LACTOSE AND REDUCTION SUGAR CONCENTRATIONS, PH AND THE SOURNESS OF DATE FLAVORED YOGURT DRINK AS PROBIOTIC BEVERAGE

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ABSTRACT: Yogurt drink contains of Lactic Acid Bacteria which have lot of functions for health. The growth of Lactic Acid Bacteria depends on heat treatment, how long fermentation takes place, and kinds of sugar in the milk. Adding some sugar to Yogurt drink can optimize the growth of Lactic Acid Bacteria. Date palm was used to add the sugar contain of yogurt drink with different percentage range from 0% (T0), 2% (T1), 4% (T2) and 6% (T3) with 5 times replicated. To aim the information of the sugar utilities in fermenting milk, so in this study used four parameters, there were lactose concentration, total reduction sugar, pH and level of sourness. Completely Randomized Design was used, data result were analyzed with ANOVA, then were continued with Duncan Multiple Range Test. Finally result showed that adding date palm during fermentation decreases the lactose concentration from T1 to T3 then increased in T4 with range from 3.19%-3.32%, Reduction Sugar increased persistently from T0 to T3 range from 2.15%-2.99%, and pH value decreased range from 3.83-3.76. However, adding date palm into yogurt drink had no effect in sourness. This study informs that the natural sugar of date palm was used by Lactic Acid Bacteria during fermentation process, so that it affected Lactose and reduced Sugar concentration and pH value.

Keyword : Yogurt Drink, Date, Lactose, Reduction Sugar, pH and Sourness.

INTRODUCTION

Yogurt drink is kind of fermented milk containing Lactic Acid Bacteria and lot of benefits for health. Generally yogurt drink is produced with low fat milk, diluted with water for reducing total solid or stirred the yogurt for gaining low viscosity before packaging. Total solid of yogurt drink should be below 11% (Tamime, 2006; Legowo, 2009; Yildiz, 2010). A number of sugar and sweetener can be added to the milk before fermentation to increase the viability of Lactic Acid Bacteria (LAB). The more amounts of sugar in the milk, the higher acidity of obtaining yogurt drink. However, too much sugar on the milk can inhibit LAB (Tamime, 2006). In this study, date was used as natural sweetener into yogurt to support the growth of LAB. Date is one of the highest sugar concentration and has lot of benefits for health. The kinds of date sugar are glucose, fructose, and sucrose. A study showed that date contains for about 83% of sugar. Sugar of date can increase viability of bacteria so it will increase the acidity and decrease pH value (Al-Khuzaaim, 2010; El-Sharnouby et al. 2009; Marshall, 2006; Gad et al. 2010).

Additional of natural sweetener during fermentation influence utility of sugar by LAB. Generally, Streptococcus thermophilus will use lactose and degrade lactose become glucose and galactose. Glucose is changed to be lactic acid and some others lactic organic (Legowo et al., 2009). The others kind of LAB such as Lactobacillus acidophilus, and Lactobacillus bulgaricus also use lactose as their energy resource and produce lactic acid. (Yildiz, 2010; Tamime, 2006). Beside lactose, LAB used the others sugar such as glucose and fructose as reduction sugar (Caldwell, 1995 cited by Diwangkoro, 2008). The more amounts of sugar which used by LAB, the higher acidity and the lower pH value.

The aim of this study is to get the information about the utilities of sugar of date in fermenting milk. The utilities of sugar will influence the total Lactic Acid Bacteria, acidity and pH of yogurt. To know how much sugar is used by LAB can be assumed by measuring total lactose and reduction sugar in yogurt. This research is important to know the best treatment of adding date into yogurt drink. This study also give a detail about best percentage of adding date into yogurt drink with the optimum of total lactic acid bacteria for making probiotic beverage and give info the utility of sugar of date in fermenting milk.

MATERIALS AND METHODS

Making Yogurt Drink Kurma

Low fat milk was isolated with three kinds Lactic Acid Bacteria Lactobacillus acidophilus, Lactobacillus bulgaricus and Streptococcus thermophilus and added by date (Phoenix dactylifera) with different percentage T1 (0%);
T(2%); T3 (4%); and T4 (6%). The raw was incubated in incubator for 5 hours.

Measurement of Lactose Concentration
was used Telles Method. Sample was diluted up to 200 dilution, then poured 2,5ml of simple into closed test tube and added ZnSO4 5% dan Ba(OH)2 4,5% each reagent 0,2ml. Simple was centrifuged on speed 1000rpm for 5 minutes till appeared the sediment. 1 ml of supernatant was poured into closed test tube and added Telles Reagent, then boiled on waterbath for 6 minutes. Aquades was added into test tube until the volume became 12,5ml and shaked it well (Teles et al., 1978). Read the sample result into spectrometer in the formula bellow:

\[
\text{X (gram/100ml)} = \frac{\text{B (gram)}}{\text{Weight of sample}}
\]

Information:
X : Result of conversion absorbant sample
B : weight of sample

Measurement of pH value
pH value was used pH digital. Sample was poured into tube and then put indicator of pH digital on sample. Read the result on pH digital.

Measurement of Reduction Sugar Concentration
sample poured into flask 100ml about 2ml and added aquades until the volume 100ml, shaked it well to make it homogen. Put 10 ml of sampel into enlemeyer then poured 25ml of Luff Schoorl reagent. The sample was boiled on waterbath for 10 minutes, later on added 15 ml KI 20% dan 35 ml H2SO4 carefully through enlemeyer-wall. Tittrated the sample with Na-thiosflat ± 0,1 N till become yellow, then added amylum 1% continued titrated untill blue color disappeared. Made Blanko titrated with sample 25ml Luff Schoorl reagent. The Reduction Sugar concentration gain by used the formulas bellow:

\[
\text{Approach of result} \times P = \frac{\text{Weight of Sampel}}{\text{Approach of Result}} \times 100\%
\]

Result of measured parameters in this study is presented in Table 1. Lactose Concentration, Total Reduction Sugar, pH and Level of Sourness of Date Flavored Yogurt Drink. Different superskip indicate difference result based on statistic analysis, (ns) indicate there is no differences (P<0.05).

As seen in table 1, adding date with different percentage gave variety impact to all parameters. Lactose concentration and total reduction sugar had correlation for assuming the utility of those kinds of sugar. The data gave detail that the lower lactose concentration means the higher lactose was used by LAB. The more addition of date into yogurt drink gave impact to total reduction sugar in yogurt. However the data showed that the more total reduction sugar, the lower pH value, and it also indicate that the lower pH value, the higher activities of LAB in producing lactic acid.

Adding different percentage of date into yogurt drink influenced the utility of lactose in fermented process (Fig. 1). Lactose concentration of yogurt drink based on this study showed tendency to decrease from T0 to T2 but still in same range of statistic analysis. Treatment T3 showed the highest lactose concentration. The study informed that LAB mostly using lactose from T0-T2, and in T3 was assumed that LAB used another kinds of sugar to grow. Lactose can be deegred by LAB and used the carbon as energy resource. Mazahreh dan Ershidat (2009), state that Lactobacillus bulgaricus Streptococcus thermophilus able to deegred lactose to be glucose and galactose up to 20-30% of total lactose in milk. Yildiz (2010) also clarify that Lactobacillus acidophilus break the lactose to be lactic acid. Lactose concentration was also depend on the ability of LAB to use and deegred lactose.

Result of total reduction sugar increase persistently from T0 to T3 (Fig. 2). Adding date extract into yogurt drink increase total reduction sugar of yogurt. Amount of reduction sugar in yogurt can support the growth of Lactic Acid Bacteria. Gad et al. (2010) stated that sugar of date palm stimulate the lactic acid bacteria activities. El-Sharnouby et al. (2009) said that date contains of 83.51% reduction sugar such as glucose and fructose. Reduction sugar is kind of sugar which encourage LAB to grow. However too much sugar in yogurt will not good for LAB to grow. Lubis (2011) also stated that adding date extract into yogurt drink increase Total LAB significantly. Yildiz (2010) state that range fruit addition into yogurt drink better from 30-35% containing fructose 2.7% in maximum and sucrose less than 4%. Amount of added date extract into yogurt drink give impact to total reduction sugar, the more addition of date extract into yogurt drink, the more total reduction sugar in yogurt drink.

RESULT AND DISCUSSION
Based on this research make clear that yogurt drink which was added by date increased total lactic acid bacteria and it influenced some others parameter. Different percentage date added into yogurt drink made different effect of some parameters.
In Fig. 3 showed that pH value decreased from T0 to T3. The more addition of date extracts the more lower pH value of yogurt drink. pH value were caused by activities of LAB in forming lactic acid. Yildiz (2010) said that Lactobacillus acidophilus is able to produce and accumulate lactic acid so that decrease the pH value. Based on the research of Lubis (2011), adding more date extract accumulated the acidity of yogurt drink. Base on statistic analyzed adding date into yogurt drink gave no influence to the sourness by panelist (Fig. 4). So the different percentage of added date range from 0%-6% gave no impact in level of sourness.

CONCLUSION
This study confirmed that adding date extract into yogurt drink added up the amount of reduction sugar significantly and support LAB to produce lactic acid. The more lactic acid of yogurt, the lower of pH value. The best treatment percentage added date yogurt drink was placed in T2 adding 4% of date extracts, because the result of all parameter mostly not give significant influence.

REFERENCES