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# Nutrition Content of Murrah Buffalo's Milk Curd By Using Lime Juice (*Citrus aurantifolia*)

***S. D. Yanti, Hasnudi*, Yunilas, E. Mirwandhono and N. Ginting***

*Animal Production Program Study, Faculty of Agriculture, University of North Sumatra, Padang Bulan, Medan 20155, Indonesia*

** Correspondent author: prof_hasnudi@yahoo.com*

**Abstract**. Dadih is the result of fermented milk made in bamboo and covered with banana leaves on top, then allowed to stand for approximately 24-48 hours. This study aims to determine the effect of various doses of lime juice (*Citrus aurantifolia*) in the manufacture of dadih on the nutritional content (water content, fat content, protein content, carbohydrates and pH).This research method used a completely randomized design (CRD) 4 treatments 5 replications. The treatments were dose of lime juice, namely P0 = 0% Control only buffalo milk without lime, P1 = 1% lime juice, P2 = 3% lime juice, P3= 5% lime juice. Based on the research results, it is known that the addition of 5% (10 ml) for every 200 ml of milk is the optimal treatment for water content, fat content, protein content, carbohydrates and pH.

**Keywords:** buffalo milk, dadih, dosage, lime juice, nutritional content

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## 1. Introduction

[1] explained that milk is a food ingredient composed of food substances in balanced proportions, high nutritional value, easy to digest and contains all the food elements needed by humans. Milk is a type of perishable food or food that is easily damaged if left unprocessed. Milk is also a very appropriate medium for the growth and proliferation of microorganisms. This is due to the high nutrient content in milk and the high water content in milk which reaches 83-87.5%. Processing of milk is the right way to extend the shelf life and prevent spoilage of milk caused by microbes. One of the efforts is to process milk into curd, which is a typical dairy product from West Sumatra.

Dadih is the result of fermented milk made in bamboo and covered with banana leaves on top, then allowed to stand for approximately 24-48 hours. Curd is a specific food that is white in color and almost resembles tofu, it can be cut and eaten with a spoon. [2] curd is a fermented milk product that resembles yogurt and kefir. The people of West Sumatra usually consume curd to be used as side dishes, traditional medicine and as a complement to traditional

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ceremonies. Dadih is produced from a traditional fermentation process carried out by the people of West Sumatra, they only use pieces of bamboo as a container and banana leaves as a cover. [3] explains that it is better if the bamboo chosen to be used is old bamboo so that it has a low water content, and thus will produce curd with a thick texture. The fermentation process can occur due to the presence of microorganisms that cause fermentation in the bamboo segments used. Curd microorganisms derived from the surface of bamboo and banana leaves as the cover of the bamboo tube, consisting of yeast which reached 106-107 colonies/g. The use of banana leaves as a cover adds a distinctive taste and aroma. The extract of flavor compounds from banana leaves resulting from water distillation extracted with ethyl acetate solvent contains chemical compounds, namely Methoxy-4-finylphenol, phytol, 1,2-Benzenedicarboxylic acid, bis (ethylhexyl) ester, Vanillin and E-15 Heptadecenal. These five compounds play a role in the aroma produced by banana leaves [4].

Lime (*Citrus aurantifolia*) is one of the plants that is widely used by the community as a spice in cooking and medicine. In the medical field, lime is used as an appetite enhancer, antipyretic diarrhea, and diet. Orange is a plant that comes from Asia and thrives in tropical climates. Lime is a plant that comes from the family *Rutaceae* with the genus *Citrus*. This lime tree has a height of about 135-150 cm and thin-skinned fruit and white flowers. This plant has a salt content of about 10% and can thrive on soils that have a slope of about 30̊ [5].

Lime can also be used as a coagulant to solidify the texture of the curd, the citric acid in lime is a substitute for the rennet enzyme which functions as a coagulant for milk and has the advantages of being easy to obtain, available in large quantities, more resistant in high acid-base conditions, and relatively cheap prices [6]. [7 concluded that the concentration of lime that was good to use was 3%.

Buffalo's milk in 100 grams contains 3.6% protein, 3.8% fat. In addition, the texture of buffalo milk curd has the advantage of being more compact and dense and has a smooth texture compared to cow's and goat's milk curd [8].

## 2. Materials and Method

### 2.1. Materials

The material used in this study was fresh buffalo milk as the object of research with lime juice and bamboo gombong as a place for making curd and banana leaves as a bamboo tip cover.

### 2.2. Methods

The method in this study was completely randomized design (CRD) with 4 treatments and 5 replications with the addition of lime juice with variations of 1% (P1), 3% (P2), 5% (P3). The treatments given were as follows:

P0 = Control Only Buffalo Milk Without lime

P1 = Buffalo Milk + 1% Lime Juice

P2 = Buffalo Milk + 3% Lime Juice

P3 = Buffalo Milk + 5% Lime Juice

While the number of repetitions is obtained by using the following formula:

$t (n-1) \geq 15$

$4 (n-1) \geq 15$

$4n-4 \geq 15$

$4n \geq 19$

$n = 4,7$

## 3. Results and Discussion

### 3.1. Water content

**Table 1**. Effect of Lime Juice on Water Content of Buffalo Milk curd (%)

| Treatment | Test | | | | | Average±SD |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | |
| P0 | 38.7 | 34.61 | 34.74 | 36.84 | 38.5 | $36.67^{C}$ |
| P1 | 61.41 | 43.95 | 43.09 | 39.84 | 38.44 | $45.34^{B}$ |
| P2 | 56.33 | 57.02 | 45.93 | 49.97 | 51.78 | $52.20^{A}$ |
| P3 | 52.47 | 60.47 | 54.63 | 63.36 | 63.03 | $58.79^{A}$ |

Description: Different superscripts in the same column showed a very significant difference ($P < 0.01$).

These results indicate that the highest nutritional value is found in the treatment P3 (5% lime juice) with a percentage of 58.79% then P2 (3% lime juice) with a percentage of 52.20% then P1 (1% lime juice) with a percentage of 45 .34% and P0 with a percentage of 36.67%. Among these three treatments, the highest water content was found at P3 58.79% this is because the higher the lime content treatment, the higher the water content.

This is in line with [9] which states that the addition of skim has a very significant effect on the water content of cow's milk whey water content, namely 71.15% - 59.78%, the decrease in water content is influenced by the addition of skim treatment, the more skim added can increase density of cow's milk, because the higher the density, the lower the water content. This is in

accordance with the research above so that the administration of lime juice has a very real effect on increasing the percentage of water content.

### 3.2 Carbohydrate levels

**Table 2**. Effect of Lime Juice on Carbohydrate Levels of Buffalo Milk Curd (%)

| Treatment | Test | | | | | Average±SD |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | |
| P0 | 11.8 | 11.15 | 9.45 | 11.61 | 11.36 | $11.07^{tn}$ |
| P1 | 9.94 | 10.87 | 11.11 | 11.73 | 8.94 | $10.51^{tn}$ |
| P2 | 11.4 | 10.73 | 11.57 | 11.3 | 11.36 | $11.27^{tn}$ |
| P3 | 12.05 | 10.59 | 10.61 | 9.96 | 8.13 | $10.26^{tn}$ |

Description: tn has no significant effect.

The results showed that the highest carbohydrate percentage was found in treatment P2 (3% lime juice) with a percentage of 11.27% then P0 treatment with a percentage of 11.07% then P1 (1% lime juice) with a percentage of 10.51% and P3 (5% lime juice) with a percentage of 10.26% this proves that the administration of lime juice with various doses does not have a significant effect on the percentage of carbohydrates.

This is also related to [10] the quality of koro benguk curd with the addition of lime juice through different types of milk and curing time, it is known that koro benguk curd with J0 treatment (without milk) has the lowest carbohydrate content compared to other treatments, which is equal to 28.86 g. Koro Benguk Dadih uses Koro Benguk as a basic ingredient, where in 100 g Koro Benguk contains 55 g of carbohydrates, but after becoming a curd product, the carbohydrate content actually decreases.

### 3.3. pH

**Table 3**. Effect of Lime Juice on the pH Value of Buffalo Milk Curd (ºC)

| Treatment | Test | | | | | Average±SD |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | |
| P0 | 3.8 | 3.8 | 4 | 3.8 | 4 | $3.88^{B}$ |
| P1 | 4 | 4 | 4.1 | 4.2 | 4.1 | $4.08^{A}$ |
| P2 | 4.1 | 4.2 | 4.8 | 4.3 | 4.3 | $4.34^{A}$ |
| P3 | 4 | 4.5 | 4.3 | 4.2 | 4.5 | $4.30^{A}$ |

Description: Different superscripts in the same column showed a significant effect ($P < 0.01$).

The highest pH value was found in Treatment P2 (3% lime juice) with a level of 4.34º then P3 (5% lime juice) 4.30º then P1 (1% lime juice) 4.08º and the lowest was P0 3.88º This proves that lime juice has a significant effect in increasing the pH of buffalo milk curd. This result is supported by research by [11] which states that buffalo milk curd has a pH content of 4.43-5.6. Lactose is the main component in milk used by LAB as an energy source during fermentation,

the more LAB activity increases, the more lactic acid is produced, thus increasing acidity and lowering pH. The pH value of buffalo milk curd is a determination of the acidity level of the metabolism of starter bacteria which converts lactose into lactic acid, lactic acid causes a decrease in the pH value, if the pH of milk reaches the isoelectric point of milk protein, the protein will clot to form curd. According to Jannah [12] the decrease in the pH of yogurt drinks is influenced by the activity of lactic acid bacteria in breaking down lactose into lactic acid. The production of lactic acid as a result of sugar metabolism causes a decrease in the pH of yogurt.

The increasing number of lactic acid bacteria that use lactose, the more sources of sugar that can be metabolized, the more organic acids are produced so that automatically the pH will also be lower.

### 3.4. Protein content

**Table 4**. Effect of Lime Juice on Curd Protein Levels (%)

| Treatment | Test | | | | | Average±SD |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | |
| P0 | 1.44 | 1.75 | 1.83 | 2.23 | 2.14 | $1.87^{C}$ |
| P1 | 1.88 | 2.71 | 2.58 | 2.8 | 3.02 | $2.59^{A}$ |
| P2 | 2.18 | 2.05 | 2.14 | 2.36 | 2.27 | $2.20^{C}$ |
| P3 | 2.45 | 2.67 | 2.93 | 3.23 | 3.37 | $2.93^{A}$ |

Description: Different superscripts in the same column showed a very significant difference ($P < 0.01$).

Based on the above treatment, the highest protein content percentage was found in treatment P3 (5% lime juice) with a percentage of 2.93% then P1 (1% lime juice) with a percentage of 2.59% then P2 (3% lime juice) with a percentage 2.20% then the lowest is at P0 with a percentage of 1.87%. This proves that the administration of lime juice has a significant effect on the protein content of buffalo milk curd because there is a fermentation process in the curd resulting in microbial development. In this result, the addition of lime juice will result in clumping of protein in milk.

[13] stated that the highest protein content of curd products was obtained with a curing time of 48 hours, which was 2.272 g/100g. This is also supported by research by [14] that protein will experience denaturation (clumping) at low pH. This also happened in [15] which showed the highest protein content was found in the treatment of cow's milk curd with the addition of lime juice as much as 3% (7.5 ml). In the treatment of cow's milk curd with the addition of 1% lime juice (2.5 ml) the lowest protein content was obtained.

### 3.5. Fat level

**Table 5**. Effect of Lime Juice on Fat Content of Buffalo Milk Curd (%)

| Treatment | Test | | | | | Average±SD |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | |
| P0 | 41.78 | 36.41 | 49.08 | 43.17 | 55.14 | $45.11^{A}$ |
| P1 | 70.29 | 44.68 | 45.96 | 47.42 | 40.75 | $49.82^{A}$ |
| P2 | 33.81 | 48.54 | 24.39 | 24.63 | 43.68 | $35.01^{B}$ |
| P3 | 9.8 | 9.38 | 4.83 | 14.56 | 19.41 | $11.59^{C}$ |

Description: Different superscripts in the same column showed a very significant difference ($P < 0.01$).

Based on the above treatment, the highest percentage of fat content was found in treatment P1 (1% orange juice) with a percentage of 49.82% then P0 with a percentage of 45.11% then P2 (3% lime juice) with a percentage of 35.01% then the lowest was at P3 (5% lime juice) with a percentage of 11.59% this proves that the administration of lime juice with various treatments has a very significant effect on reducing fat content in buffalo milk curd this is because the fat in curd with the addition of lime decreased of curd without the addition of lime juice.

This is presumably because the acid content of lime juice which can reduce fat levels is in accordance with [16] which examined the acid in local lime (*Citrus aurantifolia swingle*) which is an orange that has the highest citric acid content when compared to other types of lime. other oranges. Citric acid in local lime as much as 55.6 g/kg, while 48.9 g/kg lemon and bangkok lime 38.6 g/kg. Citric acid is an organic acid that is soluble in water, citric acid is believed to be able to dissolve fat. The amount used can affect the value of fat content, because the citric acid in oranges is able to reduce fat.

## 4. Conclusion

Based on the research results, it is known that the addition doses of lime juice to the curd with a dose of 5% (10 ml) for every 200 ml of milk is the optimal treatment for water content, fat content, protein content, carbohydrates and pH.

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