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DAIRY

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Months are lost

World dairy trade will continue to suffer



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At the moment this commentary is being written, everything revolves around how the world, people and, above all, economy can return to normal life from the rigidity of pandemic containment without causing further damage. A further lockdown, which would undoubtedly be imposed if the infection figures were to flare up again, would in all probability be the death knell for large parts of industry and the economy.

But even so, there will be enormous upheavals when the world awakens from isolation. The threat of millions of jobs being lost or already lost will not exactly encourage people to spend money. People will have to economize on consumption and, by force, on everything else. In addition, global milk exports will fall, because the oil-producing countries in particular are short of money due to the drop in oil prices and will be unable to act develop significant demand for the time being.

Incidentally, milk processors are affected by the pandemic in very different ways. There are companies with a good mix in their portfolio that are not at all badly off even in the current crisis. Others, on the other hand, do not know how and where to sell their products, especially if they have focused on certain niches such as food service. These dairies/cheese makers will certainly have great difficulties this year.

For the dairy industry as a whole, however, the crisis can still go without a total crash if the food service sector gets back on track reasonably quickly. Canteens and catering facilities are likely to be the driving force here if a return to some form of normality is successful. However, in view of the requirements to combat epidemics, there will be no significant recovery in sales of restaurants in the long term, especially since the threat of unemployment is playing a role here to curb consumption and holiday travel may fall away completely. Trade in B2B products is still affected by the disruptions in the logistics chain anyway, even if these are now increasingly disappearing. A few months of trade are and will remain lost, and the post-Corona worldwide bad economic climate will not allow any fast catching up.

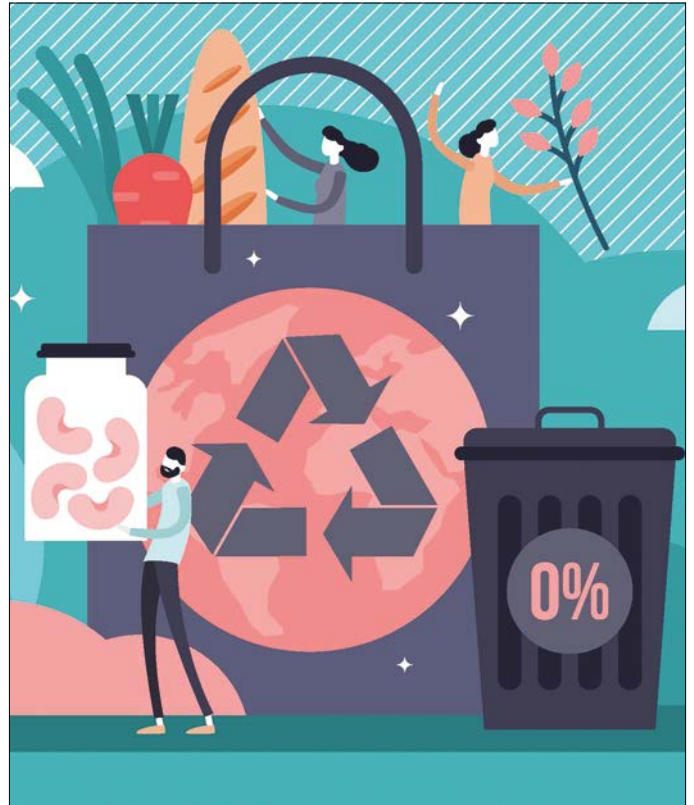
Of course Covid-19 will have an impact on milk prices. As always with some delay, but all the more lasting and possibly longer lasting. Revenues will only be supported by private storage for a short period of time in the EU, with prices tending to move towards intervention levels. Whether and when a recovery will take place is completely unclear at this stage. The only consolation is that the dairy industry as a whole is still in a much better position than other sectors such as tourism, Roland Sossna thinks.



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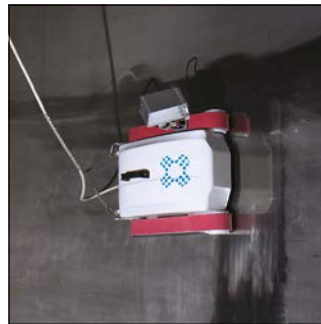
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An efficient use of resources for packaging needs to ensure the protection of the packaged goods (photo: VectorMine/Shutterstock.com)

EU research project BIONtop

Research and development of more sustainable packaging concepts



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Packaging is primarily intended to protect the packaged goods in order to save resource-intensive and sensitive products such as food from loss and to avoid associated CO₂ emissions. A packaging material must have sufficient mechanical and barrier properties, depending on the specific sensitivity of the foodstuff, to meet the requirements during transportation, sale and use by the consumer. Furthermore, packaging should be designed in a material-efficient manner and be environmentally friendly as well as recyclable and degradable, according to the wishes of the general public. In reality, this wish is

usually not yet fulfilled when plastic packaging is concerned. At present, only a small proportion of 15.6% (Plastikatlas, 2019) of the plastic waste produced in Germany is recycled, most of it is incinerated or ends up in landfills. Parallel to the public interest in reducing packaging waste, the European Commission is pursuing the goal of reducing the use of plastics and increasing their recyclability in the "European Strategy for Plastics in Closed Substance Cycle Waste Management". By 2030, all plastic packaging should be recyclable, and companies are called upon to set themselves sustainability targets. Plastic packaging should be reusable or easy to



The InnoCamp Sigmaringen, where research projects on sustainable packaging concepts are being carried out in the near future. (architektenwerkgemeinschaft weinbrenner.single.arabzadeh)

recycle in order to minimise the amount of plastics entering the environment, especially marine waste (European Commission, 2018).

Many foods, including most dairy products, are packaged in multi-layer composite films or polystyrene, often with ethylene vinyl alcohol (EVOH) co-polymers to provide sufficient flavour and oxygen barrier properties. It seems that a decision has to be made whether one wants a material-efficient thermoplastic composite material that cannot be recycled, or can only be recycled to a limited extent, or mono-materials that can be recycled but are mostly not material-efficient and provide less barrier properties (Kaiser et al., 2017).

Research into more sustainable packaging materials as an alternative to petrochemical plastics has already been investigated in several research projects, including the completed EU projects "Wheylayer" and "Thermowhey". These projects showed that certain biopolymers have a high potential to provide sufficient barrier properties as coating materials to produce different types of packaging such as trays and blisters. Sustainable whey coatings were developed that showed improved barrier properties, suitable to replace expensive polymers such as EVOH and thus increase recyclability. For example, it has been shown that trays coated with whey protein have improved oxygen barrier properties to meet the requirements of modified atmosphere fresh meat packaging (Schmid et al., 2011). The barrier properties of packaging materials are decisive for the protection of the packaged foods, but the mechanical properties as well as those relevant for processing must also be taken into account. For example, the EU project ThermoWhey has developed formulations with whey protein coatings with improved thermoformability and processing properties that are suitable for the production of cups and trays.

Building on the previous research results, the current EU research project BIONtop (Grant Agreement Number GA 837761) is researching innovative, fully bio-based and recyclable packaging and textiles with the aim of developing a

more environmentally friendly alternative to the plastic packaging currently produced from crude oil. The 4-year research project, which started in 2019, is being carried out by 21 teams of experts from industry and science. These include representatives from trade associations, research institutes, the mechanical engineering sector and food and packaging companies from 8 EU countries.

In the project, thermoplastic composite materials for trays and foils are to be developed, which are suitable for packaging in modified atmosphere such as dairy products or personal care products. To this end, the BIONtop project is pursuing various strategies to optimise biopolymers to meet the requirements of MAP packaging. The following goals are being pursued with the bio-based packaging alternatives; they shall

- Have tailor-made properties
- Have optimized barrier properties
- Enable new end-of-life options
- Consist of bio-based polymers
- Have a coating with residual protein-based materials.

Poly(lactic acid) (PLA)-based films are used for this purpose. PLA-based plastics are produced from biomass and are the most researched synthetic biopolymers with promising properties for use in sustainable packaging concepts (Auras et al., 2010). The optical and mechanical properties of PLA films are comparable to conventional polyester films. Furthermore, PLA-based plastics can already be produced on an industrial scale and account for a considerable share of 13.9% of global bioplastics production capacity, as of 2019 (European Bioplastics). PLA-based plastics are thus among the most promising biobased packaging materials. However, PLA films are not suitable for products with a medium to long shelf life or for sensitive products. Especially the low oxygen and water vapour barrier properties of PLA films are insufficient to protect sensitive food, cosmetic or pharmaceutical products. In order to achieve good oxygen barrier properties, an EVOH layer is commonly used. However, these composites are not recyclable.

ble. Thus, PLA-based films are modified by new coating technologies in order to have comparable barrier and processing properties as petrochemical-based plastics. These new coating technologies are being developed by a research group for Biopolymer Processing and Functionalization BPF at the Sustainable Packaging Institute SPI of the Albstadt-Sigmaringen University of Applied Sciences, headed by Dr. Corina Reichert, as part of the BIONtop project. In future, research at the Sustainable Packaging Institute SPI will take place in new laboratories and pilot plants at InnoCamp Sigmaringen, which are optimally designed for research into sustainable packaging concepts.

The aim of the BIONtop project is the development of coatings made of bio-based materials such as fatty acids or proteins from side streams during food production. Thereby, thermoplastic PLA films shall get a water-repellent coating by means of nanoscale surface functionalisation with fatty acids ("fatty acid grafting"). In order for the fatty acids to be coated onto the PLA film, a protein coating layer is used to provide sufficient reactive groups.

The coating will first be tested with whey proteins on PLA films, as whey proteins have been very well researched, followed by coatings with materials from side streams of the agri-food industry. In addition to facilitating fatty acid coating, protein coating is expected to increase the oxygen barrier properties of the PLA film, as has already been shown for whey protein isolate coatings on plastic films (Stäbler & Schmid, 2016). Whey protein coatings showed comparable oxygen barrier properties to an EVOH (44%) layer in earlier research (patent WO2,013,014,493). Whey proteins or proteins in general therefore have the potential to replace EVOH in multilayer films and thus represent a bio-based sustainable coating alternative.

If successful, the developed bio-based multilayer films will be scaled up to pilot plant and industrial scale and finally the physical and sensory parameters will be evaluated in packaging and storage tests. This type of bio-based packaging made from renewable materials will be designed in such a way that they can be used and recycled cost-efficiently, which already works excellently on a laboratory scale (Cinelli et al. 2016). Various end-of-life scenarios are being researched and optimised for a holistic view of packaging. In the BIONtop project, the focus will be on ensuring that sustainable packaging can be processed in existing waste recycling plants or that they are even seawater degradable.

The holistic development of bio-based packaging and textiles in the EU research project BIONtop is intended to make a decisive step towards more sustainable, recyclable and marketable packaging.

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PLA film in a tensile testing device. These bio-based films will be coated with bio-based material to enhance the oxygen and water vapour barrier properties (photo: University of Albstadt-Sigmaringen)

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Digitization of the dairy industry

A term that is on everyone's lips, but still hard to grasp – digitization. What does it really mean for dairies and what changes can be expected? IDM talked about this matter with Prof. Matthias Lütke Entrup from the International School of Management in Dortmund, who is also a partner of the Düsseldorf-based consultancy firm HÖVELER HOLZMANN.

IDM: Prof. Lütke Entrup, haven't we been talking about digitization for decades? What distinguishes this digital change from the previous ones?

Lütke Entrup: This digital change is different. Cycles to the next-step innovation are much shorter and sometimes they wipe out entire industries. Markets change much faster nowa-

days. Take the popular example of the music industry: the speed at which CDs have been almost completely replaced by digital streaming platforms is enormous. Providers such as Spotify and Apple Music now largely dominate the market. The publishing industry has also been revolutionized, as has the retail sector. One could go on like this endlessly without running out of examples to demonstrate the speed of this digital change.

In the "milk" value chain, the calm before the big storm still prevails in some cases. However, there are already some harbingers that announce accelerated digitization. Keywords in this matter are, for example: smart or precision farming and the "digital cowshed". If you now see these developments as an opportunity, all doors are open to you. Modern technology combined with optimal data evaluation can sig-



Prof. Matthias Lütke Entrup, HÖVELER HOLZMANN: Digitization will fundamentally change many processes and structures that are still taken for granted today – and faster than many people realize

nificantly increase the efficiency of the whole value chain.

IDM: Smart & Precision Farming – just fashionable terms or a real opportunity for the dairy industry?

Lütke Entrup: Definitely a real opportunity. For example, farmers can use drones to monitor growth in fields and control pests with pinpoint accuracy. Agricultural machinery is increasingly autonomous and networked. Sensors provide valuable information about soil conditions (e.g. fertility and moisture). The data can be merged with weather data and other data sources such as from satellites. This enables targeted seed application, fertilization and irrigation of land areas. Once implemented, these measures lead to lower resource consumption and higher yields. In addition, the soil is protected and managed more sustainably. In Europe, these technologies are still relatively uncommon by comparison, but the United States is a pioneer in the use of these technologies.

IDM: What does the digital cowshed look like?

Lütke Entrup: Already relatively widespread are milking carousels or milking robots, which make the milking process considerably more efficient. In some cases, robot technology is already being used for feeding. Depending on their age, cows are individually fed automatically by sensors on the cow's neck which record the cow's feeding behavior and feed intake. Moreover, pedometers on the cow's legs measure the movement activity. This allows optimal insemination times or diseases to be detected



(Source: iStock-Ekkasit919)

faster and more precisely. In a herd management program, data of the milking system (e.g. milk quantity, color of the milk, ingredients, cell content) can be linked as well. All in all, advanced robotics not only relieve the burden on farmers, but also ensures better results and efficient processes.

IDM: What possibilities do dairies have for further digitization?

Lütke Entrup: A key topic in the coming years will be integrated planning and control of the value chain. For this purpose, powerful solutions are now available which, on the one hand, enable algorithm-based sales planning and, on the other hand, check the sales data against available capacities at all levels. This is done with consideration all relevant restrictions (e.g. best before date / remaining shelf time) while also solving bottlenecks. The software can furthermore generate margin-optimal utilization proposals for milk surpluses and shortages. In addition, the connection of the machines to the ERP systems via MES, the further automation of production as well as the use of process data for improved plant control (filling quantities, water contents etc.) are relevant for many dairies.

IDM: What forms of digitization and automation can be expected to be introduced in retail?

Lütke Entrup: Massive competition and in particular the increasing shortage of qualified workers are forcing retailers to automate their warehouses and stores. Automation and robotics solutions can support warehouses or take over processes completely. For example, individual retail warehouses do not store full pallets, but individual products/cases, which in turn can be specifically controlled during retrieval. In this way, roll containers are picked in such a way that the goods can be optimally moved around the store (roll cage sequencing). In addition, more and more sophisticated sales forecasting and disposition procedures will enable a real fine control of stocks and deliveries.

IDM: What does all this now mean for a medium-sized company in the dairy industry?

Lütke Entrup: It is clear that not every company in the dairy industry is able to implement the entire spectrum of digitization due to limited financial and personnel resources. The core issue for these companies is to identify the relevant topics and projects, while considering the opportunities and benefits for their own business, as well as the use of resources and risk. This requires employees who demonstrate the triad of

a detailed understanding of digital ecosystems, the right business sense, and the required social competence. In addition, the risk must always be assessed: for example, about 50% of venture capital investments are completely lost and about 75% are not profitable. Medium-sized companies should therefore start with proven solutions (e.g. OCR scanners, checkweighers, etc.) – if these have not yet been implemented, then existing data should be used more extensively (e.g. for complex batch size optimizations or better forecasts) in order to use the resulting savings to finance next projects.

IDM: In a presentation you said recently: "The holy cows of today are the dinosaurs of tomorrow" – what does that mean exactly?

Lütke Entrup: By that I mean that the meteorite of digitization will fundamentally change many processes and structures that are still taken for granted today – and it will do so faster than many people suspect. Companies in the dairy business should therefore take a comprehensive look at these issues and develop a roadmap to profit from the opportunities that arise to not end up as dinosaurs.



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Bickford's Australia

Boosting flexibility through dry preform sterilisation

Bickford's, a family-owned and treasured Australian brand, put their trust in Sidel for the very first time and installed a complete, flexible PET line, handling both sensitive beverages and carbonated soft drinks (CSD). Riding the wave of healthy living, Bickford's was not only able to expand their portfolio but also to improve production efficiency and sustainability. All in all, this significantly optimised their Total Cost of Ownership (TCO), while relying on new bottle designs.

Bickford's is one of the oldest and most valued Australian brands, holding a premium positioning in the market with exports to 32 countries worldwide. Founded in 1839, they are an independently owned business, with head office and operations based in Adelaide (South Australia). Their offer is diverse: producing CSD, cordials, flavoured water, still and sparkling water as well as juices, dairy and non-dairy drinks, syrups and alcoholic beverages, such as beer, wine, spirits and cider.

In Bickford's home of Australia, as in many other countries, one can observe increasing health consciousness and wellness concerns as key drivers for the growth of beverage categories such as bottled water, especially flavoured options. Juices, nectars, soft drinks, isotonic and teas (JNSDIT) are also affected by this change in consumer behaviour and are predicted to show a positive trajectory in the next three years. Notably, Australia also has a strong coffee culture. Although the focus on RTD coffee clearly is about taste and functionality with customers seeking a quick energy boost, future products might shift towards health-promoting benefits.

Furthermore, given the keen competition within these segments as well as the premiumisation trend across the board, new product developments are increasingly focusing on flavour variety, accompanied by the introduction of new packaging formats for further diversification in the market. In the beverage industry but in particular in water, JNSDIT and CSD segments, PET is projected to remain a popular packaging material in the future.

A first: Bickford's opts for aseptic PET bottling with dry preform sterilisation

To accommodate those opportunities, grow their share and diversify their portfolio, Bickford's started to search for a very flexible production line, able to handle both still and sparkling, as well as low- and high-acid products with two different short bottle necks and two distinct decoration possibilities. For this particular challenge, they turned to Sidel – the leading expert in aseptic PET ap-



plications and packaging design – for the first time in their long history. In fact, this also marks the very first time the Australian player invested in aseptic technology with dry preform decontamination, which has not yet been widely adopted in the country.

“Previously, we were mainly familiar with hot-filling PET applications. We decided to partially shift to aseptic PET bottling because we wanted to optimise our production set-up and achieve a better TCO, which is of course critical if you plan to attract more consumers,” says Angelo Kotses, Bickford's CEO and owner. “Plus, we really wanted to diversify our product portfolio by introducing new references, including dairy products and plant-based alternatives, and by moving some drinks formerly packaged in glass and can to PET,” he goes on. For such a large-scale project, Bickford's needed a full solution partner; one that is an expert in packaging development, bottling machinery, production and services. This is why Sidel was the logical choice. The Australian brand decided to inaugurate this cooperation by investing in one complete, versatile PET line, managing both sensitive products and CSD through an Aseptic Combi Predis and a Combi SF300, respectively.

This move helped Bickford's enjoy great freedom in terms of packaging design. They can now benefit from the wide branding surface to apply both sleeve labels and pressure sensitive labels (PSL). Moreover, thanks to Sidel's proven dry preform sterilisation technology, the Aus-



Bickford's hyper-flexible line manages both aseptic and regular PET packaging on two different Combi (photo: Sidel)

tralian player is also leveraging a safe, easy to operate, cost-efficient and sustainable packaging solution. The line welcomes expanded manufacturing capabilities in terms of volume and type of beverages, while switching quickly from one product to another. In total, the new line now processes more than 20 different SKUs including still water, coffee with milk, coffee with almonds, four different flavoured waters and eight types of juices – all in either 250 ml, 500 ml or 1 L formats.

Outstanding bottle and decoration design capabilities

“At the start of the project, Bickford's team visited three of our customers' sites in Thailand, Japan and France and was able to experience the advantages offered by Sidel's Aseptic Combi Predis first hand. On top of that, they could rely on us through every step of the journey, including the choice of raw material suppliers and the right designs for the preform and the bottle,” says Herve Herambert, Account Director Sales Aseptic South East Asia Pacific at Sidel. He continues, “They were particularly impressed by Sidel's 40-year experience in aseptic PET applications as well as in packaging: the family-owned company appreciated the support offered to design and industrialise the containers, including the perfect application of the labels to the new bottle's shapes.”

Throughout the project, Sidel's packaging experts worked in close collaboration with Bickford's marketing team to launch their



The line is running at 12,000 bph for the aseptically filled drinks and up to 18,000 bph for the CSD products (photo: Sidel)

products. “Looking at our water and CSD range filled through the Combi SF300, we wanted to achieve an iconic shape to help our brand stand out in a very crowded marketplace. Our new bottles needed to offer convenient handling to our consumers and be robust enough to hold their ergonomic shape and carbonation once opened,” explains Beverley Reeves, Senior Brand Manager at Bickford's. Talking water, the Sidel packaging team started from scratch: new containers were designed for the 1 L Aqua Pura branded water, applicable both to sparkling and still water, with the latter one supported by the proven StarLITE base. To accommodate future needs, Sidel also developed an additional 600 ml design, perfectly applicable to a variety of recipes, including flavoured water.

A redesign was needed also around the family of drinks previously packaged via hot-fill technology. In this case, the number one priority was to optimise the packaging, while keeping the same premium brand attributes, and also lightweighting the bottle. For instance, by changing the production set-up from hot-fill packaging to aseptic PET bottling with dry preform sterilisation, the Australian player halved the weight of their 1 L juice bottle – down to 32 g – while enhancing its attractiveness and expanding its shelf life up to 8 months. The new bottles are designed with quite straight body panels with simplified ribbing at the sides to allow the application of either sleeve labels or PSL; the biggest format (1 L) engraved with the iconic Bickford's brand name. “We were really impressed by Sidel's

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Bickford's Australia invested in one complete, versatile PET line, managing both sensitive products and CSD (photo: Sidel)

packaging capabilities. To streamline our decision process, they provided many bottle design alternatives and great conceptual designs with current labels as well as new prototypes. Considering the productivity advantages we gained and the high consumer acceptance around our redesigned containers, we are planning to strengthen the cooperation with Sidel further and launch a 1 L format for sparkling products, for water as well as CSD," concludes Reeves.

Extensive flexibility for greater product variety

Refreshed designs within a diversified, premium portfolio are answering the needs of a niche market, which is why Bickford's is targeting small batch production; an approach perfectly supported by the Sidel low-speed aseptic line. To install the new set of equipment, Bickford's reorganised the production set-up and raw material localisation: for instance, by removing two out of three hot-fill lines they had, they gained empty floor space to be dedicated to the new complete line. The challenge for Sidel's team was to complete the installation without disrupting the production routines, while also securing the very high hygienic requirements needed in aseptic production.

The new versatile PET line, set-up at the Adelaide plant, includes Tetra Pak Processing Systems technologies, guaranteeing full product safety and maximising uptime starting from the process step. Additionally, the Aseptic Combi Predis is completed by the Capdis system for dry cap decontamination, while the CSD Combi features the compact and hygienic BlendFILL configuration, combining carbonator and filler in a single system for reduced consumption of CO₂. Gebo OptiDry, a fully washable, stainless steel drying system with a proven efficiency of over 99% is integrated. As part of the line, the customer opted also for Sidel's proven Roll Adhesive labeller, ensuring great stability and precision in the process, plus a sleeve intended to handle PSL.

Bickford's hyper-flexible line manages both aseptic and regular PET packaging on two different Combis, thus dealing with products featuring two different bottle necks, namely 28 mm for CSD

and 38 mm for the aseptically-bottled products. They chose to use one single End-of-Line (EOL) solution to optimise the TCO while leading to maximised uptime, as changeovers are very easy. This EOL includes a VersaWrap wrap-around case packer and a PaAccess palletiser. Both pieces of equipment are designed with multi-format versatility and fast and simple format changeovers in mind, therefore perfectly suiting Bickford's needs.

The line is now running at 12,000 bottles per hour (bph) for the aseptically filled drinks and up to 18,000 bph for the CSD products, with a greater efficiency than the one committed on the purchasing agreement, thus contributing to a production capacity reaching approximately 60 million bottles per year.

Safe and cost-effective solution around the clock

"It is important to note that this fantastic opportunity to switch from one product to another is not compromising the sterility of our production, rather the opposite. The PET aseptic line in our factory runs ten hours per day and Sidel managed to keep the product in the filler under complete food safety conditions between the last shift of the day and the first one the day after, meaning for more than twelve hours," highlights George Kotses, Operations Manager at Bickford's.

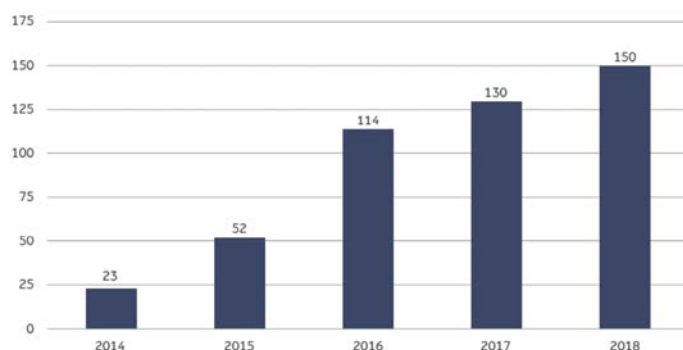
"By shifting from hot-fill to aseptic PET applications, we are benefitting from an optimised TCO. Namely, the Combi Predis offers a very competitive cost-efficiency ratio and a great environmental footprint because it does not consume any water and uses only very few chemicals. The solution allowed us to drastically reduce the bottle's weight," he continues. Lastly, the reduced need for cleaning in place (CIP) lowers maintenance costs.

Bickford's first sellable product from the new line was introduced to the market in the summer of 2019. As a final point in this successful journey, the treasured brand celebrated the opening ceremony for the line commissioning in September in the presence of Australian Prime Minister, Scott Morrison, and Premier of South Australia, Steven Marshall.

Skyr is predicted a promising future in Europe

Arla Foods Ingredients

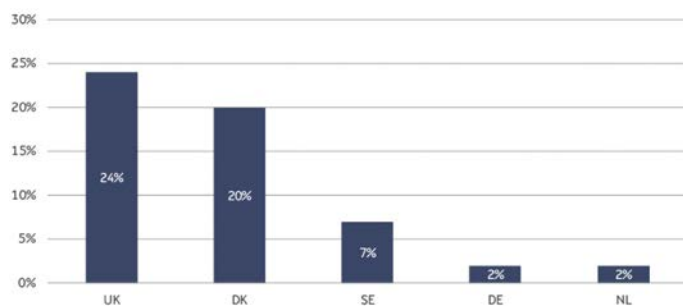
When looking at the total yoghurt market we see that Skyr as a product is taking an increasing piece of the total market share. Furthermore, the market for Skyr is characterized by new product launches emphasizing a growing market. Additionally, Skyr is predicted to have the potential to reach up to 25% of yoghurt volume sales in large dairy markets – taking Skyr out of its niche and into the mainstream.



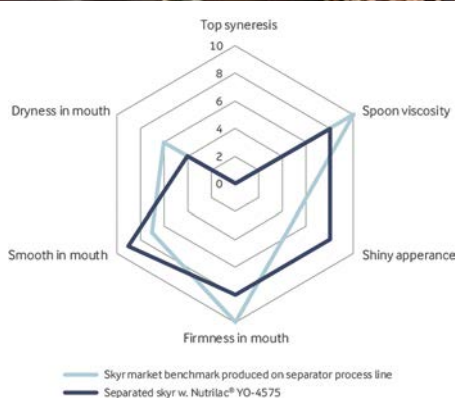
Product launches, Europe (Source: Innova Market Insights, January 2014 – December 2018)

A market with growth potential

In the UK, Skyr already accounts for a big part of the overall yoghurt volume sales with a 24% market share. In addition, Skyr also accounts for a big part in DK with a 20% share. However, in other countries the market share for Skyr is much lower with 7% in Sweden and 2% in both Germany and The Netherlands indicating a huge growth potential (Nielsen, EU market scanning data 2019).



Skyr Market Share (Source: Nielsen, scanning data 2019)



Sensory evaluation of a separated Skyr with Nutrilac YO-4575

Making a consumer preferred skyr on a separator processing line

So how can you take advantage of this growing market and make sure that your Skyr brand is top of the consumer's mind? Arla Foods Ingredients have developed Nutrilac YO-4575 which allows you to satisfy consumers and produce Skyr efficiently on your separator processing line.

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Dare to Dairy

Dairy products consumption and disease prevention



Author: Alexander Anton, EDA Secretary General

Milk and dairy products have been unjustifiably discredited in recent years, in different ways. Some unscientific but popular diets and food trends encourage people to limit or avoid its consumption. However, when turning towards science, many recent studies found that getting enough dairy throughout life can help preventing multiple chronic diseases, including heart disease, colon and bladder cancers, and even diabetes.

The latest World Cancer Report 2020 recognised that there is a strong evidence that higher intake of calcium and dairy products decreases risk of colorectal cancer. Colorectal cancer is the second most commonly occurring cancer in women and the third most commonly occurring cancer in men.

High intake of milk and other dairy products (400 g/day of dairy overall, including 200 g/day of milk) together with other wholesome foods such as fruits and vegetables, whole grains, nuts and legumes, fish and other seafood, have been recognised as part of dietary patterns associated with a lower risk of colorectal cancer. The report explains that the mechanism behind this pattern is related to calcium which is naturally present in high quantities in dairy. Calcium binds to potentially toxic secondary bile acids in the intestinal lu-

men. In addition, intraluminal calcium binds to the calcium-sensing receptor, a cell surface receptor that is expressed on colonocytes and increases expression of E-cadherin, p21, and p27, which have anticancer effects.

Another recent publication reviewed 14 different American, European, and Spanish studies that examined the effects of dairy on the prevention of chronic diseases (the meta-analysis has been published in *Advances in Nutrition*).

One of the biggest findings is that dairy has a positive health effect at all life stages. Drinking a moderate amount of milk during pregnancy has been linked to better birth weight, length, and bone-mineral content during childhood. For elderly people, daily milk and dairy intake may lower the risk of frailty and sarcopenia (muscle loss due to aging). Scientists found that eating high amounts of low-fat milk and yoghurt and products rich in dairy-proteins (e.g. ricotta cheese) have beneficial protective effect against these conditions. Dairy consumption has also been associated with a lower risk of coronary heart disease, including heart attacks. Also, eating dairy products, especially low-fat, may be linked to a reduced risk of type 2 diabetes. Moderate consumption of milk and dairy products as well as medium and high consumption of milk and fermented dairy products

has been associated with a lower risk of colorectal cancer and bladder cancer. Another study found that milk and dairy consumption was not shown to have an inflammatory effect in people who are overweight or obese.

A study published by the *British Journal of Nutrition* involving 2,000 men found that those men who were high consumers of low-fat fermented dairy products like yoghurt and cheese had a smaller risk of coronary artery disease than men who ate less of these products. This supports earlier studies that showed that fermented dairy products have a particularly positive health effect on blood lipid profiles and the risk of heart disease. Dairy products are nutrient-rich and are excellent sources of high-quality protein, as well as calcium, phosphorous, potassium, iodine, vitamin B2 and B12. They also contain small amounts of other nutrients such as zinc, selenium and magnesium; and other B vitamins (B3, B6, B9), and vitamin A.

It is therefore well established in nutrition science and dietary guidelines that dairy products play an important role as part of a healthy and balanced diet and across all life stages. It is especially important to establish the habit of drinking milk in young children, as those who consume milk at an early age are more likely to do so as adults. Iodine for example, is an essential nu-

trient for normal growth and development. Iodine deficiency, which can cause intellectual impairment and brain damage, affects about 2 billion people worldwide. Severe iodine deficiency can result in a 10%–15% reduction in the IQ of a population.

During childhood and adolescence, bones need high quality protein and calcium to grow and develop healthily while maintaining bone health later in life. Both nutrients are naturally abundant in dairy products such as milk, cheese and yoghurts. The health benefits of these products can be communicated to consumers through many authorised EU nutrition and health claims.

The beneficial effects of milk and dairy products on health is well recognised by nutrition science. It is the combined responsibility of the scientific community, policy makers and dairy industry to communicate these facts to the consumers to give them the best available basis for making their everyday dietary choices.

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Alain Zijlstra has been named Volpak's new CEO. Zijlstra, originally from the Netherlands, boasts over 25 years of professional industrial experience globally, of which 10 years have been spent in Spain on different locations. In his international career he has served as CEO of various industrial companies and has acquired experience in the flexible packaging industry as well.



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GEA Hilge NOVATWIN

Complete portfolio for hygienic screw pumps

The new GEA Hilge NOVATWIN twin screw pumps are particularly suitable for gentle pumping of lumpy, shear-sensitive media of different viscosities. (Photo: iStock.com/HandMadePictures)

With its new flexible screw pump GEA Hilge NOVATWIN GEA fulfils customer wishes and requirements such as the highest hygienic demands for gentle product handling, long-term reliability, versatile applications and professional support throughout the entire product life cycle, based on more than 150 years of pumping experience. The new positive displacement pump completes GEA's portfolio of hygienic pumps. It sets high standards in the pump industry in terms of reliable operation, gentle product handling and hygienic design using high-quality stainless steel. The GEA Hilge NOVATWIN can be used by customers in the milk and dairy, beverage, food, pharmaceutical, biopharmaceutical, pet food, personal care and household cleaning industries.

The new twin screw pump will be available in 6 sizes. It is part of the GEA VARIPUMP line, which stands for pumps with a high

degree of flexibility for optimum adaptation to individual customer requirements.

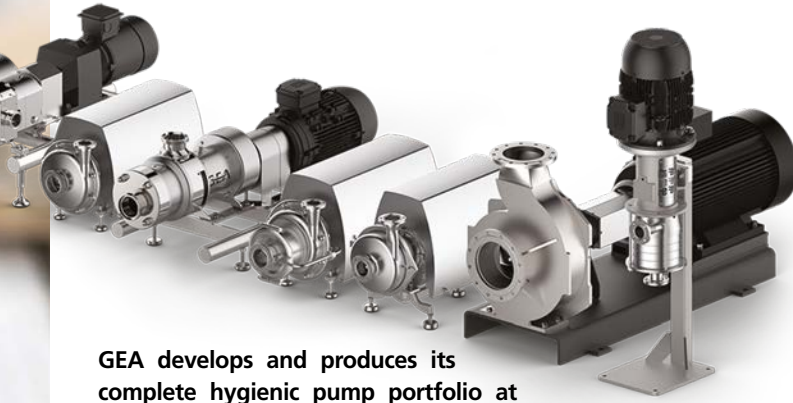
"Together with the proven and reliable GEA Hilge NOVALOBE rotary lobe pump, we are consistently expanding our competence in the positive displacement pump sector. As one of the technology leaders in this field, the different markets quite rightly demand top pumps with a high degree of flexibility for optimal adaptation to their individual customer needs. Solutions à la "one pump fits all" are not very effective and are neither our philosophy nor our claim. The addition of this promising pump type to the portfolio alongside the established rotary lobe pump GEA Hilge NOVALOBE will significantly strengthen GEA's position in the positive displacement pump sector. We are now in an even better position to cover the various customer requirements with the ideal pump solution from our own broad product portfolio," says Stefan Andresen, Business Development Manager Hygienic Pumps.

Wide range of applications for GEA Hilge NOVATWIN pumps

GEA Hilge NOVATWIN pumps have a wide range of applications. In the dairy products sector, for example, cream cheese, butter, yoghurt (also with fruit pieces), sour cream and ice cream. In the food sector, these include sugar solutions, chocolate, sauces (also with pieces), soups, mayonnaise, pastes, oils and fats, ready-made salads and pet food. Good examples of beverages are smoothies, juice concentrates, premixes and brewing yeast. Applications in the sector Pharmaceuticals and biopharmaceuticals can include neutraceuticals, blood products, vaccines, enzymes and cell cultures. For personal care products and household cleaners, GEA Hilge NOVATWIN can be used in the manufacture, processing and filling of cosmetics, body and skin care, textile care and in the processing of household cleaners.



Left: GEA Hilge NOVATWIN screw pump (Photo: GEA). Right: The robust and reliable GEA Hilge NOVALOBE rotary lobe pump is specially designed for gentle pumping and dosing of highly viscous liquids. The compact design, flexible configuration options and easy maintenance characterize the NOVALOBE as part of the GEA VARIPUMP line. (Photo: GEA)



GEA develops and produces its complete hygienic pump portfolio at its Pump Competence Center in Bodenheim: the highly flexible VARIPUMP line for complex applications as well as the more standardized SMARTPUMP line. Now GEA's positive displacement pump range was set to grow with the new twin screw pump GEA Hilge NOVATWIN. (Photo: GEA)

The pump competence center Bodenheim

GEA develops and produces its complete hygienic pump portfolio in the pump competence center in Bodenheim: the highly flexible VARIPUMP line for complex applications as well as the more standardized SMARTPUMP line.

How GEA Hilge NOVATWIN works: Conveying and cleaning with one pump

Twin screw pumps have two screws which interlock without contact and form a closed chamber together with the pump housing. The screws rotate and thus move the medium along the screw axis from the suction to the discharge side. Like positive displacement pumps in general, twin screw pumps stand for the gentle conveyance of lumpy, shear-sensitive and abrasive media. They offer exceptionally high flexibility for pumping liquids of different viscosities.

The special feature of the twin screw pump is its dual function, as they can not only pump the actual, often highly viscous product, but can also function as a CIP pump, as they can also be operated at very high speeds. Compared to alternative solutions, the use of an additional CIP pump can thus be saved.

The self-priming, hygienic GEA Hilge NOVATWIN enables safe operation with low pulsation and low noise levels at high product viscosities, temperatures up to 135 °C and differential pressures up to 25 bar. The system pressure of 30 bar also allows the pump to be used in high-pressure applications. It enables one pump to handle both sensitive viscous media at low speed and cleaning media in the CIP process at up to 3,000 rpm. A constant flow at different pressures and volumes is another advantage. Due to its self-priming property (suction height up to 8 meters), other application areas can be served.

For special requirements due to the pumped medium, GEA offers additional options such as a heatable or hardened pump housing. The heatable housing as an option allows the pump chamber to be heated or cooled depending on the temperature requirements of the pumped medium.

Keyword "hardened pump housing": In case of abrasive media the screw spindles and additionally the pump housing can be hardened to increase the lifetime of the pump. Due to the low-pulsation and gentle pumping, the properties of the pumped media are retained in their appearance, structure and size. By using different screws with different pitches, the pump can be optimally adapted to the pumped medium

in terms of solid size and differential pressure. This also enables gentle pumping such as yoghurt with pieces of fruit or meat salads with solids with a diameter of up to 44 mm.

Designed according to strict hygiene guidelines

The delivery of hygienically perfect and high-quality liquids requires absolutely clean pumps. They must be cleaned immediately at the end of a production and absolutely clean and free of bacteria at the beginning of a new production phase. "Cleaning" refers to the process in which the surfaces are completely freed from adhering product, deposits, etc. A carefully cleaned surface is free of visible, tangible or chemically detectable residue of contamination. The GEA Hilge NOVATWIN is designed according to EHEDG guidelines and complies with 3-A requirements.

Advantages of GEA Hilge NOVATWIN at a glance

- Due to the axial, low-pulsation conveying, even sensitive products with large solids remain intact.
- The use of one instead of two pumps for production and CIP process saves investment costs and simplifies installation.
- Good suction performance due to tight manufacturing tolerances and resulting in narrow gaps in the pump.
- Hygienic design ensures fast and safe cleanability, saving time, resources and increasing production reliability.
- Hardened surfaces also allow problem-free pumping of abrasive media.
- Numerous combinations of screw diameters and pitches allow optimum adaptation to the desired duty point and application.

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Lowering fault-related costs

Digital twin

In future, the digital twin will become a key component of industrial production. KHS uses models to virtually map the machine and conveyor system commissioning process.

With the help of smart, digital technologies KHS is networking and automating production processes step by step so that machines, products and complete lines can efficiently communicate and work with one another. "In particular what's known as the digital twin enables procedures to be transferred to a virtual environment by tracking and imaging all phases in a machine's life cycle," says Stefan Diesner, head of the Palletizing Product Center. Alternative, optimized production processes are displayed on the computer.

One of the major prerequisites for this is that engineering is consistent throughout the entire value chain in order to prevent what is known as data discontinuity at the interfaces between the various engineering disciplines, namely mechanical components, electrical equipment and software. Unlike the way a lot of work is done today, projects are not processed sequentially; instead, in an ideal scenario all departments work in parallel across their respective disciplines on the implementation of a project and share a common data model – the basis for the digital twin that depicts every last detail of a system virtually and permits precise simulation. khs.com

New strategic sustainability targets

Paulig

Paulig announced an ambitious sustainability approach with the aim to become a sustainable frontrunner in the Food & Beverage industry. Paulig's ambition is for 70% of its net sales to come from products and services which enable the health and well-being of people and the planet by 2030.

Paulig Sustainability Approach 2030 is based on three prioritised United Nations Sustainable Development Goals and has at its core products and services which enable the health and well-being of people and the planet, climate action and circularity and fair and inclusive way of working.

Paulig was founded in 1876. The company is family-owned and offers coffee, food concepts, spices, plant-based products and snacks. The company's brands are Paulig, Santa Maria, Risenta, Gold&Green and Poco Loco. Paulig has operations in 13 countries and sales amounted to EUR 907 million in 2018. The group has 2.130 employees. pauligroup.com



(fig.: Paulig)

Scientific breakthrough in dairy bioprotection

Chr. Hansen

For the first time, the main mechanism of lactic acid bacteria with bioprotective effect against yeasts and molds in dairy products has been revealed: It's all about competition for a specific nutrient (manganese).

While the popularity of food cultures that can help improve quality and shelf life has increased non-stop over the past years, Chr. Hansen scientists are the first to reveal the mechanism that can explain the main part of the inhibitory effect against yeast and mold spoilage organisms. The findings on the mode of action are documented in a new scientific article featured in the prestigious Applied and Environmental Microbiology Journal.

So far, most scientific activities have focused on trying to identify antimicrobial compounds produced by the food cultures, but without being able to identify any compounds that could explain a considerable part of the effect. Therefore, it became apparent that other mechanisms play a major role, but the specific mechanism had not been proven.

"What we have discovered and proved is the ability of our good bacteria in the FreshQ® cultures to absorb a nutrient in fermented milk that yeast and mold need to grow. This nutrient is called manganese. Through a 'transporter' in the bacterial strains the nutrient is removed from the food matrix, preventing the unwanted contaminants to feed on it," says Rute Neves, director in Bacterial Physiology, Research & Development, Chr. Hansen and affiliated professor at DTU (Technical University of Denmark), Bio-engineering.

Starting in-house, the Chr. Hansen scientists identified in the strains the transporter that absorbs manganese in a specific dairy food matrix. In cooperation with North Carolina State University in the US, the mechanism was proven at genetic level. chr-hansen.com

CHR HANSEN

AR service tool that overcomes all borders

miRemote

With an innovative service tool, Minebea Intec shows that its customers can always rely on the company: miRemote, based on augmented reality technology, enables an immediate online connection between customers and Minebea Intec, thus avoiding waiting times for technicians and unnecessary production downtimes: Smaller problems can often be solved with a little support – as if the service technician himself were live on site. Especially in times when travelling, access to production facilities and personal contact is difficult or even impossible, miRemote proves to be exactly the right service solution.



The service tool miRemote closes the gap between preventive service measures and corrective maintenance (photo Minebea Intec)

With miRemote, service staff can get a quick and immediate picture of the situation, simply by looking at the camera function of the device in use, without having to invest in additional hardware or software – all it takes is a link and a click, and the live connection is established," says Michael Tappe, Global Service Manager at Minebea Intec.

Thanks to the secure app connection, the connected service employee sees exactly what the user is currently seeing – as if he were directly on site. By fading in gestures, sending helpful documents or direct instructions via the audio track, the user can be intuitively told what to do.

End-of-line packaging BMS enters EOL group

Pursuing its Buy & Build strategy, EOL Packaging Experts (EOL) has made a second add-on acquisition by investing in BMS Maschinenfabrik GmbH (BMS) in Pfatter, Germany. End-of-line packaging specialist EoL composed of A+F Automation + Fördertechnik GmbH (A+F) and Standard-Knapp, Inc. (S-K) in Portland, Connecticut, has thus gained an important partner in German-speaking countries. This step will further strengthen the group's positioning in Europe and boost its growth sustainably.

This investment fits perfectly into the EoL group's strategic planning and aim to be a market leader in end-of-line packaging solutions for the food and beverages industry. Together with A+F as a leading provider of integrated and innovative systems solutions for secondary and tertiary packaging, as well as S-K as a leading manufacturer of end-of-line packaging machines in the US market, BMS will in future complement the group as a provider of systems for innovative sorting installations, state of the art end-of-line solutions, and flexible repacking solutions. Within EoL's global sales and service structure, A+F, S-K, and BMS will equally benefit and complement each other in the market area and the product portfolio as well as in production and machine technology, digitization, service, and project management.



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Also complete dairy factories

Standardized digitalization of an existing pudding production

Integration of a digital twin management system



Authors: Roman Werner¹, Alexander Beugholt¹, Ronny Takacs¹, Dominik Geier¹, Thomas Becker¹, Rudolf Sollacher², Marc Mauermann³, Norbert Weißenberg⁴, Martin Roest⁵, Jameel Istaitih⁶

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³ Fraunhofer IVV Dresden

⁴ Fraunhofer ISST Dortmund

⁵ Givaudan SA

⁶ Strauss Group Ltd.

Nowadays, the fourth industrial revolution influences every production process. In the food industry different concepts offer promising possibilities for making manufacturing processes more sustainable, efficient and safe. For the operation of most industry 4.0 solutions, IoT platforms are used to collect acquired data and process them with diverse techniques and technologies. According to Deloitte ^[1], the number of IoT capable devices will increase to over 20 Billion by 2020. This enormous number of connected devices has great potential for many industry sectors in terms of establishing new production concepts and process monitoring approaches. One promising concept that strongly benefits from IoT is the application of

digital twins of production processes, machinery, and products. The use of digital twins always requires a well-organized, structured and standardized management system or platform.

This article describes the activities of a Europe-wide research consortium funded by EIT Food (www.eitfood.eu), Europe's leading food innovation initiative. The aim is to design a cross-company, standardized Digital Twin Management System (DTM) and its implementation into an existing production process for pudding desserts. The development steps from the non-digital or semi-digitalized production to the successful implementation of the DTM are demonstrated in this project utilizing two use cases. The first is the production of a vanilla flavor in a plant of the Swiss flavorings producer Givaudan

SA. The second use case is the pudding production process at an Israeli dairy plant of the Strauss Group, which is considered centrally here. Givaudan SA is a direct supplier of the Strauss Group demonstrating the cross-company functionality of the DTM.

What is a Digital Twin?

The digital twin is "a dynamic virtual representation of a physical object or system across its lifecycle using real-time data to enable understanding, learning and reasoning" ^[2]. Usually, digital twins are connected to sensors in plants, which send data to virtual models within the IoT-platform. This data is fed into the digital twins in real time and thus a data structure is created that can be analyzed by algorithms automatically. However, digital twins

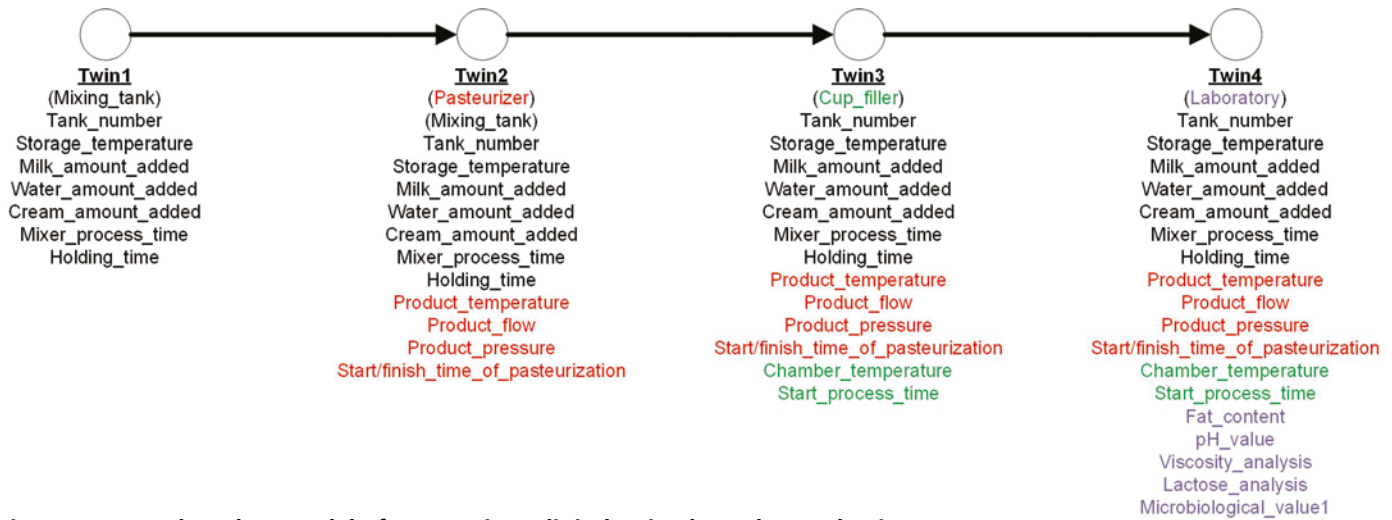


Figure 1: Exemplary data model of a “growing” digital twin along the production process

are not just applicable to production plants. They can also represent a wide variety of use cases like public transportation systems and even whole cities.

In case of the dairy plant in focus of this article, the benefits of using digital twin technology are a data-based optimization of an existing production process and a simplified data transfer, internal and along the entire value chain starting with raw materials (e.g. aroma substances) up to packaged pudding cups. The enormous amount of potentially usable data is the basis for tracking and tracing of food within the production process and between the stakeholders involved along the complete value chain.

Standardization of processes and model structuring

To reach comparability between different use cases in the DTM system, the respective production processes have to be analyzed and structured according to relevant standards. Here, the standards of the International Society of Automation (ISA) offer plenty of possibilities [3]. In this project, especially the ISA 88 and ISA 95 are applied. Initially, the classification into work centers, work units, equipment modules, and phases is applied to design comparable, standardized structures in the DTM. Using these standards, a physical model of each production process is constructed where each work unit has its own digital twin. The key aspect is that the existing physical model only contains equipment that gets in direct contact with the product. Equipment modules

and phases are categorized – according to ISA 88 – in each digital twin unit. Often these are sensors and valves that collect measurement data or connect individual plant components (and thus their digital twins).

The definition and structuring of process-related digital twins always require a detailed analysis of the existing production process, based on given production plans, SCADA plans (Supervisory Control and Data Acquisition) and other information from the ERP system (Enterprise Resource Planning). All available data points must be collected and structured according to their prioritization in production. Based on this, a second model – the data model – is designed. This model consists of digital twins, which feed time-dependent data points into the model from the beginning to the end of production. This means that the first

digital twin is considered the “poorest in data” reflecting only one production step. The last digital twin in the production chain is the one with the most and actual product data. However, all twins are needed to reflect the production process and allow traceability. Figure 1 illustrates such “growing” digital twins using an exemplary data model from pudding production.

Implementation into an existing pudding production

The development steps from raw production to a complex DTM were applied to two use cases – the first is an aroma supplier and the second one is a dairy plant for yoghurt and pudding production. The used DTM system is based on the Siemens’ cloud platform MindSphere, which is able to collect data points from different MES or ERP systems and to make them available

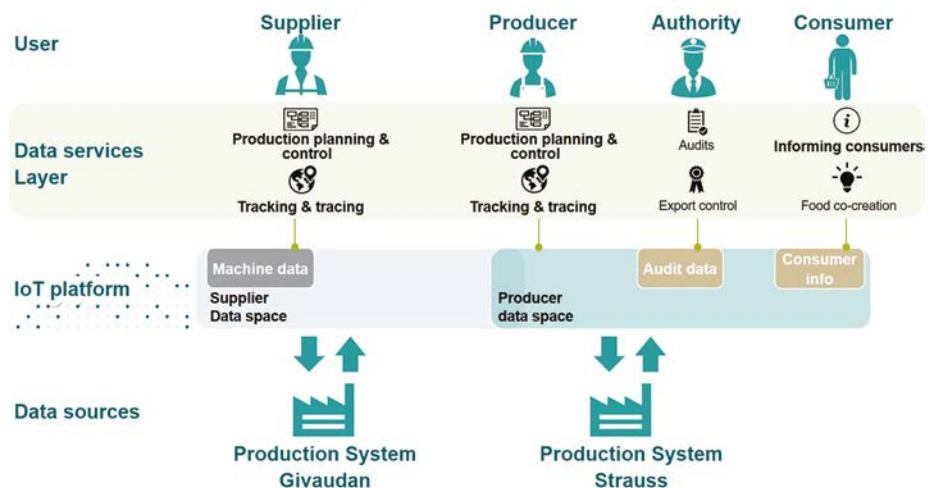


Figure 2: Structure of the Digital Twin Management system and interconnections between individual stakeholders via the IoT platform MindSphere.

for participating production companies. After identifying all physical components of the production line with direct product-contact, the relevant valves, pumps, controllers, and sensors in these parts are determined. Figure 2 illustrates how stakeholders share data via MindSphere for specific use cases. Figure 3 schematically illustrates interconnections of individual digital twins, company-wide or with a specific view to pudding production in a dairy.

What other possibilities does the DTM offer?

Data from management, administration, and planning services, e.g. personnel

and resource planning, can also be synchronized with data from digital twins or made accessible for subsequent analysis purposes [4, 5]. New cross-connections and patterns can be recognized by using methods of artificial intelligence or machine learning. By networking with these higher architectural levels and such new evaluation possibilities, estimates of product quality or machine service lifetime can be made in real time. A particular advantage is the predictive analysis of future events. For example, anomalies in devices or machines can be forecasted and counteracted in order to avoid undesired defects, minimize downtimes and reduce production losses. Due

to their data density and structure, these systems are able to generate their own expert knowledge and thus can detect anomalies independently. This high degree of networking beyond a company's own production boundaries enables evaluation across the entire value chain.

DTM and data integrity

Within the DTM system, data security, accountability, and transparency are ensured. If data leaves the DTM system, additional security is required. Therefore, the International Data Space (IDS) developed by the Fraunhofer Gesellschaft [6] was utilized, namely for communication with the Digital Food Passport. The Digital Food Passport is an app, which provides selected food safety data to consumers and authorities. The IDS is a virtual data space leveraging existing standards and technologies to facilitate secure and standardized data exchange and data linkage in a trusted business ecosystem. It thereby provides a basis for facilitating innovative cross-company business processes, while at the same time guaranteeing data sovereignty for data owners.

Conclusion and outlook

The integration of digital twins always requires a detailed analysis of the existing production process with production plans, SCADA plans and other information from the ERP system. For existing plants, it may be necessary to integrate new measuring points into the process. However, the depth of data collection is not limited. Basic data, such as temperatures, times, conductance values, filling levels, etc. should always be integrated. More detailed representations of individual data correlations are possible at any time, but even more macroscopic observations can provide important information, e.g. on process efficiency. Here, it makes sense to create a so-called Big Picture for existing production processes. This Big Picture reflects the physical production process and also maps data streams, production responsibilities, and stakeholders. The amount of data is also helping to execute root cause analyses for the identification of problematic deviations in the production process. This contributes to the prediction of problematic

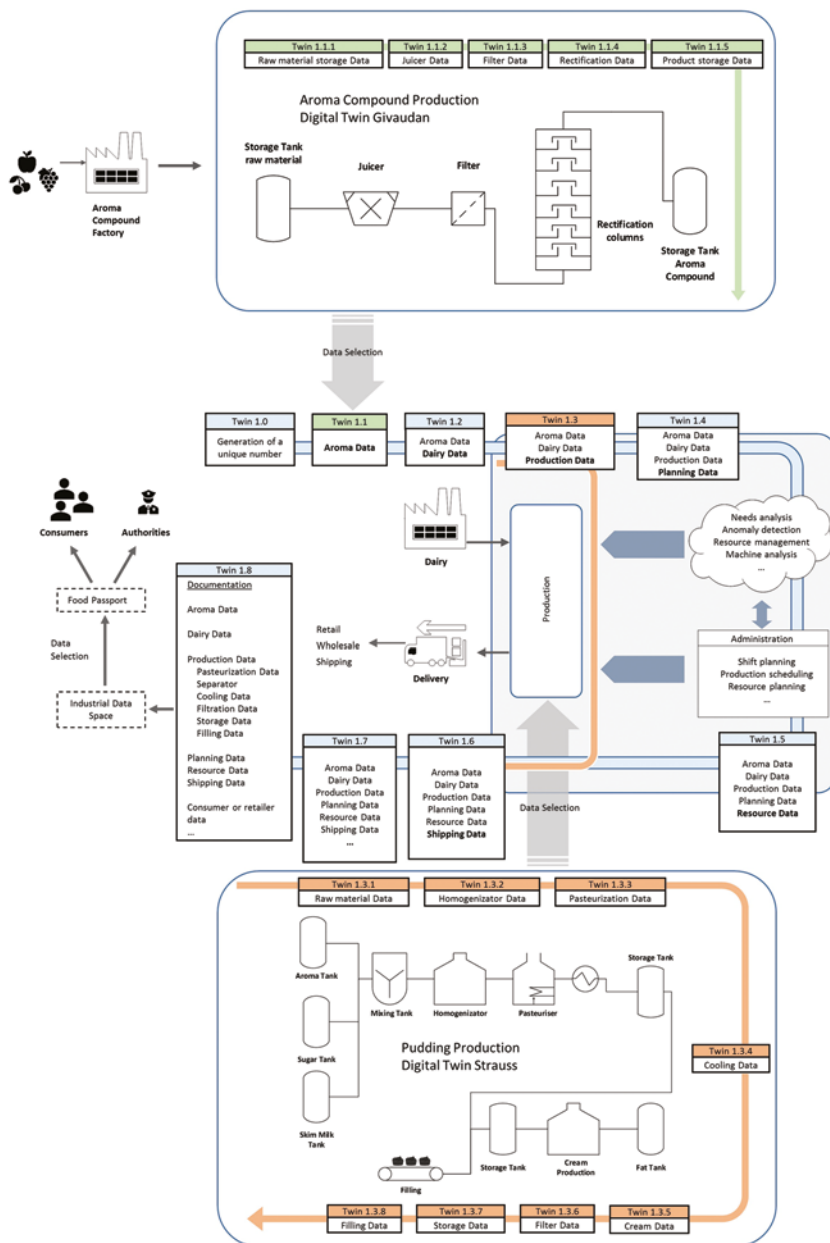


Figure 3: Connection of individual digital twins within the considered value chain.

batches concerning food safety and quality.

The presented work shows the suitability of the developed concept to structure the production process of different products in a standardized way and to make them available to a DTM system. The DTM system provides a platform, where all relevant data from a production system are made available. They can be used for enabling and simplifying, monitoring and analysis of production processes. Companies can holistically visualize, monitor, and analyze their production in one system comparable to a MES. Additionally, relevant data can be shared between B2B and B2C fast and efficiently. In the end, there is a win-win-situation for producers and customers. The DTM offers transparency with higher production efficiency and product safety. Additionally, consumers and authorities

can benefit from a DTM that may provide safety-relevant data like raw material origin, allergens or health claim information. This is the key idea of the Digital Food Passport app, based on a holistic view of the standardized data across the entire value chain. Also for establishing a fast and reliable food recall system in case of food safety problems, the presented DTM offers a suitable platform.

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International Exhibition on Dairy Products, Processing & Packaging Machinery and Allied Industries

Concurrent Events:

12th Edition
Agri Tech India 2020 & **PULTRY & Livestock Expo 2020**

RC REVERSE BUYER SELLER MEET 2020



DairyTech India 2020

18-19-20 AUGUST 2020
BIEC, Bangalore, India

10th
Edition



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Safe and Efficient

Invert Robotics inspects containers quickly and without the need for human access, all achieved by using a robot

Invert Robotics carry out critical assets inspections that are not only non-destructive, but above all, they ensure less plant downtime, enabling their customers to get their critical assets back into production as fast as possible. The company, founded in New Zealand, offers a global, innovative, robot-based solution, in the Food & Beverage and (Petro) Chemical industries.

Invert Robotics inspect drying towers, tanks of all types and sizes, cyclones, filters, fluid beds, silos, boilers and even tankers. They provide this service by using their patented climbing robots with precise 360° camera diagnostics. IDM visited the German office to have a closer look at how the robots work.

Compared to conventional inspection methods, the robot does the actual work for Invert Robotics and their customers. Once the assets, that need to be inspected, have been emptied and cleaned, the robot is deployed. The advanced sliding suction cup technology enables the robots to stick to most non-magnetic surfaces and they can complete a full



Delan Amin: We are aware of tight time constraints in the production process and when it comes to inspections, we focus on planned preventative maintenance, schedules in accordance with our customers (Photo: IDM)



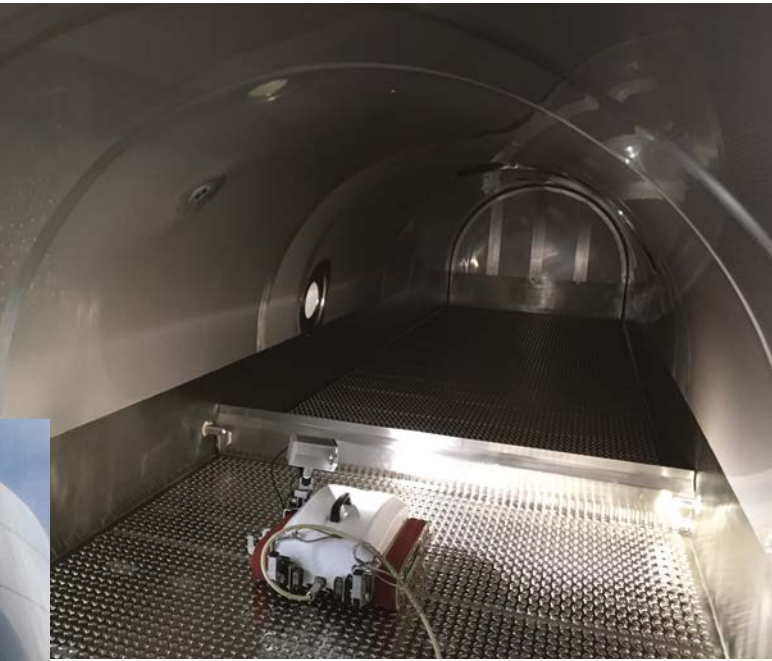
Invert Robotics can inspect even the largest silo tanks for damage without the need for scaffolding (Photo: Invert Robotics)

inspection of the entire equipment without missing an angle. It only takes approximately 15 minutes to prepare the robot for the inspections.

"Conventional inspection of containers, such as in the case of dye penetration, is an extremely complex undertaking", says Delan Amin, Sales Manager DACH (location Germany) at Invert Robotics. "The systems must be emptied, cleaned, sprayed with paint and cleaned again. Then, depending on their size, scaffolding may have to be erected inside before the actual work can begin." This method is very time-consuming and sometimes dangerous for workers. In addition, dye penetration processes often leave residue behind that can hard to remove, if at all, and this can lead to a negative effect on production.

Inspection of the Assets

Invert Robotics' technicians steer the robot from outside the assets by means of a remote control, powered from a control case. For safety reasons, the climbing robot is connected to a cable. This cable also supplies the robot with operating power and delivers the images captured by the camera to a screen (based in the control case). If a damaged area is detected, it is marked with a pen attached to the robot, this in turn is recorded by the camera and the exact position



Climbing robot during examination in a fluidised bed dryer (Photo: Invert Robotics)

documented in a report. If a repair is necessary, it can be carried out immediately by Invert Robotics' partner companies, provided that the repair is scheduled accordingly. These specialists are certified industrial climbers (IRATA) and welding experts and do not need to erect scaffolding for their work. Due to this method, the critical assets only need to be taken out of production for a minimum amount of time. This makes it an extremely cost-effective exercise for the customer. The average inspection time of a dryer with an 8m diameter is just one day, whilst a storage tank can be inspected within a time frame of 2 to 3 hours.

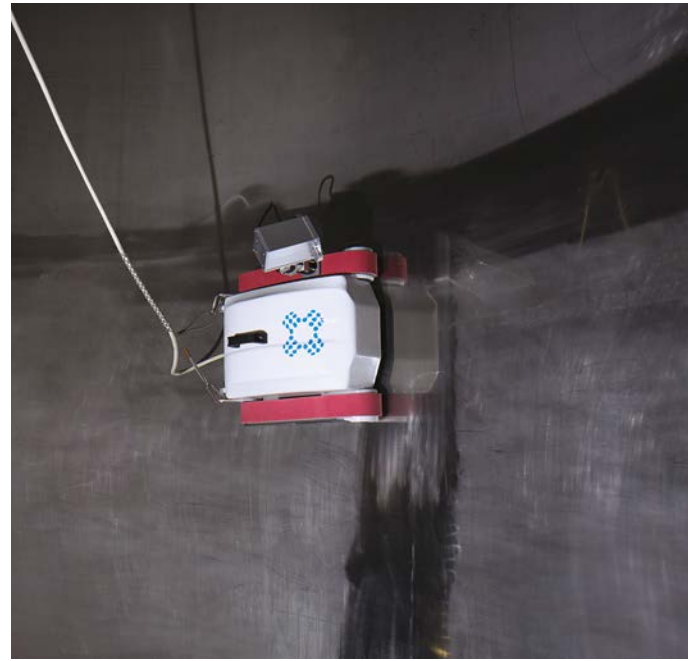
Reporting

Invert Robotics is aware of tight time constraints in the production process and bases its inspections on planned preventive maintenance, scheduled in accordance with their customers. On request, Invert Robotics can also inspect entire silo farms (up to 25 tanks per week), states Mr. Amin, a trained biologist and Industry Commercial Specialist.

After each inspection, the client receives an immediate preliminary report, and this is backed up with a final report within 72 hours of the inspection having taken place. This report provides the basis, should any further inspection or maintenance be needed. Regularly performed inspections usually lead to a longer service life of the critical assets and serve to avoid any unplanned production stoppage. Well-known companies in the industry, such as Milei or Sachsenmilch, already use the service of Invert Robotics.

Special features

In the case of particularly narrow containers that the robot cannot pass through, Invert Robotics guides a camera suspended from cables into the area to be tested. This camera can be moved 360° by remote control to gain the required



The robot adheres itself onto the inner wall of the container via vacuum and travels over its entire surface (Photo: Invert Robotics)

view. The robots' manoeuvrability means it can inspect from several angles; it can even complete its inspection hanging upside down.

Depending on the surface condition of a container, Invert Robotics can also use robots that are magnetically attached. Ultrasonic testing, which is used, for example, to determine wall thickness, completes Invert Robotics' range of services.

Cooperation with inspection authorities

Invert Robotics regularly supports inspection authorities like TÜV with its technology in the testing of pressure vessels and reactors. Invert Robotics technicians and TÜV inspectors work closely together and the acceptance test is carried out as usual by the inspector of the Technical Inspection Agency.

No chemistry

"One of the main advantages offered by our method, in addition to the time saved for the client and plant health and safety, is that we can operate without chemicals," explains Mr. Amin. "Especially in drying plants, air filters often show discoloration for some time after the conventional inspection, which is caused by the fluorescent dyes used."

Idea and progress

Invert Robotics' climbing robots were invented in New Zealand. James Robertson developed the patented combined sliding and suction cup technology seven years ago at the University of Canterbury when he received a request from the New Zealand dairy industry to reduce the time required for container inspections and to eliminate the use of dyes. In the meantime, the company founded by Robertson is active worldwide. In due course, IDM will report on current ongoing developments, about which Delan Amin is currently only hinting at...

Sisterna sucrose esters are emulsifiers with unique and powerful functionalities. Not only are they very effective oil-in-water emulsifiers, they also interact with proteins, which protects proteins from coagulation. These are just a few of the numerous benefits of using Sisterna sucrose esters.

In the area of dairy drinks there are three different products that we can focus on for sucrose esters: beta-glucan milk drink, milk alternatives and powdered hot drink.

Beta-glucan milk drink

Beta-glucans (β -glucans) are polysaccharides that can be found in oats and barley. They are recognised by the European Food Safety Authority (EFSA) as being capable of reducing disease risk. The FDA has endorsed claims that foods with soluble fibre from whole oats may reduce heart disease risk.

Addition of beta-glucan to milk is known to produce destabilisation. The flocculation is most probably due to a weak interaction between beta-glucan molecules, or beta-glucan micelles, and kappa casein.

When beta-glucan is heated in milk, the milk flocculates almost immediately. This flocculation can be prevented by using Sisterna SP70 in a dosage of 0.3%. The best results are achieved when SP70 is heated in milk before beta-glucan is added. When SP70 and beta-glucan are added at the same time, the dosage of SP70 needs to be higher to achieve equivalent stability (0.5% instead of 0.3%)

Addition of sugar and flavour makes it possible to produce a tasty milk drink. The texture of this drink is comparable to yoghurt drink, due to the effect of beta-glucan on the viscosity. Sucrose esters have hardly any effect on the viscosity.

Milk alternatives

There are various reasons for replacing dairy milk with a plant-based alternative: lactose intolerance, veganism, animal welfare and environmental concerns. Milk alternatives have become increasingly popular in recent years. They may be based on soy, rice, coconut and several types of nuts, seeds and grains.



Author: Lia Bax, Product & Salesmanager Food, Sisterna B.V., The Netherlands

Emulsifying

Dairy milk contains a high level of proteins (roughly 3%), which are natural emulsifiers in milk. Plant-based milks, with the exception of soy, generally contain far less protein. Most plant material (e.g. nuts and seeds) that is ground to make milk alternatives contain oil. In other cases, oil is added (e.g. for rice and grain milk). In liquid products the use of a powerful oil-in-water emulsifier is crucial to ensure a stable emulsion for the whole shelf life. Sucrose esters are very powerful oil-in-water emulsifiers, that can help to keep milk alternatives stable for a long time.

Particles

Besides emulsifying oil and fat, sucrose esters also seem to be able to “emulsify” fatty particles. Sucrose esters have the ability to keep the particles of cocoa and almonds longer in suspension,

and slow down their sedimentation in a drink. We do not see this effect in oat drink. Probably the fat content of a particle plays a role.

Protection

There is a third benefit to use sucrose esters in milk alternatives. Sisterna sucrose esters are known for their interaction with various sources of protein. This interaction makes proteins less sensitive to coagulation due to acid, heat, shear or destabilising components like alcohol or beta-glucan.

Although the protein level of milk alternatives is generally low (0.2 – 1.0% (soy milk 3 - 4%)), flocculation can deteriorate the appearance of the drink. Just like caseinate, proteins of most milk alternatives have an iso-electric point – the pH at which the proteins have the same charge, making it possible to move towards each other, and coagulate.

Improving consistency in milk somatic cell counting



Author: Aurélie Dubois-Lozier, IDF Science and Standards Programme Manager



Somatic cell counting is a key indicator for udder health in several lactating animals, including dairy cows. Accurate counting therefore has significance in food quality regulations, milk payment testing, farm management and breeding programmes.

The counting of somatic cells relies on the performance of high capacity routine somatic cell counters. Current practice requires milk laboratories in different geographies to link to their own individual reference materials, creating potential issues with comparability and thus equivalence.

Establishing an international reference system for somatic cell counting

In order to address these issues, a joint project between the International Dairy Federation (IDF) and the International Committee for Animal Recording (ICAR) and the European Commission's Joint Research Centre (JRC), the European Commission's science and knowledge service was established to develop a common, robust, and internationally accepted anchor point to implement and safeguard equivalent somatic cell counting worldwide. After several years of collaboration, in April 2020 the project partners made the welcome announcement that the reference materials have been launched for use.

The materials (ERM-BD001) are arranged as sets. Each set consists of two bottles with spray-dried cow milk, one with low and one with high somatic cell count, characterized by means of an interlaboratory comparison with 32 laboratories worldwide. The reference materials' documentation includes instructions on the reconstitution and defines the intended use: calibration material for routine methods, and quality control material for both reference methods and routine methods. Moreover, the materials can be used to assign values to in-house materials.

Significant importance for the sector

The reference materials will be of great practical importance to many within the livestock sector, including raw milk test-

ing laboratories, national and international bodies responsible for regulations on measuring somatic cell count, supervising bodies in milk payment testing and many others. Looking ahead, IDF and ICAR are working on additional guidance to provide further information on the use of this material to establish international metrological traceability for milk analyses.

In addition to the applications already mentioned, the material will be of specific interest to dairy herd improvement organisations, QA services, manufacturers and distributors of routine equipment for somatic cell counting, providers of secondary reference materials for somatic cell counting, organizers of proficiency testing, animal health organizations, universities and research institutes and accreditation bodies.

The reference materials can be acquired directly through EC JRC or its authorized reference material distributors (<https://ec.europa.eu/jrc/en/reference-materials/catalogue>). It should be noted that delivery may be delayed till the course of May due to the COVID-19 outbreak. For more information about the reference materials, please contact Reinhard Zeleny (reinhard.zeleny@ec.europa.eu).

**IDM has
a new website**



Have a look at
international-dairy.com

Zenith Global Report

USA Opportunities in Plant-based Drinks Report

Zenith Global Ltd. has recently analysed the US plant-based drinks market that has shown a tremendous growth over the past years. The category has developed a real challenge for traditional dairy products, although on a still moderate volume. But this volume is set to increase. IDM quotes some of the key findings of the Zenith report.

The US plant-based drinks market grew steadily between 2014 and 2017 registering a CAGR of 7% reaching 1.07 bn liters in 2017. In 2018 the sector increased by 9% registering over 1.16 bn litres. Accordingly, per capita consumption has increased gradually from 2.8 litres in 2014 to 3.6 litres in 2018 an increase of 28.5%. Main growth drivers behind the popularity of plant-based drinks include rising lactose intolerance incidences, digestive benefits, consumers' perception of plant-based drinks as healthier than animal milk, sensitivity to animal welfare and consumers' perception of „the negative environmental impact of the dairy industry“.

Evolution of channels

Most plant-based drinks are consumed at home. In 2018 retail sales accounted for 92 of total sales registering sales of over 1 billion litres and OOH (Out Of Home) only 8 or 91.1 million litres.

OOH is growing faster than retail (albeit from a low base) at a rate of 15% against 8.6 in 2018. The momentum can be explained by the popularity of plant-based drinks as an ingredient for beverages in coffee shops. In terms of value, the total plant-based market reached US 2.32 billion in 2018 an increase of 44% since 2014.



Key drivers behind the rising value include, increased consumption and consumers willingness to pay more for a product they deemed as healthy and beneficial for their overall wellbeing. Consequently per capita expenditure has surged from US 5.2 to US 7.1 in 2018 an increase of 19 points.

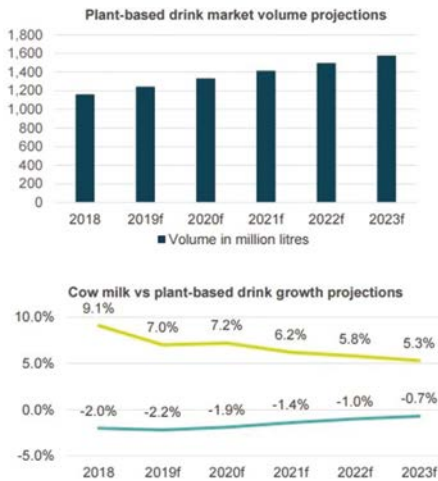
Price competition

The Price per litre (PPL) of cow's milk has been declining year on year from US 1.10 in 2014 to US 1.03 in 2018. Despite negative press and increased competition from plant-based drinks, resulting in declining sales of cow's milk, the production has been encouraged by government subsidies. This has led to an oversupply of milk and consequently declining farmgate and retail prices.

Within cow's milk, fresh milk which is the largest category, the PPL decreased from US 1.01 in 2017 to US 0.98 in 2018.

Although the price per litre could grow further as flavoured milk is gaining momentum with higher prices than plain milk. The price per litre of cow's milk is expected to remain lower than plant-based drinks due to over local supply. Also, the US government may continue to incentivise production, with parts of this milk distributed through the government's National school lunch programme a federally assisted meal programme that provides nutritious low cost or no cost lunches to children in public and non profit private schools).

In 2018 the price per litre of non dairy alternatives grew by 1.7% to US 1.81



compared to the previous year. The increase of the price per litre is due to the popularity of the product coupled with rising costs of raw materials, higher production costs and the premium positioning compared to cow's milk.

The clientele

Millennials and Generation Z are driving the consumption of plant-based drinks. These demographics are more sensitive to animal welfare and the environmental impact of their food and drink choices. Adults from Generation X and baby boomers are also purchasing plant-based drinks but in lesser quantities.

Zenith Global's research has shown that several factors are influencing consumers when purchasing plant-based drinks namely flavour (52%), price (40%) and health claims (37%). Convenience is also an important factor.

Although plant-based drinks brands generally target younger consumers, some brands such as Oatly are marketing their products to people over 50 years old. The company has recently launched a new range of plant-based nutritional beverages targeting this overlooked demographic segment. The line features a proprietary blend of plant proteins, vitamins, minerals and fibres which are "tailored to fuel, body and brain over 50". The different marketing approach enables Oatly to differentiate itself from the competition and target a new consumer segment.

The popularity of plant-based drinks has been boosted by the ongoing health and wellness trend. In addition to vegan and lactose intolerants, consumers who do not necessarily suffer from allergy or

intolerance have also increasingly purchased plant-based drinks. This audience usually perceives plant-based drinks as healthy and are keen on trying new beverages. Other drivers include environmental concerns and animal welfare.

Plant-based drinks are consumed in a variety of ways including on their own, for breakfast, and they are used as an ingredient in beverages such as juice, smoothies, coffee and hot chocolate.

Next 5 years

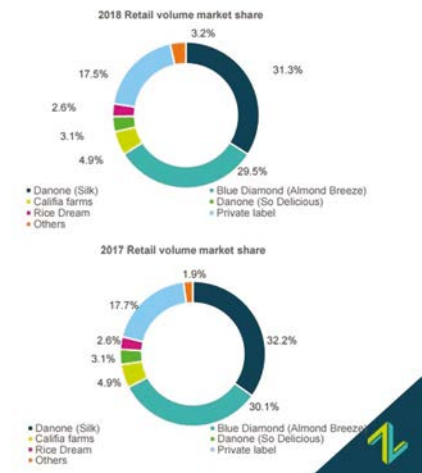
The US plant-based market is forecast to enjoy steady growth over the next five years growing at a rate of 7% between 2018 and 2019. By 2023 sales of plant-based drinks are projected to reach over 1.58 billion litres compared to 1.16 billion litres in 2018 a CAGR of 6.4%. The growth will continue to be led by the health and wellness trend. Whilst almond drinks is likely to remain the most popular type within the plant-based drink category, oat drink is expected to gain additional momentum while soy drink will continue to lose popularity. Oat drink is said to be more environmentally sustainable as its production requires less water and GMO. Plant-based drinks made using peas is also a trend to watch being high protein and similarly to oat using a lesser amount of water compared to nut based drinks.

The growth of plant-based drinks will be fueled by companies' continuous investments as dairy players see it as a new avenue of growth. Danone has recently stated that its plant-based business has the potential to become as significant as its own dairy offerings.

Plant-based drink growth is expected to continue outpacing dairy milk sales. Cow's milk consumption has been falling over the years and is expected to decline further by 2.2% in 2019. Sales are hampered by negative press, greater awareness of animal welfare and the anti-dairy movement. Additionally, plant-based milk is perceived as better for the environment than animal based milk.

Per capita consumption (PCC) of cow's milk is projected to decline by 1.3 in 2023 standing at 62.3 litres per person, an equivalent of 21.5 million litres. In comparison, the PCC stood at 68.8 litres in 2018.

Producers of animal milk are likely to seek new growth opportunities to prevent



a further decline in sales. Organic and functional milk appear as the two growth drivers of the category.

Innovation trends

As the plant-based category evolves companies are working harder to differentiate with new plant-based niches, new flavours textures and cross category products. The emerging varieties within plant-based drinks are growing at the cost of soya and almond drinks due to consumers' perception of the environmental impact of the production of these varieties together with the excitement of new consumers to diversify their plant-based drinks consumption with varieties that could provide additional health benefits and novel flavours and tastes.

Good Karma (flax) Oatly (oat) and Forager Project (cashew) are examples of new and established brands seeking to exploit niches and evolve individual categories into more sophisticated offerings in a bid to differentiate themselves from the competition.

2018 was the year that confirmed oat milk's rise to prominence in the US plant-based dairy alternative category. Pinterest, the online vision board website, revealed that oat drinks was the year's hottest plant-based drink. Reporting that oat milk searches on its site went up 186 year over year. For instance, Silk's new oat milk line Oat Yeah was launched in January 2019 and is available at retailers including Target, Walmart, Publix and Sprouts in three varieties Plain, Vanilla and Chocolate.

Within the oat drinks space, the Swedish firm Oatly which entered the US in 2016 has seen its sales surge as it

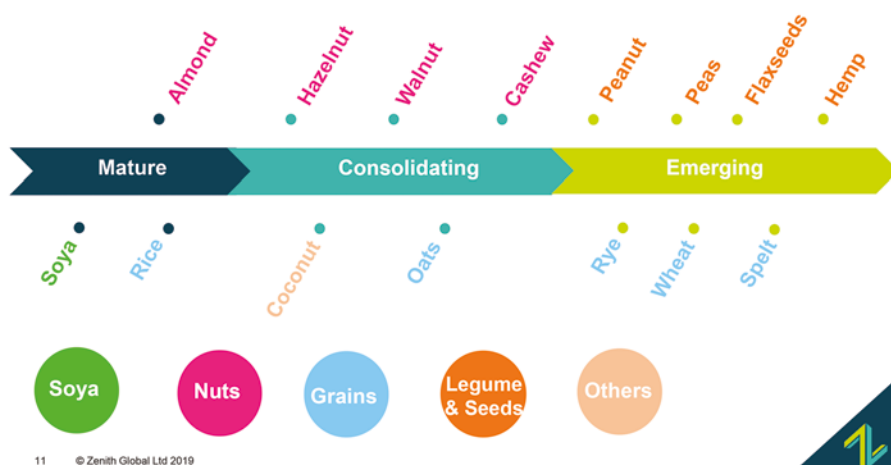
targets high end coffee shops. Oatly announced it will open its first production plant in New Jersey in 2019 to support its growth. Alongside increased production, the firm aims to introduce more flavours of its oat milk.

Also, drinks made from peas have similar growth potential as oat drinks, since they boast nutritional attributes with high protein content and sustainable values with less water usage than nuts.

All figures taken from Zenith Global Report "USA Opportunities in Plant-based Drinks Report". More market information is available from Zenith Global Ltd, tel. +44 (0)1225 327900, eMail: JHMMaynard@zenithglobal.com, www.zenithglobal.com

1. USA plant-based drinks market overview

1.7 Evolution of plant-based drinks variety trend development



Dairy and Plant Proteins in Weight Management and Healthy Ageing

3A Business Consulting

Sales of Weight Management products, globally estimated at USD 17.6 billion in 2019 and growing, is unsurprisingly correlated with overweight and obesity rates. With an increasing number of people worldwide classified as overweight or obese, the potential for Weight Management products appears significant. Also concerned with wellbeing is the ever-growing number of ageing consumers across the world. A key focus of this Healthy Ageing trend is maintaining energy, strength and function as ageing is associated with frailty, loss of muscle and strength, i.e. sarcopenia.

The report provides an overview of the current and future global market for dairy and plant-based proteins in Weight Management and Healthy Ageing. It is global in scope and with the following headlines:

- ▶ Market size and growth by product category and region/country
- ▶ Key market developments, drivers and trends
- ▶ Major players, brands, market shares and distribution channels
- ▶ Major whey-, milk- and plant protein processors
- ▶ Protein ingredient volumes and trends in Weight Management and Healthy Ageing
- ▶ New product launches per region, major players, categories and per protein ingredient 2014-2019
- ▶ Market and ingredient outlook 2020-2024

The report can be purchased for EUR 3,800. More information: Tage Affertsholt – 3A Business Consulting, Tel: +45 70 21 00 98, email: ta@3abc.dk, Web: www.3abc.dk

Clean-label concept for ambient yogurt

Arla Foods Ingredients

Arla Foods Ingredients has launched a clean-label concept to help brands meet growing demand for ambient stirred yogurt in China. The new solution uses Nutrilac YO-4575, a 100% natural whey protein, to give unrefrigerated yogurts a premium positioning with all-natural ingredients.

Nutrilac YO-4575 is unique due to its heat-stability and texturizing properties. It keeps ambient products smooth and stable throughout shelf life without the need for additives or preservatives.

Research shows that "made with real ingredients" and "no artificial flavor/colors" are the most important claims for Chinese consumers [Lindberg International, Organic Foods – Customer Insights China, 2019].

Arla Foods Ingredients has created an ambient stirred yogurt concept containing just five all-natural ingredients: skimmed milk, cream (38% fat), Nutrilac YO-4575, sugar and native tapioca starch. On offer are three varieties: vanilla, peach and green tea. arla-foods-ingredients.com



Clean label yogurts are in high demand in China (photo: Arla Foods Ingredients)

Call for applications!

Dairy Technology Award

Deadline for applications 30 October 2020

Supported by the dairy trade publications IDM International Dairy Magazine and molkerei-industrie and the Society of German Dairy Engineers (Ahlemer Ingenieure), the Dairy Technology Award aims at highlighting successful innovations in dairy and food technology. The prize has been awarded since 2009 to companies in the dairy and supplying industry and relevant service providers.

The Dairy Technology Award focuses on processes, equipment, complete production units and problem solutions that are of benefit to the overall dairy industry.



Awards will be made in these field

- Process & Automation Technology
- Packaging & Filling Technology
- Environment & Sustainability Improvement (saving of energy and resources)
- Process Management & IT
- Logistics
- Food Safety.

Awarding

The prize winning developments will be presented at the trade show Anuga FoodTec in March 2021.

Awardees will receive a certificate, the winning developments will be presented to an international readership in the magazines IDM International Dairy Magazine and molkerei-industrie as well as on Twitter and the websites international-dairy.com and moproweb.de.

How to apply

Only in digital form, a condensed application is requested first. It should include:

- a) Reason for application
- b) Description of company/innovator with a short portrayal of the applicant and its professional background.
- c) Title of the application and area of development
- d) Description of the innovative project/the innovation on max. 3 pages A4 incl. illustration (photos, graphs, tables, sketches) centering on the special innovative development and, if applicable, quoting sources. (After checking, the jury might ask for further documentation or an on-site inspection)

Send applications to: Roland Sossna,
Editor molkerei-industrie/IDM International Dairy Magazine,
Email: sossna@blmedien.de. Questions will be answered by email or phone: +49 2590 94 37 20, +49 170 418 59 54 .

Jury

Applications will be judged and awardees will be selected by a jury consisting of these renowned experts:

- Prof. Dr.-Ing. Jörg Hinrichs, Dep. Soft Matter Science and Dairy Technology, University of Hohenheim
- Prof. Dr. Ulrich Müller, Dep. of Life and Science Technologies, University of Applied Sciences Ostwestfalen-Lippe
- Dipl.-Ing. Klaus Schleiminger, KSI Engineering, Krefeld
- Prof. Dr.-Ing. Saskia Schwermann, University of Applied Sciences and Arts Hannover, Faculty of Mechanical and Bioprocess Engineering
- Prof. Dr.-Ing. Matthias Weiß, University of Applied Sciences and Arts Hannover, Faculty of Mechanical and Bioprocess Engineering

Cheese cutting machines



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Cheese cutting machines



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international-dairy.com



(photo: Qlip)

Improving efficiency through digitisation
QM



(photo: SIG)

The future of packaging
Packaging



(photo: Gammel)

District steam heating of a dairy plant
Technology/IT



(photo: Westfalia)

Ammerland doubles storage capacity
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