

THE EFFECT OF IMPROVER ADDITION ON SWEET BREAD MADE FROM WHEAT FLOUR

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ABSTRACT

Modified starch produced in the MOCAF manufacturing process is still not widely used, so further studies are needed regarding the utilization of modified MOCAF-based starch. Starch can be used to improve the quality of bread. The raw materials used in the research are ADIRA cassava and cakra flour for sweet bread. The method used RAL with 3 factors, A type of control treatment improver (without addition of improver), addition of improver (native) and improver (modification), treatment B with variations in the amount of treatment added water (480, 510, 540 ml), and treatment C with variations in the concentration of the number of improvers added (0.125, 5 and 1%). In the application of sweet bread the data obtained from the results of the study were analyzed using the ANOVA test, Duncan's Multiple Range Test and continued the Effectiveness test to get the best treatment of bread produced. The lowest density and texture are the modification improver (1%+540 ml). The density value is 0.17 ± 0.00 (g/cm³) and the texture value is 36 ± 6 g/10 mm was obtained after storage on day 1. Based on the sensory test, the overall bread appearance score, the color of the inside of the bread, and the aroma, ranged from likes to the value of 4. The modification improver treatment (1%+540 ml) has a texture and taste which is preferred with values 4.25 and 4.25 and ease of swallowing with a value of 4.17. The effectiveness value of 0.8 in treatment modification (1%+540 ml). The conclusion is that the improver in modification treatment is best used as an improver on sweet bread.

Keywords: Improver, MOCAF, modified starch, bread, cassava

INTRODUCTION

During the process of MOCAF making, many of unused modified starch is produced, so further studies are needed on the utilization of modified MOCAF side-processing starch. Selomulyo and Zhou (2007), reported that improver including hydrocolloid, emulsifier or other improver can be used to improve the quality of fresh and stored bread.

Cauvin (2000) states that an improver is an ingredient added to 'increase' the potential of flour-fed bread processing. Different bread processing uses different flour and different formulations. According to Wassermann (2009) improver is used specifically to improve production methods and quality of bread products. Improver can be derived from natural materials or with the addition of

additives, intended to facilitate or simplify the making of bakery product to exchange compensation for processing characteristics due to fluctuations in raw materials and to affect the quality of bakery product.

Improver applications are generally used not more than 10% out of the flour weight, improver is multifunctional product. Improver materials interact each other and are arranged in such a way as to meet the requirements of each type of flour and bakery, applied technology and quality of bread needed in bakery.

Starch contributes to bakery products in which it has important roles such as gelatinization, ability to absorb water and retrogradation (Taggart, 2004; Cui 2005). Starch gelatinization is important for building

the structure and texture of the starch products. The ability of starch to bind water can reduce the stickiness of the dough, improve the handling and softening the texture of bakery product (Radley, 1976; Taggart, 2004). The ability of starch to bind water can reduce the stickiness of the dough, improve handling, and increase the volume of bread. These characteristics can increase moisture and soften the texture of bakery products (Radley, 1976; Taggart, 2004).

Improver is a material that can be added to a product in order to make better product (product quality, process tolerance, and shelf life stability). The addition of improver into bread products is expected to increase expand power, decreasing staleness and density. The purpose of this research is to study the application of modified starch as an improver material on sweet bread.

The aim of the research are: to know the effect of adding starch (native / modified) to sweet bread product made from wheat flour, and the best improver treatment used in sweet bread made from wheat flour.

MATERIALS AND METHODS

Tools and Materials

The raw material used in this research is ADIRA cassava from Rowo Indah village, Jember Regency, aged of 10-12 months. Other research materials used are flour brand of Cakra Kembar Premium Bogasari, milk powder brand of Dancow, salt brand of Ship Cap, local sugar brand of Gulaku, instant yeast brand of Fermipan, blue band brand of Master, and HD plastic obtained in the city of Jember.

The tools used in this study include knives, plastic tubs, slicer, baking sheet, blender brand of Philips, 100 mesh sieve, Minolta color reader, Rheotex brand of Ogawa Saiki, oven brand of J Labtech. Rheotex Ogawa Seiki brand type SD-700, analytic balance brand of Matler Toledo AL204 type ($\pm 0.01g$), oven brand of J Lab Tech, digital camera brand of Samsung with 10 pixel magnification. Scanner brand of Canon. Bread maker consists of proofing tools brand of Sinmag, Oven brand of Sinmag, bread mixer brand of Sinmag type SM-201.

Method

In the first stage of research, starch production was used as an improver with fermentation time (hours) of 0, 24, 48 and 72

(F0, F1, F2, F3) with three replications and FB as a control with 10 hours fermentation time. Furthermore, physical, chemical, SEM and RVA analysis were measured. Followed by a non-factorial random test, which showed the F count was significantly different in all treatments at the 5% level.

Duncan test was further applied, the DMRT of 5% showed a real difference in the FB (native) and F3 (modified). Then 2 treatments were selected, namely FB and F3 to be applied as an improver on sweet bread products, to see how it affected the bread products made from flour such as swelling power, texture, density, H:D, water content, staleness and organoleptic properties. Furthermore, native starch and modification are used as improver with improver concentration of 0.125%; 0.5%; 1% and the variable addition of water 480, 510 and 540 ml, with three replications.

Data Analysis

The processing of research data uses descriptive method. Observation data is displayed in table form, and to facilitate data interpretation, a histogram is created. In the application of sweet bread, the data obtained from the results of the study are analyzed by Variant analysis method (Analysis of Variant or ANOVA) with 5% confidence interval and continued with the Effectiveness test to obtain the best treatment of modified starch used.

MOCAF and Starch Production

Cassava is removed from the skin, washed thoroughly to remove dirt and mucus. Then reduced the size in the form of chips with a thickness of 1-3 mm, weighed as much as 5 kg and added water with a ratio (1:2), and the starter is added until the concentration of marinade solution contains 100 ppm BAL. Stater is made by weighing as much as 0.5 g, 50 g of sugar, 50 g of dry MOCAF chips and as much as 1000 ml of water put into a 1000 ml of beaker glass, left for 24 hours until ready to use.

Furthermore, 5 kg chips are put into the tub and 9000 ml of water and 1000 ml of water are added, then fermented for 0, 24, 48 and 72 hours (F0, F1, F2, and F3). After reaching the required fermentation time, the MOCAF chips are harvested and separated from the modified starch by filtering the liquid using a 120 mesh sieve and continued precipitation for 2 hours,

latter the fermented water is removed and the modified starch is dried underneath the sun.

As the FB made by crushing cassava with a blender then the juice is taken with a ratio of 5 kg of chips dissolved in 9000 ml of water and taking the starch then added with LAB as above as much as 1000 ml, precipitated for 10 hours, then set aside the fermented water and dried the starch under the sun. The flowchart starch production in the (FB).

Table 1. Fermentation time treatment

Fermentation Time (hour)	1	2	3
F0	F0.1	F0.2	F0.3
F1	F1.1	F1.2	F1.3
F2	F2.1	F2.2	F2.3
F3	F3.1	F3.2	F3.3

Application of Improver to Sweet Bread

The second phase of the research is an improver application into sweet bread product. In this application, two types of improver that are still/original are selected, namely FB/native and those that have undergone modified, namely F3 improver. Based on physico-chemical characteristics, RVA and SEM. Native and modification improvers are selected in sweet bread applications since native and improvers had physicochemical characteristics, different chemistry in which native had granules, high break down (BD) $2,620 \pm 30.45$ while modification has granules that have been modified by fermentation, which are more hollow and larger in size based on SEM, and break down (BD) is low 1.494 ± 148.28 based on RVA.

The native improver has a higher peak viscosity (PV) with a value of $4,389.00 \pm 58.39$ compared to modification with a value of $4,207.00 \pm 143.04$. The native improver has a higher set back value (SB) with a value of 955.67 ± 23.07 compared to modification with a value of 889.67 ± 76.85 . Application of native and modification improver on sweet bread is done to see the effect on the quality of the sweet bread produced, so that the control is used as a comparison with which improver is not added. Then formulation is carried out to see the effect of treatment, which is the addition of improver on sweet bread. Control is done by increasing the amount of water in

stages (480 ml, 510 ml and 540 ml). In native and modification, an increase in the number of improvers and water is carried out in stages (0.125%+480 ml; 0.50%+510 ml; 1%+540 ml). Furthermore, testing of the quality of sweet bread on controls, native and modification are added to the improver.

a. The Design Application of Starch on Sweet Bread

The design of starch application in sweet bread products of wheat flour as the raw materials can be seen in Table 2. The composition of sweet bread and control composition of sweet bread can be seen in Table 3.

b. The Procedure of Making Bread

The method used in making sweet bread is a straight dough method. The ingredients are weighed appropriately then stir the flour, sugar, vegetables, milk and modified starch until it is mixed well in a stirring machine for 2.5 minutes. Furthermore add the salt, eggs, water and stir for 5 minutes. Add blue band and stir evenly for 2.5 minutes. After all the dough is mixed well, increase the speed by 3 (three) and stir for 15 minutes until the dough is smooth. After it is smooth and a stirring film is formed, then stop the stirring. The dough is transferred to the table to be rounded and left for 10 minutes and covered with aluminum foil.

The dough is weighed as much as @ 80 g and shaped round, then let stand for 10 minutes on aluminum film cover. The dough is twisted 2-3x to remove gas on the surface then flipped and roll again 2-3 times, furthermore form the dough by rolling and put into mold that has been smeared in butter. Molds that have been filled with dough are arranged in a baking sheet to be included in the proofing room for 1 hour at 40°C. The proofing process has done as well as the increasing volume of the dough, and then put it into the oven at 180°C for 20 minutes. After the bread is baked, the bread is removed from the oven and cooled. The bread is cooled 6-8 hours then weighed and put into plastic and arranged in a platter for observation and testing.

c. Testing of Sweet Bread Products

At this stage the quality of sweet bread products produced includes: expand power (%), density (g/cm³), texture (g/10 mm), moisture content (%), crust color (L, a*,

b*)with Color Reader, and sensory testing (color, taste, aroma, texture, ease of

swallowing, color of inside the bread and overall appearance).

Table 2. Design application of starch on sweet bread

Treatment	Control (C)			Native (N)			Modification (M)		
Water (ml)	480	510	540	480	510	540	480	510	540
Improver (%)	-	-	-	0,125	0,5	1	0,125	0,5	1

Table 3. Design application of starch on sweet bread

Treatment	Control (C)			Native (N)			Modification (M)		
Starch (%)	-	-	-	0,125	0,5	1	0,125	0,5	1
Water (mL)	480	510	540	480	510	540	480	510	540
Flour (kg)	1	1	1	1	1	1	1	1	1
Instant yeast (g)	22	22	22	22	22	22	22	22	22
Sugar (g)	220	220	220	220	220	220	220	220	220
Salt (g)	15	15	15	15	15	15	15	15	15
Powdered milk (g)	60	60	60	60	60	60	60	60	60
Butter (g)	150	150	150	150	150	150	150	150	150
Egg (g)	100	100	100	100	100	100	100	100	100

d. Measuring the Quality of Sweet Bread

Expand Power (Yuwono and Susanto, 2001)

The procedure for testing the expand power of the bakery is done by measuring and sticking it in the middle of the dough using a stick, so the measurement of the height before and after bakery can be known:

$$\% \text{ Expand Power} = \frac{B-A}{A} \times 100\%$$

Description:

A = the height before bakery

B = the height after bakery

Density (Eduardo et al., 2014)

Bread as many as (7) seven pieces are weighed and measured 60 minutes after the roasting process. Bread weight and bread volume measurement expressed in (g/cm³).

Texture

Bread is cut into pieces with a thickness of 3cm and measured the texture of 6-7 spots during storage of 0, 1, 2, 3, 4 and 5 days.

Water Content (Eduardo et al., 2014)

Bread samples were weighed 2 g, heated at 130°C for 2 days, then cooled in a desiccator. Measured fresh bread of (3) three pieces. Water content is measured by the formula:

$$\text{Water content (\%)} = \frac{\text{weight of water (g)}}{\text{weight of material (g)}} \times 100\%$$

Lightness (L) Bread Crust

The bread surface is measured in color after 180 minutes or (3) three hours out of roasting with total (4) four breads to measure. Determination of white degree is based on the Color Reader method. Previously, Color Reader is calibrated with standard porcelain. A number of samples are placed in a cup, then target the sample at seven points to find out the values of dE, dL, da, and db. The value of L * (Lightness) is related to the degree of brightness, which ranges from 0 (zero) to 100 (one hundred). Brightness is stated to increase with increasing L value *.

The L value is obtained based on the formula:

$$L = \frac{L \text{ porcelin standart (spesifik factory)}}{L \text{ in porcelin used}}$$

Description:

L porcelain standard (specific factory) = 94.35

L in porcelain used = 63.50

Sensory Test (Rampengan et al., 1985)

Sensory testing is done to determine the level of preference or feasibility of a product to

be accepted by the researcher (consumer). The test method used is the hedonic method (test of preference). Bread sensory testing carries out among overall (appearance, interior color of bread, aroma, texture, taste and ease of swallowing) through the scoring method by 35 panelists. The sensory test is carried out in a cross and random manner. Done step by step. Bread samples are placed on white paper which is given a 3 digit random number code. Panelists were asked to smell, hold, and observe the bread using their eyes, mouth and nose. The scores used are:

- 1 = extremely dislike
- 2 = dislike
- 3 = rather like
- 4 = like
- 5 = really like

e. Effectiveness Test (Degarmo, et al.,1984)

Determination of the best treatment is determined based on the index effectiveness method (DeGarmo et al., 1984). This method is based on the procedure as follows: variables are sorted by priority and contribute to results. Give value weight to each variable (BV) according to its contribution with relative numbers 0-1. This weight differs depending on the importance of each variable whose results are obtained as a result of treatment. Normal weight (BN) is determined from each variable by dividing the variable weight (BV) by the sum of all value weights.

Divide the variables analyzed into two groups, namely:

1. Group A, consists of variables in which the greater the average the better the value (desired for the treated product).
2. Group B consists of variables which are the greater the worse (not desired).

Determined the effectiveness value (Ne) of each variable, using the formula: the treatment value - the worst value and the best value - the worst value, for the variable with the greater average the better, so the lowest value as the worst and the highest value as the best. Conversely for the variable with the smaller value the better, the highest value as the worst value and the lowest value as the best. Calculate the result value (Nh) of each variable obtained from the normal weight multiplication (BN) with the value of effectiveness (Ne).

Add the results value of all variables and the best combination is chosen from the treatment combination which has the highest result value (Nh).

$$N \text{ Effectiveness} = \frac{\text{treatment value} - \text{the worst value}}{\text{the best value} - \text{the worst value}}$$

$$\text{Result value} = NE \times \text{weight}$$

RESULTS AND DISCUSSION

Application of native and modification improver on sweet bread is done to see the effect on the quality of the sweet bread produced, so that the control is used as a comparison of which the improver is not added.

Expand Power

Bread expand power is the ability of bread to experience increased size before and after cooking process. The lowest expand power is 114.1±4.2% in the native improver with the formulation (0.125%+480 ml), the highest expand power in the modification improver with a value of 304.1±34.6% in the formulation (1%+450 ml).

In the modification improver the old fermentation causes the improver to have a shorter chain that has been converted into simple sugars so that during the proofing process it is used by the yeast as an energy source to increase the expand power. Bread expand power can be seen in Figure 1.

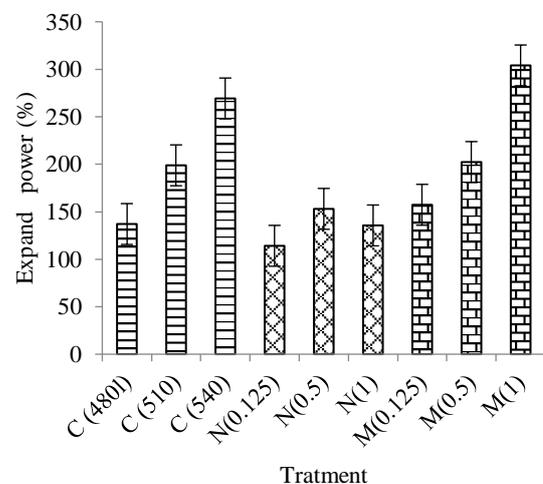


Figure 1. Expand power of sweet bread with the addition of improver: 0.125%; 0.5%; and 1%



The capacity of swelling is often related to protein and starch (Woolfe, 1992). Higher protein content in flour can cause starch granules to be embedded in the protein matrix, which then limits the access of starch to water and limits swelling strength (Aprianita *et al.*, 2009). Amilopectin is primarily responsible for granular swelling (Tester and Morrison, 1990). Moorthy and Ramanuhour (1986) also report that the swelling strength of the granules is an indication of the extent of associative strength in the granule.

Density

Density or solidity is the amount of substance in a unit of volume, in bread it is used to measure the density of bread at a certain volume. The low density of the bread indicates that the bread has the greater volume, as well as the smaller the density. The highest density obtained in this study is 0.20 ± 0.01 (g/cm^3) in the native improver (0.125%+480 ml).

While the lowest density is equal to 0.17 ± 0.00 (g/cm^3) in the modification improver (1%+540 ml). Bread that is given an improver with an modification formulation (1%+540 ml) produced a lower density than an native improver (1%+540 ml). Density here relates to the size of the cavity in the bread, if the density is small then the cavity in the bread is getting bigger or more porous and the volume of bread that is increasingly expanding can be seen in Figure 2.

The low density shows that the bread is tenderer. The modification improver has a lower density value than the native improver, indicating that bread given an modification

improver is tenderer than native. Controls have lower values based on tenderness level, controls are softer than modification or native.

The density value can be seen on Figure 3.

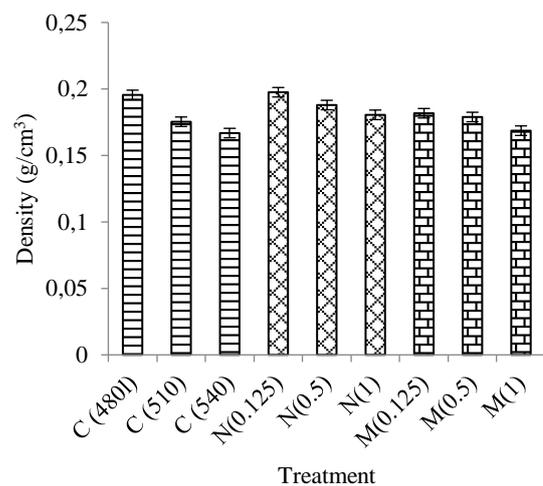


Figure 3. Density of sweet bread with the addition of improver: 0.125%; 0.5%; and 1%

Texture

Texture is one of the most important factors for measuring bread quality, since the bread hardness increases during staling due to changes in amylopectin structure during gelatinization, and swelling of granules (Schoch, 1965). Texture ($\text{g}/10$ mm) is count to measure the level of hardness on bread. The quality of bread, especially texture, is specifically related to the level of hardness and is associated with density, which means the smallest density, the tenderer the bread will be (Basman *et al.*, 2002).

The lowest texture is obtained after storage on day 1 of the modification improver (1%+540 ml) with a value of 36 ± 6 g/10 mm and the highest value in the native improver (1%+540 ml) with a value of 46 ± 2 g/10 mm. After the 5th day being stored, the lowest value is obtained in the modification improver (1%+540 ml) with a value of 86 ± 28 g/10 mm and the highest value in the native improver (1%+540ml) with a value of 92 ± 26 g/10 mm .

The addition of water decreases the texture of the control due to the addition of

excess water, therefore the control texture has a lower value than modification and native. This is presumably because the native improver added to the bread is still so the dough cannot absorb the water in the starch perfectly when it is mixed. Most of the granules are still close after the cooking process and when cooling retrogradation occurs by re-crystalline the starch which is characterized by an increasingly hard texture. In Figure 4.

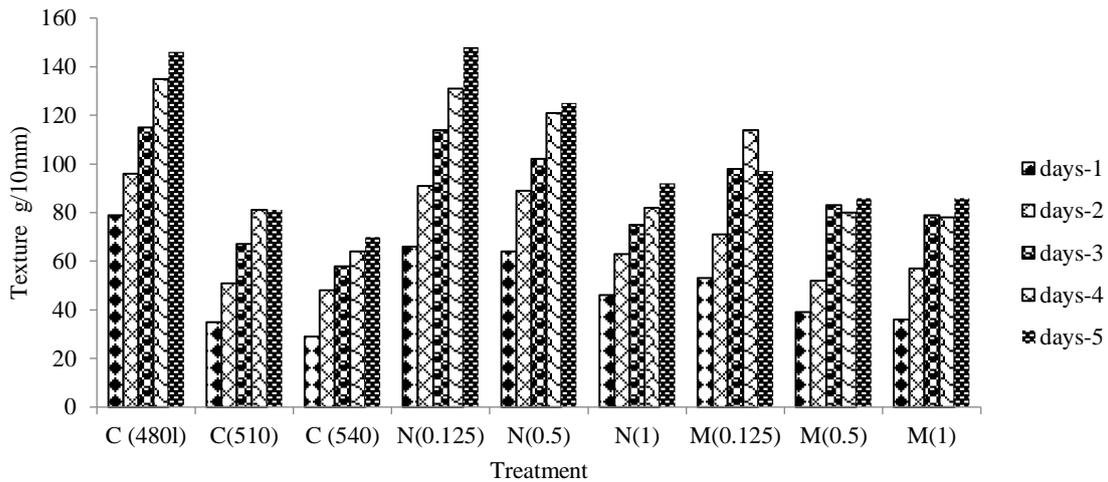


Figure 4. Texture of sweet bread with the addition of improver: 0.125%; 0.5%; and 1% (1st day until 5th day) from left to right

Hibi *et al.*, (1993) stated that starch granules have a semi-crystalline structure and do not dissolve at room temperature. Retrogradation in starch is unnecessary for food products such as bread, because it causes staling and shortens product shelf life (Karim *et al.*, 2000; Jane 2004). Starch in bakery products has important roles such as gelatinization, ability to absorb water and retrogradation. Starch gelatinization is important for building the structure and texture of the starch products. The ability of starch to bind water can reduce the stickiness of the dough, increase handling, and increase volume. This characteristic can increase moisture and soften the texture of bekeri products (Taggart, 2004). According to Be Miller (2007) the changes in bread will result in staling by the increase of bread texture, and the transfer of water from the bread to the skin/crust of bread.

According to (Zallie *et al.*, 1984) low amylose content can delay staling bread. Amylose proposition and amylopectin

structure have an important role in the speed and degree of starch retrogradation (Goodfellow and Wilson, 1990). Staling involves several physical and chemical phenomena, crystallization of amylose and amylopectin (Zobel and Kulp, 1996).

Water Content

The water content in food ingredients also determines the level of acceptance, freshness and durability of the product. Most of the chemical and biochemical changes in food ingredients occur in the medium of water that comes from that material (Winarno, 2004).

The lowest water content obtained in this study is $23.48 \pm 0.90\%$ in modification improver (0.125%+480 ml). While the highest water content found is $30.66 \pm 2.27\%$ in native improver (0.125%+480 ml). During storage until the 5th day the water content of the modification improver is lower than the native improver. The results of the measurement of water content can be seen in Figure 5. The addition of improver does not have an effect on

the weight loss of bread. This shows the level of freshness of bread with native and modification improver has the same level of freshness as the control.

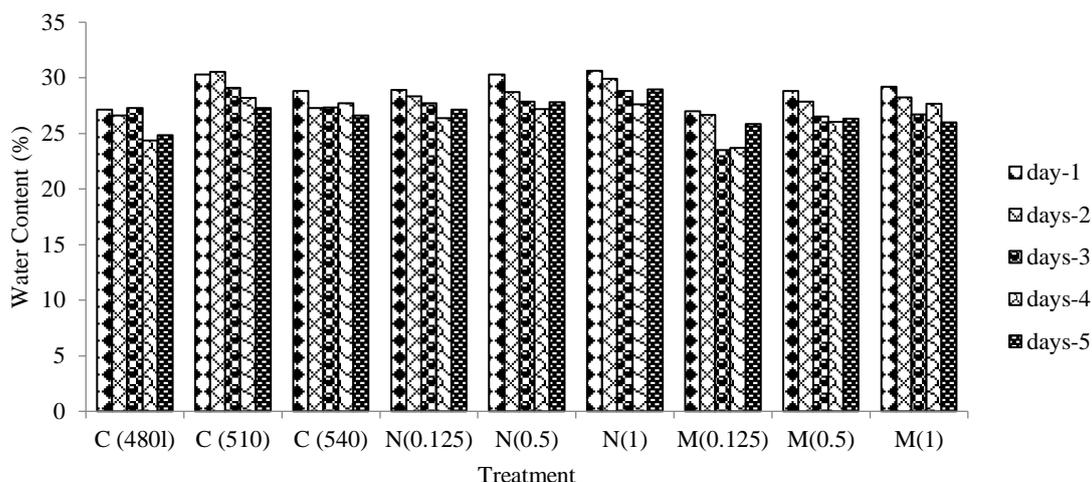


Figure 5. Water content of sweet bread with the addition of improver: 0.125%; 0.5%; and 1% (1st day until 5th day) from left to right

According to Stauffer (2000) water content is an important parameter for staling since the occurrence of retrogradation of starch slowly when the water content is high. The use of starch can increase the binding capacity of water (Zallie, 1988). Starch also has multifunctional properties in ingredients, including gelling and moisture storage (Pietrasik, 1999). Increasing water absorption capacity in food systems makes it possible to manipulate the functional properties of dough in bread products (Achinewhu and Orafun, 2000; Iwe and Onadipe, 2001). Water content is an important parameter in staling, when starch undergoes retrogradation in a state when the water content is high. The water content that rises 2% will increase the shelf life of bread one day (Stauffer, 2000).

Bread is produced using additional ingredients such as fat, milk, and additives, together with optimized parameters of the technological process found to improve its sensory and nutritional characteristics (Fik, 2004). Addition of other ingredients in the bakery process such as fat will also affect staling and water loss, as well as the processing of bread (temperature, processing). Bread shelf life can be increased by such methods involving freezing, packaging, heating processes, bioconversion and addition of chemicals and others (Karolak et al., 2014).

Lightness (L)

Color is the most determining factor for whether or not a food product is attractive (Winarno, 1991). According to Fennema (1985), color is the most important quality attribute together with texture and taste. Color plays a role in determining the level of acceptance of a food, even Kartika et al., (1988) states that color is one of the visual profiles that become consumers first impression in assessing food ingredients. The result of the lightness (L) measurement on the control shows a darker color. This is presumed by the addition of water to the control, the dough is more fully mixed. The modification improver has a* higher intensity value than the native improver. The values of L, a*, and b* on sweet bread can be seen in Table 4.

The bread color is directly related to the raw material, the formulation used and the condition of the bread (Silva et al., 2009). In general, the L value indicates the high value of brightness/light with brighter color results. The high values of a* and b* illustrate that the sample has strong red and yellow or golden/golden intensity (Esteller et al., 2004). Crumb lightness colour (L*), red (a*) and yellow (b*). The bread crust color as a whole at the top is deep golden brown and light golden brown at the bottom (Kamman, 1970).

The intensity value of the bread surface/crust increases when it gets stronger red/gold color. In the control by adding water, the red color on the crust is getting stronger, this is presumably because of the sugar content, amino acids in flour are completely dissolved so that when working the non-enzymatic browning process or the maillard takes place more perfectly. According to Bamforth (2005) the reaction of red or brown color on the crust due to the maillard reaction, which is a heated sugar compound and free amino groups, namely amino acids, proteins and amines, will have an impact on flavor.

It can also occur in amino components and substrates other than sugar (carbonyl free group), which are ascorbic acid and molecules produced during lipid oxidation. Color is an important criterion for the initial acceptance of a bakery product to be accepted by consumers. Color development occurs at the stage of work

and it is a very complex stage in the production process (Zanoni *et al.*, 1995). Zanoni *et al.*, (1995) state the color of the bread surface depends on the physical and chemical characteristics of the raw material (such as water content, pH, reducing sugars, amino acids and operating conditions during the cooking process) such as temperature, air velocity, RH, and transfer heat.

According to Fayle & Gerrard (2002) during production there is a maillard reaction between wheat protein and added sugar and caramelization which is influenced by the distribution of water and added sugars and amino acids (Kent and Evers, 1994). The maillard reaction is related to temperature, time and the presence of a_w / water activity, and the crust color on the bread will be optimal as the occurrence of browning reactions (Eduardo *et al.*, 2013).

Table 4. Lightness of sweet bread

Treatment	L	a *	b *	
Control/C	480 ml	57,26	7,15	1,72
	510 ml	55,9	7,98	1,74
	540 ml	55,99	7,7	1,66
Native/N	0,125%+480 ml	55,11	6,84	1,11
	0,5%+510 ml	55,75	6,36	1,05
	1%+540 ml	56,98	6,79	1,55
Modification/M	0,125%+480 ml	55,3	7,09	1,22
	0,5%+510 ml	54,49	7,29	1,19
	1%+540 ml	56,69	7,29	1,28

Sensory Test

Bread sensory tests with modification and native improver on various concentrations were carried out for overall bread appearance attributes, the inside color of the bread, aroma, texture, taste and melting were swallowed using the scoring method. Based on the sensory test results obtained the overall bread appearance score, the color of the inside of the bread, and the aroma, ranged from likes to a value of 4. The modification improver treatment (1%+540 ml) had a texture and taste that was favored with grades 4.25 and 4, 25 and ease of swallowing with a value of 4.17. Native improver treatment (1%+540 ml) has the preferred texture and taste with values of 3.75 and 3.73 and ease of swallowing with a value of 3.90. Based on the test, Modification

and native sensory improvers are received by consumers. The panelists' assessment of the overall appearance of the bread, the color of the inside of the bread, aroma, texture, taste and ease of swallowing can be seen in Figure 6.

Flavor (aroma and taste) is one of the most preferred sensory characteristics of bread (Caul, 1972, Martinez-Anaya, 1996). Flavor consists of aroma sensation, mouth feeling (Martinez-Anaya, 1996, Caul, 1972, El-D ash, 1967). Improvers, especially starch, protein and water contribute to structural architecture and mechanical strength of bread, assumed to play an important role in changing the nature of cell walls during bread storage (Gray and BeMiller, 2003). Elasticity is mainly influenced by interactions between starch

gelatinization and gluten dough, and can form a continuous spongy structure in bread after

feeding, which results in more elasticity of bread dough (Hoseney and Roger., 1994).

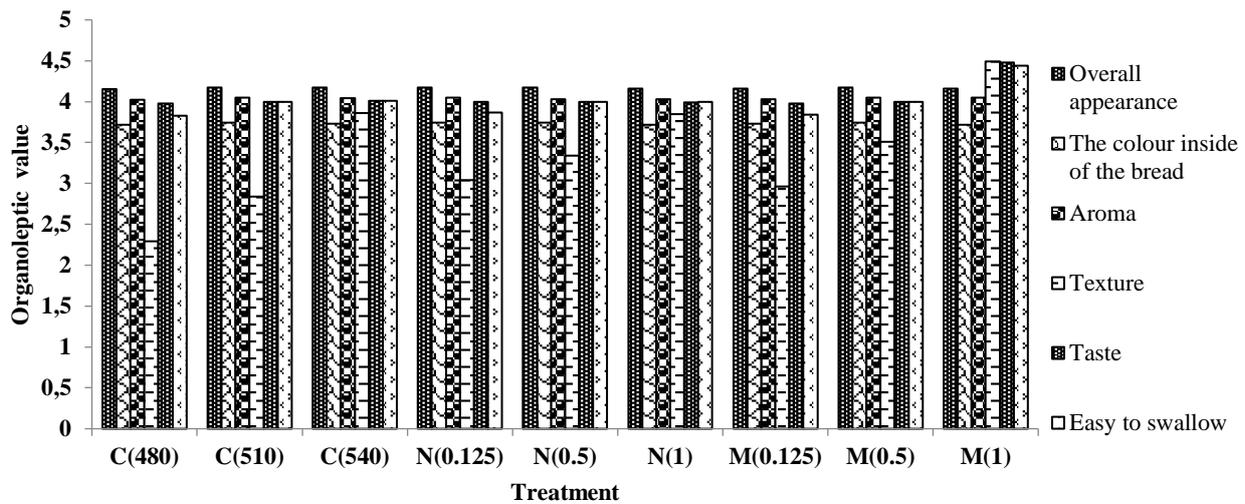


Figure 6. Sensory test of sweet bread with the addition of improver: 0.125%; 0.5%; and 1%

Effectiveness Test

The effectiveness test is carried out to determine the best improver treatment used in sweet bread products. Effectiveness testing is carried out on all parameters, involving expand power, density, H:D, texture, water content, skin color/crust (L, a*, b*) and sensory test (overall appearance, inner color of bread, aroma, texture, taste and ease of swallowing, the color of the inside) on the bread.

The portion given for each parameter is different. The weight for expand power is 1.0; texture of day 5 is 1.0; density of 0.9; water content of 0.8. Weight for sensory test (texture of 1.0; taste of 1.0; overall appearance of 0.9; ease of swallowing by 0.9; aroma of 0.8; color of inner bread is 0.7; and crust color (a* of 0.8; b* of 0.8; and L of 0.8) The effectiveness index of sweet bread with the addition of improvers can be seen in Table 5.

Treatment	Effectiveness Value
Control (+480 ml)	0,352
Control (+510 ml)	0,733
Control (+540 ml)	0,69
Native (0,125%+ 480 ml)	0,418
Native (0,5%+510 ml)	0,332
Native (1%+540 ml)	0,352
Modification(0,125%+ 480 ml)	0,414
Modification (0,5%+510 ml)	0,586
Modification(1%+540 ml)	0,8

Based on Table 5, the effectiveness test of sweet bread with modification improver treatment (1%+540 ml) has the highest effectiveness value of 0.80 with characteristics: expand power 304.1±34.6%; density 0.17±0.00 g/cm³; H:D 0.17±0.02 (cm: cm); 5th day texture 86±28 g/10mm; and the fifth day's staleness is 1.06±0.28%; water content of 25.99±0.90%. Bread sensory test includes crust color a* with a value of 7.29±0.68; b* with a value of 1.28±0.45; and L with a value of 56.69±1.33; and sensory test (overall appearance with a value of 4.09; the color of the inside of the bread with a value of 3.62; aroma with a value of 3.97; texture with a value of 4.25; taste with a value of 4.25; and ease swallowed with a value of 4, 17; the color of the inside of the bread with a value of 3.62 received by the consumer with the value of preference.

CONCLUSION

The modification improver application is very suitable for sweet bread products made from wheat flour, because in the modification improver the old fermentation causes the improver to have a shorter chain that has been converted into simple sugars so that during the proofing process it is used by the yeast as an energy source to increase the expand power. Based on the effectiveness test of sweet bread with modification improver treatment

(1%+540 ml) has the highest effectiveness value of 0.80.

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Kartikasari SN et al.

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