

I N T E R N A T I O N A L

DAIRY

September/October 2020

SPECIAL „PLANT BASED ALTERNATIVES“



magazine

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INTERNATIONAL
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SPECIAL PLANT BASED DAIRY ALTERNATIVES

Vegetable dairy alternatives are currently considered to be the mega-trend in the food industry. According to Nielsen market research, sales of vegetarian-vegan food last year reached €960m, a new record and a 30 percent increase over the previous year, in the German market alone.

Vegetable dairy alternatives are one of the top-selling product categories. According to Euromonitor, global retail sales of dairy alternatives have grown by 8 percent annually over the last ten years.

In view of the rapidly growing importance of these products more and more dairies are entering this market. In our Special ISSUE the current development in this market is evaluated and of course we also look at suppliers with their corresponding solutions.

Content

- 5 >>>> Sustainable, innovative foods
- 6 >>>> Next generation cheese
- 8 >>>> Enzymes for dairy alternatives
- 9 >>>> All-Round ingredient solutions
- 10 >>>> FFFHI & FFP
- 11 >>> Increasingly popular
- 12 >>>> A growth market
- 13 >>>> Experts in texture and stability
- 14 >>>> Overcoming stability challenges
- 16 >>>> Allergen-free alternatives
- 17 >>>> Dairy free yogurt with chickpea protein
- 18 >>>> Enzymatic toolbox
- 19 >>>> Sucrose esters
- 20 >>>> ... from a single process line
- 21 >>>> Plant-based drinks report
- 24 >>>> Benefiting from market developments
- 27 >>>> Imprint



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Chr. Hansen

Development of sustainable, innovative foods

Chr. Hansen has joined MISTA, a California-based start-up optimizer focusing on the development of sustainable, innovative foods. With this collaboration, Chr. Hansen wants to further develop fermented plant-based solutions that help customers match this trend, and help create a sustainable and resilient global food system that can feed a growing population.

When it comes to dairy alternatives, consumers are looking for experiences that provide the same health and delicious taste profile as associated with traditional dairy products. Fermented plant-based foods – an industry that is evolving rapidly – can offer excellent options. Driven by a global focus and concern for sustainable food production, the plant-based foods industry has gone from being a relatively niche market to more mainstream. Today, consumers all over the world are enjoying the innovative options for a flexitarian or plant-based diet. In the past 12 months, 160 new brands of fermented plant-based foods have been launched. In the US, plant-based milks now account for more than 10% of the volume of drinking milks.

At MISTA, Chr. Hansen joins world-class food players Givaudan, Danone, Ingredion and Mars, to work with a selected cohort of around 20 start-up companies. It will also collaborate with a range of service partners, venture financiers and renowned universities such as UC Davis and UC Berkeley. MISTA brings together the power and expertise of large companies operating in different segments of the value chain, and the agility and fast-paced innovation spirit of start-ups.



Chr. Hansen will invest in fermentation capability including equipment and application staff on site to run collaborative projects and to conduct its own internal research (photo: Chr. Hansen)

Co-creating solutions for a healthier planet

The MISTA premises in San Francisco house a test kitchen, pilot scale production and laboratory facilities, as well as office and function space. Chr. Hansen will invest in fermentation capability including equipment and application staff on site to run collaborative projects and to conduct its own internal research.

“Our foray represents a bold new approach to exploring close-to-market innovation using a tailored ecosystem. It will allow us to participate in building new ideas with innovative start-ups whilst leveraging the power of large and established ingredient and end-product developers. This will accelerate the innovation, and also increase the chance of success, since all parties are working together for the same goal – ultimately co-creating solutions that address the health and wellness of both people and the planet,” says Ross Crittenden, senior director Commercial Development for Plant-based Dairy Alternatives at Chr. Hansen.

Rapid prototyping of sustainable, innovative foods

MISTA provides a platform for rapid and focused innovation with an in-built path for commercialization. “The application work will be plugged into Chr. Hansen’s global network of application centers to ensure efficient dissemination of learnings both ways. It will give us an opportunity to run rapid prototyping directly with potential customers in collaboration with best-in-class ingredient suppliers. Working closely with the other partners will help us to accelerate our research, and ultimately our product development, within the exciting space of fermented plant-based. Chr. Hansen already has a number of solutions in this category, but we are keen to offer even more options to our customers. We also look forward to supporting the other members’ aims of developing exciting, tasty, healthy and sustainable foods, and gaining valuable knowledge and commercialization opportunities along the way,” concludes Ross Crittenden, who will manage Chr. Hansen’s participation in MISTA.

Next generation cheese

Plant-based, delicious and healthy added value

Plant-based products enjoy double-digit growth in their market share. As more and more people choose to follow a vegetarian diet or even cut out animal ingredients altogether, they are looking for more sustainability in their food and beverages for their modern, healthy lifestyles. Although consumers are interested in plant-based foods, they want them to be as close as possible to the taste and sensory properties of traditional products, such as desserts and cheese. Moreover, they expect the products to provide functional added value. Consumers are therefore placing increasingly complex demands on their food and beverages.

Plant-based gaining in popularity

Around 29 per cent of consumers worldwide are attempting to increase their consumption of plant-based proteins, while 40 per cent pay active attention to vegetarian or plant-based nutrition. The term “plant-based” in general appeals to 72 per cent.¹

66 per cent of those who already consume plant-based products in North and South America, and 65 per cent of those in Europe, say that they are particularly interested in plant-based cheese.² 51 per cent of consumers in Europe and 58 per cent of consumers in North and South America state that they want to actively promote a healthy and health-conscious lifestyle by consuming dairy-free alternatives – as shown in two online studies by Döhler Sensory and Consumer Science (SCS), conducted in 2018 and 2019.³ The studies show that an average of 45 per cent of consumers in North and South America consume plant-based products at least once a month; the figure for Europe is 47 per cent.⁴ 80 per cent of these consumers in North and South America, and 74 per cent in Europe, consume these foods at least two to three times per week.⁵

Plant-based cheese on the rise

Purely plant-based cheese currently accounts for around 2 per cent of all market launches for cheese on the European market, with 40 per cent of global turnover generated in Europe.⁶

22 per cent of the plant-based cheeses launched on the market globally are block cheeses.⁷ With a wide range of natural ingredients for dairy-free cheese, Doehler is serving the emergent market for plant-based block and sliced cheese. With its unique mixing technology and application experience, the company offers a functional powder mixture of texturisers, plant-based proteins, natural colours, spice preparations and natural flavours for plant-based cheese alternatives.

The block and sliced cheeses impress with an authentic look, a full-bodied mouthfeel and a natural taste that fully lives up to milk-based cheese – and appeals to the indulgent experience consumers know and love. The cheese also displays optimum melting properties, making it ideal for cooking, while plant-based proteins offer healthy added value.

Not only block and sliced cheeses, but also applications that correspond to the popular cream cheese, are emerging on the market for plant-based cheese varieties. Doehler offers a range of concepts based on almond, nut, seed, cashew or coconut, which are used to supply fats and to create a creamy mouthfeel. Additional plant-based proteins from chickpeas, beans or peas replace animal proteins and are therefore added as protein sources. They also provide a pleasant mouthfeel, a creamy texture and an optimum nutrient composition. The proteins are produced at special production sites – Doehler thus offers an extensive portfolio of tailor-made solutions for plant-based cream cheese-style products, including myriad spices and herbs for various taste and texture requirements. The portfolio is positioned as clean label.

Delicious alternatives to dairy products

Many consumers are already familiar with plant-based preparations in drinks, desserts and ice cream creations in particular, as an alternative to applications that are traditionally produced with milk. For example, consumers have already experienced the creamy texture with fresh, tropical taste for applications based on coconut, the nutty taste of almond-based preparations, and the mild sweetness when rice and oats are used – ideal for breakfast cereal.



Furthermore, consumers want to see products that can support a plant-based diet at every meal throughout the day – not just a sweet breakfast. If plant-based products are to succeed on the market, both their sensory profile and their excellent nutritional value need to impress. A particularly effective way for them to do this is to offer the consumer a taste and texture experience comparable to that of the traditional product, so as to build on familiar, learned properties.

Plant-based ingredients for an ideal nutritional profile

Consumers demand food and beverages that not only deliver good taste and sustainable production, but also added value for body and mind. Numerous functional and healthy ingredients, such as plant-based proteins, powders, nuts and seeds, can be used in food and beverages to meet this requirement – such as in the aforementioned sliced and block cheese varieties and the cream cheese-style products.

The new Optifine Powders from Doehler also support a plant-based, nutrient-rich diet. Starting from a wide range of plants, gentle processing methods are used to protect the healthy nutrients in the plants in the best possible way, to retain their natural composition and deliver functional added value – which is why the powders are also called full-spectrum powders. These powders are particularly highly soluble and ideal for foods and food supplements, beverages such as smoothies, drinks and yoghurts.

Extensive product portfolio for plant-based applications

Doehler provides numerous natural ingredients for a wide range of applications that taste just as good to consumers as familiar food based on milk or with animal ingredients. The company's profile includes plant-based ingredients for natural and multi-sensory flavours and colours, powders, botanical extracts and an extensive selection of herbs and spices, offering the ideal basis for developing numerous plant-based cheese variations. These natural ingredients can also be used in tea and coffee beverages, juices and juice concentrates, spoonables, desserts, ice cream, baked goods, confectionery, and savoury foods and beverages. Depending on the recipe, an application's taste profile can be further refined with fruit components or natural flavours to create an optimised nutritional profile with optimum taste and ideal texture.

Sources:

¹ Global Data Consumer Survey Q3 2019 | Global (2019): Online available via: <http://consumer.globaldata.com> [20. September 2019]

² Ibid.

³ SCS 2018; SCS 2019, both available online via: <https://www.doehler.com/en/doehler-consumer-insights.html> [13. February 2020]

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.



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DSM

Enzymes for plant-based dairy alternatives



DSM has launched the DelvoPlant range of enzymes for optimizing the taste, texture and sweetness of plant-based drinks. Part of DSM's expanding portfolio of solutions for dairy alternatives, these enzymes offer a unique variety of benefits, from increasing the solubility of protein and reducing viscosity to improving mouthfeel and unlocking the natural sweetness of raw materials like rice, soy and oats. By helping to deliver an appealing dairy alternative experience, the DelvoPlant enzymes allow brands to develop winning cereal- and non-cereal-based drinks that will ensure today's discerning consumers keep coming back for more.

Depending on the application, the enzymes can unlock glucose and/or maltose to help manufacturers create healthier dairy alternative beverages without added sugar, to offer sweetness that can be tailored to align with local market preferences. The new DelvoPlant enzyme range also improves the availability of minerals and in oat-based drinks, these solutions can reduce the gluten content to create strong appeal for an even broader range of consumers. [dsm.com](https://www.dsm.com)

(photo: [american-heritage-chocolate@unsplash.com](https://www.unsplash.com))

DuPont

All-Round Ingredient Solutions for Plant-Based Innovation

DuPont Nutrition & Biosciences has built a new plant-based solutions portfolio to help food producers meet the growing demand for healthier, more sustainable foods and beverages that are meat and dairy-free. The portfolio is a comprehensive launch pad for new product development.

The global sales growth forecast for the plant-based sector is huge. As more consumers choose a flexitarian, vegetarian or vegan diet, Euromonitor estimates the market total value at USD 23 billion with growth rate close to 9%.

Innovation beyond dairy alternatives

Among millennials, the desire for healthy and sustainable food solutions is also moving the market beyond plant-based alternatives that mimic meat or dairy. The rise of fermented products is a prime example of that. Through the fermentation of numerous vegetable bases, manufacturers can create exciting new tastes and textures.

“Using our plant-based solutions, food manufacturers can redefine existing products or create entirely new categories that give consumers a wider range of choices. If the plant-based movement is to have a long-term impact on health and sustainability, we need to provide more options so consumers can quickly identify their personal preferences and speed up change in their purchasing habits,” says Sonia Huppert, Global Marketing Leader for Plant-Based Health at DuPont.

The DuPont plant-based solutions comprise a comprehensive portfolio of plant proteins, cultures, probiotics, enzymes and stabilizing solutions that deliver all-round nutritional and functional benefits. The plant-based opportunities link with the DuPont platforms for digestive health and clean label solutions. dupontnutritionandbiosciences.com



(photo: shutterstock.com)

New show date

Free from functional & health ingredients and free from packaging



The organisers of the Free From Functional & Health Ingredients (FFFHI) and Free From Packaging (FFP) have confirmed that the events will be postponed to 24-25 November 2020, following the global escalation of COVID-19.

Free From Functional & Health Ingredients (FFFHI) is Europe's leading platform for the dynamic free from industries. The Expo sits alongside Free From Packaging (FFP) – making this the most comprehensive Free From focused event in Europe.

Reflecting one of the food and drink industry's most dynamic sectors, FFFHI and FFP will return in November to showcase pioneering developments across five distinct product categories including Free From, Vegan, Natural/Organic, Functional and Ingredients.

In addition to an exciting show floor, packed with exhibitors showing the latest plant-based and free from innovations, four targeted conference programmes will offer attendees with an exciting schedule of seminars. Delivered by some of the world's most eminent food and drink professionals, FFFHI continues to provide delegates with quality insight into the latest innovations, trends and market analysis. freefromfoodexpo.com

FFFHI is postponed to the end of November (photo: Expo Business Communications)

Plant-based beverages increasingly popular

Bringing quality plant-based beverages to today's discerning consumers with GEA technology

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 vegetarian segment is a key focal area for development at GEA. Demand is high around the world and GEA's extensive project experience and technology portfolio allow us to support customers every step of the way, through to service in ongoing operations," says Colm O'Gorman, GEA Business Manager Plant-Based Beverages.

"The core of the entire process line is extraction by a one- or two-stage decanter process," explains Angel Rubio Domenech, Product Manager Separation, Plant-based Beverages. "We have already been active in the market for plant-based beverages for decades and have meanwhile developed our decanter into a lean, mean machine". The two-stage decanter process increases the yield by up to ten per cent (protein in soy, starch in rice and oats) compared with earlier processes using the same ingredients. Designed in a hygienic design for maximum product safety, GEA decanters also have flexibly adaptable operating parameters such as the differential speed for optimized yields. The robust decanters ensure long operating times by using wear-resistant parts and convenient service intervals. The patented hydrohermetic system reduces foam formation. In ad-

GEA decanters in hygienic design: Production of beverages at the highest level and in reproducible quality. (Photo: GEA)



dition, the fully automatic control and regulation system GEA varipond enables an adjustable pond depth, which simplifies the processing of different products.

Turnkey plant for processing soy

One of China's largest milk processors expanded its portfolio with a complete soy processing plant from GEA. The project included the construction and installation of components for the pretreatment of soy products - from extracting the beans to blending. The new plant was commissioned in late summer 2019, significantly increasing the customer's soybean processing capacity and its position in the plant-based beverage market.

In this complete turnkey processing line, the soy beverage is produced in a stable mixture of oil, water and protein by soaking the soybeans, then milling and blending them with water. The okara (soy pulp) is then strained out with a decanter.

Once the enzymes are deactivated by heat, the liquid is deodorized, mixed and homogenized. The soy products are then pasteurized or ultra-heat treated and packaged. Reducing the activity

of the lipoxygenase enzyme is an important step in this process since this prevents unsaturated fatty acids from oxidizing and creating an undesirable off-taste (e.g. bean flavor). Flavor variations - whether the product has a bean or neutral flavor - are created by setting the appropriate parameters during the extraction phase.

Turnkey plants such as those realized by GEA require expertise at all levels. Here GEA designs integrated process lines from the raw material to the finished packaged product: Here the processing technologies for raw material handling, separation by decanters, inactivation of enzymes, aroma control, mixing and homogenization through to aseptic filling and packaging flow into a complete solution. The ability to combine technologies with engineering knowledge, project management and commissioning know-how and service expertise is new and unique in the market.

Interested customers can carry out the process or individual process stages in one of the numerous GEA test centers. GEA's new CF 1000 decanter is suitable for on-site trials and GEA also offers a webinar about plant-based beverages at [video.gea.com](https://www.gea.com/video).

Dairy alternatives, a growth market

Plant-based alternatives to cottage and white cheese in expanded product line

More and more people around the world are substituting plant-based alternatives for animal products, and the market for plant-based foods reflects this, with double-digit growth rates. According to Innova Market Insights, by far the strongest category is milk and dairy products. Hydrosol recognised the trend early on and has developed many concepts for plant-based alternatives. Katharina Schäfer, Product Manager Dairy & Deli at Hydrosol, says, "The dairy category features very wide product variety. Addressing this in the form of plant-based alternatives is one of our central goals. In our newly created Plant-Based Competence Center we and our sister companies in the Stern-Wywiol Gruppe bundle all of our knowledge in a creative pool." There, product managers, nutritionists, food technologists and marketing specialists work together to develop creative concepts specifically for the trends on international markets.

For many years Hydrosol has been supplying a variety of plant-based alternatives to milk, yogurt and cheese, as well as special products like foaming solutions for baristas. The portfolio is constantly being expanded. Among the recent additions are alternatives to cream cheese and white cheese in brine. "One of our latest highlights is a plant-based alternative to white cheese that has no E-numbers," says Katharina Schäfer. "With our stabilising system from the Stabisol series it's possible to make a creamy product that stands up to any comparison with the animal product in flavour and texture." The plant-based product can be marinated in oil or flavoured with herbs just like regular white cheese.



In a newly created Plant-Based Competence Center, Stern-Wywiol bundles all of its knowledge in a creative pool (photo: Hydrosol)

New in the fermented category are special alternatives to cottage cheese. "Our stabilising system permits recipes based on almond or oat protein, meaning that they are soy-free," reports Schäfer. Hydrosol also meets the free-from trend with its plant-based alternative to quark. The clean label system from the Stabisol series contains no E-numbers, and can also be used to produce a plant-based alternative to sour cream. Both products are made with the help of almond drink or almond paste, and so are likewise soy-free.

"If you look at the market research results of Innova Market Insights, it becomes clear how much potential cheese alternatives have," comments Schäfer. "Cheese is popular with consumers in general, and is a correspondingly important product category in the plant-based alternative market, with many new launches. In addition to classic slices, pizza toppings and mozzarella alternatives are already on grocery store shelves. With plant-based versions of cream cheese and white cheese, man-

ufacturers can add new trend products to their line-ups." One thing is abundantly clear – the plant-based boom continues unabated, and consumers' awareness of animal welfare and environmental issues is rising quickly even during the current crisis. In Germany alone the percentage of flexitarians has risen to 55 percent, according to the 2020 Nutrition Report of the Federal Ministry of Food and Agriculture. The same trend can be observed on international markets.



Katharina Schäfer,
Product Manager
Dairy & Deli
at Hydrosol

ICL Food Specialties

Global experts in texture and stability

For over 50 years ICL has proudly offered specialty phosphate solutions to the dairy beverage industry. The diverse ICL portfolio consists of high-quality functional phosphate and mineral systems to deliver buffering, pH adjustment, protein protection and shelf life enhancement.

In the growing plant-based beverage market ICL knows that fortification and stability are important to consumers. ICL's micronized tricalcium phosphate, CAL-Sistent®, delivers the calcium customers want in an easy-to-utilize particle size for the beverage industry. Further, ICL offers magnesium and potassium-based ingredients as well as options for sodium reduction, such as ICL's Salona® sea salt. Salona® is tailored to help reduce sodium in products up to 25% without compromising quality or taste.

Protection during processing is key to maintaining product quality and stability throughout shelf-life. ICL's premium blends, JOHA® and BEKAPLUS®, are superior solutions for non-dairy beverage stability. These functional blends of phosphates offer excellent buffering capability, pH adjustment and protein protection for plant based RTDs. Whether it is ESL, UHT, or retort processing, both work to protect emulsions from heat-induced acid formation. JOHA® and BEKAPLUS® solutions help achieve product stability by binding minerals that cause unwanted protein separation and sedimentation.

ICL goes above and beyond supplying ingredients for their customers, whether it involves co-developing at their locations or working in-house at one of ICL's global technical centers in the US, Germany, or Brazil. ICL's technical centers are fully equipped with HTST/UHT and retort capabilities to assist customers in development, formulation and testing. Further, ICL offers technical assistance so they can stay connected to the process even after product launch.



ICL offers a wide range of solutions to improve buffering, texture, and stability (photo: ICL)

Plant-based dairy alternative beverages

Overcoming stability challenges

If you've begun working with plant-based protein, you know it comes with challenges. Nuts, grains and legumes have different molecular structures, amino acid profiles and isoelectric points than their dairy protein counterparts. They have varying amounts of fiber and tend to denature, losing emulsifying properties. Your formulation may become gritty with signs of sedimentation, often right after processing. Or, you may notice creaming – another sign of emulsion instability. Sensitive to heat treatment, proteins incur chemical changes that impact flavor, color and nutritional value. All of this

can make effective stabilization of your plant-based, dairy alternative beverage difficult – and leave you with an unsightly product.

Stabilizers and suspension agents, also known as hydrocolloids, can help conquer your dairy alternative challenges. There are many factors that go into deciding which agent to use. Here are some points for consideration:

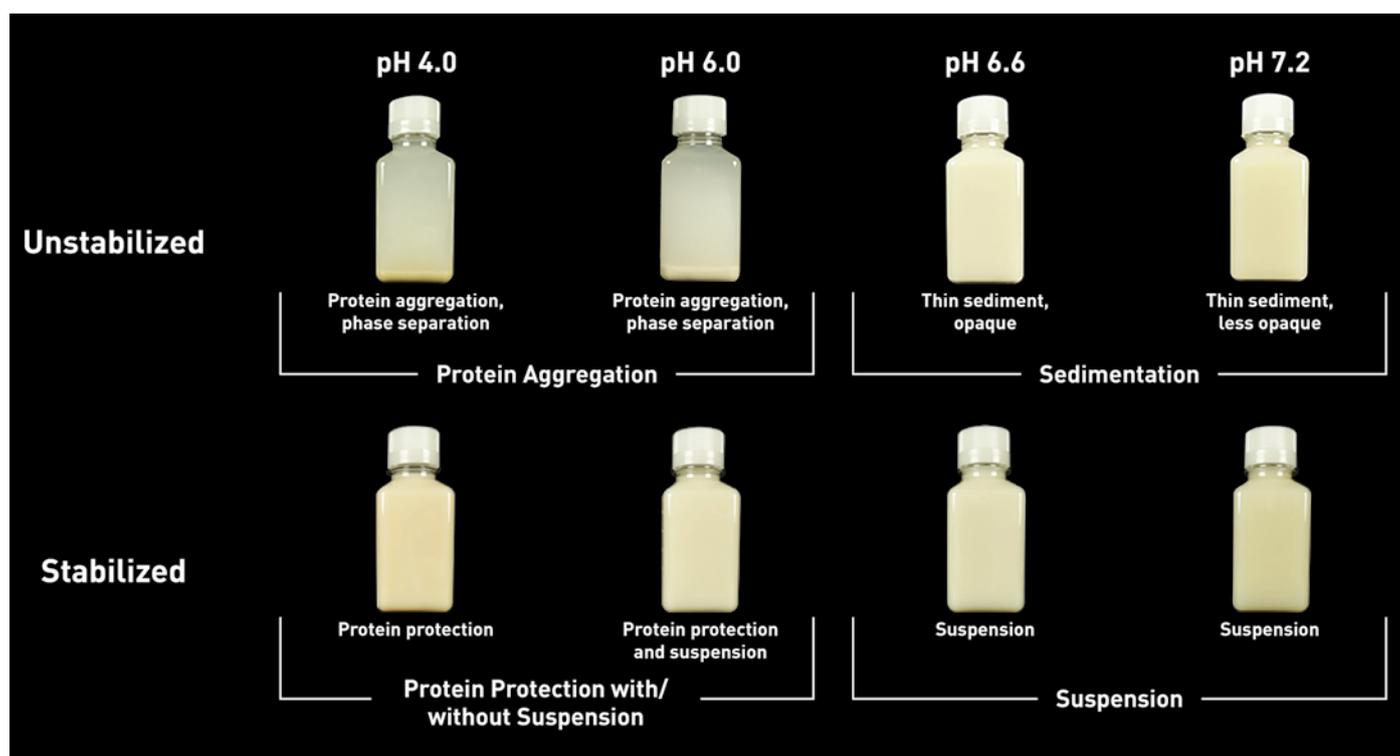
- Total protein content
- Type of protein used (plant-based or mixed with dairy)
- Are you adding calcium, inclusions, vitamins or sweeteners?
- The pH level (neutral or acidified)

- What type of heat treatment is involved – UHT, pasteurization, retort?
- Will your product have a short or long shelf life?

Certain combinations of the above can impact your decision too; e.g., a product with low pH, heat treatment and inclusions. Also consider your desired texture at this stage of formulation. Are you trying to duplicate the creaminess of full-fat dairy? Do you want a thin or thick mouthfeel?

Solving the most common challenges

Suspension refers to how well insoluble ingredients, including protein, re-



Protein aggregation and sedimentation challenges in 1% pea protein beverages at different pH (Figure: CP Kelco)

main uniformly distributed in liquid – both in the manufacturing process to ensure even filling of particulates in packaging, and also over the shelf life of a product.

Gellan gum has become a popular choice because it provides suspension regardless of protein type and protein level. Produced in part by fermentation of a pure culture of *Sphingomonas elodea* that naturally occurs on lily pond plants, KELCOGEL Gellan Gum has the unique quality of forming a fluid gel network to effectively suspend particles. A finite stress must be exceeded before the fluid gel will flow. If the stress exerted by gravity on the particles is less than the yield stress, the suspension will remain stable. Another plus is that gellan gum can be dispersed into hot or cold liquids and will hydrate up to 80 degrees Celsius. It can then be filled hot or cold and still create a stable fluid gel system.

When plant-based, dairy alternative drinks containing protein are heat treated in a low pH environment, the proteins tend to aggregate, create lumps and settle to the bottom, which results in an unstable – and unsightly – beverage. Pectin can help formulators solve the common challenge of sedimentation and protein aggregation in acidified protein products such as fermented yoghurt-type drinks. Sourced primarily from citrus peels, label-friendly pectin helps to stabilize proteins while also contributing a refreshing mouthfeel. This makes it beneficial while also reducing sugar content because pectin imparts a pleasant flavor profile.

Creaming is the reverse of sedimentation. Dispersed particles migrate up instead of down. As long as there is a density difference, oil droplets will cream. This occurs more often in plant protein beverages than in dairy beverages. However, increasing the viscosity with a thickening agent such as gellan gum helps to keep all particles suspended. While this includes slowing the rising and coalescence of droplets, additional modification may be needed for long-term stability. Carrageenan can help. Derived from red seaweed known as Irish moss, carrageenan



**Negative
Control**

**With KELCOGEL®
Gellan Gum**

**Coconut milk with 0.25%
protein and 2.0% fat**

Adding KELCOGEL Gellan Gum for creaming reduction in coconut milk with 0.25% protein and 2.0% fat (Figure: CP Kelco)

has been used for centuries as a gelling agent. Other functions include help with suspension, protein stabilization, mouthfeel, body and emulsion stability. It also can prevent creaming in hard-to-stabilize dairy alternatives with lower protein/higher fat content, such as coconut milk.

It seems as if new alternative protein bases appear every day – and so do the challenges. Luckily, there are effective, nature-based ingredient solutions to help. Consult a technical expert for formulation and process guidance to ensure you achieve your desired beverage results.

A look at current sales figures and growth projections quickly reveals the importance of plant-based alternatives to meat and dairy products. “The plant-based revolution” is not just one of this year’s top trends according to Innova Market Insights, it’s also a rapidly expanding category in food retail. Worldwide, the market for plant-based products is showing double-digit growth. However, consumer expectations are rising commensurately. In addition to flavour, texture and indulgence, a short ingredients list is also increasingly important, as is the absence of soy and other allergenic ingredients. Accordingly, Hydrosol has long been using other plant protein sources instead of soy.

Meat alternatives with peas, potatoes or fava beans

“Due to the GMO issue and its allergenic potential the demand for soy in Europe is declining sharply,” says Florian Bark, Product Manager at Hydrosol. “In its place, protein sources like peas, potatoes and fava beans are coming to the fore, along with newer sources like chickpeas, sunflower and algae. For example, we use these proteins in our plant-based meat and sausage alternatives.” Allergen- and soy-free stabilising and texturing systems based on potato and pea protein can be used to make a wide range of products, from cold cuts to salami to bacon.



Hydrosol has established a Competence Centre for plant-based products at its HQ in Ahrensburg, Germany (photo: Hydrosol)

Allergen-free alternatives

New generation of plant-based foods – without soy or wheat



Hydrosol use mostly soy-free stabilising and texturing systems (photo: Hydrosol)

For plant-based convenience foods, Hydrosol offers its HydroTOP VEGAN Patty PP range, based on fava bean and pea protein, and free of soy, wheat and other allergens. Together with the plant-based texturate it enables users to make vegan burger patties that are very similar to meat products in taste, texture and mouth feel. The plant-based nuggets made with HydroTOP VEGAN Patty PP and a rice texturate likewise feature a meat-like structure with appealing bite. They have the familiar white colour of chicken nuggets. With the HydroTOP VEGAN Patty range, Hydrosol provides a modular system that can be used to serve the convenience market with a wide variety of plant-based foods.

Plant-based alternatives to dairy products – mostly soy-free

For a long time now Hydrosol has been using mostly soy-free stabilising and texturing systems for the broad spectrum of plant alternatives to dairy products. Successful examples include desserts based on almond and coconut drinks. A functional system of modified starch, hydrocolloids and plant fibre lets manufacturers make a tasty pudding, and can also be used to make fermented desserts. In the milk drink category, sunflower and oat alternatives are possible. A new item in the portfolio is a plant alternative to sour cream that cannot be told from the original – and is just as versatile. This plant-based sour cream is free of e-numbers,

as well as being entirely soy-free. At FI Europe in Paris Hydrosol staged the product in a memorably way. Together with sister company Deutsche Back it developed a soy- and gluten-free vegan tarte flambée, with gluten-free crust, plant-based sour cream and vegan bacon. “The tarte flambée was a great success, and many visitors were immediately won over by the taste of our sour cream,” reports Product Manager Katharina Schäfer.

Competence Centre for plant-based products

Hydrosol saw the potential of plant-based foods early on, and in 2014 the company marketed the first functional systems for making plant-based alternatives to cheese and sausage. Since then its portfolio of innovative product ideas has grown enormously, and today Hydrosol is an established international expert for plant-based alternatives. With the formation of the Plant-based Competence Centre the company has now bundled all of its expertise in a creative pool. Here, product managers, nutritionists, food technologists and marketing specialists develop creative concepts to address the trends in international markets. “In our stabilising and texturing system concepts we have long combined market trend knowledge with scientific and technological understanding. Our new Plant-based Competence Center is a seedbed for innovative food concepts with high future potential, as well as a dialogue platform for our customers,” notes Hydrosol Managing Director Dr Matthias Moser.

Migros and Innovopro

The world's first dairy free yogurt with chickpea protein

Migros, Switzerland's largest retailer, in June 2020 launched a new line of dairy free yogurts incorporating Innovopro's chickpea protein CP Pro 70. The dairy free yogurts also include oats and are gluten and lactose free, offering consumers an alternative to dairy yogurts, without compromising on a delicious taste.

The Migros-exclusive line includes 3 flavors, natural, vanilla and tropical fruits. Both companies are working to bring additional yogurt lines to several European countries later this year.

"Our customers are looking for high quality, innovative, healthy and tasty options. The collaboration with Innovopro on chickpea protein, opens for us the opportu-

nity to create new solutions for unmet consumer needs. The chickpea protein with its high functionality, neutral taste and clean label profile enables us to offer consumers new and exciting products," said Matthew Robin, CEO of ELSA-Mifroma (a group of manufacturing companies in the Migros Group and a leading Swiss milk processor).

Chickpeas naturally contain some 20% protein, and InnovoPro is the first company in the world to launch a 70% concentrate, an innovative plant-based protein that adds value to both producers and consumers. InnovoPro's product addresses customers' choices for a new, clean-label, non-GMO and non-allergenic source of protein and brings excellent food-technol-

ogy properties as well as benefits in terms of functionality, health, nutrition, taste and mouthfeel. These properties render it highly suitable for developing a broad range of food products that meet a range of demands from diverse target audiences across the globe.

InnovoPro has been recognized as an innovator of disruptive technology in the food industry. Over the past 3 years InnovoPro garnered several awards such as "Most Innovative Protein of the Year" at the Protein Summit in 2018, and "Most Innovative Startup in Israeli Food-Tech" in 2018. In 2019, InnovoPro was awarded the "Seal of Excellence" by the European Commission and was chosen to be a member of the EIT Food rising stars community.



Migros/ELSA-Mifroma and Innovopro have developed the first dairy free yogurt alternatives containing chickpea protein (photo: Migros)

Novozymes

Enzymatic toolbox

As the market for oat drinks grows, Novozymes has developed a new toolbox to guide producers to expand their businesses into oat drinks. Half a billion people worldwide are either vegan or vegetarian, 26% of millennials have already embraced this lifestyle and 73% among them are willing to pay more for sustainable food and drinks¹. The combination of these trends is giving the sale of oat drinks a boost, with an expected growth of 30% a year².

“A new market is opening up and booming. To help dairies and beverage producers expand their portfolio and create new types of oat drinks, we have developed a toolbox that can help them expand their business into this new terri-

tory,” says Alessandro Palumbo, Market Development Manager at Novozymes.

Oat drinks is the fastest growing category in the plant based beverage segment. This is mainly due to the fact that oat drinks have one of the best nutritional profiles among dairy alternatives. Oat drinks is also known for its benefits when it comes to sustainability.

In spite of huge interest and a growing market, a study finds only 2 in 10 consumers think that plant protein is extremely good tasting².

“The fast-growing demand gives producers the opportunity to develop and market new types of oat drinks. But at the same time, it’s also a challenge to come up with products that match the

consumer’s taste and preference,” Alessandro Palumbo says.

Speed up development and help match consumer’s taste and preference

The new enzymatic toolbox is developed by Novozymes and is the first of its kind. It provides insights into how to use and combine enzymes, raw material and production parameters to adjust sweetness, mouthfeel and nutritional profile in oat drinks. It also provides insights for producers into how to optimize the production process and save costs.

“The toolbox gives dairy and beverage producers the opportunity to develop the oat drinks consumers want. By teaming up with Novozymes, they will be able to select the flavor and nutritional profile of their drink, starting from a prototype and quickly scale it up using the perfect combination of enzymes, raw materials and equipment,” says Alessandro Palumbo.

“This will help them to speed up the go-to-market process while reducing their risks related to new product development.”

By working with Novozymes, producers will also have access to a team of experts, who can provide 360° technical support from raw material to finished product.

Data references:

¹ Vegans, millennials and willingness to pay a premium

² Findings from Quid platform on healthy eating and a Novozymes’ plant protein consumer research conducted in the USA in December 2018 with an online panel of 1,000 respondents, carried out by Natural Marketing Institute (NMI).



(photo: Schwarzwaldmilch)

Plant-based milk alternatives

Sisterna sucrose esters

Milk alternatives based on vegetable raw materials, have become increasingly popular in recent years, with a drastic increase in the availability of varieties and flavours. Sisterna sucrose esters are especially suitable for plant-based drinks, as they can emulsify the oils very well, and can keep the proteins in solution and particles in suspension. And also very important; the taste of your plant based drink will remain as it was meant by nature.

Stable and white

Plant-based milks, with the exception of soy, generally contain far less protein than dairy milk, while they contain some fat/oil that is released when the plant material (e.g. nuts and seeds) are grounded. In some cases, oil is added for extra nutritional value.

In liquid products the use of a powerful oil-in-water emulsifier is crucial to ensure a stable emulsion for the whole shelf life. This is particularly so because most milk alternatives have a long shelf life at ambient temperatures.

Sisterna sucrose esters are water soluble, which is very important to

An overview of the benefits of Sisterna SP70 in milk alternatives like coconut- or almond drink.

Functionality Sisterna sucrose esters	Effect in plant based milk
Emulsification of oil/fat	No oil separation at surface
	Whiter colour
Dispersing particles	Easier to shake to homogeneous drink
Protein protection	No flocculation
	Homogeneous residue on glass (almond drink)

get a stable emulsion. The high HLB value of sucrose esters (up to 16!) strongly lowers the surface tension which results in the easy formation of very small oil droplets, thus ensuring stability and whiteness. Small oil droplets do not have a strong upward force (Stoke's Law), and scatter the light in a way that the emulsion appears white.

Smooth and clean

Proteins in many plants are sensitive to coagulation at acidic conditions, near their iso-electric point, similar

to caseinate. Sisterna SP70 protects the plant proteins as well as caseinate from coagulation caused by low pH and/or heat.

The pictures show that sucrose esters prevent coagulation and precipitation of vegetable proteins at a pH around their iso-electrical point. In some cases the sedimentation is only partly prevented. Probably the effect is larger with a higher dosage of Sisterna SP70, e.g. 0.3% or 0.5%.

Most packages of milk alternatives state "SHAKE BEFORE USE", because small particles sediment to the bottom. Sucrose esters have the ability to keep particles in suspension, and prevent a tight packed layer of particles at the bottom of the package. Drinks with sucrose esters are easy to shake to a homogeneous whole.

Taste and odour

Milk alternatives have a mild taste. Sisterna sucrose esters are very neutral in taste and odour, and therefore they are an excellent choice for almost all food stuffs. Your plant-based drink will keep its original natural taste.



↑ Suspensions of 2% almond flour in water

pH 6.8 (original) pH 6 pH 5 pH 4.5 pH 4 pH 3.5

↓ Suspensions of 2% almond flour in water with 0.2% Sisterna SP70



SPX FLOW

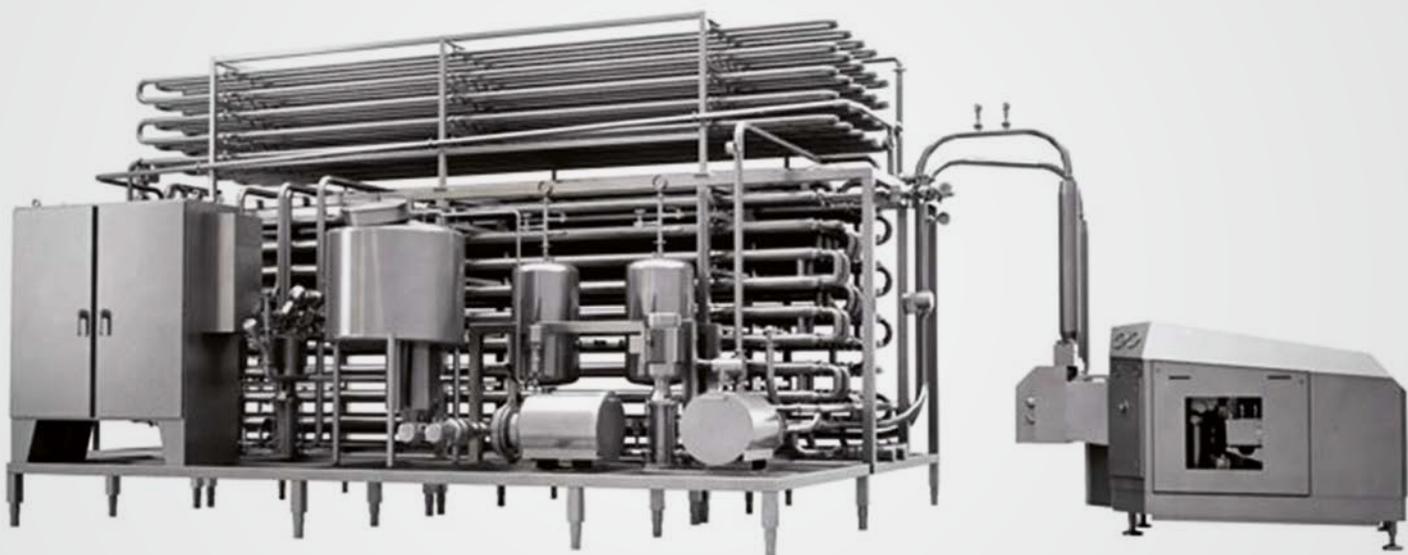
Innovative nutritious beverages from a single process line

SPX FLOW has developed a new, cost-effective, and efficient solution to meet the growing demand for high quality beverages with particles such as wheat, oats, rice, nut pieces, or fruit. Based on Tubular UHT technology, the Drinkable Grains solution provides a single process line solution with up to 40% less cost than alternative processing methods.

The SPX FLOW system requires just one aseptic tank and one UHT

skid. It produces a compact, low cost installation with optimized energy usage, reduced CIP and minimized waste. As the system uses a special Tubular UHT technology, it can handle much larger particle sizes than traditional methods. This design ensures a gentle process that protects them from damage or maceration. This ensures a thicker, more nutritious, premium quality final product.

A single processing line provides a simpler, more compact production method than traditional dual line concepts used for processing beverages with fruit, nut, or grain particles. Grains are added in-line after the homogenizer and the liquid and particles are then continuously mixed together before being processed through the UHT system. The design ensures blending accuracy and stability for consistent, high quality results. [spx.com](https://www.spx.com)



SPX FLOW has developed a processing line for plant-based beverages (photo: SPX FLOW)

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.



Zenith Global Report

2019

USA Opportunities in Plant-based drinks Report

An overview of market trends and innovations within the USA plant-based drinks market.

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.

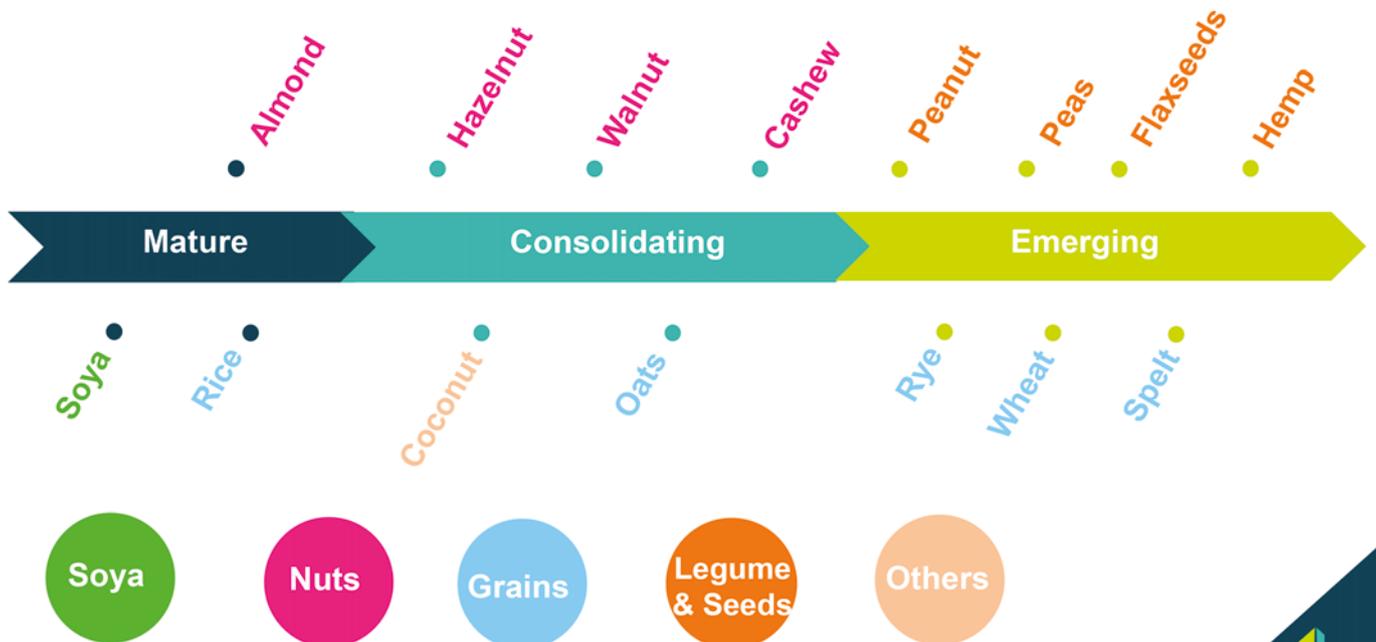
Next 5 years

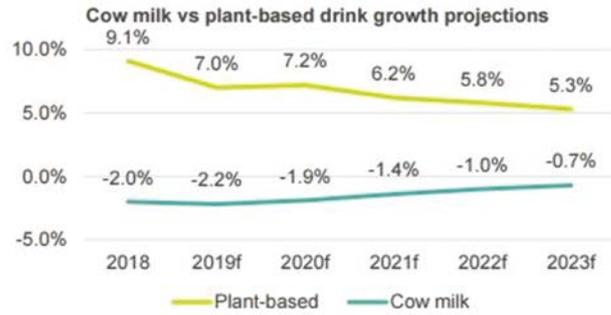
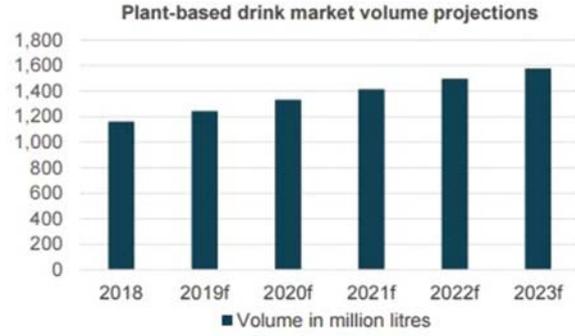
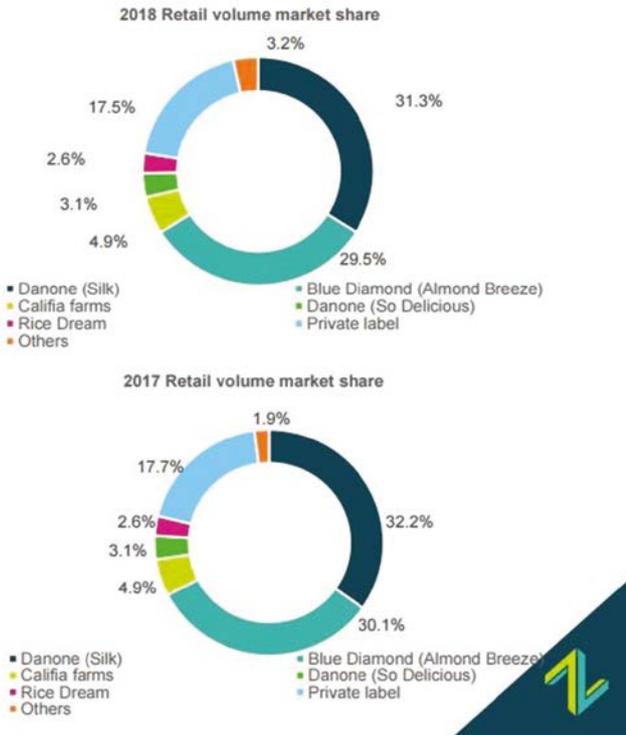
The US plant based market is forecast to enjoy steady growth over the next five years growing at a rate of 7% between 2018 and 2019. By 2023 sales of plant based drinks are projected to reach over 1.58 billion litres compared to 1.16 billion litres in 2018 a CAGR of 6.4%. The growth will continue to 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 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 drink will be fueled by companies’ continuous investments as dairy players see it as a new avenue of growth.

1. USA plant-based drinks market overview

1.7 Evolution of plant-based drinks variety trend development





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: JHMaynard@zenithglobal.com, www.zenithglobal.com

Benefiting from market developments

Zentis advises dairies to also look into alternative products



(photo: Zentis)

Dairy alternatives are showing a growth rate that currently exceeds that of classic dairy products. In 2018/19, the total German market grew by almost 17% to €327 million. An average annual growth rate of 5% p.a. is expected to be maintained until 2029 [Source: FMI]. IDM talked about the prospects for plant-based alternative products with Zentis, a leading supplier and initiator of trend-oriented product development.

Discussion partners were Lukas Leutgöb, Head of Research & Development and B2B Marketing, Greet Hermans, Product Development, Felix Weber, Vice President Sales, and Roland Gianotten, Key Account Manager Europe Dairy & Alternatives.

IDM: How interesting is the market for dairy alternatives for Zentis as a traditional supplier for the dairy sector and since when have you been dealing with it?

Gianotten: Zentis has been active in this segment for a very long time. For a long time we have been supporting manufacturers who occupied this category early on. While sales in this segment were still manageable in the first few years, we have been able to record strong growth in the last four to five years. Today, we work very intensively with large and medium-sized companies as well as with small start-ups. The focus here is on innovative and trendy concepts. We are prepared to serve companies of different sizes and structures, starting with 200 kg delivery up to 1,000 tons per fruit variety.

IDM: How exactly do you adjust to the companies that produce milk alternatives?

Weber: We have formed a team to look after these customers. The team is broadly based and consists of experts from the following depart-

ments in our company: Market Intelligence, Innovation Management, Marketing, Product Development and Sales. This is all about an all-inclusive service, which we traditionally also offer to traditional dairies. Our team bundles the many years of know-how at Zentis in the area of plant-based milk alternatives. This enables us to propose very good and well thought-out solutions for raw materials used as well as process technology.

Zentis traditionally follows a working method which is closely oriented to the market and the respective customer. We see ourselves as pioneers and impulse generators for our customers and want to accompany them in their development in partnership.

IDM: How does product development for replacement products differ from that for dairy?

Hermans: The basic recipes are similar. One difference, for example, with plant-based alternative products based on soy, is that we have to stabilize with our fruit preparations. We use the classic stabilizing systems for this. If, for example, an alternative product is to have the same nutritional values as the classic dairy, we can also add calcium and vitamins.

IDM: And that leads to ingredient lists in the declaration that are not exactly compact.

Leutgöb: That's right. Numerous vegetable alternative products, meat alternatives but also milk alternatives, have long lists of ingredients. Consumers are currently still more tolerant of complex lists of ingredients than they are of classic dairy products. But we also recognize the trend towards clean labels in the alternatives sector. On the other hand, the requirement profile for the alternatives is often similar to that of classic cow's milk-based dairy products. I am thinking, for example, of the different amounts of protein. The protein in the



Greet Hermans: If an alternative product is to equalize the nutritional values with the classical dairy, we have to add calcium and vitamins.



Roland Gianotten: In the area of alternative products we work very intensively with large and medium-sized companies as well as small start-ups.



Felix Weber: With experts from different departments Zentis offers an all-inclusive service which we traditionally also offer to traditional dairies.



Lukas Leutgöb: We also recognize the trend towards clean labels when it comes to alternatives.

milk has a texturising effect. If similar plant-based products are to be created, plant-based proteins or stabilisers must be used.

IDM: And where do you get this protein from?

Weber: Last year Zentis acquired a share in Sunbloom Proteins. This spin-off of the Freising-based Fraunhofer Institute IVV is concerned with the extraction of proteins from sunflowers. We are thus optimally positioned in this field for our customers in order to be able to offer alternative products in line with the latest trends.

IDM: What is the best basis for manufacturing alternative products?

Leutgöb: There are various vegetable raw materials that are used for this. So the use of soy, coconut, almonds or oats depends on how the product is positioned and what it is supposed to do. Many consumers are convinced by the sensory qualities of coconut and oat, and in the case of soy the distinctive taste has been largely neutralised. From a sustainability perspective, oats is the winner for us. It can be grown regionally, needs less water in comparison, for example, and therefore has a lower CO₂ footprint. In North America, but also in Europe, oat-based yoghurt alternatives are already available, and an American key player is very active in this area, for example. Oat drinks are a real hit, growing 69% in sales and 71% in tonnage in 2019.

IDM: Is it possible that these alternative products are just hype again?

Gianotten: We are convinced that plant-based alternatives are a real and lasting trend. In the past it was a niche - today it is already mainstream. Overarching trends such as "Healthy me!" and "Healthy Planet!" are promoting the success of dairy alternatives.

Added to this, of course, are quality and high convenience, combined with organic and regional products.

Topics such as sustainability and naturalness are present in the media and also in the minds of consumers ... and therefore on everyone's lips. Several developments are the reason for the long lasting positive development of this category. On the one hand on the consumer side, new buyer households are entering the category. Among them are also households that have previously bought neither milk alternatives nor classic dairy products. Overall, the consumer reach has increased by approx. 14%. In addition, there is also an intensification. Younger consumer target groups in particular are being addressed by milk alternatives, especially "Generation Z". Young singles, couples and young families with children account for just under 50% of buyers.

Hermans: The trendy products have not only been picked up by start-ups in recent months and years, big dairy players are also entering the market and the new products are receiving massive support through their marketing power. Food retailers are creating corresponding shelf space to accommodate the growth. We therefore recommend all dairies to participate in the market development. The choice and variety of alternatives is still limited, but we expect a similar diversification in the future as in the dairy aisles; both established suppliers and newcomers will drive diversity.

IDM: Can a dairy credibly also bring alternatives to the market or should one rather think about establishing separate companies so as not to dilute its own brand?

Weber: We are observing a change in the dairy industry. Dairies don't just rest on their laurels, but im-

plement new, sustainable trends such as plant-based alternatives. In principle, this is just another field that is being covered. The companies don't necessarily have to build up anything specifically for this; they have everything, from technology and R&D to distribution and market knowledge. This is an invaluable advantage over newcomers. One supplier of meat-based products has shown how to credibly bring both worlds under one brand umbrella.

Leutgöb: You don't necessarily have to take the big leap directly, as developments of hybrid solutions in the USA, for example, confirm.

With our hybrid concepts we combine the best of two worlds. Normal milk and the vegetable alternative directly in one product, ideally in a 50:50 mixture.

Classic yoghurts/drinks are the benchmark for good taste, while vegetable milk alternatives offer health benefits.

This way, for example, the creaminess and calcium of milk and the benefits associated with oat can be exploited. Oat offers valuable nutrients, scores points with proteins, and provides valuable fibres.

Zentis has developed complete solutions especially for such products, which can be added to our customers' white mass ready for use, also, for example, directly combined with our fruit preparations.

IDM: Let's take a look at the pricing, at last. Alternatives are considerably more expensive than classic dairy products. Is that justified?

Gianotten: It is indeed true that vegetable products provide better margins at all stages of the chain. Consumers are willing to pay a higher price for the sustainability provided by the products and the associated health benefits. This is why retailers are willing to provide shelf space.

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