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On Food Science And Technology



PROCEEDING

EXPLORING FOOD BIOTECHNOLOGY ROLES:
FROM FARM TO TABLE

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The 11th National Student Conference

**“Exploring Food Biotechnology Roles : From
Farm To Table”**

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Penerbit Universitas Katolik Soegijapranata

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THE USE OF COW MILK AND GOAT MILK ON THE MAKING OF YOGHURT

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ABSTRACT

Yogurt is milk that is made by fermentation of bacteria. Yogurt can be made from any milk. Modern production is currently dominated by cow's milk, though Indonesia is actually rich in natural resources, including milk. Therefore we want to try to make yogurt products from other dairy products, like goat's milk. Yogurt is made by putting specific bacteria into the milk under controlled temperature and environmental conditions, especially in industrial production. Bacteria break down the natural milk sugars and release lactic acid as waste product. Increased acidity causes the milk protein goes solid. Increased acidity (pH = 4-5) also avoids the potential proliferation of pathogenic bacteria. Most yogurt products made using *Lactobacillus* and *Streptococcus* bacteria that we often encounter in a variety of sold yogurt products. But in some countries, the product may be called yoghurt only if there are live bacteria in the final product. Products that have been pasteurized, which had no live bacteria, is called fermented milk. Yogurt that has been pasteurized has a long shelf life and does not require a refrigerator. Yogurt has various functions in human life, therefore the product of yogurt has become a universal drink which is beneficial to human health, especially in the digestive tract (eg: facilitate constipation or difficult bowel movements). Also yogurt is rich in protein, several B vitamins, and minerals that are important. Yogurt has much fat milk from which it is made. Because the structure of the lactose yogurt was damaged, then the yogurt can be consumed by people who are allergic to milk.

Keyword: *Cow's milk, goat's milk, yoghurt.*

INTRODUCTION

In recent years, there has been increasing demand for a new range of dairy products, including yoghurts, which are similar to traditional products but have a low fat content (Begona et al., 2000). Yoghurt is one of the most popular fermented dairy product widely consumed all over the world. It is obtained by lactic acid fermentation of

milk by the action of a starter culture containing *Streptococcus thermophilus* and *Lactobacillus delbrueckii* ssp. *bulgaricus*. The role of these two gene in yoghurt manufacture can be summarized as milk acidification and synthesis of aromatic compounds (Sera et al., 2009), (Sahan et al., 2008). Yoghurt is more nutritious than many other fermented milk products because it contains a high level of milk solids in

addition to nutrients developed during the fermentation process. The aim of this study is to make yogurt that is more nutritious than milk.

Yogurt is made by fermenting milk using specific bacteria, under controlled temperature and environmental condition. Bacteria break down the natural milk sugars and release lactic acid as waste product. The increase in acidity causes the milk protein convert to solid form. The increase in acidity (pH = 4-5) also avoids the potential proliferation of pathogenic bacteria. Most yogurt products made using *Lactobacillus* and *Streptococcus* bacteria that we often find in a variety of marketed yogurt products. In some countries, the product may be called yoghurt only when life bacteria available in the product. Products that have been pasteurized, which had no life bacteria, called fermented milk. Yogurt that has been pasteurized has a long shelf life and does not need refrigerator to save. Yogurt has various roles in human life, therefore the product of yogurt has become a universal drink and bringing benefit to human health, especially in the digestive tract (eg: facilitate constipation or difficult bowel movements). Yogurt also rich in protein, some types of B vitamins, and important

minerals. Yogurt contains fat milk as much as the milk from which it is made. Because the structure of the lactose yogurt was damaged, then the yogurt can be consumed by people allergic to milk.

Table 1 . Nutrition Content of *yoghurt*

Component	Contain (per 100 mg)
Energy (Kkal)	42-62
pH	4.2-4.4
Protein	4.5-5.0
Carbohidrate	6-7
Fat	-
Calsium	130-176
Magnesium	17
Potassium	226

Source : Canadian Dairy Commission (2002) disitasi Anonimus (2008a).

Table 2. Composition Comparison of Goat Milk and Cow Milk

Nutritional Value	Goat Milk	Cow Milk
Water (%)	87.5	87.2
Carbohydrate (%)	4.6	6.9
Energy (kcal)	67.0	69.1
Fat	4.0-7.3	4.4
Protein	3.3-4.9	1.0
Calsium	129	33
Phospor	106	14
Iron	0.05	0.05
Vitamin A	185	240
Vitamin B12	0.07	0.84

Source : Budiana and Susanto (2005) and LPPM IPB (2008).

The main ingredient of yoghurt is currently dominated by cow milk. But in fact, there are other milk that can be used as the main ingredient of yoghurt like goat milk, horse milk, etc. Whereas the potential of other milk product in Indonesia is high too. Therefore, we try

to make yoghurt from milk that still rarely used at the production of yoghurt like goat milk. So we can increase the national income of this country and make more people to have a better life.

MATERIALS AND METHODS

The studies were conducted following this procedures. A commercial yoghurt of "biokul", is used as the source of the bacteria. Cow and goat milks were boiled at 90^o C for 15-30 minutes, then gelatin and sugar were put into the boiled milk and was then put into the steril bottles. All the bottle was sterilized at 121 ^oC for 2 hours. The milk was allowed to cool. When the temperature of the milk down to 43^o C, the commercial yoghurt was added into the milk, then was kept at room temperature for one night. Then the sensory (colour, smell, taste), physical (viscosity) and chemical (pH) were evaluated following Eskin (1990) procedures. The sensory test was made using 5 scales as follows: 1 (most unliked), 2 (unliked), 4 (liked), and 5 (very liked).

RESULTS AND DISCUSSION

Table 1. shows that the pH of yogurt that uses goat milk is higher than the pH of yogurt that using cow milk. This is because goat milk is more alkali (alkali foods) so the pH is higher than cow milk. In addition, the higher pH of goat milk might be due the content of an alkaline compound such as calcium and phosphorus in goat milk is higher than in cow milk.

Table 3. The comparisson of pH and viscosity of yoghurt, produced from cow and goat milks

Milk	pH	Viscosity
Cow	4.52	3
Goat	5.55	5.5

Contrary to this, Table 2. Shows that the viscosity of yogurt that uses goat milk as the basic ingredients is higher than the viscosity of yogurt that using cow milk as the basic ingredients. This is because goat milk fat content is higher than cow milk fat content. Fat content of goat milk is 4.25% and the fat content cow milk is 3.70% (Webb and Johnson, 1965).

Table 2. The comparison of taste, colour and smell of yoghurt, produced from cow and goat milks

	Taste	Colour	Smell
Cow	3.33 a	3.80 a	3.43 a
Goat	2.37 b	3.47 b	3.13 b

Based on the sensory evaluation made to 30 respondents, it was found that yogurt made from cow milk was preferred by consumers compared to yogurt made from goat milk. For flavor, the yogurt that uses cow milk as the basic ingredients obtained an average of 3.33, while the yogurt that uses goat milk as the basic ingredients gained an average of 2.37. Based on these results, it can be concluded that cow milk yogurt was more popular than goat milk yogurt. It was probably not caused by goat's milk products that have worse taste than cow milk, but it was likely due to the fact that in general are more regular to consuming products derived from milk cow rather than those products derived from goat milk.

In addition, the unfavored of goat milk was due to the smell of goat milk that was much stronger than cow milk. According to Boycheva *et al.* (2011), goat milk contains more vitamin A than cow milk. The fatty acid composition of goat milk is also different, goat milk contains more volatile fatty acids (Kaproat, caprylic, and capric) that

cause taste and odor that is more specific on the results of dairy products.

CONCLUSION

Yoghurt produced from goat milk having higher pH than cow milk. Similarly, the viscosity of goat milk is higher than cow milk. The sensory evaluation on taste, aroma and colour, it was found that cow milk was preferred by the consumers compared to goat milk, which might be due to the fact that the people get use to consume the cow milk. Goat milk likely having less popular because of the smell was stronger than cow milk

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BOILING IS KNOWN TO BE THE BEST WAY TO PRESERVE HONEY: DO YOU THINK SO?

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ABSTRACT

Nowadays, honey is a product that is widely used for various needs, such as health. Honey is a viscous fluid produced by bees from flower nectar. Honey has a wide range of content that is very nutritious for the body (sugar, minerals, and other useful components for body). In addition to having many properties, honey also has a delicious flavor and sweet. The sweet taste of honey depends on the type of flower nectar supply. For this reason, the honey is very familiar in various circles. People from all walks of at least never consume honey for many purposes. However, many people still lack knowledge about honey. Most people tend to boil the honey to preserve it, but this will reduce the content - essential ingredients in honey, although the boiling honey can be durable. Actually, by boiling, enzymes contained in the honey will be denatured so that the microbes die and cause the honey to be durable.

Keywords: *honey, boiling, enzyme*

INTRODUCTION

Honey is useful for human's body. Many people consume honey for many purposes, such as for health and as a natural sweetener. Honey is a sweet, thick fluid made by bees from flower nectar.. Worker bees sip nectar from flower blossoms and carry it to their hives, where they share it with other worker bees. Each bee has a pouch in his body, called a honey stomach, where

the nectar is temporarily stored. In the pouch, enzymes produced and mix with the nectar. Which promote sugar inversion into two simple sugars, fructose and glucose. After inversion is complete, the bees use their mouthparts to expose the nectar to the hive's warm air, so that some water evaporates. Then the bees deposit the nectar in a honeycomb, a mass of six-sided compartments called cells. In the cells,

water continue to evaporate from the nectar. Nectar can be called honey when its water content, on the average, less than 19 percent (Connor, 2005). Workers then put wax caps on the honey-filled cells. Beekeepers collect honey from the combs. However, they leave enough in the hive to feed the bees (Heinrich, 2005).

The color and flavor of honey depend on the kinds of flowers that supply the nectar. Honey color ranges from white to dark amber, and it can have a mild or strong flavor. Most honey found in stores have flavor mild (Connor, 2005). Light-colored honeys are usually of higher quality than darker honeys (Anonymous, 2006).

Honey is a good source for energy because it contains simple sugars that the body can use quickly (Connor, 2005). The calories of honey about 3307 cal/kg (about 1520 cal/lb), that 40 % lower than sugar in same quantity (Anonymous, 2006). Honey also contains small amounts of minerals and other materials used by the body (Connor, 2005). Honey consist of 17.1 % water, 82.4 % carbohydrate, 0.5 % protein, amino acid, vitamins (vitamin A, B₁, B₂, B₃, B₆, C, and E in various composition depend on pollen and

nectar quality), mineral (magnesium, potassium, calcium, sodium, chlorine, sulphur, iron, phosphate, a few of copper, iodine, and zinc), antibiotic, phenol compound and hormone. The carbohydrates consist of 38.5 % fructose, 31 % glucose, and 12.9 % maltose, sucrose, and other sugars. One spoon of honey contains 64 calories of energy. Free amino acids in the honey can help the disease curing and also help formation of neurotransmitter (compound that is used to optimized the brain function). Honey contains antibiotic compounds which are used to kill pathogen bacteria. Antibacterial properties of honey help to prevent infection of the lesion and its anti inflammation activity reduce pain and increase circulation which affects the healing process. More over, but honey reduce scarring due to the stimulation of the growth of new tissues (Anonymous, 2006).

Many people assume boiling the honey, will increase its shelf life and efficacy of the honey. But in fact, it has not been proven yet. Although Kaspar R. & Stefan B. (2004) stated that properly applied heat treatment can be a great aid in handling honey. Heat also dissolves coarse crystals and destroys yeasts, and thus prevents fermentation and retards

granulation. Heat may alter the color, flavor, and aroma of honey unless particular precautions are taken. The alteration result from long period heating. Though several methods of heating are used successfully, the use of excessive heat for liquefaction or pasteurisation of honey has adverse effect on honey quality, i.e. loss of volatile compounds, accumulation of HMF and reduction of invertase and diastase enzyme activities (Kaspar Ruoff & Stefan Bogdanov, 2004). Therefore, the aim of this research is to prove the effect of boiling honey to the shelf life and efficacy of honey.

MATERIAL METHODS

Honey sample was collected from honey bee farm. 1 L honey freshly harvested from honey bee box was randomly collected out of total honey bee produced in a box of a harvesting period. The collected honey bee was then separated into 2 groups for boiling honey : boiled & unboiled treatments. The boiled treatment was run following this procedure: the separated honey was boiled on stove until the honey was fully boiled, shown on the bubble came out from all part of fluid. At this stage the boiling was continued for 2 minutes before the stove was turned off. The boiled honey was then left until the

temperature return to room temperature. To viscosity observation, the evaluation was made at every five minutes during the cooling stage.

Method we did to compare boiled honey with honey that has not been boiled is to do some parametric and non parametric tests. Where the parametric tests are done by testing the viscosity, color (with chromameter), and pH. And non-parametric tests performed by test sensory level of sweetness and aroma of honey with boiling and without boiling.

Parametric:

Viscosity Test

Preparation of solution: boiled honey and not boiled honey

Experimental set-up: Approximately 250 ml boiled honey was put in a viscotester, and then viscotester turned on. Viscotester will show the viscosity of the boiled honey. Rotor used in this experiment is the 3R. After that, wait for five minutes, then test again its viscosity using the same viscotester. Then honey is left again during the next five minutes, only then re-examined its viscosity. The same treatment was used for unboiled honey, to know its viscosity and compare them.

Chromameter Test

Preparation of solution: boiled honey and not boiled honey

Experimental set-up: Approximately 250 ml honey that has not been boiled, put into plastic, and then tested using chromameter L*A*B* scale. after that seen out on the chromameter, to see the L * a * and b * value. While for the boiled honey, should be awaited until honey is cooler, before finally tested with chromameter.

pH Test

Preparation of solution: boiled honey and not boiled honey

Experimental set-up: Approximately 50 ml honey that has not been boiled, put into beaker glass, and then we can see the pH value. While the boiled honey should be awaited until honey is cooler before finally did the pH test.

Non parametric:

We did the sensory test, by asking about 30 people to taste then compare the sweetness and aroma of boiled honey and honey that has not been boiled in a quisioner form.

RESULT AND DISCUSSION

Table 1. The Comparison of pH between the pH boiled honey and unboiled honey

Honey	Average of pH
A (boiled honey)	3,68
B (unboiled honey)	3,55

Based on the observation of pH measurement with samples of boiled honey and unboiled honey, data obtained as follows: The average pH obtained from the first loop to repeat the third on a boiled honey is 3.68. Meanwhile, the average pH from not boiled honey obtained from the first repetition until the third test which is 3.55.

Table 2. The Changing of viscosity

Honey	Viscosity		
	0 mins	5 mins	10 mins
Boiled honey	0,3	0,7	1
Unboiled honey	5,5	5,5	5,5

Based on viscosity measurements on samples of boiled honey and honey that is not boiled, data obtained follows. The viscosity of boiled honey on the first repetition (0 min) is 0.3; the second repetition (5 minutes) is 0.7; and third repetition (10 minutes) is 1. While, the viscosity of unboiled honey on the first repetition (0 min) is 5.5; second repetition (5 minutes) is 5.5, and the

third repetition obtained the same which is 5.5.

Table 3. The comparison of color

Honey	Color		
	L	a	b
A (boiled honey)	25,93	5,1	3,09
B (unboiled honey)	23,73	2,07	1,64

Based on the results of chromameter test between two samples: boiled honey and honey that is not boiled, data obtained as follows: Boiled honey in the first repetition of the color measurement, obtained 25,93 as L; 5,1 as a; and 3,09 as b.. While for the honey that is not boiled, the first repetition of the resulting color L = 23,73; a = 2,07; and b = 1,64.

As we can see from the data above, pH value of unboiled honey is higher than the boiled one. So, honey boiled is a little more acidic than the unboiled honey. In the viscosity test, boiled honey which has a lower viscosity than unboiled honey and the longer it is boiled or cooled, its viscosity will increase, which means the honey is more viscous. While the not boiled honey has a viscosity that is high enough and its viscosity will remain constant. And in the chromameter test, boiled honey has an average value of L, a, b that is higher than the not boiled

honey. This caused the color of boiled honey is darker than not boiled one. From the data we got on the research, we can conclude that by boiling the honey, will not give any good effect, as like it will be the best way to preserve the honey. Because actually the pH and viscosity will almost remain the same. Boiling the honey will cause losing its pure color.

Moreover, based non parametric test, we can conclude that the sweetness of boiled honey is lower than not boiled honey, although the aroma of boiled and not boiled honey are slightly the same. In conclusion, boiling is not the best way to preserve honey. Heat may alter the color, flavor, and aroma of honey unless particular precautions are taken. By boiling honey, it cannot prolong its shelf life, though the boiling process might resulting in the denaturation of some enzymes.

CONCLUSION

Although boiling process might denaturing some enzymes, this cannot prolonging the shelf life the honey. However, the heat resulting from the boiling process may damaging the color, flavor, and aroma of honey. Therefore, boiled honey recorded having lower

viscosity, lower sweetness rate, loosing the pure color of honey and also having lower pH.

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The Effect of Cow Udder Handling on Viscosity, Smell, Colour, and pH of Cow's Milk

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ABSTRACT

Cow's milk is one of the most preferred dairy products. Besides the milk is having good tastes, cow's milk contains highly nutritional value. However, since the milk is a liquid product, this can be the source for the growth of microorganisms. One of the main sources of the microorganism growth is its own uncleaned udder (cow udder). This is due to the facts that normally, the milking worker does not clean the udder, before starting the milking process. The washing it self, is a simple process and is not requiring additional cost. Therefore, there is a need to conduct a series of studies, aimed to compare the quality of milk, treated under these two treatments, i.e. washing the udder and left the udder unwashed. The studies were focussed on the effectiveness of the treatment against the growth of microorganisms. The research was conducted on cattle farms located in Kopeng, the District of Semarang, Central Java, in November 2011. Some 6 cattle randomly selected from the crowd of cattle farm; 3 cattle for each treatment. The milk produced from these two treatments was preserved in cool box, three sample each, and then evaluated its quality indices at the Laboratory of Food Chemistry and Laboratory of Food Microbiology, Soegijapranata Catholic University. The evaluation included the milk viscosity, color, odor, and pH. Each sample was evaluated three times as the replicates and the different means of each treatment were evaluated at 95% confidence interval.

Keyword: *cow's milk, viscosity, smell, colour, pH*

INTRODUCTION

Milk is food product that can be produced during lactation period by mammal in order to give nutrition source and immunity system for human (Widodo, 2003). The other definition said that milk is the product of squeezing from cow or other mammals which is squeezed continually and the components aren't reduced and aren't

added by other materials (Sirait, 1996). Nowadays, either in the developed country or in the developing country (include Indonesia), dairy cow is the main source of milk producer which has high value. Although there are also milk that are produced by other cattle such as buffalo, goat, sheep, their utilization in society are not as popular as dairy milk. The dairy milk becomes very popular

because of the delicious taste, and the nutrition value (Sirait & Abubakar, 1995).

Milk has many benefits for the body that is, milk contains lactose which serves as an energy source, milk contains protein that functions as a life-support material for basic life, growth and cell turnover, and the material taken as a form of cheese, albumin and globulin, milk contains a fat that serves as the best energy source other than animal fat production and the last is milk contains minerals and vitamins that are needed in the digestion and metabolism as a catalyst and purposes of the body resistance (Saleh, 2004).

Dairy products come from a small farm, milk is often not accepted. This is because the milk does not fulfill ISO standards and microbial content in milk is quite high. These problems mostly caused due to lack of hygienic handling of cow udders before milking or also can be caused because the milker who does not clean their hands before milking. The wrong handling mechanism will cause the milk easily contaminated. When contamination occurs, the milk will be the best medium for the growth and reproduction of a large variety of microorganisms, grow in

which will lead to physical and chemical changes of the milk. The most visible change is the change in color, and changes in pH and will cause the odor and viscosity is also changed. The main purpose of this research is to determine the influence of cleaning cow udders before milking process to the odor, color, pH and viscosity of the milk compared with cow's milk without cleaning udders of cows.

MATERIALS AND METHODS

The milk was collected from cow ranch, in Kopeng, Central Java. There were the resource persons six cows randomly choose from the available cows. The cows were chosen by the resource persons separated in two groups, 3 cows each. The first group was treated by washing the udder before milking process was conducted. First, the udder was washed with water and dried with a cloth, and after that, udder ready to be milked. The second group was not treated by washing the udder before milking process (udder is left dirty). After the six cows are milked, the milk directly entered into the coolbox and brought to Semarang, Central Java to be researched the pH, viscosity, color and odor in the Laboratory of Chemical, Food of Agricultural Technology Soegijapranata Catholic University.

After cooling in the coolbox for 2 hours, the milk was directly tested against the pH, viscosity, color and odor.

For pH testing, pH meter used to measure pH value. For this test, 25 ml of milk put in a beaker glass, and after that, detectors pH immersed into the beaker glass. If the pH meter on the screen shown that the pH value constant / unchanging for about 2 minutes, then the pH value shown is the pH value of the sample. The test be repeated three times to obtain accurate results. At viscosity testing, we use viscotester to measure viscosity of the milk. First, 500 ml of milk put into viscotester. After that, turned on the viscotester, and the propeller on viscotester will rotate to measure the viscosity of the milk. Then, compared the results of the viscosity of milk with cleaning process with those without cleaning process. At color and odor testing, we did not perform analysis using tools. In this analysis, we simply compare the color and also the smell of each of milk. This analysis was only done by one person, to prevent the rise of different perceptions.

The data was analyzed using two- tailed T test at 95% degree of confidence interval. Where as all the qualitative data was tabulated based on the

frequency of appearance and was left without any statistical analysis.

RESULTS AND DISCUSSION

Table 1. The comparison between pH of the dairy milk produced from washed udder and the controlled

Treatment	pH
Washed	6,671 ± 0,0092 ^b
Controlled	6,299 ± 0,0161 ^a

Note: Figures followed with the same letter, indicates as not significantly different at $p=0.05$

Table 1. showed that the pH of the milk produced from washed udder 6,671 ± 0,0092 compare to controlled 6,299 ± 0,0161. Figure shown with different letter indicated significantly different. Figure shown that the milk milked from washed treatment has a pH suitable for fresh milk (6.5 to 6,7), and while the controls had a lower pH. This can be caused due to the control milk was contaminated by microorganisms, so the lactose in milk is broken down into lactic acid, which will also affect the viscosity, odor and appearance of the milk.

Table 2. The comparison between viscosity of the dairy milk produced from washed udder and the controlled

Treatment	Viscosity
Washed	2 CP
Controlled	3 CP

Table 2. showed that the viscosity of the milk produced from washed udder was 2 cP, compare to controlled which was 3 CP. Figure shown significantly different at the udder washed and controlled. Milks from washed treatment has a smaller viscosity than the controlled. This is because, the control was mixed with dirt on the udder, and made the milk was thickening and ultimately increase the viscosity of milk.

Table 3. The comparison between odor of the dairy milk produced from washed udder and the controlled

Treatment	Odor
Washed	Characteristic smell of milk
Controlled	Smell rather sour

Table 3. showed that on the cow which udder was cleaned before milking process, the milk has a smell like the smell of ordinary milk (characteristic smell of milk) while on the cow which udder was not cleaned before milking process (control), the smell of milk that produced has a rather sour smell. This was be happened because bacteria or contaminants which were in the control milk had multiply and broke down the lactose into lactic acid which caused the acid smell on milk.

Table 4. The comparison between color of the dairy milk produced from washed udder and the controlled

Treatment	Color
Washed	White
Controlled	Opaque

Tabel 4. showed that the color of the milk which the cow's udder was cleaned before milking process had white colour . However, the color which the cow's udder was not cleaned before milking process, had a white turbid (opaque) colour. The white colour of milk is the result from dispersion of light reflection by fat globulas, and colloidal particles from casein and calcium phosphate. While the turbid (opaque) colour is the result from dirt particles during milking process.

Milk is a secretion from the glands of cow which feeding his son and it is obtained by milking. In general, the composition of cow's milk is 3,9% fat content, 3,4% protein, 0,72% ash, and 87,10% water content (Arpah, 1993). The nutrients contained in milk is very high, so the spoilage of milk is also easily occur, especially spoilage caused by microorganisms. Contamination in milk occurred since the milking process, which can be originate from various sources such as cow skin, udder, water, soil, dust, people, equipment, and air. At

the time of the milk came out after milking process, milk is a pure material, hygienic, high nutritional value, or it can be said that the milk was sterile, smell and taste have not changed and is not dangerous to drink. After some time in room temperature, the milk is very sensitive to pollution that can lowering the quality of milk (Buckle *et al.*, 1987). This contamination can be continued at the stage of transportation from farmers to manufacturers, processing the product, until the milk storage process. According to Eckles *et al* (1998) milked milk is often contaminated if the exterior of the cow is not cleaned before milking process. This condition causing the milk from the healthy udder (free from bacteria) remain contaminated after milking. The new milked milk even from healthy cows and milked aseptically usually contain a small amount of bacteria. Therefore, we conducted a different treatment, by washing the cow's udder before milking process, and didn't wash the cow's udder before the milking process to prove that the process of washing the cow's udder before milking process is an important thing that must be considered so minimize the occurrence or contamination, can be minimize and produce good quality milk

Data which generated from both treatments was clearly shown that washing cow udders gave real effect on the milked milk. Judging from the chemical properties of milk, the pH of the milk produced from the milking process of cleaned cow's udder was $6,671 \pm 0,0092$, and the pH of the milk produced from the cow's udder which not washed first was $6,299 \pm 0,0161$. According to Saleh (2004), fresh milk has amphoteric properties, which can be acid and bases as well. If it given a blue litmus paper, the color will changing to red, otherwise if given a red litmus paper, the paper turn blue. Potential hydrogen ions (pH) of fresh milk is situated between 6,5-6,7. Milk from cow's which udder was not cleaned first had acidity below 6,5 which means the milk had been contaminated. If the pH of milk is higher than 6,7 is usually interpreted that the cow's produced that milk is affected by mastitis (infection/inflammation of the udder) and when pH is below than 6,5 indicate the presence of colostrums or bacteria. Widodo (2003) also added that the pH of the milk that deviate from standard milk means that milk contains lactic acid from microbial activity or enzymes. In general, the decrease in acidity indicates the decrease in fat, total solid, solid non fat, casein, and lactose.

Conversely, the increase in acidity indicates an increase in the percentage of non casein protein and ash. The acidity of milk has a differently fluctuated according time of milking. At the beginning of milking process generated low acidity content and the highest of acidity at the middle stage of milking. The acidity of milk can be easily evaluated with the pH value. If there is pretty much acidification by bacterial activity, the pH of milk will decrease significantly (Buckle *et al.*, 1987).

The difference on the pH between the dairy milk produced from washed udder and control as shown at table 1. may be due to the presence of contamination from microorganism in the milk that will make chemical changes and affect further into the physical properties of milk even it can damage the quality of milk. Buckle *et al* (1985) describe some of the damage on milk caused by the activity of microorganism include :

1. acidification and flocculation that caused due to fermentation of lactose into lactic acid which causes the drop in pH and the possibility of casein clotting.
2. Slimy like a rope that caused due to occurrence of coagulation and

formation mucous as a result of expenses such as capsules and resin materials by several types of bacteria.

3. Milk coagulation that come without a decrease in pH, in this case is caused by bacteria such as *Bacillus cereus* that produce enzymes that digest the thin layer of phospholipid together to form a clot that arises to the surfaces of the milk.

Judging from it's physical properties, viscosity of milk that obtained from milking the cow's which udder was cleaned had a viscosity of 2 CP (centipose), and viscosity of the milk that obtained from cow's which udder were not cleaned has a viscosity of 3 CP. According to Sumoprastowo (2000) milk has a viscosity between 1,5 to 2,0 centipoise at 20°C. factors that affecting the viscosity of milk is the state of the protein concentration, and state of fat, temperature, and duration of milk has been saved. The milk obtained from milking process on cow which udder are not washed become more viscous due to impurities that come from the udder into the milk during the milking process. This resulted in the milk became contaminated.

Besides that, the smell of the milk produced from these two treatments was different. Milk that produced from cow's that the udder was cleaned first had a smell of fresh milk, while the milk obtained from the cow' which udder was not washed first has a sour smell. The smell of milk can vary, which can actually be influenced by the nature of the milk components, that is fat from milk that easily absorb odors, smell of milk also different can be derived from the food that given to the cow. However if the smell of milk has turned into a sour odor, then these factors are not related, but rather than bacteria in the milk which break down lactose into lactic acid. These formation of lactic acid causes changes in odor so the smell of milk turned into sour. The sour smell will affect the quality assessment of milk Arpah (1993). The speed of formation of lactic acid depends on the number and kinds of bacteria that contaminate the milk (Lampert, 1970). High and low lactic acid levels are influenced by the ability of starter in forming lactic acid that determined by the amount and type of starter used (Kosikowski,1977).

The color of cow's milk with different treatments was also different. The color of milk produced from cows that udder

washed first produced white color, while the milk of cows which udder was not washed first produce turbid colors. According to Buda (1980), the color of milk is ranges from bluish white to golden yellow. The color of milk is caused by the color of milk casein, which is a colloidal dispersion that cannot be passed by light, it can form a white color. The milk color is slightly yellowish color caused by the substances that dissolved in fat besides the substance that are dissolved in water which contained in milk. The white color of milk is the result of dispersion of the reflection of light by globulas colloidal particles of fat and casein and calcium phosphate. The yellow color is due fat and carotene which are soluble. When fat is taken from the milk then the milk will show bluish colors.

Looking at the results of both treatments, known that milk from cows which the udder were not cleaned had been damaged. This is because according to Anonim (2003) dairy products stated damaged and unfit for consumption if there is a change in the milk taste and aroma, that is sour, rotten, not fresh anymore, and clumping or separating. For liquid milk products, changes in color is usually indicates an early indication of damage to the

product, that is the growth of bacteria and acid increases. Products like this should not be consumed. The process of milking became the center of attention because when the milk begins to come out from the udder, the milk begins to contact with the air environment, so from here is the starting point of contamination even it's on small amount. Therefore, the good milking process can minimize the damage occurrence on the milk, and get quality milk with a small amount of microorganism and free from pathogenic bacteria and impurities are clearly visible. Cleaning cow's udder with clean water can minimize contamination of milk by microorganism.

CONCLUSIONS

In the process of milk handling, it must be undertaken in order to obtain the milk with a small amount of microorganism, free from pathogenic bacteria, free from impurities that are clearly visible. With the cleaning and washing cow's udders before milking process, the milk that is produced does not have a higher number of microorganism if compared with those not washed. The process of cleaning and washing cow's udder become a major concern which proved can be minimized the damage that occur in milk, either physical or chemical

damage, so the fresh milk products that obtained have better quality.

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THE EFFECT OF ACID CONCENTRATION TREATMENT ON MEAT CHARACTERISTICS OF RED BELLIED PACU FISH AT ROOM TEMPERATURE

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ABSTRACT

In Indonesia, red bellied pacu (*Colossoma bidens*) fish, is consumed by many people because the fairly cheap in price and highly nutritional value. In addition, red bellied pacu is also easy to cultivate. Therefore, there is a need to explore the meat quality after mortem, in order to save the meat appearance. We used fresh fish that has been cleaned (gutted fish). The studies included 2 steps. The first one included the following procedures, at first we do the scaling fish. Then fish was cut from the anus to the chest of fish. The pelvic fish is cut and then pulled so that the inside of the belly of the fish such as intestine, gastric, kidneys, etc. will also be drawn out. The next step gutted fish was given two treatments. The first treatment, the fish was left untreated, as the control. The second treatment, gutted fish immersed into lime solution. The solution itself has different concentration, i.e. 1%, 3%, and 5%. The lime solution 1% (3%) [5%] was made from 10 ml (30 ml) [50 ml] lime into 1000 ml water. Then the fish immersed in 1 liter solution. In this experiment, chemical, physical and sensory characteristics of the meat was evaluated. Both pH and texture was evaluated at 0, 2, 4, and 6 hours of treatment. Meat colour will be evaluated visually at the time of treatment commencement and at hour 2, 4, and 6 of the treatment. Its treatment was repeated in 3 times evaluation. The two-tailed T-test at 95% degree of confident was employed to analyzed the data.

Keywords: *Colossoma bidens*, red bellied pacu, *citric acid*.

INTRODUCTION

In Indonesia, red bellied pacu fish widely consumes because fairly cheap in price and it tastes pretty good. Many people use red bellied pacu fish as the provider of the need for animal protein with little or no religious rejection of it, which gives it an advantage over pork or

beef. In addition, red bellied pacu fish is very easy to obtain and does not require special processing methods in its preparation. Red bellied pacu fish, *Colossoma bidens*, is a freshwater fish and often mistaken for piranhas. Pacus can be distinguished by the overbite as opposed to the underbite of a piranha.

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Also if the fish is large enough you can tell by their teeth, a Pacu teeth are flat like a humans front teeth whereas a Piranhas teeth are seraded like a knife. Perhaps the most unfortunate thing about Pacus is their massive size makes them almost inadiquite to keep in an aquarium. (Anonim, 2006)

Colossoma bidens has variety common names such as pacu, red bellied pacu, or black pacu. Its origin is from South America and it can grow up to 25" and larger. *Colossoma bidens* are omnivores and consumes everything, especially likes veggies. In its native setting it eats things that fall from trees such as nuts or fruit. *Colossoma bidens* is a very timid fish not near aggressive than their cousin piranha but more like it's other family member the Silver Dollar. Moreover, it can live for several years. (Anonim, 2006). *Colossoma bidens* has teeth that resemble human teeth and are used to crush nuts and seeds that fall from the Amazonian forests into the Pacu's water. They are closely related to the famous Piranha fish, the main difference is Piranha have pointed, razor-sharp teeth (Carnivores) and pacu have square, straight teeth (Omnivore). Red bellied pacu can also grow much

larger than piranha but are not overly aggressive. (Anonim¹)

The following scientific classification:

Kingdom : Animalia

Phylum : Chordata

Class : Actinopterygii

Order : Characiformes

Family : Characidae

Subfamily : Serrasalminae

Genus : *Colossoma*

Species : *Colossoma bidens*

(Anonim¹)

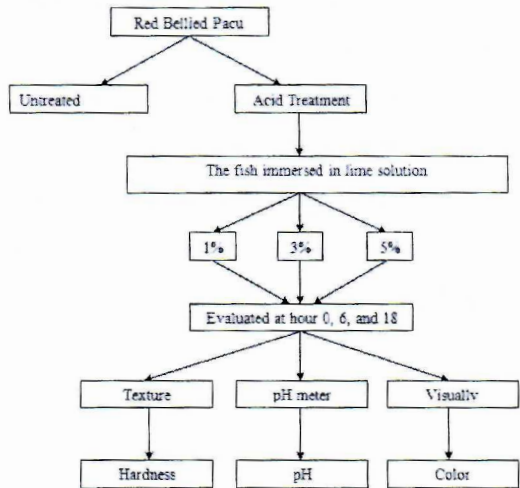
Fish are a very perishable commodity, more than cattle, sheep, and poultry. They spoil very easily even in temperature climates. So unless it is disposed quickly after capture, it must be preserved in some way. In this experiment, the fish was given acid treatment with citric acid from lime. Limes (*Citrus aurantifolia*) are small citrus fruit either sour nor sweet. Sour limes possess greater sugar and citric acid content than lemons and feature an acidic and tart taste (Jayana et. al.,

2010). Citric acid found in limes (lemon and lime) is about 8% wet weight (Barus, 2009). Citric acid (2-hydroxy-1,2,3-propanetricar-boxylic acid) is a weak tricarboxylic acid that is naturally concentrated in citrus fruits. Citric acid is frequently used as a food additive to provide acidity and sour taste to foods and beverages.(Penniston *et. al.*, 2009). Citric acid is vitamin C's close cousin which also a natural additive. Citric acid is also found naturally in the human body, so it causes no side effects in most of the population. (Omojowo *et. al.*, 2008). Citric acid, the major organic acid in these juices, was found to be responsible as food preservative, flavoring agent, and antioxidant in many food preparations. The aim of this study was to know about the texture, pH, and color that appear in the red bellied pacu fish after 6 hours immersing in different concentration of lime solution. This was achieved by evaluating the relationship between acid concentration and the length of storage time of fish. By this experiment, we can measure the spoilage, discoloration, and acidity level on fish.

SURVEY METHODOLOGY

Survey that we do based on the literature and research that we do in the laboratory "Food Science".

MATERIAL AND METHOD



The first one included the following procedures, at first we do the scaling fish. Then fish was cut from the anus to the chest of fish. The pelvic fish was cut and then pulled so that the inside of the belly of the fish such as intestine, gastric, kidneys, etc. will also be drawn out. The next step gutted fish was given two treatments. The first treatment, the fish was left untreated, as the control. The second treatment, gutted fish immersed into lime solution with different concentration, i.e. 1%, 3%, and 5%. The lime solution 1% (3%) (5%) was made from 10 ml (30 ml) (50 ml) lime into 1000 ml water. Then the fish immersed in 1 liter solution. In this experiment, chemical, physical and sensory characteristics of the meat was evaluated. In this experiment, we

evaluated the texture, pH, and color of the fish flesh at the time of commencement and after 6 hours treatment. The color of the fish flesh evaluated visually. Both pH and texture was evaluated at 0 and 6 hours treatment. pH can be measured by pH meter and the texture can be measured by Texture Analyzer. Meat colour will be evaluated visually at the time of treatment commencement and at 6 hour the treatment. Each treatment was repeated in 3 times evaluation. The two-tailed T-test at 95% degree of confident was employed to analyzed the data.

RESULTS AND DISCUSSION

Table 1. The comparisson between texture, pH, and color of control, fish flesh immersed in lime solution and the fish immersed in different concentration of lime for 6 & 18 hours.

Treatment	Conc.	Hardness	pH	Colour
0 hours		773,413	6,41	fresh red meat
	1%	482,263	6,4	red meat, pale white, slightly reddish
6 hours	3%	496,387	6,05	reddish
	5%	375,233	6,01	White
18 hours	Fish decaying, so it can not be observed			

Table 2 Relationship between Treatment and Texture

Treatment	texture
6 hours, 5%	375,233 a
6 hours, 3%	482,263 a
6 hours, 1%	496,387 a
Control	773,413 b

Note: Figures followed with the same letter, indicates as not significantly different at $p=0.05$

From Table 2 we can see that the flesh fish immersed in 5% lime solution has hardness level of 375,233 gf. The flesh fish immersed in 3% lime solution has hardness level of 482,263 gf. The flesh fish immersed in 1% lime solution has hardness level of 496,387 gf. While the flesh fish as a control has hardness level of 773,413 gf. It means that the higher concentration the softer texture of the fish.

Table 3. Relationship between Treatment and pH

Treatment	pH	
6 hours, 5%	6,010	a
6 hours, 3%	6,047	b
6 hours, 1%	6,397	c
Control	6,410	c

Note: Figures followed with the same letter, indicates as not significantly different at $p=0.05$

From Table 3 we can see that the pH value of the flesh fish immersed in 5% lime solution is of 6,010 .The flesh fish immersed in 3% lime solution's pH value is 6,047 and the pH value of the flesh fish immersed in 1% lime solution is 6,397. While the flesh fish as a control has the pH value of 6,410. It means that the higher concentration the more acid of the fish

In this study, the fish was given acid treatment because the acid can preserve food. As the result, the food will be more acid, odors will disappear, and the appearance of food will be better. Moreover, the microorganisms such as bacteria and fungi can be reduced or prevent to grow on food. According Fardiaz (1992), acidification is one way of food preservation that has been operated since long time. In the medium with low pH, bacteria will react to maintain pH constant / optimum in his cell. At the time of lowering pH from pH optimum, protons are present in high

quantities in the medium and will enter into the cell cytoplasm. Furthermore, this proton must be removed from the cells to prevent acidification and denaturation of cell components. The removal of the proton requires energy magnitude depends on the high-low pH. As the result, energy for cell growth is reduced then growth may even stop altogether.

Table 1. Shows that the fish flesh as a control had fresh red meat color. The flesh fish which was immersed in 1% lime solution for 6 hours had a pale red meat colour. The fish flesh was immersed in 3% lime solution for 6 hours have white color and slightly reddish. While the fish flesh immersed in 5% lime solution and allowed to dive for 6 hours has white color. This indicates that the citric acid can remove the blood-stained in the fish flesh and the higher the concentration of a lime solution, the more faded the fish blood (become white/pale). According to Fukazawa (1973), fish flesh is known to be blood-stained and the processed products made by the use of these meats as raw materials are also badly affected in their qualities. The blood-removal of meats can be more effectively accomplished by immersing them into

an aqueous solution containing citric acid. The period of time for the immersion may be varied depending on the sort, size and volume of the raw material being treated, the content of each effective ingredient in the treating solution and other factors, but it is usually for about 0.5 - 6 hours. The citric acid which was employed in this method do not adversely affect the quality, taste and the like of raw material. The meats treated with citric acid show more effective removal of blood and a deodorized of offensive odor including irritating smell, fishy smell, rancid smell or the like.

From Table 2, can be seen that the flesh of fish as a control has hardness level of 773.4133 gf. The fish flesh immersed in 1% lime solution has hardness level of 496.3867 gf. The fish flesh immersed in 3% lime solution has hardness level of 482.2633 gf. While, the fish flesh immersed in 5% lime solution of has hardness level of 375.2333 gf. In comparison, fish flesh immersed in lime solution of 1%, 3%, and 5%, the texture was not significantly different. However, if the fish flesh with acid treatment compared with the control, the results showed significantly different. This indicates that the higher the

concentration of a lime solution, the more soft texture of the fish. The acid will also give flavor to the product, develop the desired texture, and soften bones. However, the acid will not preserve the fish indefinitely—it will only slow spoilage and softening caused by enzyme action.(Anonim²)

Fish flesh immersed in an 1% lime solution has a pH of 6.3967; fish flesh immersed in 3% lime solution has a pH of 6.0467, while fish flesh immersed in 5% lime solution has a pH of 6.0100. In comparison, the pH between control and fish flesh that immersed in 1% lime solution was not significantly different. Moreover, the pH of fish flesh that immersed in 1% lime solution still has a pH within the range 6,2-6,6 (Morkemo, 2006). This is because the very small concentration of lime (only 1%), so it does not give such a large effect to pH. Fish flesh immersed in 3% lime solution and 5% lime solution looks significantly different. Meanwhile, if the fish flesh that immersed in 1% lime solution is compared with fish flesh that immersed in 5% lime solution, the result looks highly significantly different. This indicates that the higher the concentration of a lime solution, the more acidic the fish flesh.

CONCLUSION

Citric acid has been used as a food preservative since a long time. With different acid concentrations, the effects are also different. The higher concentration of acid, the softer texture, the more acidic pH value and the more pale colour as result. The best texture and the best pH of fish flesh obtained in fish flesh immersed in 1% lime solution. As for color, the best result obtained in the fish flesh immersed in 5% lime solution.

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THE INFLUENCE OF SALT AND ICE BLOCK TREATMENTS ON MEAT QUALITY OF FRESHWATER FISH

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ABSTRACT

Fish is one of food commodities that can be easily found in many areas in Indonesia. This is due to the fish productions in Indonesia that are quite high. But in reality, a lot of fish can't be distributed into the hands of consumers in a good-quality because of fish' shelf life which is short due to the moisture content in the fish was so high that the fish are very easily contaminated by spoilage microorganisms. Therefore, it is necessary to do some treatments that can prolong the shelf life of fish and maintain the quality of fish. Effective treatment that can be done is to put the fish on the surface of the ice cubes. However, ice can easily melts in room temperature so there should be another treatment to slow down the melting process by adding salt to the ice cubes. With the addition of salt, melting process will become slower and ice cubes will last longer. As a result, the quantity of ice cubes needed can be decrease significantly. The purpose of these research is to obtain the proper treatment, so that the fish will still be in a good quality when distributed to the consumers. The quality are determined from meat's hardness and pH. The research will be carried out using tilapia fish (*Oreochromis mossambicu*) which are given special treatment in 3 different levels. First treatment is stored in a basin without any treatment. The second treatment, tilapia fish are stored in ice cubes, while the third is stored in ice cubes and added 250 g salt. This research was done using 3 tilapia fish for each treatment carried out. The quality of the fish will be determined in terms of sensory especially texture (hardness) and from the level of acidity by measuring its pH. And as a comparison, we also test the meat quality of the fresh tilapia fish. The data of pH will be analyzed using one-way ANOVA at 95 degrees of confidence where the others was analyzed using kruskall Wallis, and the difference between the treatments means was evaluated using whitney, both at 95%.

Keywords : *Tilapia fish, salt, ice, meat quality, hardness, pH.*

INTRODUCTION

Tilapia fish is a fresh water fish which has a flat body shape with gray, brown, or black color. There are many tilapia

fish that can be found in West Java, Central Java, Sumatera, and Kalimantan, but tilapia fish in Indonesia at first was found in Blitar, East Java (Prihatman,

2000). Besides that, tilapia fish are ranked as the second most widely farmed fish in the world. They are farmed in at least 85 countries, with most production coming from Asia and Latin America (Eknath et al., 2007). In 2007, tilapia production of China reached 1,210,000 tons, approximately up to 49% of the global yield (Li and Cai, 2008). The majority (approximately 66.7%) of tilapia production in China is sold alive in domestic market and the remaining are frozen for exportation or used for further processing (Li and Cai, 2008). Unfortunately, tilapia fish is highly perishable, due to its high water activity (aw) and protein content, neutral pH and presence of autolytic enzymes which cause fish spoilage. The rate of fish spoilage is affected by species, fat content, fishing and slaughter method, hygiene manipulation, postmortem handling and many other factors (Huss, 1995). Post-mortem fish undergoes in four stages, rigor mortis, dissolution of rigor mortis, autolysis and bacterial spoilage.

The initial loss of freshness is caused by endogenously autolytic enzymes in muscle and the subsequent spoilage is usually due to microbial activities, especially for the rapid proliferation of specific spoilage organisms (SSO)

(Huss, 1995). Interaction between microbial metabolism and physiochemical reactions accelerate fish quality deterioration as amines formation, lipid oxidation, nucleotide and protein degradation, contributes to off-odors, off-flavors and texture softening (Ozogul et al., 2006; Alasalvar et al., 2001; Hernandez et al., 2009).

Texture is the parameter that is most affected as loss of water-holding capacity leads to excessive loss of texture, so that the flesh turns dry, stringy and is hard to chew (Ruiz-Capillas & Moral, 2001). Varieties of quality attributes such as texture and pH have been used to assess fish freshness in many cold water fish species as sea bream, sea bass, sardine and european-eel (Alasalvar et al., 2001; Alasalvar et al., 2002; Ozogul et al., 2004; Ozogul et al., 2006; Hernandez et al., 2009). However, there are also few researches were reported on quality assessment for tropical freshwater fish species (Chytiri et al., 2004). Therefore, the objective of this research is to assess the most appropriate combination of ice cube and salt to preserve the flesh quality of tilapia fish which looking from flesh hardness and pH assessment.

MATERIAL AND METHOD

The tilapia fish that used to this research were obtained from "Tanah Mas market". Twelve tilapia fish were divided in 3 treatments, as follows; first, without any treatment, ice block treatment, and ice block with salt treatment. The treatments were tested after 7 hours. As the reference, some its tilapia fish were tested when the fish were still in fresh condition. Each treatment subjected to 1 kilogram of tilapia fish. The purpose of the treatments were conducted for for picking the best treatment of storage process for tilapia fish.

The first treatment was without any treatment. The objective of this treatment was to know shelf life range of tilapia fish without any treatment in its storage process. The method of this treatment was letting the fish without anything around the fish body and were tested in hardness using "Texture Analyzer" and pH using pH meter after 7 hours.

The second treatment was ice block treatment. This treatment is used to prolong tilapia fish's shelf life. The comparison of the number of ice block is 2-3 times higher than the weight of tilapia fish. The ices are located all around the fish body. After 7 hours, the

fish were tested for both its hardness using texture analyzer and pH using pH meter.

The last treatment was ice block with salt treatment. The amount of ice used are the same with the amount used for second treatment. The quantity of salt are 25% from the weight of tilapia fish. The ice block and the salt are located all around the fish body. After 7 hours, the fish were tested in hardness using "Texture Analyzer" and pH using pH meter.

RESULT AND DISCUSSION

Hardness of tilapia fish that had been treated can be seen from table below.

Table 1. The comparison of hardness of tilapia fish under various treatments

Treatment	Hardness	
Ice+Salt	2839,5000	a
Control	2999,2000	a
Ice block	3857,8333	a
Without any	5352,4333	b

Note: Figures followed with the same letter, indicates as not significantly different at $p=0.05$

From Table 1, it can be seen the difference of hardness between each treatment. The hardness of tilapia fish that consider as control and both tilapia fish with ice block treatment and those with concentration of ice+salt were not significantly different. On the other hand, tilapia fish without any treatment

had the highest hardness value and significantly different from other data. This difference is caused by the dramatic changing in onset of rigor mortis. Immediately after death, the muscle is totally relaxed and the limp of elastic texture usually persists for some hours, whereafter the muscle will contract. When it becomes hard and stiff the whole body becomes inflexible and the fish is in rigor mortis. This condition usually lasts for a day or more and then rigor resolves.

The resolution of rigor mortis makes the muscle relax again and it becomes limp, but no longer as elastic as before rigor. The rate in onset and resolution of rigor varies from species to species and highly affected by temperature, handling, size and physical condition of the fish. Previous studies found that white-flesh of fish came to rigor mortis at temperatures above 17°C, the muscle tissue may be ruptured through severe muscle contractions and weakening of the connective tissue (Love, 1973). Therefore, ice block can delay the onset of rigor mortis because ice block decreased the temperature of fish below 17°C. Whereas, the fish with ice block and salt treatment has the lowest hardness. This happened because the ice block with salt addition has longer

melting time than the ice block without salt addition. As a result, the rigor mortis of fish with ice block and salt treatment can be delayed longer than the fish with ice block treatment only. But, there was no significantly difference from the 2 treatments (ice block treatment and ice block with salt treatment) because both temperature did not significantly difference.

pH of tilapia fish that had been treated can be seen from Table 2 below.

Table 2. The pH comparison of tilapia fish under various comparisons

Treatment	pH	
Control	6,1867	a
Ice + Salt	6,2767	b
Ice Block	6,4900	c
Without any	6,6700	d

Note: Figures followed with the same letter, indicates as not significantly different at $p=0.05$

From the Table 2, it was shown that each treatment had significant difference. The fresh fish have the lowest pH, followed by the fish with ice block and salt treatment, then the fish ice block treatment only. The highest pH owned by fish without any treatment. The pH of the unfresh fish is usually higher than the fresh one. This was due to the onset of the compound that are bases, such as ammonia, trimethylamine (TMA), and other volatile compounds. Amine has base characteristic, so when

the unfresh fish produces ammonia and TMA, the pH will be increased because of alkaline compounds are accumulated through autolytic activities or microbial metabolism. Fish which treated with ice block inhibit the autolytic and microbial activity, so TMA which is produced by fish is lower than fish without treatment (Pons-Sanchez-Cascado et al., 2006).

CONCLUSION

The best treatment for prolonging tilapia fish shelf life was ice block with salt treatment because the elasticity of the fish texture and the low pH characteristic are approaching the fresh fish.

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COMPARISON OF BROILER CHICKEN QUALITY BASED ON THE TREATMENT CLASSICAL MUSIC OF MOZART AND DANGDUT MUSIC WHICH GIVEN BEFORE AND DURING SLAUGHTERING

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ABSTRACT

The meat of chicken broiler is widely consumed and takes a major portion in meat consumption all around the world. As a food that is consumed in large quantities, the quality of chicken meat should be continuously improved. Before and during the slaughtering process is the one important factor that played a role in improving the quality of chicken meat. In attempt to improve the chicken meat quality, which is can be operated massively either at chicken farm or chicken slaughtering house is treating music at the time of harvesting or in time of slaughtering. While classical music of mozart has been comercialy applied in some slaughtering houses, however the music is not familiar with Indonesian farm workers. The most popular music for workers is dangdut. This studies there for attempting to compare dangdut and classical music of mozart on meat characteristics indeces. The studies will consisted of three treatments; classical music of Mozart, dangdut, and left untreated as control. Some nine birds, three birds each treatment randomly choosen from a chicken broiler farm was separated and treated one hours three musical treatments, before suddenly slaughtered. Prior to slaughtering, the birds evaluated their temperature body and the frecueny of pulse. After slaughtered, the evaluation of the meat birds were conducted on visually colour at zero, one, and two hours. The legs and breast of each treated birds were then boiled at 100°C 30 minutes, composing of 1kg meat : 2L water. The boiled meat will be analyzed by colour and tenderness. All parametrics data were analyzed using one way analysis of variance. Whereas all parametrics data analyzed using Kruskal Wallies, and the difference between the treatments mean was analyzed using Mann Whitney. All statistical analysis was made at 95% degree of confidence.

Keywords: *broiler chicken, quality indices, treatment classical music, Mozart, Dangdut*

INTRODUCTION

Livestock products plays important role in national economy and become more significant in public income, beside

providing protein-source food supply.

The characteristics of poultry farm business are flexible from small scale to modern and high farming technology is

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another factor which attracting farmer to participate in the farm business. The government promotes livestock production to increase national stock to meet national demand. Within the livestock sector, poultry industry seems more and more attractive than others due to fast economic turn over, due to highly demand on cheap of-animal protein food sources. While the other meat products still far below national needs, the products of poultry industry have been about to meet national surplus. Attempts to export poultry meats, however still facing with meat quality particularly on tenderness and colour meat.

Music is the one treatment which mostly used. The positive effects of the music of Wolfgang Amadaus Mozart on spatial reasoning ability have become a popular topic. Some studies suggest that listening to Mozart has a short-term positive effect on spatial IQ (Nantais, 1997; Rideout, Dougherty, & Wernert, 1998; Wilson & Brown, 1997). Others suggest that prenatal and early childhood exposure to music can lead to long-term positive effects (Costa-Goimi, 1997; Rauscher, Robinson, & Jens, submitted 1998; Rauscher et al., 1997). Mozart is often referred to as the most universal composer that means everybody can enjoy his music. It has

that magical combination of lightness, joy, elegance, and rhythmic motion. The magical effect that Mozart's music is more than two centuries after his death and has not diminished (Markow, 2003).

Dangdut is Indonesian music. The most favorite music for listening to farm workers on daily life is Dangdut music, not classical music of Mozart. So this experiment is used to find pre slaughtering treatment which is simple, economical, practical, easy to apply and not change the daily life of farm workers but teoritically effective to improving the quality of chicken broiler meat by reducing the stress prior to slaughtering.

MATERIALS AND METHODS

Five birds of chicken broilers at \pm 38 days, were randomly selected from 40,000 chickens in the Harmasudi Agung Farm. The chosen chickens about at equal size and age. These five chicken samples were then weighed, and separated in three groups. One of the chicken birds was chosen as a control. Soon after weighing, the heart rate was measured for 1 minute, and immediately slaughtered. Whereas the rest four birds ere separated in two groups for Classical and Dangdut musical treatments; two birds each. To these treated birds, were

selected and weighed and then were measured the heart rate and then placed on a spot to be treated with musical treatments; i.e. Classical Music of Mozart and Dangdut music of Ayu Ting-Ting. Each music was played for 1 hour. The places for these two musical treatments were separated in appropriate distant to enable the sound of each music would not mingle to each other. After 1 hour in musical exposure, the chickens were re-measured their heart rate for 1 minute then were slaughtered one by one. To these five chickens, including the control chicken, after they were slaughtered then they were skinned immediately, so that the meat under the hides could be observed. Visible color of the meat was observed. Some 700 grams of bird meats from each was taken. Chicken meat was boiled in 1 Liter of water for 30 minutes. The boiled meat were then observed subjectively, in five range the tenderness; +++++ (very hard meat), ++++ (hard meat), +++ (fairly hard meat), ++ (soft meat), and + (very soft meat). The evaluation on the level of tenderness was made by hand. The data was tabulated following the replicates and then was presented in table of observation. No statistical analysis was conducted.

RESULTS AND DISCUSSIONS

Table 1. Mean value of heart beat (/minute) on pretest and posttreatment

Treatment	Weight (kg)	Heart beat (/min)	
		Pretest	Posttreatment
Control	2	400	-
Classical Music	2	430	255
Dangdut Music	1,9	405	275

Table 1 shows that the treatment was conducted to about equals size of chicken birds, i.e. 1,9 – 2 kg/birds. Similarly, the frequency of heart beat was about equal too, i.e. ranging from 400 – 430 times/ minute. Although it was recorded of having in a little bit higher for Classical music treatment, the different with the rest two treated groups was not so extreme, particularly when the frequency was compared with the beat frequency after treatment.

All musical treatments showed having strong effects in reducing the frequency of chickens heart beat. In Classical music treatment, the heart beat was decrease from 430 beat/minute to become 255 beat/minute after the treatment. Similarly in Dangdut treatment the beat was decrease from 405 beat/minute to become 275 beat/minute.

Mozart music can calm the hearts and minds. Mozart can be easily recorded in the mind even after the music stops.

Chickens which are listened to Mozart's music became more calm and less mobile, indicating that the chicken is no longer to be nervous. This has been studied from several studies that Mozart's music can affect the mood and sometimes can also affect the attitudes and behaviors (Harmon et al., 2008). A quite and slightly moving chicken due to its anxiety found reduced in the heart rate.

Dangdut music has a different tempo. Dangdut music gives a sense of comfort and calm, but not as quite as Mozart music-treated chicken. The difference in heart rate is 130 beats / min, whereas in chickens that have been treated with Mozart music can achieve the difference in heart rate up to 175 beats / minute.

Table 2. Mean value of tenderness and meat color on pretest and posttreatment

Type of Music	Meat colour	Tenderness
Control	light brown	+++++
Classical Music (Mozart)	Pink to light brown+	
Dangdut Music	Pink to light brown+++	

Notes:

- +++++ : very hard meat
- ++++ : hard meat
- +++ : fairly hard meat
- ++ : soft
- + : very soft

Table 2 shows that chicken which given Mozart music treatment would produce the most tender meat compared to the

control and Dangdut treated chicken. Chicken exposed in Dangdut music remains having more tender than those given the control treatment, but not as soft as that exposed to Classical music.

However, for untreated chicken, is pink and brown. The pink color was obtained when the chicken was sliced off immediately. But, when chicken did not die immediately after slaughtered, the meat gradually turned to brown.

Color and texture are the Quality Attributes (QA) which help consumer in determining the selection of chicken meat. Consumers usually are not only seeing Cues of Quality (QC), but also examined the appearance of chicken meat. The color of the visible and the softness of meat indicate the quality of the meat, and also the eating quality of the meat will be soft or not. According Erdsieck (1989), color and texture included in determining the Eating Quality.

The color of birds of chicken meat also influenced also by the pre-slaughtering factors, one of that was the psychological condition before slaughtered (Froning, 1995). The sudden stress prior to slaughtering, will give effect on the color of meat. This occurred in the untreated chicken that

was slaughtered immediately. This control chicken, shock and stress, make the pH of the muscle becomes higher and gives an affect on the myoglobin's content. The content of hemoglobin was increased and the pH was also increased, and all resulting in the chicken meat color turn to brown quickly (Walker and Fletcher, 1993). Muscle pH and meat colour are in highly correlation. Higher pH in muscle is associate with darker meat, in the other hand lower pH is associate with lighter meat color.

Meat pH has been shown to have primarily relation to the biochemical state of the muscle at the moment of slaughter and following the development of rigor mortis. This affects the light reflectance properties of the meat as well as the chemical reactions of the myoglobin (Fletcher, 1999a). Muscle pH and meat color are also in highly correlation. Higher pH in muscle is associate with darker meat whereas lower pH is associate with lighter meat color. In the extremes, high pH meat is often characterized as being dark, firm and dry (DFD) and the lighter meat as being pale, soft and exudative (PSE). The effect of pH on meat color is complex.

Muscle pH has also been associated with other meat quality attributes such as

tenderness. In the extremes, high pH meat may be classified as dark, firm and dry (DFD-like) with lighter meat classified as pale, soft and exudative (PSE-like). This relationship between raw meat colour and raw meat pH has been demonstrated by many researchers (Barbut, 1993; Boulianne and King, 1995 and 1998; Allen *et al*, 1997 and Fletcher, 1999b).

Texture is probably considered to be the most important attribute by the average consumer (Dransfield, 1994; Chrystall, 1994). Mechanical factors (tenderness) contributes to different meat textures. The tenderness of meat is the sum total of the mechanical strength of skeletal muscle tissue and its weakening during the post-mortem aging of meat (Takahashi, 1996).

Music influences mood. For chickens with musical treatments were calmer and more silent also were not a lot of motion. The result is the muscle becomes not rigid.

Ante-mortem stress, including struggle (Ma and Addis, 1973; Lee *et al* 1979. Ngoka and Froning, 1982; Papinaho *et al*, 1995) has been shown to accelerate glycogen depletion, increase the rate of pH decline and possibly result in tougher meat. Muscle glycogen stores at

the time of slaughter are affected by struggle before slaughter. Birds with higher glycogen content in their muscle at slaughter have lower final muscle pH and lower shear values than birds with lower muscle glycogen.

Berry *et al.* (2005), showed that ante-mortem struggling and glycogen concentration in muscle at death were key factors associated with onset and extent of pH drop and ultimately breast meat quality. This series of research perhaps answers the differences of tenderness and meat color under musical treatment as shown in Table 2.

CONCLUSSIONS

The effect of music treatment was investigated to increase the quality of broiler meat. The broiler chickens that had been given treatment have a lower heart rate that can affect the color of the meat brighter and more tender. Can be concluded that, both Classical and Dangdut music, can improve the quality of birds of chicken broiler meat, especially classical music Symphony Number 40, which gives the difference pulse, meat color and tenderness that are significant compared with broilers given treatment with Dangdut music Ayu TingTing. However more research needs

to be held for a wider influence of classical music and Dangdut music.

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THE IMPORTANCE OF REVIEW OF NATIONAL PROCESSED FOOD QUALITY AT GLOBALIZATION ERA

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ABSTRACT

Indonesia is known as heaven of food. That is caused not only by a lot of diversifications of food but also by acculturations between original food of Indonesia with food that come from another countries, which it has their own culture characteristics. Therefore, something that becomes a serious trouble is our attitude to face the entrance of the new culture characteristic, so that the identity of our original food is still remain and cannot be excluded from strange culture characteristic. This blending might in some way cause the origin of our own food character fade and lose. We should maintain and improve the quality of our original food by resemebading it. Managing our native might also bring us mare prospective opportunities in the economic side. We are welcoming for food culture however strengthening for traditional food cannot be neglected in other to strengthening our food culture.

Key words: original foods, acculturated food, review

INTRODUCTION

a) Original food

Original food is native food of the countries which reflect their culture. Indonesia is very rich in our nature food. That people may called as ‘the food heaven’ country. Indonesian original food can be signature of Indonesian people. It’s also related with a traditional ceremony in some of Indonesian tribes. It also can

attract many visitors and increase the tourism sector. As in Yogyakarta, many visitors who come attracted by the unique culture and also typical snack on offer, such as gudeg, bakpia, etc.

The importance of the role and position of food and beverage business in Indonesia, as one of the driving component of the economy and trade, can be seen from remained firm and continuing most of these

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efforts during the crisis or a transition sometimes ago. That is why, the food and beverage sector plays an important role and becomes backbone of the national economy, although contribution are not too large but can be used as one of the promising business opportunities.

b) Foreign food:

Foreign food in truth, consuming original food becomes our nation's culture. For example, consuming the traditional food such as mendoan, rujak cingur, arem-arem and etc. in the other hand, the globalization flows hard in this modernization era, consequently foreign culture enter in the society habit especially in Indonesia.

Unfortunately, for many people foreign culture is being considered as modern culture. As the result, the foreign culture is mushrooming in our life. Usually, people adopted foreign culture by consuming foreign foods. They judge that consuming it can increase the prestige. In the middle of 20th century, Americans eat fast food for a simple way to have a trip especially for a long trip. For now, people eat fast food as a habit. In America fast food is usually consume by low class in society. It's very ironic, because in Indonesia fast

food becomes a prestige food. Food is acculturated and it taste good for Indonesian mouth feel. Because it's simple to serve and easy to consume in busy condition people that eat fast food is better. Some people stated that fast food it's not necessary to be considered as precious things and becoming habit including life style.

c) Acculturation food:

Unfortunately, many cities are forgetting the importance of this sector. In the midst of globalization many people's behavior has changed, where the change is related to trade in food and beverage sector. In the past, most people still cook for the needs daily meals then this present moment. Because of they have very high activity (especially in big cities), we found a lot people have been encountered buying ready meals to the needs of daily meals. Most of the changes in the pattern / behavior community indicates a shift in how people's consumption into an instant or a practical way. It's been going on all society groups both young and old groups.

The ability of food and beverage business in Indonesia is less attention. Consequently, when the free trade entries into a country (society), it affects the pattern of life.

It also brings great impact. The positive impact is the free market as an opportunity to introduce this type of traditional cuisines (dishes or foods) Indonesia in the global market. On the other hand, the presence of food and beverage products, which originate from foreign countries, will more easily enter and immediately are in the midst of our society, which is a consumer who consumption is quite high and will take the market of this type of food and beverage businesses in the country. That's why our society has lost its sense of traditional dishes (original food). And tend to combine a sense of traditional foods and foreign, in order to attract the attention of consumers. As a result, they forget the real taste of typical dishes.

MATERIAL AND METHODOLOGY

The implementation process of this paper is done with literature study. But it also assisted with the collection of quantitative data through questionnaires. It is done, by distributed a questionnaire covering the original food, food of acculturation, and foreign food. in

addition, the targeted approach is the lifestyle and behavior of society as well as views on the role of these foods for the daily habits of society. In addition, this questionnaire reviewing the extent to which people know and eat the original foods, foods of acculturation, and foreign food. This questionnaire is reviewed based on age, income, and education level. The questionnaire was distributed in the scope of UNIKA universities and in offices.

RESULT AND DISCUSSIONS

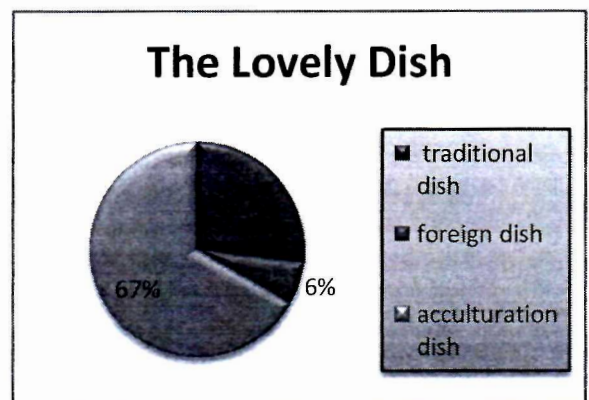


Figure 1. The first (traditional food), second (foreign dish), and the third (acculturation dish) top of mind of the respondent on real food daily consumed in Semarang

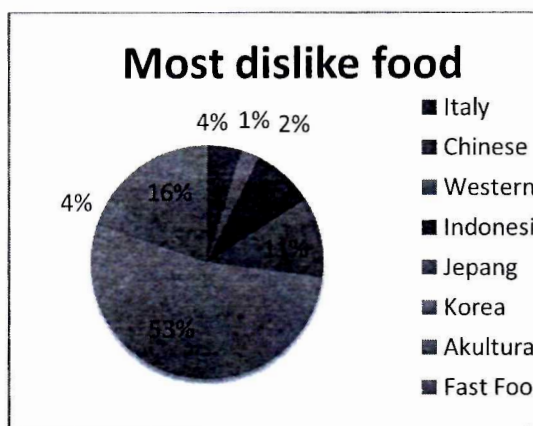
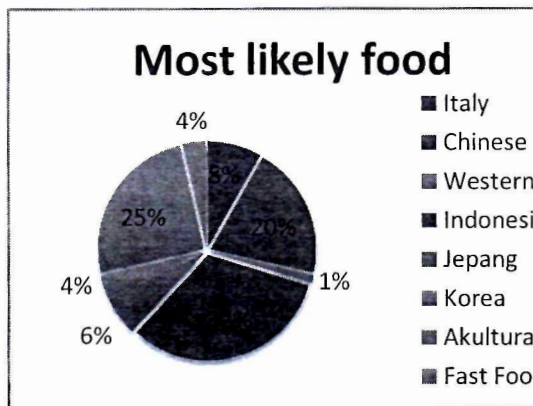


Figure 2. The first (Indonesia food), second (acculturation food), and the third (Chinese food), as the most likely food. And first (Korean), second (fast food), and the third (Japan) as the most dislike food, base on the respondent on real food daily consumed in Semarang.

Based on the result from the research, Indonesian food, especially traditional food, are not really disappear from our society in this era of globalization. Based on the result that we have, Indonesian food is in the first grade in the result as a number one food, and after that is acculturated food, Chinese food, Italian food, Japanese food, Korean food and fast food. But, it can't

close the possibility that Indonesian food, 10 years later, can be unfavorable. This can be proven by the result from the research that Indonesian food is on the third grade of food as the last grade. Based on observations, Indonesian restaurant is still believed to have a big payoff. On the other hand, despite Indonesia becomes one type of restaurant that really wants to open in the future, many people are actually more likely to choose or prefer Chinese food. This case is called social diseases, where what is wanted is not in accordance with what is consumed. On the other way, there are a lot of college students that want to open Chinese food restaurant or the other foreign food restaurant, and the reason is, because foreign food restaurant has a good prospect than Indonesian food restaurant. This problem shows that foreign food has a strong role in the food industry of Indonesia. If the foreign food becomes more popular in Indonesia, as the effect, the original food from our country will be eliminated by the new culture. That are college students that think that Western food or Japanese food are healthy foods, so it will be better to consume that foods. There is one way to make the consumer believe to Indonesian food, if Indonesia improves the quality

and safety of food industry. Halal and good food is the important requirement to improve the local food production in Indonesia, especially to compete with foreign product. Actually, it is not difficult for Indonesia to have a halal and good food product. That because of almost all of the people of Indonesia are Moslem.

restauran which is wanted to open in the future	Chinesse food restaurant	36.00%
	Japanesse food restaurant	13.33%
	Western food restaurant	13.33%
the lovely restaurant, that recommended with all member in family	Indonesian food restaurant	37.33%
	Chinesse food restaurant	50.00%
	Japanesse food restaurant	7.69%
	Western food restaurant	6.41%
the restaurant, that is always be visited	Indonesian food restaurant	35.90%
	Chinesse food restaurant	50.62%
	Japanesse food restaurant	1.23%
	Western food restaurant	3.70%
	Indonesian food restaurant	44.44%

Table1. Questioners Result

Most loved food	traditional dish	26.92%
	foreign dish	6.41%
	acculturation dish	66.67%
the reason to choose traditional dish	unique	14.81%
	siut to mouthfeel	70.37%
the reason to choose foreign dish	not much additives food	14.81%
	prestige	4.17%
	most delicious	58.33%
the reason to choose acculturated dish	it is simple	37.50%
	taste good	38.24%
	much varieties	45.59%
	easy to catch/ find	16.18%
the meaning of acculturated food	prestige	0.00%
	food that comes by acculturated the culture	73.24%
	the typical of city	5.63%
	food which has a good prestige	8.45%
	food that needs to dilestarikan	12.68%
the food which is recommended in the future	a unique food, which suit with nationnal country	8.45%
	traditional dish	85.71%
	foreign dish	0.00%
	acculturation dish	14.29%
the daily breakfast	bread + milk	11.54%
	rice + porridge	79.49%
	cereal	7.69%

From questioners, it also knows that job, income, last graduated, and age can be indicator people to choose a food. More get income they wanted more to eat expensive and varieties of foods. It difference than people who get less than 1 billion each month. In another hand, people who has great last graduation has a great opinion and has a high considerer that Indonesian food is one of typical characteristic in Indonesian history, that's why people who has high graduation rather to choose Indonesian food most. In this case, people can be more wised to increase traditional sector especially in food business. Age can be indicator to, because elder people rather to choose a simple and healthy food for they need, in the line to prevent a lot of diseases.

Indonesia has to struggle so that the food product can't be eaten by foreign product. Just like the case of shrimp export rejection and other fishery product, because of anti biotic component that across the limit, rejection of milk export because of the amount of E.coli and salmonella as the one of sanitation and hygiene indicator in Indonesia still low. Besides, there are a lot of cases about children that poisoned by the Indonesian food contain that can cause a diarrhea disease. This is happen because of the merchant is lack of knowledge about hygiene that very important for body especially for food that we consumed. Quality and safety have to be maintained and enhanced. Nutrition and quality of food is the base needs that have to be fulfilled as the guarantee of prosperous life. People have to consume micro nutrition (nutrient and vitamin) that sufficient for healthy life. Food can be describe as nutritious or qualified food if contain of carbohydrate, protein, fat, antioxidant, vitamin, and mineral component that enough for our needs. To embody it, the food has to come from qualified ingredient and depend on the sanitation and hygiene after the harvest, saving, preparation, processing, and serving. Food is save if that food is free of

pathogen microorganism (that causes a sickness and break cell) like salmonella, E.coli, etc. Free of physic dirtier like sand, glass, hair etc, free of biology dirtier like bugs, free of chemical material like pesticide and other chemical material like formalin, borax etc. (contaminants may occur during food handling from farm to table).

Food security is defined as the release of food from substances or materials that can harm the health of the body without distinguishing whether the substance is naturally present in food ingredients that are used or mixed intentionally or unintentionally into food or food ingredient (Moehyi, 2000). According to the Regulation of the Minister of Health of the Republic of Indonesia No. 235/ MenkesPerNi/ 1979 dated June 19, 1979 classifying a food additive according to its function, namely: antioxidants and synergistic antioxidants, anti-glob, pickling, neutralizing, enzymes, artificial sweeteners, bleach and embankment, nutritional additives, preservatives, emulsifiers, thickeners, hardener, color additives & noodles and synthetic flavor and fragrance, sekuestren and other additional materials. Foreign food additive contains material that is almost

covering about five kinds of additives in the food. Consequently, the food had been contaminated with many chemicals, which is feared will lead to disease. According to this reality, many people are still fond of traditional foods as compared with foreign food.

Actually, we have to challenge in controlling food safety because wide coverage area of control and large diversity of foods, Inadequate knowledge and skill to produce better quality and safer foods, low level of consumers awareness in food safety and limited number of competent food inspector, because of a lot of reasons we have to improving the knowledge and skill and raising food safety awareness of food producers and raising food safety awareness of consumers. Increasing burden of foodborne illness and new and emerging foodborne hazards;Rapidly changing technologies in food production, processing and marketing; Developing science-based food control systems with a focus on consumer protection; International food trade and need for harmonization of food safety and quality standards, Changes in lifestyles, including rapid urbanization; and Growing consumer awareness of food safety and quality issues and

increasing demand for better information.

According to Futurology concept, food, fashion, and fun is global style in this era. So, in this era, food industry of Indonesia has to improve product competitions that make a result through a warranty that make a product which is good and halal. Food which is good often associated by guarantee that the food that been produce is nutritious, delicious, attractive, have a good texture, free from things that endanger the body, like the contain of pathogen microorganism, physic component, biological, and danger chemical compound.

CONCLUSION

Even there are a lot of culture that comes in our country, mostly people still in love with the traditional food. But a lot of people usually consume acculturated food in daily live. Foreign food in the country of Indonesia accepted as a form of variation and also symbolizes the calm of cultural harmony. Thus we easily find acculturation food results.

Foreign foods have strong flavors and additives are high, which feared the

public would bring adverse effects to health so that people tend to switch to traditional foods, however food safety of traditional foods is still low. Therefore it is necessary to review the quality of traditional food and the processed.

The Indonesian peoples are still fond of the traditional food and still believe in its prospects in the future. Look at this reality, the government needs to move quickly for make a review of the traditional food (food original) quality, before entering the era of globalization.

Good lawful food security and it is absolutely necessary to improve the competitiveness of local food products both within Indonesia and abroad. Guarantee of local lawful products Indonesia could become a barrier to foreign products that do not have a lawful certificate. Good food product can be a competitor products out. To realize good food, of course, must be a joint effort and struggle among all policy holders in the food, manufacturers, researchers, government and consumers

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COMPARISON BETWEEN YOGHURT AND KEFIR IN PART OF PRODUCTION PROCESS, ORGANOLEPTIC TEST AND NUTRITION WITHIN

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ABSTRACT

In Indonesia, yoghurt is more popular than kefir, just few people know about and consumed kefir. Basically, both of them are product of milk fermentation process. However their appearance are not same. Some literature show that there are some points that distinguished yoghurt and kefir, such as their texture, the bacteria used in process, composition and production process. Kefir are fermented by some bacteria such as *Lactobacillus kefiri*, *Leuconostoc*, *Lactococcus*, *Saccharomyces* and *Acetobacter* while yoghurt only fermented by *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The bacteria used in fermentation process produce difference texture and composition. Kefir's texture is thinner than yoghurt, and have stronger flavor compare to yoghurt, because of the alcohol produced by *Saccharomyces* in kefir. Kefir and yoghurt can be categorized into probiotic drink. And have benefit for human's health. Some research show that kefir has more benefit than yoghurt. Kefir has smaller particle than yoghurt, so it is easier to be digest by human body.

Keywords : *Yoghurt, Kefir, bacteria, benefit.*

INTRODUCTION

Kefir is a traditional beverage which popular in Middle Eastern, originated from Turkish word 'Keyif' which means "good feeling" (Chaitow and Trenev, 2002). Kefir is the product of milk that fermentated by kefir grains. Kefir grains contain of some bacteria such as *Lactobacillus*, *Leuconostoc*, *Lactococcus*, *Sacharomyces* and

Acetobacter (Libudzisz and Piatkiewicz, 1990) are added to different types of milk. Kefir can be made from any type of milk; cow, goat or sheep, coconut, rice and soy but cow milk is the most common to be used (Anonymous, 1992). Vitamins, minerals and essential amino acids that contained in Kefir could help in the maintenance of the body fuctions and digestive system (Hosono *et al.*,

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1990). Kefir is a probiotic beverage which means it contains of live bacteria that can life inside human body. These bacteria activities will stimulate ferementation process in the human's digestive system. Although kefir is good for human's health, it is not as popular as yoghurt.

Yoghurt dairy beverage products has been known since 4000 years ago, the word yoghurt also delivered from Turkish 'jugurt' or 'yogurut' which means acid milk. (Surajudin *et al.*, 2006). Though yoghurt and kefir are made from fermentated milk, they are not same. The bacteria that fermentated milk into yoghurt are *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Widodo,2002) . Both yoghurt and kefir has benefit for human's body, but they have some differences especially in production process, and organoleptic test.

MATERIAL AND METHOD

Material

Raw milk, kefir grains, chromameter, viskometer, general panelist, *Lactobacillus bulgaricus*, *L. kefirgranum*.

Method

Production proses

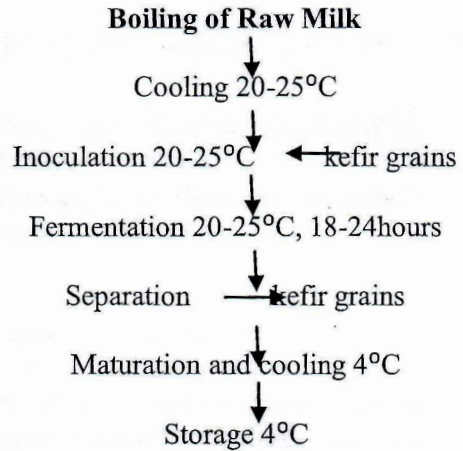


Figure 1. Kefir production process

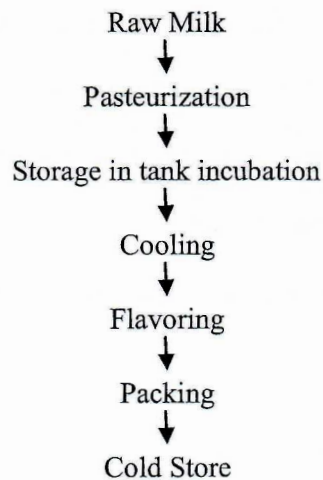


Figure 2. Yoghurt Production Process

Organoleptic test

Colour test

Colour test used chromameter. Sample in transparent plastic, then first chromameter must be kalibration before

to use. After chromameter ready to use, chromameter shoot to the sample, colour can see in $L^*A^*B^*$. (+L*) indicate the sample has a light in lightness exactly (-L*) indicate the sample has a dark in lightness. (+A*) indicate the sample has a reddish exactly (-A*) indicate the sample has a greenish. (+B*) indicate the sample has a yellowish exactly (-B*) indicate the sample has a bluish.

Viscosity test

Viscosity test used to viskometer. Sample in cylinder of viskometer then viskometer can use. Vicosity of sample can see in viskometer.

Smell

Smell test used general panelist to smelling the kefir and yoghurt. Which one has a harder sense causes containing alcohol and which one has a smoothin sense.

RESULT AND DISCUSSION

The difference of production process between yoghurt and kefir lies in the addition of kefir grains. In kefir production, the kefir grains must be separated after fermentation while in yoghurt production, the starter doesn't

need to be separated and yoghurt can be flavored.

From a result viscosity test, founded Yoghurt has higher viscosity than kefir. But Yoghurt texture more smoother than kefir. Kefir has a rough texture. Yoghurt doesn't have alcohol sense, but kefir has a special sense, like *yeastly* (containng alchohol sense). The roughness of kefir texture caused by degradation of polyshacarids. Kefir has white yellowish colour more than yoghurt.

Kefir has alcohol as the effect of fermentation with bacteria, so kefir more difficult to be packed than yoghurt. Kefir packaging is difficult, because when unsuitable packaging material is difficult, because when the packaging may explode during distribution and storage high content of carbon dioxide produce in kefir. Yoghurt doesn't contain alcohol, therefore yogurt is easier to pack and easier to distribute.

However, kefir has many benefits for example, kefir has smaller particle than yogurt, so it is easier to be digested by human body. Kefir can be helpful in controlling body weight because kefir is probiotic drink and can be used as treatment for several illness, like diabetes, high blood pressure, tuberculosis, cancer and good for

children's metabolism. Kefir also rich in many important nutrition for body's need. Such as vitamin B₁, B₁₂, calcium, amino acids, folic acid, and vitamin K.

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CONCLUSION(S)

- Kefir has more benefit if consumed every day.
- Kefir containing vitamin B₁, B₁₂, calcium, amino acids, folic acid, and vitamin K
- Kefir has stronger flavor than yoghurt because it contains alcohol
- Kefir is thinner than yoghurt
- Kefir packaging is more difficult than yoghurt packaging
- Kefir has colour whiter and yellowish than yoghurt.
- Making kefir needed *L. kefirgranum* as bacterium and kefir grains as starter
- Microorganism used in making yoghurt is *Lactobacillus bulgaricus*.
- Consuming kefir is very recommended.

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LUWAK COFFEE : THE MOST PRESTIGIOUS LIFESTYLE IN THE WORLD AND THE NEW WAY OF PROCESSING TECHNOLOGY

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ABSTRACT

Kopi Luwak or civet coffee is one of the most expensive coffee in the world. Actually it becomes a “sign of popularity” for Indonesia. In the colonial era, this coffee was one of the biggest export commodities from Indonesia to international market. Complicate processing was required to produce luwak coffee from raw material to ready-drink product. The process was very complicated because luwak take the biggest part to make this coffee. Kopi Luwak has unusual flavor because it’s not fermented in water but in luwak’s stomach using enzyme and stomach acid to process the coffee beans. The output coffee beans will be found in feces. The good quality beans will be chosen, cleaned and roasted to kill the pathogen bacteria. Because of that reasons, tight control of luwak’s life, excretion, cleaning, separating, roasting system and security of processing management is involved in production system. Those things make Kopi Luwak becomes very expensive. Now, we have the new style in producing Kopi Luwak. In the new style is different with the old style that let luwak lives in the wildlife. This new style was locked the luwak in the cage and then given coffee beans to eat. Each style had its own advantages and disadvantages. What must we do to keep Kopi Luwak as the most famous coffee from Indonesia with the variation of production styles?

Keywords : “luwak” coffee, production system, wildlife, plantation size, lifestyle

INTRODUCTION

Kopi Luwak or civet coffee is a unique coffee made from strange process. This gourmet coffee made from the ripest coffee berries which has been eaten by and passed through the digestive tract of an animal that called *Paradoxurus*

hermaphroditus. That's the scientific name, the locals call them *luwaks*. These little mammals live in the trees and one of their favorite foods is the red ripe coffee cherry. The beans of the coffee will let out an unique aroma like grape and leche. Flavor and aroma that are produced by civet cat’s coffee is

believed to come from the enzymes. When civet ate the coffee, civet will peel the skin of the beans coffee. The eaten coffee will go through a series of digestion processes. Enzymes will processes the beans coffee. This process is usually called fermentation process. Civet cats is a kind of omnivor animal that eat really ripe coffee fruit. This animal also consume fresh and ripe fruit in the garden and chicken farm. In the collonial era, they like to live in the clean area such as on dry ground, on fallen tree trunk, or in rocks. In Indonesia, civet coffee is produced in Sumatra along the mountain chain from Aceh to Lampung over Lake Toba, Padang, Jambi, and Bengkulu and also found on Java, Bali, Sulawesi, West Nusa Tenggara, East Nusa Tenggara, East Timor, and Papua. The scientific evidence with super-sophiscated equipment such as electron microscopy, proximated analysism electronic nose analysis, SDD-PAGE electrophoresis and others to research civet coffee were very expensive. This coffee beans have a uniform color because all the seeds are harvested by civet cat that make the beans are smooth and have no cracks when it send to the milling process.

Special handling and thorough gathering, trained farmers, cleaning, storage, selection, until toasting process were required to produce a good civet

coffee. Civet's endogenous digestive secretions carried proteolytic enzymes, which seep into the beans. And broke down the beans' proteins, yielding shorter peptides and more free amino acids. That makes this coffee had a unique flavour. Inside a civet the beans begin to germinate by malting which lowers their bitterness. The safety of this luwak coffee is still unguarantee.

However, it was found that after thorough washing, levels of harmful organisms in civet coffee beans were insignificant. Roasting at high temperature have been cited as making the beans safer after washing. Special handling and thorough gathering, trained farmers, cleaning, storage, selection, until toasting process were required to produce a good civet coffee. The best civet coffee is gained when collected at dawn in garden, cleaned, and then dried in sun. To processed one kilogram of civet coffee, it takes about five hours, after the coffee bean in form of feces released after fermentation, were gathered, it need further sorting to take out coffee beans that do not meet the standards. The coffee beans that did not meet the standards are removed. The rest are dried in the sun until reaches 11 % it moisture content and then stored. Coffee beans must clean of dirt, twigs, and stones.

“Broadl” said there are two varieties of civet cat coffee called Robusta and Arabica. Robusta is more earthy (the smell of soil) but Arabica has more exotic flavor. After consumed by civet cat, Robusta that taste bitter and highly caffeinated turned into mild floral scent of vanilla mixed with chocolate and not bitter anymore. At the time of the drink, it let out a great coffee scent, the coffee is thick, dense and smooth, this changed of unique flavor make this coffee is very exotic and desirable. Robusta coffee from civet is suitable for consumer who don't like an acidic coffee. For consumer who love the smell of varied and slightly acid can try civet cat Arabica coffee.

MATERIAL AND METHOD

A literature study was done to know how civet coffee processed until become one of the most prestigious coffee in the world that makes a new lifestyle for human and to researches about the new way to control the quality of this coffee. This literature study included searching for books and journal from the internet. The data gathered were compared to have a better understanding about this coffee.

RESULT AND DISCUSSION

Kopi Luwak is the most famous and prestigious coffee in the world because its unique and have a very limited supplies. The annual production of civet cat coffee is uncertain, which depend on nature, civet cat population and market demand. Kopi Luwak is produced from animal (civet cat) digestive system. The beans will be fermented in civet cat stomach. Because this coffee is very difficult to produce and unique quality, Kopi Luwak is very expensive. The cheapest price of luwak coffee is US \$100 per pound. Usually the price is between US\$100 and US\$600. In London, the price of the civet cat coffee is US\$ 79 per cup. In Italy the price of the civet cat coffee in espresso is 15 euros in small cup. In Asia country like Japan, the price is US\$800 per kilogram. In United State of America, Kopi Luwak was sold at US\$50 per small cup. Drinking Kopi Luwak become a lifestyle in the world. One of the reason why Kopi Luwak become the greatest coffee in the world is the level of its ripening stage. Good quality coffee is obtained because the civet cat just ate the right kind of coffee (the ripe one). It was different from the coffee harvested by farmers directly from the coffee tree because they had different quality.

Roasting of the luwak coffee beans is one of the important and critical things

to do to make Kopi Luwak. In the first step, since is used the hot air roaster so that the beans have no contact with any part of hot metal. In the case of Kopi Luwak, it was essential to have a roaster, which can work with small quantities because this coffee is not a mass production product. The beans should be roasted when ordered by customers so they can always have fresh roasted Kopi Luwak.

Back to the roasting process, coffee need to be roasted at a certain temperature between 220^o C and 230^o C (440^o F). While coffee was roasted, it releases oil and sugar, grows in size and loses humidity, and its final weight 20% of reduces. The chemical components of the bean experience important transformations both at quantity and quality level. Sugar, fat, proteins, non-protein nitrogenous substances, acids, etc. In fact, everything would be transformed due to the high temperatures that the beans are exposed, to.

Just like other types of coffee, Kopi Luwak is medium roasted, so that the complex flavors acquired during both processes was not destroyed. Afterwards, beans need to be cooled quickly to stop the roasting process and to allowed the aroma to be stabilized and the oil substances to be condensed.

It is recommended to grind and prepared the coffee 12 hours after the roasting process.

CONCLUSIONS

Kopi Luwak is one of the most expensive coffee in the world because it has an unique aroma and it was sought by rich people in Europe and America. The price for one cup of Kopi Luwak is seventy US dollars. For this reason make Kopi Luwak become the most prestigious lifestyle in the world. Civet cat is an important thing in coffee making process. Enymes in the stomach civet cat would digest coffee beans before was it relased together with feces. This process and the roasting process will produce an unique aroma which make Kopi Luwak become the most expensive coffee in the world.

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