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Freshwater Clams (*Pilsbryoconcha Exilis*) as an Potential Local Mineral Sources in Weaning Food to Overcome Stunting in Grobogan, Central Java, Indonesia

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Abstract. Based on a preliminary survey in Grobogan Central Java, one of the local food that has a prospective nutrient content developed is freshwater clams. Results of PSG report in 2015, especially in Grobogan district with stunting problem of 31.5% consisting of 7.2% very short and 24.1% short. From the stunting event factor, the role of weaning food in the form of baby porridge is the most important component in the fulfillment of infant nutrition. The research is divided into two stages of the research is the initial stage to make the formulation process by way of freshwater clams, nutrient analysis, and formula calculation. The second stage is the process of formulation weaning food by way of formula making, nutrient analysis, and acceptance test of weaning food on the baby slurry is substituted by the freshwater clams. The influence statistically different substitution of freshwater clams on protein content (p=0.014), fat (p=0,041), carbohydrate (p=0,039), water (p=0,0001), ash (p=0.0001), iron (p=0.0001), and zinc (p=0.0001). There is no influence substitution of freshwater clams on energy content (p=0,129) and fiber (p=0,225). The percentage of favorite level on the acceptance test of color (p=0,005) and taste (p=0,006) was statistically different, but there was no difference flavour (p=0,913) and texture (p=0,198). freshwater clams flour is rich in iron and zinc content, so it can serve as local food, especially in Grobogan Central Java as a stunting handling. Obtained from the results of several formulations substituted of freshwater clams in formulation 2 is a formula that can meet the standards of KEPMENKES except on the content of protein and moisture content. Formula 2 acceptable to the panelists, except for the assessment of taste.

Keywords: freshwater clams, Weaning food, Value of nutrients, Stunting

A. Introduction

Nutrition problems in Indonesia are increasingly complex, where the problem of malnutrition is a problem that must be handled. The National Medium Term Development Plan for 2010-2014 states that improving the community's nutritional status is one of the priorities by reducing the prevalence of short toddlers (stunting) to 32%. Based on the results of Riskesdas Central Java, especially Grobogan District, is one of the problems with high stunting occupy the second position in the province. The result of the report from Riskesdas of Central Java Province in 2013 has stunting rate of 36.7% which consists of

16.8% very short and 19.8% short [1]. According to the Determination of Nutritional Status (PSG) 2015 Grobogan District [2], with stunting problems of 31, 5% consisting of a very short 7.2% and a short 24.1 %. Public health problems are categorized as severe if the short prevalence is 30-39% and is seriously categorized when the prevalence is ≥40% [3].

Of the factors that may affect the incidence of stunting, the role of the family in the care of the child greatly determines the nutritional status and development of children. Maternal care patterns closely related to the pattern of consumption of child feeding, the quality and quantity of breastfeeding (breast milk) and weaning food (food companion breast milk). The quality and quantity of good weaning food is the most important component, with nutrient content that plays a role in child growth [4]. Weaning food is a food given to under-fives under two years, especially 6 to 24 months. Provision of weaning food over 6 months due to the fulfillment of breast milk alone can not meet the needs so the need for introduction to toddlers to family food. Breastfeeding foods can be baby porridge, which contains various nutrients such as carbohydrates, proteins, fats, vitamins, and other minerals [5].

According to the Decree the Minister of Health the Republic of Indonesia, the manufacture of baby milk powder in powder form must meet the nutritional needs, with energy content per 100 grams of 400 to 440 kcal; Protein content of 15 to 22 grams; Fat 10 to 15 grams; Fiber with a maximum content of 5 grams; Iron content of 5 to 8 mg; Zinc of 2.5 to 4 mg; and water content up to 4 grams [6]. The preparation of weaning food generally comes from a mixture of rice flour, skim milk, refined sugar and vegetable oil [7]. To increase the nutrient content, these substances can be substituted with locally sourced foods of protein and substances iron. One of the local foods sourced from protein and iron that can be utilized as weaning food based on preliminary survey in Grobogan area that is shellfish (*Pilsbryoconcha exilis*) [8]. Local food is shellfish is an appropriate alternative way as one way of fulfilling the nutrition of toddlers In the area.

freshwater clams belong to Pelecypoda animals that can live in rivers, freshwater, lakes, and ponds [9]. This material has a protein content of 7.37 grams and iron of 31.02 mg [8]. Protein in freshwater clams is one of the nutrients Macro consisting of more complete amino acids than vegetable proteins [10]. Freshwater clams are used by the community as food and as a source of animal protein, usually available in the freshest form ready to be cooked and processed [8].

Based on the above background, the research was conducted to find out the nutrient content of freshwater clams flour and powder formulation of weaning food, as well as acceptance test of infant porridge in weaning food substituted freshwater clams (*Pilsbryoconcha exilis*) with various formulations as the manifestation of breastfeeding food stunting Children Below Two Years.

B. Methods

The research belongs to the field of food production or food technology. The research is divided into two stages, namely the initial stage of determining the formulation by way of freshwater clams, nutritional analysis, and formula planning. The second stage is done formulation process by making the formulation of weaning food substituted flour freshwater clams, nutrient analysis, and panelist acceptance test. Implementation of the research was carried out for seven months, which was conducted in Integrated Laboratory of Diponegoro University, Faculty of Agricultural Technology Study Program of Food Technology, Soegijapranata Catholic University, and Central Laboratory of Pollution Prevention Industry (BBTPPI). Each treatment performed at least two repetitions on the Bomb Calorimeter (energy), gravimetric (ash and fiber), AAS/Atomic Absorption Spectrometry (iron and zinc), ICP/Inductively Copled Plasma (lead), and carbohydrate by difference (carbohydrates). Minimum of three repetitions on Bradford (protein), oven (air), and soxhlet (fat).

The initial phase of the research was done by determining the formulation process with the process of processing the freshwater clams into flour from Kedung Ombo Reservoir, Grobogan Central Java. Initial process is done that is shell washing twice as many stages, drain the shell, boil the shell for 30 minutes, separate the shell with mussel meat, cut the shell meat thinly, dry the mussel meat with dry oven with temperature 50-60◦C for 24 hours, Grind the dried mussels using a grinder, and sift the flour using a 1000 micrometer sieve. Flour that has been through the stage until sieving, the process of testing

the content of nutrients in the form of energy, protein, fat, carbohydrates, fiber, ash, water, zinc, iron, and lead levels. Planning uses calculations from the analysis of nutrient content of flour shellfish with a list of food composition (DKBM). The initial composition of the baby slurry used was 35% rice flour, 50% skim milk, 10% vegetable oil, and 5% refined sugar [11]. So that four treatments (F1/control, F2, F3 and F4) were obtained in the form of a combination of substitution of freshwater clams flour by 5%, 10% and 15%.

The second stage with the formula of planning results, then carried out the stage of formulation. Prior to the process of mixing the formulation, the flour of rice was processed by gelatinization. Where the gelatinization stage of rice flour is to weigh the rice and air flour with a ratio of 1: 4, then stir the dough until evenly, heat the dough until the form of a gray transparent gel, put the dough on the baking sheet to do drying process using dry oven with 50- 60◦C for 24 hours, the dry dough of the grinding process using a grinder, and the sieving process using a 1000 micrometer. Furthermore, the process of making weaning food powder through a stage such as weighing the materials according to the formulation plan, mixing the material using blander for 5 minutes, drying the formulation using dry oven for 1 hour. Formulations with various concentrations, conducted testing of nutrient analysis in the form of energy content, proteins, fats, carbohydrates, fiber, air, ash, zinc, and iron.

Assessment of acceptance of weaning food on infant porridge with various formulations on color, aroma, texture, and taste using hedonic test with 4 rating scale 1 (very like), 2 (like), 3 (dislike), 4 (very dislike). Assessment of acceptance of baby slurry is ready to be served to 25 rather skilled panelists who are undergraduate students of Nutrition Science Program Diponegoro University of Semarang. The process of serving the infant porridge substituted shellfish by brewing the baby powder with the addition of water (treatment 1: 8) for 8 minutes using a stove until smooth textured porridge in the absence of clots.

The data that has been collected is then analyzed using a computer. The effect of variation of freshwater clams substitution on nutrient content was tested using one way ANOVA with 95% confidence degree followed by Tukey posthoc test to know the real difference between treatment, as well as acceptance test was done statistical analysis using Friedman test.

C. Result

1. Determination of formulation

Based on a preliminary survey in the Grobogan area on the freshwater clams (Pilsbryoconcha exilis) is an appropriate alternative way as one way of fulfilling the nutrition of children under five in the area. This material has high iron and zinc content [12]. The following is the result of laboratory tests on freshwater clams flour presented in Table 1.

Table 1. The content of freshwater clams flour (100 grams)

Nutrition	Content	Unit
Energy	350.4	Kkal
Protein	8.1	Gram
Fat	5.8	Gram
Carbohydrate	60.8	Gram
- Fiber	2.2	Gram
Ash	19.5	Gram
Water	3.7	Gram
Irin	170	Mg
Zinc	48.6	Mg
Lead	0.4	ppm*

*Terms of lead level not more than 1.14 ppm[6]

The formulation aims to increase the nutritional value of weaning food, therefore the freshwater clams flour iron and zinc are substituted with skim milk. Based on calculations from the analysis of freshwater clams flour content in preliminary test and list of food ingredients composition (DKBM),

it is determined substitution of freshwater clams flour by 5%, 10%, and 15% which is attached in Table 2.

Table 2. Composition of MP-formula formulation of baby powder

Information	F1 (Control)	F2	F3	F4
freshwater clams flour	0%	5%	10%	15%
Skim milk	50%	45%	40%	35%
Rice flour	35%	35%	35%	35%
Vegetable oil	10%	10%	10%	10%
Refined sugar	5%	5%	5%	5%
Total	100%	100%	100%	100%

Description: F is a formula

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2. Weaning Food with Substitution of Freshwater Clams Flour

a) Nutrient Contents in Weaning Food

Tabel 3. Results of nutrient content between treatments

Treatment	Energy (kkal)	Protein (gram)	Fat (gram)	Carbohydrate (gram)	Fiber (gram)	Ash (gram)	Water (gram)	Iron (mg)	Zinc (mg)
F1 (Control)	424.5±1.9	10.7±0.5[a]	11.9±0.7[ab]	67.1±1.1[a]	2.09±0.6	2.69±0.0[a]	5.23±0.1[a]	1.1±0.0[a]	2.8±0.0[a]
F2	425.4±4.8	13.1±0.8[b]	10.6±0.5[a]	65.2±0.9[a]	2.70±0.6	3.38±0.0[b]	5.36±0.1[a]	7.9±0.0[b]	2.8±0.0[a]
F3	410.6±5.1	12.1±0.8[ab]	11.6±0.3[abc]	61.8±1.0[b]	3.65±0.2	3.94±0.0[c]	6.11±0.2[b]	14.5±0.1[c]	3.7±0.0[b]
F4	410.1±10.4	11.5±0.1[ab]	12.1±0.5[ac]	63.7±1.3[ab]	1.69±1.2	4.53±0.0[d]	6.25±0.2[b]	20.5±0.1[d]	4.7±0.0[c]
Terms of KEPMENKES	400-440	15-22	10-15	-	Maximum 5	-	Maximum 4	5-8	2.5-4.0
p value	0.129	0.014	0.041	0.039	0.225	0.0001	0.0001	0.0001	0.0001

Information : F is a formula, Figures followed by different superscript letters (a, b, c, d) show real differences
*Testing with one way ANOVA

There was influence of freshwater clams substitution with 0%, 5%, 10%, and 15% on protein content (p=0.014), fat (p=0.041), carbohydrate (p=0.039), water content (p=0.0001), ash (p=0.0001), iron (p=0.0001) and zinc (p=0.0001). Meanwhile, in the energy content (p=0.129) and fiber (p=0.225) there was no influence with the freshwater clams substitution of 0%, 5%, 10%, and 15%.

The requirements of KEPMENKES regarding the specification of weaning food on formula 1 (F1 / Control) that have fulfilled the requirements include energy, fat, fiber, iron and zinc content. Formulation 2 (F2) with 5% shellfish substitution includes energy, fat, fiber, iron and zinc content. The shell substitution is 10% in formulation 3 (F3), including energy, fat, fiber and zinc content. Meanwhile, the formulation of 4 (F4) with the shellfish substitution of 15% includes the energy, fat, and fiber content. In carbohydrate content, there is no special requirement on the specification but the highest content of the freshwater clams substitution in formulation 2 and the lowest content of formulation 4.

b) Receive power test

Formulation 2 (F2) with 5% freshwater clams substitution includes energy, fat, fiber, iron and zinc content. The shell substitution is 10% in formulation 3 (F3), including energy, fat, fiber and zinc content. Meanwhile, the formulation of 4 (F4) with the freshwater clams substitution of 15% includes the energy, fat, and fiber content. In carbohydrate content, there is no special requirement on the specification but the highest content of the freshwater clams substitution in formulation 2 and the lowest content of formulation 4.

Table 4. Results of trial analysis of weaning food baby slurry with subchiefs of freshwater clams

Treatment	Color		Taste		Flavour		Texture	
	Average	Info.	Average	Info.	Average	Info.	Average	Info.
F1 (Control)	2.92±0.57^{a}	Like	2.56±0.76^{abc}	Like	2.64±0.63	Like	2.60±0.81	Like
F2	3.16±0.74^{b}	Like	2.20±0.70^{a}	Dislike	2.76±0.72	Like	2.92±0.86	Like
F3	2.44±0.71^{b}	Dislike	1.80±0.76^{b}	Dislike	2.68±0.98	Like	2.68±0.80	Like
F4	2.44±0.82^{a}	Dislike	2.56±0.71^{c}	Like	2.68±0.85	Like	2.48±0.82	Dislike
p *value*	p=0.005		p=0.006		p=0.913		p=0.198	

Information: F is a formula, Figures followed by different superscript letters (a, b, c, d) show real differences

The color of the infant formula formulation in weaning food made from the freshwater clams flour, obtained in formulation 2 (F2) is favored by the panelists of the other formulations. In the taste of a baby porridge, in formulation 1 (F1 or control) in the absence of addition of freshwater clams flour and formulation 4 (F4), it may be accepted by the panelists included in the likes category. Meanwhile, on the aroma of baby porridge on the weaning food all data formulations received by the panelist with the likes category. Similarly, in the texture, obtained formulations 1 to 3 can be favored by the panelists, while in the formulation of 4 with subchiefs of flour shellfish of 15% is not favored by the panelists. The percentage of substitution preference level on color (p=0.0005) and taste (p=0.0006), statistically obtained there was a significant difference in subchief of flour shell flour. While in the aroma (p=0.913) and texture (p=0.198), there is no difference in the preferred level of substitution of freshwater clams flour.

D. Discussion

1. Determination of formulation

Food diversity program is currently being encouraged, one of the efforts that can be done is to make food that has high nutrient content. One type of product that has a high iron and zinc content of freshwater clams flour. The content of freshwater clams flour per 100 grams is 350.4 kcal on energy, 8.1 gram protein, 5.8 gram fat, 60.8 gram carbohydrate, 2.2 gram fiber, 19.5 gram ash content, 3.7 gram water content, 170 mg iron content, 48.6 mg zinc , and 48.6 ppm lead. Research on lead levels has met the requirements according to KEPMENKES, where the lead content (metal contamination) for weaning food does not exceed 1.14 ppm.

One of the efforts of food diversity in this research is to make a product of weaning food in the form of baby porridge as an alternative food of baby companion, especially in Grobogan area in handling stunting problem, which has high nutritional and economic value. Before making a formula product, it is necessary to have a formulation planning stage. The result of the analysis of the content of the freshwater clams flour that has been obtained is then calculated with a list of food composition (DKBM) to find out the content contained in skimmed milk powder, refined sugar, vegetable oil, and rice flour.

2. Weaning Food with Substitution of Freshwater Clams Flour

a) Nutrient Content

Energy

The energy content of baby powder in weaning food with substitution of freshwater clams ranges between 410,11-424,53 kcal per 100 gram. Based on the infant powder requirements of weaning food according to KEPMENKES in which the energy content of 400-440 kcal in 100 grams, all of the infant powder treatment in the weaning food meets the requirements [6]. Formula 2 is the formula with the highest energy content, while formula 4 is the content The lowest energy of the four formulations.

Energy requirements in infants are 24-30% greater than in infants ages 3-5 months [13]. Infants aged 6-12 months, complementary feeding is a transitional period from milk-based intakes to semi-solid foods. So that breastfeeding food given to the baby must meet the requirements of energy adequacy [14]. In the human body, energy is shattered due to the burning of carbohydrates, proteins and fats. Thus in order to be fulfilled his energy needs needed intake with enough nutrients into the body. If the body is in a state of lack of energy source substances such as carbohydrates and fats, then the body will use proteins to form energy and replace its main function as a builder substance. In toddlers this condition has a disruption to growth [15].

Protein

The results showed that infant powder protein content of breastfeeding food (weaning food) with freshwater clams substitution ranged from 10.71 to 13.18%. Where is the requirement of protein content of weaning food according to KEPMENKES equal to 15-22 gram in 100 gram of baby powder in weaning food [6]. Protein content in baby powder produced not yet able to reach weaning food milk supply, but can pass the protein content of 50- 70% of the standard weaning food. This is because the protein content of the freshwater clams flour in 100 grams only contributed by 8.1 grams. Formula 2 is the most approximate formulation of KEPMENKES, and where formulation 1 is the formula with the lowest protein content.

According to the Nutrition Adequacy Rate (AKG) at the age of 6 months and over the needs of infants 12-18 grams per day, where the formulation 2 on the weaning food that has been made to help the fulfillment of infant nutrition [16]. Age 6 to 12 months, the baby is still breastfed where ASI contents can contribute 1.5 grams of protein in 100 grams so that the child's needs according to AKG from formulation 2 can be fulfilled [17].

Warming can cause both expected and unexpected reactions. This reaction is influenced by the temperature and duration of heating, pH, the presence of oxidizing agents, antioxidants, radicals and other active compounds, especially carbonyl compounds. Most food proteins are

denatured when heated to moderate temperatures (60-90◦C) for one hour or less so as to decrease the protein content [18].

Age 6 to 12 months is a critical period, where rapid growth occurs at the age of 6-12 months and at this time the baby begins to rely on supplementary food [19]. Protein, in addition to the energy source also serves as a body building agent and regulatory substances in the body. One of the main functions of protein in the body is the growth and maintenance of tissues. In the body, there is a growth hormone called somatotrophic hormone (SH) or somatotropin [20]. It can be concluded that, lack of protein intake in children is more at risk of stunting [21].

Fat

The specification of fat content in weaning food according to KEPMENKES requires the fat content of 10-15 grams in 100 grams of baby powder in weaning food [6]. The fat content of baby powder in weaning food made from freshwater clams ranges from 11.96-12.12%. The baby powder formulations produced from the four formulas contained the fat content in the vulnerability required by KEPMENKES. The highest fat content significantly in powdered infant infant powder was found in the formula 4 (F4) of 12.12 grams with the composition of freshwater clams flour by 15%. While on the lowest fat content in the formulation 2 (F2) with freshwater clams substitution of 5%.

Fat is an efficient source, the infant's limited stomach capacity energy density in weaning food can be achieved by the addition of fat. Essential fatty acid content is essential for brain growth and childhood mining [21]. The results of the study show that the proportion of children with low fat intake stunting more than the proportion of children with adequate fat intake.[22] The presence of fat may also be helpful in the absorption of fat soluble vitamins (Vitamins A, D and E) so low fat intake can lead to deficiency of fat soluble vitamins [18].

Carbohydrate

The quality of good food intake is an important component in the diet of children because it contains a source of macro nutrients such as carbohydrates, where macro nutrients, especially carbohydrates play a role in the growth of children. The main function of carbohydrates is to provide energy for the body, because carbohydrates are the main source of energy in the body. Carbohydrates for infants are a major role, so carbohydrates should at least meet 52-54% of energy needs [23].

Carbohydrate content is calculated using carbohydrate by difference method, where the calculation is strongly influenced by other nutrient content such as water content, ash, fat, protein and fiber. Results of carbohydrates with various formulations of 61.80-67.14 grams per 100 grams of baby powder on the weaning food. There is no requirement regarding the range of carbohydrate content in infant powder according to KEPMENKES. Formulation 2 (F2) has higher carbohydrate content than other substituted freshwater clams formulations, obtained 65.25% carbohydrate content with freshwater clams substitution of 5%. The lowest carbohydrate content is found in formulation 3 (F3).

Fiber

Weaning food fiber content in infant powder with various formulations obtained a coarse fiber content of 1.69-3.65 grams per 100 grams of packaging. According to KEPMENKES, maximum fiber content of 5 grams per 100 gram of packaging. Obtained from all four formulations have fulfilled the requirements of weaning food on baby powder. Formulation 3 (F3) is the highest formula, whereas in formula 4 is a formula with substitution of freshwater clams on the lowest fiber content.

Fiber is mostly contained in vegetables, fruits, cereals and seeds. The content of crude fiber in baby food according to KEPMENKES does not exceed 5 grams per 100 grams of baby powder packaging. When a food product contains high crude fiber, the food product is

relatively harmful because the crude fiber is potentially disruptive in the absorption of nutrients such as proteins, fats, vitamins and minerals the body needs. High fiber content can cause the baby's stomach to feel full faster, because the fiber has a high water absorption [24].

Ash

The ash content in the foodstuff has a related with the mineral content which is an inorganic substance. The burning process causes the organic material to burn out, while the inorganic material does not burn out. The result of this combustion is referred to as ash [25]. The ash content of baby food powder of breast milk, with substitution of flour shell of river equal to 2,69-4,53%. There is no ash content requirement according to KEPMENKES, but there are conditions under SNI 01-7111.42005 where ash content does not exceed from 3.5 gram per 100 gram per pack. Obtained, the formulation of 2 (F2) of 3.38 gram has fulfilled the requirement of weaning food according to SNI 01-7111.42005.26 Infant powder with 15% shellfish flour formulations on Formulation 4 (F4) contains the highest ash content of 4.53%. While on the formula 1 (Control) is the lowest ash content.

Ash content has something to do with the minerals of a material. Ash is an organic waste residual organic waste material of an organic material [27]. The higher temperature of the vacuum drying will increase the ash content due to the corresponding temperature increase in a drying process does not result in the destruction of nutrients of food, especially minerals, only reduces the water content of food alone [28].

Water

Water content in food is very influential on the quality of a food. Where water content is very important in determining the durability of food, because it will affect the physical properties, chemistry, microbiological changes, and changes of enzymatic food [29]. Water content in infant milk powder feeding food range between 5.23-6.25%. Standard of weaning food according to KEPMENKES in 100 gram that is maximal 4 gram.

Of the four formulations of water content exceeding KEPMENKES standards because the raw materials used contain 3.7 grams of water, so it can be expected to have a shorter shelf life. This can be handled by making air-tight packaging such as aluminum foil to decrease mold growth and pass through heating to reduce water content [29]. Where the highest water content is found in formula 4 whereas formula 1 (Control) has the lowest moisture content.

Iron

The results of iron content obtained ranged from 1.13-20.53 mg per 100 grams of baby powder on the weaning food substituted freshwater clams flour. Terms of weaning food in the form of baby powder, iron content ranges from 5-8 grams per 100 grams. Of the four formulas, there are two formulations that qualify for the manufacture of weaning food in infant powder that is formula 1 and formula 2 (F1/control and F2). According to the Nutrition Adequacy Ratio (AKG), children aged 7 months and over require an iron intake of 7 mg per day where in formlation 2 with substitution of freshwater clams flour by 5% can meet the needs of children in the day with breastfeeding. The higher the formulation of freshwater clams flour makes the iron content increased, this is because the iron content contained in freshwater clams flour for 170 mg in 100 grams. Obtained in Formulation 4 (F4) has the highest iron content, whereas in formula 1 (Control) has the lowest iron content.

Iron deficiency is also associated with decreased immune function as measured by changes in some components of the immune system that occur during iron deficiency. The consequences of immune function changes are susceptible to infectious diseases. Iron deficiency anemia is most often found specifically in children under five, the state of anemia will slowly inhibit the growth and development of intelligence, children will be more susceptible to disease due to decreased

endurance. Iron deficiency anemia in children can delay physical and mental development and decrease resistance to disease [30].

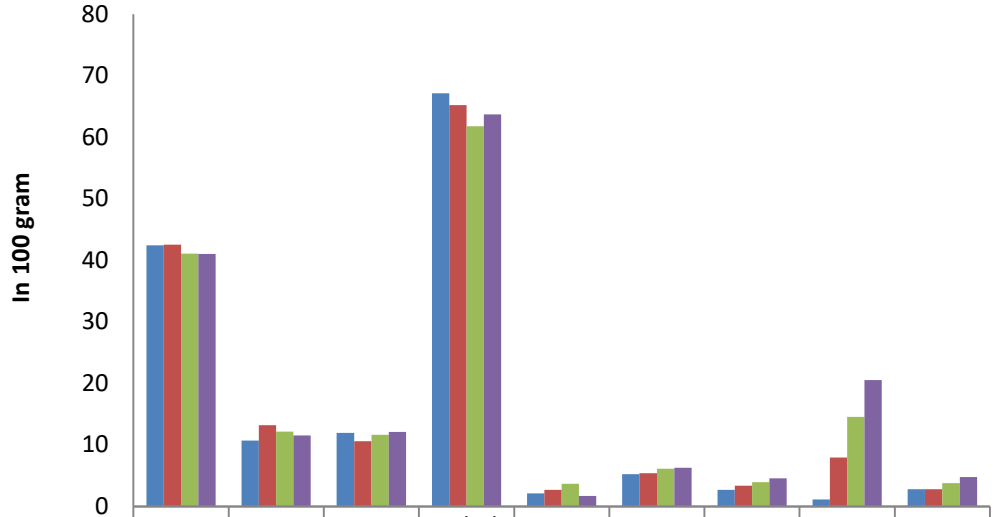
Zinc

Specification of infant powder making on weaning food, zinc content according to KEPMENKES of 2.5-4,0 mg in 100 gram of packing. Zinc infant powder levels with substitution of the resulting freshwater clams range from 2.8-4.76 mg per 100 grams. Therefore, from the four formulations that fulfill the requirements of KEPMENKES are formulations 1 to 3. The content of 15% freshwater clams flour substitution in Formulation 4 (F4) contains the highest iron content, whereas in formula 1 (Control) and 2 have low iron content.

According to the nutritional adequacy rate (AKG) of zinc content in infants aged 7 months and over by 3 mg per day, where formulations with 5% and 10% of freshwater clams substitutes (F2 and F3) can meet the standard needs of infants in a day [15]. Zinc Important in terms of structure and function of biomembrane, zinc becomes an important component of several enzymes that regulate cell growth, protein and DNA synthesis, energy metabolism, regulation of gene transcription, hormone levels and growth factor metabolism. Not only that, zinc plays a role in human immune function. The content of zinc is an essential nutrient and has received quite serious attention lately. Zinc deficiency in childhood can cause stunting [30].

b) Selection Formulation According to KEPMENKES

Based on the figure below, it shows that formula 2 with subchannel freshwater clams has nutrient content according to KEPMENKES standard except on protein and water content. Of the four formulations, there is a formulation with the highest nutritional content of formula 4. However, in the formula 4 protein content, moisture content, iron, and zinc can not meet the requirements according to KEPMENKES. Ash content in the formulation 4 according to SNI in 2005, ash content exceeds the requirements limit.



	Energy	Protein	Fat	Carbohydrate	Fiber	Water	Ash	Iron	Zinc
F1 (Control)	42,45	10,71	11,96	67,14	2,09	5,23	2,69	1,13	2,8
F2	42,55	13,18	10,6	65,25	2,7	5,36	3,38	7,91	2,8
F3	41,06	12,16	11,65	61,8	3,65	6,11	3,94	14,55	3,79
F4	41,01	11,5	12,12	63,72	1,69	6,25	4,53	20,53	4,76

Figure 1. Results Formulation of Nutritional Ingredients Weaning Food on Baby Powder

c) Receive power test

1) Color

Receive power test, color is the first time assessment of the eyes to the product. Color holds the most important role, if the color of a food is unattractive even though its complete nutritional content will reduce the level of panelist acceptance of the product. So color is the quickest and easiest response to give a good impression of a food product [31].

Breastfeeding foods in baby porridge generated from various variations of freshwater clams flour are found in Formulation 2 (F2) with 5% freshwater clams flour composition preferably panelists. The addition of flour shellfish streams in the formulations 3 and 4 (F3 and F4), will cause the color of the baby porridge tend to be darker. This is because the colors contained in the freshwater clams flour tend to be brownish. Not only that, when the process of cooking protein that joins the sugar in a hot atmosphere will cause the color to darken this is due to the reaction maillard [31].

2) Flavour

In flavour is one of the organoleptic aspects that greatly affect the acceptability or the level of the panelist's preference for a product. That is, a product although physically has an attractive color, good texture and aroma, but if it feels bad then cause the product is rejected or not favored by panelis [32].

Based on the assessment of the flavur aspect, substitution of the freshwater clams with a concentration of 15% is highly favored by the panelists. The panelist acceptance decreases in substitution of freshwater clams flour with a concentration of 5-10% because the addition does not significantly affect taste by a rather well-trained panelist (adult panelist). Thus, the higher concentration of freshwater clams flour added to weaning food formula, will affect the panelist's acceptance of the freshwater clams flour.

3) Aroma

According to the food industry, the aroma is important because one of the decisive factors in the quality of a food product. The presence of aroma substances that dissolve in water and fat that is volatile (yawn) [33]. Panzer preferences level to the scent, all formulations in the baby slurry can be accepted by panelists with the likes category because all dominant formulations are not fishy from freshwater clams flour. The aroma produced in each formulation, resulting in a fragrant aroma. This is influenced by the basic material used in the formulation of skim milk. The addition of skim milk contains lactose and lactic acid, where lactic acid is one of the odor-forming components. Although skim milk is milk that has reduced fat content but the fat content is still there to play a role in the odor formation of baby slurry products in complementary foods ASI [34].

4) Texture

Suitable breastfeeding supplements for ages 6 months and above are semi-solid textured foods [35]. According to KEPMENKES standards set on infant powder standards, when mixed with water will produce fine pulp in the absence of clots with viscosity that allows spoon-feeding. The resulting form on the 100% powder passes the filtering test using a 1000 micrometer filter.

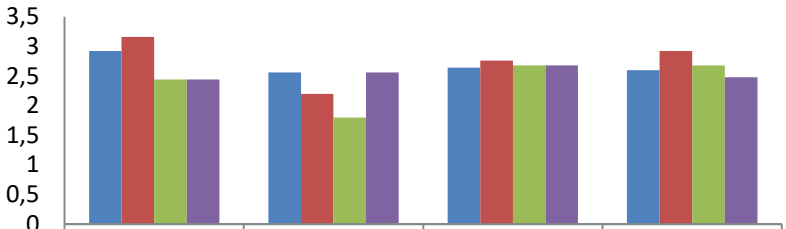
Brewing process, baby powder added with water (ratio 1: 8). The selection of baby powder comparison with water was done experiment first. Where in the ratio of 1: 6 used other commercial products, weaning food with subchief of freshwater clams has a texture on the flour with a low level of maturity because the product of weaning food in this study has not been at the stage of instant baby porridge. While at a ratio of 1:10, the texture of weaning food formula product becomes more fluid. So we get 1: 8 ratio when

mixed with water obtained texture of fine porridge and does not leave a clot with viscosity that allows the giving by using a spoon to the baby.

The acceptance rate of baby porridge texture on complementary feeding of ASI acceptable to panelists is found in formulations 1 to 3 under the likes category. While the formulation of 4 levels of panelist preferences decreased to dislike, this is due to the texture produced in the formulation 4 tend to be thick compared to other formulations that tend to be smooth.

5) Selection of Formula According to Panelists

Based on the figure below, it can be concluded that formulation 2 (F2) has the most acceptable power test result by a rather well trained panelist that is adult panelists except on the assessment of taste. The dominant assessment of panelist flavor tends to choose formula 1 (Control) and 4.



	Color	Taste	Flavour	Texture
F1 (Control)	2,92	2,56	2,64	2,6
F2	3,16	2,2	2,76	2,92
F3	2,44	1,8	2,68	2,68
F4	2,44	2,56	2,68	2,48

Figure 2. Acceptance Results of Weaning Food Panel on Baby Porridge

3. Contribution to Nutritional Adequacy

Contribution in a serving quantity (20 gram), formulation 2 (F2) can meet 11.74% energy adequacy, 14.67% protein adequacy, 5.89% fat adequacy, 15.91% carbohydrate adequacy, 5.4% fiber adequacy, 18.67% zinc adequacy, and 22.28% Iron adequacy. According to WHO, adequate breastfeeding at the age of 6 months and above can contribute 413 kcal of energy so that with the provision of weaning food in formulation 2 can meet the needs of children in day.[36] The results of nutritional contributions by AKG and KEPMENKES in Formulation 2 (F2) Briefly presented there are Table 5.

Table 5. Nutritional Contribution of Formulation 2 per Serving Meal of Baby Porridge (20 gram)

	Formulation 2 (F2)			
Content	Results of nutrients (100 gram)	Terms of KEPMENKES	Results of nutrients (20 gram)	% AKG (20 gram)
Energy	425.46 kkal	400-450 kkal	85.09 kkal	11.74%
Protein	13.18 gram	15-22 gram	2.64 gram	14.67%
Fat	10.60 gram	10-15 gram	2.12 gram	5.89%
Carbohydrate	65.25 gram	-	13.05 gram	15.91%
- Fiber	2.70 gram	Maximum 5 gram	0.54 gram	5.4%
Water	5.36 gram	Maximum 4 gram	1.07 gram	-
Ash	3.38 gram	-	0.68 gram	-
Zinc	2.80 mg	2.5-4.0 mg	0.56 mg	18.67%
Iron	7.91 mg	5-8 mg	1.58 mg	22.28%

E. Conclusions

1. The influence of substitution of freshwater clams with treatment level 0%, 5%, 10%, and 15% on protein content (p=0.014), fat (p=0.041), carbohydrate (p=0.039), water content (p=0.0001), ash (p=0.0001), iron (p=0.0001) and zinc (p=0.0001). Meanwhile, in the energy content (p=0.129) and fiber (p=0.225) there was no influence with the freshwater clams substitution of 0%, 5%, 10%, and 15%.
2. The result of nutrient content of the four formulas, substitution of 5% freshwater clams flour in formula 2 (F2) can fulfill the requirement of baby powder nutrient specification in weaning food according to KEPMENKES except protein and water content.
3. Obtained from various subchiefs of freshwater clams flour in weaning food baby slurry, level of panelist acceptance of color; aroma; and texture of formula 2 (F2) with 5% freshwater clams substitution preferred by panelists. However, on the taste assessment, the freshwater clams substitution of formula 2 (F2) is less favored by a slightly trained panelist, since the addition does not significantly affect the taste.

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