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FATTY ACID COMPOSITION OF DIFFERENT CHOCOLATE TYPES

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Introduction

Chocolate contains up to 40% of lipids that are responsible for sensory and rheological properties as well as stability during storage. Fat content of chocolates depends on its formulation. Main ingredients used in production are cocoa mass, cocoa butter, sugar and emulsifier. Cocoa butter fatty acid profile mainly depends on growing conditions of cocoa beans. Fatty acids are organised as triacylglycerols which consist most commonly of palmitic, stearic and oleic acid. In the production of chocolate, a part of cocoa butter can be replaced with cocoa butter alternatives. Also, in production of milk chocolates, different milk ingredients can be used such as milk powder, condensed milk, whey powder, etc.
The aim of this study was to determine total lipid content and fatty acid composition of different chocolate types.

Samples and methods

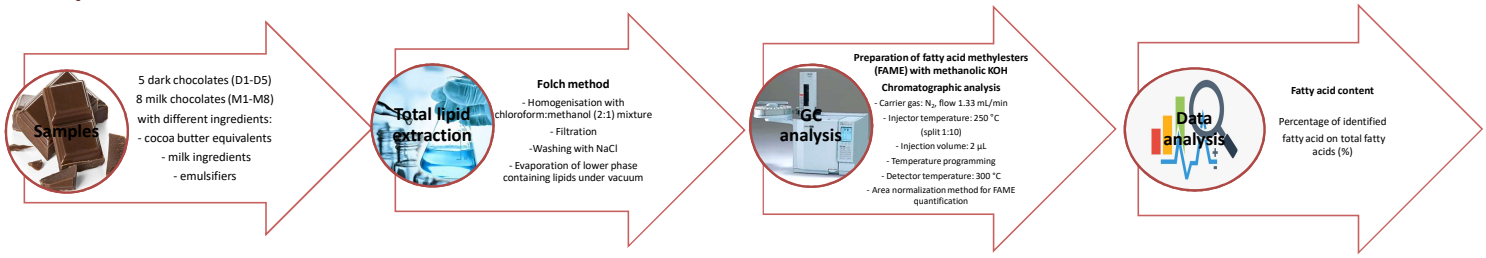

Table 1. Average values of identified fatty acids in different chocolate types

Chocolate sample	Formulation	Fatty acid content (%)													
		C4:0	C6:0	C8:0	C10:0	C14:0	C16:0	C16:1	C18:0	C18:1n9	C18:3n3	C20:0	C22:0	C22:2	C24:0
D1	Dark chocolate with lecitin	0.00	0.00	0.00	0.00	0.09	24.07	0.17	34.53	29.30	0.25	0.94	0.88	1.30	0.60
D2	Dark chocolate with PGPR	0.00	0.00	0.00	0.00	0.10	21.59	0.17	31.33	25.82	0.13	0.88	1.66	3.91	1.64
D3	Dark chocolate with lecitin+PGPR	0.17	0.00	0.00	0.00	0.09	24.22	0.17	34.80	29.21	0.22	0.99	0.74	1.07	0.50
D4	Dark chocolate with palm oil	0.11	0.00	0.00	0.00	0.18	26.85	0.18	30.97	31.57	0.27	0.90	0.62	0.79	0.31
D5	Dark chocolate with coconut oil	0.09	0.06	0.84	0.65	1.92	22.30	0.16	30.69	27.05	0.20	0.90	0.58	1.23	0.22
M1	Milk chocolate with lecitin	0.08	0.20	0.14	0.35	1.57	26.19	0.35	32.40	30.04	0.25	0.88	0.47	0.45	0.17
M2	Milk chocolate with PGPR	0.23	0.19	0.12	0.31	1.43	24.63	0.31	29.90	25.60	0.16	0.82	0.92	3.19	0.66
M3	Milk chocolate with lecitin+PGPR	0.07	0.22	0.14	0.35	1.60	26.03	0.35	31.66	29.21	0.23	0.85	0.67	0.86	0.44
M4	Milk chocolate with coconut oil	0.07	0.30	1.15	1.16	3.95	22.44	0.31	25.04	23.43	0.24	0.70	0.95	1.92	0.89
M5	Milk chocolate with palm oil	0.02	0.27	0.18	0.44	2.08	29.13	0.38	26.52	29.92	0.32	0.73	0.51	0.94	0.21
M6	Milk chocolate with whey powder	0.00	0.21	0.14	0.34	1.54	25.71	0.35	30.82	28.38	0.31	0.86	0.76	1.13	0.44
M7	Milk chocolate with condensed sweetened milk	0.14	0.17	0.14	0.35	1.59	25.38	0.35	29.98	28.08	0.29	0.82	1.03	1.32	0.80
M8	Milk chocolate with condensed unsweetened milk	0.00	0.16	0.12	0.29	1.27	24.74	0.29	30.29	27.29	0.35	0.82	1.13	1.92	0.91

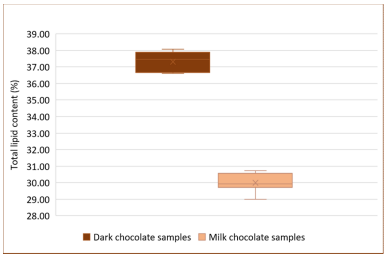

Figure 1. Total lipid content (%) in analysed chocolate samples

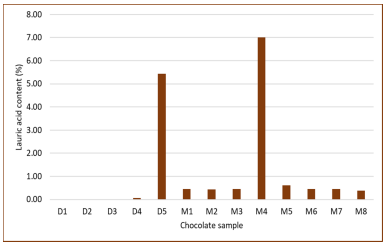

Figure 2. Lauric acid content (%) in analysed chocolate samples

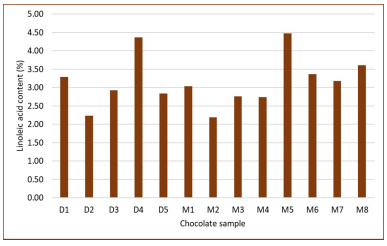

Figure 3. Linoliec acid content (%) in analysed chocolate samples

Results

- Dark chocolate (D1-D5) contains significantly higher total lipid content (average 37.31 ± 0.64%) compared to milk chocolate (M1-M8) (average 29.99 ± 0.57%) as presented in **Figure 1**.
- The main fatty acids were stearic, palmitic and oleic acids with total average content of 83.62 ± 5.21% (**Table 1**).
- Milk chocolate samples had higher short and medium chain fatty acids (up to C12) than dark chocolates (**Table 1**), with exception of dark chocolate with coconut oil (D5).
- Chocolate samples containing coconut oil (D5 and M4) showed significantly higher content of lauric acid than other analysed chocolate types (**Figure 2**) while chocolates with palm oil (D4 and M5) contained higher linoleic acid content (**Figure 3**).

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