A COMPARATIVE STUDY FRYING WITH LARD OIL

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Abstract: **Ten Kate produces since 2009 lard oil, originated from pig fat. This lard oil is fractionated and deodorized and the question rose if this fraction with the low melting point would be usable as deep fry medium for snacks. A comparative study of deep frying two different snacks was carried out with lard oil, sunflower oil and peanut oil. During 5 days of 6 hours, French fries and croquette rolls were deep fried while the products and frying oils were analyzed during this period.**
The chemical analyses of the fat during the study showed small differences between the uses types of oil. There was also no difference between the oil uptake fo the products and colour of the frying oil during the experiments, as to conclude the olein fraction of the lard can be appleid for frying products like snacks.

Index terms; lard oil, olein fraction, deep fat fry, snacks.

I INTRODUCTION

Of all the macronutrients in a diet, fat contains the highest energy density. This results in the situation, that different diets, aiming at reducing body weight, the macronutrient fat the first nutrient from the diet is to be removed. That is not always healthy. Fat is essential for body functions, like forming cell membranes and function in nervous systems; fat plays also a role in regulating the enzyme activity in the body. In addition, there are essential nutrients that are only soluble in fats, such as vitamins A, D, E and K.

On the other hand, the consumption of products high in saturated fat and / or trans fatty acids are defined as an important risk factor for the development of cardiovascular disease.
The ratio between good (HDL) and bad (LDL) cholesterol is a key parameter with respect to a prediction of health effects. Trans fatty acids in a diet raise cholesterol ratio significantly and thus increase the risk of developing cardiovascular disease. Unsaturated fatty acids reduce the cholesterol ratio and therefore the risk of developing cardiovascular disease.

A key issue, currently being debated in the food industry is how to lower the dietary intake of saturated fatty acids and how to minimize the intake of trans fatty acids. As a consequence there is an increasing demand for vegetable fats. To modify vegetable fats in the traditional way, the amount of trans fatty acids shall increase and can transcend the natural amount of animal fat.

There are also indications that a low fat intake is associated with an increased risk of developing a stroke. According to several articles, based on epidemiologic studies[1,2] at which no relation between dietary saturated fat intake and the risk of heart disease has been found, a scientific debate has started between supporters and opponents about the health effects of dietary saturated fat. This debate is stimulated by other authors who stated that the highest health gains shall be achieved by a higher intake of unsaturated fat and a lower intake of carbohydrates[3,4]. Right now, there is still no clear consensus among scientists about the impact of saturated fat on the development of cardiovascular disease.
At the end of the day, the most reasonable advice shall be a diet with all nutrients equally divided.

Lard oil is a new innovation developed by Ten Kate.[5] Pig fat is a mixture of different fat fractions with a high and a low melting point. By mechanical separation of these fractions one gets a fraction with a high melting point and a fraction with a low melting point. The fat fraction with a low melting point is called the olein fraction, this oil has a cloud point of 0° C and remains a liquid at room temperature. The fraction with a high melting point is called the stearine fraction, it has a melting point as high as e.g. beef fat. Lard Oil can be an interesting replacement of e.g. fish oil and rape seed oil.

II MATERIALS AND METHODS

Materials Frozen French fries (Aviko) and croquette rolls (Ad van Geloven, 100 grams)
Lard oil, fractioned, refined and deodorized
Peanut oil (Levo),
Sunflower oil (Vita Do'r)
Deep fat fryers, (type Stilfer)
Method: In 7.5 liter of each oil type 50 kg of French fries and 25 kg of croquette rolls were fried at 175 °C during 5 days of 8 hrs. At the beginning of the experiment, and the end of each day, samples of oil and products were taken. Chemical analysis was carried out on fatty acid profile, composition of di- and polymer triglycerides, the polarity of the oil and the fat content of the French fries and the croquette rolls. Before start and after the 3rd and 5th day the free fatty acids and the peroxide value are also determined. A sensory evaluation will be carried out by an expert panel.

III RESULTS AND DISCUSSION

Chemical analysis
Peroxide value: The peroxide value of the used oils showed at the start of the experiment the same value. During the frying period of 5 days, the peroxide value of the peanut oil increased more than the lard oil or the sunflower oil. The analytical results of all used oils remained below the critical value of 20 meq/kg.

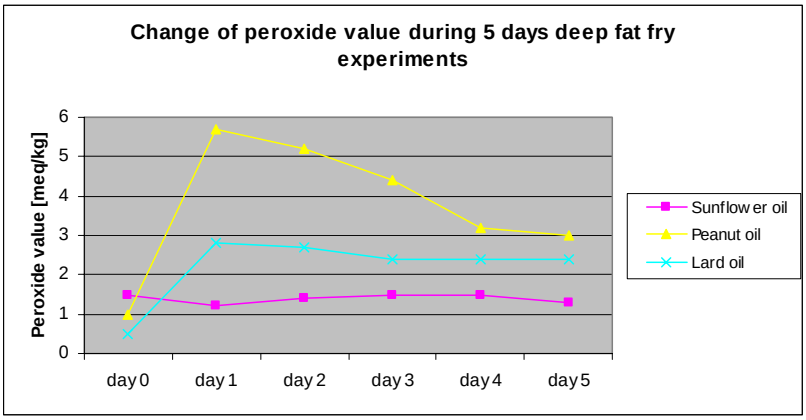

Figure 1 Change of peroxide value during 5 days of deep fat fry experiments with 3 types of oil.

Free fatty acids (FFA) The amount of FFA of the peanut oil started at a higher level and increased more compared to the peanut oil during 5 days of deep frying. The amount of FFA of lard oil and sunflower oil were comparable.

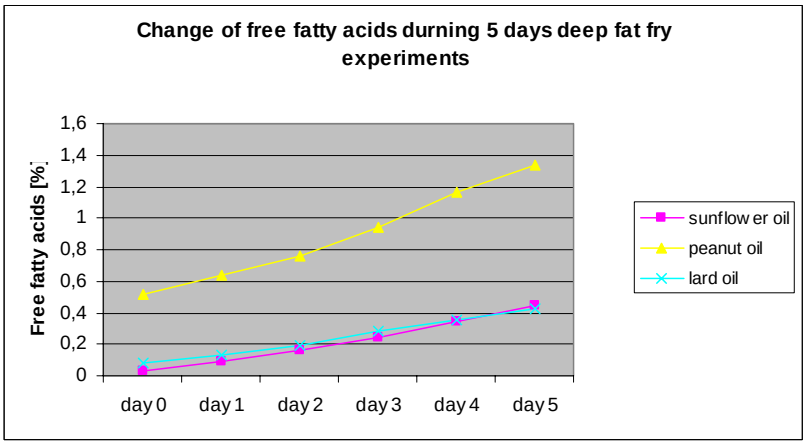

Figure 2 Increase of free fatty acid concentration during 5 days of frying with 3 types of oil.

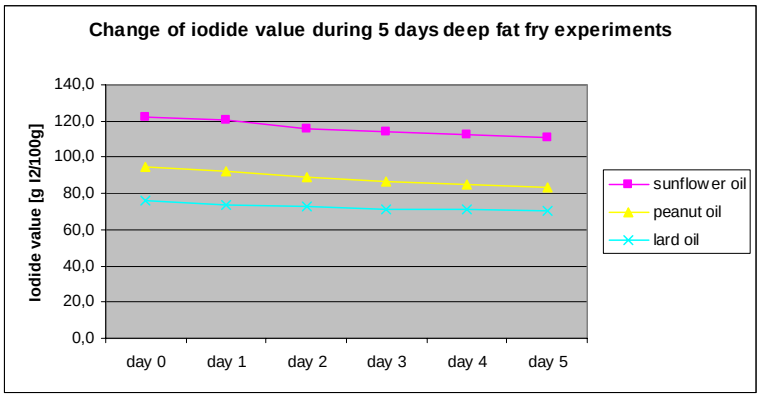

Figure 3 Decrease of Iodide value during 5 days of deep fat fry experiments with 3 types of oil

Iodine value and polymer triglycerides The iodine value, shown in figure 3, decreased slowly for all used deep fry oils during the 5 baking days. The amount of available polymer triglyceride in lard oil is twice as low as its amount in peanut oil at the beginning of the experiments. During 5 days of frying, the amount of polymer triglycerides increased. However values still did not exceed the upper limit of 16%.

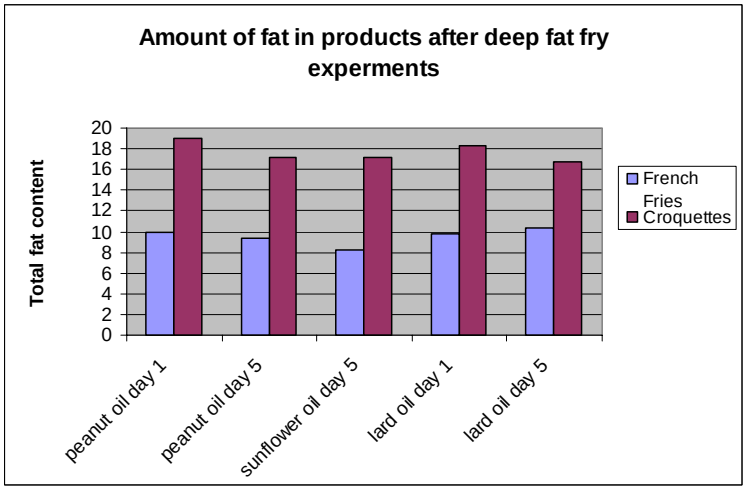

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Figure 4, Total fat content of two products after frying.

Polar components During deep frying in oil and fat, polar components will be formed as degradation products. The amount of polar components is a measurement of thermal oxidation. The amount of polar components rose during the frying experiments. In lard oil as well as sunflower and peanut oil the polar components increased approximately with the same value and stayed after 1 week deep fat frying far below the 25%, which is a critical value.

Colour When thermo-oxidation takes place in oil, several degradation products will be formed. Many of these products will influence the colour and the viscosity of the oil. Also results from the Maillard reaction which will occur during frying French fries and croquettes, can influence the colour of the oil. During the 5 days of frying, the discoloration of lard oil was comparable to peanut oil. For an optical impression see also figure 4. This discoloration didn't affect the fried product colour.

Figure 5 Colour development of lard oil (reuzel) and peanut oil (arachide-olie) during 5 days frying

IV CONCLUSION

Comparison between lard oil, sunflower oil and peanut oil during 5 days of deep fat fry experiments shows that fractionated lard oil (olein fraction) can very well be used as deep fry oil for snack products.
The typical odour of the fractionated lard oil can be removed by refine and deodorize the oil.

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