



MAKE COCONUT KEFIR AT HOME

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What is kefir?

Kefir is a milk drink with a creamy consistency fermented by kefir grains. The taste of kefir is tangy, fizzy, and refreshing like drinking yogurt. Due to yeast fermentation, kefir is slightly carbonated with a small amount of alcohol. Kefir contains various probiotics including lactic acid bacteria, yeasts, and acetic acid bacteria.

The Turkish word “*Keyif*” means good feeling, health, and well-being. In Eastern Europe, kefir is traditionally consumed for health benefits and longevity.



Figure 1. Homemade coconut kefir.

Health benefits of kefir

Positive health benefits of kefir result from various genera, species, and strains of probiotics, which are defined as “live microorganisms that when administered in adequate amounts confer a health benefit on the host” (FAO/WHO, 2002). Kefir probiotics, such as lactic acid bacteria, acetic acid bacteria, and yeast, improve the intestinal microbial balance of the host. In addition to probiotics, kefiran, a unique exopolysaccharide secreted by *L. Kefiranofaciens*, also possesses various functional properties, such as antitumoral, antimicrobial, anti-inflammatory, and immunomodulation activities (Prado et al., 2015).

Generally, there has been multiple research efforts to support kefir products confer health benefits on the host including anticarcinogenicity and antimutagenity, modulating the immune system, anti-inflammatory activity, lowering cholesterol, antimicrobial activity, antihypertensive effects, antidiabetic effects, antioxidative activity, improving lactose intolerance, and promoting wound healing (Prado et al., 2015; Rosa et al., 2017). In addition, kefir contains vitamins, minerals, and amino acids that promote nutrient absorption, maintain bodily functions, and improve bone density.

Kefir grains and cultures

Milk kefir grains, water kefir grains, and kefir culture are three available cultures to make kefir products. Milk kefir grains are white or yellow semi-hard granules, like pieces of coral or small clumps of cauliflower florets with diameter from 3 to 20 mm. Milk kefir grains are obtained from the fermentation of milk in a goat-hide bag. Exopolysaccharide, protein, fat, and cellular debris form a matrix of kefir grains for probiotic cultures. The probiotic cultures are unevenly distributed on the surface and in the interior of the kefir grains. Milk kefir grains can grow during fermentation and be reused for making kefir.



Figure 2. Activated milk kefir grains.

Water kefir grains have a translucent and jelly-like appearance, normally containing fewer strains of bacteria and yeast than those of milk kefir grains. In addition to water kefir, the grains can be used to make other non-dairy kefir, such as fruit juice kefir. Kefir culture is usually in form of dry powders and convenient to use for kefir without activation. However, the number and the profile of probiotics in kefir culture may not be the same as in the kefir grains.



Figure 2.1. Activated water kefir grains.



Figure 2.2. Kefir culture.

Why home-made coconut kefir?

Although coconut is a popular tropical fruit on the Western Pacific islands, coconut kefir is not readily available in the markets on Guam. The tropical temperature of the Pacific islands is ideal for kefir fermentation. Home-made kefir is fresh with a high number of probiotics and attractive sensory quality. The taste, tartness, and sweetness of kefir can be controlled by incubation and ingredients. Kefir grains can also be reused, making coconut kefir low cost at home.

In addition, coconut milk is a dairy-free milk alternative rich with vitamins, amino acids, and minerals and contains lauric acid, a medium chain fatty acid (MCFA) that potentially reduces stroke risk by decreasing serum

low-density lipoproteins and increasing high-density lipoproteins. Coconut kefir retains these nutrients and health benefits. Recently, research indicates that coconut milk kefir exhibits antimicrobial activity and anti-carcinogenic property (Lakshmi et al., 2017).

Procedures of making coconut kefir

Procedures to make coconut kefir include: activating kefir grains, making and pasteurizing coconut milk, inoculation and incubation, separation of kefir grains, and storage (Figure 5). Tools and ingredients to make coconut kefir at home are shown in Table 1.

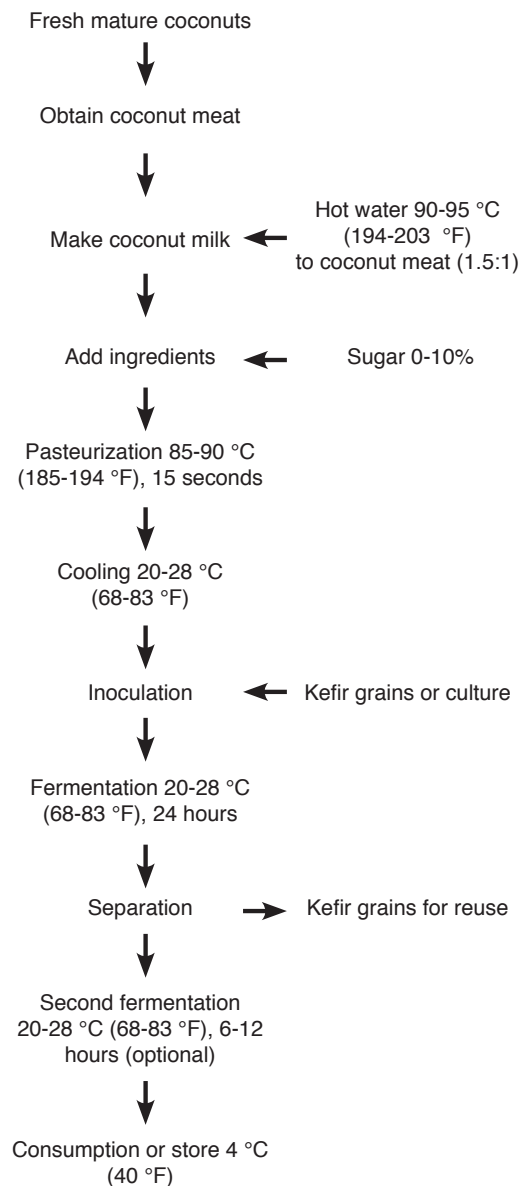


Figure 3. Flow chart for making coconut kefir.

Table 1. Tools and instructions to make coconut milk kefir.

	Tools and Utensils	Instructions
Activate kefir grains	Jars; mesh strainer, cheesecloth, container.	Fully activate milk or water kefir grains before making kefir. No need to activate kefir culture.
Obtain coconut meat	Meat cleaver, heavy knife, or hammer; manual or electronic coconut grater, coconut knife.	Choose mature coconuts, preferably with water inside; ensure there is no mold covering the coconut. Crack and open coconuts, then grate or slice meat. Meat should be white and firm without any discoloration.
Make coconut milk	Pan, stove, or other heating device; blender, thermometer, timer; mesh strainer or cheesecloth.	Add hot water at 90-95°C (194-203 °F) to grated coconut meat at a ratio of 1.5:1 (water:coconut) and blend the mixture for 5 min and squeeze the milk with cheesecloth.
Pasteurize coconut milk	Pan, stove, or other heating device; thermometer, timer.	Heat and stir coconut milk in pan to 85-90 °C (185-194 °F) for 15 seconds.
Cool coconut milk	Larger pot or container.	Use cold portable water in a larger pot or container to cool coconut milk in pan to 28 °C (83 °F).
Inoculation and incubation	Spoon, jars or containers; cheese cloth or coffee filter as covers, and rubber band.	Add milk or water kefir grains at 3-5% of coconut milk (w/w) or kefir culture. Ferment the milk at 20-30 °C (70-86 °F) for 24 hrs.
Strain kefir grains	Mesh strainer, cheesecloth, container.	Use a strainer or cheesecloth to separate kefir grains from coconut kefir.
Store and consumption	Refrigerator.	Store kefir at temperature at 4°C (40 °F) for consumption within 2 weeks.

Make fresh coconut milk

Since mature coconut produces high yield, good quality milk, use mature coconuts to make fresh coconut milk. The mature coconut may contain some water and a nut inside but should not have brown or black spots. After cracking and opening the coconut, use a manual or electronic grater to remove the coconut meat from the shell. A coconut knife can also be used to scrape large chunks of

the meat from the shell. Cut the meat into small cubes. If needed, use a vegetable peeler to remove the brown skin. Small pieces of coconut meat help to extract coconut milk efficiently.

To extract coconut milk, place grated or small cubes of coconut meat in a blender and add boiling or hot water 90-95 °C (194-203 °F) over the meat at a ratio of 1.5:1 (water:coconut meat). After one minute, blend the mixture for 5 minutes. During blending, increase speed gradually; scrape the sides of the blender to ensure all of the meat is being blended. After blending, pour the mixture onto two layers of cheesecloth or into a bowl lined with a strainer and squeeze the pulp to collect the coconut milk. The meat residues from coconut milk are by-product, which can be dehydrated into coconut flour and used as a food ingredient for bakery products.

Pasteurization

The purpose of pasteurization is to kill vegetative cells of pathogens and spoilage microorganisms. Pasteurization can also denature proteins in coconut milk and improve the texture of kefir. For pasteurizing coconut milk, heat the milk in pan to the temperature of 85-90 °C (185-194 °F) for 15 seconds. During pasteurization, use a food thermometer to check the temperature and constantly stir the milk to avoid scorching. After pasteurization, immediately cool the coconut milk in a pan with cold water in a bigger container. Change the water 2-3 times till the milk's temperature drops below at 28 °C (83 °F). If an ingredient, such as sugar, is used in the recipe, add the ingredient to the coconut milk before pasteurization.

Activating kefir grains

Kefir fermentation requires activated kefir grains. If grains are already activated, proceed to inoculation. For commercial kefir grains, please follow the instruction of kefir activation from the procedure.

Dairy kefir grains

Activation of milk kefir grains may take 3-7 days to reach its fermentation potential. First, empty 1 packet of the dehydrated milk-kefir grains into a clean jar and add 1 cup of cold, pasteurized dairy milk and stir. Cover the jar with a cheese cloth or coffee filter secured by a rubber band, and then incubate the grains at room temperature of 70-86 °F (20-30 °C) for 8-24 hours. Check the milk texture by tilting the jar or swirling the contents.



Figure 4. Checking milk during activation.

If the texture of milk becomes gel-like (thick) within 24 hours, separate the grains from the milk by a strainer and discard the first batch of kefir. Place grains in 1.5 cups of fresh milk and incubate at the same temperature for 8-24 hours; strain out the grains after the milk thickened. Repeat this activation process with increasing the amount of milk by 0.5 cup each time until the kefir grains are able to ferment up to 4 cups of milk. During activation of kefir grains, if milk does not thicken after 24 hours, strain out and reactivate the grains with the same amount of fresh milk until the milk is thickened. During inactivation, kefir made after the first batch can be saved and consumed if the smell and taste is pleasant. Fully activated grains, which can consistently thicken milk within 24 hours, will be used for fermenting coconut milk.

Water kefir grains

Water kefir grains can also be used to make coconut milk kefir. Activation of dehydrated water kefir grains requires 3-4 days. First, prepare a 10-15% brown sugar solution (0.25 cup brown sugar with 3-4 cups of drinking water), heat the solution to 165 °F (74 °C) for pasteurization, and cool the solution to 24 °C (75 °F). Then add 1 packet of dehydrated water kefir grains and a stir. Cover the jar with a cheese cloth or coffee filter secured by a rubber band and activate grains at 20-30 °C (70-86 °F) for 3-4 days. If the grains appear plump and translucent, grains are fully activated, strain out the grains and discard the sugar water. The grains can be used to add into coconut milk for making kefir.

Inoculation and incubation

After coconut milk is cooled to 28 °C (83 °F), add activated milk or water kefir grains to the coconut milk (about 3-5% of milk based on weight) and stir. Cover the

containers with a cheese cloth or coffee filter, secured by a rubber band, and incubate the coconut milk at 20-28 °C (70-86 °F) for 24 hours. During incubation, the kefir grains usually sink at the bottom of the jars; slightly tilting or shaking the jars two or three times will enhance the fermentation. Observe the texture changes of coconut milk. If the milk becomes gel-like, end the fermentation.

Straining and storage

After incubation for 24 hours or observing the thickening of coconut milk, strain out the kefir grains. Store the kefir in refrigerator at 4°C (40 °F) and consumer it within two weeks.

After removing the kefir grains, the kefir can also be stored at 20-28 °C (70-83 °F) for 6-12 hours. This process is called the second fermentation, which can enhance the taste and flavor of kefir and increase the number of probiotics. To stop the second fermentation, place the kefir in the refrigerator at 4°C (40 °F). The second fermentation is optional and completely dependent on one's preference for taste.



Figure 5. Straining grains from kefir.

Maintain and store kefir grains

The kefir grains strained from kefir can be reused to make another batch of kefir. If needed, activate milk kefir grains with dairy milk or water kefir grains with brown sugar solution. For short-term storage of kefir grains, place the dairy grains or water kefir grains in a jar filled with dairy milk or brown sugar solution, respectively, and store them in refrigerator. For long-term storage of kefir grains, rinse the grains with drinking water, absorb the excess liquid with a paper towel. Then lay the grains on parchment paper. Cover with a cheese cloth for 3-5 days until the grains are hard. Place the grains in an air-tight bag and store them in the refrigerator. Milk powder can be added to dehydrated milk kefir grains for storage.

Kefir sensory properties and recipes

Fresh coconut milk kefir should have a tart and effervescent yogurt-like flavor, with a taste of coconut and a hint of bread or vinegar. The kefir should be thicker than regular coconut milk with a texture similar to buttermilk or drinking yogurt. After incubation and storage, it is normal that coconut milk kefir shows a little separation; just shake the kefir for consumption. Sugar or sweeter alternatives can be added for kefir. For example, add 3 teaspoons or less of sugar per cup of coconut milk before pasteurizing (Table 2).

Table 2. Recipes with sugar to make coconut kefir with either milk or water kefir grains.

Ingredients	Coconut kefir 0% sugar	Coconut kefir 5% sugar	Coconut kefir 10% sugar
Coconut milk ¹	4 cups (1000g)	4 cups (1000g)	4 cups (1000g)
Sugar ²	-	¼ cup (50g)	½ cup (100g)
Milk kefir grains ² or Water kefir grains ²	1 tsp (2-3g) ¼ cup (25g)	1 tsp (2-3g) ¼ cup (25g)	1 tsp (2-3g) ¼ cup (25g)

¹Use liquid measuring cup. ²Use solid measuring cup

Enjoying kefir in different ways

Coconut kefir can be flavored after removing grains using the second fermentation process. If one prefers a yogurt-like flavor, coconut milk can be mixed with pasteurized dairy milk at a ratio of 1:1 before inoculation. Soy milk, nut milk, or fruit juice can also be mixed with the coconut milk to make various kefir products. In addition, coconut kefir can be used as an ingredient to make ice cream, smoothies, salad dressings, or even meat marinade.

Food safety practice for making kefir

To make kefir safely, always practice food safe handling practices:

- Practice good personal hygiene, use soap and warm running water to wash your hands, and bandage cuts and burns on hands before handling food;
- Avoid cross-contamination; clean and sanitize equipment and utensils, rinse well, and air dry.
- Use ingredients with good quality and uncontaminated; and
- Discard kefir grains and batches that are moldy, smell rotten, and look unpleasant.



Figure 6. Coconut kefir made of coconut milk

For further information:

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