NEW AGE **MILK PROTEIN**

CURRENT MODELS OF AGRICULTURAL METHODS ARE TOO RESOURCE-INTENSE: TOO MUCH LAND IS USED FOR CROPS AND LIVESTOCK, LAND IS FERTILISED TOO HEAVILY AND IRRIGATED TOO EXTENSIVELY. WE NEED TO RETHINK HOW FOOD IS PRODUCED, AS DICTATED BY NECESSITY. EXAMINING HOW ALTERNATIVE PROTEINS ARE CULTIVATED IS A GOOD PLACE TO START. CONTRIBUTED BY AUTHOR & PROTEIN APPLICATION EXPERT, **HENK HOOGENKAMP**.

THE dairy and meat industries await a paradigm shift as a growing number of consumers question their daily intake of animal-derived products, including meat, eggs and milk, over concerns about their own health, environmental damage and animal welfare.

Many people think that there is a real urgency to change these unfavourable carbon footprints, and fortunately, emerging non-animal dairy technology might be the answer.

Dairy alternatives such as those made from soy, rice, almond and oat have become ubiquitous, but all are still lacking the real taste of old-fashioned milk. Fortunately, a fundamental shift has taken place now that "non-animal dairy protein", which is organoleptically and nutritionally identical to cow's milk, has become available. The microbes programmed to produce milk proteins are basically a step further in the same processes that are already used to make probiotics and vitamins. In the future, traditional dairy will still be available, though a higher proportion will come from microbial fermentation.

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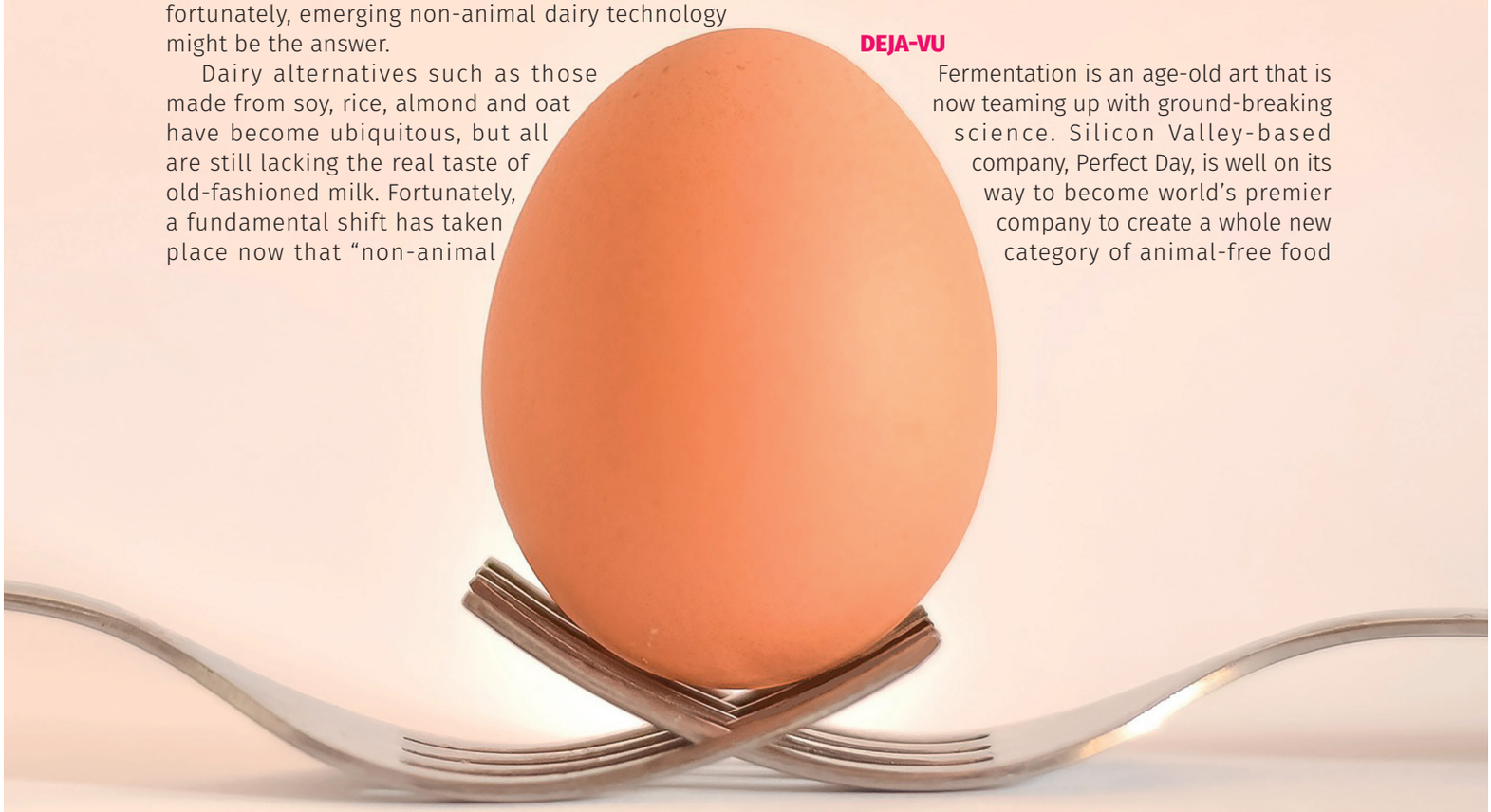
Fermentation is an age-old art that is now teaming up with ground-breaking science. Silicon Valley-based company, Perfect Day, is well on its way to become world's premier company to create a whole new category of animal-free food



products by developing a method to produce high-quality, nutritious, and tasty protein by fermenting microflora. This technology encompasses the fermentation to convert sugar from the microflora into proteins such as whey and casein.

To make non-animal milk protein, microbes are used. During the fermentation process, the flora-microbes are brought together with sugar which is subsequently converted into high-quality milk protein ingredients or milk fat components.

These animal-free milk proteins have a flavour profile and flavour release that is identical to milk. But it is not only about the organoleptic and nutritional advantages—it is important to know that this protein has excellent fat-binding properties to keep the integrity of traditional consumer products together, including opaque stable dispersion in milk products, coffee creamer and cheese.

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PRECISION FERMENTATION

Ingredients like non-animal derived milk proteins, such as whey protein isolate produced via microbial precision fermentation (without any cows), is one of the important emerging solutions for food security to safeguard future nutrition on a global level.

Microbial precision fermentation is a process that enables the programming of micro-organisms to produce almost any complex organic molecule. Modulated micro-organisms such as yeast, fungi, and bacteria are capable of producing everything from

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collagen to heme proteins, cell cultured meat, milk proteins, egg albumen and proteins found in human breast milk.

As such, synthetic biotechnology will greatly contribute to ease the growing pains of global food insecurity and supply chain issues. Another good example is Clara Foods—a Silicon Valley start-up which has succeeded in replacing specific groups of proteins in egg whites without necessarily replicating it compound for compound. The bottom line is that to achieve 100 percent functionality, certain specific ratios are needed, instead of the entire spectrum.

For example, novel chicken-less egg proteins are unique albumen replacement options for environmental-friendly food platforms, including clean and natural labels, improved digestibility, as well as eliminating price instability. These cellular cultured egg proteins are derived from yeasts that are traditionally found in eggs and show unique application and nutritional characteristics without the inclusion of animal-derived ingredients. The technology is based on fermentation systems using specific modulated yeast inputs that enable a natural identical protein.

These technologies will greatly disrupt legacy food and ingredient industries as known today. Although price points of precision fermented products or ingredients in 2020 are still substantial higher than traditional proteins, it is projected that due to process efficiencies, these kinder and greener protein ingredients will be significantly cheaper than traditional protein sources.

Once the scale-up and infrastructure of the manufacturing has been completed, it is projected that the non-animal milk proteins can be as much as 30-40 percent cheaper than conventional cow milk proteins. Possibly by as early as 2025, prices of these cell cultured ingredients will be on par with traditional dairy protein ingredients.

THERE IS RAPID EMERGING AWARENESS BY YOUNGER GENERATIONS THAT NOVEL FOOD TECHNOLOGIES WILL BECOME PART OF THE FOOD SYSTEM IN THE FUTURE.

NAME CALLING: A GENERATIONAL ISSUE

It is anticipated that the new generation of active buying consumers are open to the idea of cell-cultured milk and milk fats that are being used as functional and nutritional ingredients in foods like ice cream, yoghurt and cheese. Only milk proteins have the unique capability to give, for example, "pizza cheese" their stretch and texture. The same is true when using milk protein ingredients in ice cream and fat-filled powders like coffee creamer because of its unique creamy meltiness and superior taste.

Of course, as is the case with all new disruptive technologies, consumers need to get used to certain names and it is important that the right name is used to communicate with the consumers. Negative-sounding names such as synthetic or lab-grown should be avoided, simply because consumers might find those names scary.

Yet, as consumers get younger like Gen Y or "millennials" as well as the Gen Z generation, the willingness to accept positive-sounding names such as "non-animal protein", "flora protein" and "cultured milk protein" are likely to become standard phrases or these novel food ingredients. That is especially the case when these products can be labelled to causes such as "save the planet" and "sustainable".

There is rapid emerging awareness by the younger generations that novel food technologies will become part of the food system in the future. Within this concept it will be key to address long-term health impacts as these novel proteins will continue to break barriers, and continued exposure will slowly move these great tasting proteins from novel to ordinary. APFI