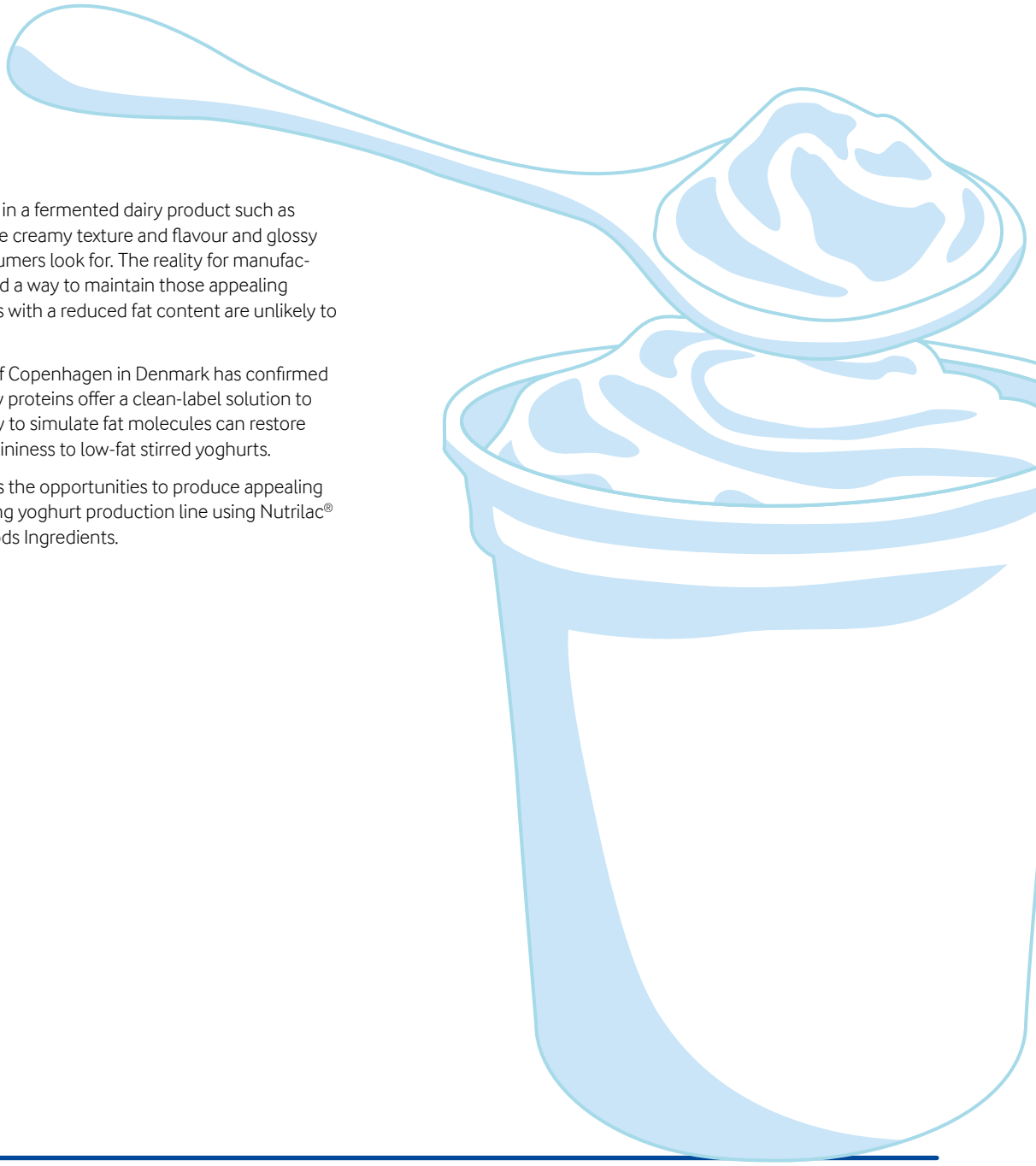
Recapture the creaminess in low-fat yoghurt

Effective fat replacement with Nutrilac® whey proteins



Abstract

Milk fat is difficult to replace in a fermented dairy product such as yoghurt, where it delivers the creamy texture and flavour and glossy appearance that most consumers look for. The reality for manufacturers is that, unless they find a way to maintain those appealing sensory properties, yoghurts with a reduced fat content are unlikely to succeed.

Research at the University of Copenhagen in Denmark has confirmed that microparticulated whey proteins offer a clean-label solution to fat replacement. Their ability to simulate fat molecules can restore creaminess, viscosity and shininess to low-fat stirred yoghurts.

This white paper documents the opportunities to produce appealing low-fat yoghurt on an existing yoghurt production line using Nutrilac® whey proteins from Arla Foods Ingredients.

Arla Foods Ingredients

Discovering the wonders of whey

The technical challenges

Research has shown that the creaminess of yoghurt is closely linked to viscosity, smoothness and a dairy flavour. An attractive glossy appearance adds to the perception. So, when milk fat is removed to produce a healthier yoghurt, it's typically at the expense of sensory quality.

The primary challenges are:

- Low stability
  Fat reduction alters the viscosity of stirred yoghurt. A fat replacement solution is required to avoid a thin, less spoonable result.

- Poor mouthfeel
  Low-fat yoghurts are often characterised by a dry mouthfeel and grainy texture. This is typically due to fat replacement by standard protein or starch. While these ingredients are able to restore viscosity and product stability, they do not have a similar positive effect on smoothness or creaminess.

- Loss of shininess
  Fat replacement with standard protein or starch has a negative effect on product appearance. Although the issue can be solved by the use of smoothing equipment, many manufacturers do not have the necessary range of equipment available.

Figure 1: Fat reduction poses a challenge to stability

Conventional solutions to these challenges include the use of fat replacers, such as thickening agents, or alternative starter cultures; alterations to the production process; and/or the addition of flavours.

Replacing milk fat with whey protein

Nutrilac® solutions containing microparticulated whey proteins (MWP) have a particle size that closely resembles the size of milk fat molecules. These can be successfully used in low-fat yoghurt formulations.

A research study has investigated the effect of MWP on the rheological and sensory properties of low-fat yoghurt. Along with sensory evaluations at Arla Foods Ingredients, the findings indicate that Nutrilac® is an efficient, natural and easy-to-use ingredient for milk fat simulation.

Rheological and sensory study

Scientists from the University of Copenhagen tested ten types of MWP as a fat replacer in a series of plain stirred yoghurts with 0.5% fat and 4.25% or 5% protein. These samples were compared with three reference products: a standard full-fat yoghurt with 3.5% fat and 3.5% protein, and two reference reduced-fat products with 0.5% fat and 4.25% or 5% protein.

The rheological analysis measured and mapped the texture characteristics of each yoghurt sample. A trained panel conducted the sensory analysis.

Key overall findings:

- A low content of fat and protein reduces viscosity

- Texture characteristics vary depending on the type of MWP used

- MWP with a larger particle size are likely to reduce texture graininess if integrated in the yoghurt matrix during fermentation

- A high content of MWP gives a texture similar to full-fat yoghurt – and stands out from the reference low-fat yoghurts

Arla Foods Ingredients produced all the MWP powders for the study.

Low-fat versus full-fat sensory evaluation

In a sensory evaluation by an external trained panel, low-fat yoghurt containing Nutrilac® was tested against a full-fat market standard. The scores show that Nutrilac® delivers similar viscosity, creaminess and smoothness and a distinctive fresh and natural taste, with reduced dry sensation (figures 2, 3 and 4).

Non-fat with MWP versus non-fat market standard

Following the University of Copenhagen study of low-fat yoghurt, application trials were held to investigate whether MWP provides similar benefits in non-fat products. Here, an external trained panel was asked to compare a non-fat yoghurt containing Nutrilac® with a non-fat market standard – both samples containing 0.1% fat. While this test showed no difference in the creamy mouthfeel of the two products, the yoghurt containing Nutrilac® was evaluated as having a longer consistency, lower viscosity, whiter appearance and a smoother, less dry mouthfeel. See comment to figure 5 on opposite page.

Summary

Yoghurt's rich and creamy appeal is easily compromised when fat is taken out to produce healthier variants. Evidence from a series of studies highlights Nutrilac® as an effective fat replacer. The microparticulated whey proteins in Nutrilac® effectively restore an appealing texture and sensory characteristics to low-fat and non-fat yoghurt without any alteration to existing yoghurt processing lines.

References

Torres I C, Janhøj T, Mikkelsen B Ø and Ipsen R: Effect of microparticulated whey protein with varying content of denatured protein on the rheological and sensory characteristics of low-fat yoghurt. International Dairy Journal 21, 2011

Don't hesitate. Get in touch

Interested in learning more about how you can use Nutrilac® as a fat replacer in low-fat or non-fat stirred yoghurt? Just send us a mail at dairy@arlafoods.com, and we'll get back to you as soon as possible.

Figure 2: Insufficient smoothing

Figure 3: Sufficient smoothing

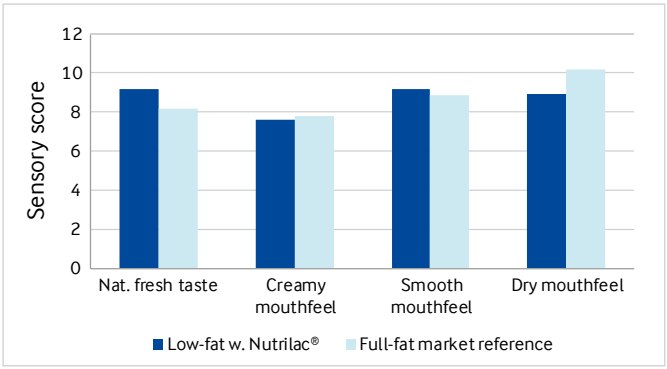


Figure 4: Sensory evaluation of low-fat yogurt with MWP vs. a full-fat market reference

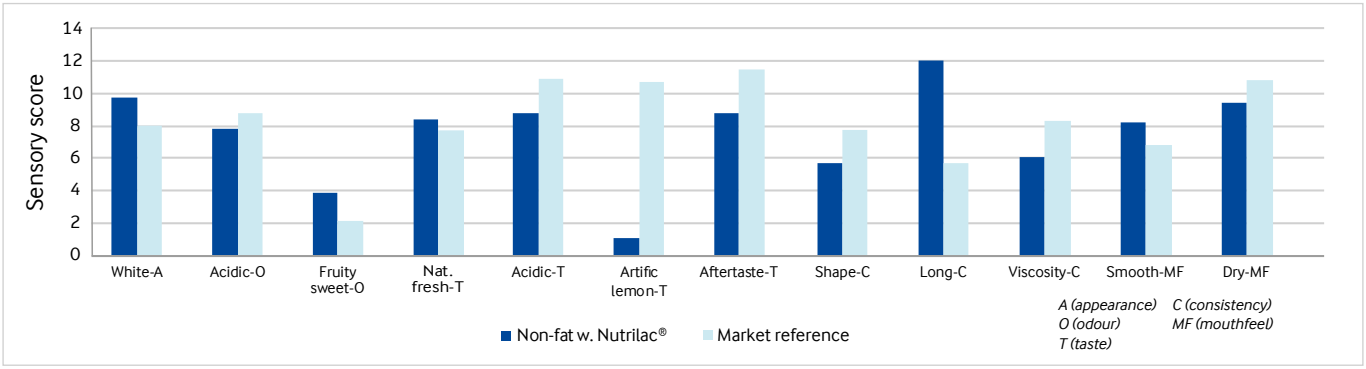


Figure 5: Sensory evaluation of non-fat yoghurt with MWP vs. market reference

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