	0	0	0	0	-	-
PET Bottles (0.5 litre and over)	291	343	328	305	3.1	-1.5
PET Bottles (up to 499ml)	972	1,112	1,350	2,999	8.5	17.3
Plastic pouches (0.5 litre and over)	0	0	0	0	-	-
Plastic pouches (up to 499ml)	22	27	28	29	6.2	1.1
Plastic pots (over 50ml)	0	0	0	0	-	-
Plastic pots (under 50ml)	0	0	0	0	-	-
Bag in Box	0	0	0	0	-	-
Others - glass, cans, aerosols, stick	0	0	0	0	-	-
TOTAL	1,654	1,887	2,099	3,723	6.1	12.1

Source: Zenith International/Warrick Research

E COMPETITIVE POSITION OF ASEPTIC FILLING LINES

Hot Fill v. Aseptic - Overview

For beverages in bottles, aseptic filling competes with hot filling and with the use of preservatives as a method of achieving shelf-stable products and thus allowing ambient distribution.

In developed markets - Europe, North America, and Japan - the use of preservatives is largely confined to the low cost end of the market. For higher quality products, especially pure juices and tea, the choice is between aseptic filling and hot filling. The North American market has to date mainly chosen hot fill, Europe has mainly chosen aseptic filling, and Japan has chosen the two technologies equally.

In developing markets there is more use of preservatives.

Choice of Hot Filling and Aseptic Filling

Most fillers have similar opinions on the relative merits and weaknesses of hot fill and aseptic filling. They may, however, vary in their assessment of the level of importance of different factors, and in the overall balance of advantages.

Aseptic filling - key perceived advantage is pack cost

Hot fill - key perceived advantages are capital cost and system tolerance.

Key Factor	Hot Fill	Aseptic
	Advantage	Advantage
Capital cost	++	
Diligence/tolerance	+	
Running cost	+	
Ease of operation	+	
Oxygen barrier	+	
Chemical use	+	
Operating speed	+=	- =
Product quality		+=
Energy use		+=
Pack design		+
Pack cost		++

Capital Cost

The capital cost of an aseptic bottle filling line is higher than the cost of a hot filling line. In recent years, the cost difference has been reduced, due to design improvements and the increased experience gained by aseptic filler suppliers as the number of installations has rapidly increased.

Diligence/Tolerance

Aseptic systems are perceived as having less margin for error, requiring greater levels of diligence, and with mistakes and breakdowns likely to have more serious consequences. This view is particularly strong among smaller fillers, without experience of aseptic filling of other types of pack. In recent years, the major multinational beverage and dairy companies such as Coca-Cola, PepsiCo and Nestlé have been leading investors in new aseptic fillers.

Running Costs

Hot fill running costs on balance are usually lower. Staff costs for hot fill are expected to be lower, though staff numbers are similar. Maintenance costs for aseptic systems are likely to be higher.

Ease of Operation

Hot fill is thought to be easier to operate, because it is a more 'tolerant' system. Sterilisation/cleaning may be required more frequently on an aseptic system.

Product Quality

On balance, aseptic systems are expected to give a higher product quality. This however will vary according to product filled, and be more significant for orange juice than for other types of juice or beverages.

F ENVIRONMENTAL CONSIDERATIONS

Overview

For major brand owners and fillers, environmental issues are now of major importance. Companies do not wish to be on the `wrong side` of a consumer trend, and perceive that issues such as recycling and sustainability are now important consumer concerns in many markets. Company managers and employees are also part of `consumer trends` and tend to have the same concerns.

In addition to the `environmental` aspects, improving `environmental` performance will often actually reduce costs. This may include reducing environmental recycling fees by reducing packs weights or changing the material use in packs. Or reducing costs through lower water usage.

Renewable Packaging

Renewable packaging is made from renewable resources such as carton board from trees, or non-renewables - such as plastics from oil. The use of renewables is generally regarded as more desirable, other things being equal.

Some materials, such as silica used to make glass, are in abundant supply, although not renewable. Ecolean use chalk in cartons to replace some of the carton board. Chalk is non-renewable but present in huge volumes.

A major recent development is the introduction of polymers made from renewable materials, including sugar cane waste. The first applications are in cartons for short life products, where polyethylene is made from renewable bio materials.

Recycling and Re-use of Packaging

In developed markets recycling rates for consumer packaging, in particular beverage packaging, are an important issue; many countries now have an established infrastructure for collection and recycling of packs. In developing markets the picture is more varied, both in terms of recycling rates, and collection and recycling systems. In some countries, private individuals make a living by collecting used containers in public places

Recycling Rates

In North America and much of Europe, recycling rates for aluminium containers are 65-70%. The industry is planning for higher rates - Novelis states its aim is to recycle 90% of containers by 2020.

While neither aluminium nor steel containers are much used in the aseptic packaging market, it is likely that most beverage, and to a lesser extent food, packaging will be expected to achieve similar recycling rates if it uses non-renewable resources.