

## **ADDVALUE LINE CELLULOSE DERIVATIVES ON OBTAINING LOW CALORIE SPREADING FROM HIGH FAT RAW MATERIAL**

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### **Abstract**

*The caloric content reduction of a food is a topic of dilution of those components of aliments which have caloric value. Cellulose derivatives functions as an effective inert substitute and also has a binder water capacity. Walocel® products (cellulose derivatives) contribute no off-flavors or color and are calorie free. The aim of this paper was to test the possibilities of using Walocel products (cellulose derivatives) in margarines. Because of its properties we found that cellulose derivatives (WALOCEL products) act as: emulsifier and fat substitute and water binder and nutritive value enhancer. The greatest amount of water was bounded when the water was added as Walocel solution. We calculate the caloric value of the outcomes in order to prove a high caloric content reduction in products which had Walocel® product added.*

**Keywords:** *cellulose derivatives, carboxymethylcellulose, reduced calorie, Walocel®,*

### **Introduction**

The caloric content reduction of a food is a topic of dilution of those components of aliments which have caloric value. This target can be achieved using two methods: by replacing an amount of any raw material with bulking agents which have no energy content and by binding water as much as possible (Phillips, 2000; Ang, 2005; Ognean 2006a). The two ways could be use alone or in combination.

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The greatest challenge for food technologist is that the consumer expects to find for the light variant of foods the same sensorial characteristics as those of that of the traditional food (Ognean, 1995; Ognean, 2006b; Ognean, 2006c).

This research was conducted in the context of both reducing the total energy of the outcomes product and preserving the sensorial properties of the outcome spreading.

The aim of this paper was to test the possibilities of using Walocel products in margarines.

### **Experimental**

The three kinds of cellulose derivatives used were obtained as free samples from Wolff Cellulosics GmbH & Co. KG – a Bayer Material Science Company. Walocel® CRT 20 000 PA 07 and Walocel® CRT 40 000 PA 07 and Walocel® CRT 60 000 PA 07 are manufactured from high – purity cellulose in compliance with GMP (Good Manufacturing Practices) and HACCP.

In codes and regulations Walocel® CRT 20 000 PA 07 and Walocel® CRT 40 000 PA 07 and Walocel® CRT 60 000 PA 07 are also known as a sodium carboxymethylcellulose, cellulose gum E 466. Walocel® C products meet all requirements of the Code of Federal Regulation of the Food and Drug Administration (FDA) 21 CFR 182 1745 (GRAS – General Recognized as Safe), FCC (The Federal Communication Commission) and the EU directives for E 466 in their current versions. (Wolff Cellulosics, 2006).

Tests were performed on UNIREA margarine. Producer: ORKLA Foods Production SRL. Lipid content 65%. Other ingredients: salt (0.35%), emulsifiers (mono- and diglycerides, soya lecithin, preservative (ascorbic acid), acidifier (citric acid), flavor, colorant (beta carotene), vitamins (A, D<sub>3</sub>). Homogenization method used a UFESA hand mixer.

Table 1 describes shows the summary of the experimental part.

**Table 1.** Summary of the experimental part

Type of Walocel used	Dosage and how the CMC was added	Walocel content in outcome product (%)	Water bound by 100 grams of margarine with Walocel (ml)	Caloric Value Kcal /100 grams	Decreases of the caloric content (%)
Walocel® CRT 20 000 PA 07	- 2% on margarine weight as pure powder directly to the margarine - the water was added gradually	1.4	40	417	28.57
	4 % on margarine weight as pure powder directly to the margarine - the water was added gradually	2.59	50	390	33.33
	- as solution 1% added gradually on margarine	0.5	100	292.5	50
	- 2% on margarine weight as pure powder directly to a small quantity of melted margarine - the water was added gradually	1.40	40	417	28.57
Walocel® CRT 40 000 PA	- 2% on margarine weight as pure powder directly to the margarine - the water was added gradually	1.31	50	390	33.33
	4 % on margarine weight as pure powder directly to the margarine - the water was added gradually	2.56	56	375	35.89
	- as solution 1% added gradually on margarine	0.56	130	254.34	56.52
	- 2% on margarine weight as pure powder directly to a small quantity of melted margarine - the water was added gradually	1.31	50	390	33.33
Walocel® CRT 60 000 PA 07	- 2% on margarine weight as pure powder directly to the margarine - the water was added gradually	1.09	80	321.4	45.05
	4 % on margarine weight as pure powder directly to the margarine - the water was added gradually	2.08	90	304.68	47.91
	- as solution 1% added gradually on margarine	0.6	150	234	60
	- 2% on margarine weight as pure powder directly to a small quantity of melted margarine - the water was added gradually	1.09	80	321.4	45.05

## **Results and Discussions**

When the Walocel product was added as pure powder directly to the margarine and the water was added gradually, the first quantity of water was most difficult to integrate. Despite doubling the dosage of Walocel, the quantity of bounded water increases only very few.

The more quantity of bounded water:

- the lighter color of the end product
- the fluffier consistency
- the less feeling of the oily sense
- better spreading capacity

The control sample doesn't bind any quantity of water. So due to the Walocel product there is the capacity to bind water and to introduce it into lipids from margarine. WALOCEL products act as:

- emulsifier
- fat replacer
- water binder
- nutritive value enhancer
  - increasing fiber content
  - decreasing caloric content
  - lowering lipid content

There are some advantages as:

- enhances the yield of the outcomes product by replacing raw material with water
- decreases the costs of production
- reducing the lipids content while the sensorial characteristics of the end product remains the same or even better
- much healthier type of spreading
  - with fiber content
  - lower calorie value
  - lower lipid content

## **Conclusions:**

The greatest amount of water was bounded when the water was added as Walocel solution. The explanation is that the emulsifier ability of the cellulose derivatives is the best when it's fully hydrated. Comparative test on margarine with low lipids content shows that Walocel products work synergistic with emulsifiers already present in margarines as ingredients. Water binding capacity of Walocel products in margarines increases with degree of polymerization of cellulose derivatives.

Carboxymethylcelluloses become interesting on shortening, lipids and spreading field with products as:

- emulsifiers alone or in combination with other emulsifiers
- fat substitute
- enhancer of nutritive value by
  - increases fiber content
  - lowers lipid content
  - decreases caloric content
  - enhances spreading properties
  - improves sensorial properties

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