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Total Solid Optimizing in The Making of Functional Fermentation Milk Drink Lactobacillus Cassei Tomatoes

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***Abstract*— The purpose of this research is to get Functional Fermentation Milk Drink Lactobacillus cassei TomatoesExtract Formulation appropriately, in a way to organize the total solid. The total solid for semi-solid fermentation milk is about 24 – 28 %. In searching for Functional Fermentation Milk Drink Lactobacillus cassei Tomatoes extractformulation, the plan to be used is Random Complete Design (RCD) with 5 treatments and 3 repetitions. For advance test is done by Duncan's New Multiple Range Test (DNMRT) on real standard 5 %. The treatment is made based on skim powder milk percentage that to be added to the fresh milk that contained 13 % of total solid for getting fermentation milk appropriate with wanted total solidity. Each treatments are : (A). Addition skim powder milk 3 %; (B). Addition skim powder milk 6 %; (C). Addition skim powder milk 9 %; (D). Addition skim powder milk 12 % (E). Addition skim powder milk 15 %. The best treatment to be choosen is E (Addition skim powder milk 15 %) because the total solidity approaches standard (22,054 %), microbial total above the standard (1,9 x 1010), acid total (0,6968 %), pH (4,93) and organoleptic aspects in terms of taste, texture, aroma and preferred color by panelist.**

***Keywords*— Functional Drink, Lycopene, Fermentation Milk, L. Cassei, Total Solid.**

I. PREFACE

A. Background

Tomatoes may many available and easy to get in Limapuluh Kota Regency. By its High Bio Avaibility will be able to become well food source In way to avoid degeneratives diseases. Lycopene likely to be found in tomatoes so much, Lycopene contens in tomatoes based on its type, ripeness and surrounding where the tomatoes grow. Average of 100 gr tomatoes contain 3 – 5 mg Lycopene.

For more varied and to enrich tomatoes fickle forms, the alternative processing of tomatoes in form of fermentation milk is done as functional drink that really good for health. Tomatoes extract in its presentation yoked to fermentation milk becomes tomatoes extract fermentation milk with contens Lactobacillus Cassei bactery so that each component strengtheningly as functional drink. Tomatoes extract fermentation milk is functional drink contents a number of live probioticbacteria gives advantageous effect for health, therapeutic function and also high nutrition it has. Probiotic bacteria is non-phatogenic microorganism that will give positive effect if to be consumed to the physiology and its host health (Schrezenmeir dan de Vrese, 2001).

To get the fermentation milk that meets requirements as functional drink needed properly formulation. The most important thing to be concerned is processing in making fermentation milk is Total Solid. Total solid for semi-solid fermentation milk ranging 24 – 28 % (Ratih and Haryadi, 1998). Fermentation milk Total Solid can be controlled by adding skim powder milk to get wanted viscosity.

High lycopene content in tomatoes has function as antioxydant and Lactobacillus potentially as probiotic cholesterol-reducing expected giving good sinergy, where the blend between fermentation milk and tomatoes extract will become refreshing and salutary functional drink product.

B. Problems

From the descriptions above can be concluded some problems to be followed-up :

1. The formulation of tomatoes extract fermentation milk need to be managed appropriate with the certainty.
2. Diversification of tomatoes fickle product become tomatoes extract fermentation milk, as one of alternative tomatoes utilization and effort in ward off tomatoes production when the harvest season.

C. Research Purpose

The purpose of this research is to get Functional Fermentation Milk Drink Lactobacillus cassei Tomato Extract Formulation appropriately, in a way to organize the

total solid. The total solid for semi-solid fermentation milk is about 24 – 28 %.

D. Benefits of Reasearch

Benefits of this reasearch are to develop probiotic drink by utilization tomatoes local food in tomatoes extract fermentation milk form. Consume tomatoes means to consume antioxidant naturally that can be preventing free radical forming in the body, preventingcholesterol synthesis excessively and preventing cancer. Making the best use of Lactobacillus Bacteria to produce fermentation milk drink product that acceptable in community of life.

II. RESEARCH METHODOLOGY

A. Time and Place of Research

This research will be implemented at Food Processing Laboratory and Chemistry Laboratory of Payakumbuh State Agricultural Polytechnic in six months research time.

B. Tool and Device

Material to be used in the making of tomatoes extract fermentation milk is fresh tomatoes, addition materials are sugar, fresh milk, skim-milk, yakult and gelatinmedia to be used to make starter and total microbe analysis are MRSA, MRSB.

Equipments needed are stainless-steel knife, juice extractor, filter cloth, pan, plastic cup, cup sealer, pH meter, stove, strainer, washbasin, stirring spoon, termometer, sterilized oven, autoclaf, petridish, reaction tube.

C. Design

In searching for Functional Fermentation Milk Drink Lactobacillus cassei Tomato Concentrate formulation, the plan to be used is Random Complete Design (RCD) with 5 treatments and 3 repetitions. For advance test is done by Duncan's New Multiple Range Test (DNMRT) on real standard 5 %. The treatment is made based on skim powder milk percentage that to be added to the fresh milk that contained 13 % of total solid for getting fermentation milk appropriate with wanted total solidity. Each treatments are :

A. Addition skim powder milk 3 %
B. Addition skim powder milk 6 %
C. Addition skim powder milk 9 %
D. Addition skim powder milk 12 %
E. Addition skim powder milk 15 %

D. Implementation

1. Starter-making Lactobacillus caseii

Starter-making Lactobacillus caseii stages-phases of its are as follows: the planting of a Microbe Lactobasillus shirota caseii on gelatin media MRS A, isolation and cultivation of the microbes in slant gelatin, the manufacture of liquid culture; and the making of a starter.

2. Tomatoes Extract Making

The stages in the making of tomatoes extract starts from the sorting of plum tomatoes are taken from the Salimpaung area of Tanah Datar Regency. The chosen fruit is ripe, and not foul. First fruits are washed, then drained then blanching is done for 1 minute followed by destruction or extraction with the juicer. Net weight of 100 grams of tomato fruit yield of 75 ml of tomato juice.

3. Fermentation Milk Making

Prepare ingredients according to the formulations and treatment that have been determined. Do the mixing and pasteurization 90 oC, 10 minutes. Cooling to a temperature 43oC. Doing Inoculation 5% starter of Lactobacillus caseii shirota (60 ml) to 1115,1 grams weight of dough fermentation milk move into the sterilized bottle . Incubate in the incubator at 37 ° c for 24 hours. Then do storage in refrigerator.

E. Observations

Observations that to be done are: the measurement of Total Solid, measurement of pH (degree of acidity), Total acid, Total Lactic Acid Bacteria (LAB) and Organoleptic.

III. RESULT AND DISCUSSION

A. Total Solid of Tomatoes Extract Fermentation MilkText Font of Entire Document

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the total solid (real level 5%) as shown in table 1.

TABLE I
AVERAGE TOTAL SOLID OF TOMATOES EXTRACT FERMENTATION MILK DRINK

Treatment	Average of Total Solid (%)
E (Adding Skim Powder Milk 15 %)	22,054 a
D (Adding Skim Powder Milk 12 %)	20,636 b
C (Adding Skim Powder Milk 9 %)	20,011 c
B (Adding Skim Powder Milk 6 %)	18,578 d
A (Adding Skim Powder Milk 3 %)	17,148 e
KK = 5,8 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.

From the table 1is seen that the average value of the highest total solids exist at treatment E i.e. 22,054%. The Total solid of fermentation milk that qualify has ranged from 24-28% (Dewanti et al, 1998). In addition 15% of total solid still not reach yet wanted total solid especially for tomatoes extract fermentation milk with the comparison of mixture 1 part of tomato mixed 1 part of fermentation milk with addition 15 % powder milk to increase the total solid. Than according to SNI 2981 ; 2009 yoghurt contains minimal Solid Non Fat (SNF) 8,2 %.

B. Tomatoes Extract Fermentation Milk pH

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the pH (real level 5%) as shown in table 2.

TABLE II
AVERAGE PH OF TOMATOES EXTRACT FERMENTATION MILK DRINK

Treatment	Average of pH (%)
E (Adding Skim Powder Milk 15 %)	4,93 a
D (Adding Skim Powder Milk 12 %)	4,81 b
C (Adding Skim Powder Milk 9 %)	4,67 c
B (Adding Skim Powder Milk 6 %)	4,65 d
A (Adding Skim Powder Milk 3 %)	4,46 e
KK = 2,9 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.

From table 2 that is seen the highest pH values looks at treatment E and the lowest pH values looks at treatment A. Good fermentation milk drinkshavepH value between 3.8 to 4.2 (Walstra, p. et al., 1999). The whole treatments have pH values above 4.2

C. Total Acid of Tomatoes Extract Fermentation Milk

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the total acid (real level 5%) as shown in table 3.

TABLE III
AVERAGE TOTAL ACID OF TOMATOES EXTRACT FERMENTATION MILK DRINK

Treatment	Average of Total Acid (%)
D (Adding Skim Powder Milk 15 %)	0,707 a
C (Adding Skim Powder Milk 12 %)	0,7026 b
E (Adding Skim Powder Milk 9 %)	0,6968 c
A (Adding Skim Powder Milk 6 %)	0,6864 d
B (Adding Skim Powder Milk 3 %)	0,6842 e
KK = 0,76 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.

From table 3it is looked that the value of total acid for the treatment D, C, and E is not real different but the treatment D real different with treatment A and B. The Total acid value for all treatments have range from 0,6842% to 0,7076. According to SNI 2981: 2009 total acid has range from 0.5 – 2.0%. Total acid on fermentation milk calculated as lactic acid that is produced through fermentation by bacteria Lactobacillus cassei.

D. Total Lactic Acid Bacteria (LAB) Tomatoes Extract Fermentation Milk

For total microbial tomatoes extract fermentation milk can be seen in table 6. For total microbial is not done data processing statistically, just to be seen the average treatment and compare it with the standard.

TABLE IV
THE AVERAGE OF TOTAL MICROBIAL FUNCTIONAL TOMATOES EXTRACT FERMENTATION MILK

Treatment	Average of total microbial (CFU/g)
E (adding skim powder milk 15 %)	$1,9 \times 10^{10}$
C (adding skim powder milk 9 %)	$2,0 \times 10^{9}$
D (adding skim powder milk 12 %)	$2,13 \times 10^{9}$
B (adding skim powder milk 6 %)	$3,8 \times 10^{8}$
A (adding skim powder milk 3 %)	$1,77 \times 10^{8}$

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.

From table 4 it can be seen that the average total microbial for each treatment range from 108 to 1010 CFU/gram. Total microbial tomatoes extract fermentation milk drink for all the treatments have been eligible because according to SNI 2981: 2009 total Lactic Acid Bacteria (BAL) at least 107 CFU/g

E. Organoleptic test of Tomatoes Extract Fermentation Milk

1. Tomatoes Extract Fermentation Milk Taste

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the pH (real level 5%) as shown in table 5.

TABLE V
THE AVERAGE OF MINIMUM FUNCTIONAL TOMATOES EXTRACT FERMENTATION MILK DRINK TASTE

Treatment	Average of taste (CFU/g)
E (adding skim powder milk 15 %)	3,5 a
C (adding skim powder milk 9 %)	3,4 a
D (adding skim powder milk 12 %)	3,4 a
B (adding skim powder milk 6 %)	3,3 a
A (adding skim powder milk 3 %)	2,9 b
KK = 9,8 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.(5 = very like, 4 = like, 3 = neutral / plain; 2 = do not like: 1 = very unhappy).

From the Table 5 it is looked that the treatment D, C, B and E, average value of taste tomatoes extract fermentation milk are not real different, than for the treatment A is real different with all treatments. So, the resource of taste of tomatoes extract fermentation milk just between usual or like

2. The texture of Tomatoes Extract Fermentation Milk

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the texture (real level 5%) as shown in table 6.

TABLE VI
THE AVERAGE OF MINIMUM TEXTURE FUNCTIONAL TOMATOES EXTRACT FERMENTATION MILK DRINK TASTE

Treatment	Average texture
E (adding skim powder milk 15 %)	3,5 a
C (adding skim powder milk 9 %)	3,5 a b
D (adding skim powder milk 12 %)	3,3 a b
B (adding skim powder milk 6 %)	3,3 a b
A (adding skim powder milk 3 %)	3,1 b
KK=9,8 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.(5 = very like, 4 = like, 3 = neutral / plain; 2 = do not like: 1 = very unhappy).

From the Table 6 it is looked that the treatment E, D, C and B average value of texture tomatoes extract fermentation milk are not real different, than for the treatment A is real different with treatment E but not real differerent with treatment B, C and D So, the resource of texture of tomatoes extract fermentation milk just between usual/neutral or like. There is a tendency of the higher addition of total solid tomatoes extract fermentation milk then the texture is increasingly to be liked.

3. The Aroma of Tomatoes Extract Fermentation MilkTable Captions

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the texture (real level 5%) as shown in table 7.

TABLE VII
THE AVERAGE OF AROMA VALUES FUNCTIONAL TOMATOES EXTRACT FERMENTATION MILK DRINK PAGE NUMBERS, HEADERS AND FOOTERS

Treatment	Average aroma
D (adding skim powder milk 15 %)	3,4 a
E (adding skim powder milk 9 %)	3,2 a b
C (adding skim powder milk 12 %)	3,1 a b
B (adding skim powder milk 6 %)	2,9 b c
A (adding skim powder milk 3 %)	2,7 c
KK=11,9 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%.(5 = very like, 4 = like, 3 = neutral / plain; 2 = do not like: 1 = very unhappy).

From the table 7 it is seen that treatment D, E and C the average values of tomatoes extract fermentation milk is not real different or has the same resource, than for treatment A is real different with treatment D, E and C but not real different with treatment B. Treatment A has the lowest resource. So the resoucre of tomatoes extract fermentation milk aroma between usual/neutral with to be ilked.

The Aroma of tomatoes extract fermentation milk provides a combination of aromasof lactic acid with tomatoes aromas . According to Wood, (1991). Stating that the strains used as a starter largely determine the characteristic of flavor on fermentation drink is largely a donation of lactic acid and asetaldehid but the complexcity of the flavor also to be influenced by comparison level from the amount others products released fermentation like carbonil compund and amino acid. The most Lactic Acid Bacteria produces asetaldehid is Lactobacillus sp Strains.

4. The Color of tomatoes Extract Fermentation Milk Links and Bookmarks

The results indicate that treatment of total solid optimization in the making of functional tomatoes extract fermentation milk drink has real effect to the texture (real level 5%) as shown in table 8.

TABLE VIII
THE AVERAGE OF MINUM COLOR VALUES FUNCTIONAL TOMATOES EXTRACT FERMENTATIONMILK

Treatment	Average color
D (adding skim powder milk 15 %)	3,6 a
E (adding skim powder milk 9 %)	3,5 a
C (adding skim powder milk 12 %)	3,5 a
B (adding skim powder milk 6 %)	3,4 a
A (adding skim powder milk 3 %)	3,2 b
KK = 6,8 %	

Numbers that are followed by small letters are the same on the same line are not real different according to the advance test DNMRT on the real level of 5%. (5 = very like, 4 = like, 3 = neutral / plain; 2 = do not like: 1 = very unhappy).

From the table 8 it is seen that treatment D, E, C and B show the tendency similar color except for treatment A is real different with other treatment. Orange on tomatoes extract fermentation milk caused by tomatoes juice color. Amount of total solid that to be added (Powder Milk) influences the tomatoes extract fermentation milk strenght.

Here, panelists prefere to like a little bit pale orange.

The use of B-carotene as color subtances has been widely developed. B-Carotene is a natural pigment from growing plants that can be able to be used as food coloring to replace synthetic color and directly able to be added into food (Gross, 1977).

IV. CONCLUSIONS AND SUGGESTIONS

A. Conclusions

Based on this research can be taken some conclusions :

1. The choosen treatment is E (adding skim milk 15 %) because the total solid si closed to standard (22,054%), total microbial is above the standard (1,9 X 1010), Total Acid (0,6968%), pH(4,93) and organoleptic side from the taste, texture, aroma and panelists prefered color.

B. Suggestions

From the research to be suggested to increase the additional of skim powder milk up to minimal 18 % in order to get the minimal total solid 24 %.

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