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Stability, Fat Content and Protein Content Test of Instant Powder Protein Combination of Milk, Egg Yolk and Temulawak (Curcuma xanthorrhiza Roxb.) Eggs to Prevent Stunting

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KEY W O R D S

Accelerated Shelf Life Testing (ASLT), Fat Content, Protein Content, Instant Powder Milk Combination, Egg Yolk and Milk, Stability.

A B S T R A C T

Consuming foods or drinks that contain animal protein, such as milk and yolks, is one way to prevent stunting. In addition, the addition of temulawak in the formula can enhance appetite. Innovation is needed to turn milk, yolks, and temulawak into powder because their high protein content makes the products prone to spoilage. Information about the stability and content of products is very important to ensure that the products are safe for consumption. One way to determine the stability of a formulation is to conduct tests at various storage temperatures. The purpose of this research is to determine the storage stability (temperature and shelf life), fat content, and protein content of the instant powder preparation combining milk, yolk, and temulawak. Stability testing using the accelerated stability testing method or Accelerated Shelf Life Testing (ASLT) to determine shelf life. This method uses temperature variations, namely T1: refrigerator temperature 4°C ± 2°C, T2: room temperature 30°C ± 2°C, and T3: warm temperature 40°C ± 2°C for a duration of 2 weeks. The parameters used are moisture content, redispersibility time, and the pH of the preparation. Stability data analysis is calculated using the Arrhenius model and reaction order. The fat content and protein content are determined using the method outlined in the SNI-01-2970-2006 attachment for powdered milk. The research results show that the instant powder combination of milk, yolk, and temulawak has a fat content of 10.09% and a protein content of 71.07%. The stability test of the preparation conducted at storage temperatures of 4°C ± 2°C, 30°C ± 2°C, and 40°C ± 2°C, respectively, showed results based on moisture content (54 days, 26 days, 20 days), redispersibility time (371 days, 99 days, 63 days), and pH of the preparation. (247 hari, 72 hari, 47 hari). The decrease in stability is directly proportional to the increase in storage temperature. In conclusion, the instant powder combination of milk, yolk, and temulawak is stable at storage temperatures below 30°C, with a fat content of 10.09% and a protein content of 71.07%.

1. INTRODUCTION

Stunting is a condition in which toddlers have a lower height and weight compared to their normal height and weight at that age. This condition can be caused by various triggering factors, such as socioeconomic conditions, baby complaints, pregnant women's diet, and nutritional deficiencies for babies. Children who suffer from stunting experience poor physical and cognitive development (Ministry of Health of the Republic of Indonesia, 2018). In Indonesia, the stunting percentage in 2023 is 21.6%. However, according to the Ministry of Health of the Republic of Indonesia (2022), the government hopes that the number of stunting

cases will drop to 14% by 2024 (Ministry of Health of the Republic of Indonesia, 2022). The cause of stunting in children is due to a lack of protein and low appetite. Feeding milk and eggs can be used as a source of protein to complement daily nutritional fulfillment. Milk contains vitamins, calcium, fat, and protein. In addition, eggs have high levels of protein, which helps prevent stunting.

Appetite is a person's desire to eat, feel hungry, and like the food they choose. Consuming turmeric, curcumin, dates, and honey is a non-pharmacological way to deal with decreased appetite. Curcumin and temulawak essential oil can stimulate hunger (Tjondro & Widowati, 2023). Due to its high water content, fresh curcuma quickly spoils if it is not immediately dried or processed (Harahap et al., 2020). One way of processing to prevent damage is to change the product line to produce products with a longer shelf life, such as instant powder drinks (Darniadi et al., 2020).

The combination of egg yolk milk and curcuma in the form of instant powder preparations is expected to maximize the government's efforts to reduce the prevalence of stunting in Indonesia. Instant powder combined with milk, egg yolk and curcuma is a commodity or nutraceutical product whose quality is ensured through stability tests and SNI parameters of milk powder. Pharmaceutical product stability is the ability of a product to maintain its quality according to the quality specifications set throughout the storage and use time period. One way to find out the stability of a preparation needs to be carried out several tests, one of which is the influence on the temperature, where temperature is one of the factors that must be considered in the stability test of the preparation (Asiah et al., 2018).

This study aims to determine the storage stability (temperature and shelf life) by the Accelerated Shelf Life Test (ASLT) method, fat content and protein content of instant powder preparations combined with milk, egg yolk, and curcumin.

2. METHOD

Tools and Materials

The tools used are an oven (Labtech LDO 100E), a refrigerator, freeze dry (Chris T AlpHa 1-2 LDplus), a crucible cup, an analytical scale (Sartorius BSA224S-CW), a crucifixable clamp, a desiccant, a stopwatch, a digital room thermometer (Yieryi HTC-1), a digital pH meter (Mediatech 009), a stirring rod, a watch glass, a metal spatula, a glass beaker 250 mL (pyrex), a measuring cup 100 mL (pyrex), a sieve no mesh 10, horn spoons, and containers or jars. The ingredients used are instant powder preparations combining milk, egg yolk, and temulawak, sucralose, maltodextrin, pH buffer powder, aluminum foil packaging, and aquadest.

The Course of Research

1. Sample Preparation and Material Formulation

   The method of making instant powder preparations with a combination of milk, egg yolk, and curcuma is carried out in several stages such as extracting temulawak, drying ingredients using the freeze drying method to convert liquid materials into powder form. The following is the powder formula of the combination of milk, egg yolk, and curcuma:

Table 1. Instant Powder Formula

Ingredient Name	Concentration (% w/b)	Function
Milk Powder	50	Active ingredients
Egg Yolk Powder	3	Active ingredients

Javanese Turmeric Powder	2	Active ingredients
Sucralose	0,2	Sweetener
Maltodextrin	Ad 100	Filler

The first stage was to prepare 500 grams of fresh temulawak rhizomes, liquid milk, and egg yolks. Fresh curcuma is washed thoroughly, put it in a blender, add 500 mL of water, then blend until smooth. Strain using gauze or a clean cloth to separate the pulp from the juice. Temulawak juice was obtained, then each ingredient, namely fresh temulawak juice, liquid milk, and egg yolk, was freeze-dried separately using a freeze dry tool at a temperature of -560 C for 3 weeks, until temulawak powder, milk powder, and egg yolk powder were obtained. Furthermore, the three ingredients are formulated into instant powder with the addition of maltodextrin excipient as a filler and sucralose as a sweetener (Rowe et al., 2009).

2. Sample Storage at Storage Temperature Variations

   After the instant powder preparation is ready, the next step is to store the preparation at a certain temperature. There are several stages, namely the preparation of tools, materials, and research samples to be used, then each instant powder that has been packaged uses aluminum foil packaging with each weighing 20 grams. Put 8 packs of instant powder preparation each in a refrigerator with a cold temperature of 40C ± 20C, in a room with a temperature of 300C ± 20C, and in an oven with a warm temperature of 400C ± 20C (BPOM RI, 2019).

   Store the preparation according to the predetermined temperature, then monitor the temperature every day using a thermometer with the condition that each temperature is ± 20C. Wait until you arrive at the test interval, where on days 0, 3, 6, 10, and 14 samples are tested for 2 weeks. Stability tests include moisture content tests, redispersibility time tests, and pH tests of preparations (Putri et al., 2018).

3. Sample Stability Test

   a. Water Content Test

      In the study, a moisture content test was carried out to determine the amount of water content in the instant powder preparation of a combination of milk, egg yolk, and temulawak. Moisture content is a critical parameter in determining the quality of dry products such as instant powdered drinks. The moisture content test is one of the chemical stability tests carried out on health supplements that refer to the Food and Drug Supervisory Agency. A gravimetric approach based on the evaporation of water in a material after being heated to 1050 C for a certain period of time until a consistent weight is achieved is used to determine this moisture content (Yanti, 2021).

      The working procedure for moisture content testing is to weigh 1 g – 2 g of samples, then pour them into crucitable dishes, weigh them using an analytical scale. Weighing one to two grams of a sample, pouring it into a steam cup, and then weighing it again using an analytical scale is how moisture content testing works. Next, dry for three hours at 105 o Celsius in the oven. Once cooled in the desik, weigh again, and so on until a consistent weight is achieved. SNI 01-2970-2006 stipulates that the moisture content of powdered milk must be less than 5% (National Standardization Agency, 2006).

The moisture content can be calculated by the following formula:

$$\%\ \text{Water content} = \frac{(W1) - (W2)}{(W1) - (W0)} x100\%$$

Information:
W0 = empty cup weight (g)
W1 = sample weight + cup before drying (g)
W2 = sample weight + cup after drying (g)

b. Redispersibility Time Test
In this study, a redispersibility time test was carried out to calculate how long it took for instant powder preparations to be dispersed evenly in aquadest. One of the physical stability tests used for health supplements referred to by the Food and Drug Administration is redispersibility time. If the redispersibility time of instant beverage powder is faster, the time it takes for the powder to be dispersed in the medium (aquadest) indicates that the powder is easier to distribute (BPOM Health Supplement Stability Test, 2023).

The redispersible time test was carried out by weighing 5 grams of samples, then dispersed in 100 mL of aquadest in a 250 mL beaker glass. Then use a stopwatch to calculate the speed at which the powder is dispersed in the water. The redispersibility time of instant powder preparations of less than five minutes is a criterion for the redispersibility test value (Zuniarto et al., 2021).

c. pH Test
In the study, a pH test was carried out on the preparation to determine the alkalinity or acidity level of the product. Acidic solutions have a pH below 7, neutral solution pH is 7, while alkaline solutions are above 7 to 14. The pH test is one of the physical stability tests carried out on health supplements that leads to the Food and Drug Administration. The pH determination technique uses a pH meter consisting of a reference column electrode and a hydrogen glass electrode. In SNI 01-2891-1992 concerning Food and Beverage Testing Methods. First, a pH buffer solution is used to calibrate the pH meter. Then, the electrodes that have been cleaned with aquadest are dipped into the sample for testing. pH is measured and recorded on the pH meter scale (National Standardization Agency, 1992).

Powder preparations are considered good if the acidity level is close to the neutral pH of 6 to 7. A very acidic pH value will irritate the stomach and if it is too alkaline it will make the food taste bitter, so pH regulation is very important (Rahmawati et al., 2016).

4. Fat content
The fat in the sample is hydrolyzed with ammonia and alcohol and then extracted with ether. The obtained ether extract is then evaporated until dry in an aluminum plate and the fat content is calculated gravimetrically.
How it works:
a. weigh 1 g sample of milk powder into an extraction pumpkin (W), add 10 ml of distilled water, stir so that it forms a paste, and heat if needed;
b. add 1ml to 25ml of concentrated ammonium hydroxide, heat in a water bath at a temperature of 600C to 700C for

15 minutes, stirring occasionally and cool;

c. add 3 drops of phenolphthalein indicator, 10 ml of 95% alcohol %, cover the extraction pumpkin, and stir for 15 seconds;
d. for the first extraction; Add 25 ml of ethyl ether, cover the extraction pumpkin, and beat tightly for 1 minute
e. Loosen the extraction pumpkin lid occasionally if needed.
f. Add 25 ml of petrolium ether, cover the extraction pumpkin, and beat tightly for 1 minute
g. Loosen the extraction pumpkin lid occasionally if needed.
h. centrifuge the pumpkin at 600 rpm for 30 seconds so that the separation of the water phase (bright pink) and ether occurs clearly.
i. carefully pour a layer of ether into a fat flask or an empty aluminum plate of known weight (W0);
j. A layer of water is used for subsequent extraction.
k. For the second extraction, repeat the C – J process with the addition of 5 ml of 95% alcohol, 15 ml of ethyl ether and 15 ml of petrolium ether.
l. For the third extraction, repeat the C – J operation with no addition of 95% alcohol, 15 ml ethyl ether and 15 ml petrolium ether (the 3rd extraction does not need to be done for skim milk)
m. steam the solvent on a water bath and dry the fat pumpkin/aluminum plate containing the fat extract in the oven at (100 ± 1)oC for 30 minutes or vacuum oven at 70oC to 75oC with a pressure of <50 mf Hg (6.7 Kpa);
n. refrigerate in a desicator and weigh until a fixed weight (W1).

Calculation of fat content in a sample with the formula:

$$\% \text{ Fat content} = \frac{(W1) - (W0)}{(W)} x100\%$$

with;
W = is the example weight, (g);
W0 = is the weight of the fat pumpkin/empty aluminum plate, (g);
W1 = is the weight of the fat pumpkin/empty aluminum plate and fat, (g).

5. Protein content (Nx6.38)
The sample was constructed with H2SO4 using CuSO4.5H2O as the catalyst and K2SO4 to increase its boiling point aiming to release nitrogen from the protein as ammonium salt. The ammonium salt is decomposed into NH3 during distillation using NaOH. The released NH3 is bound with boric acid to produce ammonium borate which is quantitatively titrated with an acid raw solution so that total nitrogen is obtained. The protein content of milk is obtained from the product of total nitrogen with 6.38.
How it works:
   a. weigh 1 g of the sample into the Kjeldahl pumpkin, add 15.00 g of K2SO4, 1 ml of CuSO4.5H2O catalyst solution or 1 g of selenium catalyst mixture, 8-10 boiling stones and 25 ml of concentrated H2SO4;
   b. Heat the mixture in an electric heater until it boils and the solution becomes greenish-clear. Do it in a fume hood or equip the destruction device with a smoke extraction unit;
   c. let cool, then dilute with distilled water to taste;
   d. add 75 ml of NaOH 30% solution. (check with the PP indicator so that the mixture becomes alkaline);
   e. distill for 5 - 10 minutes or when the

distillate solution has reached approximately 150 ml, with the distillate reservoir being 50 ml of 3 % H3BO4 solution;

f. rinse the cooling tip with distilled water;
g. titar a solution of distillate mixture with HCl solution of 0.1000 M;
h. Work on the determination of blanks.

Calculation of protein content with the formula:

$$\% \text{ Protein content} = \frac{(V1 - V2)\ x\ N\ x\ (14{,}008)}{(W)} x100\%$$

with:
V1 = is HCl Volume 0.1000 N for sample titration, (ml);
V2 = is 0.1000 N HCl Volume for blank titration, (ml);
N = is the Normality of HCl solution;
W = is the weight of the example (mg);
14.008 = is the atomic weight of Nitrogen.
6.38 = is the protein factor for milk

Data Analysis

The data from each stability test was analyzed using linear regression techniques, order of reaction, and the Arrhenius model.

3. RESULT AND DISCUSSION

1. Determination of Temulawak Plants (Curcuma xanthorrhiza Roxb)
   The temulawak plant used is a root simplicia in the form of rhizomes. Obtained from Rajagaluh Village, Rajagaluh District, Majalengka Regency. This temulawak plant was determined at the Botanical Laboratory, Department of Biology Education, Siliwangi University. The results of the plant determination showed that Curcuma xanthorrhiza Roxb was a sample of the temulawak plant used (Appendix 1).

2. Stability Test of Preparations
   The stability test of the instant powder preparation was carried out for 2 weeks at each storage temperature which included moisture content test, redispersibility time test, and pH test of the preparation. To determine the shelf life of the product, it is determined by the highest determination coefficient (R2) value and the lowest Ea value which indicates a very rapid quality deterioration (Asiah et al., 2018).

Water content test

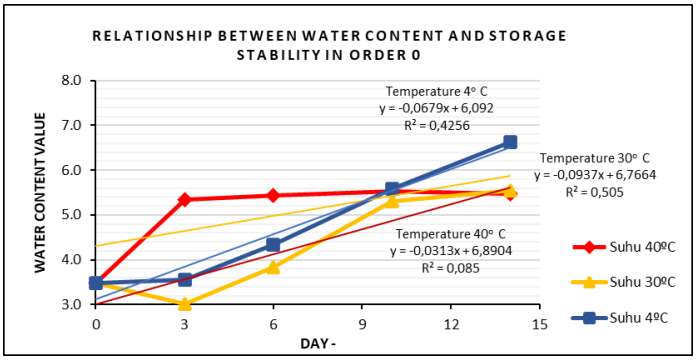
The moisture content requirement in powdered milk in SNI 01-2970-2006 is <5% (National Standardization Agency, 2006). The following are the results of testing the moisture content of combination instant powder preparations, egg yolks, and curcuma at storage temperature shown in table 2.

Table 2. Water content values of instant powder

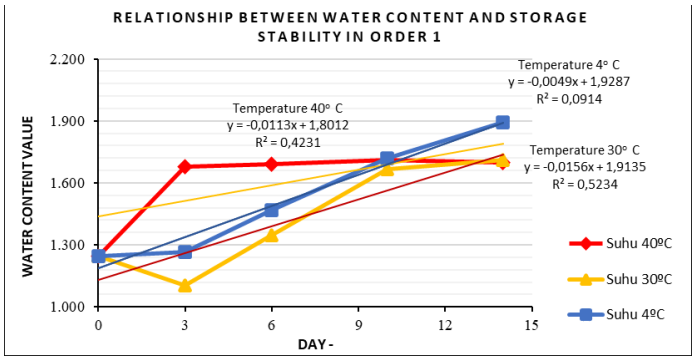
Day -	Water content		
	Temperature 4°C	Temperature 30°C	Temperature 40°C
0	3,48	3,48	3,48
3	3,55	3,01	5,35
6	4,34	3,84	5,43
10	5,58	5,3	5,53
14	6,63	5,54	5,47

The results of the moisture content analysis produced tend to increase and decrease, this is due to temperature fluctuations during storage. The higher the temperature, the higher the moisture content value in the product, which indicates a decrease in quality or increased food spoilage (Abustang & Sushanti, 2022).

The temperature and permeability of the packaging affect the increase in moisture content in food products. This change in moisture content occurs because the material absorbs moisture from the environment. Temperature and storage time affect the increase in water activity value in the powder (Miskiyah & Yuanita, 2020). The smaller the permeability of the packaging, the smaller the water vapor permeability, and vice versa. The permeability of packaging materials will increase when storage temperatures are high, resulting in greater moisture from the environment that can pass through packaging materials (Setyani et al., 2022). This study uses aluminum foil packaging because it has a low permeability value that can resist moisture, light, fat and gases that will enter the product, flexible, and not translucent, (Aprida, 2017). The moisture content of the product tends to increase with the addition of maltodextrin and drying time. This is because maltodextrine is hygroscopic, meaning it can absorb water, which causes water content to increase (Kaljannah et al., 2019). The relationship between moisture content values and storage time at 40C ± 20C, 300C ± 20C, and 400C ± 20C for 14 days results in the linear regression equation shown in the following graph:

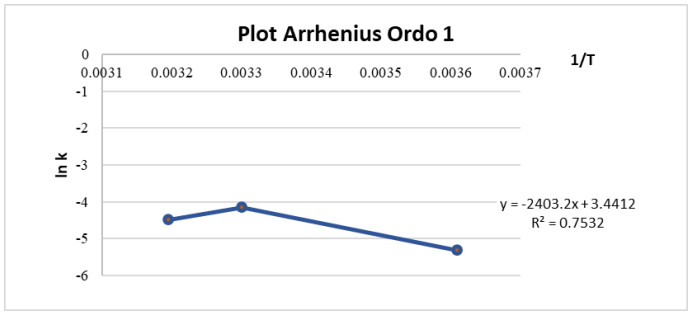


Graph 1. Relationship between moisture content and storage stability in the 0th order



Graph 2. Relationship between moisture content and storage stability in order 1

From graph 1. and 2. shows that the reaction order that has the largest determination coefficient (R2) value is the reaction order used to determine the Arrhenius equation. In the stability test with the moisture content parameter, the determination coefficient value (R2) at various storage temperatures shows that the 1st order has a higher (R2), so it was chosen to determine the Arrhenius equation. Furthermore, the slope value (b) of the linear equation in the order of 1 is plotted as the value k to the Arrhenius Model ln k = ln ko – (Ea/R) (1/T). The following is a regression graph using the Arrhenius Model.



Graph 3. Plot of Arrhenius water content in order 1

The Arrhenius equation for the combination instant powder preparation, egg yolk, and curcuma is shown in graph 3. In the stability test with moisture content parameters, the resulting Arrhenius equation is where the intercept value ln ko = -2403.2, slope (Ea/R) = 3.4412 and Ra =

0.7532. The results of the calculation with Arrhenius can estimate that the stability of the storage temperature based on the moisture content parameter of instant powder combination of milk, egg yolk, and curcuma is 54 days at a refrigerator temperature of 40C ± 20C; 26 days at room temperature 300C ± 20C, and 20 days at 400C ± 20C.

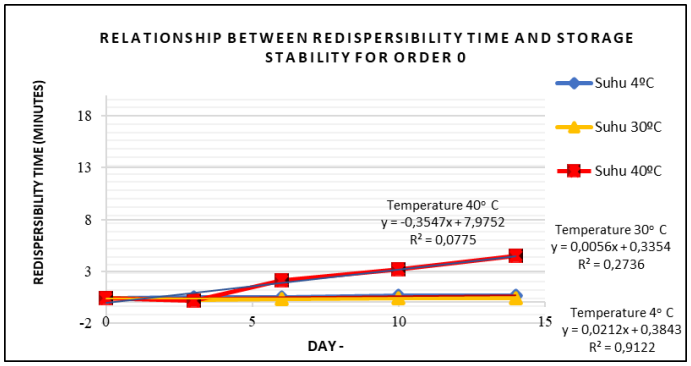
Redispersibility Time

Instant powder preparations are tested for redispersibility time in aquadest. The requirement for redispersibility test values for instant powder preparations is less than 5 minutes (Zuniarto et al., 2021). The following are the results of testing the redispersibility time of combination instant powder preparations, egg yolks, and curcuma during storage shown in table 3.

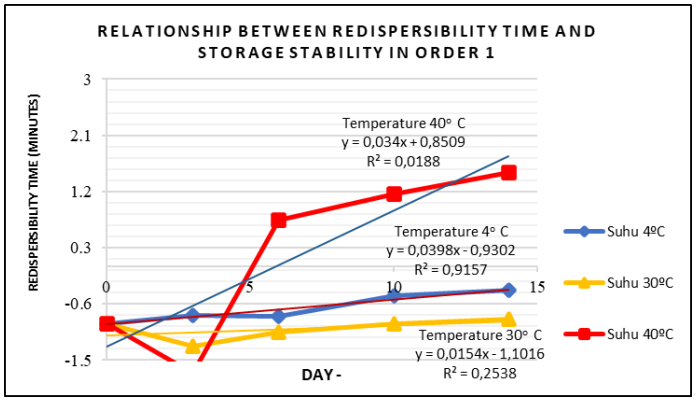
Table 3. Instant powder redispersibility time values

Day 2-	Redispersibility Time (Minutes)		
	Temperature 4°C	Temperature 30°C	Temperature 40°C
0	0,4	0,4	0,4
3	0,46	0,28	0,18
6	0,45	0,35	2,1
10	0,63	0,4	3,2
14	0,68	0,43	4,47

The redispersibility time of a preparation is affected by the moisture content, the higher the moisture content of a material, the lower the redispersibility time value because it tends to form larger granules. It was obtained that the value of moisture content is directly proportional to the redispersibility time, the higher the moisture content, the higher the redispersibility time. The high moisture content in the material will form bonds that can cause clumps to form, so the material cannot absorb much water and the bonds between the particles need to be broken down for a long time which can reduce the ability of the product to be dispersed (Setyani et al., 2022). The following graph of the relationship between redispersibility time and storage stability at 40C ± 20C, 300C ± 20C, and 400C ± 20C for 14 days results in the linear regression equation shown in the following graph.



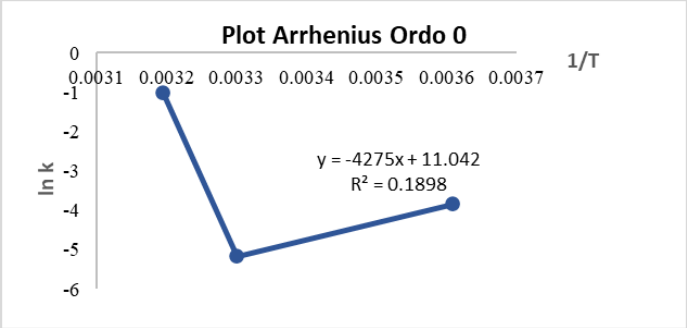
Graph 4. Relationship between recontinuity time and storage stability in the 0th order



Graph 5. Relationship between rescontinuity

time and storage stability in order 1

From graph 4. and 5., In the stability test with the redispersibility time parameter, the value of the determination coefficient (R2) at various storage temperatures was seen that the order 0 had a higher (R2), so it was chosen to determine the Arrhenius equation. Furthermore, the slope value (b) of the linear equation in the order of 0 is plotted as the value of k to the Arrhenius Model ln k = ln k0 – (Ea/R) (1/T). The following is a regression graph using the Arrhenius Model.



Graph 6. Arrhenius Plot Redispersibility Time Order 0

Arrhenius' equation for the combination instant powder preparation, egg yolk, and curcuma is shown in graph 6. In the stability test with the redispersibility time parameter, the resulting Arrhenius equation is where the intercept value ln k0 = 11.042, slope (Ea/R) = -4275 and Ra = 0.1898. The results of the calculation with Arrhenius can estimate that the stability of the storage temperature based on the redispersibility time parameter of instant powder combination of milk, egg yolk, and curcuma is 371 days at a refrigerator temperature of 40C ± 20C; 99 days at room temperature 300C ± 20C, and 63 days at 400C ± 20C.

pH of the preparation

pH is the acidity standard to determine the quality of instant powder that has been dispersed with water (aquadest). Powder preparations are considered good if the acidity level is close to the neutral pH of 6 to 7. A pH value that is too acidic or alkaline will irritate the stomach and make food taste bitter (Rahmawati et al., 2016). The following are the results of pH testing of combination instant powder preparations, egg yolks, and curcuma at various storage temperatures shown in table 4.

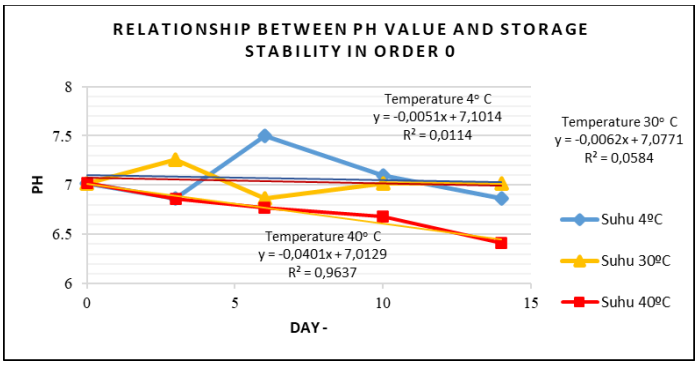
Table 4. Instant powder pH test values

Day -	pH		
	Temperature 4°C	Temperature 30°C	Temperature 40°C
0	7,02	7,02	7,02
3	6,86	7,26	6,86
6	7,5	6,86	6,77
10	7,1	7,02	6,68
14	6,86	7,02	6,41

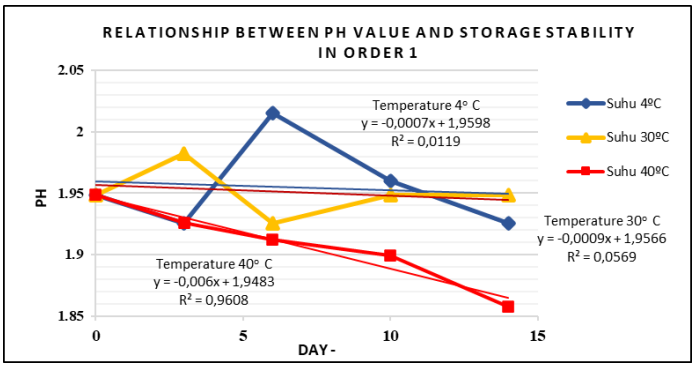
Table 4. showed that the pH value of the combination instant powder, egg yolk, and temulawak was in the range of 6.41-7.50 where the value still met the requirements for instant powder preparations, namely acid close to neutral. The resulting pH value decreases for 14 days of storage at each storage. The optimum pH value is 5 to 7, in this range microorganisms can live and multiply well, on the other hand, if the environmental pH is too high or too low, it will affect the survival of microorganisms (Fajar et al., 2022).

Maltodextrin is a type of polysaccharide

carbohydrate that is able to make the pH of food alkaline, because it can reduce the acidity of food. This is because the compound contains many hydroxyl groups (OH), which allows it to neutralize the acidic properties of raw materials (Fiana et al., 2016). The following graph of the relationship between pH value and storage stability at 4oC ± 2oC, 30oC ± 2oC, and 40oC ± 2oC for 14 days results in the linear regression equation shown in the following graph.

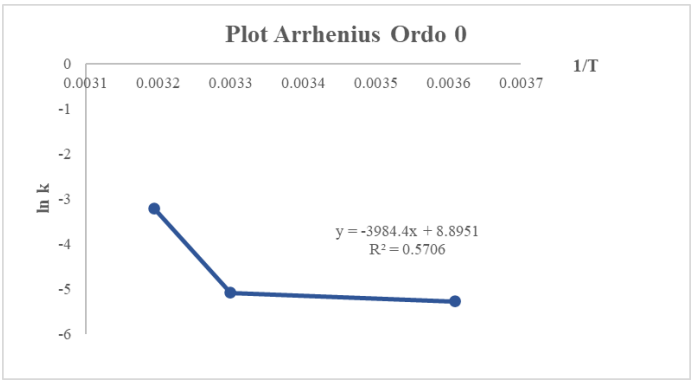


Graph 7. Relationship between pH value and storage stability in the 0th order



Graph 8. Relationship between pH value and storage stability in the 1st order

From graph 7. and 8., In the stability test with the pH value parameter of the determination coefficient value (R2) at various storage temperatures, it is seen that the order 0 has a higher (R2), so it was chosen to determine the Arrhenius equation. Furthermore, the slope value (b) of the linear equation in the order of 0 is plotted as the value of k to the Arrhenius Model ln k = ln ko – (Ea/R) (1/T). The following is a regression graph using the Arrhenius Model.



Graph 9. Arrhenius plot pH value Order 0

Arrhenius' equation for the combination instant powder preparation, egg yolk, and curcuma is shown in graph 6. In the stability test with the pH value parameter, the resulting Arrhenius equation is where the intercept value ln ko = 8.8951, slope (Ea/R) = -3984.4 and Ra = 0.5706. The results of the calculation with Arrhenius can estimate that the stability of the storage temperature based on the pH value parameter of instant powder combined with milk, egg yolk, and curcuma is 247 days at a refrigerator temperature of 4oC ± 2oC; 72 days at room temperature 30oC ± 2oC, and 47 days at 40oC ± 2oC.

3. Fat Content Test and Protein Content Test
   Fat content and protein content are the quality criteria for milk powder according to SNI-01-2970-2006. The results of the fat and protein content tests in instant powder with a combination of milk, egg yolk and curcuma can be seen in table 5.

Table 5. Instant powder quality criteria

Preparation	Fat Content (% w/w)	Protein Content (% w/w)
Instant powder combination of	10,09	71,07

milk, egg yolk and turmeric		
Full fat milk powder (SNI-01-2970-2006)	Min. 26	Min. 23

Based on the results of the fat content test presented in table 5., instant powder combined with milk, egg yolk and curcuma has a fat content of 10.09%. The fat content is lower than the SNI-01-2970-2006 parameter of fatty milk powder, because the raw materials used are not only milk, but use raw materials such as egg yolk and temulawak sourced from rhizomes that contain more water.

The results of the protein content test of instant powder protein content combined with milk, egg yolk and curcuma have a protein content of 71.07%. The high protein content is due to the raw materials used are milk and egg yolks which are rich in protein. The protein content of instant powder protein of the combination of milk, egg yolk and curcuma meets the parameters of SNI-01-2970-2006 milk powder.

4. CONCLUSION

Based on the results of the study and discussion, it can be concluded that the instant powder combined with milk, egg yolk and curcuma is stable at a storage temperature of less than 30oC with a fat content of 10.09% and a protein content of 71.07%. Instant powder combined with milk, egg yolk and curcuma has a high protein content, so it can be used to prevent stunting.

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