međunarodni znanstveno-stručni skup
19. Ružičkini dani
DANAS ZNANOST – SUTRA INDUSTRIJA
21. – 23. rujna 2022. | Vukovar, Hrvatska

FAT STABILITY OF CHOCOLATES WITH ADDED COCOA SHELL

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Introduction

Chocolates are one of the most favourite confectionery products that have a long shelf life, commonly one to two years. Cocoa bean shell is one of the by-products generated in the cocoa industry that has a high content of dietary fibres and bioactive components. Since this by-product is generated in large quantities, it presents a growing environmental problem. The aim of this study was to implement cocoa shell in chocolate production and analyse the stability of such chocolates.

Materials and Methods

Chocolate production

Chocolates were produced in laboratory ball mill at 55 °C with speed of mixing 60 rpm and mixing time 3 h (chocolates without cocoa shell; **D0** and **M0**) and 3.5 h (chocolates with cocoa shell). For dark chocolates with cocoa shell (**TN15**), 15% of cocoa shell was added at the begining to cocoa butter. After half an hour cocoa mass and sugar were added (hence, 30 min longer process).

For milk chocolate 5% of cocoa shell was used in the same way as for dark chocolates (**MN5**).

Lecithin (0.4%) was added after 2.5 h and vanillin (0.03%) after 3 h of mixing.

Chocolate mass was tempered (temper index 4-7), molded and cooled (8 °C) for half an hour.

All analyses were performed after production, 3, 6, 9 and 12 months of storage.

Fatty acid composition

Lipids from chocolates were extracted by Folch method. After that fatty acids methyl esters (FAMEs) were prepared with cold methanolic potassium hydroxide solution. Separation of FAMEs was performed on gas chromatograph equiped with flame ionization detector.

Peroxide value

Method was performed according to ISO 3967/IDF74 method. Extracted fats (~10 mg) were disolved in chloroform-methanol (7:3) and ammonium thiocyanate and iron(II) chloride solution were added. Mixtures were left in dark for 10 min and absorbance was measured at 500 nm.

Gloss of chocolates

Gloss of chocolates was measured with Gloss Meter PCE-PGM 100 at 85°.

Results

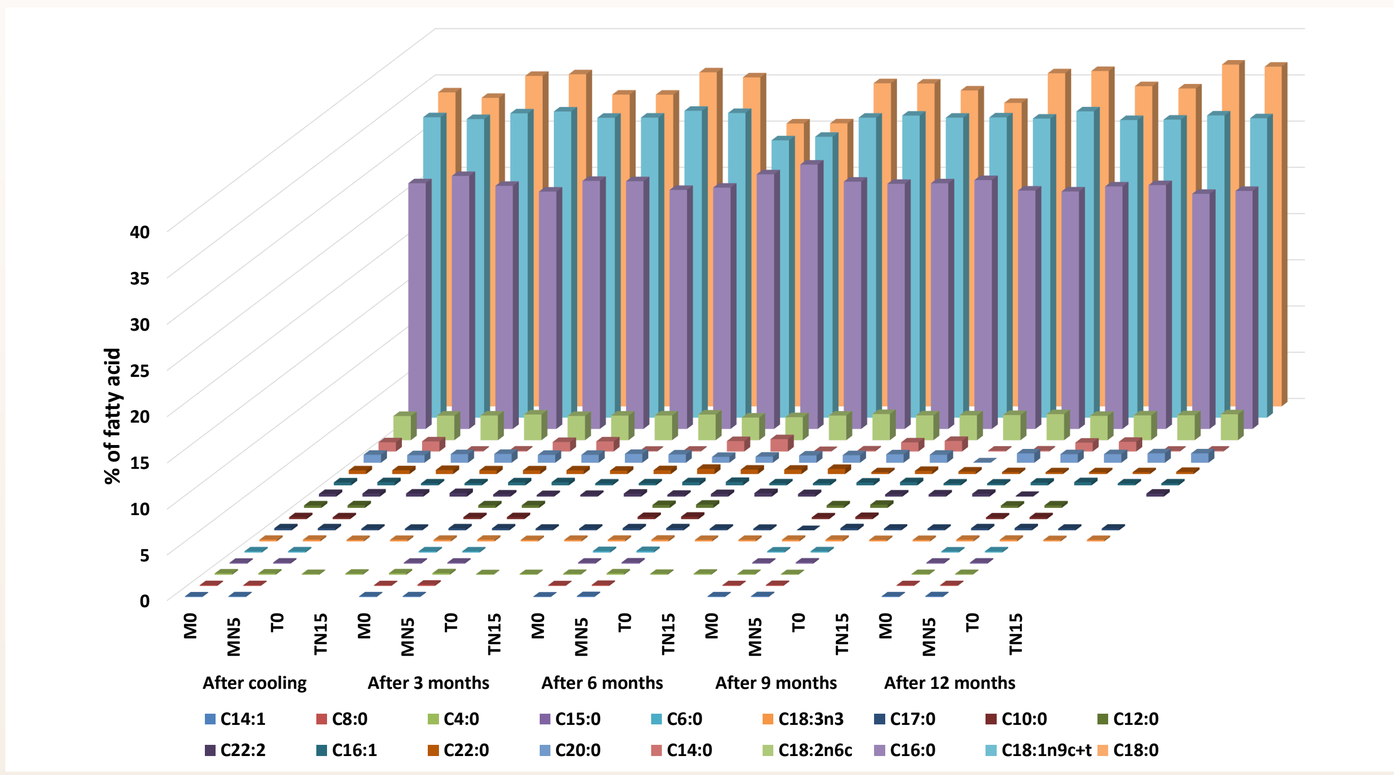

Figure 1. Fatty acids composition of chocolates during 12 months of storage

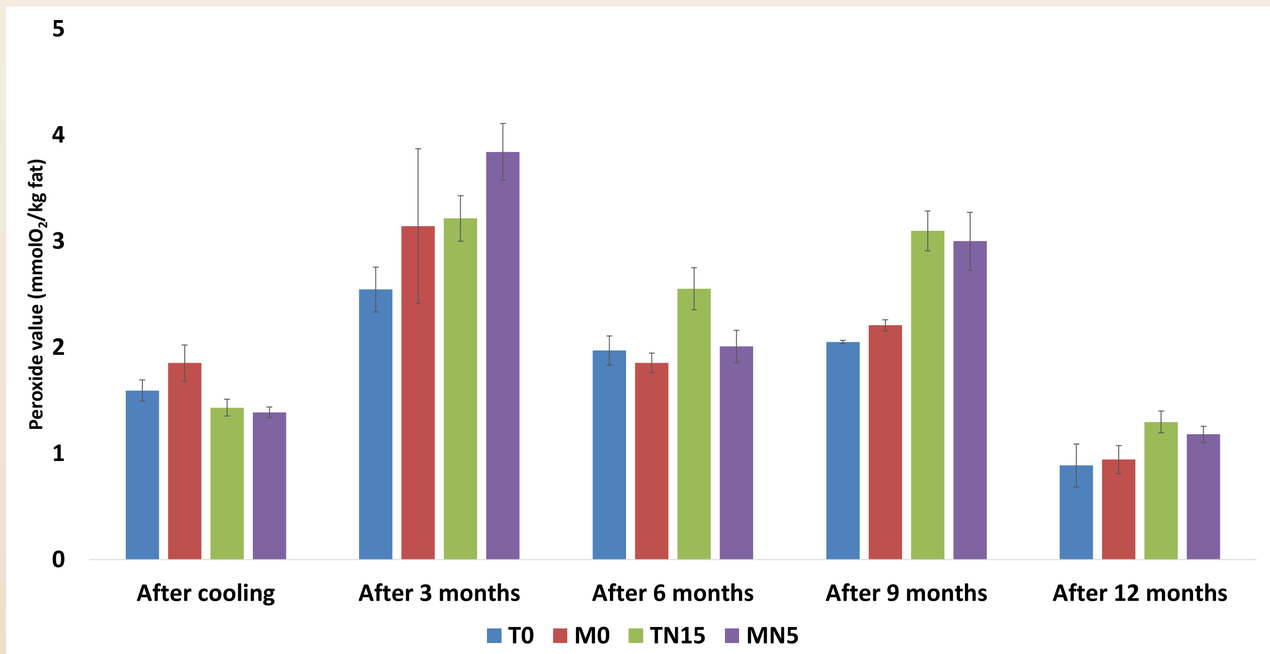

Figure 2. Peroxide value of chocolates during 12 months of storage

Table 1. Gloss of chocolates during 12 months of storage

Sample	After cooling	After 3 months	After 6 months	After 9 months	After 12 months
D0	65.18 ± 1.88	45.20 ± 1.93	17.43 ± 0.86	1.08 ± 0.53	1.75 ± 0.38
DS15	63.60 ± 2.30	15.37 ± 2.16	12.30 ± 1.17	0.40 ± 0.18	0.40 ± 0.19
M0	52.08 ± 4.47	45.80 ± 4.16	43.88 ± 5.35	20.92 ± 2.81	2.32 ± 0.64
MS5	62.83 ± 3.91	56.33 ± 4.38	42.68 ± 2.12	35.55 ± 1.89	6.43 ± 1.42

Conclusions

- Results showed that chocolates had the highest content of palmitic, oleic and stearic acid (**Figure 1**). In addition, all analysed fatty acids were stable during tested period.
- The peroxide value of chocolates after the production was similar for all chocolates, while after one year chocolates with added cocoa shell had a slightly higher peroxide value but it was still in acceptable range (**Figure 2**).
- The gloss of all dark chocolates decreased after 3 months and for milk chocolates after 6 months of storage (**Table 1**).

Acknowledgment

This work has been supported by Croatian Science Foundation under the project „Application of cocoa husk in production of chocolate and chocolate-like products” (UIP-2017-05-8709)