

Delivering functional benefits for tasty **plant-based ice cream**



The challenge: finding a viable plant-based substitute

Ice cream manufacturers have long struggled to find a viable plant-based substitute for milk proteins in their formulations. Convincing consumers that plant-based ice cream can deliver the taste and mouthfeel they associate with ice cream has also proved challenging.

“The number one priority for formulators here is taste neutrality,” says Margriet van Gurp, application manager at Cosun. “Plant protein ingredients are often associated with unpleasant flavors, commonly described as grassy, beany, bitter or astringent. Formulators often have to up the dosages of other flavors and aromas to mask these notes, which can be expensive.”

Many plant proteins also have poor solubility in water, which can lead to sensory defects such as graininess and a lack of smoothness. Plant proteins in general also possess lower emulsifying and foaming functionality than milk proteins, which limits their effectiveness and therefore applicability in ice cream formulations.

“To make ice cream, you need to use a protein with high solubility, in order to achieve these maximum emulsification and foaming activities,” van Gurp explains. “With high solubility comes high functionality. Put simply: if a protein is less soluble, it will be less functional.”

The solution: Cosun Protein Tendra®

This is where Cosun’s Tendra® comes in. This ingredient is a highly functional and taste-neutral plant-based protein, which can be effectively used in dairy-free ice cream applications. The protein isolate, sourced from fava beans cultivated in Europe and extracted via a proprietary processing method, delivers the taste and sensory qualities that both formulators and consumers expect – and demand – from ice cream.

In this way, Tendra® addresses a key market gap in the ice cream innovation space – a viable plant-based substitute for milk protein that offers high solubility, excellent emulsification properties and a neutral mild taste.

This White Paper examines how Tendra® can help brands to meet consumer expectations on the supermarket shelf, and enable formulators to overcome the

technical challenges typically associated with plant-based proteins in the dairy-free sector. It also takes a quick look at the market opportunities in this exciting and evolving innovation space.



What are consumers looking for?

Consumers are open to plant-based protein alternatives across a range of product categories. The reasons for this are numerous and well known. In the dairy-free sector, these include growing health concerns (increasing cases of lactose intolerance, and a general motivation to cut down on dairy, for instance), as well as ethical considerations such as animal welfare. Approximately 30 million adults in the US suffer from some degree of lactose intolerance by the age of 20.¹

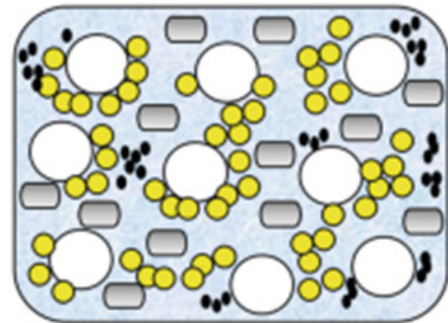
Consumers are also increasingly prioritising clean label ingredients that are sustainably sourced. A recent survey by The Economist showed that since 2018, global online searches for sustainable goods have grown by 71%.²

What are formulators looking for?

Ice cream is known for its smooth and creamy mouthfeel, and owes these sensory properties to its complex microstructure. To achieve a creamy product, the majority of ice crystals need to be relatively small - typically in the size range of 20 to 50 μm .³

Another important factor is air bubbles. Small air bubbles make the texture smoother and softer. If air bubbles are in close proximity, there is a risk that they can coalesce to form a larger bubble, resulting in a loss of sensory quality.

Above all though, consumers want products that taste good, and deliver the sensory qualities they expect. And this is especially true for market sub-segments associated with indulgence, such as ice cream.



The complex microstructure of ice cream (adapted from [3])

This is where proteins and fat particles come in. By spreading across the surface of the air bubbles, they form a protective layer that then stabilizes them against coalescence. Regular ice cream contains about 4 % protein, which typically comes from milk or milk products such as cream, condensed milk or milk powder.

¹ <https://www.gminsights.com/industry-analysis/non-dairy-ice-cream-market>

² <https://insights.figlobal.com/sustainability/how-build-sustainable-food-brand-according-experts>

³ Douglas G., Colloidal aspects of ice cream—A review, Int. Dairy J., Vol 7, Issues 6-7, 363-373 (1997).

What are the benefits of Cosun's Tendra® ?

Cosun's Tendra® was introduced to the market in 2022, to help formulators fill the market need for a taste-neutral plant-based protein ingredient that delivers the textural and sensory characteristics of regular ice cream.

Tendra® is a protein isolate from the Fava bean (*Vicia faba*). Also known as faba or broad bean, this is a flowering plant in the pea and bean family, and has a long history of human consumption. "The fava bean has a more neutral taste than pea, and is a crop that can be grown locally," explains van Gurp.

The fava beans used by Cosun to produce Tendra® are cultivated in Europe, are GMO free, and grown in a climate-friendly way with limited water use. Fava beans are also one of the world's most powerful nitrogen fixers. Once they have flowered and produced beans, the fava bean plant releases nitrogen into the soil, naturally enriching the soil and providing food and energy for the next crop of plants.⁴

Tendra® is produced using proprietary patented extraction technology that preserves much of the native functionality of the protein. This delivers a powder with a protein content above 85%.

For formulators this means having a functional ingredient with a unique combination of properties, including a high solubility, excellent emulsification properties and a neutral mild taste. This makes the ingredient highly suitable in plant-based ice cream. Tendra® also has the potential to replace milk protein in other dairy products.

Tendra®-based ice cream has a smooth and creamy texture, a neutral taste, a slow melting rate and good shape retention. Critically, the process of making ice cream with Tendra® is similar to making regular ice cream, which makes it easy for formulators to incorporate the ingredient in their processes.

"Unlike other plant-based proteins, Tendra® doesn't increase the viscosity of the pre-mix," says van Gurp. "This is a really important consideration for the processing stage, and it shows again that Tendra® is an easy and functional ingredient for formulators."




tendra®

⁴ <https://www.tandfonline.com/doi/full/10.1080/09064710.2015.1042028>

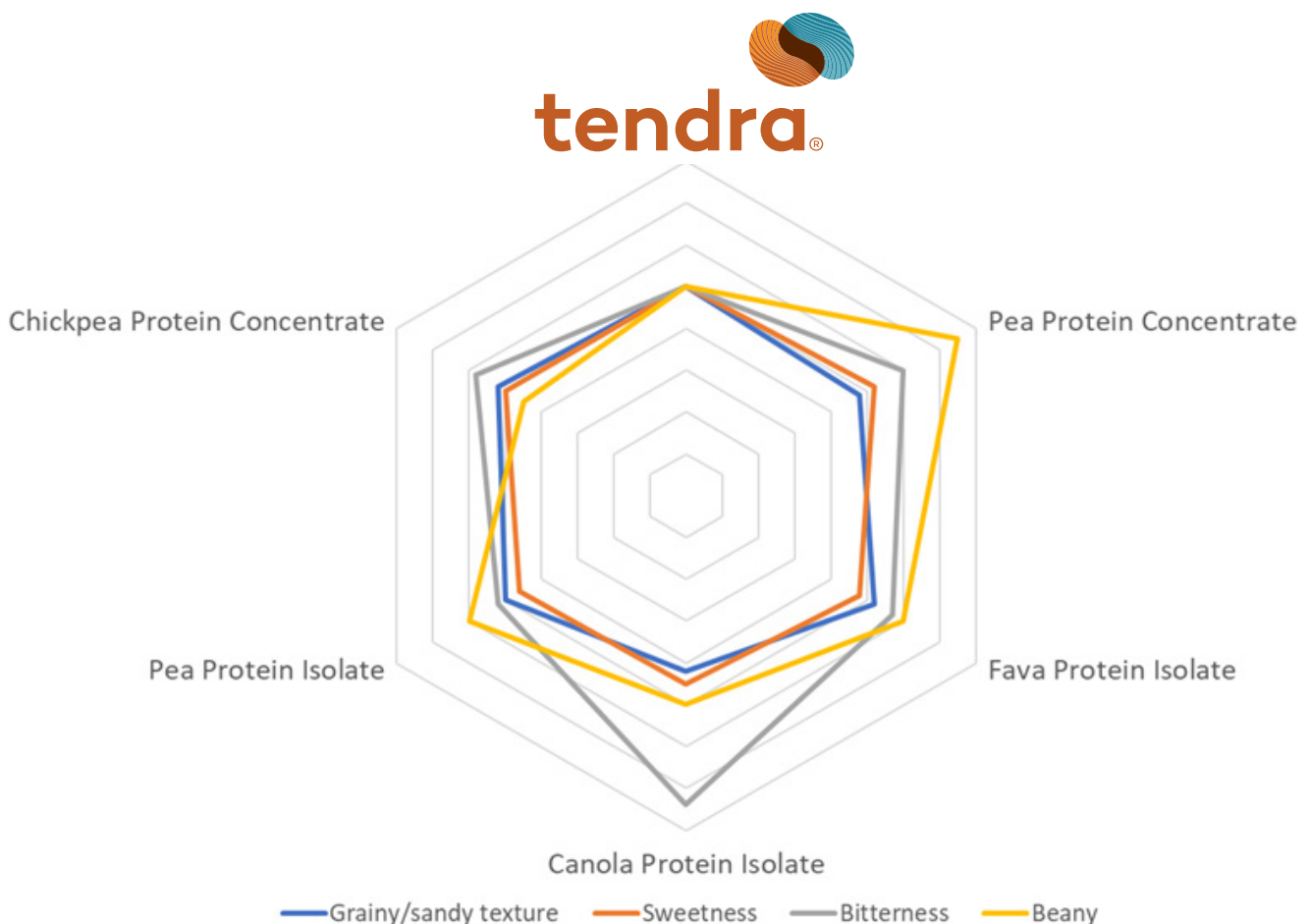
It all comes down to taste

According to a recent Bloomberg Intelligence report,⁵ the plant-based foods market could make up to 7.7 % of the global protein market by 2030, with a value of over \$162 billion, up from \$29.4 billion in 2020. Nonetheless, pleasure remains the top purchasing driver, influencing both consumer behaviour and product innovation.

“The ice cream can have great structure, but it still needs to taste good,” van Gurp points out. In other words, it all comes down to taste. On this point, Tendra® can help manufacturers demonstrate to

consumers that plant-based ice cream is not just an inferior ‘free from’ product, targeted at a niche audience.

Tendra® is being used in ice cream products currently on the market, demonstrating that plant-based ice cream is becoming more mainstream and accepted as a viable option on the supermarket shelf. Tendra® also brings the plant-based benefits of being sustainably sourced and free from animal products.



Tendra® has a mild and neutral flavor in comparison to reference products (fava protein isolates available on the market)

⁵ <https://www.bloomberg.com/company/press/plant-based-foods-market-to-hit-162-billion-in-next-decade-projects-bloomberg-intelligence/>

Key takeaways

- Consumers are open to plant-based protein alternatives across a range of product categories, but the number one priority remains taste.
- Plant protein ingredients are often associated with unpleasant flavors, and can present formulators with technical challenges.
- Cosun's Tendra® is a highly functional and taste-neutral plant-based protein that can be effectively used in dairy-free ice cream applications.
- Sourced sustainably from the fava bean, Tendra® delivers the textural and sensory characteristics of regular ice cream.
- Cosun's proprietary extraction technology preserves much of the native functionality of the protein.
- It offers high solubility, excellent emulsification properties and a neutral mild taste.
- Tendra® is in ice cream products currently on the market, demonstrating that plant-based ice cream is an increasingly viable option for consumers.

The Cosun Protein team will support you with information



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