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Effect of the addition of aromatic plants on the physicochemical and fatty acid composition and antioxidant activity of cow's milk curds

Silviya Ivanova[1], Daniela Miteva[1], Tsonka Odjakova[2*], Ayten Solak[1] and Pavel Todorov[2]

[1] *Agricultural Academy, Institute of Cryobiology and Food Technology, 1407 Sofia, Bulgaria*
[2] *Agricultural Academy, Research Centre of Stockbreeding and Agriculture, 4700 Smolyan, Bulgaria*
[*] *Coresponding autor:* tsonkaat@abv.bg

Abstract

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The purpose of the study is to determine the influence of biologically active additives in different concentrations on the organoleptic evaluation, physicochemical and fatty acid composition, antioxidant activity, and total polyphenols of cow's milk curd obtained from highly productive Bulgarian Rhodope cattle. The technological processing of collected cow's milk into curd with the addition of different concentrations of peppermint, turmeric, and black pepper leads to an increase in yield. A loss of protein was detected when aromatic plants were added to the curd, but the amount of fat increased, and it was enriched with fibber.

The technological processing of curd with the addition of different concentrations of aromatic plants results in an improvement of the fatty acid composition of the curd, characterized by a decrease in saturated fatty acids and an increase in mono- and polyunsaturated fatty acids. The use of plant supplements in varying concentrations results in a reduction of the atherogenic and thrombogenic indices. The hypo-hypercholesterolemic index in the curd is 0.31 and increases slightly when additives with different concentrations are added.

All types of additives lead to an improvement in the antioxidant activity of the curd, with the highest values obtained with rosemary. In terms of total polyphenol content, the best results were achieved with rosemary supplementation.

Keywords: Bulgarian Rhodope cattle; yield; fat; protein; polyphenols; biologically active additive
Abbreviations: B – basil; M – lemon balm (*Melissa officinalis*); P – peppermint; T – thyme; R – rosemary; C – turmeric*:* black pepper; FAME – fatty acids methyl ester; F- fat; P – protein; pH – active acidity; E – energy; SFA – saturated fatty acid; MUFA – monounsaturated fatty acid; PUFA – polyunsaturated fatty acid; MCT- middle chain fatty acid; SCT – short chain fatty acid; BFA – branched fatty acid; FA- fatty acid; LPS- lipid preventive scor; AI – aterogenic index; TI – trombogenic index; h/H – hyper-hypocholesterolemic index; TFA- trans fatty acids; DPPH – 1,1-diphenyl-2-picrylhydrazyl; TPC – total phenolic content

Introduction

Curd is a type of fermented milk product, also called fresh cheese, protein, or protein-butter product, which is usually produced from the milk of all ruminant species. It is a traditional Bulgarian product that has been widely used in dietary nutrition due to its high content of complete proteins and the essential amino acids methionine and choline. According to Disanayaka (2019), quality curd should have a firm and uniform texture, a pleasant aroma, and a smooth

and glossy surface. According to the standard for cow's milk curd, it has a pH of 4.5, fat – 5.0% and SNF – 8.5%. Curd exhibits therapeutic properties in gastrointestinal diseases, such as constipation, diarrhea, and dysentery (Gandhi and Nambudripad, 1975), and helps lower blood cholesterol levels (Mann and Spoerry, 1974). Das and Seth (2017) found the following physicochemical parameters of colostrum-enriched curd: dry matter -14.12%, fat 4.3%, protein 3.75%, lactose 5.2%, ash 0.81%, reduced syneresis, and increased hardness.

Functional food products have been the most promising area in the dairy industry in the last decade. Products of this type take into account the balanced nutrition of different population groups and were able to satisfy the physiological needs of energy and essential substances (Gorlov et al., 2014; Slozhenkina et al., 2019). In the production of functional fermented milk products, probiotics (starter microorganisms), prebiotics (lactulose, inulin, oligo fructose, dietary fibber, etc.) and natural plant materials (fruits, vegetables, seeds and spices) were used, which were of great value, mainly due to its specific combinations of biologically active components (Cerdó et al., 2017; Wong et al., 2016). Kryuchkova et al. (2020) analysed literature data. They found that inulin and blackcurrant possess prebiotic properties, as well as health-promoting properties and a rich chemical composition, making them suitable as functional food ingredients with bifidogenic, immunomodulatory, antioxidant, prebiotic, and hepatoprotective properties. They can be used to enrich a dairy product with better quality indicators, including protein (0.5%), fat (0.2%), carbohydrates (12.4%), fiber (3.4%), pectin (1.0%), ash (0.5%), and organic acids (86.4%).

Turmeric is a perennial herbaceous plant of the ginger family, native to South India and Indonesia, and is known as "Indian saffron". The tuberous rhizomes or underground stems are used as a spice, textile dye, and aromatic stimulant in medicine. In ancient times, it was used as a perfume and spice. The rhizome has a peppery aroma, a slightly bitter and warm taste, and an intense orange-yellow color. It is widely used in the food industry as a colorant and flavouring of natural origin, such as in mustard, curry powder, sweets, pickles, seasoned oils for vegetables, and in dishes featuring fish, eggs, poultry, rice, and pork. It is used in the cosmetic industry to improve skin color, for soaps, antiseptics, cosmetics, and other products. It exhibits anti-inflammatory properties, which help relieve the symptoms of arthritis and intestinal problems. It has been used medicinally for long-term use and is taken internally as a stimulant. The combination of turmeric and black pepper in warm milk is beneficial for sore throats, coughs, colds, and other acute respiratory infections. Turmeric contains the lipophilic bioactive compound curcumin, which possesses antioxidant and anti-inflammatory properties (Hewlings and Kalman, 2017). Idowu-Adebayo et al. (2021a) investigated the effects of turmeric supplementation in soy milk and hibiscus beverage on organoleptic parameters and consumer acceptability.

Idowu-Adebayo et al. (2021b) established the nutritional value and antioxidant activity of soy milk and a hibiscus-based drink supplemented with turmeric. Idowu-Adebayo et al. (2022) investigated the effect of adding turmeric paste to soy milk, both with and without heat treatment, on the nutritional and chemical values of all variants. They reported an increase in protein, iron, zinc, TPC (total phenols), and antioxidant activity.

The use of aromatic plants as a dry additive in curd has not been well studied, and the literature data have mainly related to the addition by feed in ruminants; however, these studies were also scarce. Therefore, an in-depth research is necessary.

The purpose of the study is to determine the influence of biologically active additives in different concentrations on the organoleptic evaluation, physicochemical and fatty acid composition, antioxidant activity, and total polyphenols of cow's milk curd obtained from highly productive Bulgarian Rhodope cattle.

Material and Methods

Milk from highly productive Bulgarian Rhodope cattle cows was collected, taken every month for one year, from the Research Centre of Stockbreeding and Agriculture in Smolyan. The milk (4 liters) was pasteurized, and technological processing to curd was carried out (Figure 1), adding additives of aromatic plants in the form of a dry substance at concentrations of 0% (control, K) and 0.05%, 0.1%, 0.2%, and 0.3%. The different types of additives and their concentration when added to brine cheese are presented in Table 1.

Table 1. Addition of aromatic plants to curd

Supplement	0.05%	0.1%	0.2%	0.3%
Basil	B1	B2	B3	B4
Lemon balm	M1	M2	M3	M4
Peppermint	P1	P2	P3	P4
Thyme	T1	T2	T3	T4
Rosemary	R1	R2	R3	R4
Turmeric:black pepper 3:1	C1	C2	C3	C4

Source: Authors' own elaboration

The technological scheme is presented in Figure 1.

The study was conducted using processed milk every month to assess changes in milk quality after technological

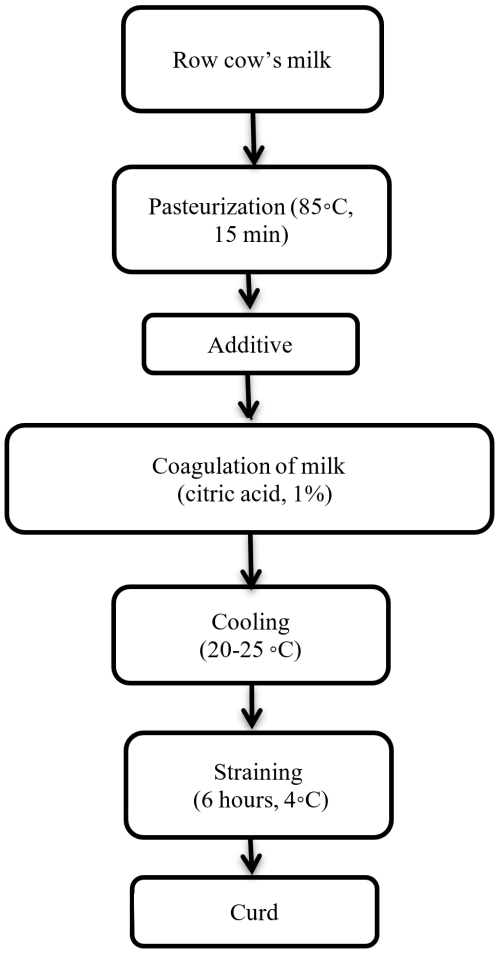

Fig. 1. Technological scheme for obtaining a curd
Source: Authors' own elaboration

treatment. An organoleptic evaluation of curd cheese with and without an additive in different concentrations was conducted to determine the most suitable concentration based on the sensory perceptions of consumers (10 participants). It was performed in accordance with the guidelines for ethical and food research defined by the European Union (Alfonsi et al., 2012). Smell, aroma, taste, consistency, and colour were examined on a scale of 1 to 5, where one was 'extremely dislike' and five was 'extremely like'. A colour analysis was performed to determine the differences between the treated additive and the original curd. The physicochemical and fatty acid composition of the control and treated curds was measured at 24 hours.

- Total solids – BNS 1109: 1989, ISO 9622
- Protein – ISO 9622, BNS EN ISO 8968-1: 2002
- Fat – BNS EN ISO 1211: 2002, ISO 9622
- Ash – BNS 6154:1974
- Titratable acidity BNS 1111:1980
- Salt content sodium chloride) BNS 8274:1982
- pH- with pH-meter model MW102-FOOD
- Fiber by Dosi-Fiber-Selecta automatic fiber extraction system, Spain

Extraction of total lipids was performed according to the method of Roese & Gottlieb. Fatty acid methyl esters (FAME) were analysed using a Shimadzu-2010 gas chromatograph (Kyoto, Japan) equipped with a flame ionization detector and an automatic injection system (AOC-2010i). The analysis was performed on a CP-7420 capillary column (100m x 0.25mm i.d., 0.2μm film; Varian Inc., Palo Alto, CA). Hydrogen was used as the carrier gas. and as a makeup gas – nitrogen from the gas tower. A four-step furnace mode was programmed, with the column's initial temperature set at 80 °C /min. Maintained for 15 minutes. then increased by 12ºC / min to 170ºC and maintained for 20 minutes. followed by a further increase of 4 °C/min to 186 °C for 19 minutes and up to 220 °C with a rate of 4 °C/min until the process is complete. The qualitative assessment of the fat fraction of the resulting samples includes the following: lipid preventive score (LPS). Atherogenic (AI) and thrombogenic index (TI) (Ulbricht and Southgate, 1991). the ratio between hyper- and hypocholesterolemic (h/H) fatty acids. trans fatty acids (TFA) and the amount of saturated fatty acids (Regulation (EC) No 1924/2006).

$$LPS = FAT + 2xSFA – MUFA – 0.5PUFA.$$

$$AI = 12:0+4\times14:0+16:0/[\Sigma MUFAs+PUFA\ n\text{-}6+PUFAn\text{-}3]$$

$$TI = (14:0 + 16:0 + 18:0)/[0.5 \times \Sigma MUFAs + 0.5 \times PUFAn\text{-}6+ 3\times PUFAn\text{-}3 + PUFAn\text{-}3/PUFA\ n\text{-}6]$$

$$h/H = (C18:1n\text{-}9 + C18:1n\text{-}7 + C18:2n\text{-}6 + C18:3n\text{-}3 + + C18:3n\text{-}6 + C20:3n\text{-}6+C20:4n\text{-}6 + C20:5n\text{-}3 + C22:4n\text{-}6 + + C22:5n\text{-}3 + C22:6n\text{-}3)/(C14:0 + C16:0).$$

Preparation of samples for analysis of total phenol content and antioxidant activity

The curd samples were extracted with 95% ethanol at a ratio of sample: extractant of 1:5 (w/v) for 6 hours at room temperature and in the dark. All samples after centrifugation (10°C, 4000 rmp/, 10 min) and filtration (Whatman No. 4 paper) were stored at -20°C for subsequent analyses.

Determination of the content of total phenols in curd

For the quantitative determination of total phenolic content (TPC), the method of Singleton et al. (1999) was employed, with modifications as described by Valyova et al.

(2012). Briefly, 3.0 mL of distilled water and 0.25 mL of Folin–Ciocalteu reagent are added to 0.5 mL of the sample (with the corresponding dilution). After standing for 2 minutes, 0.75 mL of a 20% sodium carbonate solution and 0.5 mL of distilled water were added to the mixture. Absorbance was measured at 765 nm using a UV-Vis spectrophotometer (Biochrom Libra S20, UK) after the sample had stood in the dark at room temperature for 120 minutes. TPC is calculated according to the standard law of gallic acid and is expressed as milligrams of gallic acid equivalents per 100 grams of fresh product (mg GAE/100 g product).

Determination of antioxidant activity by method: 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging capacity at Trolox standard

The antioxidant capacity of the samples was evaluated by determining the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging capacity according to the method of Brand-Williams et al. (1995) with a slight modification: 0.6 mL of a 0.2 mM solution of DPPH in methanol was mixed with 0.9 mL of methanol and 0.5 mL of the corresponding sample dilution. Absorbance was measured after standing (60 minutes) at room temperature in the dark with a UV-Vis spectrophotometer (Biochrom Libra S20, UK) at 517 nm against methanol. In the control, the sample solution was replaced by 0.5 mL of 80% methanol. The antioxidant activity was calculated against the Trolox standard curve, and the results were expressed as milligram Trolox equivalents per 100 grams of fresh product – mg TE/100 g product.

Statistical analysis. The results of the studies were analysed using the MiniTab 17 statistical program. Analysis of Variance (ANOVA) and post hoc Tukey test were used. Data are presented as mean ± standard deviation (SD). A significance level of $p < 0.05$ was adopted for all comparisons.

Results and Discussion

The organoleptic research conducted by consumers provides information about the changes in five indicators of curd, with all indicators being most acceptable when using 0.05% and 0.1% additives. The samples with a 0.3% additive were the worst-rated in all indicators compared to the control sample and the other concentrations in the combination of turmeric and black pepper. The use of thyme also resulted in the most acceptable smell, taste, consistency, aroma, and color at a 0.1% addition, and unacceptable smell and aroma at 0.2% and 0.3%. Basil, as an aromatic plant embedded in the curd, is well accepted by all organoleptic indicators at concentrations of 0.1% and 0.2%, and was evaluated less well when using 0.3%. Lemon balm, when added, influences the evaluators' perceptions, and they rated the curd with 0.05% and 0.1% additive as the most acceptable compared to the other variants. The addition of peppermint to curd yielded the best evaluation for smell and taste at a 0.05% concentration, aroma at 0.05% and 0.1%, consistency at 0.05% and 0.1%, and colour at all options. The addition of rosemary to curd showed the most sensory acceptable performance at 0.05%, followed by 0.1%, 0.2%, and 0.3% additions (Table 2).

The curd yield after straining in the control group was 862.45 g and increased reliably in C3 and C4. The addition of basil to the investigated curd variants results in a decrease in yield at all concentrations, with the highest yield at 0.3% (833.55 g). The yield when using lemon balm was lower compared to the starting curd, varying depending on the concentration of the lemon balm. The application of 0.05% lemon balm yielded significantly more than the 0.1% supplement, and at 0.2%, it was significantly higher than at both 0.1% and 0.3%. The application of peppermint in different concentrations results in an unreliable increase in the yield of curd compared to the control samples, whereas it decreases in the case of thyme. The use of 0.05% and 0.1% oregano increases and preserves the yield of curds, but at 0.2% and 0.3%, it decreases unreliably compared to the control curds. The addition of various types of additives falsely lowers the protein content of the curd, leading to an increase in the amount of fat. The addition of the additive leads to an increase in the fat content, which is caused on the one hand by the fat content in the additive, and on the other hand by the preservation of fat after technological treatment in the cheese itself, and is not separated from the whey of the curd. When basil was used, the fat content increased reliably from 10.56% at 0.05% addition to 14.67% at 0.3% addition. The addition of lemon balm resulted in a reliable increase in fat from 14.04% at 0.05% supplementation to 22.82% at 0.3% supplementation. Peppermint curd maintained fat content at 0.1 and 0.2% (2.5 times the control) and increased at 0.3% (3 times the control curd/ supplementation at 0.05%/twice the control curd). The use of thyme increased the fat in the curd twice at 0.1%, 2.5 times at 0.2% and threefold at 0.3%. Rosemary curd had a threefold higher fat content at 0.1% supplementation, 3.5 times that at 0.2% supplementation, and almost four times that at 0.3% supplementation compared to the control curd. The use of turmeric with black pepper resulted in a two-fold increase in curd fat at 0.1% and 0.2%, and a 2.5-fold increase at 0.3% supplementation compared to the baseline. The use of all types of additives enriches the curd with fibber, the amount of which increases proportionally with the concentration. The amount of sodium chloride was highest in the curd control group – 0.40%. This content contained natural milk and was not affected by technological treatment, as no salt was added for salting purposes. This allowed for the determination of changes during

Table 2. Organoleptic evaluation of curd with additives, n = 10

	K		B1		B2		B3		B4		M1		M2		M3		M4	
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
Smell	$3.90^{DGHLPT*}$	0.99	3.60	0.97	3.30	0.82	3.40	1.17	2.90	0.74	3.60^{EGH}	0.84	3.30^{FGH}	0.95	2.50	0.53	2.40	0.52
Taste	$4.10^{CDGHJKLPSTWX*}$	0.99	3.60^{AD}	0.84	3.50^{BD}	1.08	3.00	0.82	2.40	0.84	4.00^{EFGH}	0.67	2.50	1.08	2.50	0.71	2.20	0.63
Aroma	$3.90^{CDFGHKLPSTX*}$	0.88	3.60^{AD}	0.84	3.40^{BD}	1.17	2.90	0.74	2.40	0.84	3.50^{EGH}	0.97	2.90	1.10	2.30	0.48	2.10	0.57
Consistency	4.20^{H*}	1.03	3.80	1.03	3.70	1.16	3.80	1.14	3.30	1.06	4.20^{EGH}	0.63	4.10^{FGH}	0.99	3.10	0.88	3.00	0.94
Color	4.30^{DHS*}	1.06	3.90^{AD}	1.10	4.00^{BD}	1.15	3.40	1.43	2.70	0.95	4.00^{EGH}	0.82	3.50	1.43	3.10	0.74	2.50	0.97

1 – unacceptable; 2 – acceptable; 3 – I like it; 4 – I really like it; 5 – I like it very much; *Means not sharing any letter is significantly different by the Tukey-test at the 5% level of significance

Source: Authors' own elaboration

Table 2. Organoleptic evaluation of curd with additives, n = 10 (continue)

	P1		P2		P3		P4		T1		T2		T3		T4	
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
Smell	3.50	1.08	3.30	1.16	2.90	0.99	2.70	0.95	3.40	1.07	3.30	1.16	3.10	0.99	2.90	0.99
Taste	3.60	1.07	2.60	1.17	2.80	1.23	2.60	1.17	3.70	1.06	3.60	1.26	3.30	1.06	3.10	1.10
Aroma	3.30	1.06	3.30	1.16	2.80	1.03	2.60	0.97	3.50	1.08	3.40	1.17	2.90	0.99	2.70	0.95
Consistency	3.70	1.06	3.90	1.20	3.40	1.07	3.40	1.07	4.00	0.94	4.20	1.03	3.70	0.82	3.50	0.97
Color	3.80	1.14	3.70	1.34	3.40	0.97	3.40	0.97	4.10	0.99	4.20	1.03	3.60	0.84	3.40	0.97

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Source: Authors' own elaboration

Table 2. Organoleptic evaluation of curd with additives, n = 10 (continue)

	R1		R2		R3		R4		C1		C2		C3		C4	
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
Smell	3.70^{QT*}	1.16	3.40	1.26	3.00	1.15	2.60	0.70	4.20	1.03	3.70	1.06	3.50	1.18	3.20	1.14
Taste	3.90^{QT}	1.20	3.50	1.27	2.80	1.23	2.50	0.97	4.20^{UWX}	1.03	3.90	0.88	2.90	1.29	2.90	1.29
Aroma	3.80^{QST}	1.14	3.20	1.23	2.80	1.03	2.50	0.71	3.90^{UX}	0.88	3.60	0.97	3.20	1.14	2.90	0.99
Consistency	4.20^{QT}	1.32	3.80	1.23	3.50	1.18	3.10	0.99	4.30	1.06	4.10	0.99	3.70	1.06	3.60	0.97
Color	4.20^{QT}	1.32	3.70	1.25	3.50	1.08	3.10	0.88	4.40	1.07	4.10	0.99	3.80	0.92	3.70	0.82

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Source: Authors' own elaboration

the introduction of additives and subsequent monitoring of the storage period without the introduction of preservatives. The ash content in the tested curds in the control group was 1.13%. The introduction of different types of additives at four concentrations results in their lowering due to technological losses of mineral substances. The technological processing of milk into curd with additives increases the dry matter compared to the control group, with a few exceptions (Table 3).

Table 3. Physicochemical composition of curd with additives, n = 6

	K	B1	B2	B3	B4	M1	M2	M3	M4	P1	P2	P3	P4
Yield, g	862.45^{UX*}	742.75^{AB}	692.83	812.25	833.55	650.20^{EG}	673.63^{FH}	716.78^{GH}	628.40	846.02	965.45	1006.05	956.15
	18.55	29.25	37.82	25.95	23.45	26.80	25.83	34.33	27.30	33.53	18.85	15.95	22.05
P, %	12.34	11.79	11,97	12.03	12.33	10.68	11.87	10.84	12.01	12.74	13.34	12.65	12.69
	2.24	1.53	1.40	0.91	1.03	1.78	3.48	1.75	2.01	0.97	2.90	1.40	2.36
F,%	5.99	10.56	12.60^{BC}	13.41^{CD}	14.67	14.04^{EGH}	17.52	16.55	22.82	13.52	15.15	15.07	18.02
	0.57	1.55	1.44	0.57	0.89	1.46	0.69	1.43	1.26	1.15	0.96	2.09	0.89
NaCl,%	0.4^{CHJKMOPUVWX}	0.36^{AD}	0.35^{BD}	0.33	0.30	0.37	0.36	0.33	0.33	0.30	0.29	0.26	0.28
	0.04	0.08	0.07	0.07	0.07	0.10	0.08	0.04	0.07	0.06	0.03	0.04	0.05
A, %	1.19^{U}	1.06	1.05	1.25	1.16	1.06	1.10	1.13	1.15	1.06	1.08	1.14	1.19
	0.15	0.27	0.20	0.44	0.34	0.44	0.49	0.41	0.48	0.54	0.43	0.25	0.51
Fibber, %	0.00	1.80	3.77	7.61	11.25	1.72	3.32	6.52	9.65	1.49	2.92^{JL}	5.57	8.82
	0.00	0.18	0.30	0.68	0.49	0.33	0.54	0.52	0.37	0.24	0.27	0.62	0.35
TS, %	41.4^{V}	42.25	41.58	42.48	41.69	42.85	40.70	41.20	42.02	42.00	43.52	43.00	44.30
	0.88	2.48	1.80	2.05	2.19	3.84	1.36	2.19	2.39	1.65	2.84	3.40	3.86
pH	5.41	4.60^{AC}	4.77	5.07	4.74	4.73^{EH}	4.71^{FH}	4.72	4.62	4.90	5.35	4.75	4.72
	0.07	0.28	0.10	0.30	0.07	0.04	0.02	0.06	0.06	0.02	0.61	0.02	0.03
E, kcal	110.06^{UVW}	144.93	164.16	171.07	183.53	171.13	205.67	195.34	254.24	174.50	196.39	187.95	210.69
	10.05	6.86	6.09	4.12	4.74	8.23	15.63	7.64	8.76	3.85	6.84	5.59	4.15

P – protein; F – fat; A – ash; TS-total solids; E – energy; *Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.

Source: Authors' own elaboration

Table 3. Physicochemical composition of curd with additives, n = 6 (continue)

	T1	T2	T3	T4	R1	R2	R3	R4	C1	C2	C3	C4
Yield, g	609.38	53.12	647.51	674.25	947.05	865.98	673.23	721.52	919.75	961.32	1053.95^{WX*}	954.77
	33.63	25.62	36.50	82.75	22.95	72.22	23.93	23.51	1.65	36.62	17.25	47.42
P, %	10.36	11.53	12.57	12.24	11.69	12.59	13.08	13.70	10.38	11.17	12.84	14.35
	1.22	1.29	1.54	0.92	1.31	3.05	1.98	1.53	0.57	0.46	0.61	0.59
F,%	8.31	12.47	16.64	18.54	16.76^{QT}	18.59	20.46	22.75	11.09	12.18	13.75	15.15
	0.94	0.95	1.34	1.2	1.3	1.32	1.61	2.15	0.76	1.11	0.99	1.15
NaCl,%	0.34	0.33	0.33	0.31	0.40	0.38^{RS}	0.33	0.33	0.29^{UX}	0.29	0.29	0.22
	0.08	0.10	0.03	0.10	0.06	0.05	0.05	0.06	0.06	0.03	0.02	0.02
A, %	1.01	1.05	1.07	1.10	0.99	1.04	1.13	1.17	0.83^{UWX}	0.86	0.97	1.03
	0.31	0.45	0.48	0.52	0.45	0.51	0.55	0.32	0.39	0.08	0.33	0.34
Fibber, %	2.00	3.93	7.53	11.04	2.19	4.23	8.52	12.71	1.15	2.33	4.67^{WX}	7.98
	0.51	0.55	0.49	0.63	0.36	0.38	0.51	0.56	0.16	0.25	0.82	0.73
TS, %	42.14	41.84	41.68	41.41	40.84	41.07	41.79	42.48	42.11^{UW}	44.47	41.66	43.46
	2.23	2.45	1.69	2.03	2.87	1.58	2.65	3.75	0.20	0.77	0.43	0.15
pH	4.72	4.72	4.70	4.90	4.75	4.91	4.76	4.73	4.85^{UW}	4.95^{VW}	4.73^{WX}	4.86
	0.02	0.02	0.04	0.04	0.04	0.04	0.03	0.05	0.04	0.14	0.06	0.02
E, kcal	117.66	161.03	202.90	217.86	200.44	217.78	237.31	262.03	143.71	156.07	177.48	197.36
	5.45	5.63	6.76	4.25	5.88	13.70	8.64	6.91	2.56	2.03	2.74	11.68

P – protein; F – fat; A – ash; TS-total solids; E – energy; *Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.

Source: Authors' own elaboration

Saturated fatty acids in the control group of curd were 78.02 g/100g fat. They were significantly reduced when turmeric and black pepper were added in all variants, with the lowest content found in C4 – 58.01 g/100g fat. The use of basil lowered their content with increasing concentration compared to the control curd, but at 0.2% and 0.3% addition, their amount was preserved, respectively, at 53.57 and 53.92 g/100g of fat. Incorporation of lemon balm into the curd falsely reduced saturated fatty acids compared to the control cottage cheese group. The SFA content of M1 and M4 is significantly lower than that of M2 and M3. Peppermint reduces the amount of saturated fatty acids, with the highest concentration in P4 at 76.02 g/100g fat and the lowest in P2 and P3 at 70.54 and 70.41 g/100g fat, respectively. Curd with thyme has the lowest amount of saturated fatty acids at a 0.1% addition, at 58.20 g/100g fat. They vary depending on the concentration, and no decreasing trend was found with increasing concentration. Adding rosemary to the curd results in a decrease in the content of saturated fatty acids, with an increase in the amount of the additive.

The lowest value was obtained at R4, 64.41 g/100g fat. Monounsaturated fatty acids accounted for 19.73 g/100g fat in the control group of curd. In contrast, polyunsaturated fatty acids were 2.87 g/100g fat and increased with all types of supplements, at the expense of lowering saturated fatty acids. The use of supplements of plant origin leads to a decrease in the content of short-chain fatty acids from 10.22 g/100g fat to 0.30 g/100g fat for B1, 1.46 g/100g fat for M1, 0.19 g/100g fat at P2, 0.47 g/100g fat at T3, 0.16 g/100g fat at R3, and 0.23 g/100g fat at C2. Medium-chain fatty acids decreased from 20.09 g/100g fat when all supplements were added; however, some of the concentrations in the supplements made an exception for B2, P1, R1, and C1, where they remained or increased slightly. Trans and cis fatty acids in the control group of curds were 3.41 and 13.14 g/100g fat. The addition of basil at concentrations of 0.2%, 0.3%, and 0.1% rosemary preserved the content of trans fatty acids in the curds, compared to the control group.

In contrast, in the other variants, it increased. Cis isomers increased in curd using supplements of different concentrations, except for the 0.05% addition of peppermint and the 0.05% addition of a combination of turmeric and black pepper. The highest content of cis isomers was recorded when 0.2% peppermint was added, at 29.12 g/100g fat. The content of conjugated linoleic acid decreased when adding plant supplements in different concentrations, up to 2.5 times, due to their high fat content, which made high concentrations unsuitable for the work. The amount of omega-3 fatty acids in the control group of curd was 0.49 g/100g of fat. The application of basil and lemon balm leads to an increase in omega-3 fatty acids with increasing concentration, whereas the use of peppermint and rosemary preserves or lowers them. With thyme, the highest content was found for T4 and C3. Omega-6 fatty acids increase as a result of using the supplement. The lowest content was obtained for peppermint, rosemary, and turmeric, except for C4, which included black pepper. Branched-chain fatty acids in the tested control curds were 3.03 g/100g fat. The use of basil, lemon balm, thyme, 0.2% rosemary, and 0.3% rosemary leads to a decrease in their levels, while in the case of the other variants, they in-

Table 4. Fatty acid groups in curd with additives, g/100g fat, n = 6

	K		B1		B2		B3		B4		M1		M2		M3		M4	
SFA	78.02^{OQU*}	1.48	67.67	0.48	68.56	1.36	53.57	0.75	53.92	1.07	57.12^{EH}	1.27	64.95^{FGH}	0.59	66.83^{GH}	0.33	61.42	1.67
MUFA	19.73^{U}	0.38	25.54^{AB}	0.17	24.00	0.48	34.07	0.48	33.43	0.66	31.69^{EFG}	0.86	28.50^{FH}	0.26	26.99	0.13	26.34	0.72
PUFA	2.87^{IJLOU}	0.05	3.70	0.02	3.67	0.07	9.81	0.14	10.01	0.20	7.59	0.21	4.73	0.04	4.45	0.02	8.95	0.24
Σ C-18:1 Trans-FA	3.41	0.07	5.57^{AB}	0.04	6.08	0.12	2.90	0.04	3.59	0.07	8.41^{EFG}	0.23	7.28	0.07	7.80	0.04	5.63	0.15
Σ CLA	0.43	0.01	0.19	0.00	0.38	0.01	0.35	0.00	0.24	0.00	0.31	0.01	0.50	0.00	0.20	0.00	0.36	0.01
C-16:0/C-18:1cis9	2.90	0.00	2.29	0.00	2.50	0.00	1.02	0.00	1.06	0.00	1.62	0.00	2.12	0.00	2.31	0.00	1.78	0.00
C-16:0/C-18:1 ges.	2.24	0.00	1.61	0.00	1.72	0.00	0.89	0.00	0.90	0.00	1.06	0.00	1.40	0.00	1.47	0.00	1.25	0.00
Σn-3	0.49	0.01	0.38	0.00	0.87	0.02	2.40	0.03	1.97	0.04	0.68	0.02	1.01	0.01	0.73	0.00	1.95	0.05
Σ n-6	2.06^{IU}	0.04	3.45	0.02	2.87	0.06	7.29	0.10	8.15	0.16	6.91^{EG}	0.19	3.52	0.03	3.78	0.02	6.99	0.19
Σ MCT (C-10>C-14)	20.09^{LTOU}	0.38	16.98	0.11	20.76	0.41	13.91^{CD}	0.20	12.98	0.26	13.86^{EF}	0.37	15.37	0.14	17.40	0.09	13.56	0.37
Σ SCT (C-4>C-8)	10.22^{JQU}	0.19	0.30	0.07	0.72	0.01	1.47	0.02	2.70	0.05	1.46	0.24	1.96	0.02	1.63	0.01	5.12	0.14
CLA 9c,11t	0.27	0.01	0.07	0.00	0.19	0.00	0.10	0.00	0.00	0.00	0.05	0.00	0.18	0.00	0.08	0.00	0.06	0.00
Σ n-6/Σn-3	4.22	0.00	8.98	0.00	3.31	0.00	3.04	0.00	4.14	0.00	10.09	0.00	3.49	0.00	5.18	0.00	3.59	0.00
ΣC-18:1 cis-FA	13.14	0.25	17.60	0.12	14.91	0.30	29.12^{CD}	0.41	27.82	0.55	19.14^{EFG}	0.52	16.98^{FH}	0.16	16.08^{GH}	0.08	18.10	0.49
BFA	3.03^{INPU}	0.05	2.62	0.02	2.66	0.05	1.86	0.03	2.06	0.04	2.39^{EFG}	0.06	2.18	0.02	2.20	0.01	1.64	0.04

*Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.

Source: Authors' own elaboration

crease compared to the starting curd (Table 4).

The lipid preventive score in the studied milk from the control group was 15.69. The addition of vegetable additives to the curd leads to an increase in the lipid preventive score due to an increase in the total fat content of the curd and the content of long-chain saturated fatty acids. The lipid preventive score was lowest with 0.05% thyme-16 and highest with 0.3% rosemary-45.30 (Table 5). The atherogenic index in the control curds was 3.85, and the thrombogenic index was 3.40. The use of plant supplements in different concentrations leads to a decrease in the atherogenic and thrombogenic index. The atherogenic index gives the correlation between the sum of the main saturated fatty acids and the unsaturated fatty acids, the former being considered proatherogenic (favoring the adhesion of lipids in the cells of the immune and circulatory system). The second were anti-atherogenic (inhibit plaque aggregation and decrease levels of esterified fatty acids, cholesterol, and phospholipids, thus preventing the occurrence of micro- and macro-coronary diseases). The thrombogenic index is defined as the tendency for blood vessels to form clots. It is calculated as the ratio between prothrombogenic (saturated) and antithrombogenic (monounsaturated and polyunsaturated

Table 4. Fatty acid groups in curd with additives, g/100g fat, n = 6 /continue/

	P1		P2		P3		P4		T1		T2		T3		T4	
SFA	73.96^{IJKL*}	4.71	70.54	0.57	70.41	0.49	76.02	6.32	61.74^{MP}	0.82	58.20^{NP}	0.30	68.34^{OP}	0.18	65.24	1.21
MUFA	22.73^{IJKL}	0.05	23.80^{JK}	0.02	23.96	0.28	24.21	0.18	28.37	0.39	31.27	0.16	25.55	0.07	25.27	0.47
PUFA	2.81^{IJKL}	0.01	3.04	0.00	2.78	0.16	3.01	0.02	5.17	0.07	7.61^{NP}	0.04	3.12	0.01	6.96	0.13
Σ C-18:1Trans-FA	5.84	0.01	5.71	0.01	4.33	1.13	10.93	0.08	6.84	0.09	8.94	0.05	6.65	0.02	4.20	0.08
Σ CLA	0.18	0.00	0.18	0.00	0.24	0.02	0.35	0.00	0.21	0.00	0.32	0.00	0.22	0.00	0.50	0.01
C-16:0/C-18:1cis9	3.18	0.00	2.97	0.00	2.66	0.18	4.60	0.00	2.02	0.00	1.70	0.00	2.51	0.00	1.91	0.00
C-16:0/C-18:1 ges.	2.12	0.00	2.06	0.00	2.01	0.02	2.01	0.00	1.37	0.00	1.08	0.00	1.67	0.00	1.41	0.00
Σn-3	0.38^{IJKL}	0.00	0.40^{JL}	0.00	0.31	0.02	0.41	0.00	0.63	0.01	0.59	0.00	0.48	0.00	1.55	0.03
Σ n-6	2.42^{IJKL}	0.01	2.52	0.00	2.34	0.18	2.34	0.02	4.69	0.06	7.05	0.04	2.66	0.01	5.37	0.10
Σ MCT(C-10>C-14)	20.13	0.75	18.93	0.30	18.22	0.30	18.42	0.70	15.63	0.21	13.66	0.07	18.81	0.05	18.00	0.34
Σ SCT(C-4>C-8)	2.22	0.44	0.19	0.06	0.96	0.75	6.20	5.00	0.70	0.03	1.32	0.01	0.47	0.00	4.83	0.09
CLA 9c,11t	0.07	0.00	0.08	0.00	0.11	0.03	0.15	0.00	0.12	0.00	0.08	0.00	0.07	0.00	0.30	0.01
Σ n-6/Σn-3	6.36	0.00	6.27	0.00	7.64	0.16	5.71	0.00	7.43	0.00	11.94	0.00	5.51	0.00	3.46	0.00
ΣC-18:1cis-FA	13.51^{IJK}	0.03	14.42	0.01	16.14	0.94	9.50	0.07	18.49	0.25	19.63^{NP}	0.10	15.61^{OP}	0.04	18.73	0.35
BFA	3.39	0.01	3.41^{JL}	0.00	3.41^{KL}	0.07	3.31	0.02	2.98	0.04	2.82^{NP}	0.01	3.23^{OP}	0.01	3.00	0.06

*Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.
Source: Authors' own elaboration

Table 4. Fatty acid groups in curd with additives, g/100g fat, n = 6 /continue/

	R1		R2		R3		R4		C1		C2		C3		C4	
SFA	70.66^{QT*}	0.22	69.28	1.19	67.23	0.22	64.41	2.31	72.84^{UX}	1.91	66.33	1.38	66.71	1.50	58.01	6.77
MUFA	23.52^{QT}	0.07	24.17	2.16	25.35ST	0.02	27.82	0.92	22.23	0.04	24.13	0.50	23.63	0.63	29.53	4.83
PUFA	3.48	0.01	3.26	0.48	2.93ST	0.00	3.72	0.12	2.73	0.00	2.32	0.05	4.16	0.11	7.37	3.79
Σ C-18:1Trans-FA	5.06	0.02	2.84^{RT}	0.49	3.63	0.00	3.91	0.13	5.73	0.01	5.35	0.11	5.19	0.14	5.49^{WX}	1.18
Σ CLA	0.26	0.00	0.33	0.06	0.20	0.00	0.23	0.01	0.26	0.00	0.16	0.00	0.31	0.01	0.35	0.00
C-16:0/C-18:1cis9	2.74	0.00	2.30	0.26	2.12	0.00	1.84	0.00	3.14	0.00	2.65	0.00	2.67	0.00	1.74	0.66
C-16:0/C-18:1 ges.	1.91	0.00	1.90	0.28	1.70	0.00	1.48	0.00	2.07	0.00	1.86	0.00	1.89	0.00	1.34	0.53
Σn-3	0.47	0.00	0.48^{RT}	0.07	0.39	0.00	0.67	0.02	0.33	0.00	0.32	0.01	1.44	0.04	1.08	0.54
Σ n-6	3.10	0.01	2.63	0.42	2.55ST	0.00	3.01	0.10	2.29^{UX}	0.00	2.10	0.04	2.53	0.07	6.13	3.28
Σ MCT(C-10>C-14)	20.15	0.67	19.31^{RT}	1.60	17.29	0.23	15.63	0.89	21.27	0.03	17.33^{VX}	0.36	17.35	0.34	13.88^{WX}	0.76
Σ SCT(C-4>C-8)	1.09	1.26	0.56	0.15	0.16	0.01	0.53	0.24	2.97	1.84	0.23^{VW}	0.00	0.26	0.09	1.41	1.30
CLA 9c,11t	0.14	0.00	0.15	0.03	0.09	0.00	0.07	0.00	0.08	0.00	0.05	0.00	0.10	0.00	0.07	0.00
Σ n-6/Σn-3	6.66	0.00	5.49	0.06	6.47	0.00	4.52	0.00	7.00	0.00	6.56	0.00	1.76	0.00	5.54	0.39
ΣC-18:1cis-FA	15.24^{QT}	0.06	17.61	1.81	18.71ST	0.02	20.42	0.68	12.99^{UX}	0.02	15.13	0.31	15.21	0.41	21.44^{WX}	4.03
BFA	3.47	0.10	3.72	0.24	2.99	0.00	2.03	0.07	3.38^{UVX}	0.01	3.29^{VW}	0.07	3.62	0.10	3.20^{WX}	0.30

*Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.
Source: Authors' own elaboration

omega-3 and omega-6 fatty acids) fatty acids (Ghaeni et al., 2013). The thrombogenic and atherogenic index, as indicators, should not exceed 1.00 while the cholesterol index is above 1.00 (Ivanova and Hadzhinikolova, 2015). The hypo-hypercholesterolemic index in the curd is 0.31 and increases slightly when additives with different concentrations are added. Using 0.3% basil increased h/H to 0.75, 0.1% lemon balm to 1.51, 0.05% peppermint to 0.64, 0.2% thyme to 0.74, 0.05% rosemary to 0.50, and 0.3% turmeric with black pepper to 0.35. Cholesterolemic index was low (below 1.0) in all variants of supplements and concentrations except for 0.1% lemon balm.

Trans fatty acids in the control group of curd were 0.23 g/ 100g product and vary when adding aromatic plants in different concentrations, with the lowest values found at 0.3% basil – 0.11 g/ 100g product, 0. 1% lemon balm- 0.18 g/ 100g product, 0.2% peppermint 0.65 g/ 100g product, 0.2% thyme- 0.42 g/ 100g product, 0.05% rosemary -0.11 g/ 100g product and 0.3% turmeric with black pepper – 0.24 g/ 100g product. The introduction of additives from various aromatic plants leads to an improvement of the fatty acid profile and quality indicators of the curd.

The antioxidant activity in the tested curds was 1.14 TE mg/100 g product. Curds with additives were characterized by varying antioxidant activity, depending on their type and concentration applied during the technological process. Adding turmeric at a minimum concentration of 0.05% to the curd increases the antioxidant activity fourfold, to 4.67 TE mg/100 g product. As the concentration of the combination of turmeric and black pepper increases, the antioxidant activity also increases. The use of 0.1% turmeric supplement increased the antioxidant activity in curd by 5-fold, at 0.2% by 7.8-fold, and at 0.3% by 11-fold compared to the curd control group. The addition of peppermint in dry form at low concentrations (0.05% and 0.1%) reduces the antioxidant activity in the curd to 0.47 and 0.73 TE mg/100 g product, respectively. However, at 0.2% addition, it increases by 4 times, and by 8 times at 0.3%. Rosemary increased the antioxidant capacity of curd, and at 0.5%, it increased to 1.88 TE mg/100 g product compared to the control curd group. At 0.1% supplementation, the increase was 12 times, at 0.2% supplementation, it was 19.9 times, and at 0.3% addition, it was 31 times. The inclusion of lemon balm in curd at a 0.05% concentration has a lower antioxidant activity compared to the control group of curd – 0.51 TE mg/100 g product, while at 0.1% it increases by 6.7 times, at 0 2% increases by 12-fold, and by 17-fold with 0.3% addition. Thyme in dry form at 0.05% addition in the curd increased the antioxidant activity to 1.44 TE mg/100 g product, twice at 0.1% addition, 5.8 times at 0.2% addition, and 8.5 times at 0.3% addition compared to the control curd. Identical results were obtained for basil. All types of additives lead to an improvement in the antioxidant activity of the cottage cheese, with the highest values obtained with rosemary. Basil and thyme should be used at concentrations of 0.2% and 0.3%, respectively, to increase the antioxidant activity in curd; however, they negatively impact the organoleptic indicators (Table 6).

The total polyphenols in the studied curd were 4.67 GAE mg/100g product. The use of the combination of turmeric with black pepper increased the content of total phenols threefold at 0.05% supplementation, 3.4 times at 0.1% supplementation, 4.7 times at 0.2% supplementation, and by 6.3 times at 0 .3% additive. The addition of 0.05% and 0.1% peppermint to the

Table 5. Qualitative evaluation of the fat fraction of curd with supplements

	K	B1	B2	B3	B4	M1	M2	M3	M4	P1	P2	P3	P4
LPS	15.69	21.96	26.62	28.17	18.43	35.89	18.30	33.84	43.82	24.71	32.69	32.47	33.40
AI	3.85	2.88	3.21	2.84	2.17	2.91	0.61	2.62	1.96	1.98	3.55	3.48	2.93
TI	3.40	2.42	2.99	2.50	1.35	2.74	1.10	2.49	1.90	1.92	3.02	2.84	2.57
h/H	0.31	0.41	0.37	0.44	0.75	0.43	1.51	0.41	0.64	0.64	0.31	0.34	0.41
TFA (g/ 100g product)	0.23	0.59	0.77	0.71	0.11	0.72	0.18	1.29	1.28	0.74	0.86	0.65	0.75
SFA+TFA (g/ 100g product)	5.44	7.73	9.40	10.00	2.65	14.48	1.07	12.35	15.30	8.59	11.55	11.26	10.47

Source: Authors' own elaboration

Table 5. Qualitative evaluation of the fat fraction of curd with supplements

	T1	T2	T3	T4	R1	R2	R3	R4	C1	C2	C3	C4
LPS	16.00	27.80	23.43	37.40	19.62	39.55	42.49	45.30	24.63	25.26	25.63	17.60
AI	2.34	2.24	1.81	2.60	4.64	3.32	3.05	2.49	3.73	3.30	3.57	3.04
TI	2.11	2.12	1.75	2.27	2.34	2.94	2.76	2.58	2.93	2.83	2.98	2.40
h/H	0.49	0.52	0.74	0.51	0.50	0.39	0.42	0.49	0.29	0.33	0.31	0.35
TFA (g/ 100g product)	0.57	1.05	0.42	0.78	0.11	0.53	0.74	0.89	0.64	0.65	0.50	0.24
SFA+TFA (g/ 100g product)	5.70	11.12	4.94	12.87	1.73	13.41	14.50	15.54	8.71	8.73	7.63	1.90

Source: Authors' own elaboration

curd resulted in a decrease in polyphenol content compared to the control group of curd. In contrast, the other concentrations increased by 1.6 times at 0.2% and by 2.3 times at 0.3% additive. The curd with the addition of 0.05% rosemary has a higher content of total polyphenols compared to the control series – 6.00 GAE mg/100g product. This content increases depending on the concentration of the additive, with the highest value recorded at 0.3%- 52.00 GAE mg/100g product. Polyphenols increased with the addition of lemon balm compared to the control curd from 6.00 GAE mg/100g product at 0.1% to 17.16 GAE mg/100g product at 0.3% addition. The use of thyme in low concentrations (0.05% and 0.1%) resulted in a lower content of polyphenols compared to the control curd. However, at concentrations of 0.2% and 0.3%, the content increased by 3.4 and 3.7 times, respectively, compared to the control group. The addition of basil to the curd increased the content of polyphenols at all concentrations compared to the control curd. Adding basil to curd increased the total polyphenol content by 2.6-fold at 0.05%, by 3-fold at 0.1%, by 3.6-fold at 0.2%, and by 3.8-fold at 0.3% supplementation relative to the control group. Regarding the total content of polyphenols, the best results were achieved with the addition of rosemary, while the addition of peppermint and thyme yielded the most unacceptable results (Table 6).

Table 6. Antioxidant activity and content of total polyphenols in curd with additives, n = 6

	DPPH, TE mg/100 g продукт	TPC, GAE, mg/100g продукт
K	$1.14\pm0.001^{OP*}$	$4.67\pm0.29^{L*}$
C1	4.67 ± 0.026^{L}	13.33 ± 0.28^{GH}
C2	5.91 ± 0.07^{K}	16.00 ± 0.00^{F}
C3	8.93 ± 0.17^{H}	22.00 ± 0.50^{D}
C4	12.45 ± 0.20^{F}	29.50 ± 0.00^{B}
P1	0.47 ± 0.02^{R}	0.83 ± 0.28^{M}
P2	0.73 ± 0.06^{PQR}	1.67 ± 0.29^{M}
P3	4.44 ± 0.05^{L}	7.50 ± 0.00^{J}
P4	8.67 ± 0.027^{H}	10.83 ± 0.28^{I}
R1	1.88 ± 0.13^{N}	6.00 ± 0.01^{K}
R2	13.79 ± 0.28^{D}	14.03 ± 0.05^{G}
R3	22.68 ± 0.14^{B}	27.83 ± 0.76^{C}
R4	35.46 ± 0.18^{A}	52.00 ± 0.05^{A}
M1	0.51 ± 0.02^{QR}	3.83 ± 0.57^{L}
M2	7.73 ± 0.09^{I}	6.00 ± 0.86^{K}
M3	13.28 ± 0.42^{E}	8.17 ± 0.29^{J}
M4	19.38 ± 0.087^{C}	17.16 ± 0.57^{E}
T1	1.44 ± 0.03^{O}	3.83 ± 0.28^{L}
T2	2.53 ± 0.13^{M}	4.00 ± 0.00^{L}
T3	6.66 ± 0.043^{J}	16.00 ± 0.00^{F}
T4	9.64 ± 0.07^{G}	17.66 ± 0.28^{E}
B1	1.45 ± 0.01^{O}	12.33 ± 0.28^{H}
B2	2.18 ± 0.01^{MN}	14.33 ± 0.28^{G}
B3	7.35 ± 0.026^{I}	16.83 ± 0.29^{EF}
B4	8.65 ± 0.026^{H}	17.83 ± 0.29^{E}

*Means not sharing any letter are significantly different by the Tukey-test at the 5% level of significance.
Source: Authors' own elaboration

Branciari et al. (2015) in the supplementation of sheep with rosemary leaves, found that the high antioxidant activity leads to a decrease in proteolysis and lipolysis in cheese. Oxidative processes and fermentation stability were investigated by Fernandes et al. (2018) in the application of essential oils of oregano and rosemary as a natural antioxidant in cream cheese, where the acidity is lower and the pH is higher compared to the original cheese, and allows storage for a period of 30 days in refrigerated conditions.

Conclusions

The technological processing of collected cow's milk into curd with the addition of different concentrations of peppermint, turmeric, and black pepper leads to an increase in yield. A loss of protein was detected when aromatic plants were added to the curd, but the amount of fat increased, and it was enriched with fibber.

The technological processing of curd with the addition of different concentrations of aromatic plants leads to an improvement in the fatty acid composition in curd by lowering saturated and increasing mono- and polyunsaturated fatty acids. The use of plant supplements in different concentrations leads to a decrease in the atherogenic and thrombogenic index. The hypo-hypercholesterolemic index in the curd was 0.31 and increased slightly when additives with different concentrations were added.

All types of additives lead to an improvement in the antioxidant activity of the curd, with the highest values obtained with rosemary. In terms of total polyphenol content, the best results were achieved with rosemary supplementation.

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