**INTRODUCTION**

Requirements from society, consumer groups or new legislation often lead to product innovations. Regarding industrial baking margarines, such innovations have already led to marked reductions in trans fats and lower saturated fat levels. Recent developments have guided us to develop alternatives to palmitic acid-based margarine. The options however are limited.

Hydrogenated versions of liquid oils such as from sunflower or soybean, are known to possess the right technological characteristics. These hydrogenated products, however, are commonly not the first choice for margarine producers due to the labeling requirements and the negative health issues related to trans fats.

Oils and fats originating from the so-called COSCO crops, e.g. Shea, Illipe, Sal and Kokum, are increasingly popular alternatives. The present study discloses a new blend composition to develop non-hydrogenated, stearic acid-based margarine fats.

**OBJECTIVE**

The development of Shea-based margarine fats that match or outperform the present benchmark. The main criteria by which achievement of the objective will be judged are:

- Plasticity, (absence of) post hardening, and processability of the produced margarines
- Baking performance, and sensorial characteristics of the final baked products

**APPROACH**

Shea stearin-based (SHs) blends were prepared as indicated (Table 1). A control using the standard industry blend of Palm oil (PO) and Palm stearin (POs) was included. Other components included were HOSF (High-Oleic Sunflower oil), RP (Rapeseed oil) and Sunflower oil (SF).

Puff pastry margarines (containing 20% water) were prepared on a margarine pilot plant having a conventional A, C unit set-up (1 Scraped Surface Heat Exchanger (SSHE), 1 pin mixer, no resting tube).

Puff pastry was prepared according to the recipe (Table 2), using a spiral kneader at 200 rpm (slow) and 1400 rpm (fast). This was followed by sheeting (rolling decrease: 30-25-22-20-18-16-14-12-0 mm) and finally baked at 200 °C for 32 min.

**RESULTS AND DISCUSSION**

The Solid Fat Content (ISO 8292-1, non-stabilised, parallel) profiles of the Shea stearin-based (SHs) blends are shown in (Fig. 1).

Initial observation is that the hardness of the margarine product is not solely a result of the solid fat content. This is in line with previous observations [1]. The palm-based fat blend resulted in the margarine with the lowest hardness (Fig. 2). Importantly, it was observed that the shea-based blends showed no post-hardening during storage at 18 °C. This is probably due to the higher melting point of the main SOS triglycerides (TAGs) present in the shea-based blends, in comparison to the main POP (TAGs) present in the palm based reference.

It is further argued that the SOS-rich blends crystallize more swiftly and are stabilized in a 8-polymorph [2], whereas the SHs-rich blends are metastable in the 8-2 form and during storage could convert to the 8-3 polymorph (leading to post-hardening).

It was observed that increasing the amount of soft oil in the SHs blends, led to improvement in some important aspects: the resulting margarine had a better consistency (softer), and the prepared doughs showed better plasticity and were more homogeneous. Baking performance improved as shown by the reduction in baking loss, to levels less than the reference (Table 3). The baked product had a better ‘puff’ than in case of 60% SHs blends (Fig. 3). Overall, margarines based on 40% SHs with a soft oil were comparable to the reference and further optimization to match its puff height is possible by further reduction of the SHs content.

**CONCLUSIONS**

The present study showed that margarines based on shea stearin can produce suitable alternatives to those based on fat blends rich in palmitic acid.

Inclusion of soft oils (HOSF, RP, SF) along with the Shea Stearin lead to improvements in the plasticity of the margarine, little post hardening and good baking performance of the final doughs.

The obtained margarines were shown to possess:

- superior plasticity
- absence of post-hardening
- excellent processability.
- good baking performance

Our technology (2 patents pending) allows margarine producers and bakers to maintain their high quality standards for baking margarines with altered recipes.

**REFERENCES**