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SPECIAL „PLANT BASED ALTERNATIVES“

PROCESSING | INGREDIENTS | PACKAGING | IT | LOGISTICS

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Plant Based Dairy Alternatives

Plant-based dairy alternatives are enjoying growing popularity among consumers. The growth of this category in the markets is showing double-digit rates in some cases.

IDM International Dairy Magazine informs about the latest trends and solutions for the production of these novel plant-based products.

(photo: mizina – adobe.stock.com)

Content

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4CHOICE

THE PLANT-BASED ALTERNATIVE SOLUTION by Sacco System

The rise of the plant-based category is among the most prominent food industry transformations and the trend is driven by consumers who follow a vegetarian and vegan lifestyle, consumers defined as "flexitarians", consumers with allergies to dairy products, and consumers choices as they seek to improve their diets for their own health benefits. The COVID-19 pandemic has only accelerated this trend.

This great success story is attributed to the real and perceived benefits. Plant-based meals offer many nutritional benefits such as reducing cholesterol levels, improving cardiovascular health, and assisting with the control of diabetes. These choices are also closely related to the growing awareness of the negative health implications linked to the consumption of unhealthy ingredients.

Consumers are becoming more attracted to different and alternative food products with flavours, ingredients, textures, and product-based origins driving them to the selection, and in this category, plant-based products offer many different alternatives for experiencing these

different characteristics. Therefore, Food manufacturers ranging from start-up to leading companies are innovating rapidly in this category. The majority of commercial launches, investment activity, and media attention, have focused on plant-based meat alternatives.

In terms of numbers, Fortune Business Insights forecasts that the global dairy alternatives market will reach $25.1 billion by the end of 2026.

The Global Non-Dairy Yogurt Market

For some dairy processors, plant-based dairy alternatives represent another way to attract new consumers and grow overall brand awareness that can co-exist with dairy operations.

The plant-based yoghurt market is expanding with more types of plant-based cultured alternatives appearing. Sales of vegan yoghurts are predicted to exceed $12 billion by 2029 (Future Market Insights).

The non-dairy yogurt market accounts for 6% of the entire industry of dairy alternative products. Spoonable non-dairy yogurt accounts for a 2% share of the total dairy category.

As each nation is unique, so are its plant-based consumer preferences. Dairy processors that wish to enter the plant-based dairy alternatives market will have to address some challenges. Product formulation is one of them and it's no longer just about imitating dairy, but producing value-for-money products is another consideration.

The fastest-growing claims related to these products are GMO-free, indulgent, premium, and traditional.

Currently, the most used base ingredients are almonds, cashew nuts, coconuts, soybeans, and oats. Government agencies in several countries are encouraging the adoption of plant-based diets as they are rich in fibre, antioxidants, vitamins A, C, and E, and many other beneficial plant-based compounds.

Soy used to be the most popular alternative ingredient, with 80% of the global dairy-free yogurt launches in 2011, but product developers and customer demand have since changed this pattern. Ingredients such as coconut, almond and oat are now increasing in demand faster than soy, and many other ingredients are following close behind.

Indeed the "next generation" now includes products made from other legumes, nuts, seeds, and grain milk. Pea protein is now increasingly finding its way into plant-based dairy applications and off flavours are often a key issue when using peas as a product base.

Reasons behind Plant-Based Milk Alternatives

Different preferences influence customer demand, as well as perceived health benefits and ethical reasons. Many people worldwide suffer from lactose intolerance, diabetes, cardiovascular issues, and cholesterol. Nowadays, they have the opportunity to experience tasty products that are healthy, low in fat, and that contain much more nutritional value that is beneficial to our health than before.

The new group of Flexitarians represents many consumers of the population worldwide, and potentially every one of us could be considered a flexitarian since we have an innate curiosity to discover and try something new. So these product developers devote a lot of time and resources into including as much creativity in these plant-based products as possible considering many different mixtures of ingredients and packages useful to satisfy every kind of palate for every kind of daily situation.

Microbial fermentation is capable of improving the flavor and functionality of plant-based cultured alternatives. By metabolizing and transforming plant-derived ingredients into enhanced products with unique flavors, nutritional profiles, or modified textures. This allows to shape the product portfolio in unique ways to meet consumer expectations on the key drivers of consumer choice: 'plant' taste, price, and accessibility.

4CHOICE, plant-based cultures range is composed of pure and controlled hypoallergenic cultures, free of any known allergen as well as animal derived products. 4CHOICE range (starter cultures, protective cultures and probiotic cultures) ensures good fermentation time, texture, flavor and aroma development. 4CHOICE range is certified for safety and compliance with demand for dairy and lactose free, non-animal origin, allergen free, soyfree, GMO-Free according to the VLOG "Ohne Gentechnik"

SACCO technical expertise in strain development and manufacturing know-how to supply live microbial cultures, is eager to position our 4CHOICE hypoallergenic solutions as the first CHOICE among plant-based product developers, providing solutions for the plant-based industry.

4 CHOICE

THE PLANT-BASED ALTERNATIVE SOLUTION

4 CHOICE

Dairy alternatives cultures

NATURAL, TASTY, HEALTHY AND SUSTAINABLE

To meet new consumers needs of taste and texture in **plant-based** products,
with a low environmental impact and in a healthier way,
we've designed the new **4Choice** cultures range.
A hypoallergenic culture range, pure and free from animal-derived products.
The perfect solution for every taste!
Special food cultures designed for those looking for plant-based fermented products

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Next generation dairy

The ingredient tools to take a slice out of the dairy alternatives market

The market for plant-based dairy alternatives is expanding beyond its traditional base of vegans, vegetarians and milk allergy sufferers. This category is attracting a growing band of flexitarian consumers, who continue to enjoy "real" dairy products, but will also regularly opt for a dairy alternative. In fact, a Cargill study found that about half of European shoppers could fit this "flexitarian" definition.

Formulation challenges

The mainstreaming of dairy alternatives clearly presents a huge market opportunity. But it also comes with its own challenges. After all, with so many choices available for consumers, it's more important than ever to create products that stand out. Furthermore, milk loving flexitarians are more demanding, particularly around sensory shortcomings. Since 2 out of 3 of European dairy consumers prefer the taste of real dairy over dairy alternatives, according to Cargill's study, it's paramount to come really close to the original.

In addition, with the advent of nutritional profiling on product packs and smart phones, there's growing scrutiny on health composition too. Finally, the familiarity of the ingredients used, and the extent to which they are processed and sustainably sourced, further influences product choice.

It all means that securing the right ingredient toolbox is essential to success in the dairy alternatives space. Cargill's broad range of solutions paired with our deep technical expertise, gives dairy alternative formulators the flexibility to address their unique processing and formulation needs.

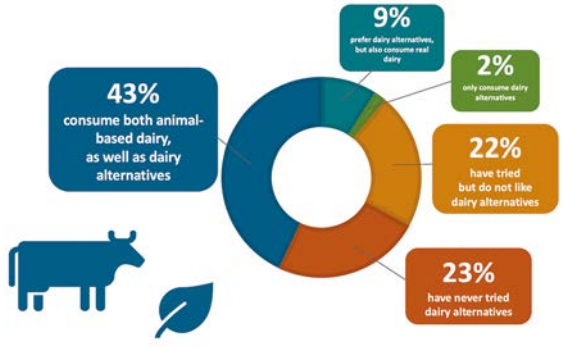
Pea: the alternative protein choice

Choosing the right alternative to replace dairy proteins isn't easy. Alternative protein sources differ in terms of organoleptic, texturizing and functional properties, as well as in their interaction with other ingredients.

This is where pea protein is such a strong performer. Functionally, it comes very close to soy in gelling properties. But it also provides great solubility, a creamy flavor and a smooth mouthfeel. Moreover, it can be optimized by heat treatment for improved functionality. It has a quality protein content and requires no allergen declaration in the EU. From a sustainability perspective, it promotes soil health and reduces carbon emissions when used as a cover crop. Importantly, it also has a very positive consumer health perception, as confirmed by our IngredienTracker analysis, in which it came out in the top 20 of over 100 ingredients surveyed on health perception.

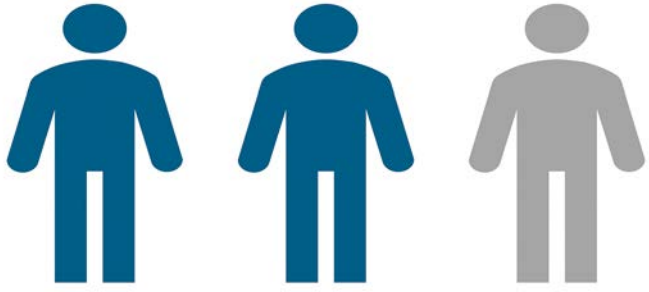
Cargill offers pea protein isolates with a mild flavor profile. With different options in terms of viscosity, the range of both standard and hydrolyzed pea proteins provides formulation flexibility. The hydrolyzed pea protein isolates are particularly suitable for applications that require whipping properties.

About half (52%) of European dairy consumers could fit the 'flexitarian' definition, as they consume both animal-based dairy and dairy alternatives.



- Source: Cargill Shifting Global Dairy Market Survey Europe 2019 (n=1,806 shoppers from the UK, Germany, France, Spain, Denmark and Russia).
- *Question : Which of the following best describes your consumption of dairy-alternatives —that is, milk or ice cream made from plants like almonds, rice, etc., compared to 'real' dairy?*

2 out of 3 European dairy consumers that have tried animal-based dairy and dairy alternatives prefer the taste of animal-based dairy.



- Source: Cargill Shifting Global Dairy Market Survey Europe 2019 (n=1,806 shoppers from the UK, Germany, France, Spain, Denmark and Russia).
- *Question : When it comes to dairy and dairy-alternative purchases, how much do you agree or disagree with each statement ? : "I prefer the taste of 'real' dairy over dairy alternatives" (responses to 'strongly agree' and 'agree')*

Closing the texture gap

The technical challenge in creating a winning dairy alternative does not stop with protein selection. Equally as challenging is finding the right balance of starches and texturizers to compensate for the loss of dairy proteins' functionalities.

Cargill offers a wide range of starches for dairy alternatives. For example, our C☆Stretch starch range was developed to give vegan cheeses varying melting and stretching characteristics, as well as improve shredding.

For formulators looking for the optimal functionality of modified starches, but with simple, familiar labels, Cargill offers a wide range of functional native starches under its SimPure brand. These label-friendly starches excel at controlling syneresis and have water-binding capabilities, improving shelf-life stability. One recent addition is the SimPure 996 and 999 series based on tapioca. While SimPure 996 combines tender gelling properties with high process tolerance, SimPure 999 provides body and mouthfeel in pourable and spoonable products. In addition, it brings great texture stability over shelf life.

Under its Unipectine brand, Cargill provides pectin solutions to improve texture stability and mouthfeel, and to create smooth and cohesive gels in dairy alternatives. Unipectine is particularly suited to the stabilization of drinking yogurt and acid drinks, limiting sedimentation and improving stabilization.

Cargill also offers Satiagel carrageenan solutions, which are sustainably sourced from red seaweed, to support gelling and thickening, and limiting sedimentation and syneresis. Satiagel is also well suited to stabilize the melting of vegan alternatives to sliced cheeses. In plant-based desserts, Satiagel compensates for lower dry matter when compared to desserts based on dairy.

Finally, Cargill provides several lecithin solutions to improve mouthfeel, enhance creamy texture, and reduce the UHT cleaning cycle time in dairy alternatives. Different botanical options are available, including soy, sunflower and canola rapeseed; in both conventional and organic options.

The full dairy alternatives toolbox

Cargill has an unparalleled portfolio of solutions for dairy alternatives. But our support goes beyond ingredients alone. We can co-create prototypes and validate new formulations at our pilot plant, simulating the conditions of real-world processing lines. Furthermore, next to our offer of single ingredient solutions, INFUSE by Cargill solutions combine various proteins, texturizers, sweeteners, fibers and other ingredients into tailored blends to meet specific customer demands.

The market for dairy alternatives is mainstreaming. Our broad portfolio and expertise mean that we can help make your new launch in this dynamic field a big success.

Plant-based yogurt alternatives

CP Kelco: Ingredients for success

Plant-based foods and beverages aren't just for vegetarians anymore. According to Innova Market Insights, conservative estimates are that more than 4,000 products with a plant-based claim have launched since 2017. One in four consumers globally is "actively trying to increase consumption of plant-based protein," according to Global Data's 2020 dairy trend report. Six out of ten consumers also told Innova Market Insights in a 2020 survey that they preferred the words "plant-based" instead of "vegan" or "vegetarian" on a product label. They see how plant-based products can benefit those with lactose intolerance and dairy allergies as well as appeal to flexitarians and food explorers.

The next segment ripe for innovation is plant-based, non-dairy beverages (photo: CP Kelco)

Convenience at the core

It's no wonder that plant-based dairy alternative products continue to grow in popularity. In the New Nutrition Business' Key Trends Report for 2021, we see that "plants made convenient" is the next area for growth: Creative new product development is about delivering plants in more convenient and snackable formats. There has been an incredible boom in new product launches of spoonable, plant-based yogurt alternatives since 2015, projected to be seven times that of dairy yogurt, according to Innova Market Insights.

The next segment ripe for innovation is plant-based, non-dairy beverages. In Asia, dairy drinking yogurts and plant-based drinking yogurt alternatives have become popular protein snacks loved by all ages. Making the snack even more convenient for both consumers and companies alike, the idea of ambient (long shelf life) drinking yogurts was born. Without a need for refrigeration, these drinkable yogurts can be stored anywhere and enjoyed anytime (also a welcome idea during a pandemic when shopping trips became less frequent). We believe the idea of long shelf life drinking yogurts could become popular in European and North American countries too – especially when you add the power of plants.

Working with plant protein

Of course, as more product developers expand into the plant-based space, new challenges also arise. Taste and texture are key – especially when trying to reach the flexitarian consumer and compete with traditional dairy counterparts for shelf space. Consumers expect these new plant-based dairy alternatives to have all the great qualities of dairy – the same rich mouthfeel, texture and creaminess – even a similar appearance. So, formulators must find ways to develop not only these desired attributes but also attain shelf stability and a strong nutritional profile using oats, coconut, pea, almond and soy, among other plant sources.

In addition to understanding what consumers want, product developers must also consider how their choice of plant protein can withstand the processing conditions necessary for yogurt production and heat treatment. For example, most plant proteins are not 100% water soluble. They don't offer the same functionality as traditional dairy casein with its butterfat and minerals. Textural challenges can arise from the absence of milkfat as well as the natural grittiness of plant protein. Earthy or beany notes can also impact flavor. So, it means formulators must get creative when revamping a recipe.

While culinary expertise in selecting the right plant protein is paramount to achieving exceptional flavor, the true secret to achieving success in plant-based yogurt alternatives is choosing the right stabilizer system. It can help solve the most common challenges in both stirred and sippable formulations: syneresis control, suspension of insoluble particles and protein protection, in addition to contributing to texture, body and mouthfeel.

Proven stabilisers

Two proven stabilizer hero ingredients are pectin and gellan gum. They work especially well in ambient/long shelf life products that undergo a heat treatment. Pectin is an easily recognized, label-friendly ingredient extracted from citrus peels. It can be used to protect proteins at an acidic pH and provide long-lasting stability over shelf life while also preventing sedimentation and syneresis. A well-known gelling agent, pectin can help formulators create a creamy, spoonable texture by delivering that missing "fat sensation" and optimize mouthfeel as it masks off-tastes.

Gellan gum is a multifunctional, fermentation-derived ingredient for solving plant-based protein challenges, with a composition identical to the naturally occurring bacteria on water lily pond plants. It provides stabilization and suspension of insoluble protein, calcium, minerals and other particles in non-dairy yogurt alternatives while contributing minimal mouthfeel and ensuring a smooth pour.

The Health Halo

For its 2020 Top Ten Trends Survey, Innova Market Insights asked consumers around the globe why they chose to eat plant-based foods. Their top reasons included "It is healthier" and "it is better for the planet." With a health halo adding to the growing interest in trying plant-based applications, a clean, recognizable label is also critical. Product developers should honor this perception of health and sustainability in their choice of stabilizers. Using nature-based ingredients such as pectin and gellan gum will complement your plant proteins, and grades are available to meet claims of organic compliance, non-GMO, gluten-free and other clean label goals. Because of their multifunctional qualities, pectin and gellan gum can also help formulators shorten their ingredient list overall.

When a product developer is able to connect all of the elements of innovation, there is no limit to the potential for success with plant-based, non-dairy yogurts.

Harnessing plant power

How ingredient innovations can help create appealing dairy alternative drinks

The market for plant-based dairy alternatives presents exciting and attractive growth potential for food and beverage manufacturers, as it continues to gain pace alongside the traditional dairy sector. A significant rise in flexitarian, vegetarian and vegan lifestyles has led to a thriving market that is currently valued at an impressive EUR 17.5 billion.[1] The category's upward trajectory also shows no signs of slowing down, with recent research across 10 countries globally demonstrating that 53% of consumers will be looking for more plant-based alternatives in the coming three to five years.[2] Producers face complex challenges, however, in formulating plant-based dairy alternatives. It is not enough anymore for products to just be plant-based, they also need to offer the great taste, sweetness, texture and – crucially – nutritional profile that are increasingly a prerequisite for consumers today.

Taste and texture barriers

The sensory properties of plant-based solutions remain a strong influencer of consumers' purchasing decisions, with 62% of people reporting that taste is their number one priority when buying food or drink products.[3] Consumers have come to expect an appealing flavor from their dairy alternative drinks too, with the right amount of sweetness – without adding sugar – as well as a great mouthfeel.

But with certain beverages, such as the increasingly popular starch-based drinks, achieving this sensory profile can pose significant formulation challenges. Since starch-based drinks do not initially possess consumer-friendly properties, they require additional steps in the production process to create an appealing taste and texture profile. Starch must be made soluble, the often undesirable flavor off-notes of plant protein have to be masked, and the natural sweetness in raw materials like rice and oats has to be unlocked.

Meeting varied preferences

Formulation challenges, however, extend beyond simply adjusting the natural sweetness of plant-based raw materials to a pre-determined level. How can producers also meet the varied regional preferences for the sweetness of plant-based dairy alternatives? Northern Europeans, for instance, look for plant-based varieties with less sweetness and a heightened focus on cereal flavors, compared to their southern European counterparts, who typically prefer sweeter products.

Solutions that can easily adjust the natural sugar profile of dairy alternatives present in the starch base – by leveraging the glucose (high sweetness) and maltose (low sweetness) inherently present in the oat or starch – are therefore becoming popular. This allows producers to deliver the 'perfect' sweetness profile for their target regions without, or with limited, added sugar.

Achieving balanced nutrition

In addition, producers need to consider the growing appeal of products with a high-quality nutritional profile. Traditional dairy products are a rich source of calcium, protein and other nutrients, which makes them well placed as part of a healthy, balanced diet. Unfortified dairy alternatives, however, typically have a lower nutritional value than dairy products – often lacking essential vitamin B2, vitamin B12 and calcium. This nutritional gap has not gone unnoticed by health-conscious consumers, with research showing that 44% of

(Photo: DSM)

people who buy oat drinks would like them to be enriched with vitamins.[4]

Increasingly health-savvy consumers, alongside those that are gluten intolerant, are also driving demand for low-gluten or gluten-free plant-based products – for their perceived health appeal. Producers are therefore looking for innovative solutions that can help them reduce the high gluten levels of cereal-based drinks to meet the growing needs of this demographic.

Ingredient innovation

As consumer preferences change and expectations for plant-based dairy alternatives become more and more sophisticated, producers are turning to solutions that can help them achieve all-important differentiation in a competitive market. DSM's complete portfolio of dairy alternative solutions was launched with these needs in mind. The DelvoPlant range of enzymes, for instance, offers a range of unique benefits when it comes to optimizing the taste, texture, sweetness and nutritional profile of plant-based drinks. For example, DelvoPlant ALT is added at the liquification stage to degrade dextrin to maltose and create an appealing mouthfeel, while DelvoPlant BGL further reduces the viscosity of cereal-based drinks and DelvoPlant TNP increases digestibility and solubilization.

Gellan gum, a naturally occurring polysaccharide, is also gaining traction among producers looking to deliver superior functionality in many plant-based food and beverage applications. DSM's GELLANEER hydrocolloid solutions provide additional benefits during saccharification, as a suspension, stabilization and texturizing agent. For example, in dairy alternative drinks, it improves product stability and contributes to more body and a creamy mouthfeel. Meanwhile, DSM's ModuMax modulation solutions enhance taste by masking the off-flavors created by raw materials and sweeteners and supporting an optimum mouthfeel in premium plant-based drinks, such as a milky texture and great taste in cereal- and non-cereal-based beverages.

The sensory properties of plant-based solutions remain a strong influencer of consumers' purchasing decisions (photo: DSM)

Beyond texture, enzyme solutions can also enhance the sweetness of plant-based drinks. DelvoPlant GLU and DelvoPlant MAL provide producers with greater control over the sweetness profile of cereal- or starch-based beverages, helping to create healthier plant-based drinks without added sugar. These enzyme solutions also support sweetness that can be modified to align with local market preferences.

Furthermore, DSM's DelvoPlant enzyme portfolio can be used to meet the rising demand for nutrient-rich dairy alternative beverages. DelvoPlant PHY helps unlock the minerals naturally available in oat-based drinks to improve the nutritional value, while DelvoPlant PSP can lower the gluten content in cereal-based beverages to meet the needs of gluten-intolerant and increasingly health-conscious consumers. DSM's vitamins and nutritional premix solutions are also gaining in popularity among producers looking to boost the nutritional profile of plant-based drinks.

DSM continually evaluates and innovates its integrated product portfolio, with new developments in the pipeline featuring CanolaPRO[5], a unique, plant-based protein with functional properties, a complete nutritional profile and balanced flavor notes. It also offers producers of cereal-based and other plant-based drinks versatile texture benefits thanks to its superior solubility, and it enables the fortification of products without impacting taste and texture.

The secret to plant-based success

With interest continuing to rise in plant-based dairy alternatives, producers must find novel ways to overcome common formulation challenges and develop high-quality products with an appealing taste, texture, sweetness and nutritional profile. Innovation in ingredient solutions, from enzymes and hydrocolloids to taste modulation solutions and vitamin premixes, is providing producers with the tools they need to overcome these challenges and unlock the full potential of dairy alternatives.

As a 'one-stop-shop' solutions provider, DSM offers comprehensive end-to-end support for manufacturers in the development of premium plant-based dairy alternatives. By leveraging our complete portfolio of dairy alternative solutions, as well as market, technical, scientific and regulatory expertise, we can help brands not only create products that continue to meet – and exceed – consumer expectations, but bring them to market more quickly.

For more information, contact the author at **Ben.Rutten@dsm.com**

1 Euromonitor, 2020 (CAGR 3.1%, 2018-2025).
2 DSM, Future of Food report, 2020.
3 Ibid.
4 FMCG Gurus, Dairy Survey Q3 2019 N=45,000.
5 CanolaPRO will be commercialized in 2022, with product samples already available to trial today.

Ecolean

Lightweight packages a great fit for all-natural dairy alternatives

Sustainability and health conscious Chinese consumers can now look to US-owned brand Wholly Moly! to enjoy dairy-free drinks with an oat base, in Ecolean's lightweight flexible packages.

The rising focus on health is one of the key drivers for the popularity of the dairy alternatives market worldwide. FMCG Gurus' Top Trends 2020 report states that 73% of consumers believe it is important for food and drink products to be all-natural. At the same time, consumers are making the link between sustainability and their own personal wellbeing. As such, consumers want brands and individuals to take a proactive approach when it comes to protecting the environment and leading a more sustainable lifestyle, according to the report.

Headquartered in Silicon Valley, California, US and Shanghai, China, Wholly Moly! is a leading brand in whole-grain and oat products tailoring to a new generation of Chinese consumers. Wholly Moly!'s oat drinks are set to innovate not only their product category by offering an oat product without any additives, but also through the packaging they have chosen to launch their drinks in. Ecolean's lightweight packaging solutions address both consumer convenience and environmental awareness. A minimal amount of packaging material means less resources used throughout the package's life cycle – for example less energy and water in production, and lighter packaging during transport. The result – a liquid food package with less impact on the environment, offering a lighter footprint for both customers and consumers.

"Without any additives, Wholly Moly! products retain their original nutrition and sweetness. We dare to use the original taste of healthy cereals. The oats grow in the fresh soil and sunlight of the Midwest of the United States and southern part of Canada, and are packaged under strict North American standards, bringing high-quality oat products to health and sustainability conscious consumers in China," says Claire Fang, CEO at Wholly Moly!.

"We welcome the launch of Wholly Moly! oat drinks in Ecolean packages, as a great fit for our approach to sustainability and being a responsible business in the packaging industry," says Johnny Sajland, Chief Commercial Officer at Ecolean. "As a global packaging producer offering lightweight packaging solutions for both chilled and ambient distribution, Ecolean is active on more than 30 markets worldwide and partners with many of the most well-known brands within the dairy, beverage and liquid food industry."

Wholly Moly! is a subsidiary of Yum Delight, headquartered in California, US. The products are available in the Greater China region and the US, through both direct-to-consumer e-retail and supermarkets and has been available in Ecolean packaging since May 2020.

Introducing Cargill's pea protein offer for Europe

Need the perfect plant-based protein?

GIVE PEAS A CHANCE

Plant-based dairy alternatives are booming, yet consumers still expect manufacturers to deliver on flavor, texture and nutritional expectations.

That's why we're introducing our pea protein offer to Europe. They're rich in quality protein, don't require allergen declaration, and appeal to sustainably minded consumers.

With outstanding solubility, mild flavor and different options in terms of functional properties, we offer a wide range that will suit your formulation needs.

So whether you're creating a plant-based alternative dessert, yogurt, ice cream, cheese or beverage, give peas a chance!

Cargill's pea protein offer for Europe

Versatile. Functional. Irresistible.

- Plant-based
- Quality protein
- Sustainable
- Organic
- No allergen declaration
- Label-friendly

Learn more at cargill.com/emea/pea-protein

Cargill®

GEA

Plant-based beverages

The rapid uptake in plant-based foods is keeping manufacturers on their toes. Plant-based beverages are gaining a significant consumer base, driven most recently by people's increased focus on health and sustainability as well as the fact that there are simply more high quality products available for people to explore and enjoy.

The dairy alternatives sector encompasses products that are 100% plant-based, made from nuts, seeds or grains, which replace dairy-based products in the form of beverages, spreads, ice cream, yoghurt and other ready-made food products. Once in aisles mostly frequented by consumers with lactose intolerances or milk protein allergies, today, plant-based options have become mainstream as more consumers pursue healthier lifestyles, seek to reduce their ecological footprint – or simply discover they really like the taste.

Compared to just 10 years ago, consumers in a growing number of markets are now relatively spoiled for choices, with new dairy-free products coming onto shelves each year. At the same time, consumer expectations around taste, texture, ingredients, nutrition, provenance and overall ecological footprint are also increasing.

Global shift towards more healthful and purposeful eating

Some studies estimate that as much as 65% of the global population has a reduced ability to digest lactose after infancy. Lactose intolerance is most prevalent in people of East Asian descent, affecting more than 90% of adults in some of these communities. Lactose intolerance is also very common in people of West African, Arab, Jewish, Greek, and Italian descent. This intolerance most often occurs because our bodies produce less lactase – the enzyme required to break down the lactose sugar in milk – as we move away from milk as the primary source of nutrition. In many cultures this occurs already in early childhood and can result in digestion problems. Others have milk protein intolerance or suffer from a milk allergy – the latter involves the immune system and can be life-threatening. And some people avoid dairy products to minimize their exposure to steroids or hormones.

Globally, more people are adopting flexitarian eating habits, vegetarianism or vegan diets as a response to concerns about the ecological footprint of some foods. This has increased interest in plant-based beverages. Soy and pea alternatives, for example, deliver high protein, which is key as more consumers make this shift. Pea-based beverages, in fact, have even more protein per glass than cow's milk. And in some markets, these types of drinks are actually more affordable than traditional cow's milk. And because most people need two or three servings of dairy (or dairy alterna-

ENGAGE WITH CONSUMERS BEYOND RETAIL

GEA is keeping a close eye on the plant-based beverage sector. It's important for us to know what trends and innovations are coming down the pipeline so that we can support our customers in meeting changing consumer expectations and needs.

Steffen Rathmann,
Head of Non-alcoholic Beverages, GEA

(photo: GEA)

tive) every day, this is a dietary matter that consumers cannot simply brush aside. Combined, these factors are driving the growth seen in this dynamic sector.

A walk down the plant-based beverage aisle

The tremendous variety in this sector is manifest in the numerous products made from nuts, seeds and grains, such as: soy, coconut, cashew, macadamia, hemp, quinoa, barley, flax and pea. Many of these drinks are highly nutritious and fortified with calcium and vitamin D. The most common are:

- **Soy milk:** a high-protein liquid made from ground cooked soybeans; typically fortified and used as a milk substitute; has roughly the same protein per cup as cow's milk
- **Almond milk:** a plant milk manufactured from almonds; contains no cholesterol or lactose
- **Rice milk:** a grain milk made from rice (typically brown); mostly sold unsweetened
- **Oat milk:** a milky liquid made from oats; used as a milk substitute, cooking ingredient and beverage.

PLANT-BASED BEVERAGES RETAIL

Leverage the nutritional value of plant-based yoghurt

Target flexitarians, vegetarians and vegans, as well as dairy consumers who are health-conscious and environmentally aware to build brand loyalty

Improve flavor and texture, including developing products with flavors that emulate dairy-based yoghurts

Culture and the economy play vital roles in the development and spread of plant-based beverage consumption. According to research organization, Zenith Global, soy milk, which is well established in Asia, continued to dominate the global category throughout 2018 – representing about 50% of the global volume. Almond milk followed at 26%, and is expected to greatly increase in popularity over the next five years, particularly in Western countries. In fact, almond overtook soy milk as the best-selling plant-based milk in the U.S. in 2013. In Asia Pacific, more new products are utilizing value added ingredients (e.g. collagen, amino acids or charcoal) and emphasizing free-from attributes (e.g. soy-free, nut-free, preservative-free, GMO-free or sugar-free). This shift is driven largely by an increased focus on healthy diet and the fact that more households have disposable income.

As seen throughout the food sector, cross-over formats are also gaining in popularity. For example, granola cereal in the form of granola bars or yoghurt, traditionally eaten from a container with a spoon, is now often sold in ready-to-drink (RTD) containers, including probiotic, dairy-free alternatives. The RTD option is ideal for active consumers who might be traveling to work, on their way to the gym or looking for a quick snack between meals. And while the growth opportunities in the dairy alternatives beverage sector are tremendous, consumer expectations have never been higher. When it comes to plant-based yoghurt products, Euromonitor International recommends manufacturers:

GEA will continue to place emphasis on development in the plant-based beverages industry, leveraging its knowledge and expertise across the world, particularly at its development centers for non-alcoholic beverages.

The GEA constellation really empowers us to bring together experts from across disciplines and to integrate the best ideas into a tailor-made concept. We have a strong team working with our customer in China to ensure that the project rolls out successfully."

OK, Boomer

Survey highlights gulf between youngest and oldest consumers

Generation Z consumers are more concerned about the sustainability credentials of food and beverage products than Boomers, and find vegetarian and vegan products more appealing, new research shows.

PR company Ingredient Communications surveyed 1,000 adults in the US and UK. A third of those aged 18-25 (34%) said they consider it 'very important' that a product is made sustainably, compared with 18% of those aged 65 and over.

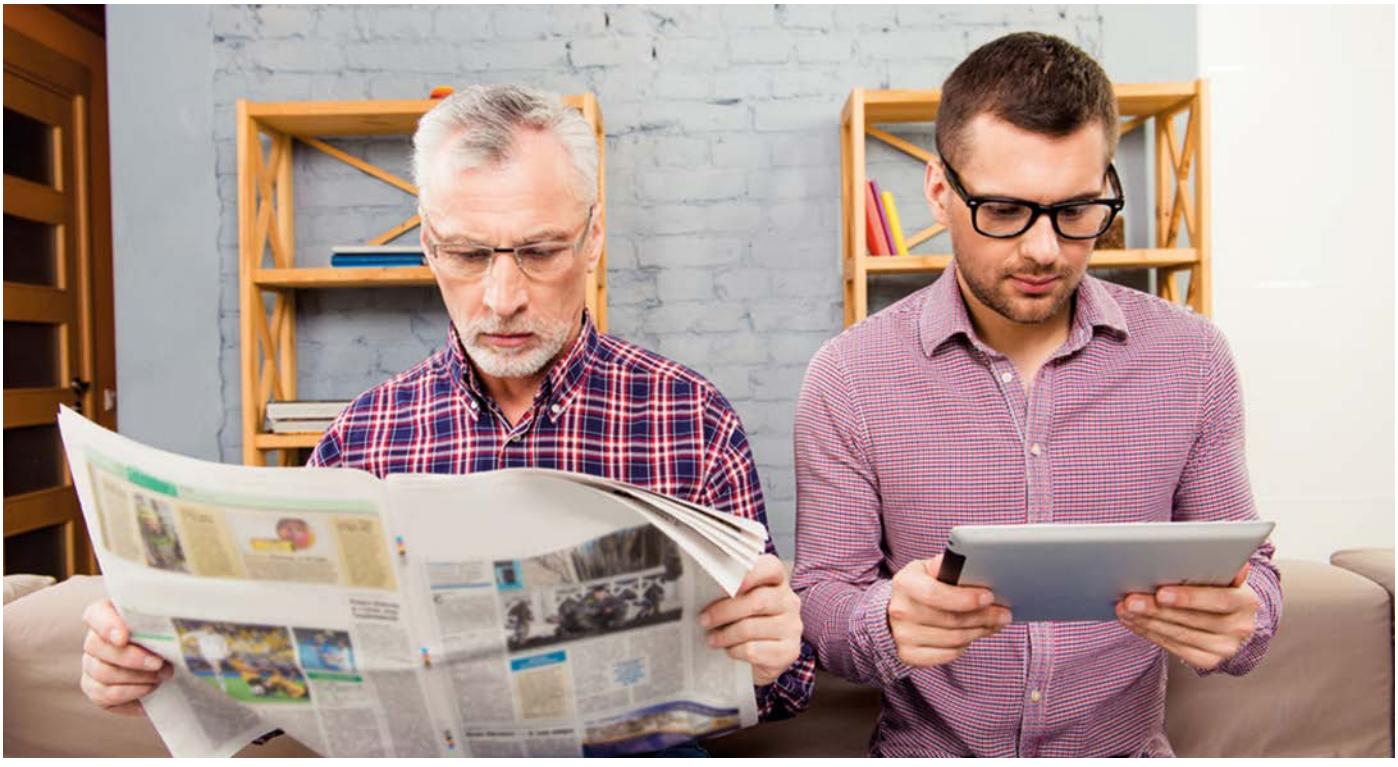
Meanwhile, 38% of 18 to 24-year-olds said they find vegetarian claims on products to be 'very appealing' and 33% said they feel the same way about vegan claims. However, only 6% of respondents aged 65+ said they find vegetarian claims 'very appealing' and just 3% said the same about vegan claims.

It's not only on environmental and ethical issues that the two generations differ. The youngest consumers are much more price sensitive. In the survey, 29% respondents aged 18-24 said it is 'very important' that a product is the cheapest available, while only 3% of people aged 65+ agreed. However, consumers aged 18-24 are much more willing to pay extra for a product that is made entirely with ingredients they recognize, with 67% saying they'd do so. By contrast, only 27% of those aged 65+ would pay more.

Richard Clarke, Managing Director of Ingredient Communications, said: "It's no surprise that younger and older consumers see the world differently. But this survey sheds light on how their views diverge in the food & beverage sector. These insights highlight the importance of aligning product development and marketing with the worldview of your target consumer demographic. While there will be common ground between generations, the areas of disagreement can be quite striking – and this means a one-size-fits-all approach is risky."

The research, conducted by SurveyGoo in September 2020, also found that the youngest shoppers have the strongest feelings against GMO ingredients. Two in five (39%) said that a GMO-free product is likely to be 'very healthy', compared with just 14% of over 65s.

In addition, while nearly four in ten (38%) of 18 to 24-year-olds believe that label claim 'gluten-free' is a sign that a product is 'very healthy', only 6% of Boomers hold this view. Accordingly, 31% of 18-24s said they find a gluten-free claim on a product to be 'very appealing' compared with 8% of over-65s.



A new survey found that generations differ not only on environmental and ethical issues (Photo: Ingredient Communications)

Prinova

New premixes for the plant-based revolution

Prinova also offers a premix optimised for plant-based cheese (photo: Prinova)

Prinova has launched a range of premixes for dairy replacement products, to help manufacturers respond to what it describes as a plant-based "revolution". In a new White Paper, the company highlights the growing prevalence of vegan and other non-dairy diets and its impact on plant-based markets. The dairy alternative market is projected to grow from USD 21.4 billion globally in 2020 to USD 36.7 billion by 2025 – a CAGR of 11.4%.[1] Similarly, the plant-based protein market is predicted to increase from USD 10.3 billion in 2020 to USD 14.5 billion by 2025 – a CAGR of 7.1%.[2]

The shift towards plant-based diets has created new nutritional challenges. Although vegans generally obtain enough protein, it can be hard for them to consume some micronutrients in sufficient quantities. Vitamin B12, for example, is absent from virtually all plant-based foods.

In order to help manufacturers meet this need, Prinova has developed new nutrient-rich premixes for dairy replacement products, and new recipes to demonstrate how well they work. Made from Prinova's 85% pea protein, its plant-based milk is smooth and creamy with a full yet light mouthfeel. Meanwhile, its pea protein yoghurt is whiter than most plant-based alternatives on the market.

A single serving of each recipe with 25mg of the premix contains 15% of the recommended intake of Vitamin B12 and 50% of the recommended intake of Vitamin D.

Prinova also offers a premix optimised for plant-based cheeses, which it is showcasing in a vegan cream cheese recipe. The premixes can all be adapted to include additional functional ingredients, such as probiotics, as well as flavourings.

Tony Gay, Head of Technical Sales & NPD for Nutrition at Prinova said: "The rise of plant-based diets is one of the most important trends in the food industry today. It has created a whole new consumer segment with particular nutritional needs, and new challenges and opportunities for manufacturers. One of the best strategies they can adopt is the use of nutrient-rich premixes. Our new recipes demonstrate how easy it is to offer appealing dairy replacement products that meet the nutritional requirements of vegan consumers."

The new recipes were made using Prinova's Pea Protein 85%, which is high in Branched Chain Amino Acids and allergen-free. Additionally, Prinova offers a full portfolio of other plant-based proteins which include chickpea, oat and soy, and which can be used in applications ranging from sports nutrition to pet food.

1 Markets and Markets 'Dairy Alternatives Market by Source', June 2020

2 Markets and Markets Plant-based Protein Market by Source, July 2020

Cheese alternatives that taste good

Willicroft has big ambitions

Willicroft, Dutch manufacturer of cheese alternatives, has big growth ambitions. Having just started selling its products in grocery stores in October 2020, sales are set to increase six-fold in 2021. IDM asked with company boss Brad Vanstone about the background.

Willicroft traces its origins to a dairy farm in Devon, UK, set up by Vanstone's grandfather in the 1950s. After Vanstone decided to adopt a vegan lifestyle in 2016, he soon found that there were hardly any replacement products on the market that even came close to cheese. So the decision to build a business with plant-based cheese alternatives was quite obvious. "The market for cheese alternatives is currently hardly occupied. This is a gap in the market that we entered in 2018. At first we did the manufacturing in-house, but now our products are made in a factory near Rotterdam," explains Vanstone.

Vanstone found its breakthrough to larger dimensions last autumn with a listing in Waitrose markets in the UK as well as Belgium and the Netherlands. The distribution partner Vandersterre was able to open some doors here. In 2021, expansion into Scandinavia, Switzerland and Germany is on the agenda. Accordingly, turnover is expected to increase from €500,000 in 2020 to €3 million in 2021.

Brad Vanstone is all about completely regenerative food production

Change in raw material

Willicroft currently offers eight plant "cheeses" for the food retail trade and 12 items for the food service sector. Bestsellers in the range are Fondue and Parmesan and Feta alternatives. With the exception of "Feta", they are

Willicroft also produces spreads like this cream cheese substitute

The products that are being replaced are still described negatively with "This is not ...".

still made on the basis of cashew nuts or are based on tofu like the "Cream Cheeses". "We operate a very artisanal production process similar to that of making cow's milk cheese, delivering products that are very similar to cheese in sensory and texture terms. We chose cashew as a raw material because the protein and fat content is similar to milk," says Vanstone. But the environmental footprint of cashew is notoriously poor. That's why Willicroft will switch completely to white beans sourced from Turkey and the Netherlands after testing about 30 different raw materials. The recipe changes are already underway.

Interestingly, "organic" is not a central issue for Willicroft. He can certainly claim organic status by switching ingredients, Vanstone explains, but it is about more, namely completely regenerative food production. Nevertheless, a number of organic products are currently in the planning stage.

Carbon footprint as a selling point

In the course of 2021, Willicroft plans to advertise the carbon footprint of its products on the packaging. "We have already prepared a life cycle analysis for all our products, which of course also takes into account the social aspect of sustainability," is the note from Vanstone. For packaging, mono-materials are used from the beginning, which are easy to recycle. Plastics are used because they give the products the necessary shelf-life and contribute only 10% to the carbon footprint of a product.

Product declaration will change in 2021. Willicroft uses the claim "This is not ..." with the addition of the original product name such as Cream Cheese or Greek White. This could well be justiciable under current designation protection regulations. At the time of the interview with IDM, however, it was still unclear how exactly Willicroft will designate its cheese alternatives.

The food future is green

Chr. Hansen responds to growing health and sustainability trends with a deepened commitment to collaboration with plant-based producers

As a growing interest in healthy eating and sustainability shape consumer decisions about what they buy and what they eat, the plant-based segment is projected to grow at an increasingly rapid rate. Producers who hope to succeed within this category must be able to meet the demands of an expanding and increasingly sophisticated consumer base. One that is continuously on the lookout for the best healthy options that offer great taste alongside creating a lighter carbon footprint.

Tasteful plant-based alternatives that measure up to traditional dairy

Research suggests that while consumers are open to replacing traditional foods with plant-based alternatives, a significant percentage does not like the taste of plant-based foods. Indeed, for instance more than two-thirds of Americans state they would be willing to incorporate more plant-based options into their diets if they tasted better than those options currently available.

Together, these trends indicate two things: first, that a segment of the global population will seek out plant-based options regardless of whether they can compete with more traditional foods when it comes to taste and culinary experience; and second, that a significant percentage will only make the switch if they believe the plant-based product is as delicious as the dairy-based counterparts they have become accustomed to eating.

Plant-based alternative products are currently experiencing a real boom (Photo: Chr. Hansen)

Consumers are looking for plant-based options without artificial ingredients (Photo: Chr. Hansen)

Kathrin Meyer, Business Development, Food Cultures & Enzymes, Chr. Hansen: Our decades of on-the-ground experience to perfect recipes, troubleshoot challenges and customize solutions leaves us well-equipped to take on the challenges and opportunities the plant-based industry is tackling (photo: Chr. Hansen)

New standard for excellence

With more than 145 years of experience, Chr. Hansen knows what it takes to bring sustainable innovations to market. We have built our business and shaped our strategy around our commitment to helping customers gain an edge while addressing broader global challenges. While our reputation has been built on collaboration with the dairy industry – and continues to be - , our focus in recent years has widened to include work with plant-based producers as they gain momentum in the marketplace and grow their market share worldwide.

Our recent launch of FreshQ DA food cultures reflect this deepening commitment, giving plant-based producers the ability to reduce food waste and improve quality by keeping their products fresh for longer, all while catering to consumer demand for plant-based options that are free from artificial ingredients. FreshQ DA is comprised of carefully selected lactic acid bacteria, which have the ability to delay spoilage from yeast and mold when used in fermentation. The bioprotective effect gained in the fermentation using these cultures helps to protect plant-based products against spoilage and optimize shelf life to save money and reduce waste for producers and consumers alike.

Research shows that consumers are more likely to check the ingredients list on dairy alternatives than on traditional dairy products. This is because these tend to use more additives to achieve dairy-like texture and appeal. With our microbial solutions, Chr. Hansen wants to enable producers to gain a natural competitive advantage by offering superior-quality products that stay fresh, delicious, and safe without adding unwanted artificial ingredients.

"Unique challenges require customized solutions," says Kathrin Meyer, Business Development, Food Cultures & Enzymes, Chr. Hansen. "With plant-based alternatives producers are using bases of all kinds, including oat, almond, coconut, pea and cashew. Increasingly, producers are mixing various ratios of different bases to explore more innovative outcomes or yield particular characteristics. Optimizing this diverse array of ingredients and properties requires innovative solutions that can be dynamic and easily tweaked as recipes evolve or change," she elaborates. "Our decades of on-the-ground experience, working alongside our customers to perfect recipes, troubleshoot challenges and customize solutions leaves us well-equipped to take on the challenges and opportunities the plant-based industry is tackling."

A more sustainable future

As plant-based options continue to capture consumer attention and a growing segment of the market, we believe that going forward, the category will be led by those producers who are able to offer the best taste alongside convenience and superior freshness. Consumer focus on health, wellbeing and sustainable consumption will only continue to push demand for compelling alternatives within this category. With over a century of expertise, Chr. Hansen is expanding its work in the plant-based industry, helping producers satisfy growing demand and raising the bar for what is possible for plant-based alternatives. "As we look to the future, we believe this category will be able to offer products that are more delicious, more competitive and more sustainably produced than anything the market has seen so far," explains Meyer. "We look forward to getting to work to help shape this future, forging new partnerships within the plant-based space and serving as a crucial collaborator to support our customers in the exciting innovation that lies ahead," she concludes.

Optimum efficiency

Use of state-of-the-art analytics in the production of plant-based beverages

Plant-based beverages are enjoying growing popularity among consumers. There are many reasons for this, ranging from the desire for sustainable and healthy nutrition to vegetarian or vegan lifestyles and concern for animal welfare.

The market is booming. As early as 2017, global sales of plant-based drinks have reached almost $250bn. With an annual growth rate of 6.7%, this figure is expected to almost double by 2028.[1]

Among the manufacturers pushing into this market are large soft drink and juice producers as well as, increasingly, dairies that want to offer their customers an alternative to dairy products. There, near infrared spectroscopy (NIRS) has been attracting more and more attention as a versatile instrument for quality control and process management for some time now.

But unlike dairy products, juices or soft drinks, plant-based beverages are relatively new on the market and experience in production optimization is still limited. In the production of plant-based milk alternatives in particular, high investments are required, as oils, fats and additives often have to be added to match the taste and mouthfeel of their animal-origin counterparts. Economic use of resources and optimized production conditions therefore play a decisive role in the creation of value.

This can be exemplified by the production of oat drinks. Oats are increasingly the raw material for plant-based drinks. The reasons for this are the relatively high protein content, the high proportion of unsaturated fatty acids and the fact that oats are naturally gluten-free. Oats also contain a lot of β-glucan, which is said to have a positive influence on the immune system, the cholesterol level and a positive influence on the blood level and blood sugar.[2]

Essentially, the production process of an oat drink consists of the following steps:

- Selection of the raw material
- Gelatinisation by adding hot water and stirring
- Addition of enzymes for splitting starch into sugars and their deactivation at a defined time
- Separation of insoluble components
- Addition of additives and, where appropriate, the preparation of mixed drinks.

The raw materials used are either oat grains or flakes, already ground as oatmeal, or liquid oat concentrates. Oat grain is the most cost-effective. With regard to the quality-imparting ingredients, however, it is subject to strong fluctuations depending on the variety used and seasonal changes. The same applies to oat flakes and oatmeal.

Simple, reliable, comes without tube: the DairyQuant GO for analysis in labs or atline- of liquid to highly viscous samples

NIRS is a reliable tool

For all agricultural products, near-infrared spectroscopy (NIRS) has long since established itself as a reliable tool for non-destructive determination of ingredients. Not only protein, fat, starch, fiber and dry matter can be analysed within a few seconds.

Versatile, simple to change Petri-Spinner for exact analysis of solid and semi-solid samples

Compact and flexible: InsightPro for online anaylisis and process optimization at up to two measuring points

It is also possible to measure the β-lucan content.[3]

For gelatinization, the oatmeal is mixed with hot water and stirred. The starch contained in the oatmeal is dissolved, which results in a drastic increase in viscosity.

By adding α-amylase, this viscosity decreases again. The starch is enzymatically split into dextrins. During the subsequent saccharification, a second enzyme – either maltogenase or gluconase – takes over the task of converting the dextrins into sugar. This is the decisive phase in order to achieve the desired product properties in terms of viscosity and sweetness. Here too, NIRS is able to determine the decisive parameters of viscosity[4], starch and sugar content in almost real time and transmit them to the process control system. Once the specifications are reached, the enzymes are thermally deactivated.

The insoluble fiber components are separated by decanters. The efficiency of the separation is not only decisive for the yield, but also for the organoleptic perception of the product. The measurement of both fiber content in the permeate and residual moisture in the residue via NIRS can contribute directly to process optimization. However, the residue must never be considered as waste. It still contains many nutrients that make it suitable for use as animal feed, which can also be determined by NIRS.

The semi-finished product produced in this way is then either mixed with oil and salt and marketed as a "clean label" product or varied in taste in a multitude of ways. This is done by mixing with fruit juices, dairy products, adding vitamins or stabilizers or even chocolate. As oat extract with a content of approx. 15% oats, it can also be used to make yoghurt, cooking cream and even cheese-like products. Regardless of which formulation is used, complex and expensive wet chemical analyses of the ingredients in the finished product are drastically reduced by the use of NIRS, while the number of control samples can be significantly increased at no cost.

NIRS thus proves to be an efficient and versatile instrument in quality management along the entire value-added chain, from incoming goods to the finished product, and supports the economic use of resources and production facilities. Q-Interline has more than 30 years of experience in the field of NIRS. Outstanding FT technology, comprehensive knowledge of sampling and the implementation of technically demanding projects in close cooperation with customers are the hallmarks of Q-Interline. Further information can be found at **www.q-interline.com**.

1 2019 Analysis and Review Plant-based Beverages Market, JMI Press Release 27.01.2020
2 Scientific Opinion on the substantiation of health claims related to beta-glucans, EFSA Journal 2011;9(6):2207
3 A Single Analytical Platform for the Rapid and Simultaneous Measurement of Protein, Oil, and β-Glucan Contents of Oats using Near-Infrared Reflectance Spectroscopy, Devendra Paudel et al., Cereal Foods World · February 2018
4 Use of inline near-infrared spectroscopy to predict the viscosity of shampoo using multivariate analysis, K. Haroon et al., International Journal of Cosmetic Science, 2019, 41, 346–356

Plant-based dairy alternatives

The main characteristics of chicory inulin

Frutafit inulin and Frutalose oligofructose are natural ingredients extracted from chicory roots. Chicory inulin and chicory oligofructose are used in food for various technological and nutritional reasons.

From a technological point of view inulin improves texture and mouthfeel in fat reduced products. It has a high water retention capacity resulting in a gel with reological properties very similar to fat and a good fat mimicking mouthfeel. It is a very suitable ingredient for structuring in low- and zero-fat food products. Inulin and oligofructose also improve the taste and mouthfeel in sugar reduced products. They have a neutral (sucrose-like) sweet taste and have bulking properties to restore the dry matter after removing sugars. Inu-

Chicory inulin is a natural soluble dietary fiber and comes from roots of the chicory plant.

lin and oligofructose can help to build structure in low sugar and 'no added sugar' food products.

From a nutritional perspective chicory inulin and chicory oligofructose are interesting as they are soluble dietary fibers, with scientifically proven prebiotic and related health benefits. It has a low caloric value and can be used for sugar, fat and calorie reduction. Since inulin and oligofructose are soluble fibers, they can enrich a product with fibers, without changing the appearance of the product or giving the end product an offtaste, which is sometimes encountered with high fiber products. They can also be used to formulate products with a reduced glycemic response.

Effects in dairy products and plant-based dairy alternatives

Frutafit inulin has the ability to improve the texture and increase creamy mouthfeel of low fat (nondairy) yogurt without affecting the fermentation time and taste. Because of the low caloric value of Frutafit inulin the creaminess of low fat yogurt will be improved without increasing the calorie content of the yogurt.

Using Frutafit inulin and Frutalose oligofructose in dairy products and plant-based dairy alternatives is an easy way to add fiber. It does not negatively affect the taste or appearance of the product. Frutafit inulin and Frutalose oligofructose are prebiotic fibers, which fits very well in dairy and alternative products. The combination with probiotic ingredients opens up the opportunity to develop symbiotic products.

Due to their sweetness Frutafit and Frutalose can also be used in sugar reduced or no added sugar products to increase sweetness and mask off tastes. Application and sensory research have shown that combining Frutafit chicory inulin and Frutalose chicory oligofructose with high intensity sweeteners has several benefits. Frutafit inulin and Frutalose oligofructose show synergy in sweetness and they can mask off- and after tastes of these sweeteners.

Due to the low calories of Frutafit inulin and Frutalose oligofructose it is possible to reduce calories or develop 'light' dairy drinks.

Dosage, application, heat stability

Using inulin or oligofructose usually means very little to no change in processing, which makes it very easy to incorporate.

Depending on the application, type of inulin or oligofructose and the desired effect, the addition levels vary anywhere between 2 to 20%. For example, to improve mouthfeel, creaminess and prevent syneresis in yoghurt or yoghurt type products, addition levels vary between 1.5 and 8%. There is a difference between the type of inulin as well; where we found positive effects on mouthfeel already at 1.5% when using a long chain inulin, the optimum effect for native inulin was around 3%.

Frutafit inulin and Frutalose oligofructose are plant-based, prebiotic, soluble dietary fibers with texturizing properties and a great taste that provide added health benefits.

In ice cream positive effects on creaminess, mouthfeel and reduced ice crystal size were found in in the range of 2% up to 15% added inulin. These levels really depend on the formulation and the desired outcome.

Inulin is stable at temperatures up to 140°C (when dissolved at near neutral pH) and can therefore be processed easily in most, if not all, food applications.

Shelf-life

Frutafit chicory inulin and Frutalose chicory oligofructose do not negatively affect the shelf life of products. They have actually been found to prevent syneresis in spreads, mousses and yoghurts.

Sensus inulin compared to other origin

Chicory inulin and oligofructose are available in different types on the market, which all have their own unique properties. Long chain inulin for example has very little sweetness, but very good texturizing properties. Oligofructose is not a strong texturizer since it has short chains, but can offer sweetness of up to 60% compared to sucrose. These differences might appear small, but can have a great effect on the end application.

However, inulin derived from agave is different. What is known as agave inulin is actually agavine and due to its branched nature offers less possibilities in applications in terms of taste and texture.

Planteneers unites indulgence and health

Plant-based cheese alternatives with improved nutritional profile

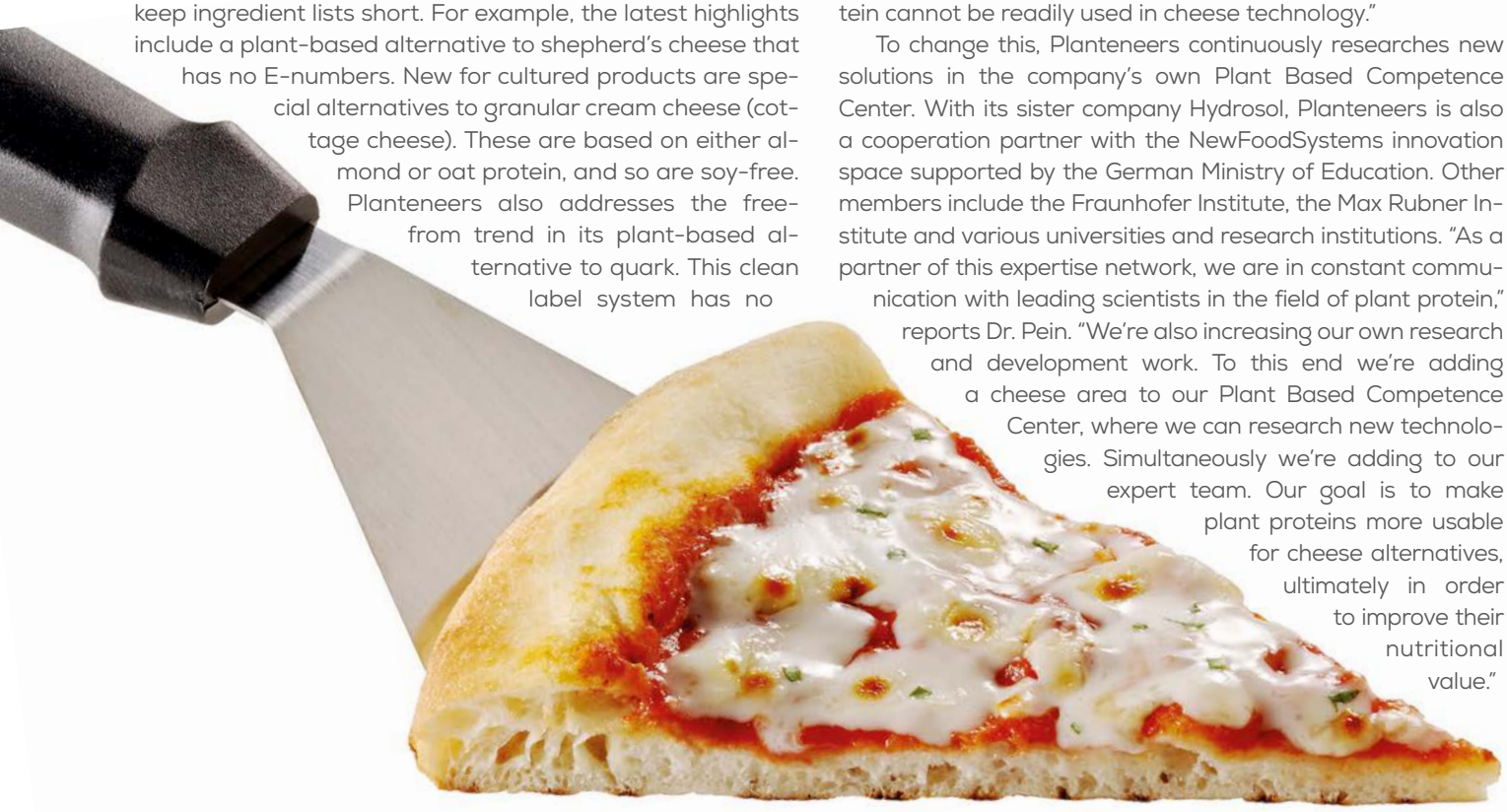
According to Innova Market, "plant forward" is a worldwide phenomenon and one of the Top Ten Trends for this year. The rising popularity of plant-based products, especially among flexitarians, will according to industry experts lead to growing demand for new formats, plant proteins and higher-end alternatives. One example is cheese alternatives, a product category of high interest to flexitarians. Cheese is often a part of the diet that's hard to give up. Planteneers doesn't just focus on taste and texture, but also on the nutritional profile.

With the all-in compounds in the fiildDairy range, Planteneers offers a selection of plant-based alternatives to cream cheese, pizza cheese, and hard cheese in slices and blocks. Alternatives to cheese fillings, for example for plant-based schnitzel and the like, are also no problem. In the development of plant-based products Planteneers is careful to keep ingredient lists short. For example, the latest highlights include a plant-based alternative to shepherd's cheese that has no E-numbers. New for cultured products are special alternatives to granular cream cheese (cottage cheese). These are based on either almond or oat protein, and so are soy-free. Planteneers also addresses the free-from trend in its plant-based alternative to quark. This clean label system has no E-numbers and can also be used to produce a plant-based version of sour cream. The products are made using almond drinks or almond paste, and thus are also free from soy.

Networked research around protein qualities

The market research results from Innova Market Insights show the potential that plant-based cheese alternatives have. Consumers like cheese very much, and it is an important product category in the plant-based alternatives market. Dr. Dorotea Pein, Director Product Management at Planteneers, comments, "in terms of technology, plant-based products have reached the point where they are very similar to their animal equivalents. They have the flavour and texture people want, brown well, and with their melting behaviour make any pizza a delicious treat. However, their nutritional value has room for improvement, since unlike with meat alternatives, plant protein cannot be readily used in cheese technology."

To change this, Planteneers continuously researches new solutions in the company's own Plant Based Competence Center. With its sister company Hydrosol, Planteneers is also a cooperation partner with the NewFoodSystems innovation space supported by the German Ministry of Education. Other members include the Fraunhofer Institute, the Max Rubner Institute and various universities and research institutions. "As a partner of this expertise network, we are in constant communication with leading scientists in the field of plant protein," reports Dr. Pein. "We're also increasing our own research and development work. To this end we're adding a cheese area to our Plant Based Competence Center, where we can research new technologies. Simultaneously we're adding to our expert team. Our goal is to make plant proteins more usable for cheese alternatives, ultimately in order to improve their nutritional value."



All-in compounds allow for the manufacuting of a wide range of plant-based cheese alternatives (photo: Planteneers)

Serac

Cup decontamination using pulsed light

Serac has made pulsed light decontamination solution available for cup filling lines. This technology offers an intermediate level of performance between H_2O_2 and UV decontamination, already part of Serac's offering.

Pulsed light enables to address new applications, such as the packaging of yogurts and desserts without additives or based on plant milks, which are growing fast.

Specifically designed for each application and extremely compact, Serac's pulsed light decontamination modules for cups, lids and covers can be originally installed on the line or added later as part of an upgrade. Manufacturers can thus progressively adapt their production tool to market change.

Reinforced decontamination for plant-based or additive-free desserts and yogurts

The microbiological quality of core ingredients, combined with the addition of sugar and a lower acidity of the final product, make plant-based desserts and yoghurts more sensitive to the development of bacteria and molds. The same applies to the reduction or elimination of additives in milk-based yoghurts and desserts.

The conventional cleaning of cups and lids with ionized air is often insufficient to guarantee an adequate shelf life. Further decontamination is necessary to ensure sufficient reduction of the microbiological load. Intended for health and environment sensitive targets, these products naturally call for dry, chemical-free decontamination solutions, such as UV and pulsed light.

A chemical-free solution, efficient and fast

Pulsed light decontamination enables manufacturers to guarantee the absence of chemical residues in cups and to significantly reduce the environmental impact of their packaging process, linked to water consumption and the generation of toxic effluents.

Pulsed light exposes cups, lids and covers to very intense flashes (50,000 times the intensity of the sun's rays on earth), which destroy the cell membrane and break the DNA chains of microorganisms. This results in a bacteriological reduction superior to that of a UV treatment, which only affects the DNA chains.

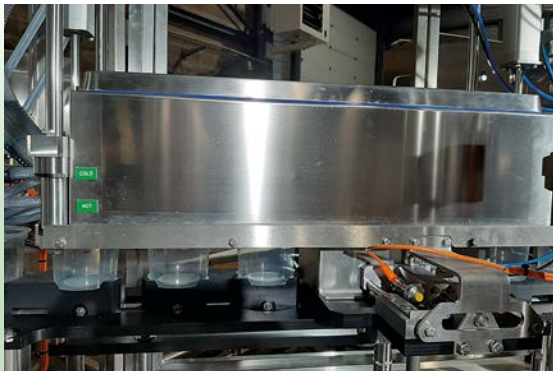
Reproducibility of the results is obtained through the customized design of the reflectors and the monitoring of the energy delivered, which ensure that light homogeneously reaches the entire surface to be treated. Also, the exposure time required by pulsed light, less than one millisecond, is perfectly compatible with high throughput rates.

Available for rotary and linear fillers of the Serac range

Serac's pulsed light decontamination modules can be combined with the Neo rotary fillers (with outputs from 1,500 to 6,000 cups/hour and 3 dosing stations) as well as with the Linea linear fillers (outputs ranging from 6,000 to 40,000 cups/hour and up to 5 dosing stations working simultaneously).

They can be used to decontaminate all types of materials: PE, PS, PP, PET, PLA, cardboard, aluminum and even glass. Serac's pulsed light offer thus covers all needs in terms of packaging materials, production volume and recipe complexity.

Serac offers dry and chemical-free decontamination solutions for ultra-clean packaging with pulsed light (3 log reduction) as well as for aseptic packaging with e-beam (up to 6 log reduction). The integration of pulsed light is in line with Serac's commitment to support all customers in reducing their environmental impact.



Cup treatment by pulsed light in a Neo cup filler

Alu foil treatment by pulsed light in a Linea filler

Sprau

The bean full of life

(Photo: Sprau)

Faba beans demonstrate huge potential to help both agriculture and the food industry become more sustainable. Faba beans contribute to the sustainability of cereal-dominated cropping systems in various ways, e.g. by improving biodiversity. In addition, an increased use of faba beans as protein source for human consumption can reduce greenhouse gas emissions by helping to replace animal-based protein.

However, the use of beans in the diet is somewhat limited by the digestive discomfort they may cause. With the newly launched ingredient Sprau that is no longer the case, because Sprau is a germinated faba bean. Germination awakens the metabolic processes within the bean and mobilizes its nutrient reserve through activation of its own enzymes. During germination, the bean efficiently degrades the alpha-galactosides that cause the digestive discomfort. Therefore, this natural process awakens the bean to its full potential, making it easier for digestion.

The typical strong flavor of faba beans limits their use in many applications where a beany flavor is not desirable, but the unique germination treatment gives Sprau a mild, cereal like flavor that enables multiple applications and diversity in flavor design. Germination also releases sugars and amino acids, making the Sprau ingredients favorable for applications that involve fermentation. Sprau has been successfully tested in various applications including plant-based yogurt, tempeh, meat analogues and dry-extruded savory snacks.

By making faba beans more accessible and easier to enjoy in the everyday diet, Sprau drives the shift towards more sustainable food production and consumption.

Fine adjustment of sweetness

Plant-based milk substitute drinks are trendy

Demand for plant-based milk substitute beverages has risen steadily in recent years. Various types of grain play an important role as raw materials. The production of grain-based drinks brings several technological challenges, and these can be addressed effectively with the use of enzymes.

SternEnzym helps here, with a series of enzymes that enable problem-free production and allow tuning of the beverages to give them the desired characteristics. In a series of steps, the viscosity, mouthfeel and sweetness of cereal drinks can be adjusted precisely to the desires of the customer.

Enzymes for the production of high-quality cereal drinks

The microbial enzymes in the SternEnzym Optizym series work best under the influence of heat. Highly active bacterial α-amylases reliably break swollen starch down into readily soluble dextrins. This makes it possible to adjust the viscosity of the beverage, as well as prevent the formation of an unsightly sediment in the product container from recrystallised starch. This first step in starch reduction is also necessary in order to give the drink a natural sweetness in the course of further processing.

Fine adjustment of the sweetness is performed in the sweetening phase with other enzymes that break dextrins down into sugars. In this step, the liquefied grain is cooled to about 60 °C and saccharified to the desired sweetness with the help of enzymes. The choice of enzymes determines the sugar composition of the final product, which in turn determines the sweetening power and sweetness profile. ß-amylases primarily split maltose and maltotriose from dextrins, giving a pleasant, mild sweetness. A maltose concentration of 60 to 80 % of the total sugar content can be attained in this way. Glucoamylases, on the other hand, split off single glucose molecules. This monosaccharide has twice the sweetening power of maltose, and gives a quick rise in sweetness.

The stop button for enzyme treatments

Technical enzyme applications have extensive benefits in beverage manufacture. These natural aids make it possible to use a wide variety of grains, permit innovative recipes and enable a longer shelf life of the final products. Besides, nutrition-conscious customers welcome the moderate sweetness, instead of table sugar. But how can the enzymatic reaction be stopped once the product reaches the desired sweetness? The enzymes used to saccharify the mash are inactivated in the normal process of pasteurising the beverage, rendering them inert.

(photo: SternEnzym)

SternVitamin

New better-for-you concepts address growing trend

Consumer enthusiasm for plant-based foods continues to grow unabated. This is also affecting the beverage market. Market research company Persistence Market Research (PMR) predicts annual growth rates exceeding six percent for plant-based drinks through 2028. And that's not all: The "plant-based revolution," as Innova Market Insights terms this top trend, opens further value-add potential. Fortification with micronutrients gives products additional health value. Plant-based alternatives to dairy products are by far the strongest category, according to Innova. SternVitamin has developed special micronutrient premixes for this segment that upgrade plant-based drinks based on oats and other protein sources. Its new SternHeartV, SternGutV and SternBonesV premixes let manufactures align plant-based drinks precisely to the special needs of specific target groups.

For example, SternHeartV addresses athletes, professionals with high-stress jobs and older people. This micronutrient combination of B vitamins, vitamin E, folic acid, iodine and zinc supports normal homocysteine metabolism and the formation of new red blood cells. In addition, it contributes to optimum muscle function and to protecting the cells from oxidative stress. For keeping bones healthy into advanced age there is SternBonesV for plant-based drinks. Its combination of vitamin D, vitamin K2, magnesium and calcium helps maintain bone health, and is appropriate for women in all age groups, vegans, and lactose-intolerant persons who want to be sure of getting a good calcium supply from plant-based products.

Market research company Persistence Market Research (PMR) predicts annual growth rates exceeding six percent for plant-based drinks through 2028 (photo: SternVitamin)

Fortification with micronutrients gives plant-based products additional health value (photo: SternVitamin)

Manufacturers of plant-based drinks with SternGutV can reach a broad audience. This premix supports the gut-associated immune system, through a combination of micronutrients for strengthening immune defences, and fibres with prebiotic and immune-modulating properties. Whether stress at work or study, whether professional or weekend athlete, plant-based drinks with SternGutV support the immune system and help it perform well. At the same time they offer good taste and a pleasant mouth feel. According to PMR, one of the main goals in the development of plant-based alternatives is to meet consumers' nutrition preferences, i.e. to offer added health benefits without compromising on taste. SternVitamin achieves this goal through its close cooperation with Planteneers, whose expertise in plant-based alternatives provides for full flavour enjoyment while SternVitamin supplies the added health benefits. At their own Plant Based Competence Center these sister companies develop attractive combinations of ingredients for a wide range of applications to meet the individual wishes of specific customers. The health benefits of these premixes can be marketed effectively on the drink packages using EU-approved Health Claims.

SPX FLOW

Remote trials and testing to keep dairy and plant-based innovation moving

With the ongoing challenges and restrictions resulting from the global pandemic, SPX FLOW has put in place secure, remote procedures to procure raw materials and conduct trials on behalf of its customers, sharing results and shipping samples of products to customer sites on completion of tests. This means that even with the current travel restrictions, producers can continue to innovate and gain competitive edge with new product introductions and improvement programs.

"SPX FLOW Innovation Center at ENIL, the French National Dairy School, offers customers superb trialing and testing facilities with the support of some of the world's leading experts," says Pranav Shah, Process Category Director, Fresh Dairy and Plant-based. "Even if travel to the center is not possible, SPX FLOW is equipped to support our customers virtually to ensure their dairy products get to market safely and quickly."

The SPX FLOW Innovation Center at ENIL offers extensive testing capability to optimize processes and products and is equipped with state-of-the-art technology supported by leading process and automation engineers. It combines expertise from ENIL and SPX FLOW within a center that is specifically designed to enhance fresh dairy products (FDP) and create new innovative dairy or plant-based products.

The center is equipped to handle a wide range of FDP applications including yogurts, fresh cheese, fermented milks, desserts, probiotic drinks, and other innovative products. Situated within the ENIL campus, the center has access to the school's own dairy for milk supplies. It incorporates a small scale, multi-purpose fermentation plant that can be used to produce and test a full range of fresh dairy products produced from fresh milk and its constituents or plant-based alternatives in liquid or solid form. A highly flexible solution, the single plant can create a wide variety of premium products with superb texture and mouthfeel, while minimizing waste and cost.

The ENIL site also incorporates the Cheasly small scale cheese processing line. The Cheasly process uses milk protein concentrate (MPC) powder making it independent of local milk quantity, quality, or price. It can produce a wide range of high quality, tasty soft and semi-hard cheeses in small quantities, making it ideal to create, develop or grow markets. Without reliance on local milk quality, producers can be assured of consistent quality. The Cheasly process line has no milk processing, cheese vats, draining or whey production, making it a high yield, highly cost-effective cheese production method.

A new video, based at the ENIL Innovation Center, provides insight into the services and processes customers make of on a regular basis (**www.spxflow.com/capabilities/innovation-centers**).


IDM has a brand new website!
www.colourbox.de
Have a look at international-dairy.com