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Mechanism of Milk Formation by Lactic Acid Fermentation

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ABSTRACT

(contains an opening sentence, research objectives, methods, results and conclusions).

The manufacture of dairy products based on the formation of sour milk is very important to know the mechanism. The mechanism for the formation of acid milk curd can occur through the addition of acid, fermentation by bacteria starter culture, or the addition of protease enzymes that affect the stability of milk components such as casein. In this study was use Lactobacillus bulgaricus …… The result indicated ……. Conclusion is the relationship between rheology and microstructure of sour milk curd using a scanning electron microscope……

Keywords: Dairy product, sour milk, bacteria starter culture, yogurt, rheology

INTRODUCTION (Calibri12pt, bold, center, capital letter)

(Explain the importance, urgency, literature support, and novelty of the research)

The mechanism of gel formation of acid milk curd is described as follows. Lowering pH (by acidification or fermentation) causes considerable change. The primary change is that micellar calcium and phosphate are dissolved in a solution of casein. Electrostatic bonds between positive and negative groups on the casein keep the micelles together, and at the isoelectric pH, these bonds are powerful. The casein particles at this pH are significantly different from the micelles at physiological conditions, although their size distribution has not changed substantially. A prolonged pH in milk leads to higher calcium ion activity, which also reduces the negative charge on the micelles. At pH 4.6, the casein particles aggregate: electrostatic repulsion is absent, and the k-casein hairs, which provide steric repulsion, are also lost.

Slow quiescent acidification of milk, as affected by the in situ conversion of lactose to lactic acid by added starter culture, or by the addition of acidogens, is fundamental in

the manufacture of fresh acid-curd products such as yogurt and fresh cheeses. Acidification promotes two significant physicochemical changes: the solubilization of micellar calcium phosphate and a reduction in the negative charge on casein. These changes confer metastability on the casein system, allowing it to reach a new stable state through structural rearrangements, ultimately forming a gel network.

Malaka et al. [1], milk fermentation is a process by which a change is produced in milk through the activity of microorganisms. The common change occurring in raw milk is the development of lactic acid from lactose, sufficient to precipitate casein, resulting in a semisolid mass [1].

Lactose is transformed into lactic acid. The first step is the hydrolysis of lactose to glucose and galactose. At least in the dissimulation of glucose, the sequence appears to be glyceroldehyde phosphate, phosphoglyceric acid, and lactic acid [2] [3].

The acidity of fresh milk, calculated as lactic acid, varies significantly. Most values range from 0.14% to 0.19%. Only a small amount of lactic acid is present in fresh milk; the acidity is primarily due to carbon dioxide, casein, albumin, phosphate, and citrates [4]. When ordinary dairy is left standing at room temperature, the acidity of 0.25% becomes noticeable, resulting in a sour taste. It is first detectable at a pH of about 6.0. As the acid in milk increases, casein precipitates at an acidity level between 0.50% and 0.65%, corresponding to a pH range of 4.64 to 4.78 [5].

With many lactic acid-producing bacteria, the acidity continues to rise after coagulation of the casein until the accumulation of acid prevents further growth. The lactose is very rarely, if ever, the limiting factor in acid production, and under ordinary conditions, there still is considerable lactose remaining when development of acid has stopped.

MATERIALS AND METHODS (Calibri12pt, bold, center, capital letter)

It should be written clearly and thoroughly, including a precise description of biological, analytical, and statistical procedures so that other researchers can replicate them. References to the original methods and procedures must be provided, and any modifications to these procedures should be clearly explained. Diets and animal conditions, such as breed, sex, age, body weight, and weighing conditions, should be described clearly.

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Appropriate statistical methods should be used, although the biological mechanism should be emphasized. The statistical model, classes, blocks, and experimental units must be designated. Consultation with a statistician is recommended to prevent the use of incorrect or inadequate statistical methods.

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Data should be presented in tables or figures when feasible. There should be no duplication of data in tables and figures. Sufficient and comprehensive data followed by some index of variation, e.g., SD, SE, etc. The significance level, e.g., $P < 0.01$, should be presented to provide complete information and enable the reader to interpret the experiment's results.

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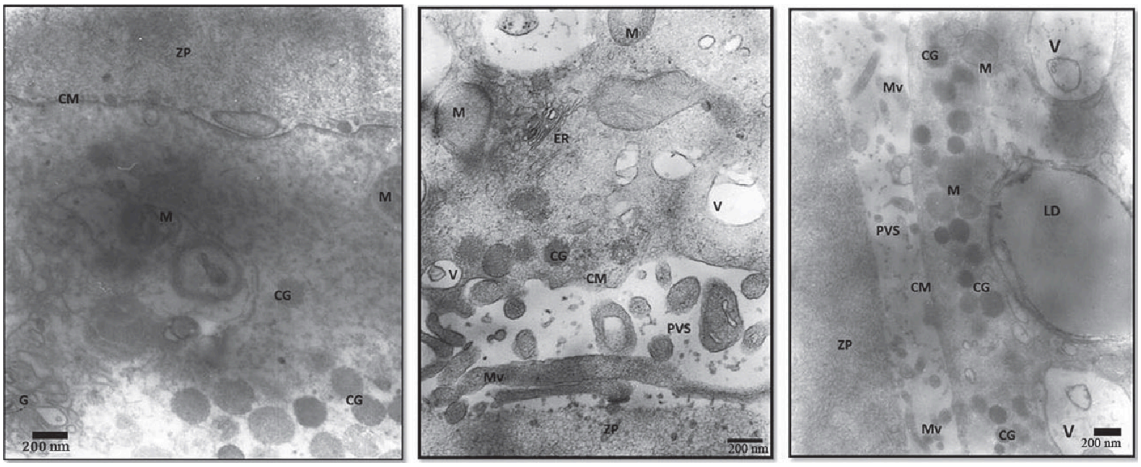


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ACKNOWLEDGEMENT (Calibri12pt, bold, center, capital letter)

Acknowledgement (if any) to person(s) or institution(s) who contributed to the experiment should be stated.

AUTHORS' CONTRIBUTIONS (Calibri12pt, bold, center, capital letter)

Conceptualized the study and drafted and revised the manuscript. All Author: Conducted experiments and analyzed data. All authors have read and approved the final manuscript.

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[1] R. Malaka, E. Abustam, and S. Baco, "Antitumor Activity (In-vitro) of Extracellular Polysaccharide Produced by Ropy Lactobacillus delbrueckii ssp. bulgaricus Isolated from Tradisional Fermented Milk", Int. J. Chem. Pharm. Sci., Vol. 4, No. 45, pp. 263–266, 2020.

[2] O. R. Afolabi and T. O. S. Popoola, "The Effects of Tebaldi Pulp Powder on the Microflora Involved in Tempe Fermentation", European Food Research and Technology, Vol. 220, No. 2, pp. 187–190, 2005. DOI https://doi.org/10.1007/s00217-004-0998-y.

[3] R. A. Lawrie, "Meat Science", Fifth Edition, University of Indonesia Publishers, Jakarta, Indonesia, 2003.

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