โยเกิร์ตจากหางนมถั่วเหลือง

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บทคัดย่อ

โยเกิร์ตจากหางนมถั่วเหลือง ได้จากการนำน้ำถั่วเหลืองส่วนที่เหลือทิ้งจากกระบวนการผลิตแผ่นฟองเต้าหู้มาหมักกับ *Streptococcus thermophilus* และ *Lactobacillus bulgaricus* ซึ่งใส่ลงไปในปริมาณร้อยละ 10 โยเกิร์ตที่ได้มีกรดแลคติคร้อยละ 0.8 การปรับปรุงผลิตภัณฑ์พบว่า โยเกิร์ตที่ผ่านการเติมน้ำตาลร้อยละ 10 และกลิ่นสตรอเบอรี่ร้อยละ 15 ได้รับการยอมรับในระดับดีเมื่อทดสอบทางประสาทสัมผัส

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Soybean-Whey Yogurt

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Abstract

Soybean-whey yogurt was developed by using soybean whey, the by-product from soybean curd film factory. By inoculating 10% of mixture cultures of *Lactobacillus bulgaricus* and Streptococcus *thermopiles*, the product obtained 0.8% lactic acid. Yogurt added with 10% sugar and 15% strawberry obtained high acceptability score from all panel members.

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Introduction

Soybean curd film or Hukie, a yellowish thin film, is commonly consumed by the Chinese and easily found in the Thai markets and side-walk shops. Normally, it is used not only as an ingredient in many types of foods such as soup, and vegetarian foods, but as soy milk supplements as well. According to the production, the liquid waste contains high organic substances (BOD 99,800 mg/l) making waste treatment difficult. However, soybean whey is still rich in nutrients, i.e., 1.54% fat, 4.36% protein, 9.40 total solid and 7.86% solids not fat. Therefore, if this waste could be utilized as food raw material, it might be beneficial to both consumers and producers. The attempt in this study was to make use of the soya bean whey for developing new value-added product.

Materials and Methods

Soybean-Whey Preparation

Soybeans were cleaned and soaked in tap water for 4-5 hrs. at room temperature (29 ±1°c.). Then the beans were ground with water at the ratio of 1 : 10. After that, the homogenate was filtered to obtain soybean milk which was mixed with 10% W/V of magnesium sulfate. The mixture was heated to 80°C and maintained at this condition for the entire process. Around 20 films of soybean curd were harvested from milk surface and the liquid was ready to use as a major component for yogurt production.

Effect of Milk Substitution on the Appearance of soybean-Whey Yogurt

Soybean-whey was mixed with milk at the concentrations of 2 5, 50, 7 5 and 100%. Then the mixtures were inoculated with 5 ml of 10% active yogurt cultures. (*Lactobacillus bulgaricus* and Streptococcus *thermophilus*) and incubated at 43°C for 16 hrs. After that, the products wrer stored in a refrigerator (4 ±1°C) in order to inhibit fermentation process. Quality of the products was accessed by checking curd formation.

Effect of Inoculum Size, Sugar and Flavoring Agents on Acceptability Scores of Soybean-Whey Yogurt

To improve product quality, the amount of inoculum and sugar were varied. For the former, four concentrations were conducted, i.e., 5, 10, 15 and 20% while for the latter, the milk mixtures were added at the concentrations of 10, 12, 15 and 20%.

Four kinds of flavoring agents were also applied in this study to improve product's taste-oder, i.e., sala, orange, strawberry and banana. The most accepted substance was used in subsequent study in order to find the suitable concentration.

Analytical Methods (Sensory Evaluation)

The Soybean-whey yogurts were coded with three digits random numbers and arranged in random order. Eleven panelists from Microbiology Department evaluated the coded samples according to their individual opinion expressed on a score sheet.

In analyzing the results, the ratings were converted into numerical values parameters, i.e., color, flavor, taste-odor, texture and acceptability were rated with scores of 9 to 1 in hedonic scale.

Data Analysis

The difference between treatment means were analyzed using one-way analysis of variance (ANOVA) at 0.05 significance level. Duncan's multiple range test was used to compare treatment mean if the significant difference was defected.

Results and Discussion

Table 1 shows that all products provided smooth curd. Analysis of variance indicated that there was no significantly different in acceptability scores among the products ($P > 0.05$). Therefore, the product with no milk substitution was chosen in subsequent study.

Table 1. Effect of Milk Substitution on the Appearance of Soybean-Whey Yogurt.

Amount of soybean-whey (%)	Acceptability Score
100	smooth curd
75	smooth curd
50	smooth curd
25	smooth curd

Table 2 implies that inoculum sizes had effect on acceptability score. It is also found that no curd was formed when inoculum size was less than 5%. Analysis of variance revealed that acceptability scores of products using active culture at the concentration between 10- 20% were not significant difference to one another (P> 0.05) and were accepted by all panel members.

Table 2. Influence of Inoculum Sizes on Acceptability of the Panel to the Soy Yogurt Products.

Amount of active cultures	Appearance	Acceptability Scores *, **
5	no curd	6.36[a]
10	mooth curd	8.36[b]
15	smooth curd	8.27[b]
20	smooth curd	8.00[b]

* Means followed by a common letter (a, b, ...) are not sigificantly different at the 5% level by DMRT

** 9 = like very much 1 = dislike very much

The results from Table 3 shows acceptability scores of products prepared by using various sugar concentrations. The panels seemed to prefer the product added with 10% sugar.

Table 3. Acceptability Scores of Soy Yogurt with Different Sugar Concentrations

Amount of sugar added	Acceptability Scores *, **
10	8.10[a]
12	5.54[b]
15	6.18[c]
20	6.82[b]

* Means followed by a common letter (a, b, ...) are not sigificantly different at the 5% level by DMRT

** 9 = like very much 1 = dislike very much

Table 4. Acceptability.Scores of Soy Yogurt with Different Flavoring Agents

Flavoring agent	Acceptability Scores *, **
Sala	4.64[a]
Orange	5.73[b]
Strawberry	8.82'
Banana	6.82[d]

* Means followed by a common letter (a, b, ...) are not sigificantly different at the 5% level by DMRT

** 9 = like very much 1 = dislike very much

Table 5. Effect of Strawberry Flavor on Acceptability Score of Soybean-Whey Yogurt

Strawberry (%)	Acceptability score *,**
5	3.18[a]
10	4.10[b]
15	7.10[c]
20	5.34[d]

* Means followed by a common letter (a, b, ...) are not sigificantly different at the 5% level by DMRT

** 9 = like very much 1 = dislike very much

The effects of various flavoring agents on acceptability of products were demonstrated in Table 4 and 5. Strawberry flavor-added products provided the highest acceptability scores while the products added with sala, orange and banana flavor obtained 4.64, 5.7 3 and 6.82, respectively. Table 5 also indicated that 15% strawberry provided the best product with the score of 7.10, significantly higher than those of other concentrations ($P< 0.05$). The product from this condition was also accepted by panel members in color, flavor, taste-odor, and texture aspects (Table 6).

Table 6. Sensory Scores on Each Attributes of the Final Product.

Attribute tested	Acceptability score * *
Color	5.44
Flavor	7.20
Taste-Odor	5.72
Texture	8.23
Overall	6.12

** 9 = like very much 1 = dislike very much

Conclusion

The potential in utilizing soybean-whey to produce yogurt was conducted. The advantages of this application were not only to minimize the amount of soybean-whey but add value to the product as well.

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