Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Effect of Using Sourdough Yeast And The Long Time of Final Proofing On The Physical Properties of Flashed Bread

Mohammad Wildan Almufarrij [1] , Wardah[1] , Wahyu Kanti Dwi Cahyani[1*]
Vocational Faculty, Universitas 17 Agustus 1945 Surabaya, Indonesia
*Correspondence E-mail:wahyukanti@untag-sby.ac.id

Article History: Received: November 24, 2023; Accepted: January 16, 2024

ABSTRACT
The use of natural yeast such as sourdough is an alternative choice in making bread. Apart from using yeast to produce good white bread, the final proofing time also affects the characteristics of bread. This research aims to determine the effect of using natural sourdough yeast and the final proofing time on the physical properties of white bread. This research was conducted at the integrated food laboratory of the Agro-Industry. The research design used was a one-factor completely randomized design with the independent variable used, namely the percentage of use of 0% natural sourdough yeast (instant yeast) , 15%, 30%, 45% and combined with final proofing treatment lengths of 45 minutes, 90 minutes, 135 minutes, 180 minutes, to obtain 16 treatments which were repeated 3 times. Analysis testing uses ANOVA (Analysis of Variance) with a significance level ($P < 0.05$) and SPSS 22 software. The results of the research show that the use of natural sourdough yeast and the long final proofing treatment have a significant effect on the physical quality of white bread in the form of dough riseability, porosity and softness of the bread. The use of natural sourdough yeast produced the highest value at the 45% level for the parameters of dough riseability of 58.631%, porosity of 54.851 pores and softness of white bread 154.262 mm/50g/10s. A good proofing time is 180 minutes resulting in a dough rising power of 62.905%, and 135 minutes for a porosity of 51.865 pores and softness of white bread 144.596 mm/50g/10s.

Keywords: proofing, properties physic, sourdough, white bread, yeast

1. INTRODUCTION

White bread has become a type of bread that is well-known and popular among the public. This bread has a soft texture and a delicious aroma. Generally, white bread sold on the market uses instant yeast as a rising agent. However, recently natural sourdough yeast has become increasingly popular as a bread developer. The reason is that instant yeast contains additional ingredients that can cause allergies if consumed (Warnock and Richardson, 2018). The use of instant yeast in making bread can also increase the content of anti-nutrient substances, so that the absorption of nutrients by the body is less than optimal (Yousif and Faid, 2014).

Today's society is increasingly concerned about consuming food that is healthy and free from chemical additives, including in bread products (Devi Ariyana et al., 2018). As an alternative solution, the use of natural sourdough yeast is becoming popular in the bread making process. Natural sourdough yeast is made from a combination of water and naturally fermented

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

flour (Tomić et al., 2023). This fermentation process involves microorganisms, such as lactic acid bacteria, which produce carbon dioxide gas to expand the bread dough. This has an influence on the aroma, taste, color and texture of the bread, as well as providing other benefits such as increasing the shelf life of the bread (Putra, 2018).

In general, the bread making process involves several stages, including mixing ingredients, kneading, cutting, rounding, resting (intermediate proofing), reducing gas (degassing), proofing (final proofing), and the final stage, namely baking. Proofing is a fermentation process where yeast breaks down carbohydrates and releases carbon dioxide gas so that the dough expands (Dwipa Adiluhung et al., 2018). Dimuzio (2010) explains that proofing is the time needed for the dough to expand after the forming process before finally being baked. The research results of (Dwipa Adiluhung et al., 2018)show that bread characteristics in the form of specific development, hardness and elasticity are influenced by variations in proofing time . Meanwhile, Prabowo et al (2021) stated that the final proofing time affects the height and pores of the bread. Other research by Wahyudi et al (2022) shows that the volume of dough expansion, color and texture of bread are influenced by the length of proofing .

Although several studies have discussed the use of natural sourdough yeast and proofing time separately and revealed their positive influence on the physical properties of bread, no research has yet investigated the effect of using natural sourdough yeast and final proofing time simultaneously on the quality of white bread. Therefore, researchers combined the use of natural sourdough yeast and final proofing time to determine its effect on the quality of white bread. In this research, the quality of white bread was measured through its physical properties, including the dough's expandability, porosity and softness of the bread.

2. RESEARCH METHOD

This research was conducted in March-June 2023 at the Integrated Food Laboratory of the Agro-Industry Study Program, Vocational Faculty, University of 17 August 1945 Surabaya. The tools used include mixers, electric ovens, analytical scales, basins, glass jars, plates, spoons, baking sheets, plastic wrap, plastic cups, baking paper, rulers, penetrometers and digital chambers. The main ingredient used in this research was Bogasari brand high protein wheat flour purchased at Superindo Puri Surya Jaya, Sidoarjo City. Meanwhile, the raw materials for making natural yeast sourdough consist of water and high protein wheat flour from the Bogasari brand. To make white bread, the ingredients used include water, flour, eggs, Bogasari brand high protein wheat flour, fermipan yeast, natural yeast, sugar, salt, skim milk and shortening. One-factor

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

completely randomized design is a research design applied with the independent variable in the form of the percentage of natural sourdough yeast used (0% (instant yeast), 15%, 30%, 45%) combined with the final proofing treatment (45 minutes, 90 minutes, 135 minutes, 180 minutes), so there are a total of 16 treatments with 3 repetitions. The dependent variables observed included the physical properties of bread, namely dough riseability, porosity and softness. In addition, control variables include materials, equipment, and processing stages.

Table 1. Research design for the use of natural sourdough yeast and final proofing time in making plain bread

Percentage of Sourdough yeast (A)	Long Final Poofing			
0 (A0)	A0B0	A0B1	A0B2	A0B3
15% (A1)	A1B0	A1B1	A1B2	A1B3
30% (A2)	A2B0	A2B1	A2B2	A2B3
45% (A3)	A3B0	A3B1	A3B2	A3B3

This research procedure consists of two core activities, namely making natural yeast sourdough and making white bread with predetermined treatments. Making natural yeast sourdough follows the method adopted from research by (Tomić et al., 2023). The initial step is to carry out fermentation directly on the first starter by applying the backslopping method every 24 hours for 5 days. The backslopping method is a fermentation process by mixing fermentation products that already contain microbes into new ingredients (Dwi Andrestian and Dewi, 2014).

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

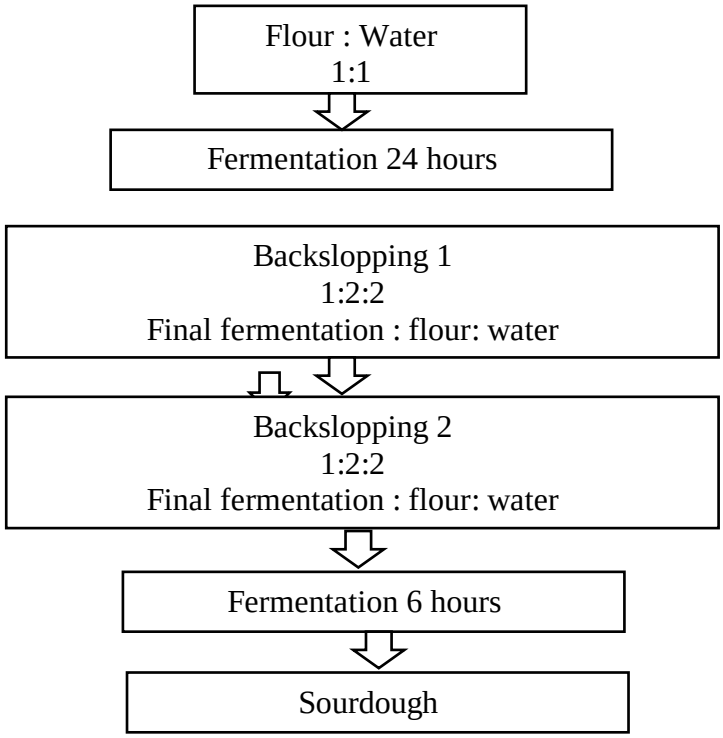

Figure 1. Flow diagram for making natural yeast sourdough

The making of white bread in this research follows treatment referring to previous research by (Putra, 2018) and (Gobbetti et al., 2014)which has been adapted to the conditions of this research. The percentage of raw material use is determined based on the percentage of the total amount of wheat flour used. Information regarding ingredient formulations can be found in Table 2.

Table 2. Material Formulation

Ingredient formulation %	A0	A1	A2	A3
Flour	100	100	100	100
Instant yeast	3	0	0	0
Natural yeast	0	15	30	45
Sugar	6	6	6	6
Salt	2	2	2	2
Milk Kim	2	2	2	2
Shortening	5	5	5	5
Water	35*	35*	35*	35*

*The amount of water depends on the consistency of the dough

The flow diagram for the process of making white bread is in Figure 2.

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

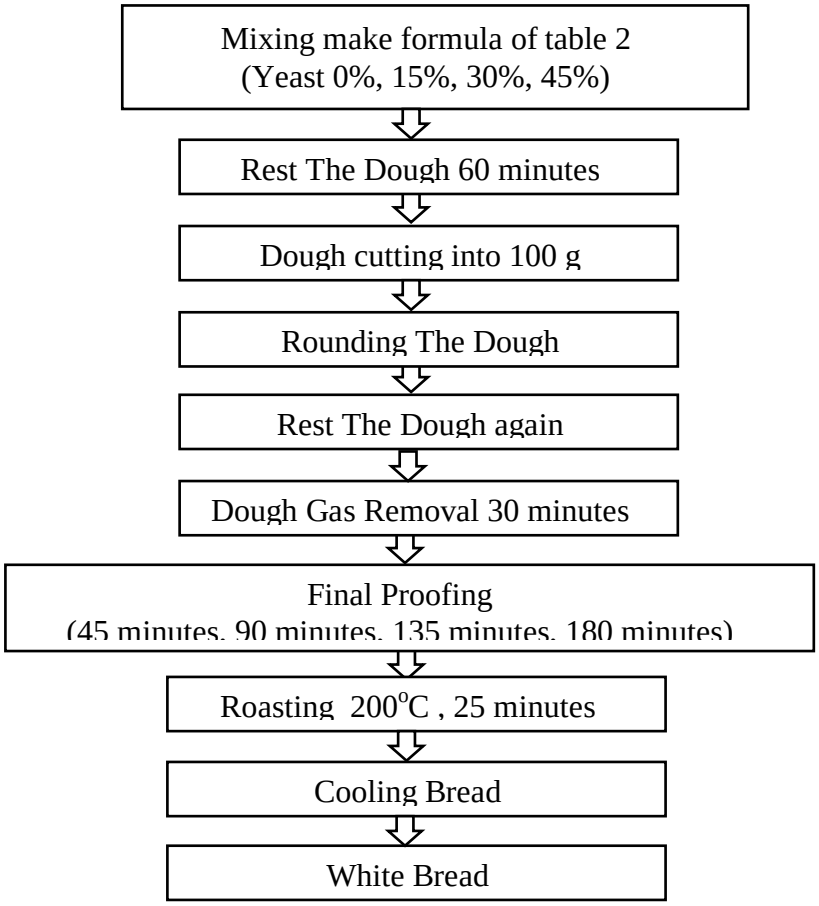

Figure 2. Flow diagram Making White bread

Data collection was based on the physical properties of white bread in the form of dough expandability, porosity and softness.

Test the Riseability of the Dough

The test for the swelling power of the dough in this research refers to a study conducted by Surono et al (2017). The height of the dough before and after the proofing process is measured vertically using a ruler. The swelling power of the dough is calculated using the formula:

$$\% \text{ Flowering power} = \frac{(\text{Tinggi Akhir} - \text{Tinggi Awal})}{\text{Tinggi Akhir}} \times 100\%$$

Bread Porosity Test

Testing bread porosity in this research refers to a study conducted by (Surono et al., 2020). The bread is cut into three parts, namely the top, bottom and middle. The HVS paper is then cut according to the size of the bread and given squares measuring 2.5 x 2.5 cm with 4 squares on each piece of paper. The number of pores is counted for each box then added up and the average taken.

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Repeat for each section, and the average number of voids for each section of bread is added up and averaged to determine the porosity of the bread.

Bread Softness Test (Penetrometer Method)

Testing the softness of bread using a penetrometer in this research refers to a study conducted by Surono et al (2017). The bread samples were cut into uniform sizes in a cubic shape measuring 1.5 cm x 1.5 cm x 1.5 cm with a weight on the penetrometer of 50 grams. Repeated three times and taken as an average. The number obtained indicates the level of softness.

Statistic test

Data processing was carried out using the ANOVA analysis of variance method with a significance level of 5% ($P < 0.05$) using SPSS 22 software. If there was a significant effect, then the Least Significant Difference (5% BNT) test was carried out for the dough riseability parameter, porosity, and softness of bread.

3. RESULTS AND DISCUSSION

Proofing is a fermentation process where yeast breaks down carbohydrates and produces carbon dioxide gas so that the dough can rise (Dwipa Adiluhung et al., 2018). Dimuzio (2010) explains that proofing is the time needed for the dough to rise after the fermentation process before finally being baked. The results of research by Adiluhung and Sutrisno (2018) show that variations in proofing time have a significant effect on the specific swelling parameters, hardness and elasticity of bread. Meanwhile, according to Prabowo et al (2021), the final proofing time affects the height and pores of the bread. Other research by Wahyudi et al (2022) also shows that proofing time has a significant influence on the volume of dough expansion, color and texture of bread.

Based on the results of physical tests with the parameters of dough riseability, porosity and softness of white bread using natural sourdough yeast combined with long final proofing treatment , the following results were obtained:

Dough Rising Power

The dough riseability parameter is one of the physical tests on white bread which can be an indicator of success in making bread. Rising power is influenced by several factors such as the dough mixing process, water content, type of flour, and yeast (Koswara, 2009).

Sourdough

The result of Table 3 on Analysis of Variance) test show that there is a real influence of the use of natural sourdough yeast on the rising power of white bread dough with the F value

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

(count) of natural sourdough yeast (3.075) greater than F (table) 5% and significant (P = 0.037) < 0.05. The BNT test results show that the most significant difference is found in the use of natural sourdough yeast at 45% level. The lowest dough rising power was found when using natural sourdough yeast at 15% level, namely 43.4965%, while the highest dough rising power was found when using natural sourdough yeast at 45% level, namely 58.6314%.

Table 3. Average Dough Rising Power of sourdough

Sourdough	Average	Standart Deviation
0%	46,9284	14,15248
15%	43,4965	14,04272
30%	52,8272	10,30627
45%	58,6314	13,79102

This shows that the greater the percentage of natural sourdough yeast used , the higher the dough's rising power will be. This condition can be caused by the fermentation process in the dough by lactic acid bacteria and natural yeast contained in sourdough . The higher the use of natural sourdough yeast , the more microorganisms that work in the fermentation process. Lactic acid bacteria influence the process of forming the gluten protein found in flour, so that the dough becomes more elastic and makes the dough rising process easier. The gluten formed in bread dough will store carbon dioxide gas during fermentation. This is in accordance with research by (Gobbetti et al., 2014), which states that the presence of microorganisms in the form of lactic acid bacteria makes an important contribution to the fermentation process to improve the quality of bakery products . Apart from that, sourdough can also produce carbon dioxide gas which makes the dough rise. (Putra, 2018)stated that the high number of lactic acid bacteria resulted in an increase in the amount of carbon dioxide resulting from.

Proofing

The result table 4 on Analysis of Variance test show that there is a very real effect of the final proofing time treatment on the rising power of white bread dough with the F (calculated) value of the final proofing time (7.969) greater than F (table)l 5% and significance (P = 0.000) < 0.05. The BNT test results show that the most significant difference is in the final proofing treatment of 180 minutes, followed by the final proofing time of 135 minutes. The lowest dough rise power was found in the final proofing treatment of 45 minutes, namely 40.1321%, while the

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

highest dough rise power was found in the proofing time treatment of 180 minutes, namely 62.9048%.

Table 4. Average Dough Rising Power sourdough of proofing

Duration final proofing	Average	Standart deviation
45	40,1321	13,44542
90	47,5273	11,73242
135	51,3192	10,70254
180	62,9048	10,53032

This shows that the longer the final proofing treatment is , the higher the dough's rising power will be. The final proofing time affects the quality of the bread by allowing the dough to relax and ferment. Longer final proofing times allow the production of carbon dioxide gas more, resulting in good dough development. This is in accordance with the research results of (Dwipa Adiluhung et al., 2018), regarding the formation of carbon dioxide gas by yeast takes time to provide optimal results.

Bread Porosity

Bread porosity is an important parameter in determining the physical quality of bread. Porosity refers to the number and uniformity of pores in bread (Surono et al, 2017). In high quality bread, the right porosity will produce a texture that is easy to chew and soft in the mouth. Ideal porosity should achieve a balance between the number of pores and appropriate pore uniformity.

Sourdough

The result Table 5 on Analysis of Variance) test show that there is a very real influence of the use of natural sourdough yeast on the porosity of white bread with the F value (count) of natural sourdough yeast (8.179) greater than F (table) 5% and significance (P = 0.000) < 0.05. The BNT test results show that the most significant difference is in the use of natural sourdough yeast at 45%, followed by the use of natural sourdough yeast at 30% and 15%. The lowest bread porosity was found when using 0% natural sourdough yeast (instant yeast), namely 34.1648 pores, while the highest bread porosity was found when using 45% natural sourdough yeast , namely 54.8514 pores.

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Table 5. Average Bread Porosity of sourdough

Percentage sourdough	Average	Standart Deviation
0%	34,164	9,28283
15%	43,7688	10,68914
30%	47,5083	8,02170
45%	54,8514	13,03661

This is because instant yeast and natural sourdough yeast have different behavior in the fermentation process, thus affecting the quality of the porosity of the bread produced. Instant yeast uses Saccharomyces cerevisiae, a species that has been dried and activated and is designed to provide fast results. Meanwhile, according to research by Van der Meulen et al (2007), natural sourdough yeast consists of several types of microorganisms, namely lactic acid bacteria such as Lactobacillus plantarum, Lactobacillus parapalantarum, Lactobacillus fermentum, Lactobacillus rossiae, Lactobacillus brevis . This results in differences in the porosity of the bread. In addition, according to Arora (2020), the microorganisms in natural sourdough yeast interact in a slower and more complex fermentation process. A slow process can affect the formation of pores evenly and uniformly.

Proofing

The result Table 6 on Analysis of Variance test show that there is a real influence of the final proofing time treatment on the porosity of white bread with the F (calculated) value of the final proofing time (3.557) greater than F (table) l 5% and significance (P = 0.022) < 0.05. The BNT test results show that the most significant difference is in the final proofing treatment time of 135 minutes. The results of research by (Dwipa Adiluhung et al., 2018) show that variations in proofing time have a significant effect on the specific swelling parameters, hardness and elasticity of bread. Meanwhile, according to (Prabowo et al, 2021), the final proofing time affects the height and pores of the bread. Other research also shows that proofing time has a significant influence on the volume of dough expansion, color and texture of bread.The lowest bread porosity was found in the final proofing treatment of 45 minutes, namely 39.4277 pores, while the highest bread porosity was found in the 135 minute long proofing treatment , namely 51.8648 pores.

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Table 6. Average Bread Porosity sourdough of proofing

Time duration final proofing	Average	Standart deviation
45	39,4277	9,37391
90	45,8498	14,96963
135	51,8648	15,5440
180	43,1511	5,81523

This is because the long proofing time results in increased gas produced by yeast and bacteria in the bread dough. If the proofing time is too long, too much gas will be produced and can damage the structure of the bread dough, resulting in low porosity. However, if the proofing time is too short, the bread dough will not ferment enough and the bread's porosity will be poor. According to Dimuzio (2010), carbon dioxide gas produced during the final proofing process plays a role in increasing the size of the air cells in bread dough. Proofing time must be well controlled to produce optimal bread porosity. Prabowo et al (2021), argue that the final fermentation period (final proofing) must be managed carefully, it should not be too long or too short.

Softness of Bread

The softness of the bread is an important factor in determining the quality of the bread. Consumers' desire is to get bread that has a soft and tender texture. Bread softness can be defined as the level of tenderness and elasticity of the bread formed.

Sourdough

The Result Table 7 on Analysis of Variance) test show that there is a very real influence of the use of natural sourdough yeast on the softness of white bread with the F value (count) of natural sourdough yeast (10.637) greater than F (table) 5% and significance (P = 0.000) < 0.05. The BNT test results show that the most significant difference is in the use of natural sourdough yeast at 45% level, followed by natural sourdough yeast at 30% level. The lowest bread softness was found when using 0% natural sourdough yeast (instant yeast), namely 125.9154 mm/50g/10s, while the highest bread softness was found when using 45% natural sourdough yeast, namely 154.2618 mm/50g/10s. This is because at the 0% level it is instant yeast which has different characteristics from natural sourdough yeast .

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Table 7. Average Softness of bread on sourdough

Percentage sourdough	Average	Standart Deviation
0%	125,9154	16,59600
15%	129,8103	14,03469
30%	138,6072	13,36786
45%	154,2618	7,96166

Sourdough's natural yeast produces lactic acid which can improve the quality of gluten and its elasticity, so the bread becomes softer. According to Gobbetti and Gänzle (2012), sourdough's natural yeast produces organic acids that slow down the development of gluten, thereby giving gluten enough time to strengthen and make the bread softer. In the results of research conducted by Putra (2018), it was found that lactic acid bacteria produce primary and secondary metabolic products which have a positive impact on the structure and texture quality of bread.

Proofing

The result Table 7 on Analysis of Variance test show that there is a real influence of the final proofing time treatment on the softness of white bread with the F (calculated) value of the final proofing time (3.894) greater than F (table) 5% and significance (P = 0.015) < 0 .05. The BNT test results show that the most significant difference is in the final proofing time of 135 minutes, which is then followed by the final proofing time of 90 minutes. The lowest bread softness was found in the final proofing treatment of 45 minutes, namely 130.7522 mm/50g/10s, while the highest bread softness was found in the 135 minutes proofing treatment , namely 144.5963 mm/50g/10s.

Table 8. Average Softness of bread sourdough of proofing

Time duration final proofing	Average	Standart Deviation
45	130,7522	17,96964
90	141,5370	18,52262
135	144,5963	14,19746
180	131,7093	14,37713

This is because a longer proofing time allows for the production of more gas and a higher bread volume, resulting in a lighter and softer texture. However, too long proofing time can result

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

in low tenderness and poor quality bread. This is because the gas produced by the yeast can start to break down the gluten structure in the dough, resulting in a dough that is weaker and less elastic. Final fermentation treatment (final proofing) that is too short causes less than optimal development and results in a hard texture, conversely, if it is too long, over-proofing will occur so that the bread becomes less sturdy and the shape is not ideal (Prabowo et al, 2021).

4. CONCLUSIONS

Based on the results of the analysis, it can be concluded that the use of natural sourdough yeast and the long final proofing treatment have a significant effect on the physical quality of white bread in the form of dough riseability, porosity and softness of the bread. The use of natural sourdough yeast produced the highest value at the 45% level for the parameters of dough riseability of 58.631%, porosity of 54.851 pores and softness of white bread 154.262 mm/50g/10s. The final proofing time treatment produced the highest value at 180 minutes for the dough swelling power parameter of 62.905%, and 135 minutes for a porosity of 51,865 pores and a softness of white bread of 144,596 mm/50g/10s.

Suggestion

Based on the conclusion, it is recommended to use a percentage of 45% sourdough as natural yeast with a final proofing time of 135 minutes. Apart from that, it is also recommended for further researchers to chemically and microbiologically analyze white bread that has been treated with sourdough and the final proofing time.

REFERENCES

Adiluhung, WD, and Sutrisno, A. (2018). The Effect of Glucomannan Concentration and Proofing Time on the Textural and Organoleptic Characteristics of Gluten-Free Rice Bread (Oryza sativa). Journal of Food and Agroindustry , 6 (4), 26–37.

Anderestian, M. ., Dewi, Z., and Sajiman. (2014). Lactic Acid Content, Organoleptic Quality, and Financial Feasibility of Pineapple Probiotic Drinks with Different Types of Inoculum. Journal of Health Scales , 5 (2).

Ariyana, DM, Amaro, M., Werdiningsih, W., Rien Handayani, B., and Sri Widyastuti, D. (2018). Addition Of Lactic Acid Bacteria To Improve Bread Quality, Safety, And Shelf Life. Pro Food (Journal of Food Science and Technology) , 4 (2), 333–342.

Arora, K., Ameur, H., Polo, A., Di Cagno, R., Rizzello, C.G., and Gobbetti, M. (2021). Thirty Years Of Knowledge On Sourdough Fermentation: A Systematic Review . Trends in Food Science and Technology , 108, 71–83.

Dimuzio, DT (2010). Bread Baking . John Wiley & Sons, Inc. America.

DOI : https://doi.org/10.55173/agriscience.v7i2.124

Vol. 7 No. 2 March 2024
ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)
AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Gobbetti, M., & Gänzle, M. (2012). Handbook on sourdough biotechnology . Springer Science & Business Media. New York.

Gobbetti, M., Rizzello, CG, Di Cagno, R., and De Angelis, M. (2014). How The Sourdough May Affect The Functional Features Of Leavened Baked Goods . Food Microbiology,37,30-40 .

Koswara, S. (2009). Bread Processing Technology . eBookPangan.com .

Prabowo, SA, Guspri Devi Artanti, and Efrina. (2021). The Effect of Final Fermentation Time on the Quality of Japanese Milk Bread . Journal of Food Science , 4 (1), 1–6.

Putra, RK (2018). The Effect of Sourdough Starter Concentration on the Quality of Sweet Bread . Scientific articles . Faculty of Food Technology and Agro-Industry. Mataram University. Mataram

Surono, DI, Nurali, EJN, Judith, SC, and Moningka, M. (2017). Physical and Sensory Quality of Gluten-Free, Casein-Free Bread Made from Goroho Banana Composite Flour (Musa acuminate L.). Cocos Journal , 1 (1), 1–12.

Tomić, J., Dapčević-Hadnađev, T., Škrobot, D., Maravić, N., Popović, N., Stevanović, D., and Hadnađev, M. (2023). Spontaneously Fermented Ancient Wheat Sourdoughs In Breadmaking: Impact Of Flour Quality On Sourdough And Bread Physico-Chemical Properties. LWT , 175 .

Van Der Meulen, R., Scheirlinck, I., Van Schoor, A., Huys, G., Vancanneyt, M., Vandamme, P., and De Vuyst, L. (2007). Population Dynamics And Metabolite Target Analysis Of Lactic Acid Bacteria During Laboratory Fermentations Of Wheat And Spelled Sourdoughs . Applied and Environmental Microbiology , 73 (15), 4741–4750.

Wahyudi, VA, Anjasari, SA, and Wachid, M. (2022). Study of the Effectiveness of Proofing Temperature and Time (Saccharomyces cerevisiae) on the Physicochemical, Microbiological and Organoleptic Properties of Sweet Bread. J. Food Science And Technology , 7 (1), 4640–4655.

Warnock, C., and Richardson, M. (2018). The Art of Baking With Natural Yeast . Front Table Books .

Yousif, MR, and Faid, S. (2014). Effect Of Using Different Types Of Yeasts On The Quality Of Egyptian Balady Bread. Journal of American Science , 10 (2), 100–109.

DOI : https://doi.org/10.55173/agriscience.v7i2.124