

FATTY ACID COMPOSITION OF BLENDED SPREADS

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Key words: blends, fatty acid composition

The paper covers characteristics of fatty acid compositions of blends consisting of milk and vegetable fats. The analyses conducted showed considerable differences in the fatty acid composition and, as well as in the composition and nutritional value of fats belonging to the same product category. The investigated samples contained between 27.1 and 62.2% of saturated fatty acids, while trans isomers of fatty acids were found at a level between 2.4 and 14.8%. Differences in monounsaturated (28.0–45.4%) and polyunsaturated fatty acids (4.3–16.8%) were observed as well.

INTRODUCTION

Blended fats composed of milk and vegetable products, commonly called butter-like spreads, are available on the Polish market since at least a decade. Recently they are more and more popular among butter producers, mainly as a result of rising prices of milk fat. The sale of this product category increases as well, but not every consumer is aware of buying blended fat. The reason of such mistakes is the way of packaging and labeling of blends, which is illuvisely similar to traditional butter. Unlike butter, investigated fats contain milk fat in a very wide range, from 10 to 80%, while the rest are oils or vegetable fats.

The process of milk and vegetable fat blending, beyond its economical aspect, is important for the nutritional value and sensory attributes of spreads. Butter as animal fat consists mainly of high amounts of saturated fatty acids (50–60%) - palmitic, stearic and mirystic; while polyunsaturated fatty acids occur in insignificant amounts [Ziemiański & Budzyńska-Topolowska, 1991; Ledoux *et al.*, 2005].

Another undesirable, from the nutritional point of view, attribute of milk fat is the presence of cholesterol the content of which ranges from 220 to 240 mg/100 g of product [Gawęcki, 1997]. The introduction of vegetable oils into milk fat enables decreasing cholesterol level and increasing polyunsaturated fatty acids content in spreads.

The aim of the study was to compare fatty acid composition of commercial blends and to assess the nutritional value of investigated fats with respect to their fatty acid composition.

MATERIALS AND METHODS

Ten different spreads coming from different manufacturers were tested. Analysis of their fatty acids composition

was carried out according to Polish Standard [PN-EN ISO 5508:1996] using the gas chromatography method.

In the investigated spreads milk fat content ranged from 1.4% up to 50%. The rest of fat composition (15% to 63%) consisted of hydrogenated vegetable fats and/or vegetable oils, mostly palm and sunflower oil. The content of refined vegetable oils was declared on the labels of 5 tested spreads (samples marked as C, D, H, I and J). It is worth mentioning that the label information was not precise: the label did not state exactly what kind of vegetable oil was used by manufacturer – palm oil or another, more valuable component. In blends marked as A, B and F refined vegetable oils were used as well as hydrogenated vegetable fats. The rest of products (E and G), except milk fat, contained only hydrogenated vegetable fat (Table 1).

RESULTS AND DISCUSSION

Analysis of fatty acid composition showed great dissimilarity of the investigated blends. The level of saturated fatty acids (SFA) ranged from 27.1 to 62.2%. Palmitic acid (17.9–36.0%), stearic acid (5.9–9.7%) and miristic acid (0.6–8.7%) were found to predominate. The content of short chain butyric acid, typical of butter, ranged from zero to 1.3%. A comparison of saturated fatty acid composition is shown in Figure 1.

Significant differences were observed also for trans fatty acids isomers. Their concentrations ranged from 2.4% up to 14.8%, the predominant isomer was trans isomer of C18:1 (up to 14.3%). The highest amounts of trans isomers were found in samples marked as A, B and F - 8.2, 10.3 and 14.8%, respectively. The content of trans fatty acids, typical of butter, is usually below 3% [Ledoux *et al.*, 2005], while in refined vegetable oils it is close to zero [Aro *et al.*, 1998]. Therefore

TABLE 1. Ingredients of spreads according to label.

Product	Milk fat declaration (%)	Vegetable oil/fat declaration (%)
A	36	24 – vegetable oils and fats
B	1.4	31.8 – vegetable fat 20.8 - vegetable oils
C	37	18 – sunflower oil
D	48	18 - vegetable oil
E	55	18 - vegetable fat
F	10	63 – hydrogenated vegetable oils and fats
G	68	32 - vegetable fat
H	28	47 - vegetable oil
I	52	15 - vegetable oil
J	10	50-52 – palm oil, sunflower oil

results for trans isomers exceeding 3% indicate utilization of hydrogenated vegetable fats. Values exceeding 3% were observed also in spreads I and J which were declared as containing only refined vegetable oils. Total trans isomer content of the investigated blends was shown in Figure 2.

The study included also determination of conjugated linolenic acids (CLA), typical of milk fat. CLA content of the tested blends, expressed as C18:2 c9t11 isomer (representing over 80% of all conjugated linolenic acids occurring in butter) did not exceed 1.4%. Details are presented in Figure 3. The highest values were found in those spreads for which milk fat was the dominant ingredient (samples marked as D, I, E and G).

The content of unsaturated fatty acids ranged from 28.0 to 45.4% for monounsaturated (MUFA) and from 4.3 to 16.8% for polyunsaturated (PUFA) (Figure 2). The concentration of linoleic acid ranged from 3.4 to 16.7%, while that of linolenic acid from 0.1 to 2.9% (Figure 3). Such a proportion of linoleic to linolenic acids is an evidence of the use of palm and sunflower oil as blends ingredients – known for very low C18:3 content.

The obtained data shows that in most cases the addition of vegetable fats and oils increased the content of polyunsaturated fatty acids in the investigated spreads. This applies especially to samples marked as I, B, D and F, in which PUFA content ranged from 11.4 to 16.8%. For products H, C and A milk fat blending with vegetable oil had limited benefits (6-7%

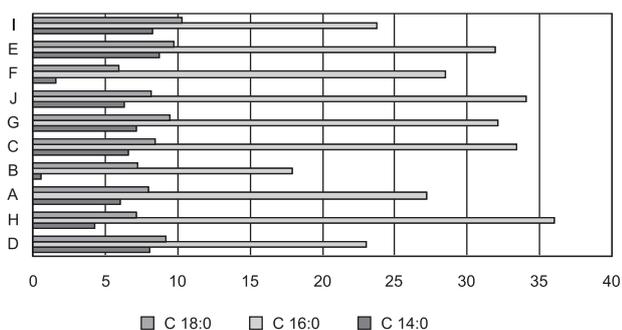


FIGURE 1. Stearic, palmitic and myristic acids content (%) in the investigated blends.

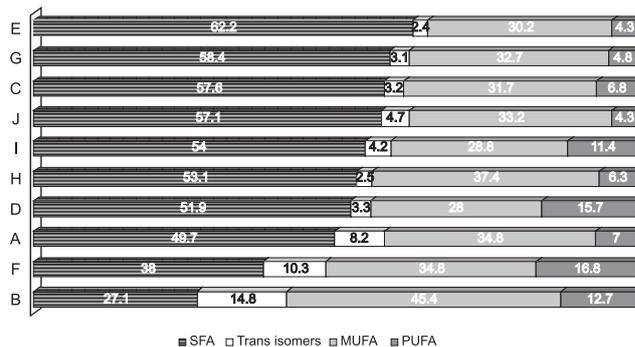


FIGURE 2. Fatty acid composition (%) of saturated, monounsaturated, polyunsaturated fatty acids and trans isomers in the investigated blends.

PUFA), while for samples marked as E, J and G was hardly noticeable (4.3–4.8%).

The positive effect of increased PUFA content in products B, F and A was countered by the presence of significant amounts of trans isomers.

CONCLUSIONS

Nutritional value of fats depends mainly on their fatty acid composition – content of MUFA, PUFA and undesirable SFA and trans isomers. Traditional butter consists largely of SFA and MUFA and lacks polyunsaturated fatty acids. The addition of vegetable oils to butter can improve its composition in PUFA and reduce cholesterol level. Nutritional value of such a blend will be higher compared to butter only when liquid vegetable oil will be added. The addition of naturally solid vegetable fats (palm oil), or, especially, hydrogenated vegetable oils is not so beneficial, since the latter are a source of trans isomers, which disturb lipid metabolism [Aro *et al.*, 1998; Institute of Shortening and Edible Oils, 1999; Katan, 1995].

Results show that blended fats composed of milk and vegetable products, commonly called butter-like spreads, are very dissimilar, judging by their fatty acids composition. Taking this into account, the investigated blends can have either superior or inferior characteristics compared to butter.

The presence of trans isomers in quantities exceeding those typical of butter indicates the use of hydrogenated vegetable fats in spreads.

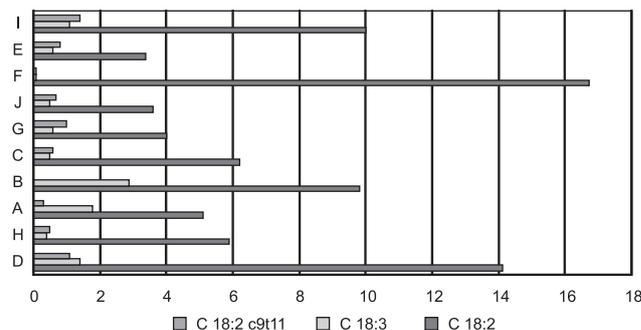


FIGURE 3. Linoleic, linolenic and conjugated linolenic acids content (%) in the investigated blends.

Hydrogenated vegetable fats have been found also in those blends which were declared to contain only milk fat and refined vegetable oils.

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PROFIL KWASÓW TŁUSZCZOWYCH MIESZANYCH TŁUSZCZÓW

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W pracy dokonano charakterystyki profilu kwasów tłuszczowych mieszanych tłuszczów mleczno- roślinnych. Analiza wykazała znaczne zróżnicowanie wśród badanych, przynależących do tej samej grupy asortymentowej, produktów - zarówno w zakresie profilu kwasów tłuszczowych, jak i wynikającej z tego profilu wartości żywieniowej tłuszczów. Kwasy nasycone występowały w ilości od 27,1% do 62,2%, izomery trans kwasów tłuszczowych w ilości od 2,4% do 14,8%. Badane próby były również znacznie zróżnicowane pod względem zawartości kwasów jednonienasyconych – od 28,0 do 45,4% i wielonienasyconych – od 4,3 do 16,8%.