

MORE VALUE FOR MILK

*How to turn 100% milk into
100% fresh cheese or strained yoghurt*

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Introduction

According to a UN study, the world population is expected to increase to 9.7 billion in 2050 and that is 2 billion people more than the world has today. More than 70% of world's population is expected to live in cities by 2050 (United Nations, 2015). The resulting population growth and urbanization leaves food manufacturers with incredible challenges. In order to meet the food supply, global food production will need to be increased by at least 60% (Rabobank, 2016). Hence, the world needs to improve the efficiency of its food processes and to develop more sustainable food production.

Traditionally, many different types of fresh cheese and strained yoghurts are produced by concentrating the fermented milk, leading to only 25% final product and, more importantly, 75% acid whey. Generally, the by-product acid whey cannot be used efficiently and is an environmental issue due to the limited uses for acid whey (Jacoby, 2015). The majority of it ends up as fertilizer or as part of animal feed (Smith, 2015).

Avebe is dedicated to developing sustainable solutions for its customers and adapting these concepts to local market needs. This white paper presents a solution for fresh cheese and strained yoghurt.

Problem and challenge for the dairy industry

There are many varieties of fresh cheese and strained yoghurt (Table 1). Historical uses of different cultures (e.g. thermophilic vs. mesophilic), milk source (e.g. cow, goat or sheep milk) and different consumer preferences (e.g. salt, plain, fruited) have led to a wide variety of fresh cheese and strained yoghurt products (Fox *et al.*, 2000, Fox *et al.*, 2015).

When these fresh cheese and strained yoghurts are produced, typically only 25% of the milk is used. Why? In traditional processes a concentration step is needed to obtain the right texture; i.e. of every 100 litres of milk, 25 litres end up in the final product. The remaining 75 litres end up as acid whey (Figure 1). There are limited uses for acid whey and as such, acid whey has a very low value.

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- Cream cheese
 - Quark
 - Fromage blanc
 - Suzme yoghurt
 - Fresh goat cheese (e.g. chèvre)
 - Greek yoghurt
 - Labne
 - Queso blanco
 - Mascarpone
 - Petit Suisse
 - Neufchatel
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Table 1: Examples of fresh cheese and strained yoghurt (Fox *et al.*, 2000, Fox *et al.*, 2015)

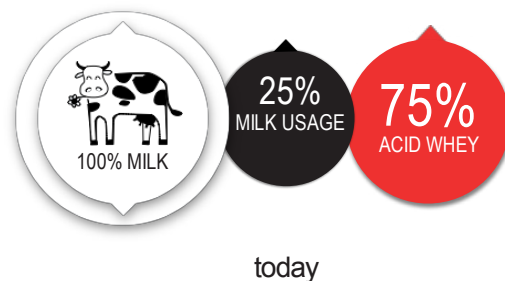


Figure 1: Traditionally only 25% of milk is utilised



Solution for the dairy industry

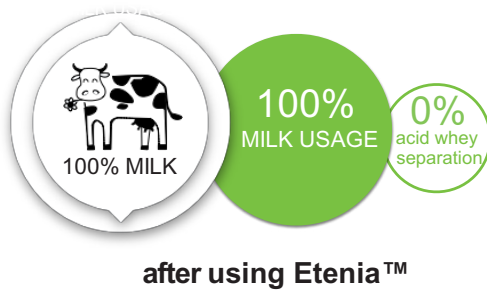


Figure 2: How to turn 100 % milk into 100% final product

What if we kept all milk together?

If we kept all the milk together, we would have four times more final product with the same amount of milk! We would use the full intrinsic value of the milk and not produce acid whey anymore.



How does this work? Avebe's-solution explained in a few words:

With Etenia™, a unique potato-based ingredient from Avebe, there is no need for any centrifugation or ultra-filtration step. Etenia™ gives your product the texture of a typical fresh cheese or strained yoghurt, without the need for acid whey separation (Figure 3).

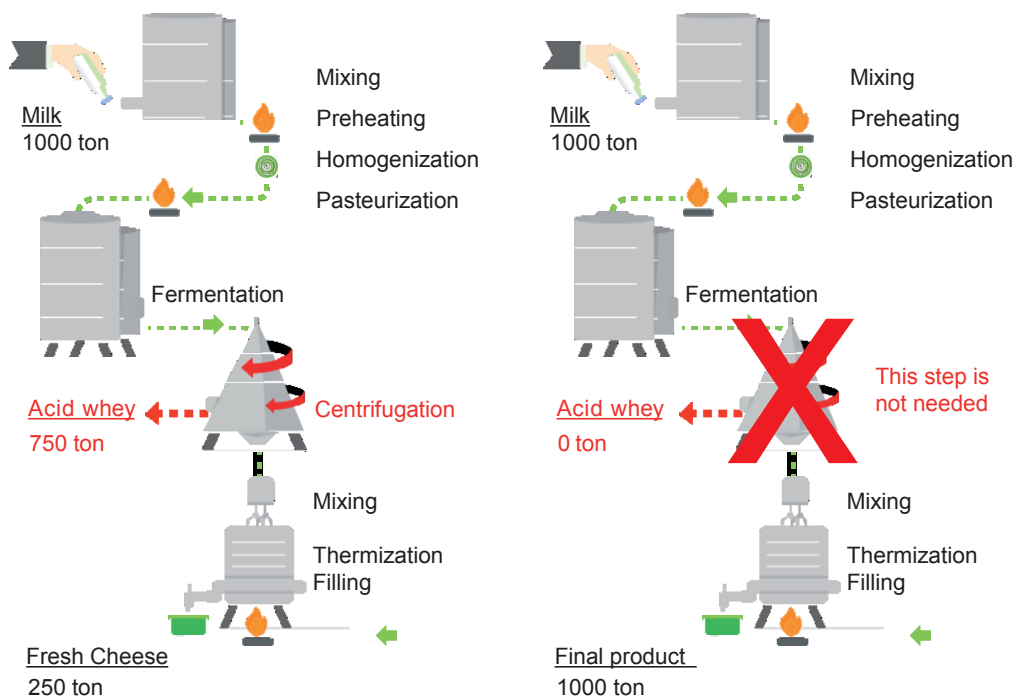


Figure 3: Whey separation is not necessary with Etenia™



Benefits for dairy manufacturers

At least 10x more sustainable than the benchmark

Milk protein is an alternative to using Etenia™. A life-cycle analysis (LCA) was performed to determine the CO₂ equivalent for producing Etenia™, taking into account the production of raw materials as well as their processing. Then this value was compared with the carbon footprint of milk protein.

Ingredient	Average CO ₂ equivalent / kg
Etenia™	±1.2
Milk protein	±30

Table 2: The CO₂ equivalent of Etenia™ is 10 times less than that of milk protein (Nijdam, Rood, & Westhoek, 2012)

Significantly better cost-in-use

By keeping all the goodness of the milk, recipe costs may be cut by 15-30% as the production yield is increased by up to 400%. This leads to huge raw material savings, i.e. of up to € 4,000,000 based on 10,000 tonnes of final product.

No compromise on taste

A consumer sensory study was carried out in order to guarantee that there is no significant difference between a traditional type of fresh cheese and one using Avebe's method. To make the comparison more challenging, a 24% fat reference was compared with the Avebe solution with only 12% fat. The blind study consisted of 281 respondents, including female (43%) and male (57%) and heavy (54%), low and non-users (46%). Although the age of the respondents did not have a normal distribution, the sample distribution of the mean approaches a normal distribution, as the sample size is much larger than 30. The age distribution is shown in Figure 4.

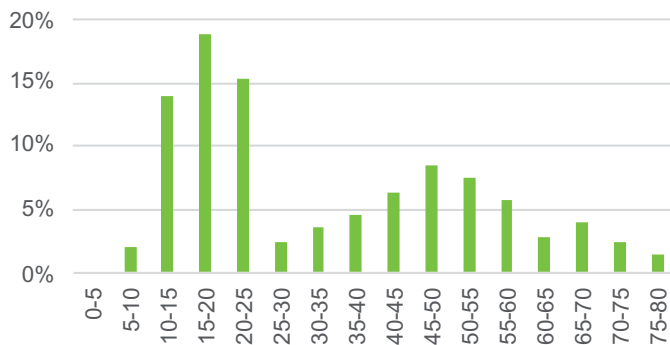


Figure 4: Age distribution of consumers who participated in the study

The products have similar 'liking' - there was no significant difference in bitterness, creaminess, freshness or spreadability (see Figure 5). The difference in sourness can be explained easily by the difference in fat content. The salt content can be adjusted and is easy to adapt to customer and consumer wishes. The consumers were also asked if they would buy the product based on the blind tasting. Some 71% of consumers preferred Avebe's solution, while only 66% preferred the reference (Figure 6). Therefore, there is no compromise on texture and taste when using Etenia™ to obtain a 100% yield in fresh cheese and strained yoghurt.

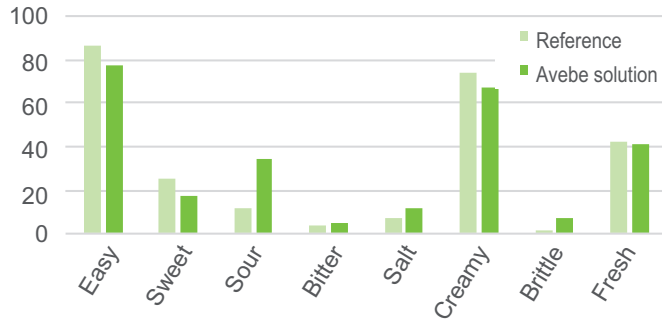


Figure 5: Difference in sensory attributes of cream cheese

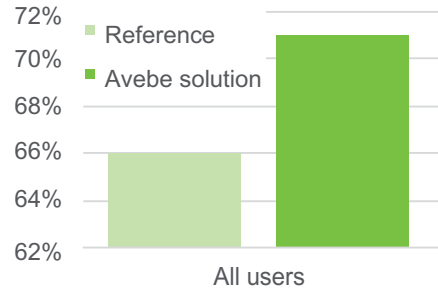


Figure 6: Buying preference

No compromise on texture

Avebe has many years of experience in developing and using a wide variety of texture measurements, adapted to the application and the need. A gel strength measurement was carried out (with the same fat content) to compare a traditional type of fresh cheese with Avebe’s solution. This measurement shows no significant differences between the reference and Avebe’s solution. Moreover, the comparison with the negative reference (i.e. fermented milk) showed a huge increase in texture produced by Etenia™ (Figure 7).

Fresh cheese containing Etenia™ (green line) is very similar in texture to the benchmark (black line) and very different from the negative reference, i.e. a product without whey separation and without Etenia™ added (red line). See Figure 7. Hence, there is no significant difference between the Avebe solution and the reference, while the major difference between the Avebe solution and the negative reference shows the added value of Etenia™.

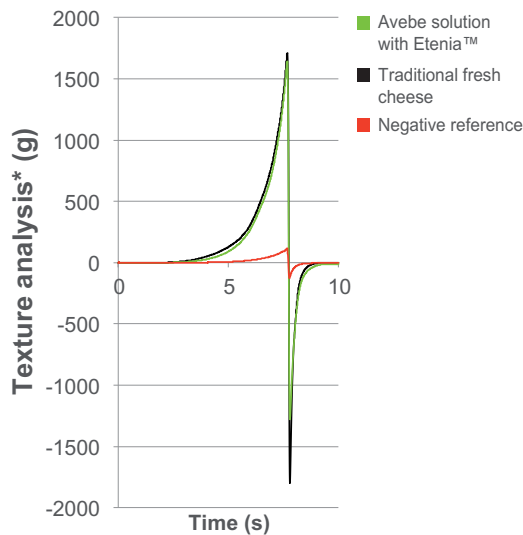


Figure 7: The gel strength is measured by a 1-inch probe in fresh cheese (entry 1mm/s, removal after 16s).



Typical product recipes, process conditions and product label

To give you an idea of what a typical process and recipe may look like, Avebe shares the typical recipe for a full-fat (10% fat) quark and the label of wheyless fresh cheese (Picture 1).

Recipe example: Wheyless full-fat quark with 10% fat

This recipe is for 10,000 kg of full-fat quark or fromage frais with 10% butterfat, to be filled in cups and stored in cardboard boxes.

Raw materials	Quantity	Dosage
Skimmed milk (0,05% fat)	7,109 kg	71.1%
Cream (40% fat)	2,491 kg	24.9%
Etenia™ 457	400 kg	4.0%

Process

- Standardize milk, cream and add Etenia™
- Pasteurize for 15-20 sec at 72-75°C
- Ferment during 10-18 h at 20-30°C
- Cool to fermentation temperature, 20-30°C (mesophilic)
- Ferment during 10-18 h at 20-30°C*
- Thermization for 2-5 min at 60-65°C*
- Cooling & filling.

* common yet optional

Example of a final product label for wheyless fresh cheese with Etenia™



Etenia™ has no e-number and can be declared as starch or maltodextrin depending on country.



About Avebe

Avebe is a cooperative of 2,500 growers of starch potatoes in the Netherlands and Germany. Each year, the starch potatoes of those members are processed into high-grade ingredients based on potato starch and potato protein; they add value to food products but also to industrial applications worldwide. Avebe works continuously on developing new opportunities and applications based on starch potatoes and is focused on sustainable continuity.

The company has over 1,300 employees and production sites in the Netherlands, Germany and Sweden and sales offices in the United States, Europe, Asia and the Middle East. The Head Office is located in Veendam, the Netherlands.

Avebe is a trade name of Coöperatie AVEBE U.A, with its registered office in Veendam (Chamber of Commerce No.: 02300804).

Contact us

Contact Avebe for detailed cost calculations, recipes and/or processes, or any other questions you may have. Many recipes and processes of local product varieties are available to you.

Contact us directly at dairy@avebe.com or find your local sales contact here:

www.avebe.com/contacts.

References

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SOME SEE POTATO
WE SEE POTENTIAL
WHAT DO YOU SEE?

