

bacteria serum, LABS) remains below the cheese, see Figure 3.

If LABS will not be harvested within seven (7) days, remove the cheese. If the cheese is not removed, the cheese melts and undergoes a secondary reaction and cannot be used.

Materials needed:

- 10 liters milk
- 1 liter of Fermented Rice Wash (FRW)
- Strainer
- Container (big enough to accommodate 10 liters of milk and FRW)

Procedure:

1. Strain the FRW in a container, keeping approximately 1 liter.
2. Mix the strained FRW in 10 liters of milk in another clean container.
3. Tightly cover the container, clearly indicate the date of preparation.
4. Harvest and filter the resulting light yellow liquid after 5-7 days.

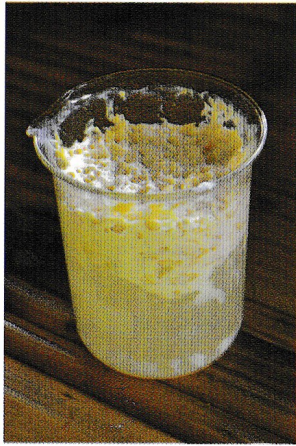


Figure 3. Since milk has more nutrients than rice wash, lactic acid bacteria grow vigorously. After 5-7 days, the mixture of FRW and milk will have distinct layer of cheese-like material on top and a yellow liquid below.

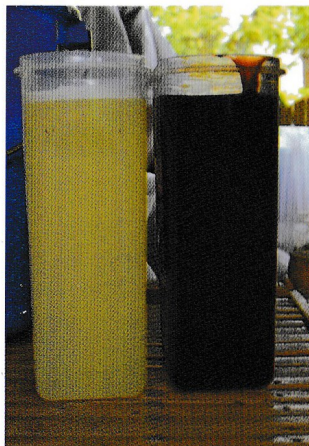


Figure 4. The molasses and the LABS should be mixed in equal proportion. Molasses would serve as the food of the bacilli while being stored at room temperature.

5. Store and keep the refined LABS in a refrigerator (1-15°C). Keeping LABS in a refrigerator would stop their multiplication by sending them to “sleep” and therefore will not eat and use up their food and will not die.

3. How to Keep LABS under Room Temperature



Figure 5. This mixture of LABS and molasses diluted with 20 parts water will make the lactic acid bacteria concoction which is ready for use.

In order to keep LABS at a normal room temperature, it must be mixed with the same amount of molasses² at 1:1 ratio, see Figure 4.

The lactic acid bacteria will multiply with the presence of molasses which serves as their “food”. As long as they have food, they will multiply and can be kept under normal room temperature.

Materials Needed:

- 1 liter Molasses
- 1 liter LABS
- Container with 3-5 liter capacity

4. How to use LABS

Materials Needed:

- Water (non-chlorinated)
- Measuring spoon
- Clean container for storage

1. The basic dilution rate for Mixture #2 is 1:1000.
2. For LABS with molasses, the basic dilution ratio is 1:20 to make the “*lactic acid bacteria concoction*”. Do not use chlorinated water as chlorine would kill the lactobacilli.
3. Mix 2-4 tablespoons of “lactic acid bacteria concoction” with a gallon of water. This can be used as a basic spray to pig pens or can be mixed with feeds to make a slop.

² According to Rodriguez, Katherine Arasula, et.al, brown or white sugar may be used and would still yield “too many to count” lactic acid bacteria.

LACTIC ACID BACTERIA SERUM – PIG A Step-by-Step Production Guide¹



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Who is Lactobacillus?

Lactobacillus is a group of gram-positive, rod-shaped bacteria that stains red as seen under the microscope (see Figure 1). It encompasses a significant number of different species that are largely diverse. The genus *Lactobacillus* contains several species that make up normal intestinal flora in the human as well as animal body. Many species are prominent in decaying plant material. They are also called *lactic acid bacteria*.

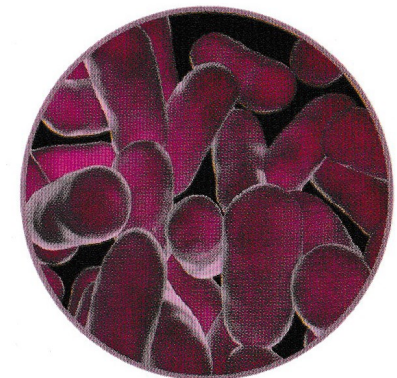


Figure 1. *Lactobacillus bacteria*

¹ This step-by-step guide is an attempt of ATI-ITCPH to describe and visualize the various stages of production of this very popular indigenous microorganism used in natural farming.

These bacteria produce lactic acid which makes its environment acidic. This acidic environment inhibits the growth of some harmful bacteria that can cause infections. As such *Lactobacillus* belongs to the so-called “beneficial” microorganisms. Beneficial microorganisms are also called “probiotics”. Probiotics are friendly bacteria that aid in digestion and absorption of nutrients. They help to keep harmful bacteria from colonizing and creating digestive problems, and thus support the body in fighting illness and disease. If beneficial bacteria become depleted or the balance is disturbed, potentially harmful (pathogenic) bacteria can overgrow, causing health problems.

Lactobacillus is known as one of the major workhorse beneficial indigenous microorganisms. As mentioned, it is known to produce enzymes and natural antibiotics aiding effective digestion and has antibacterial properties, including control of *Salmonella* and *E. coli*.

Its application in organic farming is enormous. This particular beneficial microorganism is popularly used in composting that specifically arrest foul odors associated with anaerobic decomposition. Lactic acid bacteria thrive and feed on the ammonia released in the decomposition normally associated with foul odors.

Lactic Acid Bacteria are specially used in natural piggery. Pigs are allowed to roam their pens where the floors (substrate) are made of compost, soil and other organic matter like sawdust, sprayed with lactic acid bacteria serum. There is no need to clean up the pens of excretions and urine. The lactic acid bacteria do the cleansing. They convert these wastes into unharmed ones through this natural way of decomposition. So there is no need to clean and no need to worry about foul odors.

Another application is for raising organic chickens. The serum is diluted and added to water and feeds of the chickens. With the lactic acid bacteria intake of the chickens, it helps better assimilation of nutrients of feeds through better breakdown of food, thus, more nutritious food extraction.

Likewise, in aquaculture, one of the problems is related to water quality. Poor water quality stresses the fish which in turn stunts their growth and affects their

health. This is very evident especially on high density and tank aquaculture. The ammonia produced through fish excretions pollute the water and stress the fish. With the regular addition of this beneficial microorganisms to the water, ammonia problem is minimized, if not fully arrested. It helps hasten or complete the denitrification or conversion of wastes into forms not harmful to fish.

1. Preparation of Fermented Rice Wash (FRW)¹

In this procedure, rice wash (“hugas bigas”) is the main material in producing the lactic acid bacteria. Rice wash is fermented at an optimum temperature of 23-25°C. This means that the area should be cool and shaded with no sunlight.

It should be emphasized that each environment would have varying degrees in the kind and amount of organism. This step is very important and one is literally producing the *Lactobacillus* organism very specific to the area.

The fermentation process is complete at approximately 5-7 days. However at 3-4 days, there will be three (3) divided layers already: floating matter, clear liquid, and dregs. It starts to emit a sour smell unique to lactic acid bacteria. The separated layer of clear liquid contains the ***Lactic Acid Bacteria*** (some call this LAB pure stock²).

Materials Needed:

- 1.0 liter of *hugas-bigas*³
- Covered container, plastic or bottle

Procedure:

1. Collect approximately three (3) liters of rice wash in a clean container. The container should be big enough to accommodate the rice wash and to occupy 2/3 the volume of the container to allow air gap inside the container (Figure 2). While *Lactobacilli* are “anaerobic” organisms and can therefore grow on low

¹ Taken from the Undergraduate Thesis: “Optimization of Cost-efficient and Effective Culture Media for Lactic Acid Bacteria (LAB) by Rodriguez, Catherine Arasula, et al.

² A term from a discussion on lactic acid bacteria, www.thenaturalfarming-way.com.

³ 3 liters of rice wash would yield approximately 1 liter of fermented rice wash (FRW).

or even in the absence of oxygen, the air gap is needed for the fermentation process to proceed.

2. Cover tightly to minimize or avoid contamination with other organisms.⁴
3. Label the container indicating the date of preparation and store in a cool dry place.



Figure 2. The rice wash after 5-7 days of fermentation. Rice bran will separate and float in the liquid like a thin film. The fermented rice wash should smell sour but not foul. This mixture is strained to simply get the liquid.

4. Check the fermentation process at 5-7 days and harvest the FRW accordingly.

2. Production of Lactic Acid Bacteria Serum (LABS)

The FRW has been infected with different types of microbes including *Lactobacilli*. In order to get “pure” *Lactobacilli*, we use milk to eliminate other microorganisms and more of *Lactobacilli* will be left.

FRW to milk ratio is 1:10.

This process would take another 5-7 days. Again at 23-25°C, starch, protein, and fat float on the surface (called cheese) and light yellow liquid (***Lactic Acid***

⁴ Other procedures prefer the use of Manila paper (or similar clean, porous material) secured with a string or a sturdy rubber band to cover the container. However, in the undergraduate study of Rodriguez et al, it was found out that low oxygen level would be optimum for the growth of *Lactobacilli*.