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The comparison of fatty acid and cholesterol profile on fresh and mozzarella cheese made by pampangan buffalo milk

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Abstract. This research aimed to investigate the composition of fatty acid and cholesterol profile of Fresh and Mozzarella Cheese from Pampangan Buffalo Milk. Material of this research was Pampangan buffalo milk and Mozzarella cheese made from buffalo milk. Fatty acids composition were analyzed by [1] method. Result showed the major saturated fatty acid found in milk and Mozzarella cheese Pampangan buffalo milk were palmitic, stearic and myristic acid while the unsaturated fatty acid was oleic acid. The total amount of fatty acid in Mozzarella cheese was lower than those in Pampangan buffalo milk.

Keyword: Buffalo milk, mozzarella, fatty acids, cholesterol profile

1. Introduction

Buffalo milk was consumed by Pampangan's people, which has a different nutrition with cow milk. [2] claimed that buffalo milk contains 17.7% total solid, 7.3% fat, 5% protein, 4.6% lactose and 0.9% ash. [3] reported that buffalo milk has different compositions with cow's milk, because total solid, fat, protein, lactose, mineral, and ash are higher than cow's milk. [4] explained that buffalo milk contained higher saturated fatty acids (palmitic and lauric) and lower mono-unsaturated fatty acid than cow milk in the same condition.

Milk fatty acid has been contributed in specific flavor, as a source of short chain-fatty acids (C6:0, C8:0, C10:0) which is made buffalo's milk become easy to absorb. Buffalo milk fatty acids produced energy and activated all of endocrine gland, organ, also body tissue without forming cholesterol and adipose tissue [5]. A higher of Medium chain-fatty acid in buffalo milk has a bacteriostatic effect.

The purpose of processing is to create or increase the flavor and nutrition, give an added value, produce a new product and extended the product's shelf-life. Buffalo's milk is a main material in mozzarella cheese making because buffalo milk has a good nutrition. The making process of mozzarella cheese is complex which starts with coagulation (K-casein was broken down by rennet enzyme), agglomeration (produced similar protein mass) and water-released. During the process, fat maintained the membrane integrity and protein trapped in fat membrane also formed the cheese matrix [6]. [7] reported that Mozzarella cheese has a 46.0% water content, 23.0% fat, 43.0% total solid fat and 1.2% salinity. In the making process of Mozzarella cheese, fat degraded into fatty acids. Fatty acid in milk



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in directly contributed to the aroma of cheese, however fatty acids have a role to form volatile compound through the metabolism of fatty acids [8].

This research aim to analyze total and type of fatty acid also cholesterol profile in fresh milk and mozzarella cheese from Pampangan's buffalo milk.

2. Metodology

2.1. Material and Method

This research use milk and Mozzarella cheese from Pampangan's buffalo milk, obtained from Rambutan- Pampangan subdistric in Lampung. This research be held in Baranang Siang IPB Laboratory Bogor.

2.2. Experimental Procedure

This research has been analyzed the concentration and type of fatty acids, also cholestrol in milk and Mozzarella cheese from Pampangan's buffalo milk. Fatty acid analyzing is using gas chromatography through the procedure in IPB Laboratory which is following the [1].

2.3. Data Analysis

Fatty acid was identified by descriptive analyzed and compared with the previous research.

3. Result and Discussion

Total concentration of Pampangan buffalo milk's fatty acid and Mozzarella cheese were recorderd in Table 1. Total concentration of Fatty acid in Pampangan buffalo's milk (52.22%) is higher than Mozzarella cheese (46.535%).

Table 1. Type and total unsaturated fatty acids of buffalo's milk and mozzarella cheese

Fatty Acids	Concentration (%)	
	Buffalo Milk	Mozarella Cheese
7 proic. C6:0	1.31	0.86
Caprylic. C8:0	0.33	0.325
Capric. C10:0	0.65	0.65
Lauric. C12:0	0.96	0.95
tridekanoat. C13:0	0.14	0.125
miristic. C14:0	6.56	5.96
pentadekanoat. C15:0.	1.81	1.155
palmitat. C16:0	23.90	20.695
heptadekanoat. C17:0	1.03	0.93
2 earat. C18:0	14.37	14.28
arakidat. C20:0	0.23	0.225
heneikosanoat. C21:0	0.09	0.12
behenat. C22:0	0.52	0.115
trikosanoat. C23:0	0.13	0.145
lignoserat. C24:0	0.15	0.86
Total	52.22	46.535

The final result shown some type of unsaturated fatty acids in fresh milk and Mozarella cheese from Pampangan's buffalo milk, such as lauric, miristic, palmitic, stearic, caproic, caprylic, capric, tridekanoat, arakidat, heneikosanoat, behenat, trikosanoat dan lignoseratrasi in different concentration. The highest concentration of saturated fatty acid in fresh milk and Mozarella cheese are palmitic, stearic, and miristic. [4] reported that buffalo's milk fatty acid contained of stearic and palmitic which is contributed to specific taste and aroma. [9] explained the highest concentration of fatty acid in buffalo's milk are palmitic, miristic and stearic acid. Saturated fatty acid's percentage in buffalo's milk is higher than cow's milk [10].

Miristic fatty acid (C14:0) has a role in increasing the *High Density Lipoprotein* (HDL) and *Low Density Lipoprotein* (LDL), antioxidant, prevent the oxidation of LDL and protect from microbe infection [11].

Buffalo milk's short chain fatty acids produced energy and activated all of endocrine gland, organ, also body tissue without forming cholesterol and adipose tissue [5]. Milk's fatty acid composition influenced by factors, such as lactation periods [12], type of buffalo [4] and feed composition [13]

In the making process of cheese involved curd forming with milk acidifocation and protease addition, so the process resulted the positive respond of fatty acid in milk and Mozarella cheese from buffalo milk. Milk fatty acid produced by lipolysis of fatty acid [8]. In this research, total fatty acid of Mozarella cheese is lower than Pampangan buffalo's milk. [5] reported that lypolisis not always increase the certain fatty acid. Lypolisis is chemical reaction which is produced the flavor of milk product. Therefore, the primer total of milk's fatty acid influenced the total fatty acid during the making process of Mozarella cheese.

Table 2. Type and Total Unsaturated Fatty Acids in Milk and Mozarella Cheese From Pampangan's Buffalo Milk

Fatty Acid	Buffalo Milk	Mozarella Cheese
miristoleinat. C14:1	0.04	0.355
palmitoleinat. C16:1	1.91	1.615
oleic. C18:1n6c	23.37	21.395
linoleat. C18:2n6c	0.76	0.725
linolenat. C18:3n3	0.33	0.02
Cis-11-Eikosenoat. C20:1	-	0.36
Cis-11-14- Eikosedienoat. C20:2	-	0.07
Cis -8.11.14 Eicosetrinoar . C20:3n6	-	0.035
arakidonat. C20:4n6	0.04	0.06
Cis-5.8.11.14.17 Eikosapentaenoat. C20:5n3.	0.04	
EPA		0.05
nervonat. C24:1	0.05	0.035
Total	26.91	24.72

Unsaturated fatty acid which is detected in fresh milk and Mozarella cheese from Pampangan's buffalo milk are miristoleic, palmitoleic, oleic, linoleic, linolenat, eikosanoat, arakidonat and eikosapentaenoat shown in Table 2. Concentration of unsaturated fatty acid in Mozarella cheese is

lower than Pampangan's buffalo milk. [8] explained that milk's processing did not influence the fatty acid's composition. Unsaturated fatty acid in food materials related to food's spoilage. Unsaturated fatty acid not easily oxidized.

There is a tendency of decreasing in cholesterol during processing of Pampangan's buffalo milk into Mozzarella cheese. The result shown cholesterol in milk and Mozzarella cheese are 5.96% and 1.04. Fat's composition which is influenced the cholesterol is lypolisis. [6,9] explained that lauric acid (C12:0), palmitic acid (C16:0) and miristic acid (C14:0) increased the serum cholesterol. Oleic acid (C18:1), linoleic acid (C18:3), and α -linoleic acid (C18:3) decreased the serum cholesterol.

4. Conclusion

Pampangan buffalo milk has a higher fatty acid than mozzarella cheese. Type of fatty acid which is identified in milk and mozzarella has a similiarity, however the concentration is different. There was a tendency of decreasing in cholesterol during buffalo milk processing into mozzarella cheese.

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