

INTERNATIONAL

# DAIRY

July/August 2023

magazine

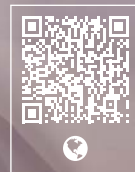
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## Cheese ripening, reinvented: with Pack-Age®

### The natural ripening solution for hard and semi-hard cheese

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# Our oat powders – allrounders for vegan alternatives!

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### Oatgurt powder

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# Carbon? No problem

Milk is not like crude oil

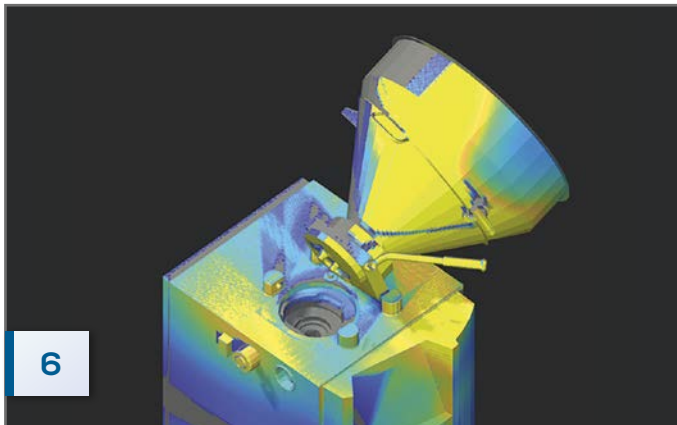


Roland Sossna  
 Editor IDM  
 International Dairy Magazine  
 sossna@blmedien.de  
[international-dairy.com](http://international-dairy.com)

The way towards sustainability in the dairy industry is much more difficult than what politicians, retailers or ordinary people from urban streets say or think. No, the way is stoney and tiresome and many a hurdle has to be passed to get only a small step forward. One example is the French organic milk price disaster. For the second time in a year, the price has fallen under that of conventional milk. Spurred by favourable prices in the past, the sector has grown too fast and too much. As it seems, a share of 5.7% in total milk supply is too much for the market. Pressure from inflation has made consumers turn the euro twice (?) in their hand before spending it. Organic will, for the time being, stay what it always was: a niche for buyers who have more than enough income to spend on significantly more expensive foods and goods just to get a good conscience and/or hoping that organic will be better for them than conventionally produced milk and food.

What is a sustainable milk anyway? Cows eat plants. Plants save carbon dioxide from the air, a cow digests it all and the carbon gets into meat and milk. The same applies to concentrated feed that high-yield cows need to fuel milk secretion. As cows are in no competition with humans about food and as most cows live on pasture anyway (at least for most of the year), cow and carbon go well together and pose no problem to global warming. As it was shown by science, methane stays only for a few years in the atmosphere before it disappears. The problem is only that politicians and NGOs don't seem to be able to comprehend such simple things.

And there is still one other thing to take into account: milk is not crude oil. It is a bringer of essential nutrients at a comparably good price. If you eat milk products or drink milk you don't need artificial supplements in your diet. And most important, milk gives millions of people in rural areas on this planet a basis on which to make their lives. So why should there be a bashing of milk all the time?



**Editorial:**

3 Carbon? No problem

**Cover Page:**

22 Ripening, reinvented – with Pack-Age

**Logistics:**

14 Digitization of shipping and export

**Business Analytics:**

30 Performance of Top Dairy Companies in 2022

**Packaging:**

9 Highly demanding competitive environment

**Technology/IT:**

6 Virtual cleaning assistant

12 Fast-track hire filtration service

17 Physical science-based spray dryer digital twins

20 Condition monitoring software

24 Hitting your cold spots

27 130 years of separator production

34 AI benefits for the dairy industry

36 UV technology

**EDA Column:**

40 EU – MERCOSUR: Time to seal the deal!

**FMCG Gurus Column:**

28 Affordability or Sustainability in the Dairy Market

**Columns:**

13, 29, 32, 33, 38, 42 News

42 Supplier Directory

43 Imprint

43 Preview IDM September/October 2023

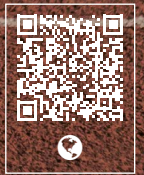


# Create winning lactose-free products, *faster*



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# Virtual cleaning assistant for real cleaning optimization

## Authors:

Max Hesse, Chris Henze, Tim Kaluza,  
Fraunhofer IVV, Dresden, Germany

Industrial cleaning is currently facing major challenges. On the one hand, there is a large proportion of manual cleaning processes, which fundamentally suffer from poor reproducibility and documentability. This is exacerbated by the fact that there is an increasing shortage of skilled workers, which makes it difficult to find qualified personnel for the demanding job in industrial cleaning. On the other hand, there are automated cleaning systems that deliver a high degree of reproducibility, but are usually completely oversized for reasons of process safety and are consequently inefficient. Both aspects have in common that there are few suitable possibilities for permanent inline monitoring and the associated automated cleaning documentation.

For these reasons, the Fraunhofer IVV in Dresden, together with development partners from industry (ADVITEC Informatik GmbH, WALTER Gerätebau GmbH), set itself the goal of developing an innovative cleaning assistant (CleanAssist) in a joint ZIM project. This is intended to support cleaning staff in improving the quality of cleaning and maintaining it at a high level by making it easier to record and document their own cleaning performance and visualizing it for optimization and training purposes.



Fig. 1: Spray lance with highly integrated position and orientation tracking system (prototype)

## System components

This goal is achieved through the system components described below, which form CleanAssist in various stages of development. The most important component of the new system is the cleaning lance, which is now equipped with a highly integrated position and orientation tracking system. Figure 1 shows the first prototype of the spray lance; the corresponding tracking unit will be much more compact in the next version.

This makes it possible to permanently record the position and orientation of the spray lance during manual cleaning in the room in near real-time. According to the current status, parallel tracking of up to 150 spray lances is theoretically possible. The orientation and position information obtained is now transferred to the second essential system component, the digital

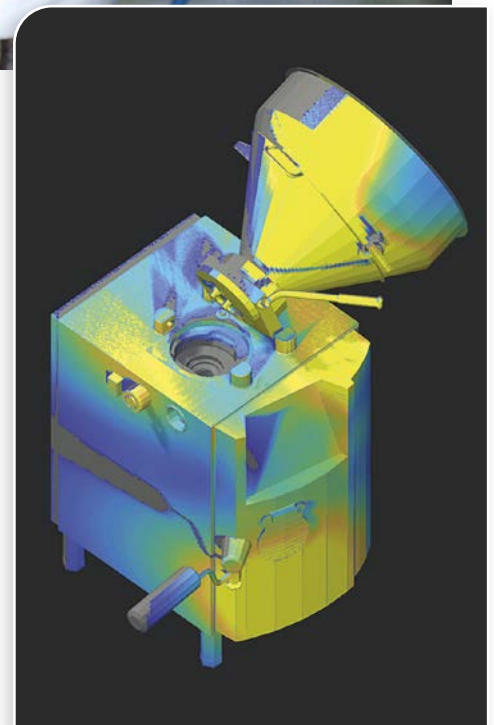


Fig. 2: Exemplary colour representation of the cumulated volume flow application



cleaning twin. The production environment or machine surface is stored in this as a 3D model (see section "Commissioning"). In the next step, a near real-time simulation of the volume flow distribution is carried out in the digital cleaning twin, based on the live position of the spray lance, and projected onto the surface (cf. section "How it works") and the manual cleaning is finally fully documented. The third essential system component is the visualization of the cleaning result for the operator. This can be implemented in various ways, as a simple display on a PC screen, via an AR-capable ("augmented reality") smartphone/tablet or also by means of an AR headset, in which the cleaning specialist receives immediate visual feedback on the work performed.

### Commissioning

In order to function, CleanAssist only requires a virtual 3D model of the production environment or machine surface as a basis. Extensive installation of additional, external tracking systems in the production environment is not necessary. The system can be referenced relative to the object to be cleaned by means of general feature recognition or markers on a machine (e.g. QR code on the machine or on a display). The 3D model of the environment can be created during commissioning, for example, by a 3D laser scan or by means of 3D photogrammetry/videogrammetry. The measurement methods are suitably selected, depending on the required level of detail, and the effort can be scaled almost arbitrarily according to the necessities and existing budgets. For the next version of CleanAssist, however, work is being done on a database for which the machine and plant manufacturers will in future be able to conveniently provide the 3D CAD data in advance. In this way, machines and plants could be sold as "CleanAssist-ready" and use with CleanAssist would be de facto plug & play.

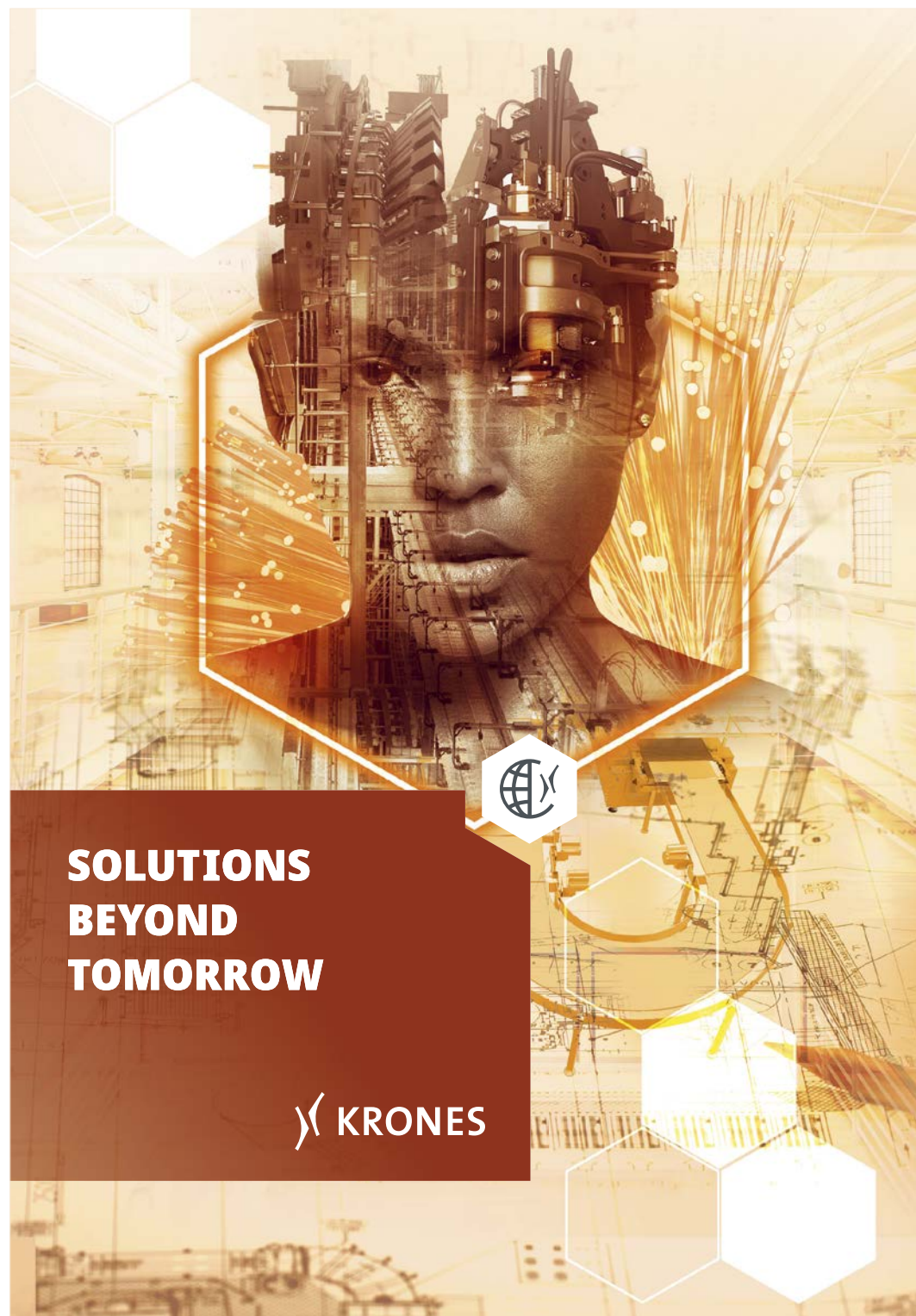
### How it works

When the production or machine environment to be cleaned is integrated as a 3D model, the use of CleanAssist can begin. As already described, the real position of the spray lance is recorded during cleaning and tracked in the digital cleaning twin. For each of these positions, a simulation of

the volume flow distribution of the spray pattern is carried out in near real-time and projected onto the machinery surface. The spray cleaning simulation software ADVISIM3D, which was already developed several years ago together with ADVITEC Informatik GmbH, serves as the basis for this simulation. Beforehand, all possible nozzle inserts for the spray lance were measured by the Fraunhofer IVV with regard to impact and volume flow distribu-

tion as well as spray angle and entered into a nozzle database, which can be called up by ADVISIM3D. The spray nozzle inserts are thus measured at different distances and pressure states and the software can thus reproduce the direct effect of the jet on the surface in a highly efficient and near real-time manner by means of GPU-based simulation. Figure 2 shows an example of a machine with the colored representation (freely selectable) of the cumulative volume

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BEYOND  
TOMORROW**

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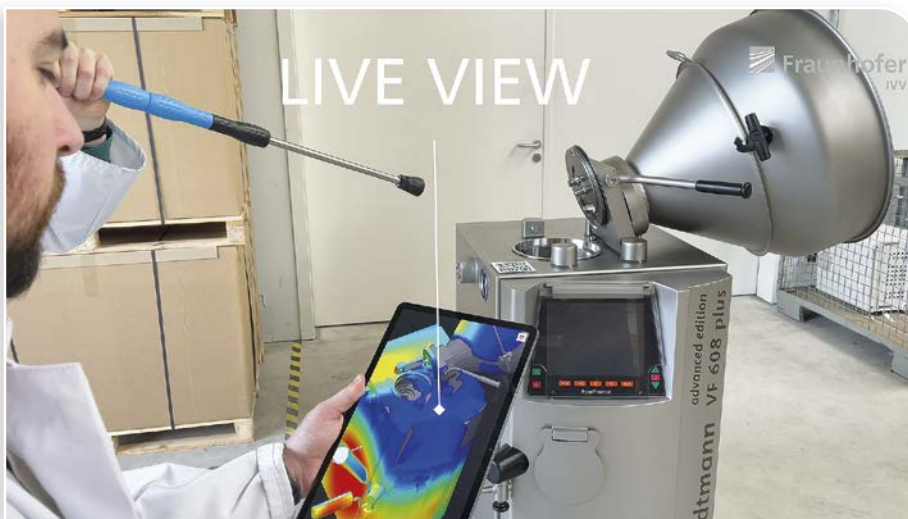


*Fig. 3: Parallel live view of the AR headset with superimposed view of two employees and representation of the volume flow distribution*

flow application. CleanAssist is therefore ideally suited for checking which surface areas are over- or under-cleaned (cleaning efficiency vs. process reliability) or whether the surface was directly impacted with cleaning agent at all (spray shadow). This applies not only to the actual spray cleaning processes, but also to foam application, for example. This operating mode can be detected automatically and CleanAssist can thus check not only whether sufficient foam has been applied everywhere, but also whether any (minimum) reaction times of the foam have been applied correctly.

### Application options

For the most immersive and direct live feedback, it is recommended to use an AR headset for each cleaning staff member. Here, CleanAssist places the determined volume flow distributions ( $\approx$  cleaning performance) in the employee's field of view over the machinery surface. This is shown as an example in Figure 3, in which the parallel live view of two employees is superimposed using an AR headset (dry exercise without spraying). The spray shadow



*Fig. 4: Control of the cleaning performance by means of a tablet and representation of the digital cleaning twin*

created behind the lever device and the different intensities can be seen very clearly. For cost reasons, however, this variant is hardly practicable, which is why it is advisable that, for example, only new employees and possibly the shift supervisor use AR headsets for the familiarization and training phase.

Likewise, it will be some time before cost-effective and robust AR headsets are available for industrial use, which is why one of the use cases shown in figure 4 will be the most suitable variant in the short and medium term. Here, the control of the cleaning performance is only carried out by means of a low-cost tablet.

### Summary and outlook

CleanAssist finally offers the possibility of making manual cleaning processes fully recordable, documentable and thus ultimately reproducible. Unskilled or low-skilled employees can be quickly and efficiently trained in the cleaning process, and product, process and ultimately consumer safety increases. The advantage of CleanAssist is the wide range of visualization options, both on the software side (color gradients, binary distinction, error evaluation, etc.) and on the hardware side (PC screen, tablet, smartphone, AR headset, etc.). An integration or retrofitting of CleanAssist is very simple, as almost exclusively the novel cleaning lance has to be procured and applied.



# Future Market Insights

Highly demanding and rapidly changing competitive environment



*One of the latest trends in the food packaging equipment market is the growing demand for smart packaging solutions (photo: Handtmann)*

**F**ood packaging equipment is a crucial component of the global food industry. Food packaging is compelled to effectively deliver it to consumers. In the food packaging industry, food packaging equipment performs various tasks such as wrapping, sealing, scripting, and stuffing. Food product packaging guarantees durability across the distribution chain.

According to research by Future Market Insights Inc. (FMI), the increased urbanization and the number of individuals preferring on-the-go meals bolsters the requirement for food packaging equipment. Heightened consumer consciousness of hygienic food products may compel the food packaging industry growth. Overall, the world food packaging equipment outlook appears to be optimistic over the forthcoming years.

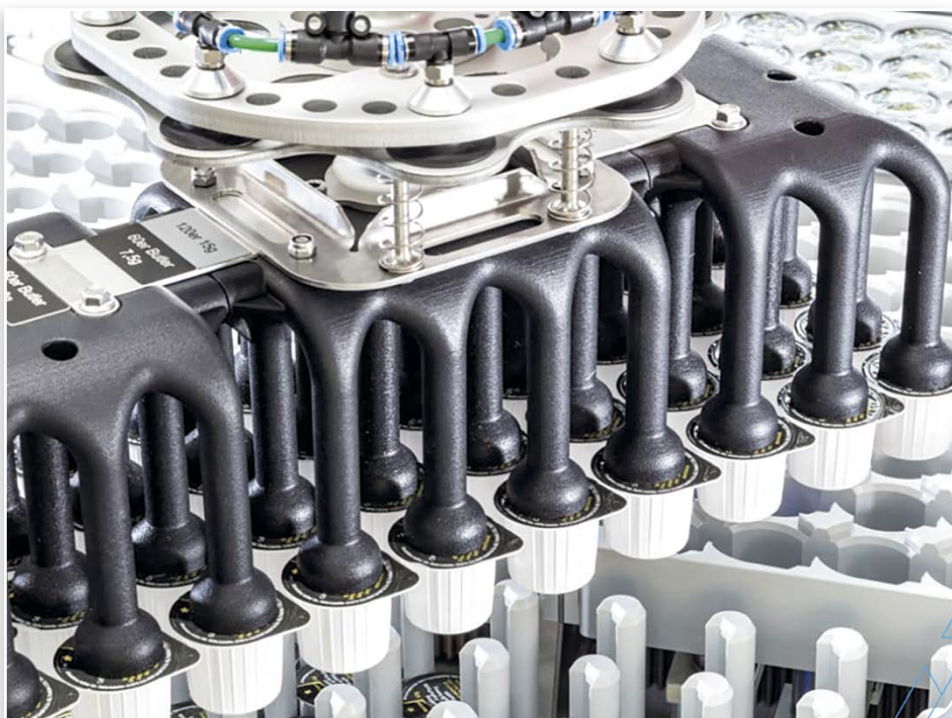
Organizations are striving to achieve these conceivable consequences. Customers' increasing advent of new, appealing, and easy-to-carry packaging, as well as automakers' competition to supply efficient packaging to customers, are cruising overall growth. The global food packaging equipment market is predicted to expand during the coming decade owing to increasing disposable income and the growth of the online market.

## Obstacles to overcome

According to FMI research, enterprises must also overcome a variety of obstacles to adopting market growth. Such as, plastic foils and wrappers, metal, cardboard, and other packing material are heavy composite materials that are unable to be easily degraded. This induces soil contamination and a variety of other environmental

concerns. Governments around the world are launching a variety of initiatives to address packaging waste and recycling issues. The administration has also constrained the use of recycled materials for packaging, citing the risk of dangerous compounds leaching into food products.

Because of the region's increasing prevalence of packaged products, APAC is predicted to be the biggest contributor to the worldwide food packaging market worldwide. Furthermore, rising disposable income leads to increased demand for packaged foods in the region. Nations like India and China are estimated to propel online food services, resulting in a greater need for food packaging. Over the coming decade, this aspect is expected to drive the global food packaging equipment market.



(photo: Schubert)

Because of the region's well-established food processing industries, North America and Western Europe are expected to experience average growth in the global food packaging equipment market. Latin America and Eastern Europe are also presumed to grow at a moderate pace.

FMI recently completed an in-depth evaluation of key vendors and the most recent developments. Bosch Packaging Technology, Oyster Holding GmbH, Multivac Inc., Nichrome India Ltd, IMA Group, Ishida and GEA Group are some of the market players in the global food packaging equipment market.

### Highly demanding environment

Food packaging equipment manufacturers are facing highly demanding and rapidly changing competitive environment. Food packaging equipment is one of the most important part of global food industry. Packaging of food is necessary in order to deliver them to customers in a proper way. Food packaging equipment carry out multiple functions such as wrapping, sealing, coding and filling in food packaging industry. Packaging of food products ensures the stability of food products throughout the supply chain.



Efficient food packaging can withstand wide range of temperature variation. Food packaging applications mainly comprises of bakery, confectionary, dairy products, poultry, meat and seafood, fruits & vegetables, convenience foods and others. Growth in technology has led to development of innovative food packaging products and equipment to maintain taste and flavor of food.

The surge in urbanization and increase in number of people opting for on-the-go meals fuels the demand for food packaging equipment market. Increase in awareness among consumers regarding hygienic food product might propel the food packaging

*The global food packaging equipment market is predicted to expand during the coming decade owing to increasing disposable income and the growth of the online market (photo: MULTIVAC)*

equipment market. Overall, the outlook for the global food packaging equipment is seems to be positive over the forecast period.

### Market dynamics

The global food packaging equipment market is expected to expand on the backdrop of growing food processing industries across the globe. Variety of food products are now available in the market which required different packaging. It propels the demand for the specific kind of equipment.

This factor might rise the global food packaging equipment market growth over the forecast period. In food processing



industry, equipment are required for case handling, cartoning, filling & dosing, labeling, coding, palletizing and various other tasks. This is expected to rise the global food packaging equipment market over the next decade.

Growing demand for innovative, attractive, and convenient to carry packaging among consumers and competition among manufacturers to provide efficient packaging to customers are factors that propel the market growth. Rise in purchasing power, and growing online market is expected to rise the global food packaging equipment market over the next decade.

One of the latest trends in the food packaging equipment market is the growing demand for smart packaging solutions. Rise in living standards and busy lifestyle fuels the growth of food packaging equipment market. Demand for ready to go meals among people also expected to rise the market growth. The stringent food safety regulations, also drive the global food packaging equipment market over the forecast period.

### Geographical outlook

APAC is expected to be the largest contributor to the global food packaging equipment market, owing to growing adoption of packaged food in the region. Also, the rise in disposable income lead to growing demand for the packaged food in the region. Countries such as India and China are expected to propel demand for online food services leads to growing demand for packaging of food. This factor is expected to rise the global food packaging equipment market over the next decade.

North America and Western Europe are expected to witness average growth in the global food packaging equipment market due to well established food processing industries in the region. Latin America and Eastern Europe regions are also expected to witness average growth. MEA is expected to witness lucrative growth in the global market due to establishment of food processing industries in the region. Japan is expected to witness below average growth in the global market.

### Key players

A few of the market players in the global food packaging equipment market are Bosch Packaging Technology, Oystar Holding GmbH, Multivac Inc., Nichrome India Ltd, IMA Group, Ishida and GEA Group among others.

The research report presents a comprehensive assessment of the market and contains thoughtful insights, facts, historical

data, and statistically supported and industry-validated market data. It also contains projections using a suitable set of assumptions and methodologies. The research report provides analysis and information according to market segments such as geographies, application, and industry.

These insights are based on a report on Food Packaging Equipment market by Future Market Insights. [futuremarketsinsights.com](http://futuremarketsinsights.com)

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# Evo-ON

## THE SMARTNESS WITHIN

**Without data, your plant is silent.**  
It can't tell you where its weaknesses or its potential for improvement lie. Since 1996, we have been developing digital solutions to make your lines talk – an expertise that today culminates in the **Evo-ON software suite.**

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**Performance through Understanding**

# Axium Process

Fast-track hire filtration service



*Axium Process has launched a membrane separation rental service (photo: Axium Process)*

**T**he decision to invest valuable CAPEX into untested high value equipment carries risks and fears that are typically a step too far for most companies and individuals. Will the equipment work? Is it the right solution? Will it ultimately be a waste of company funds? These are all questions that stop CAPEX purchases in their tracks on a regular basis.

Filtration specialists Axium Process now have the answer to these questions, with the launch of a membrane separation rental service developed specifically to bypass traditional concerns and provide a fast-track solution. Axium's new service is a valuable resource for fast or temporary technical filtration solutions that would normally involve time-consuming research and risky commitments to large capital investment.

Offering great flexibility and suitable for many liquid processing applications, Axium's UF2Go and RO2Go crossflow systems have been developed for rapid filtration solutions. Backed up with extensive technical expertise, Axium can fulfill high-priority requirements swiftly from their range of universally adaptable membrane filtration options.

The UF2Go and RO2Go systems have been designed to meet industrial scale demand for most types of liquid processing requirements – with environmental concerns top of the list.

"The UF2Go and RO2Go crossflow systems provide an exceptionally practical solution for urgent filtration needs," says Derek Davies, Business Development Director at Axium Process. "Both systems are available through a rental model typically using OPEX, which bypasses the usual CAPEX restrictions but allows observation of long-term trends. It's ideal for situations where a permanent installation may be required at a future point."

Quick to install and easy to use, there are a vast array of applications for Axium's systems across many different industries, including manufacturing, pharmaceutical, food, beverage, dairy and water recycling.

From the removal of suspended solids and organic impurities to wastewater recovery, high-value protein extraction, or even to support occasional high-demand situations, the versatile concept is built on reliable tried-and-tested technology used by multiple leading brands.



## GEA New Food Application and Technology Center of Excellence

GEA has inaugurated the New Food Application and Technology Center of Excellence (ATC) in Hildesheim, Germany, as a central hub for piloting processes and products for the alternative protein industry. The shift to plant-based foods, cultivated meat and products such as microbially produced dairy proteins promises to feed future generations in a climate-friendly way. At the new technology center, GEA's new food experts will be using a cell cultivation and fermentation pilot line to fast-track innovations from the lab to commercial-scale manufacturing. The new testing platform at the ATC bridges the gap between the test bench and industrial-scale production without customers having to invest in large-scale plant from the outset.



One of GEA's first customers in the New Food Application and Technology Center of Excellence is Imagindairy, a scale-up from Israel (photo: GEA)

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The metal detector Mitus uses innovative „MiWave“ technology to detect the smallest metallic foreign objects, even with large product effect (photo: Minebea Intec)

### New metal detector Mitus

#### Maximum detection, minimum rejection

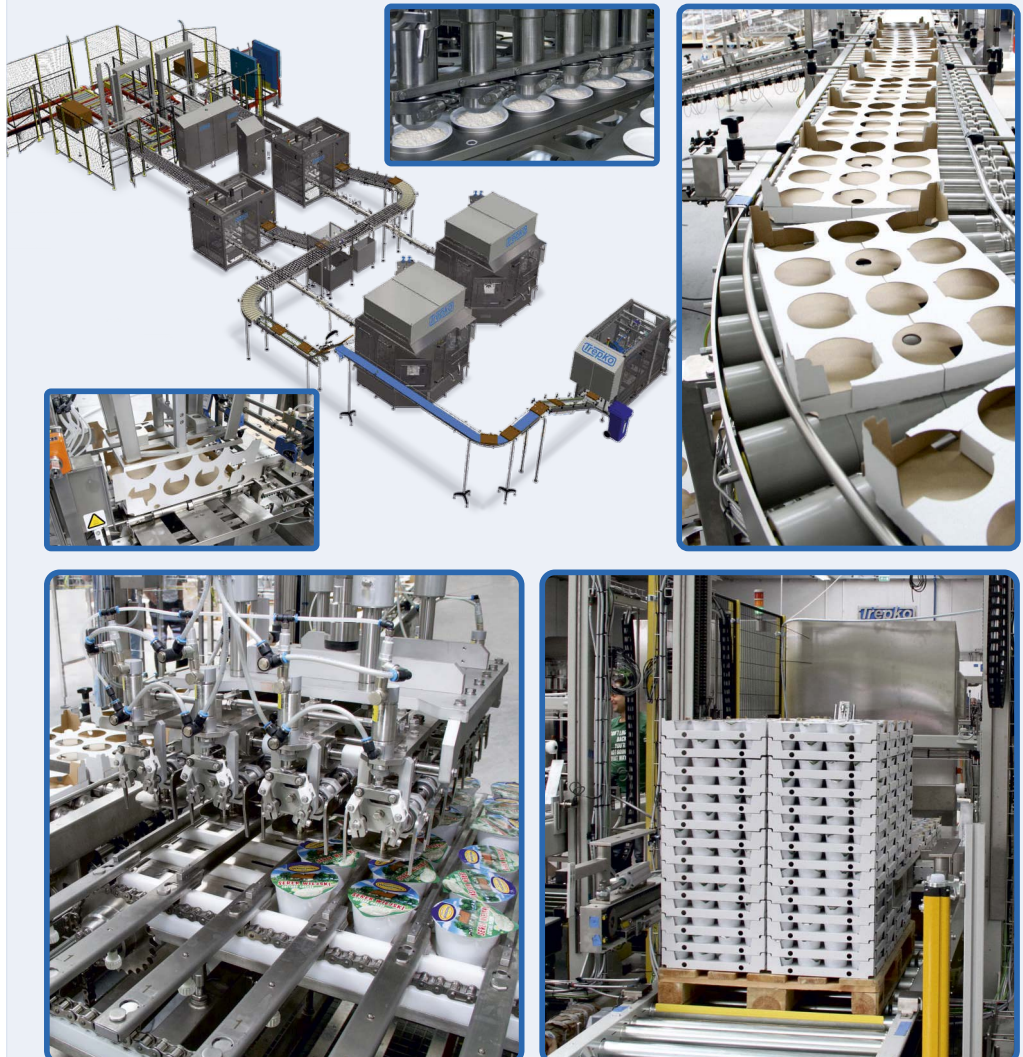
The metal detection system Mitus offers users a whole new level of foreign object detection: Thanks to its flexible modulation feature MiWave, the inspection solution from Minebea Intec reliably detects contaminated products of a wide range of sizes, shapes and compositions, thereby preventing needless incorrect rejections. This ensures maximum product safety and efficiency on the production line.

Thanks to its flexible modulation feature MiWave, the system ignores high product effects caused by product shape, size and composition, and minimises incorrect separations in the process.

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(photo: Karwendel)

# Karwendel uses EVA mailing system

## Digitization of shipping and export

**K**arwendel-Werke Huber GmbH & Co. KG, based in Buchloe, is a third-generation family company that has been combining tradition with innovation for over 111 years. As an important regional employer (with around 547 employees), the company generates annual sales of around 375 million euros (2021). With brands such as Exquisa or miree and – recently also with a very rapidly growing market share of vegan products – one of the most successful private German dairies, Karwendel has long been in demand internationally as a specialist for the highest product quality; around 42 percent of its production goes abroad – which requires a fast, extremely reliable shipping and export system. Karwendel supplies and exports foodstuffs with a best-before date, so its products must be available to the customer or for collection

“just in time”. If there are faults here, it becomes expensive and customer satisfaction falls. That’s why Karwendel-Werke has been using ANTON’s EVA shipping system since 2005.

The high level of customer satisfaction in the shipping/export area has top priority in the company. Keeping it and continuously optimizing it is the goal of the Karwendel works, which is why they are constantly driving digitization: to ensure delivery reliability, reduce process throughput times and reduce resource consumption, which is also a major concern for Karwendel. The intelligent EVA system is a great support for Karwendel, as it offers high process stability and flexibility for individual applications.



## Shipping and exporting food: a special challenge

The demands on the shipping area at Karwendel are becoming increasingly complex: a wide range of customer requirements have to be reconciled with complex export documents, the applicable customs law and sometimes ever shorter-term orders while at the same time guaranteeing pick-up and delivery on the exact day. The Karwendel Group maintains large, modern storage areas (cooling areas) for this purpose.

A lot of cream cheese is consumed worldwide; Karwendel now also offers vegan products that are on the rise and are already very successful in the market. The highest throughputs in shipping are traditionally recorded at Easter, and sales and shipping volumes were particularly high during the pandemic. Deliveries are made both to wholesalers and directly to retail chains, which sometimes requires very short delivery times and complex adjustments to the shipping documents.

## Karwendel: High degree of digitization in shipping and export with EVA7

As traditional as Karwendel is, when it comes to business processes, people want to be technologically up-to-date. In the course of this, the company switched from EVA6 in 2021 to the modern EVA7 system at an early stage. It offers advanced functions for even smoother shipping processes that hardly allow any more errors. In addition, the EVA7 system is extremely fast and fail-safe and even more flexible than the previous version; individual customer requirements, e.g. for the execution of shipping and export documents, can be implemented with little effort.

## Error-free shipping and export processes for complex requirements

Since the shipping at Karwendel is relatively complex and expensive in view of the impressive number of customers with correspondingly high and different requirements, its shipping system

has to react to changes and innovations both quickly and flexibly. In addition to wholesalers and retail chains, a large part of other European countries and third countries are also supplied, and so a wide variety of shipping documents with some specific features such as extensions in text fields or additional fields in the CMR consignment note are required, but also documents for special cases that are particularly carefully are to be edited. If certain dates are to be entered separately or some CMRs are only to be printed on the day of loading, this can be done conveniently with EVA7.

Export and shipping documents (i.e. CMR, certificates of origin, preference certificates, etc.) are usually printed at Karwendel a few days before shipping. Due to the close integration with SAP, EVA7 offers the possibility of creating these documents on the day of loading itself and with the current date. EVA7 also allows a large number of individual master data to be stored, which makes constant manual entries unnecessary, helps to avoid errors and leads to smoother processes.

## Challenge: System conversion during ongoing operations

“Of course, at first we were concerned that the changeover to EVA7 would cause problems. However, since we were well looked after by Anton during this process, this change went almost smoothly. All of the requirements were precisely coordinated in advance, and we then always had direct contact with Anton and his project managers in every project phase, if necessary, without any complicated 'ticket' procedures. This was extremely important for us, since our products naturally do not tolerate long shipping or export waiting times. As a result, the changeover was uncomplicated and completely problem-free,” explains Wolfgang Steckelner, head of IT infrastructure at Karwendel. “The EVA7 system offers a large number of functions, so there is hardly any room for error. We make good use of the high potential of this system.”

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## Success model “ultraclean (UC)

## hygiene design” for dairies

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### Features:

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“**AIM**  
We always **AIM**  
for pioneering solutions

*Karwendel has benefited enormously from the reliability, high functionality and ease of use of Anton's EVA mailing system (photo: Karwendel)*



*Wolfgang Steckenleiter, head of IT infrastructure at Karwendel, and Account Manager Sabrina Klimek: As traditional as Karwendel is, as far as company processes are concerned, we want to be technologically up-to-date (photo: Karwendel)*

### Export processes digitized

Karwendel exports within Europe and to third countries such as Ukraine, Switzerland or Kosovo require special attention with regard to veterinary regulations, health certificates and the correspondingly correct customs documents; here Karwendel-Werke acts as exporter and direct representative. Export is sometimes particularly challenging. Depending on the country to which delivery is made, there are different regulations that change frequently and that must be observed. It is also important to meet individual customer requirements for the delivery and export documents, while at the same time the customer expects very punctual loading. In order to fulfill this, the export documents must always be absolutely correct and always up to date – which Karwendel reliably manages with the help of EVA7.

Account Manager Sabrina Klimek: “Ukraine is currently a special case, where the correctness of the documents is checked particularly intensively. We do the customs declaration here for a German customer, so we are the direct exporter in this case. With EVA we create correct documents quickly and easily. Our customer, for whom we handle customs clearance here, appreciates this service very much.”

### EVA system: Customer satisfaction through optimum delivery processes

Customers and new customers in particular often have to deal with very short-term orders and various changes or additions to the shipping and export documents, which can also be handled smoothly thanks to the high flexibility of the EVA system and the easily accessible Anton expert hotline.

“We have been using Anton's EVA mailing system since 2005 and have never had any problems with it. Quite the contrary: We benefited enormously from the reliability, high functionality and ease of use. If we still need support, Anton's expert hotline offers competent help immediately. If the worst comes to the worst, we will receive an answer and information within a few hours, the same applies to changes or a release change. The Anton team is always available when needed – really excellent customer service,” say Wolfgang Steckenleiter and Sabrina Klimek in unison.

Since customer satisfaction has the highest priority at Karwendel, flexibility and service orientation are key, especially in a competitive environment in which, in addition to excellent product quality, above all fast reactions, short delivery times and high reliability count. For the future, Karwendel is therefore anticipating a further increase in shipping volumes, which the company, equipped with the EVA system from Anton, is relaxed about.



# Sustainable production excellence

Physical science-based spray dryer digital twins



Author: Sam K. Wilkinson, Strategy Director Food & Beverage / Siemens gPROMS,  
26-28 Hammersmith Grove, London, W6 7HA, UK, s.wilkinson@siemens.com

## Spray drying in the dairy industry today

Many dairy producers face complex challenges in improving the performance of their manufacturing operations in the face of cost pressures, high quality demands, increasing levels of new product introductions and sustainability targets. This is seen acutely with spray dryer operations with constraints in energy usage, temperature, moisture, and CIP times, as well as downtime associated with new products. These constraints are dynamic throughout the year as plant operators also seek additional processing capacity during the peak milk season. The result is often over €1 million value can be trapped in a typical 7.5 te/h (powder production) spray dryer annually.

To manage this complexity and build competitive advantage, dairy producers are adopting digital technologies across their organizations. Process digital twins represent one category in this overall transformation. They represent a virtual model of manufacturing assets to enable optimal manufacture of new and existing products. We will discuss how a physical science-based approach to these digital twins can best capture the complexity of operations such as spray drying and deliver tangible outputs to support manufacturing goals.

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## Understanding what is happening inside the spray dryer

So, what is a physical science-based digital twin? These are models which are based on fundamental principles, and incorporate conservation of mass and energy, phenomena associated with the process and product-specific parameters. For spray drying, this incorporates kinetics of the drying process, atomisation, and a sorption isotherm and stickiness curve for the product (as a function of temperature and humidity). This framework creates an explainable relationship between process inputs (air temperature/humidity, feed composition/flowrate) and output key performance indicators (KPIs) such as powder product moisture content, flowrate, and particle size distribution.

A common question asked is how much data is needed to apply this model framework to a specific spray dryer case? Typically, this is more than an order of magnitude lower than traditional data-driven (empirical) approaches as the model structure already exists, and only a smaller number of unknown parameters within the model will need to be tuned. This is termed a data calibrated approach. Once calibrated, the physical science-based digital twin can be exploited by dairy producers to optimize their production.

Examples scenarios include:

» **I am over-drying my product. How can I increase my average powder moisture content?**

*By providing high precision in the prediction of spray dryer KPIs such as powder moisture and thus can advise on the best set points to raise average powder moisture content without going out of specification.*

» **During the peak milk season, I need to process more milk than usual. How can I increase my throughput?**

*By finding optimal operating conditions to maximize throughput, whilst still meeting quality constraints on product quality and process operability.*

» **I am introducing new powder products regularly. How can I bring these into production faster without many factory trials**

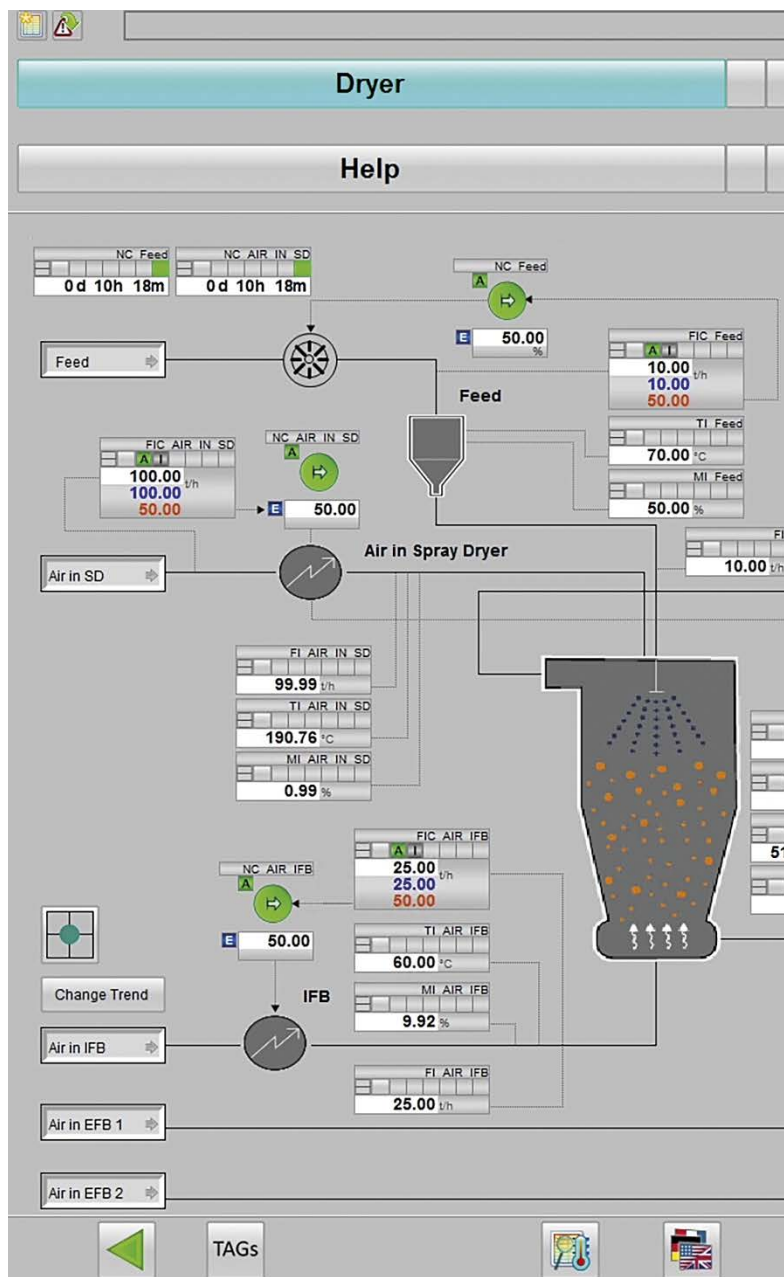
*By capturing deep process knowledge of the spray drying process, the best operating conditions for producing an on-spec product can be rapidly determined, thus reducing the number of factory trials required.*

## Introducing Siemens Spray Dryer Optimizer

The performance of a spray dryer depends strongly on either an operator's experience or an advanced process control (APC) system. To further optimize the process and reduce energy costs, the data from the spray dryer must be collected and analysed. With the Siemens Spray Dryer Optimizer, a special combination of hardware and software that works with mathematical and physical models is used to map and control the process more accurately than other solutions. Siemens Industrial Edge is used to record a standard set of process data directly using a local device. The data is then fed to

a Spray Dryer Digital Twin which is based on gPROMS technology, to optimize the process. The system can be installed and maintained easily, de-centrally and flexibly.

The monitoring, optimization and APC capabilities provided by the Siemens Spray Dryer Optimizer are new in the experience of many operations teams. As such, the solution offers a set of operating modes to allow operators to progressively build trust in the solution and adopt its usage into their workflows. These modes are off-line, real-time open loop and real-time closed loop. In the latter two modes the operator and control system respectively act on the optimal set points provided by the solution. The optimal set points are driven by operational goals such as increasing throughput or reducing energy consumption.



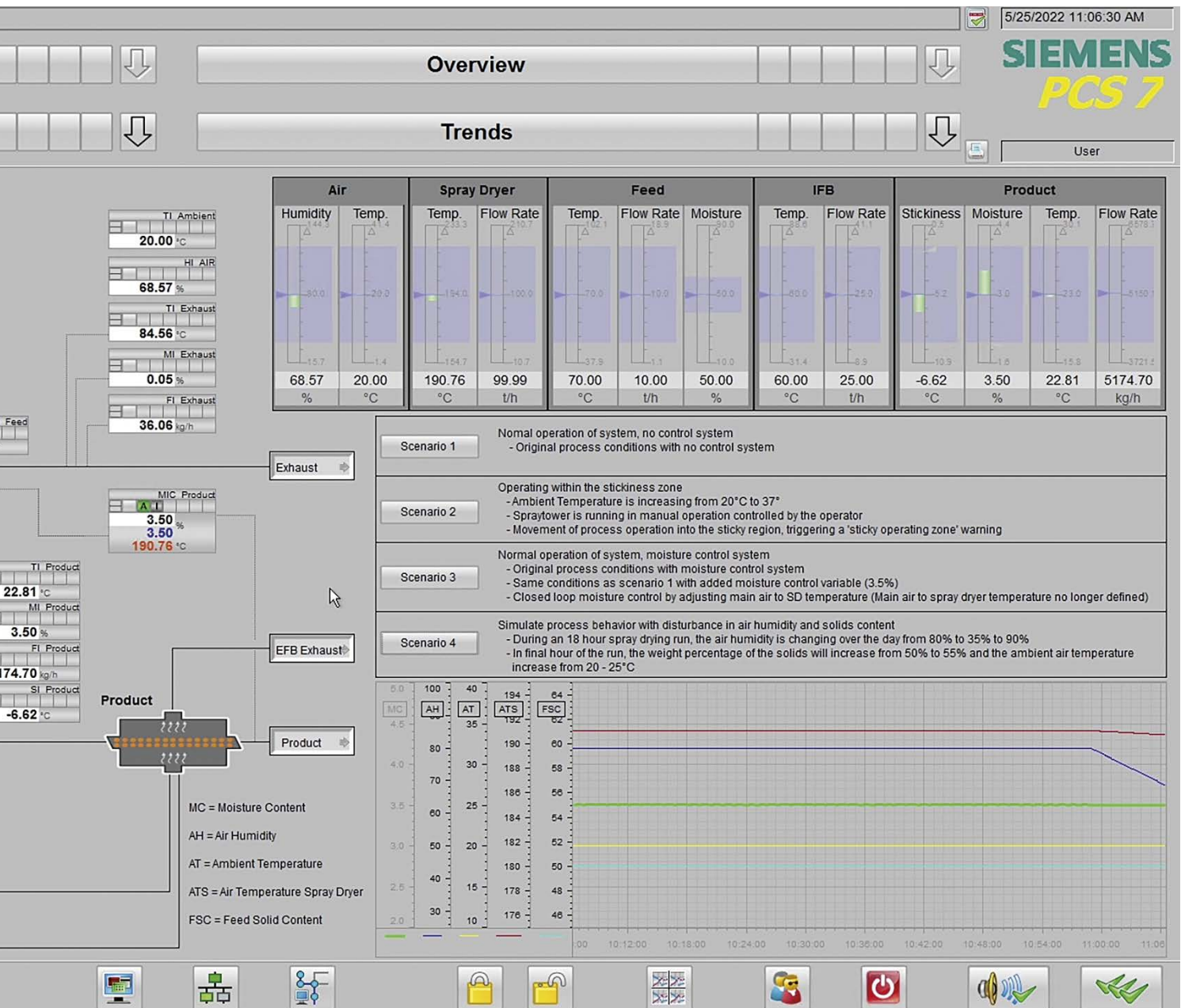


Crucially, as physical science-based digital twins are calibrated prior to use, they are not dependent on measurements during operation for tuning, such as offline powder moisture content analysis. This enables operators to achieve optimal spray dryer performance soon after reaching steady state during start-up, rather than wait 1-2 hours for an offline measurement input.

The resulting financial benefits delivered from Siemens' solution are typically 2-3x that of a traditional data-driven APC system. Total benefits of €0.5-1.0 million is not uncommon for a spray dryer producing 7.5 te/h powder at 80% annual utilization. Key differentiating benefits arise from higher average moisture content (typically +0.2%) and overall powder throughput (typically +2%) when compared to traditional data-driven APC. Companies investing in the solution have typically seen a return on investment of less than 6 months.

A physical science-based digital twin framework leverages deep process knowledge that can be reused across multiple assets. These digital twins are well adapted, through their robust structure, to handling changes in business and operational requirements and enable faster adoption, roll out and business value across an organization.

- 1 Energy Saving Spray Drying – <https://www.siemens.com/global/en/markets/food-beverage/use-cases/spray-drying.html>
- 2 Danone Spray Dryer Digital Twin – webinar delivered by Sherwin Safavi Nic (Danone), 24/06/2022: <https://www.psenterprise.com/events/webinars/2022/danone-spray-dryer-digital-twin>





# Alfa Laval Analytics solution

Condition monitoring software with built-in analytics

**A**lfa Laval has released a new condition monitoring software with built-in analytics. Using artificial intelligence, the new Alfa Laval Analytics for online condition monitoring helps hygienic industries prevent unplanned downtime, extends lifetime of valuable assets and helps reach sustainability targets.

“This is a big step for the hygienic industries. Our new Alfa Laval Analytics solution detects potential machine faults before they occur and helps diagnose the root cause. In close dialogue with our customers, we have developed an easy-to-use and reliable solution that brings peace of mind and keeps equipment at peak performance at all times,” says Torsten Pedersen, Head of Connectivity and Monitoring at Alfa Laval Fluid Handling.

Alfa Laval Analytics is a value-adding feature that can be added to all new and existing pump installations from Alfa Laval. The solution includes a one-year subscription, including online installation, training in use of dashboard and ongoing support.

## AI-based philosophy

Alfa Laval Analytics collects and analyzes pump vibration data around the clock. The philosophy behind the development of the AI-based solution has been to create peace of mind for plant operators and management. Analytics provides a clear and intuitive overview of the health condition of the equipment through a simple dashboard. Green for ok, yellow for pay attention, orange for warning and red for immediate action.

“No matter where they are and regardless of time, operators and plant managers can check plant status in their pocket. All it takes is a brief glance on the app dashboard to check the health status of the pumps and take action if needed to prevent costly downtime,” says Torsten Pedersen. He explains that Analytics not only detects faults, but also pinpoints the likely causes of the problem, which can for instance be related to misalignment of pump installation, potential process improvements or mechanical faults.





*Alfa Laval moves forward to the intelligent pump with new monitoring software (photos: Alfa Laval)*

### Enabling predictive maintenance

With its ability to predict failure and identify parts that need repair or replacement, Analytics paves the way for implementing predictive maintenance strategies that eliminate extra cost and prevent unplanned downtime.

At the same time, Analytics supports the sustainability agenda by allowing plants to do more with less. By keeping assets running flawlessly at all times, Analytics enhances energy efficiency and helps reduce carbon emissions.

Alfa Laval Analytics is a cyber secure solution. All data is transmitted via mobile network and requires no connection to the plant's internet. Analytics is part of the Connected Services programme from Alfa Laval. New services are added on an ongoing basis to leverage the potential of Industry 4.0 technologies.

"The diagnostics capabilities of the Analytics tool make it much easier for operators and technicians to locate the problem fast and fix it before any damage is done. When running Analytics, we can even extend the warranty on equipment if the pumps are monitored continuously and if recommendations to inspection and repair are followed," says Torsten Pedersen.

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NÜRNBERG MESSE

# Ripening, reinvented – with Pack-Age



**M**ature, naturally ripened cheese continues to be popular – with consumer packs of hard cheese expected to grow by 2.8% in EMEA between 2022 and 2027<sup>1</sup>.

Aside from enjoying the great eating experience, these cheese lovers are increasingly looking for a product that is produced naturally and sustainably – with shorter ingredient lists and increased transparency in product labeling.

If you're a manufacturer of semi-hard and hard natural ripened cheeses like Gouda, Tilsiter, Havarti or Manchego you'll know the challenges involved in achieving a naturally ripened rind and mature taste and texture under controlled conditions. Temperature and moisture need to be closely monitored; while the human intervention needed to re-coat and clean the cheese (and ensure its aeration) carries not only a financial cost but also the risk of mold and spoilage the more the cheese is handled.

Furthermore, removing the PVA protective coating from the cheese is not only a labor-intensive task; it also causes part of the cheese to be removed with it, thus reducing yield. In fact, manufacturers of naturally ripened cheese currently lose 3-10% of their production due to a combination of cut-off losses, spoilage and moisture loss that leads to reduced cheese volume.

## Introducing Pack-Age

Traditionally, these challenges have been viewed as simply 'the cost of doing business' for many dairies that want to improve both their efficiency and cheese ripening footprint. But in the current climate – where the margin for error (and waste) is slimmer than ever – it's a cost that can be avoided.

At dsm-firmenich we have a proven solution for achieving this. Called Pack-Age®, this unique, clean-label membrane solution allows hard and semi-hard cheese to 'breathe' during ripening and develop the great taste and texture of a naturally ripened cheese – all while protecting it against mold and spoilage. Why is it called Pack-Age? For the simple reason that it packs and ages cheese in a safer, natural, more efficient and sustainable way (with no preservatives).

## Reduced waste, increased yield

Over the past several years, Pack-Age has helped cheesemakers improve their bottom line everywhere from Europe to Dubai to Latin America. The most obvious benefit of Pack-Age is that no PVA protective coating is needed, which means that no cheese losses are incurred during the coating's removal. Once the cheese is ripened using Pack-Age, the membrane simply peels straight off – with no wasted cheese; while the membrane itself can be recycled via the established plastic waste recycling streams.

(photo: dsm-firmenich)



For cheesemakers looking to get more from their milk, this alone has proved to be a gamechanger because it reduces cut-off waste by up to 7%. But Pack-Age also provides another important advantage through faster ripening times; and specifically its ability to fine-tune maturation time by giving manufacturers better control of moisture loss – which in turn reduces cheese volume. The result? An additional 3% reduction in milk waste.

Crucially, Pack-Age achieves the same great taste and texture of a cheese naturally ripened with a PVA coating. In fact, a comparative tasting session at NIZO<sup>2</sup> demonstrated that cheese ripened with Pack-Age delivered the same taste and texture balance, even with a 3% reduction in moisture loss. Ultimately, the added moisture gives the cheese a more homogeneous texture, with a less dry rind, thus making more cheese available for consumers to enjoy.

### Safeguarding people, profit & planet

Aside from reducing waste, Pack-Age also provides peace of mind for cheese makers by taking a major bite out of spoilage. Not only does its proven bioprotective performance protect the cheese from contaminants; there is also less potential for mold growth due to continual human intervention – for example, through repeated coating treatments, cleaning cycles, and coating of equipment and shelves.

In fact, by using Pack-Age, cheesemakers have an opportunity to change the entire cheese maturation process. For example, the product can be packed into crates (with less space needed compared to traditional wooden shelves), and transferred using modern, fully automated handling systems that further reduce labor costs.

But this solution doesn't just benefit people and profit. It's also good for the planet. Based on our calculation, if all Gouda and hard-type cheeses like Parmesan, globally were ripened using Pack-Age it would save at least 200,000 tons of cheese every year. This in turn would reduce the amount of milk needed for mature cheese production by 3.55 billion liters a year – resulting in a reduction of CO<sub>2</sub> emissions totaling 6.2 million tons.

### Adding value, inside and out

If you would like to learn more about Pack-Age; what it has already achieved for cheesemakers worldwide; and most importantly what it could do for your own production of naturally matured cheese – please get in touch with dsm-firmenich.

Our global team of technical experts prides itself on knowing cheese inside out. With Pack-Age, we can not only help protect the outside of your cheese, but also bring new value to the inside.

1 Euromonitor 2 Dutch Institute for Dairy Research

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# Hitting your cold spots

Innovation in ice cream taste and texture



Authors:

Elsebeth Baungaard, Ice Cream Portfolio Manager

Torben Vilsgaard, Ice Cream Academy Manager at Tetra Pak



Ice cream is a relatively inexpensive treat that can be enjoyed by all, at any time of the year. Indeed, the global ice cream market is expected to hit \$75 billion by 2024, a forecast that reflects heightened demand for diverse flavours, tastes and textures. From smaller, health-conscious bites, adventurous blends of nuts and fruits, to new plant-based ice cream – producers need to constantly innovate.

Each variety brings a new challenge when it comes to perfecting the taste and texture. There are a multitude of key factors to consider – from flavours, richness and fat content to the drip/melt rate. With this in mind, producers must combine intricate processing techniques when tackling new ingredients and recipes.

## The science of ice cream making

Ice cream is a complex chemistry consisting of ice crystals, air bubbles and fat globules, held in water and sugar solution. This requires a comprehensive process of freezing, churning, blending and aerating the mix in an optimal way.

Before processing even begins, mix preparation is key. Each ingredient within the base mix will be affected by each stage of processing, so it's important to get the balance right. For example, the amount and type of sugar will determine the quantity of frozen water in the mixture.

Freezing should not cause a build-up of large ice crystals, which can affect the overall texture of the product. Efficient heat transfer can prevent this through rapid freezing, ensuring that a good mouth feel is maintained, during a longer storage period.

Air plays an important role too, with the correct proportion of bubbles allowing for consistency in product quality. Both the ice crystals and air bubbles are crucial in determining the creaminess. The smaller they are, the creamier the sensation as the ice cream melts.

A synergy between these factors throughout each stage of processing guarantees the best end experience for consumers. Ultimately, there should be no negligible variations between products.

## Toothsome textures - how to get a good crunch

Ice cream producers have long sought to embed large inclusions like chunks of cookie dough or brownie to ice cream on a stick. Previously, it has been too complex to embed large inclusions in such a way, due to the risk of breaking the surface area of products.

However, to meet such demand, Tetra Pak developed the Tetra Pak Extrusion Wheel, which can be added to existing lines. A filling nozzle fills each cavity completely and ensures even distribution of





*Ice cream producers have long sought to embed large inclusions like chunks of cookie dough or brownie to ice cream on a stick*

large inclusions. The patented wheel design also ensures uniform product, thickness, size and shape.

There is no need for cutting either; a heated blade releases each ice cream product accurately and gently onto trays. This ensures a smooth product surface and exact positioning for pick-up and further processing.

Meanwhile, sticky ingredients like caramel must be evenly distributed to avoid lumping – ingredient dosers play an important role here. Controlling the space within the doser enables even and gentle distribution. A re-design of Tetra Pak hoppers creates this additional space and prevents the squeezing of the inclusions. A patented star-shaped outlet also helps chunkier inclusions – like cookie dough – to be distributed more evenly into the mix.

Both patents have enabled an inclusion revolution to ice cream stick products.

### Millennials seek more exciting tastes

Chunky ingredients only scratch the surface of the more adventurous appetite for tastes and experiences.

Millennial consumers are driving interest in more original flavours, including spices like chilli and cardamom. For example, 34%

of Germans who consume ice cream are interested in ice cream with spicy flavours (vs 27% of all ice cream consumers).

Mintel research also demonstrates a shift towards more “indulgent” flavours over healthier, low-calorie choices. Nearly half (48%) of consumers think it has been “easier to justify eating indulgent food or drink since Covid-19.”

Size preference is changing too, with more “indulgent” flavours often accompanied by smaller-health conscious bites. More than three in five – 62% – of US consumers prefer a smaller, more indulgent ice cream to a full size yet low-calorie alternative. Ice cream is therefore shrinking, from mini (around 40 to 60 ml/g) to smaller bite-sizes of around 25ml/g.

Dietary requirements are also shaking up product offerings, with a need to cater toward vegans, flexitarians and the large portion of the population that are lactose intolerant. Plant-based ice cream caters to all such groups.

Looking to the future, the market is only expected to grow, with an increase in value forecast by \$279.1 million by 2029. For plant-based consumers, the demand for indulgent tastes and exciting flavours, such as fruit and nuts, is no different from the wider consumer base. This doesn't come without its challenges though.



*Consumer preference is ever changing, with the market for new tastes, flavours and textures expanding annually*



*New plant-based desserts require mastering new ingredients*

### Plant-based processing challenges

New plant-based desserts require mastering new ingredients – from oat, soy and cashew, to coconut, pea and avocado. However, plant-based ingredients are more abrasive to process and require more robust equipment solutions.

It is not a simple matter of replacing dairy milk proteins with plant-based proteins. A complex mixture of different plant-based proteins has a different functionality to dairy proteins. These include a higher water holding capacity, differing effects on fat stabilisation, and a reduction of fat agglomeration.

When mixing plant-based ice creams, proteins pose a challenge through high surface activity and varying behaviour to water suspension. This can lead to the generation of foam, which can increase cleaning and maintenance intervals, as well as reduce the solubility of the mix.

A high-shear mixer under vacuum can reduce such foaming by minimising air exposure, while pre-mixing plant protein in water before adding in other ingredients maintains solubility. The end result is a lower loss of material and a more consistent mix of purer quality.

Homogenization – where fat globules are broken down into smaller sizes – of plant-based fat globules can also cause abrasion to equipment. This is particularly common for products that require a low-fat content, as fat acts as a lubricating agent. Optimising devices with wider gaps can help minimise this abrasion, while also reducing costs.

In summary, processors can look to these solutions to maintain the four parameters – structure, body, eating properties and creaminess – to create the right mouth feel.

### Looking ahead

Consumer preference is ever changing, with the market for new tastes, flavours and textures expanding annually. To keep up with demand, innovations in processing must continue. There is no universal solution to product development, which is why Tetra Pak is constantly working with ice cream brands to test future recipes and technology at its Ice Cream Product Development Centre in Aarhus, Denmark. While a lot of investment is generated in Winter, before new products are launched in late Spring, these products will take one or two years to come to market, which summarises the level of intricacy that goes into the ultimate treat.

Quoted sources: statista, BBC, databridgemarketresearch, canr.msu.edu, Tetra Pak, Mintel; all photos: Tetra Pak



# 130 years of separator production

GEA invests €50 million



*View into the separator production in GEA's Oelde plant (photo: GEA)*

*Talking about their plans on the occasion of the 130th anniversary of GEA separator production in Oelde: GEA CEO Stefan Klebert (left) and Oelde site manager Klaus Stojentin (photo: IDM)*

Centrifugal separation technology in the GEA Group celebrated its 130th anniversary in May. To mark the occasion, the group held a presentation in Oelde, the location of the group's largest separator plant, which focused primarily on the future. IDM was there.

There are currently 150,000 GEA separators in operation worldwide. They are used in over 3,500 applications, with those in the food industry predominating. GEA does 80% of its business in this area (incl. pharmaceutical industry) and claims to have a global market share of 50% in dairy separators. This is based, among other things, on a service network in 153 countries with a total of 1,100 technicians who complete around 90,000 calls per year.

Oelde is the central location for separator production, here around 1,300 machines are produced by the 530 employees every year. There are also decanters from the Niederahr plant, and two other plants in Bangalore, India, and Tianjin, China, that bring the total production for the GEA Separation Technology division to around 3,500 machines (670 decanters, around 2,700 separators). Separation technology generates €1.4 billion of GEA's total sales of €5.2 billion (2022). A shortage of skilled workers is almost unknown in Oelde, explained site manager Klaus Stojentin, since 180 trainees (total workforce: 1,900) are trained in nine professions.



GEA will invest €50 million in its separators division over the next few years, of which €15 million will go into innovation and €14 million into sustainability developments. 34 ongoing projects are dedicated to the latter. Currently in the R&D pipeline is the "Big Bowl" separator, which should be on the market as early as 2024. The machine will have a significantly larger clarification area than previous separators and will work with a significantly lower volume throughput. Depending on the application, GEA expects energy savings of 45 to 70%. Other new developments are also aimed at sustainability, as reported by GEA CEO Stefan Klebert, who gave the example of equipping a dryer at Arla in Denmark with a heat pump concept, which brings electricity savings of 50%.

# Affordability or Sustainability in the Dairy Market



Author:  
Kate Kehoe, Marketing Executive at FMCG Gurus



In the last few years, consumers have become more attentive towards the impact that the agricultural production industry has on the environment. This has generated an increase in environmentally friendly choices and sustainable alternatives among consumers when seeking out dairy products. As a result, brands should be offering and promoting smarter methods of farming which do not involve harmful processes towards the animal, producer, or the planet. In doing so, brands will be ensuring that carbon emissions are reduced or eliminated and through transparent storytelling, provide evidence to support their claims. In addition, many consumers deem sustainable dairy products with being better-for-you and therefore associate sustainability claims with enhancing/aiding their health and wellness.

However, it is essential that dairy brands are considering the impact that the current of cost-of-living crisis is having on shopping habits and perceptions of sustainability. FMCG Gurus' consumer insights reveal that 53% of global consumers are actively trying to reduce spending on food and drink products. As a result of rising costs and financial uncertainty, consumers shopping habits are changing and it is possible that consumers will no longer view sustainability as a priority when seeking out dairy products.





## Sustainability and Cost of Living

Consumers are conscious of the impact that food production has on the environment. As a result, many consumers have made lifestyle and dietary choices to help combat this. For instance, FMCG Gurus consumer insights have highlighted that 73% of consumers say that sustainability pledges and claims are important when choosing which dairy products to purchase. Some of the key sustainability pledges that consumers value when choosing dairy products are a reduced carbon footprint/no carbon footprint for fresh milk (70%), followed by environmentally friendly pledges (67%) and animal welfare initiatives (59%). This indicates that various sustainable pledges on dairy products are highly valued by a large portion of consumers.

Although, in a cost-of-living crisis, consumers are adopting recessionary spending habits in which they are minimizing what they spend on certain food and drink products. When asked what product attributes are influential when shaping your view on whether food and drink is good value for money, 71% of consumers said price, followed by 68% of consumers who said taste. Some other factors included natural claims (51%), and sustainability claims, (37%). The latter answers still signify a substantial proportion of consumers who favor natural, sustainable products. Yet, our findings indicate that price and taste are the most important factors during this time of financial uncertainty. This highlights that consumers are less willing to compromise on price and taste in today's cost-of-living crisis, while the importance of sustainability to some consumers is lessening.

## Perceptions of Value

During today's recessionary environment, consumer perceptions of value are important, and brands must make sure their products are considered good value for money. Dairy brands must not forget that taste is a key factor for consumers when seeking out dairy products. It is essential that brands do not compromise on taste or indulgence to facilitate health. When asked what factors are important when buying dairy products in particular, 84% of global consumers said that they prioritize taste. This highlights that despite consumers health-conscious approaches, taste should not be compromised, and dairy products that are considered a form of healthy indulgence, as well as sustainable, will have enhanced perceptions of value.

Another idea to enhance perceptions of value in sustainable dairy products is for brands to promote sustainability as holistic. If brands position sustainable products as better-for-you and for the wider environment, while not compromising on taste, consumers will deem this kind of product good value for money.

This article is based on FMCG Gurus: Health & Wellness in the Dairy Market in 2023 and Re-evaluating Convenience Food in a Cost-of-Living Crisis in 2023. For more information, please contact us at [info@fmcggurus.com](mailto:info@fmcggurus.com)

## ANRITSU

### New inspection equipment

Anritsu Ltd, global manufacturer of inline product detection and inspection equipment for the food industries, has launched a line of inspection equipment which significantly improves contaminant detection and surpasses strict worldwide hygiene protocols.

The XR75 DualX+ uses a next generation Photon Detector technology to make images meaningfully sharper, delivering superior detection capabilities and lower false rejection rates. Contaminants are clearly displayed and identified by the shadows they cast and foreign bodies are more readily identified too, even ones that are smaller and thinner in shape, such as fine metal fragments.

Another new Anritsu invention is the IP69K sanitary x-ray. Built in the XR75 platform, it offers the XR75's reliability, ease of use and low cost of ownership in a robust, compact footprint. This hygienic solution is specifically designed for inspection systems that go in the processing area of a production line. The model meets and exceeds high-pressure washing and sanitary requirements in the Americas and Europe.



The XR75 DualX+ uses a next generation Photon Detector technology (photo: Anritsu)

# Performance of Top Dairy Companies in 2022

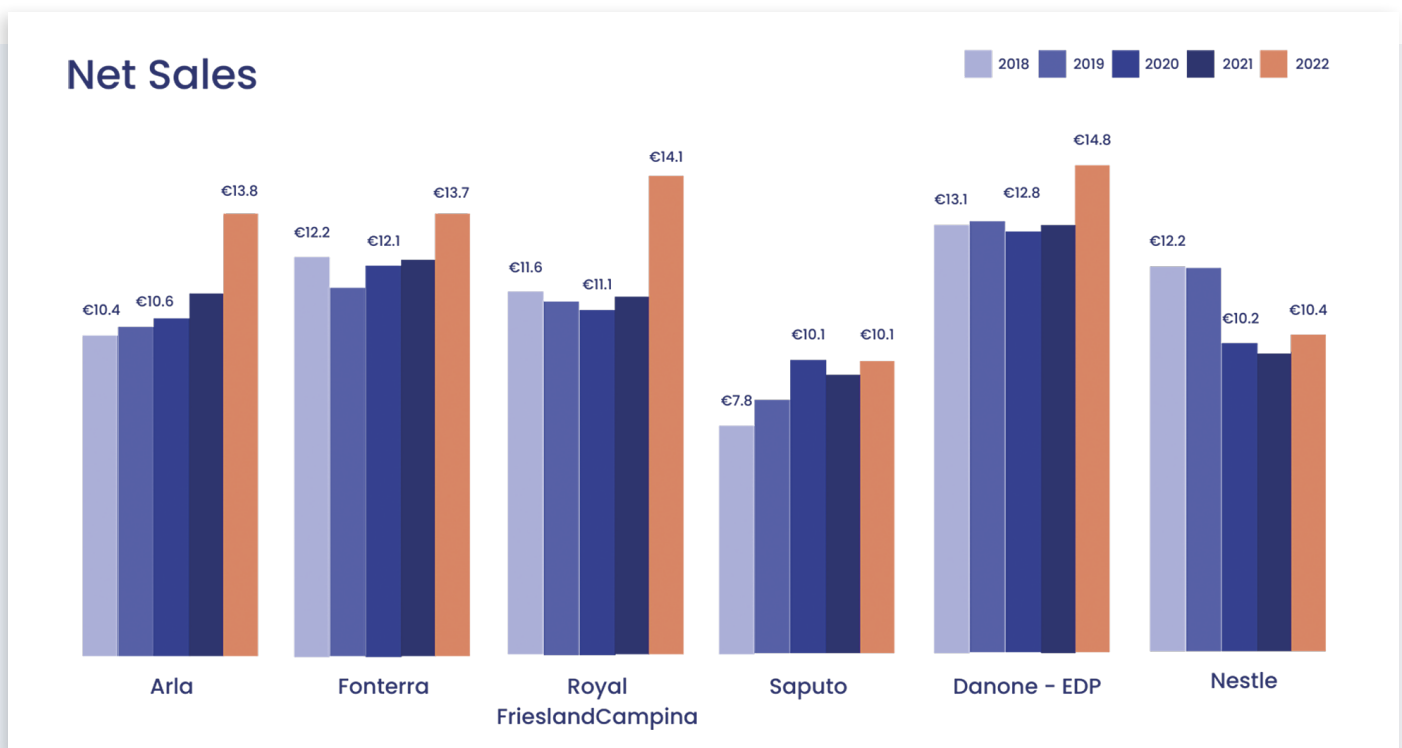
Author: Jelmer Leek, A-Insights, [jelmer.leek@a-insights.eu](mailto:jelmer.leek@a-insights.eu), [www.a-insights.eu](http://www.a-insights.eu)

Royal FrieslandCampina and Arla recently published their annual figures for fiscal year 2022. The annual report of another giant, French company Danone, is just around the corner as well. This is the time to take stock of the global dairy market. Let's take a look at

6 companies from the Rabobank Global Dairy Top 10, whose 2022 results are already in: Nestlé, Danone, Fonterra, Royal FrieslandCampina, Arla, and Saputo. In this article we dive into their operational performance, trends, and challenges in the industry.

## Revenue and growth within the dairy industry

Across the industry, 2022 was characterized by high cost inflation. By passing on input costs to customers, it's not shocking that all companies realized significant sales growth in the most recent year.





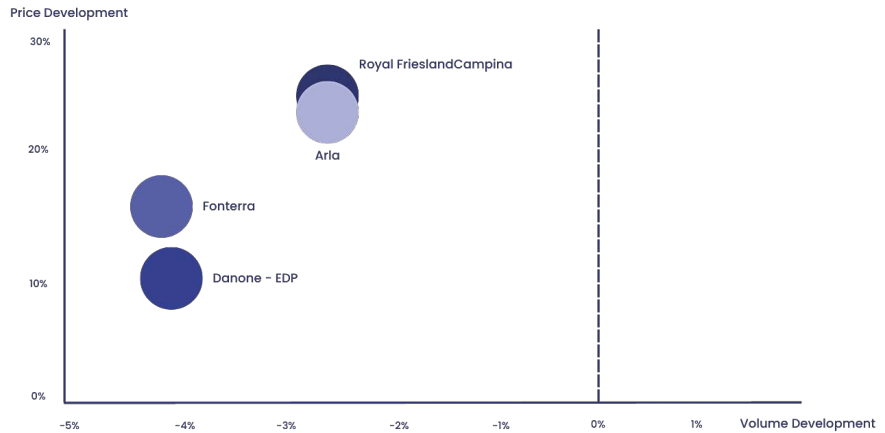
Predominantly driven by higher sales prices, which in some cases increased by more than 25%.

- » In terms of volume growth, the top performer is **Saputo**, who managed to increase their total sold volumes of products in 2022. Particularly in the industry and foodservice segments, which was more than sufficient to make up for lower retail volumes. Comparatively, its competitors performed worse in terms of volume.
- » **Arla** sold lower volumes of its main global brands (Arla -4.3%, Lurpak -7.6%, Castello -6.9%), leading to an overall volume decline for the first time in years.
- » Similarly, **FrieslandCampina** also struggled to maintain its volumes, in part due to 6.0% of its member farmers leaving the company, resulting in 2.5% lower milk intake.
- » **Fonterra** saw its production volume (of ingredients especially) decline by 160 thousand tonnes, but still net sales increased by 11.6% this year.
- » **Nestlé Dairy** reports single-digit growth led by strong demand for premium and fortified milks. Its reported sales of milk products and ice cream (excluding infant nutrition and also not including sales of its joint-venture Froneri) grew by 5.5%. Its infant nutrition business reported a strong 10.1% organic growth, especially in China.
- » **Danone** shows a similar development. Like-for-like sales of EDP (Essential Dairy and plant-based products) increase by 5.8%, despite 4.3% lower sold volumes.

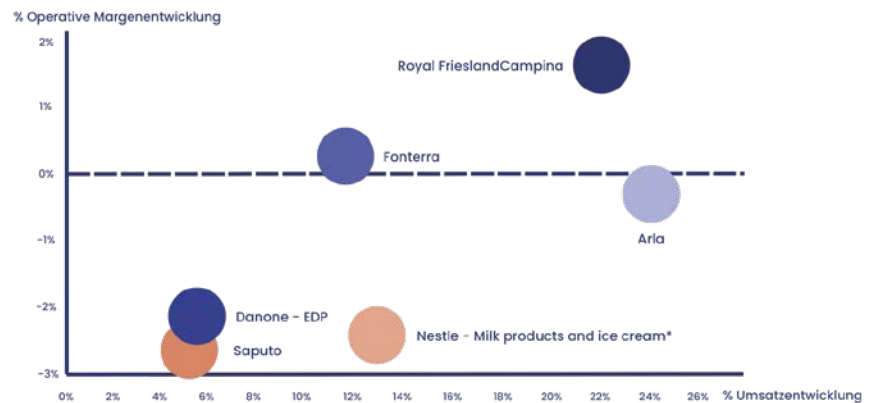
### Operational performance

Taking a look at the operational performance in 2022. There's a balance in the rate at which the price increases are going to the milk suppliers. The gross margin is under increasing pressure across the industry. Royal FrieslandCampina continues to pay a competitive milk price, at €57.4 cent/kg (an increase of 46.2%). Yet their gross margin declined by -1.7%. Similarly, Arla's performance price increased to €55.1 cent/kg and Fonterra's Farmgate milk price increased to \$9.3 / kg, while their gross margins declined by 3.8% and 0.5% (relative to net sales) respectively.

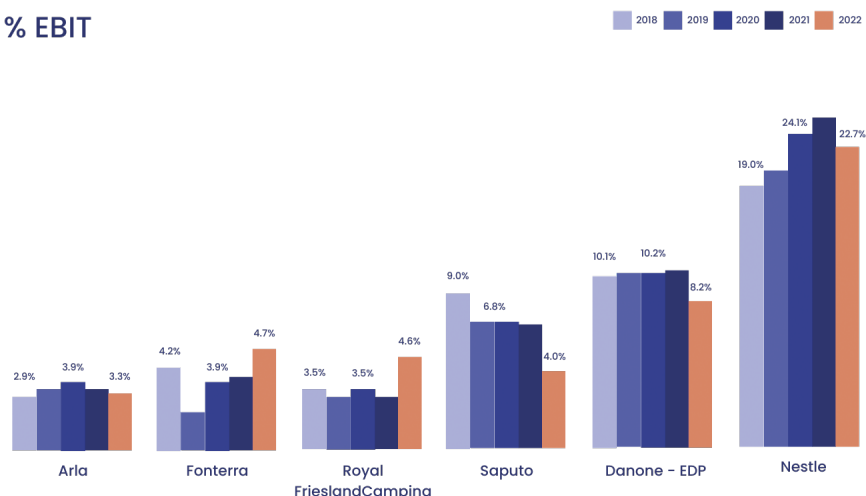
### Volume vs. Price - 2022



### Net sales vs. profit development - 2022



### % EBIT



At an operational level, the dairy companies see fluctuations across the board. Most notable, Royal FrieslandCampina's EBIT (excluding exceptional income and costs, among which €153 million in reorganization costs which pressure the profit before taxes) increases by 1.5%, driven by staff efficiencies and lower depreciations.

### Investments

How are these dairy companies set to overcome global challenges, like the shrinking livestock numbers? Across the industry, companies are actively investing in their own efficiency in order to maintain profitable growth accessible in the future.

Like the abovementioned focus on extra added-value in the product portfolio, similarities exist in the restructuring processes of these dairy firms. Bringing down the number of production locations. FrieslandCampina reduced its number of factories from 65 to 48 (2022), and Saputo is 'streamlining' production in the US in a similar way (2023). Similarly, Saputo and Nestlé both seem to go back to their core in certain markets, by outsourcing production (Nestlé in Africa, 2022) or distribution (Saputo in the UK, 2023) to external partners.

Corporate Social Responsibility continues to be big on the agenda as well. This year, Arla and FrieslandCampina both saw a reduction in the amount of member farmers. With further impact of climate-related restrictions in the industry expected, how do these cooperatives differentiate themselves in order to bind suppliers to them? Via FrieslandCampina's ('Fokus planet') and Arla's (€500 million per year) sustainability incentives, the monetary incentive is there.

More generally, emerging markets like China and India remain interesting growth markets for dairy companies. Among others, Nestlé is planning to invest US\$613m in India by 2025 to accelerate its business here. Meanwhile, Danone has invested in a new R&D facility in China in 2023.

### Growth markets and strategy

As the operational performance shows, the ability to produce and sell at high volumes is under pressure. This raises challenges in the short- and long-term. How will these companies deal with these challenges, to remain competitive and profitable?

A recurring theme in the 2022 financials is infant nutrition, which is generating solid growth in terms of both volume and price. FrieslandCampina, Fonterra and Nestlé report substantially higher demand. Major growth markets this year were China and the US, the latter being fueled by infant formula shortages due to supply chain issues and a shutdown of production by Abbott Labs. Selling infant nutrition in emerging markets seems like a way to mitigate the volume decline in dairy. However, this comes with its own set of challenges, like increased competition and declining birth rates in China, which these companies will have to overcome.

Another recurring theme between these dairy firms, is their focus on strategic brands. Arla, FrieslandCampina, Nestlé, and Danone all focus on higher-value brands in their strategies. For Nestlé, this might lead to a higher share of dairy in its product mix, in favor of low-value segments like frozen-food and water. The profitability of these dairy firms has come under pressure in 2022, and this looks like a good way to maintain their profitability in the coming years. However, the question will be how that pans out in the

## KRONES

### R&D center for ideas of the future

Just a few years ago, Krones' subsidiary Steinecker opened a technology center in Freising where customers can create and test recipes for beer and plant-based drinks.

Krones has opened a fully-equipped R&D lab dubbed the "Process Technology Center" at the company's headquarters in Neutraubling. It is designed to support Krones customers in product development processes. It makes no difference whether the customer already has a finished recipe for a future product or is still at the start of the product development journey and would like to leverage Krones' expertise for those first steps.

Krones itself will use the new technology center to more closely analyse the effects of various process parameters on different products. The results will then go into further developing and refining Krones machines and lines.

On the process technology side, various process and treatment steps can be realistically simulated on a pilot UHT system with steam injection and steam infusion. For other



At Krones headquarters in Neutraubling, a new Process Technology Center was opened in early May (photo: Krones)

trials, the facility is also equipped with systems for mixing, flash pasteurisation, deaeration, homogenisation and filling. The results are evaluated in-house, for example in Krones' own microbiological and chemical testing labs.



next year, since consumers are increasingly shifting away from A-brands as the inflation persists. It suggests the brand-focused strategy is not aligned with consumers' demands. Furthermore, plant-based alternatives are gaining market share; although keeping it profitable could be challenging.

On one hand, branded products are necessary for these firms to remain profitable and pay out solid prices for their milk supply. However, it needs to be done efficiently, to deal with the imbalance between supply and demand. Not only in the coming year, but also after the current cost inflation has subsided.

*If you would like to stay updated on trends and developments specific to your industry, have a look at our Knowledge Hub and discover how companies in various sectors use data insights to shape their business strategy and ensure long-term company success.*



## Final thoughts

This article shows that competition among dairy companies will increase among multiple fronts. Both volume and value growth could be under pressure towards the future. The companies are taking action by increasing focusing on brands and investing in efficiency. And yes, brands are a way to increase valorization of milk: but are they really what a consumer wants in times of inflation?

The larger companies are also challenged by smaller companies like Royal A-Ware, which are gaining a bigger piece of the pie. These smaller companies are more flexible and have proven to respond quicker to changing market conditions. Smaller companies can also position themselves in niches: that can be a difference maker for them, more than for larger companies. Larger companies possess an advantage over their smaller counterparts in terms of scale. With scale comes the potential for greater long-term operational efficiency. However, in the current climate, the benefit of scale looks more like an obstacle. Hence, the question becomes more: how and where can I take advantage of the benefits of my scale?

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NEWS



The awarded Krones mobile robot is used, among other things, to exchange film rolls on packaging machines (photo: Krones)

### GERMAN INNOVATION AWARD

#### Mobile robot system from Krones

Krones was able to demonstrate its innovative strength again this year at the German Innovation Awards 2023. In the category "Special Mention: Excellence in Business to Business – Machines & Engineering", the mobile robot system Mobile Production Robotics (MPR) received the coveted award.

The system supports Krones' in supplying materials to filling and packaging lines. The mobile robot is used, among other things, on packaging machines that wrap six beverage bottles in film to form a so-called tray. Thanks to Mobile Production Robotics, the reloading of the film into the machine is now fully automated. This reduces operating costs and makes production even more flexible.

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# Artificial intelligence

## Benefits for the dairy industry

**A**rtificial intelligence (AI) is one of the terms that is always being bandied about in the media as a great technology of the future. In fact, AI is no longer a dream, it has long been established, as Dr Ralph Moog, head of the supervisory board of the Frankfurt-based AI service provider ItByCLOUD, explains.

"We already have numerous customers in the international dairy industry," Moog told IDM. "In Germany, we have carried out projects with two large dairies and created a complete traceability solution for Schwarzwaldmilch. At the time, consumers were able to find out exactly how one of Schwarzwaldmilch's branded products had evolved via a QR code on the packaging."

ItByCLOUD's core competence is the analysis of entire supply chains. For this purpose, the upstream suppliers, the production of raw materials and their collection, as well as the path through the processing plant to the retailer and on to the consumer are mapped. Data is collected at all stages and entered into a database. The more data there is – which takes time to collect – the better the starting point for the algorithms of an AI. Dr Moog: "In simple terms, AI recognises patterns in large amounts of data. Once the AI has been trained to evaluate them, it can reveal correlations. For example, it can plan ahead by incorporating external data such as weather forecasts. Based on previous sales figures, the AI can "recommend" the amount of production of a seasonal item such as buttermilk for the coming week."

How accurate such forecasts turn out or how well risks in the supply chain can be identified depends solely on the quality of the data. An AI can process any number of parameters and its analysis does not require a working hypothesis. When it comes to calculating business processes, business administration speaks of "operations research". This discipline also benefits significantly from artificial intelligence.

### AI and milk

In the dairy industry, as in any industrial production of food, there are unpredictabilities. The supply of raw materials fluctuates, because nature cannot be perfectly planned. The influencing factors are altogether manifold, some are known, others are not.

At the same time, the demand for different dairy products also fluctuates depending on a wide variety of factors. Weather, certain trends, advertising, scandals. This results in unnecessary costs and, unfortunately, waste of valuable food.

An AI model can make predictions for the future by analysing the data. In this way, manufacturers receive information about which products they should produce at a certain time in order to achieve the best possible utilisation mix. The keyword here is demand-oriented production. The more data available for the analysis, the better. For this reason, too, companies would do well to repeatedly initiate digitisation processes. The supplying farms should also be included in this process. Since the data volumes are ideally huge, the analyses run on server farms rented for the purpose from the relevant cloud solution providers. AI is classically used as a SaaS model (software as a service).

Not only forecasts for sales can be created with AI, but also diverse other evaluations, such as quality aspects or whether there is a risk in the supply chain that legal provisions could be violated. This is exactly what ItByCLOUD creates transparency for with its "YoY Impact Economy Cloud" solution. Dr Ralph Moog: "Transparent supply chains are not an end in themselves and do not only serve to satisfy the needs of consumers externally or to have a better overview internally. A digitised supply chain is the basis for future business success. And that is exactly what AI enables."





*"A digitised supply chain is the basis for future business success"*

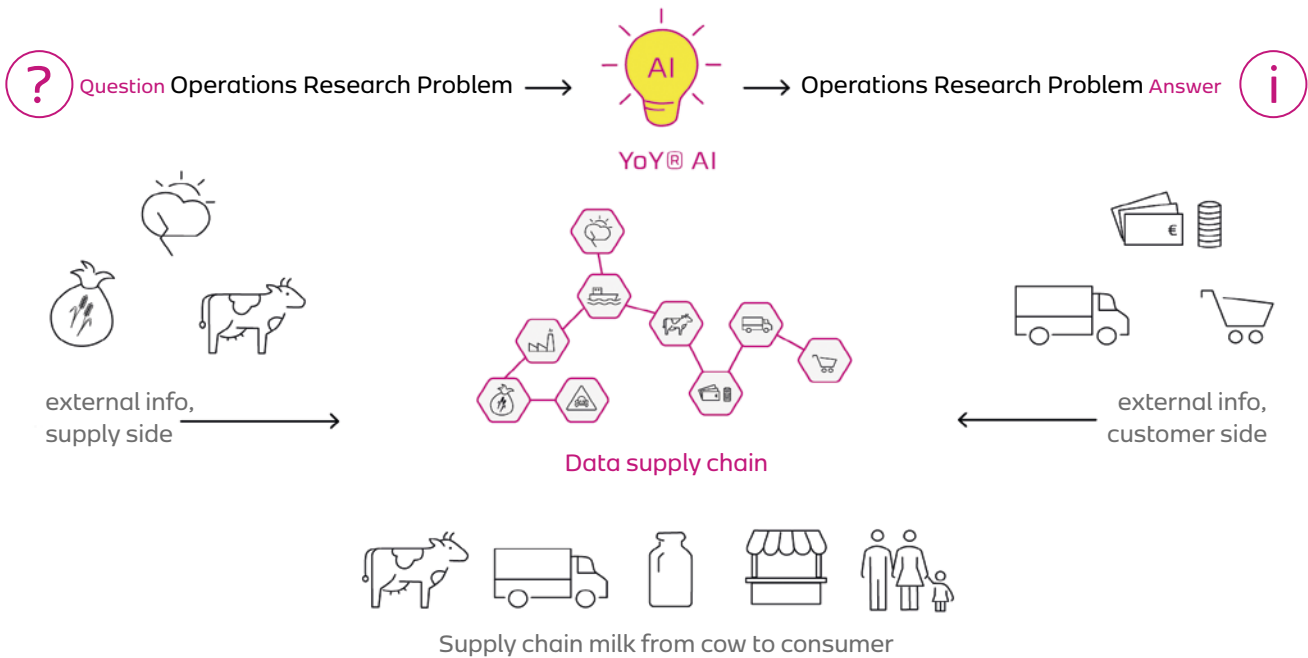
Ralph Moog, ItByCLOUD

### Artificial intelligence – benefits for the dairy industry

Artificial intelligence (AI) can benefit the dairy industry in many ways. Some examples are:

1. Quality control: AI systems can be used to automatically monitor the quality of milk and dairy products and ensure that they meet requirements.
2. Process optimisation: AI systems can be used to optimise processes in milk processing to increase efficiency and reduce costs.
3. Predictive analytics: AI systems can be used to make future demand and inventory forecasts to ensure that enough milk and dairy products are in stock to meet customers' needs.
4. Machine monitoring: AI systems can be used to monitor the performance of machines in dairy processing and ensure that they are working properly and maintenance is carried out before they break down.

This text was actually written by AI



photos: ItByCLOUD

# UV technology

Arla cheese plant protects the environment and saves money

**A**rla Foods Kruså achieves both environmental and financial profit by replacing their microfiltration system with a UV system from Lyras. Waste and energy consumption is reduced, while cleaning and operation also becomes simpler and cheaper. UV technology will therefore in future treat all brine for the company's production of salad cheese.

"With the new UV system from Lyras, we can reuse our brine 100% and thereby eliminate the CO<sub>2</sub> emitted from the salt retentate disposal. From microfiltration, 10-12% of the salt is disposed of as retentate. Cleaning has also become cheaper and easier. This means that we run CIP from our central systems, and now only takes 15 minutes. This solution is considerably cheaper compared to cleaning microfiltration systems. The working environment for our employees has improved, and the expectations to the microbiology have been met in relation to the dairy's wishes. Adding to the environmental profits, is reduced energy and water consumption, as well as 10% less salt usage," says Packaging Manager Vagn Clausen from Arla Foods Kruså.

Process Operator at Arla Foods Kruså, Claus Werner Fischbach, is also pleased with the new technology. He says: "It is much easier to operate the new UV system compared to the microfiltration plant. We control the raslyation unit from our SCA-DA system, just as we do with the rest of our process equipment. The Lyras system worked from day one."



*Arla Foods Kruså plant uses a UV system from Lyras to treat brine (photo: Lyras)*

## Unwanted yeast growth in brine

Each time one of the dairy's brine tanks with salad cheese cubes is emptied after one to two days of salting, the cheese has the right percentage of salt for use in cups and glasses with added chili, tomato, paprika and oil. Brine from emptied tanks is reused but is treated between each new production to avoid unwanted yeast growth.

In the past, Arla Foods Kruså used to microfiltrate the brine. But as the production and demand for salad cheese is increasing, the dairy was looking for a plant able to process larger amounts of brine per hour while achieving the same microbiology as from the microfiltration plant.

## Welcoming new technology

With 43 years of experience in the business, Vagn Clausen was not afraid to take a closer look at Lyras' groundbreaking technology. It ensures high food quality even in opaque liquids by way of UV light eliminating bacteria and spores.

"It is good to have a recent technology challenge the existing. Recent technology, such as raslyation, could well be the future in some areas, as the technology is incredibly simple. It makes our job easier and helps protect the environment," says Packaging Manager Vagn Clausen from Arla Foods Kruså.

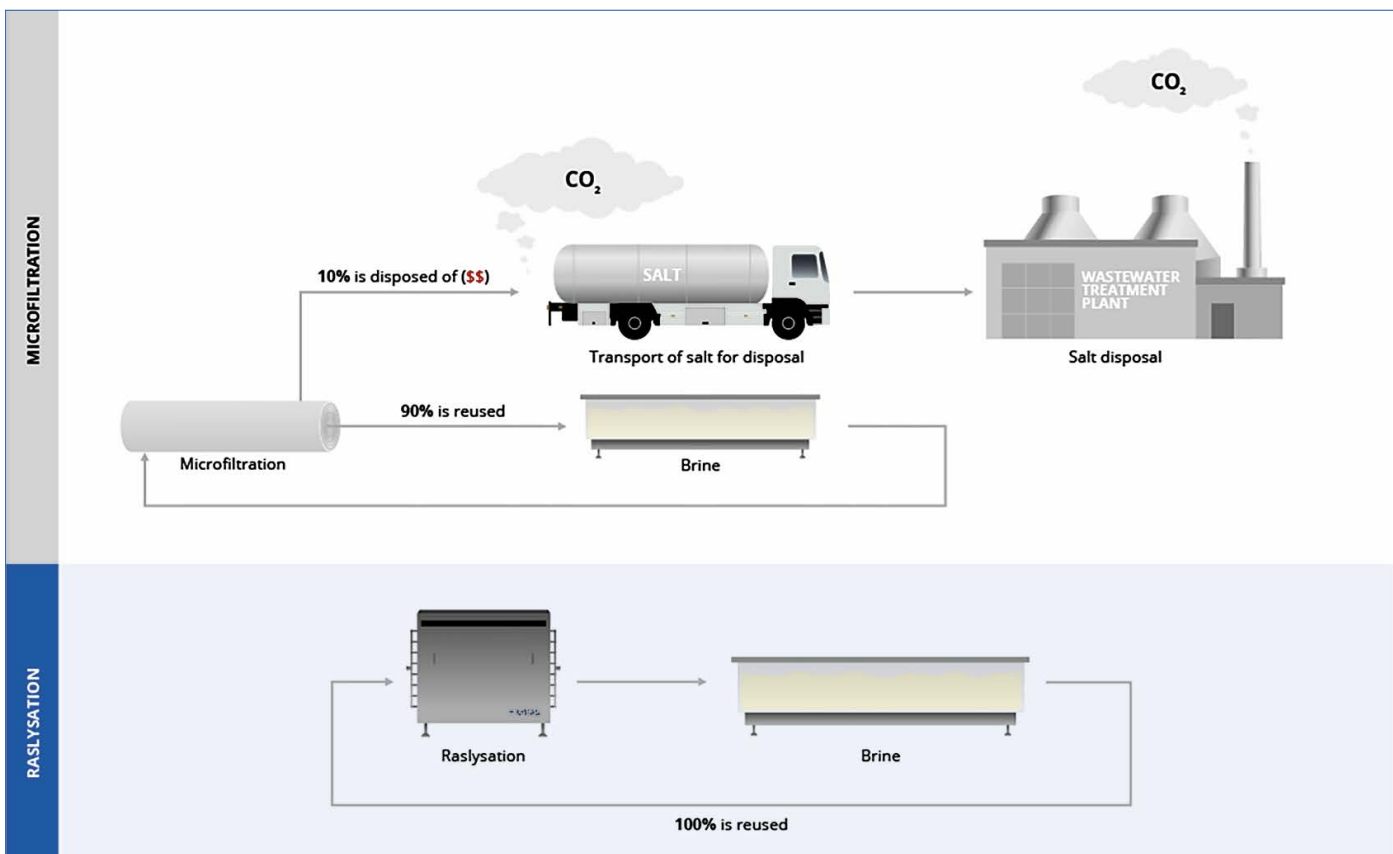




*Vagn Clausen, packaging manager at Arla Foods Kruså: New technology such as raslysatation may be the benchmark in some areas in the future, as it is incredibly simple (photo: Lyras)*

## Why Arla Foods Kruså uses Lyras' UV technology

- » 100 percent recycle of brine – the previous waste of 10–12 percent is avoided
- » Salt saving of approx. 10%
- » CO<sub>2</sub> emissions and expenses at waste transportation are avoided
- » Considerably less CIP chemicals
- » Desired microbiological level is achieved
- » Improved work environment
- » Cleaning from central CIP facility with standard chemistry
- » Complete cleaning in approx. 15 minutes including pipes
- » Energy savings: Lyras's systems use half as much power as previous equipment at most
- » Water savings: Lyras's systems use significantly less water
- » A simpler system to operate
- » Easy commissioning: Lyras's system was in production from day one
- » Increased capacity
- » Good experience with thorough test period pre-purchase as well as project and commissioning phase



*Benefits of raslysatation of saltbrine*



The use of scFOS enables sugar replacement with simultaneous fiber enrichment (photo: Antonio Guillem\_shutterstock)

## BENEO New solution for sugar reduction

BENEO expands its portfolio with a short-chain fructooligosaccharide (scFOS). Beneo-scl85 offers a new way to replace sugar in food and add fiber to it.

The dietary fiber scFOS is obtained from sugar beets. It has a mild sweetness, good solubility, and natural properties that can positively impact flavor and texture in applications such as baked goods, dairy, and cereals. Fiber also adds bulk to formulas. The new ingredient is made in Germany and is available as a syrup.

The use of scFOS enables sugar replacement with simultaneous fiber enrichment. This improves a product's nutritional profile and allows manufacturers to achieve better ratings in nutrition labeling schemes such as the Nutri-Score in Europe.

## KRONES Thrifty high-performer

Since it was launched over 14 years ago, the Krones ErgoBloc L has taken care of the blow-moulding, labelling, filling and closing of PET bottles in a single, highly efficient system. Its efficiency was once again demonstrated last September at the drinktec, the world's biggest trade fair for the beverage and liquid-food industry, where a block-synchronised system was able to produce 100,000 bottles per hour for the first time.

Just under 30 of these high-speed blocks were sold within a few short months, six of them to customers in the Middle East. This goes to show that the ErgoBloc system meets the needs of beverage producers all over the world, both by achieving the required performance and by helping to put the production process on a more sustainable footing.

### Higher outputs result in improved sustainability

When compared to a 72,000-bph block, the new ErgoBloc L, rated at 100,000 bottles per hour, not only boasts better performance, it also provides substantial energy savings. Technical upgrades in the heating tunnel, for example, reduce energy consumption by more than ten per cent and the amount of compressed air in the stretch blow-moulding process by 20 per cent. What is more, up to 3,600 tons of CO<sub>2</sub> per year can be saved if 100 per cent rPET is used.

The high-speed ErgoBloc L reduces both media consumption levels and the footprint required for its installation. It needs up to 70 per cent less space than conventional systems. The block also scores highly when it comes to process dependability. State-of-the-art automation technology ensures that it continues in operation even if one of the two fillers fails, and that the blow-moulder is emptied, thus preventing an immediate standstill in the block and minimising the scrap rate.



With its high-speed block, Krones meets customers' requirements in regard to performance, flexibility and sustainability (photo: Krones)

## DSM-FIRMENICH Maxilact Next – new enzymatic solution

dsm-firmenich has launched Maxilact®Next – the latest addition to its Maxilact lactase enzymes. The lactase produces lactose-free milk even faster, allowing to achieve an additional 25% reduction in hydrolysis time. Maxilact Next is the fastest pure lactase now available on the market which empowers lactose-free milk producers to optimize production, increase capacity and use raw materials more efficiently – all without affecting the taste of lactose-free milk products.



Maxilact delivers optimized capacity without significant capex investment while maintaining high quality (photo: dsm-firmenich)



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# EU – MERCOSUR: Time to seal the deal!




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Author: Laurens van Delft, Director Trade & Economics,  
European Dairy Association/European Whey Processors Association

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**W**ith 10 of the 20 leading global dairy companies based in Europe, the European dairy industry is in pole position to support increasing global demand on the world's food markets. In 2022, the European milk processing industry contributed for more than 18 billion euros to the overall EU trade balance. The European Dairy Association (EDA) therefore welcomed in 2019 the comprehensive trade agreement as concluded between the EU and MERCOSUR. After two decades, finally the MERCOSUR countries (Argentina, Brazil, Paraguay, and Uruguay) and the European Union reached an agreement on the trade environment for more than 715 million citizens. With trade agreements already in place between the EU and Chile, Columbia, Mexico, Ecuador and Peru, the EU will have covered close to 95% of the LATAM GDP as soon as the Mercosur-EU deal is done.

EU dairy companies' diversified export portfolio not only ensures that we can provide all regions of the world with our unique and healthy products. With more than 45,000 jobs directly linked to these exports, the dairy sector is also a key contributor to local societies benefiting from growth and jobs related directly and indirectly to dairy production and export. A key concern for the EU and for European dairies is to lower emissions, which is why the sector does not only export dairy products but also ways of production to secure a resilient and sustainable future for our sector. The final ratification of the agreement would fit this commitment and would allow us to engage with Mercosur countries on global

challenges, such as climate change and forests preservation. It will also enhance regulatory dialogue on specific topics such as animal welfare and traceability, antimicrobial resistance, and products standards where stronger cooperation is needed.

But now, four years later, we still haven't moved forward. The EU/CELAC Summit, held in Brussels on Monday 17 and Tuesday 18 July 2023 also did not bring the push we hoped for, even if one could detect signs of both sides that they wish to use the time window right now, ideally before the mid-2024 elections for the European Parliament.

This is why we hereby iterate our message towards the European Union and MERCOSUR: please finish what we started and unleash the potential of the EU-Mercosur agreement.

For all our sector, the EU-Mercosur agreement is key to preserving our competitiveness. It would offer us an opportunity to further diversify our export markets and the portfolio of suppliers of critical inputs. From an export perspective we see that the EU-Mercosur agreement offers Europe a unique opportunity to get a real foot in the door into the wider Latin America market. The Mercosur trade agreement will basically allow to uncork some of the potential of these markets. The agreed TRQ volumes of 30,000 tons of cheese is about ten times the quantities we export today. This additional market access will also help to underpin the





(photo: butenkow/romankrykh/stock.adobe.com)

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diversification of our EU dairy export destinations and hence, make the dairy sector more resilient when it comes to trade distortions.

And all economic analysts converge that the EU-Mercosur trade deal will also foster the intra-LATAM trade. In a more political perspective, an EU – Mercosur deal would show the capacity of MERCOSUR to conclude trade deals – so far, MERCOSUR has a trade deal with Israel (2007), Egypt (2010) and Singapore (2022).

From a dairy perspective, all 4 countries forming the Mercosur area have a great dairy culture, with a self-sufficiency rate between 98% and 281%. So far, dairy trade has mainly taken place within the Mercosur region. The cheese and powder imports from the EU (mainly from the Netherlands, France, Italy and Germany) have not reached a significant volume. But this is where opportunities lie.

Sealing the final deal would allow both parties to work on the details of the agreement and make sure that the final implementation secures unhindered access for our European dairy exports, including the reduction and abolishment of tariffs as well as non-tariff barriers. The adopted legal safeguards to protect over 350 high-quality European food and drink products like Fromage de Herve (Belgique) or Comté (France), from imitation in Mercosur countries will also strengthen the well-deserved high-quality reputation of all European dairy products.

Taking all the above into account, we call upon the European Union and its Institutions to take all the necessary initiatives to ensure the swift ratification of the EU-Mercosur agreement.



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**ALFA LAVAL**  
 Unique Mixproof CIP and Process valves

Alfa Laval has developed two new hygienic valves, the Alfa Laval Unique Mixproof CIP and Unique Mixproof Process, extending its hygienic double-seat valve range. With the introduction of these two innovative mixproof valves, manufacturers concerned about product integrity now have a cost-effective way to enhance product safety while boosting process efficiency and sustainability.

These two newcomers are built on proven performance, yet refined for purpose. The Unique Mixproof CIP is a double-seat valve that safely and efficiently manages the flow of cleaning media during cleaning-in-place (CIP). The Unique Mixproof Process, a compact version of proven Alfa Laval double-seat valves, is configurable and available in various sizes to meet manufacturers' fundamental hygienic processing requirements. Both are capable of simultaneously routing two different fluids without the risk of cross-contamination, thereby contributing to more uptime and reduced total cost of ownership. The valves are certified according to FDA, 3A and other recognized standards.

With a fully balanced design, the new Alfa Laval valves can easily handle high pressure without the risk of pressure shocks (photo: Alfa Laval)





(photo: METTLER TOLEDO)

Italian dairy opted for in-line control  
Technology/IT



(photo: airmotec)

Good air for good milk  
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### Managing Director:

Harry Lietzenmayer, Stephan Toth, Björn Hansen

### Object Manager:

Burkhard Endemann, Direct line: +49 (0) 26 33/45 40-16, Email: [be@blmedien.de](mailto:be@blmedien.de)

### Editor:

Roland Sossna (responsible), Office Dülmen/Germany, Direct line: +49 (0) 25 90/94 37 20, Cell phone: +49 (0) 1 70/4 18 59 54, Email: [sossna@blmedien.de](mailto:sossna@blmedien.de)

Anja Hoffrichter, Office Dorsten/Germany, Cell phone: +49 (0) 178 233 0047, Email: [ah@blmedien.de](mailto:ah@blmedien.de)

### Correspondents:

Tatyana Antonenko, CIS, [t.antonenko@molprom.com.ua](mailto:t.antonenko@molprom.com.ua); Chris Walkland, UK & Ireland, [chriswalkland@ntlworld.com](mailto:chriswalkland@ntlworld.com); Bent Oestergaard, Scandinavia, OCon ApS, [bent@ocon.one](mailto:bent@ocon.one), Claudia Vasquez Alarcon, Spain/Portugal, [cva@blmedien.de](mailto:cva@blmedien.de)

### Graphics, Layout and Production:

Silvia Schneider, Office Solingen/Germany, Cell phone: +49 (0) 170 297 5864, Email: [s.schneider@blmedien.de](mailto:s.schneider@blmedien.de)

### Advertising Manager:

Heike Turowski, Office Marl/Germany, Direct line: +49 (0) 23 65/38 97 46 Fax: +49 (0) 23 65/38 97 47, Cell phone +49 (0) 1 51/22 64 62 59, Email: [ht@blmedien.de](mailto:ht@blmedien.de)

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Sales manager: Patrick Dornacher, Direct line: +49 (0) 89/3 70 60-3 71 Email: [p.dornacher@blmedien.de](mailto:p.dornacher@blmedien.de)

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