

INTRODUCTION

According to Regulation (EC) N° 1924/2006 of the European Parliament and of the Council concerning nutrition and health claims in food, a product can be classified according to the percentage of fat removed from the product and the percentage of fat remaining to the final product. For that reason, we classify the cheese in *Reduced fat cheese* (which contains 25% less of fat), *Low fat cheese* (which contains 30% less of fat and maximum 3 grams of fat per 100 grams of product) and *Free fat cheese* (which all of fat has been removed, but it can remain 1.5% of fat in final product).

Reduced fat and low fat cheeses are usually characterized as having poor body, flavour, and functional properties because of high moisture and low salt. Procedures developed for manufacturing low fat cheeses include processing techniques, starter culture selection, and use of additives (Mistry, 2001).

It is a work review about low fat cheese. It is intended to include an overview of this product, manufacturing methods used and their effects. It emphasizes the use of fat mimetics, focusing on the use of inulin in the manufacturing of low fat cheese.

INULIN

Inulin is a carbohydrate found in many types of plants, but specially in roots and rhizomes. Inulin is considered dietary fibre, so we can not digest it and it provides no calories.

It is a homogeneous molecule formed by polymers of fructose.

It is shown in some studies that long chain molecules of inulin increases the creaminess to low fat yogurt.

In a study developed with a low fat cream cheese, no differences were observed when colour, aroma and acceptability were analyzed.

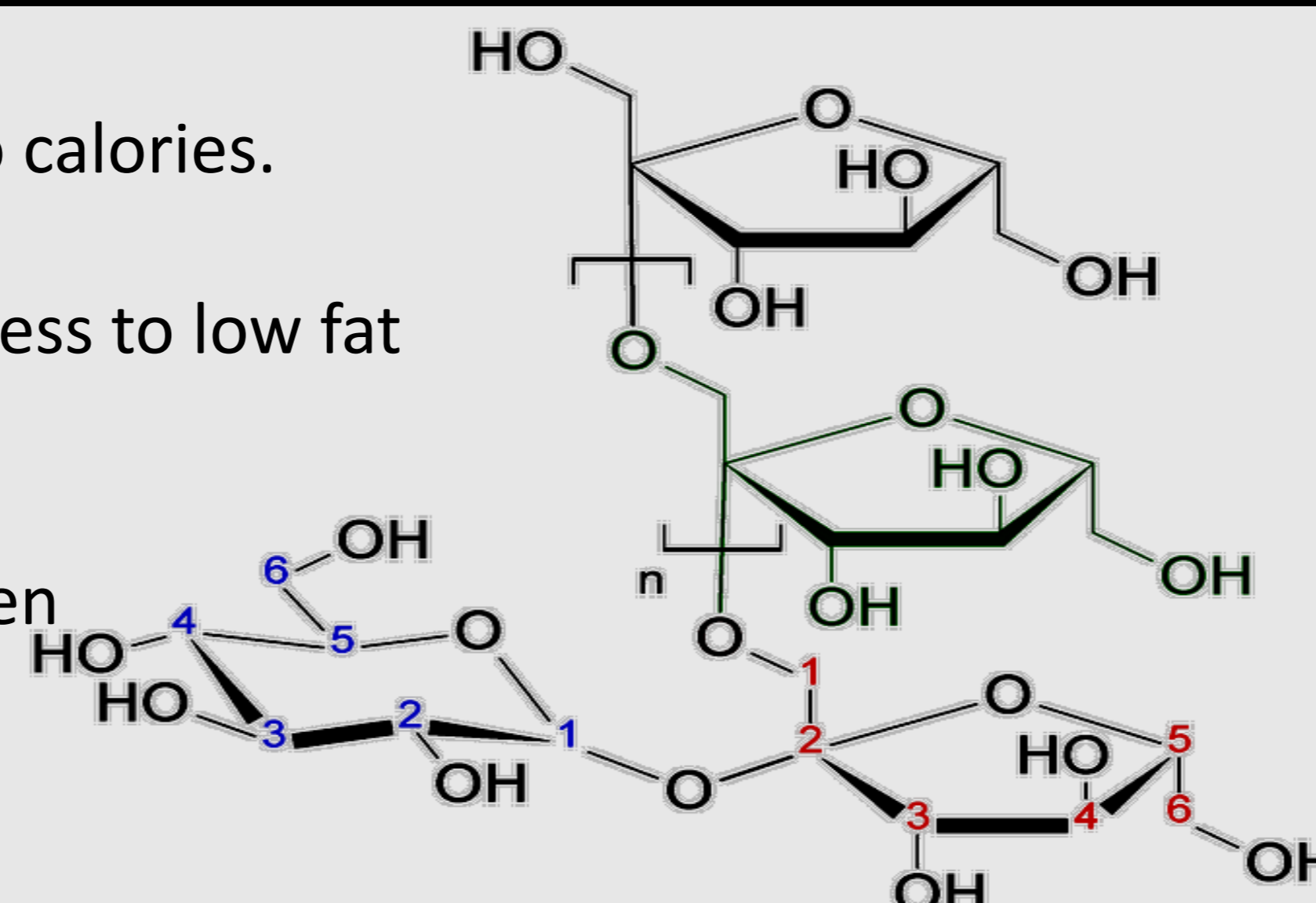
Nevertheless, there were observed variability in taste, being more tasty the sample with more percentage of inulin added (López et al., 2011).

Salvatore et al. (2014) showed that the presence of inulin as a substitute of fat cheese causes similar disruptions like those caused by the original fat milk to casein network during coagulation, resulting in a smooth and creamy cheese.

McMahon et al. (1996) determined that use of inulin decreases meltability in Mozzarella low fat cheese. When this cheese is cooked, appears a burned surface before its correct merger.

CONCLUSION Use of inulin allows the obtention a low fat cheese with similar sensorial and physico-chemical characteristics as conventional cheese, specially in fresh or creamy cheeses.

Use of this polymer increases the moisture because increases water retention capacity. Furthermore, the addition of inulin do not increases the amount of calories compared with other compounds.



MEANING REASONS

•People are concerned about fat, specially of animal origin which is primarily a saturated fat.

•During the past thirty years, the population has experienced a collective fattening, and if this trend continues, it is expected that the vast majority of adults worldwide will have problems of overweight in 2030. Interplay of the different factors including genetic, metabolic, behavioural and environmental influences in this situation (Haththotuwa et al., 2013).

•By NAOS strategy, the Spanish Agency for Food Safety (AESAN) encourages an appropriate context to help families reduce the major problem of childhood obesity.

•The NAOS strategy also affects companies. In general, this strategy demands products with low content of salt, sugar and fat and also encourages the use of following a healthy lifestyle.

•It is demonstrated that from the extraction of fat part from a product, the company diversifies its product range, experiencing a remarkable growth.

MANUFACTURING METHODS

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LOW FAT CHEESE

Processing methods

Use of ultra filtered or micro filtrated milk

It is known that we can add micro filtrated or ultra filtrated milk to standardize the fat percentage. Adding ultra filtered or micro filtrated milk we are not allowing the serum proteins going to curd. It drives to great firming of final cheese.

Milk homogenization

Homogenization of milk not only reduces the size of milk fat globules the interfacial forces at the new fat globule surface may disrupt casein micelles and lead to curd shattering and yield loss.

Use of microorganisms

Exopolysaccharide producing cultures

Its use to modify the characteristics of low-fat cheeses is limited, as only applicable to cheese with a sufficient maturation period in the way that Exopolysaccharide producing cultures can proliferate. However, some studies has shown a change in texture of cheese increasing that and decreasing the speed of syneresis.

Use of enzymes

It is shown in some studies that enzymes positively increase the texture of the cheese. Nevertheless, its enormous proteolytic activity increases the formation of very bitter compounds that confer bad properties to the final product.

Use of additives

Protein, fat mimetics

Addition of protein in low fat cheese rises its consistency, but also its gumminess and hardness. With the vast majority of hydrophobic interactions, Fat mimetics can bring more creaminess and plasticity to the cheese, but they can not relieve polar characteristics of fat as flavor.

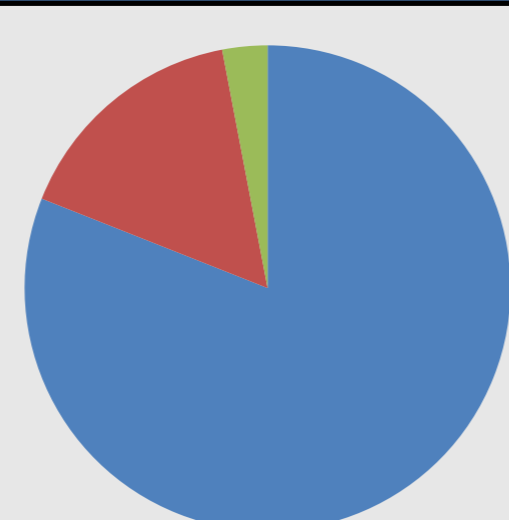
WHEN WE LOOSE FAT...

Flavour The perception of the flavor can change to positive or negative depending on which compounds are released and when. In low fat cheese it happens earlier because of the stability of curd including moisture (Delahunty et al., 1996). Hydrophobic compounds that promote flavour are absorbed by fat, but when it is removed, these compounds are felt harder (Rogers et al., 2009).

Texture It is a very important trait of cheese, very affected with the lack of fat. Fat interacts with casein matrix during curd, but when we remove the fat, the percentage of moisture raises and protein plays a great roll in development of texture, increasing firmness (Mistry, 2001). Calcium helps to increase texture. It is thought that calcium increases in low fat cheese (Nauth and Ruffie (1995).

Functionality It is very important in cheeses used as ingredients. When we takes the fat of Mozzarella cheese, white colour decreases because of dispersion of light by fat (Kosikowski et al., 1997) Meltability is also affected by removing fat of cheese, decreasing it (Rudan et al., 1998).

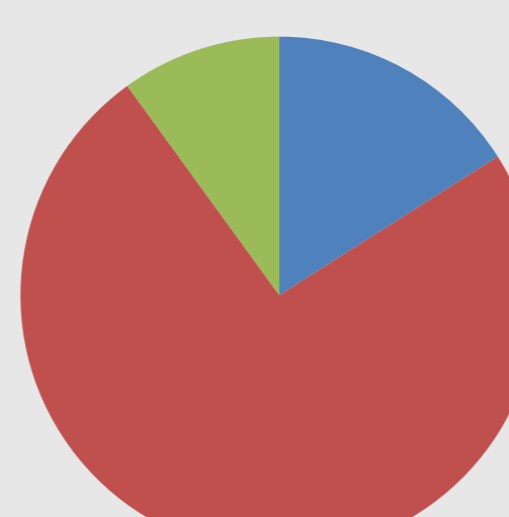
FIELD RESEARCH: RELEVANT RESULT



Usually
Sometimes
Never

How often do you consume cheese?

There we can see that the vast majority of the responders usually eat cheese in whatever of its forms.



The first time I've heard it
I know the name, but not the composition
I know the name and its composition too

Low fat cheese: does it say something to you?

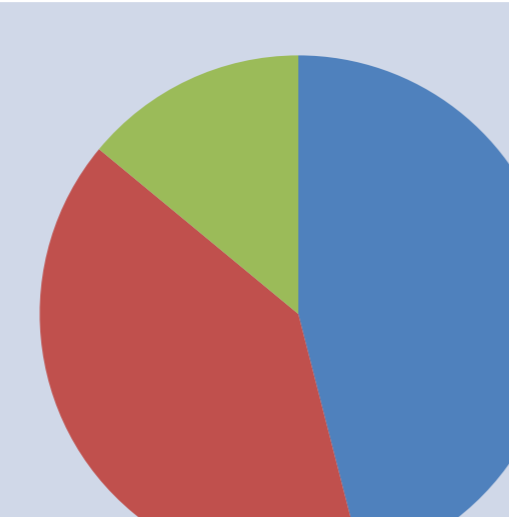
People know that "light" means a reduction of fat (in that case), but they don't know what have really changed.

CONCLUSION

The majority of respondents would buy the product simply by carrying fewer calories. The composition won the sensory characteristics of low fat cheese.

Respondents knew that the product is light because of the fat part extraction, but none of them knew any method to produce low-fat cheese.

TASTING RESEARCH: RELEVANT RESULT



Both are identical
Slight difference
Clearly different

CAUTION!
We don't know the difference in the manufacturing because it doesn't appears in the label.

Feelings between both cheeses

It can be seen that almost half of respondents found the two cheeses identical, with no differences. That is a great result. Nevertheless, some respondents felt some difference between them, usually without knowing what difference it is. A reduced minority found both clearly different.

CONCLUSION

As relevant comments;
•Both are identical.
•The low fat cheese is creamy and/or gummy.
•The low fat cheese sticks to the palate.
•The low fat cheese is bitter.
•The low fat cheese seems more oily.
•Best texture and smell for normal cheese but best aftertaste for low fat cheese.
•Low fat cheese is harder.

There is no negative comment about low fat cheese.