TECHNICAL ARTICLE

How to make a low-fat or a fat-reduced mayonnaise

BRINGING GOOD THINGS TOGETHER

Palsgaard®

This article describes the challenges faced by mayonnaise manufacturers when developing low-fat or reduced-fat mayonnaise. Taste, colour, texture and viscosity become very important parameters that must be dealt with when manufacturing a mayonnaise with a highly reduced oil content. The focus of the article will be on how to maintain texture and viscosity in low-fat or fat-reduced mayonnaises by introducing **Palsgaard® 1-2-3**.

Traditionally, mayonnaise is an oil-in-water emulsion stabilised by a blend of hydrocolloids and starches with an oil content of more than 65%, which means that it is being viewed as a high-fat food, and as such a no go with many of today's low fat and healthy lifestyle seeking consumers.

Looking at the number of new product launches of mayonnaises with a lower fat content it is however, safe to say that the market for low-fat or reduced-fat mayonnaises is continuing to grow and that the tendency is moving in the direction of an increasingly lowered oil content.

Making a low-fat mayonnaise

According to European legislation, a mayonnaise product can only be claimed as being "low-fat" if it contains no more than 3 g of fat per 100 g. Equally, to claim that a product is either "light" or "fat-reduced", the fat content must be at least 30% lower than compared to a similar full fat product.

However, to remain below the defined 3% fat limit there are a number of important factors which must each be taken into consideration: Factors such as texture, taste and colour will all be affected by the lack of oil compared to a high fat mayonnaise:

COLOUR

Looking at full fat mayonnaise, the colour is often white or creamy, or even yellowish if the mayonnaise contains eggs, which means that the consumer tends to expect a low-fat mayonnaise to look like this also.

However, when the amount of oil in the emulsion is reduced, the colour tends to become less white and more transparent. A problem, which is easily remedied; to make it less transparent colourings can be used, e.g. titan dioxide for whiteness and beta carotene to make it more yellow. Other ingredients such as skim milk powder and egg yolk may also help to reduce the transparency.

TASTE

Taste is another factor which is affected by the low oil content. Because of the high amount of water in the water phase in the mayonnaise compared to a traditional mayonnaise, a higher amount of acid is needed to lower the pH value. This can make the taste more acidic, which means that a combination of different acids such as citric acid, malic acid or different types of vinegar would be preferable. Another possibility is to add flavour to the mayonnaise.

TEXTURE

The texture is probably the most difficult parameter to deal with when developing a low-fat mayonnaise. When the amount of oil is reduced the mayonnaise tends to become less creamy, and stickier or gelled because of the high amount of water that has to be bound by the stabilisers.

Hydrocolloids alone may result in a long sticky structure, starch alone may result in taste problems because of the high amount that has to be used, or

it may result in a gelled structure. Proteins alone may result in a gelled structure and are also expensive ingredients – i.e. less cost efficient. Fibres may be a good water-binder, but they may change the appearance of the low-fat mayonnaise.

Palsgaard® 1-2-3

By combining the different water binding ingredients in the right proportions, it is possible to develop a low-fat mayonnaise with a short and creamy structure: **Palsgaard® 1-2-3** has been developed especially for low-fat and fat-reduced mayonnaises and is able to deal successfully with the above parameters. Palsgaard® 1-2-3 has been tested in recipes with respectively 3, 6 and 9 % fat content:

From the recipes listed in Table 1, below it is clear that **Palsgaard® 1-2-3** is used at the same dosage regardless of whether the total oil content is 3, 6 or 9 %.

The three recipes were made on a Koruma and viscosity and the stability measured on a HAAKE rheometer RS1.

The flow curves for the three samples shown in Figure 1 are compared to a mayonnaise with 61% fat.

Looking at the nearly identical behaviour of the four curves, you can conclude that the viscosity and creaminess is the same for all 4 products. However, the stability of the 61% oil mayonnaise is a little lower than the three low-fat mayonnaises.

Opposite process conditions

The process of manufacturing these low-fat mayonnaises is actually the opposite of the traditional method of producing a cold produced mayonnaise, where stabilisers such as hydrocolloids and starches are mixed with a little oil to prevent lumping and are added to the water phase before the oil is sucked into the homogenisation machine.

However, when making a low-fat mayonnaise according to the above recipes, the oil content is so low that it cannot be mixed with **Palsgaard® 1-2-3**.

INGREDIENTS	3 % OIL	6 % OIL	9 % OIL
Water	77.4 %	74.4 %	72.9 %
Palsgaard® 1-2-3	5.0 %	5.0 %	5.0 %
Oil	2.5 %	5.5 %	8.5 %
Vinegar	5.0 %	5.0 %	5.0 %
Skim milk powder	4.0 %	4.0 %	2.5 %
Egg yolk	2.0 %	2.0 %	2.0 %
Sugar	2.0 %	2.0 %	2.0 %
Salt	1.5 %	1.5 %	1.5 %
Preservative	0.1 %	0.1 %	0.1 %
Total	**100 %**	**100 %**	**100 %**

Table 1:
Recipe suggestions for mayonnaises with 3, 6 or 9 % fat with Palsgaard® 1-2-3 to be used on a Koruma.

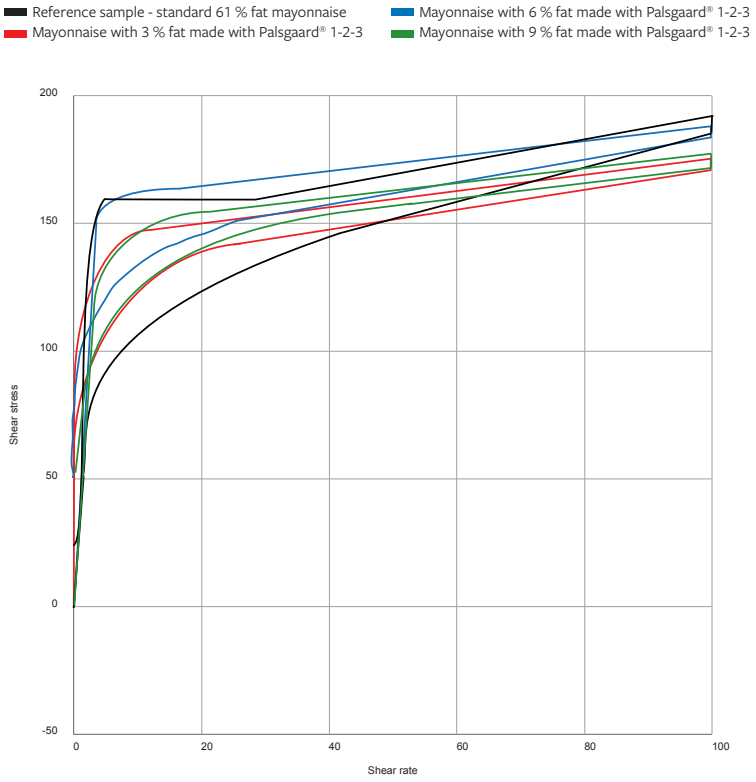

Figure 1:
A flow curve is a rheological measurement to characterize products. The principle is that the shear (mechanical treatment) is increased and after a holding time it is reduced again. By calculating the area between the up ramp and down ramp you can see how much viscosity/texture that is broken down. The mechanical action is illustrating the treatment a mayonnaise will have after production. It could be pumping, mixing in other ingredients or squeezing it out of a bottle. All these treatments will have an influence on the end product.

Therefore, it is necessary to suck the stabiliser blend into the water. However, the best results are obtained when the water is added together with the egg yolk and the oil sucked in subsequently. Following the formation of the emulsion the remaining dry ingredients are added. Optimum results are obtained if they are mixed together to prevent lumping, but it is also possible to add them separately. Finally, vinegar and acids are added.

If the dry ingredients are added before the oil is emulsified into the mayonnaise, the thickening of the water phase will start and will increase the viscosity; thereby the oil drops will not be as small as if the oil was emulsified into a water phase with low viscosity. The result will be a low-fat or a fat-reduced mayonnaise which is more unstable and less creamy.

Conclusion

Developing low-fat or reduced-fat mayonnaises has some challenges. With the right composition of water binding ingredients Palsgaard® 1-2-3 is able to meet the challenge of texture and viscosity. Palsgaard® 1-2-3 will provide the same viscosity and creaminess as a mayonnaise with a much higher fat content.

CONTACT US

Contact us to order samples of **Palsgaard® 1-2-3** to try out in our vast library of recipes, or visit **www.palsgaard.com** for more information.