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THE BIOFERMENTATION OF *LACTOBACILLUS ACIDOPHILUS* AND *BIFIDOBACTERIUM* ON MILK AGAINST THE ACTIVITY OF LIPASE AND MICE BLOOD CHOLESTEROL

LOVITA ADRIANI [1], HENDRONOTO ARNOLDUS WALEWANGKO LENGKEY [1], NOOREMMA SOPHIANIE[2]

[1] Faculty of Animal Husbandry, Padjadjaran University, Bandung, INDONESIA

[2] Biomerieux Indonesia, INDONESIA

hawlengkey@yahoo.com

lovitayoghurt@yahoo.co.id

The development in food fermentation technology allowed humans to use microbes ability optimally to increase the benefit of materials that could be damaged to products that could resist and have a high economical value.

The aim of the research is to explore the effect of the fermentation with Lactobacillus acidophilus and Bifidobacterium against the ability to increase the activity of lipase and to decrease the cholesterol value of mice blood.

Results indicated that the activity of lipase in milk fermented with Lactobacillus acidophilus and Bifidobacterium are 0.45 units/ml, and the cholesterol value is 169.5 mg/dl, compared with the Lactobacillus bulgaricus and Streptococcus thermophillus milk fermented that is 0.18 units/ml, and 224.3 mg/dl.

Key words : Biofermentation, lipase, cholesterol, Lactobacillus acidophilus,Bifidobacterium

Lactobacillus acidophilus is a slow acid producer in cultures used for the production of acidophilus milk. This product has a plain acid flavour, and may be combined with other bacteria to obtain a more palatable product. Acidophilus milk is recommended as a dietary product, because *Lactobacillus acidophilus* functions in the large intestine of man (van den Berg, 1988) In bioghurt, *Lactobacillus bulgaricus* is replaced by *Bifidobacterium* in place of *Lactobacillus bulgaricus* is that *Bifidobacterium* produces the physiologically active D(+)-lactic acid. It is assumed that a high concentration of cholesterol in the diet affects the cholesterol level in the blood serum.The endogenous lipolytic activity in intestine is low so that lipases ingested will make a significant contribution to intestinal lipolysis (Cross and Overby, 1988).

Some of the milk enzymes, can be found in the skim milk, e.g. lipase and lysozyme (Cross and Overby, 1988).

The aim of this work was to get the effect of fermentation with *Lactobacillus acidophilus* and *Bifidobacterium* on gaining the lipase activities and to reduce the blood cholesterol in mice.

MATERIALS AND METHODS

The milk. We are using raw milk (cow milk) from farm animals at the faculty.

The bacteria. The bacteria are pure cultivated *Bifidobacterium, Lactobacillus acidophillus, Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The identification of the cultures was based on the characteristics of the lactobacilli and streptococcus as described in Bergey's Manual of Determinative Bacteriology (Holt, et al, 1994). Bacteria total count with Total Plate Count (TPC).

Lipase activity. Lipase activities are tested according to Bergmeyer, 1981, after 7 weeks fermented.

Blood cholesterol. Blood cholesterol was tested according to Randox.

RESULTS AND DISCUSSION

The effect of the treatment on lipase activities

Lipase activities are responsible for the rancid flavour in milk and milk products. They hydrolyse glycerides, thus liberating free fatty acids. This process is called lipolysis. Lipase enzymes are still active at temperatures as low as 4 to 5^{O} C. Most of them are destroyed at normal or slightly increased HTST pasteurization temperatures, but rancidity already developed in raw milk will not be removed during pasteurization (van den Berg, 1988).

Table 1. Total cell counts and Lipase activities in yoghurt

Yoghurt	Total cell count (cell/ml)	Lipase activities (unit/ml)
Lactobacillus bulgaricus and *Streptococcus thermophilus*	13×10^{11}	0.18
Bifidobacterium and *Lactobacillus acidophilus*	7.6×10^{9}	0.45

In Table 1. , presents the total cell counts in yoghurt and the lipase activities in yoghurt. After fermented with *Lactobacillus acidophilus* and *Bifidobacterium*, total cell count was 13×10^{11} cell/ml and lipase activities was 0.45 unit/ml, compared to the *Lactobacillus bulgaricus* and *Streptococcus thermophilus* fermentation; the total cell counts was 7.6×10^{9} cell/ml and the lipase activities only 0.18 unit/ml.

The distribution of lipase between serum and cream fractions was altered, indicating that the equilibrium between the lipase activity of skim milk and cream is temperature dependent. The distribution of lipase in milk depends primarily on the lipid phase.

The effect of the treatment on blood cholesterol

Milk fat should only refer to the pure fat, but since the fat is associated with other fat-like substances, such as lecithine and cholesterol, the term lipids is often used for all fatty components that can be extracted from the milk by ether. Cholesterol is an alcoholic compound of complex structure. In milk, most of it is found in the fat globules. Unfortunately, milk fat has been suspected of being injurious to health. Particular attention has been given to its cholesterol content. It has been assumed that the consumption of milk fat will increase the cholesterol content of the blood.

In Table 2, presents the cholesterol content in mice blood cholesterol.

Table 2. Blood cholesterol content in mice (mg/100 ml) after 7 weeks treatment

Dosage (%)	Yoghurt			
	A	A	B	B
	Male	Female	Male	Female
1.25	172	147	153	144
2.00	166	140	143	142

Notes : A = Lactobacillus bulgaricus : Streptococcus thermophilus = 1 : 1
B = Bifidobacterium : Lactobacillus acidophilus = 1 : 1

It is assumed that a high concentration of cholesterol in the diet affects the cholesterol level in the blood serum. The cholesterol content of milk fat is relatively low compared to that of other animal foods. The average cholesterol content of milk is 13 mg/100 ml (van den Berg, 1988).

After 7 weeks treatment with 1.25% and 2.00% dosage in male and female mice, the average of blood cholesterols are varied between 140 mg/100ml and 172 mg/100 ml. The blood cholesterol content from the mice (male and female) from both dosage (1.25 and 2.00%), that consumed with *Lactobacillus bulgaricus* and *Streptococcus thermophilus* yoghurt are higher than the *Bifidobacterium* and *Lactobacillus acidophilus* yoghurt in both sexes. And between sexes, the male are higher than the female; and when the dosage are higher, the blood cholesterol will lower too. The yoghurt with *Bifidobacterium* and *Lactobacillus acidophilus* starters, has lower cholesterol content, because the cholesterol in the diet has only a limited effect on the level of cholesterol in the blood plasma, since the body has a control mechanism which ensures that the synthesis of cholesterol by the body is reduced when the amount of cholesterol consumed increases.

CONCLUSIONS

The blood cholesterol content that consumed with Lactobacillus bulgaricus and Streptococcus thermophilus yoghurt are higher than the Bifidobacterium and Lactobacillus acidophilus yoghurt. The yoghurt with Bifidobacterium and Lactobacillus acidophilus starters, has lower cholesterol content, because the cholesterol in the diet has only a limited effect on the level of cholesterol in the blood plasma, since the body has a control mechanism which ensures that the synthesis of cholesterol by the body is reduced when the amount of cholesterol consumed increases.

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