

Clean-label and Plant-based Yogurts & Desserts



WHAT ARE THE CONSEQUENCES ASSOCIATED WITH THE PACKAGING PROCESS ?

Naturalness and Plant-based Milks: Worldwide Drivers

Nearly one in two people in the world today admit they are voluntarily reducing the proportion of animal products in their diet in favor of plant-based alternatives.¹

Whether or not this choice is linked to health or environmental considerations, it has gained such momentum that the subject can no longer be ignored by the dairy industry. After the milk segment, the dessert and yogurt sectors offer the most opportunity for plant-based products; increasing at the highest level overall.

Led by the United States, the movement is global. Spreading throughout Europe, with France, Italy and Great Britain as emerging markets, forecasted to reach other major countries such as Russia and China within the next 4 years. Dairy industry leaders have already taken the plunge, either by exten-

ding their flagship ranges with plant-based recipes or by purchasing promising brands to leverage the market.

The dairy-based dessert market remains predominant. Dessert is strongly influenced by the search for natural ingredients, with consumers dictating products to be made using a minimum of ingredients and insisting the product is as natural as possible. Manufacturers are thus compelled to reduce the use of additives.

In the interim these two trends should converge, according to Euromonitor, as naturalness will be the important criteria for plant-based products. Formulated without additives or created with plant milk, the newly emerging dessert and yogurt ranges will generate specific requirements for the cup filling process, and particularly for the decontamination of the packaging.

The focus is on the above subject.

¹. 46% of the worldwide population, source Euromonitor International's Lifestyles Survey (n:40, 464)



Summary

- 1 Plant-based desserts and yogurts:
what are the particular hygiene issues?**
- 2 Which decontamination technique
to use for the packaging?**
- 3 On which filling
machine?**



1 - Plant-based desserts and yogurts

INDIVIDUAL HYGIENE ISSUES INCLUDE

Microbiological quality of core ingredients

Made from oilseeds, legumes or cereals, the core ingredients of plant-based desserts and yogurts are quite different from milk.

When it comes out of the cow's udder milk has a good microbiological quality. This is not necessarily the case with seeds that may be exposed to pathogens between harvest and processing. Known for years, particularly with safety incidents involving almonds, these dry ingredients can have a high microbiological load which will multiply upon contact with water.

Even if the manufacturing process of plant-based milks and desserts includes, at one time or another, a heat treatment, the risk of microbiological contamination remains globally higher than with milk, especially for pasteurized products.

Sugar addition

The addition of sugar or sweet ingredients, such as fruits for taste or ferments' activation in vegetable desserts, creates an environment favorable to the development of bacteria. The higher the microbiological risk on the core ingredient, the more it will be increased by these additions.

Acidity

Even if fermentation is present, products based on plant milks are generally far less acidic than dairy desserts and yogurts. This property of the product at the final stage of the manufacturing process makes it more sensitive to the development of bacteria and molds over the period between the time it is dropped in the cup and the time it is consumed.



A reinforced hygienic design for the equipment

In view of the differences between milk products and plant-based products as well as the diversity of the core ingredients, transformation processes and final recipes, the packaging lines for these new ranges require specific risk analysis.

Improved hygiene is necessary to ensure food safety and adequate shelf life, this will be even more significant for recipes without preservatives. The good practice of ultra-clean filling can be used as a reference for products sold through cold-chain networks.

Special attention should be paid toward air flow management, reduction of retention areas and the effectiveness of cleaning in place procedures to avoid recontamination of the product during the packaging process.

A higher decontamination level for the packaging

Cleaning cups and lids with ionized air may not be enough. It will probably be necessary to use a more thorough method to ensure sufficient reduction of the microbiological load.



2 - Which DECONTAMINATION TECHNIQUE FOR PACKAGING?

Different decontamination methods are available for ultra-clean packaging in the dairy industry.

These fall into 3 main categories: dry decontamination (UV, pulsed light), gaseous decontamination (hydrogen-peroxide) and liquid decontamination (ozonated water, peracetic acid). For products packed in cups, Serac prefers dry and gaseous methods that can be applied to desserts and yogurts without additives or based on plant milks.

Dry chemical-free methods tend to be preferred by manufacturers since they allow them to be fully in line with the positioning of their products:

- They neither use water nor generate toxic effluents, thus providing a significant reduction in the environmental impact of the production process;
- They ensure the absence of chemical residues, an important argument for natural products and products targeting sensitive consumers.

They offer the additional benefit of being applied on a wide variety of material: PE, PS, PP, PET, PLA, cardboard, aluminum and even glass. This versatility proves particularly interesting at a time when the material used for the cup is also becoming a selling point.

UV and pulsed light decontamination should however be reserved for applications where the reduction of the microbiological load is limited. For applications that require a decontamination level over 3-log, the gaseous method, which can achieve a reduction of up to 5-log, will be applied.



UV Decontamination

- Continuous production of UVC rays (wavelength 100-280 nm); invisible light.
- Photochemical decontamination: UV rays are absorbed by the DNA of the microorganisms; these break down and can no longer replicate.
- No risk of alteration or deformation of the packaging.
- Surface treatment: does not penetrate into the material.
- Exposure time: 2 to 4 seconds.
- Mean reduction observed on aspergillus brasiliensis < 1 log.

Pulsed light decontamination

- Production of very short and very intense flashes of broad-spectrum white light (200-1100 nm): 300 milliseconds and 50,000 times the intensity of sun on earth.
- Photothermal decontamination: UV-induced DNA breakdown and destruction of the cell membrane by temperature rise.
- No risk of alteration or deformation of the packaging.
- Surface treatment: does not penetrate the material.
- Exposure time: 0.3 to 0.9 milliseconds.
- Mean reduction observed on aspergillus brasiliensis: up to 3-log.



Main advantages of pulsed light

From a sanitary point of view	In terms of process
Pulsed light is more effective; microbiological results can be validated by a laboratory and the equipment manufacturer can commit on expected performance level.	Pulsed light makes it possible to work at higher speeds and to reduce electrical consumption. Technically speaking, pulsed light decontamination modules are much more compact than UV modules, they can be integrated more easily on packaging lines.

3 - On which FILLING MACHINE?

Serac offers two types of filling machines for preformed cups:

Neo rotary machines

from 1,500 to 6,000 cups/hour
up to 3 dosing stations



Linea linear machines

from 6,000 to 40,000 cups/hour
up to 5 dosages, simultaneously for elaborated
recipes or alternatively to simplify changeovers



Serac offers two types of filling machines for preformed cups:

Both types of machines can now be equipped with pulsed light decontamination modules on cups, lids or caps. Pulsed light comes in addition to UV decontamination and gaseous decontamination with hydrogen peroxide to offer manufacturers the widest possible choice.

The integration of pulsed light on medium to high-speed machines allows all manufacturers to benefit from this technology. It also offers the possibility of testing the market for plant-based desserts with a limited investment before moving onto large-scale production without having to change the decontamination method from one stage to the next.

Pulsed light complements ionized air blowing and dust extraction as well as all the options already available for hygiene improvement in the filling process, such as the installation of a laminar flow.



Pulsed light on Serac filling machines

Tailor-made reflectors

Reflectors, an essential part of the system that allow the pulsed light to reach all areas of the cup or cap, contain one or two lamps doubling the energy emitted depending on the size and depth of the cup.

The size of the lamps, the number and position of the reflectors are defined according to cup size and cups arrangement on the conveyor plates. In the case of a multi-format line, the reflector configuration is based on to the most complex cup.

And depending on the recipe and the size of the cup, a different number of flashes will be programmed, often between 1 and 3 flashes.

Compact, perfectly integrated modules

The pulsed light decontamination modules are perfectly integrated by Serac into each type of cup filling machine (rotary or linear) using minimum space. They are also integrated into the machine's automation system to provide a seamless user experience.

A guarantee of homogeneous decontamination

The energy delivered is measured along the entire length of the lamps to ensure that the level of exposure is homogeneous whatever the position of the cups or lids under the lamp.

The possibility to upgrade existing machines

The pulsed light decontamination modules can be integrated on rotary or linear Serac machines already in service if the space needed has been anticipated at the design stage. This offers manufacturers the possibility to progressively adapt their lines to a reorientation of their business toward products based on plant milks with or without additives.





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