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 Tomatoes Extract 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 extract 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 %. 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 degenerative diseases. Lycopene likely to be found in tomatoes so much. Lycopene contents 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 contents Lactobacillus Cassei bactery so that each component strengtheningly as functional drink. Tomatoes extract fermentation milk is functional drink contents a number of live probiotic bacteria 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 Research

Benefits of this research 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, preventing cholesterol 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 caseii 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 Lactobacillus shirotia casesi 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 Salimpauang 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 shirotia (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 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 solid (real level 5%) as shown in table 1.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average Total Solid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>22,054 a</td>
</tr>
<tr>
<td>D</td>
<td>20,636 b</td>
</tr>
<tr>
<td>C</td>
<td>20,011 c</td>
</tr>
<tr>
<td>B</td>
<td>18,578 d</td>
</tr>
<tr>
<td>A</td>
<td>17,148 e</td>
</tr>
</tbody>
</table>

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 1 is 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.

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**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average of pH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E (Adding Skim Powder Milk 15 %)</td>
<td>4.93 a</td>
</tr>
<tr>
<td>D (Adding Skim Powder Milk 12 %)</td>
<td>4.81 b</td>
</tr>
<tr>
<td>C (Adding Skim Powder Milk 9 %)</td>
<td>4.67 c</td>
</tr>
<tr>
<td>B (Adding Skim Powder Milk 6 %)</td>
<td>4.65 d</td>
</tr>
<tr>
<td>A (Adding Skim Powder Milk 3 %)</td>
<td>4.46 e</td>
</tr>
</tbody>
</table>

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 drink have pH 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**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average of Total Acid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (Adding Skim Powder Milk 15 %)</td>
<td>0.707 a</td>
</tr>
<tr>
<td>C (Adding Skim Powder Milk 12 %)</td>
<td>0.7026 b</td>
</tr>
<tr>
<td>E (Adding Skim Powder Milk 9 %)</td>
<td>0.6968 c</td>
</tr>
<tr>
<td>A (Adding Skim Powder Milk 6 %)</td>
<td>0.6864 d</td>
</tr>
<tr>
<td>B (Adding Skim Powder Milk 3 %)</td>
<td>0.6842 e</td>
</tr>
</tbody>
</table>

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 3 it 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 Lactic Acid Bacteria (LAB) 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**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average of taste (CFU/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E (adding skim powder milk 15 %)</td>
<td>3.5 a</td>
</tr>
<tr>
<td>C (adding skim powder milk 9 %)</td>
<td>3.4 a</td>
</tr>
<tr>
<td>D (adding skim powder milk 12 %)</td>
<td>3.4 a</td>
</tr>
<tr>
<td>B (adding skim powder milk 6 %)</td>
<td>3.3 a</td>
</tr>
<tr>
<td>A (adding skim powder milk 3 %)</td>
<td>2.9 b</td>
</tr>
</tbody>
</table>

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 = 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.
Acid and asetaldehid but the complexity of the flavor also
flavor on fermentation drink is largely a donation of lactic
used as a starter largely determine the characteristic of
a combination of aromas of lactic acid
The Aroma of tomatoes extract fermentation milk provides
resource. So the resourec of tomatoes extract fermentation
different with treatment B. Treatment A has the lowest
addition of total solid tomatoes extract fermentation milk
usual/neutral or like. There is a tendency of the higher
texture of tomatoes extract fermentation milk just between
different with treatment B, C and D. So, the resource of
optimization in the making of functional tomatoes extract

3. The Aroma of Tomatoes Extract Fermentation
Milk

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

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>E (adding skim powder milk 15 %)</td>
<td>3.5 a</td>
</tr>
<tr>
<td>C (adding skim powder milk 9 %)</td>
<td>3.5 a b</td>
</tr>
<tr>
<td>D (adding skim powder milk 12 %)</td>
<td>3.3 a b</td>
</tr>
<tr>
<td>B (adding skim powder milk 6 %)</td>
<td>3.3 a b</td>
</tr>
<tr>
<td>A (adding skim powder milk 3 %)</td>
<td>3.1 b</td>
</tr>
</tbody>
</table>

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
different 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.

The Aroma of Tomatoes Extract Fermentation
Milk

The results indicate that treatment of total solid
optimization in the making of functional tomatoes extract
fermentation milk caused by tomatoes juice color.
Amount of total solid that to be added (Powder Milk)
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.

Here, panelists prefer to like a little bit pale orange.
The use of B-carotene as color substances 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).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average color</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (adding skim powder milk 15 %)</td>
<td>3.6 a</td>
</tr>
<tr>
<td>E (adding skim powder milk 9 %)</td>
<td>3.5 a</td>
</tr>
<tr>
<td>C (adding skim powder milk 12 %)</td>
<td>3.5 a</td>
</tr>
<tr>
<td>B (adding skim powder milk 6 %)</td>
<td>3.4 a</td>
</tr>
<tr>
<td>A (adding skim powder milk 3 %)</td>
<td>3.2 b</td>
</tr>
</tbody>
</table>

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).

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 resource tomatoes extract fermentation
milk aroma between usual/neutral with to be liked.
The Aroma of tomatoes extract fermentation milk provides
a combination of aromas of lactic acid with tomatoes
used as a starter largely determine the characteristic of
flavor on fermentation drink is largely a donation of lactic
acid and asetaldehyd but the complexity 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
asetaldehyd 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>
<thead>
<tr>
<th>Treatment</th>
<th>Average aroma</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (adding skim powder milk 15 %)</td>
<td>3.4 a</td>
</tr>
<tr>
<td>E (adding skim powder milk 9 %)</td>
<td>3.2 a b</td>
</tr>
<tr>
<td>C (adding skim powder milk 12 %)</td>
<td>3.1 a b</td>
</tr>
<tr>
<td>B (adding skim powder milk 6 %)</td>
<td>2.9 b c</td>
</tr>
<tr>
<td>A (adding skim powder milk 3 %)</td>
<td>2.7 c</td>
</tr>
</tbody>
</table>

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 strength.

Here, panelists prefer to like a little bit pale orange.
The use of B-carotene as color substances 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 chosen treatment is E (adding skim milk 15 %) becuase 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. Suggestons

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 %.

REFERENCES


