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Application and Characterization of Dadih from Different Kinds of Bamboo Plants (Bambusa sp)

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Abstract
Dadih is a Minang traditional fermented buffalos milk in bamboo tub cover with banana leaf for 24 hrs. Traditional dadih fermentation involves various types of interacting microorganisms that was thought originally from the inner surface of bamboo tube, the surface of bana leaf, and from the milk was used. The process of making dadih still present in West Sumatera -Indonesia; however Bali has potential ability for growing of bamboo plants . In Bali there are various types of bamboo plants such as: *Swet* , *tabah* , *kuning* , *petung* , *batu* , *santong* , *putih* , *tamblang* , *kedampal* , *tali* , *ampel* and *gading* bamboo. The limited useful of bamboo in Bali only for religion ceremony and handy craft materials ; so it can be used as a container or tub (source of lactic acid bacteria) for dadih making. . The purpose of this study is to know that bamboo plants grown in the region of Bali can be used for dadih manufacture and to obtain it characteristic performance. The results showed that the 12 species of bamboo grown in Bali used as bamboo tube in this study, and has coagulating ablility in the manufacture of dadih. Dadih produced from each bamboo tube has different characteristics and performance , in both of sensory and chemical properties terms . Total of lactic acid bacteria on the dadih ranged from 2.4 x 10^7 to 2.2 x 10^{10} CFU / g., except : *batu, kedampal and ampel* bamboo does not contain lactic acid bacteria. The ranges of dadih pH from 5.03 to 5.89 were not qualified yet but the curd produced was early in the bamboo tube.
Keywords: Bamboo tube, Dadih, Lactic acid bacteria, characterization

I. Introduction

Bali is an area rich in biodiversity. One of the biodiversity in Bali is bamboo or known by its local name is "tiying". In Bali there are various types of bamboo plants, among others: *ampel* bamboo, *gading* bamboo, *buluh* bamboo, *petung* bamboo, *gesing* bamboo, *selem* bamboo, *santong* bamboo, *tali* bamboo, *tamblang* bamboo, *tutul* bamboo, *tabah* bamboo.

Fermented milk is a milk product fermented by lactic acid bacteria that usually lives very well for the health of the digestive system (tractus intestinalis). One example of a very famous fermented milk product is dadih (Sirait , 1993). Dadih is a fermented milk product that resembles as yogurt and kefir.in its fermentation involves various types of interacting microorganisms. Microorganisms that play a role in the fermentation process is thought to originate from the inner surfaces of bamboo tubes, the surfaces of cover tube , and from milk used (Sugitha, 1995).

The process of making dadih is still present in West Sumatera only whereas the potential of bamboo plants is almost there in Indonesia, including in Bali. The aditional benefits of dadih for the health effects its possibility different with various regions of Indonesia. West Sumatera Province as the original region of the dadih have different condition both in geography and topographycally with Bali area. Differences of soil type, temperature, height area level , soil nutrient content , rainfall and humidity will affect on those bamboo plants that grow in West Sumatra and Bali. The purpose of this study is to know that bamboo plants grown in the area of Bali can also be used for manufacturing of curd and to know the characteristics its produced

II. Research Methods

Samples of bamboo for research were obtained from Tabanan District while the research was conducted in Food Microbiology Laboratory, Faculty of Agricultural Technology and UPT Bioscience Laboratory, Udayana University. The research done on Jue-October 2017, consists of three stages: Early production of curd product with various types of bamboo in Bali (12 species of bamboo) as fermented tube, identification and curd produced. Type of bamboo used such as : *Swet bamboo, tabah bamboo, bamboo yellow, petung, bamboo batu bamboo, santong bamboo, putih bamboo, tamblang bamboo, kedampal bamboo, tali bamboo, ampel bamboo, gading bamboo*.

Early production of dadih in various types of bamboo based on Usmiati method, 2011. The stage of curd preparation starting with heated fresh cow's milk, at 60-73 ° C until the milk volume remains ¼ part of the initial volume(for increasing total soloid content and to kill those pathogenic microorganism present in the milk. Furthermore, homogenized the milk and add 1% CMC (Carboxy Methyl Celullose) which has been dissolved with warm water, and 3% skim milk that has been dissolved with cow's milk. The aims of the whole process for increasing the viscosity of cow milk to resemble the density of buffalo milk (23.%).While preparing the milk, prepare also pieces of bamboo types that will be used as a fermentation tube. The pasteurized milk poured into

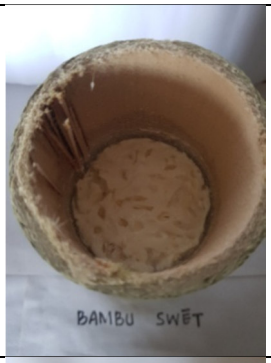
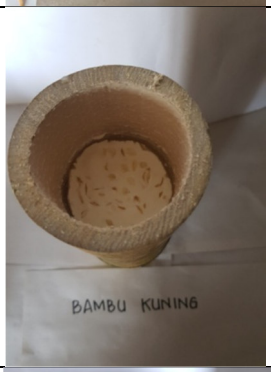
bamboo tube and covered with banana leaves and fermented at temperatures of 48°C. The parameters observed included: the performance of curd, production, sensory evaluation of the curd produced, total lactic total , lactic acid bacteria and pH of dadih.

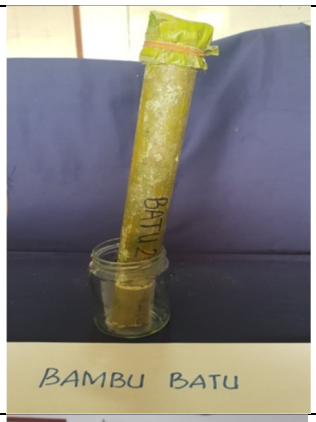
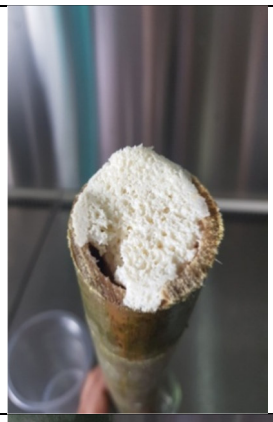
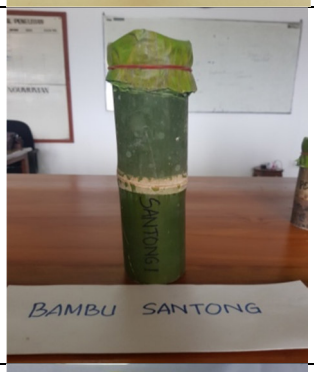
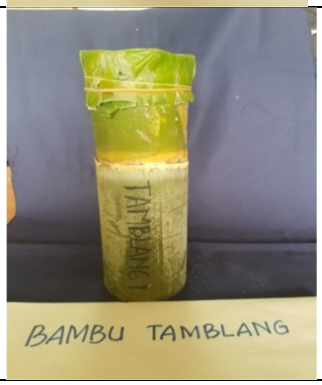
III. Results and Discussion

1. The application of dadih with various types of bamboo

From the results of research conducted to note that of 12 types of bamboo used to make dadih in this study can be seen in Table 1.

Table 1. Different types of bamboo were used to make dadih

No	Type of Bamboo	Bamboo picture	Dadih Picture	Characteristics of dadih
1	*Swet* Bamboo			A little flavor sour , a distinctive taste of milk, bitter and slightly spicy, soft and soft texture, perforated surface with smooth edges
2	*Tabah* Bamboo,			A typical flavorof milk, a little bit sour taste typical milk with no bitter aftertaste, no flavor of bamboo, soft and soft texture
3	*Kuning* Bamboo,			Milk flavor, mildly sour milk taste, no bitter aftertaste, no flavor, soft texture, perforated surface
4	*Petung* Bamboo,			The flavor of milk and a bit sour, Typical milk taste with bitter aftertaste, soft texture, perforated surface.

5	*Batu* Bamboo,			A typical flavor of milk, slightly sour taste and no bitter aftertaste, cloudy white whey, soft texture, porous surface
6	*Santong* Bamboo,			The flavor of mildly sour milk, The taste of milk without bitter aftertaste, slightly hard sandy texture, small porous surface2, white whey color.
7	*Putih* Bamboo,			Milk flavor, flavor, not sour, not bitter, whey and curd not perfectly formed, thick texture ,
8	*Tamblang* Bamboo,			Milk flavor, slightly sour taste, no bitter aftertaste, slightly hard texture, slightly perforated surface

9	*Kedampal* Bamboo,			The typical flavor of milk, the taste of milk with a bitter aftertaste somewhat bitter, slightly hard texture, compact and smooth appearance, white curd color and pale yellow whey rather pale
10	*Tali* Bamboo,			A typical flavor of milk, a bitter taste aftertaste somewhat bitter, soft texture, white curd slightly yellow, whey clear yellow pale and slightly frothy
11	*Ampel* Bamboo			A typical flavor of milk, bitter taste of milk, soft texture, porous, white curd slightly yellow, whey nodes, pale yellow
12	*Gading* Bamboo			The typical flavor of milk, the typical taste of mildly sour milk with bitter bitter aftertaste, soft texture with smooth surface, white curd, whey clear yellow slightly

The all types of bamboo used can produce dadih with different characteristics and odor produced almost uniform that gives a slightly acidic scent to a typical acid , milk almost uniform that gives a slightly acidic scent to a typical acid. This shows that in this process due to natural fermentation by lactic acid bacteria of bamboo tube . Lactic acid bacteria (LAB) produced lactic acid substance as the second dominant metabolite product. The texture of dadih were good enough with a rather hard to compactness with different curd surface. Its texture strongly related to the ability of lactic acid bacteria for agglomerating casein . The better the the ability of LAB in agglomerate milk protein the more and the good quality texture of dadih The compactness of the curd surface from homogeneous to less homogenous (punchy), the formation of a hole associated with the ability of LAB in CO_2 gas producing as a result of fermentation process. .

The characteristics of the resulting dadih range from typical milk flavor to slightly bitter, the appearance of a slightly bitter taste due to the fresh bamboo used (bitter taste tends to be bitter). . However, generally all bamboo can be used as a tube for making dadih, its mean the LAB content in fresh bamboo tube high in

amount 10^7 CFU/g.

2. Total Acid and Ph of Dadih

From results of the research conducted it is known that the mean value of dadih made by using 12 of bamboo types has a total acid and pH can be seen in Table 2.

Table 2. Total acid (mg/100g) and pH of dadih

No	Type of Bamboo	Total Acid (mg/100g)	pH
1	*Swet* Bamboo	3.23	5.36
2	*Tabah* bamboo	2.68	5.31
3	*Kuning* bamboo	2.68	5.03
4	*Petung* bamboo	2.68	5.57
5	*Batu* bamboo	2.95	5.41
6	*Santong* bamboo	3.22	5.35
7	*Putih* bamboo	1.88	5.78
8	*Tamblang* bamboo	4.30	5.24
9	*Kedampal* bamboo	2.95	5.58
10	*Tali* bamboo	2.42	5.77
11	*Ampel* bamboo	3.49	5.59
12	*Gading* bamboo	3.22	5.89

The dadih was obtain from casein coagulation of the milk by lactic acid bacteria. Lactic acid is an organic acid that can agglomerate milk protein at isoelectric point of pH 4.6. The higher the concentration of lactic acid produced by LAB, the more curd (its called dadih) produced. The total amount of dadih produced ranged from 1.88 mg/100 g to 4.30 mg/100 g. The highest total acid was obtained from the curd made on Tamblang bamboo and the lowest total acid obtained from dadih made in White bamboo tube The average of total acid produced in all types of bamboo tube used is almost the same. The range value of dadih pH produced from 5.03 to 5.89 (Table 2) , however the highest pH (5.89) was obtained from gading bamboo and the lowest pH(5.03) was obtained on dadih of kuning bamboo tube.. The pH value of 4.6 does not obtain yet, but it is sufficient to coagulate milk proteins to produce dadih..

3. Total of Lactic Acid Bacteria

From the results of research conducted it is known that dadih made by using 12 types of bamboo has a total of lactic acid bacteria is high enough. The mean of total LAB content of fresh bamboo and dadih can be seen in Table 3 whereas the total *Lactobacillus* can be seen in Table 4.

Table 3. Total of Lactic Acid Bacteria (CFU/g) in fresh bamboo and curd/dadih

No	Type of Bamboo	Total LAB (CFU/g) of fresh bamboo	Total LAB (CFU/g) of dadih
1	*Swet* Bamboo	2.6×10^7	2.4×10^7
2	*Tabah* bamboo	4.0×10^7	5.0×10^7
3	*Kuning* bamboo	2.3×10^8	5.0×10^7
4	*Petung* bamboo	7.4×10^7	7.4×10^7
5	*Batu* bamboo	4.2×10^9	1.0×10^{10}
6	*Santong* bamboo	2.2×10^{10}	2.2×10^{10}
7	*Putih* bamboo	1.5×10^{10}	1.5×10^{10}
8	*Tamblang* bamboo	4.2×10^9	4.2×10^9
9	*Kedampal* bamboo	4.2×10^9	1.0×10^9
10	*Tali* bamboo	9.1×10^9	9.1×10^9
11	*Ampel* bamboo	4.2×10^9	1.0×10^9
12	*Gading* bamboo	4.1×10^8	3.9×10^9

Total lactic acid bacteria in fresh bamboo ranged from 2.6×10^7 CFU/g to 2.2×10^{10} CFU/g , the highest content obtain from *santong* bamboo and the lowest of *swet.*bamboo. Lactic acid bacteria naturally present in bamboo reeds and contribute as a subject in milk coagulation (dadih manufacture).

Table 4. Total of *Lactobcillus* (CFU/g) in fresh bamboo and dadih

No	Type of Bamboo	Total *Lactobcillus* (CFU/g) of fresh bamboo	Total *Lactobcillus* (CFU/g) of dadih
1	*Swet* Bamboo	0	0
2	*Tabah* bamboo	0	0
3	*Kuning* bamboo	0	0
4	*Petung* bamboo	0	0
5	*Batu* bamboo	0	0
6	*Santong* bamboo	0	5.9×10^9
7	*Putih* bamboo	0	3.2×10^9
8	*Tamblang* bamboo	0	4.0×10^6
9	*Kedampal* bamboo	0	0
10	*Tali* bamboo	0	0
11	*Ampel* bamboo	1.3×10^3	0
12	*Gading* bamboo	1.2×10^4	5.5×10^8

Lactobacillus is one of usefull lactic acid bacteria of the fresh bamboo. Table 4 shows some fresh bamboo containing *Lactobacillus* as well as on the dadih produced. A direct count of *Lactobacillus* can be done by growing of samples on Rogosa sharpe agar media which is a selective medium for *Lactobacillus* growth. Total count of *lactobacillus* was present only in *ampel* and *gading* bamboo type of 1.3×10^3 CFU/g and 1.2×10^4 CFU/g respectively, while *Lactobacillus* content of dadih 5.5×10^8 CFU/g to 5.9×10^9 CFU/g, however not all bamboo and butter bars contain *Lactobacillus*.

IV. Conclusions and recommendations

1. Conclusion

From the research can be concluded that:

1. Bamboo plants (12 species) grown in the area of Bali can be used for dadih manufacturing with curd different in characteristics .
2. Such of Bamboo type : *Swet* bamboo, *tabah* bamboo, *yellow* bamboo, *petung* bamboo, *batu* bamboo, *santong* bamboo, *putih* bamboo, *tamblang* bamboo, *kedampal* bamboo, *tali* bamboo, *ampel* bamboo, *gading* bamboo. can be used in the manufacture of dadih
3. Total lactic acid bacteria count of dadih produced ranged between 2.4×10^7 to 2.2×10^{10} CFU/g; Lactic acid total : 1.88 mg / 100 g to 4.03 mg / 100 g with a pH between of 5.03 and 5.89

Recommendations

It is necessary to continue further research in identification for the specific types of lactic acid bacteria obtained and need some optimization stages if using bamboo grown in Bali to produce dadih

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