D'COFIER (COCONUT WATER KEFIR)

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A. RATIONAL

Dehydration caused by diarrheal disease can cause death due to a lack of fluids in the body. One way to treat diarrhea is to use diarrhea medicines in their use, diarrhea medicines that should not be taken carelessly because they have to be adjusted to the cause. Such as diarrhea caused by viral, bacterial and parasitic infections, lactose intolerance, and digestive disorders such as celiac or irritable bowel syndrome. Another alternative to prevent diarrhea is by consuming probiotics, which are good microorganisms or bacteria that can support the work of the intestines. Probiotics are often added to fermented foods and drinks (Makarim, 2022).

Fermented beverage products are widely known by the public because of their health benefits. Fermented beverage products are made by adding microorganisms that produce organic acids, giving rise to a sour taste which is characteristic of fermented beverages. One of the fermented beverage products is kefir. Kefir is a fermented product that has a specific taste and aroma and is thick and contains alcohol. Apart from being a fermented product, kefir can also be categorized as a functional food. Kefir can control cholesterol metabolism, as a probiotic, antibacterial, etc. There are two types of kefir, namely milk kefir and water kefir. Milk kefir is made with milk as the base, while water kefir is made with water or fruit juice as the base. The type of kefir that we often encounter is milk kefir made from animal milk such as cow's milk, goat's milk, and others. Meanwhile, kefir which is made from basic ingredients in the form of a liquid containing sugar or called water kefir is still limited in its development. Generally water kefir is considered easier to make compared to milk kefir. Apart from being easier to make, another advantage of water kefir is that it is safe for consumption by someone who is lactose intolerant. Because based on research data (Dewiasty et al., 2021), it is known that from the hydrogen breath test, two-thirds of Indonesian adults are lactose intolerant.

Water kefir requires simple ingredients such as water, sugar and water kefir grains. One type of liquid that contains sugar is coconut water. Coconut water (Cocos nucifera L.) can be used as a substrate for making water kefir. Coconut water contains macro nutrients in the form of carbohydrates, fats and proteins. In young coconut water, the carbohydrate content was 4.11%, protein and fat were 0.13% and 0.12% respectively. Micronutrients (vitamins and minerals) are also found in coconut water. The vitamins contained in coconut water are B vitamins (B1, B2, B3, B5, B6, B7, B9), vitamin C and have high levels of the mineral Potassium (Ibrahim, 2020).

According to (Lestari et al., 2018), even though it has a variety of ingredients that are beneficial to health and is included in functional food, water kefir drink is still foreign to Indonesia. In this case, functional food is food which is a food product made from natural ingredients, has a certain function when digested, has clear physical and chemical content, is suitable and safe for consumption, and the ingredients do not reduce the nutritional value of the food (Wahyono et al., 2015). As a functional food, water kefir has several benefits for the health of the body because it can lower blood pressure, increase body resistance, prevent allergies, improve digestion, and act as an antimicrobial for microbes that give toxicity to health (Schneedorf, 2012).

Butterfly pea flower is a type of plant that is widespread in almost all places in Indonesia. The butterfly pea plant (Clitoria ternatea L.) belongs to the Fabaceae family which has a small stem size and pod-like fruit. Butterfly pea flowers have single blue and purple petals. It is often found as a decorative plant for fences, ingredients for drinks, natural food coloring that is environmentally friendly and even as a traditional medicine because of its bioactive compounds. The content of phytochemicals such as anthocyanin in butterfly pea flower functions as a bioactive because it has antioxidant properties (Zahara, 2022).

B. PRODUCT CONCEPT AND DESCRIPTION

(1) Product Explanation

D'Cofier (Coconut Water Kefir) is a product development of water kefir, a probiotic drink made by fermenting sugar water and kefir grains. In general, making water kefir uses sugar water as the main ingredient. However, D'Cofier developed a water kefir product where coconut water is the main ingredient. Based on the literature, it is explained that the content in coconut water such as sugar, protein, and fat is very good for the growth of food-producing bacteria and has the potential to be made into fermented drinks (probiotic drinks). Probiotic drinks are good for health because they are made through a lactic acid fermentation process containing live lactic acid bacteria (Yanuar and Sutrisno, 2015).

Another benefit of D'Cofier products is that D'Cofier can be a solution for people who do not like or have allergies to cow's milk kefir, either goat's milk or cow's milk. In addition, this drink is a natural source of antioxidants that boost the immune system, increase nutrient absorption, improve health, reduce the duration of diarrhea, and aid lactose digestion in people with lactose intolerance. Water kefir grains used in the water kefir process, not only serve as a natural source of dextran-producing lactic acid bacteria but also safely and effectively purify water contaminated with heavy metal ions and can be developed for commercial use (Utomo and Kurniawidi, 2021).

(2) Specification

- **Material Specifications**

1. Coconut Water

➢ Physical Characteristics:

Liquid, slightly cloudy, clear color, fresh and sweet taste.

➢ Chemical Characteristics:

Protein 0.2 g, Calorie 17.0 cal, Fat 1 g, Kabohidrat 3.8 g, Calcium 15 g, Phosphorus 8 g, Iron 0.2 g, and Water 95.5 g.

➢ Microbial Characteristic:

Acetobacter Xylinum (Pradiyanti, 2016).

2. Water Kefir Grains

➢ Physical Characteristic:

Irregular granules, 2-3 cm in size, cloudy white/yellowish in color.

➢ Chemical Characteristics:

Energy 160 kcal, Carbohydrate 8 g, Protein 14 g, Fat 3 g, Sodium 90 mg, Calcium 300 mg, Vitamin A 500 IU, and Vitamin D 1000 IU.

➢ Microbial Characteristic:

Lactococcus acidophilus, L. kefir, L. kefirgranum, *L. parakefir*, *Streptococcus sp., Lactobacilli* and some types of non-pathogenic yeast/khamir (Hidayati, 2018).

3. **Butterfly Pea Flower**
    - ➢ Physical Characteristic:
      Single-petaled, blue/purple in color.
    - ➢ Chemical Characteristics:
      Flavonoid 20.07 ± 0.55 mmol/flower, Antosianine 5.40 ± 0.23 mmol/flower, Flavonol glycoside 14.66 ± 0.33 mmol/bflower, Kaempferol glucoside 12.71 ± 0.46 mmol/flower, Quercetin glycoside 1.92 ± 0.12 mmol/flower, Mirisetin glycoside 0.04 ± 0.01 mmol/flower (Puriyastuti, 2022).
    - ➢ Microbial Characteristic:
      -
4. **Sugar**
    - ➢ Physical Characteristic:
      Crystalline granules, pure white / slightly brownish white, taste sweetly, soluble in water and ethanol.
    - ➢ Chemical Characteristics:
      Calorie 364 cal, Protein 0 g, Fat 0 g, Carbohydrate 94 g, Calcium 5 mg, Phosphorus 1 mg, Iron 0.1 mg, Water 5.4 g (Mulyakin, 2020).
    - ➢ Microbial Characteristic:
      -
5. **Edible Silver Lustre Dust**
    - ➢ Physical Characteristic:
      Powder, pure white, taste less, not soluble in water, has no fragrance.
    - ➢ Chemical Characteristics:
      Acacia (gum arabic), maltodextrin, cornstarch, and color additives specifically approved for food us (FDA, 2018).
    - ➢ Microbial Characteristic:
      -

- **Product Specifications**

Coconut Water	230 mL
Water Kefir Grains	25 gram
Butterfly Pea	20 mL
Sugars	11.5 gram
Edible Silver Lustre Dust	0.005 gram

(3) Packaging

D'Cofier packaging uses glass bottles. This material was chosen because it does not contain chemicals so it is healthier to use, besides that D'Cofier is a probiotic drink where this drink contains low levels of alcohol. So that, if it used a glass bottle it would be more resistant. Not only that, but the use of glass bottles is environmentally friendly. Then the packaging design is used because it is made of glass, and this packaging is clear, this is also what attracts potential buyers because D'Cofier itself has a purple color obtained from butterfly pea. The concept carried on D'Cofier's packaging is minimalist, attractive, and reusable.

	Top Diameter	**Bottom Diameter**	**Height**
Bottle Cap	2.7 cm	-	1.5 cm
Bottle	2.5 cm	7 cm	17 cm
Total	-	-	17 cm

(4) Planned Labels based on Evaluation of Valid, Accurate, and Relevant Information

Brand	D'Cofier
Tagline	Cheers to your health
Product Description	Coconut Water Kefir probiotic drink with an unique taste
Nutritional Information	-
Net Content	250 ml
Expiration Date	20 days
Composition	Coconut Water, Water Kefir Grains, Sugar, and Butterfly Pea
Storage Suggestions	Stored in refrigerator
Produced By	PT. Djandaya

C. DESIGN AND PROTOTYPE OF PRODUCT

(1) Logo Design

Picture 3.1 Logo of D'Cofier

The logo is one of the product communicator agents to potential customers, so a good logo design is needed. The Wedges font used to write product names was chosen because it is unique and attractive but can still be easily read. In the middle, there is an illustration of coconuts which are the basic ingredients of the product. The color palette was chosen in green, brown and beige because it is the color of coconuts and the purple color as the background symbolizes the butterfly pea flower as a complement. The green color was chosen because it is synonymous with nature so it gives freshness and health to humans. The brown color was chosen because it symbolizes the simplicity of coconut water but provides many health benefits for the body. Neutral beige color is used as a neutralizer for each color. There are two stars that represent the excellent quality of D'Cofier products. The logo also includes the words "Coconut Water Kefir" as an explanation that the D'Cofier product is a water kefir probiotic drink made from coconut water.

(2) Product Prototype

The bottle packaging for D'Cofier products is made using glass which is non-toxic, food grade certified, and environmentally friendly because it can be reused (reusable). The following is a display of the D'Cofier prototype that has been made:

Picture 3.2 Design Prototype

Picture 3.3 Prototype

The clear colored glass bottles were chosen so that D'Cofier products which are purplish because the butterfly pea can be seen by consumers and are expected to attract consumer interest. Affixed with a label sticker containing the product name and product's logo on the front, while on the back contains a brief description, ingredients, storage rules and company identity

D. FURTHER TEST, SCALE UP, AND PRODUCTION PLAN

(1) Further Test Plans

Product Test

Product tests were carried out testing total acid with the titration method and degree of acidity (pH), and organoleptic tests which included color, aroma, taste, and level of consumer preference. Based on the National Standardization Agency 2009 that the total acid for probiotic drinks is around 0.2-0.9%. Lactic acid levels in water kefir can be formed due to the activity of lactic acid bacteria (LAB) that break down carbohydrates into simple sugars (glucose and galactose) through the process of glycolysis into pyruvic acid. Pyruvic acid is then broken down into lactic acid. The amount of lactic acid formed is also closely related to the type of substrate or raw material used, namely, coconut water. Lactic acid content is closely related to the pH value or acidity level of water kefir. Where the higher level shows the decreasing pH value of water kefir. The results of fermented beverages from kefir produce lactic acid and other compounds, namely carbon dioxide (CO_2) and a little alcohol (Suryani and Khasanah, 2022).

Badan Standarisasi Nasional (BSN) 2009 mentioned that kefir drink should have a liquid appearance, a distinctive normal odor, with a distinctive sour taste. The first organoleptic test was conducted with two variables, namely without the addition of sugar and with the addition of sugar dissolved by 2 mL. The result is the addition of sugar as a substrate increases the acidity of water kefir. This is because (LAB) will decompose sucrose in sugar as an energy source so that more lactic acid products are formed during the fermentation process. The addition of sucrose to sugar for water kefir products from coconut water is more preferred by consumers than without the addition of sugar. While in terms of color, it does not show a significant difference where the color of coconut water kefir is cloudy. Therefore, development is carried out so that the color of the product is more attractive to consumers.

Market Test

Market testing of D'Cofier products will be carried out through marketing to the entire community, especially for the vegan community and lactose intolerance. Feasibility testing is carried out by questionnaire session, both online questionnaire and offline questionnaire. The questions asked during the questionnaire session are:

a. Have you ever heard of or tried kefir products, either milk kefir or water kefir?
b. How do you feel about kefir products? (for either yes or no)
c. Do you have any feedback for D’Cofier?

Responses obtained through questionnaires and customer responses will be a consideration of the feasibility of D'Cofier to be marketed. Evaluating processes can be done through with customers' critics and suggestions as references.

Social Feasibility Test

Social feasibility testing is closely related to social and environmental impacts. D'cofier's producers, distributors, and sellers get jobs so that it has a positive impact on reducing the unemployment rate in the community. In addition, D'cofier provides solutions to the lactose intolerant community and vegan consumers to try kefir products. The packaging used is reusable because it can be used repeatedly as long as the conditions are still good or can be used as a container for other products.

Economic Feasibility Test

From an economic perspective, D'Cofier products are considered as standard price where the price for 1 bottle of product (250 ml) is Rp. 27,000. Considering the addition of dried butterfly pea flowers as a natural dye and additional nutritional content.

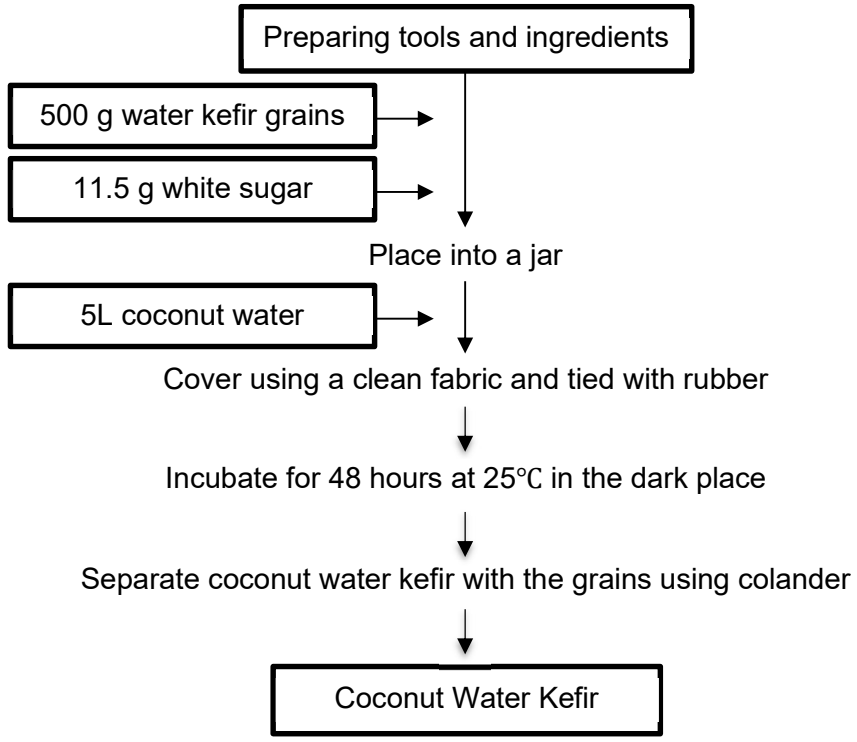
Production Materials	**Unit**	**Unit Cost (Rp)**	**Production Materials for One Batch (20 Bottle)**	**Cost (Rp)**
Coconut Water	1 L	2000	5 L	10.000
Water Kefir Grain	50 gram	40.000	500 gram	400.000
Butterfly Pea Flower	100 gram	35.000	100 gram	35.000
Sugar	250 gram	4000	230 gram	148
Edible Silver Lustre Dust	2 gram	33.000	0.1 gram	1.650
			Total material cost	450.330
			Total production cost per bottle	22.516

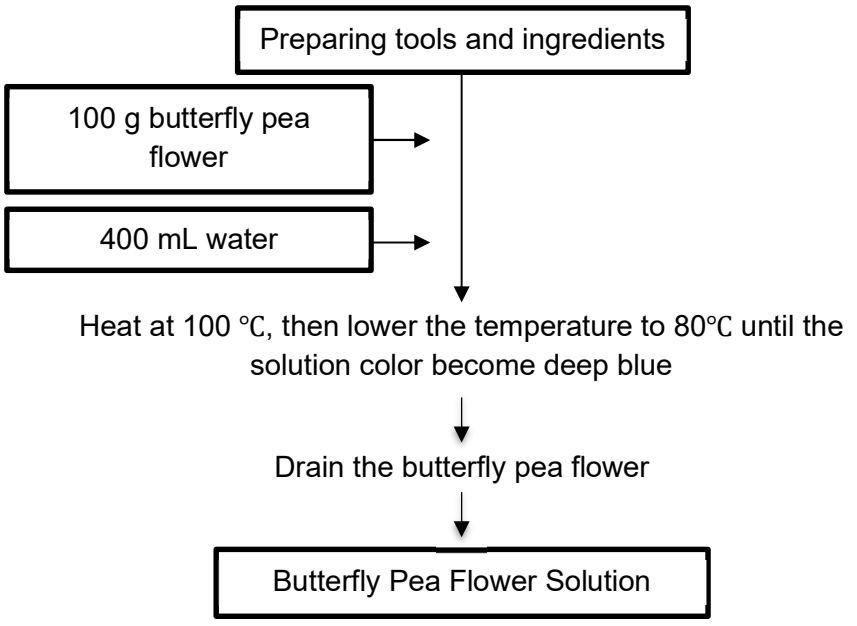
Production from D'Cofier is relatively cheap and economical where water kefir grain is included in the investment material. This means that one purchase of water kefir grain can be used for up to 19 subsequent uses, maximum. So that the cost calculation for the next batch does not include water kefir grain.

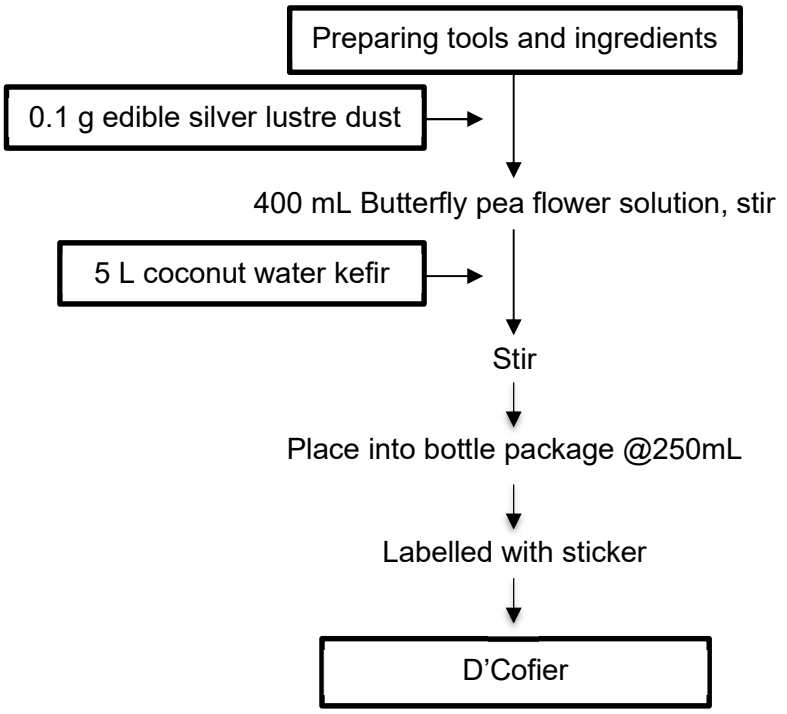
Production Materials	**Unit**	**Unit Cost (Rp)**	**Production Materials for One Batch (20 Bottle)**	**Cost (Rp)**
Coconut Water	1 L	2000	5 L	10.000
Butterfly Pea Flower	100 gram	35.000	100 gram	35.000
Sugar	250 gram	4000	230 gram	148
Edible Silver Lustre Dust	2 gram	33.000	0.1 gram	1.650
			Total material cost	46.798
			Total production cost per bottle	2.339,9

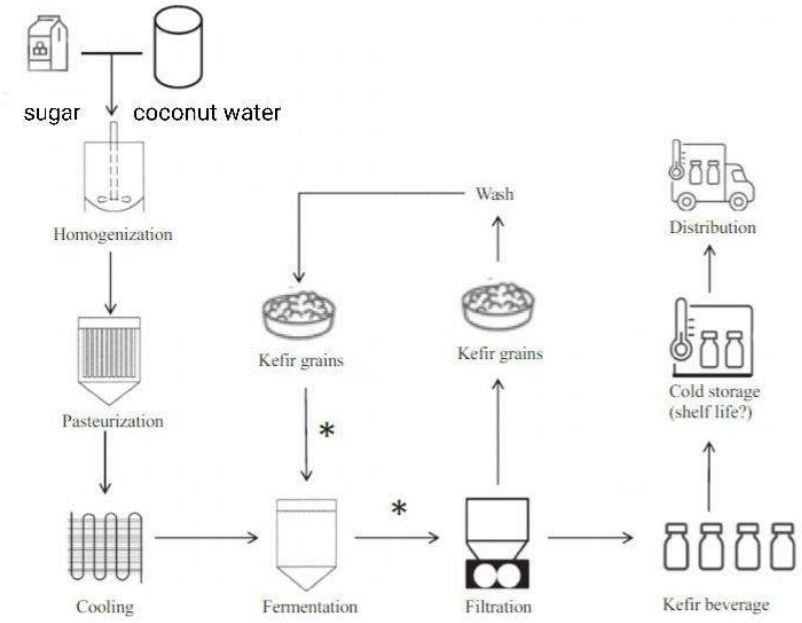
Judging from the total production price per package, the price is much cheaper than adding water kefir grains. The profits will be higher by investing in water kefir grains.

(2) Scale Up and Production Plan





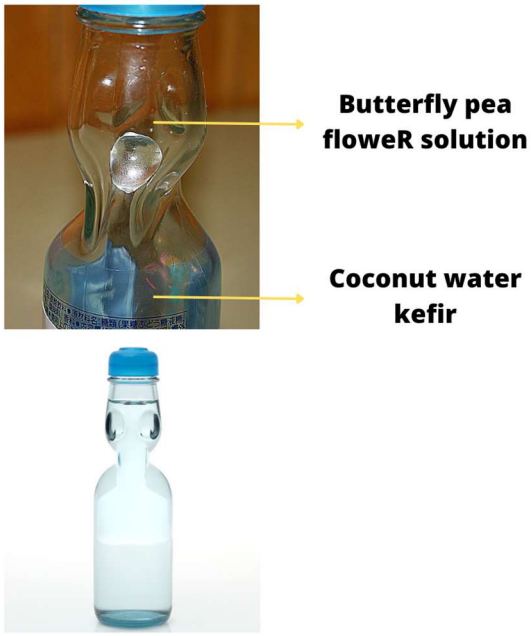




Currently, water kefir drinks are traditionally produced only in home industries. Further development is needed to scale up on an industrial scale. In this procedure, the pasteurized and cooled substrate is immediately mixed with kefir grains (10% w/v), and the mixture is then incubated for around 24 hours at 25–30°C. After fermentation, the grains are separated from the medium by filtration through a sterile sieve, washed, dried at room temperature and kept in a cooling tank for the next inoculation. Kefir beverage is stored at 4°C until it is ready to serve. The product can be kept at cold temperatures for up to 20 days after 20 to 24 hours of fermentation at 25 to 30°C

In the field of biotechnology, to support scale up, innovation can be done by isolating water kefir grains to determine the content of bacteriocins produced by the strain L. plantarum QF01 strain isolated from water kefir grain contains 4 bacteriocin genes, and has a good inhibitory effect on Escherichia coli. This is because in the fermentation process, the supernatant that acts on Escherichia coli has antibacterial properties (Xinhong dkk., 2018).

In addition to engineering the strain of microorganisms contained in water kefir grain, to support the scale up that will be carried out, innovations can be made in packaging. Because currently there are still no beverage products that allow consumers to mix butterfly pea with acidity liquid, D'Cofier packaging can be made into two parts, namely the upper part for butterfly pea liquid and the lower part for coconut water kefir.



Picture 4.1 Scale Up Product Packaging

E. PRODUCT MARKETING STRATEGY

With a target market of people of all ages, especially vegan and lactose intolerant groups, the marketing strategy for D'Cofier products can be carried out through social media and directly to the public. Marketing with social media can use paid promotion services to introduce brands to the public. The creation of an attractive official account from the brand is also carried out to attract the attention of social media users such as Instagram, Twitter and Tiktok. Then direct marketing is carried out with a field approach where there will be tester assessments to the public either in an event or without attending an event. Company participation in an event such as the healthy product event is intensified to market the product and look for relationships that will have the potential to work together in producing and marketing D'Cofier. Because it doesn't use preservatives, D'Cofier is a fresh product so it can implement a Pre-Order system.

F. PRODUCT QUALITY, REGULATION, AND FOOD SAFETY & ENVIRONMENTAL ISSUES EVALUATION

Determination of the quality of the product is carried out through the procurement of product evaluation. Evaluation of the product includes several criteria and parameters that must comply with established standards. As for what must be considered from fermented products such as water kefir are the ethanol content, pH, total sugar content and reducing sugar, acidity, antioxidants contained in the product. Measurement of alcohol content in the home industry can be done with an alcohol meter. pH measurement can also be done using a pH meter. Unfortunately for home industry-based production, the measurement of total sugar, reducing sugar, and antioxidants cannot be done simply because adequate equipment is still needed. In addition, because the main ingredient of the product is coconut water, it is necessary to pay attention to the levels of kinin contained in the coconut water used.

Based on BPOM Regulation No. 34 Tahun 2019 “Produk minuman yang dibuat dari ekstraknya atau cairan yang berasal dari tanaman (contoh air kelapa, nira) mengandung kinina, kadar kinina tidak lebih dari 40 mg/kg”. BPOM Regulation No. 34 Tahun 2019 contains food categories. Food categories aim to regulate the basic characteristics of processed food, both domestic and imported products.

According to BPOM Regulation No. 31 Tahun 2018 Pasal 64 contains food labels, especially vegan products. Retrieved from Pasal 64 ayat 1 which says “Bahwa pencantuman logo Vegan dan/atau tulisan Vegan dapat dilakukan sepanjang Pangan Olahan tidak mengandung bahan Pangan berbasis hewan dan produk olahannya termasuk madu.” And the sound of pasal 64 ayat 2 that “Pencantuman logo Vegan dan/atau tulisan Vegan sebagaimana dimaksud pada ayat 1 harus dibuktikan dengan analisis asam deoksiribonukleat (DNA).” While in ayat 3 reads “Bahwa analisis DNA sebagaimana dimaksud pada ayat 2 dilakukan oleh laboratorium terakreditasi atau laboratorium yang ditunjuk oleh pemerintah.”

There is no specific regulation about Water Kefir. However, according to BPOM Regulation No. 1 Tahun 2022 on the Supervision of Claims on Labels and Advertisements of Processed Food, it states that “Pengkajian Kultur Starter (Water Kefir Grains) dengan Mikroorganisme yang Tidak Teridentifikasi Kultur starter dengan mikroorganisme yang tidak teridentifikasi banyak ditemukan pada pangan fermentasi tradisional (contoh kultur starter: ragi tape, ragi/laru tempe, ragi roti asam, biji kefir, dan lain sebagainya). Komposisi jenis mikroorganisme pada kultur stater ini tidak dapat diketahui dengan pasti baik kualitas maupun kuantitasnya secara spesifik sehingga tidak dapat diketahui karakteristiknya.”

The risky issue found in fermented-based products is the ethanol content produced during fermentation. Too high ethanol levels can occur in the fermentation process. Too high levels of ethanol will cause allergic reactions in some people, so a process is needed to separate ethanol from water kefir products. However, as a product from the home industry, the process of separating ethanol by distillation process will cost more. So some water kefir production allows a little ethanol content in the product. The ethanol content in water kefir is below 1%. Another debate regarding the ethanol content of the product is its halal status. Recently MUI amended the fatwa regarding certifiable ethanol tolerance. MUI will provide halal certification for products with low ethanol content. However, the product must not come from the *khamr* or liquor industry. Apart from that, the MUI also stipulates that certification must go through testing first so that the granting of tolerance is based on the research conducted.

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