

LOW COST YOGURT PRODUCTION ANDAN ANALYSIS OF ITS HEALTH BENEFITS

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Introduction

Sri Lanka is a developing country, which is highly depending on agricultural resources for its development. It has a total land area of 65,610 sq. km. Of this, around 30 percent is agricultural land. Almost 75% of the agricultural land is under smallholdings and the balance under estates. The number of smallholdings is estimated at about 1.8 million and of this 90% are less than 2 ha in extent. About 70% smallholdings solely devoted to crop production, the remaining has a mixture of crops and livestock and in few cases solely livestock.

The agricultural sector contributes around 16.8 percent of National Gross Domestic Production (GDP). The livestock sub sector contributes around 1.2% of national GDP. There are about 1.5 million cattle, 0.3 million buffalo's are in the country.

The estimated annual milk production in the country is 350 million liters and is produced in all the districts. The districts with a significant milk production are Kurunegala, Badulla, Anuradhapura, Nuwara-Eliya. Of the total milk that is available, the volume of milk entering the formal milk market annually is around 100 million liters and the rest is channeled via informal routes and consumed domestically. (Ministry of live stock & rural community development Sri Lanka)

While considering all the milk products yogurt has a high value than others. It is a wonderful quick, easy and nutritious snack and it has a high nutritional value in protein, calcium, riboflavin, vitamin B6 and vitamin B12 beyond those of milk (Chenget *et al.*, 2005). It's a best protein supplement of protein for vegetarian. It increases the bioavailability, (Ensminger *et al.*, 1986) easiest to digest than milk, rich in calcium and protein (Fabian Eet *et al.*, 2006), Increase the Body's Ability to Build Bone (Cornish Jet *et al.*, 2004), Boosts Immune Response (Borrego F, *et al.*, 1999), and gives flat abs. Yogurt aids healing after intestinal infections, Protection against Ulcers, Arthritis and osteoporosis (Baharav Eet *et al.*, 2004).

This attracts our focus to develop a protocol which can be done by local farmers individually without prior knowledge and experience. So that they can avoid the wastage of milk and make more profit through a simple way. This protocol was designed through several experiments to find a better taste and texture of the yogurt.

Methodology

Cow milk is most commonly used to make yogurt, but milk from water buffalo, goats, sheep, horses, camels, humans and yaks is also can be used.

A group of bacteria called "lactic acid bacteria" ferment milk sugars, lactose, to produce lactic acid. The production of acid from the sugar results in a different taste and consistency

of the milk. Depending on the age and bacterial activity of the yogurt "starter", the inoculated milk can acidify the sugars enough to cause coagulation of the proteins within 8 to 18 hours. The production of acid may be measured by monitoring the pH of the milk and thus the consistency of the milk. Coagulation of the proteins is evident as a custard-like curd. Because more lactic acid is produced over time, the result of a longer incubation period is that yogurt becomes tart.

Commercially produced yogurt is a convenient source of starter bacteria. Generally, a mixture of *Streptococcus* and *Lactobacillus* has been used to produce yogurt and are present in the starter. Using a simple stain, one may observe typical cocci in chains of *Streptococcus* and the large rods of *Lactobacillus*. Other variables, such as the percentage of fat (butter) in the milk, the type of starter bacteria used also affect the quality of the product.

Untreated milk that is allowed to stand without refrigeration will "spoil." Bacteria naturally present in the milk will grow and usually produce highly undesirable results. The spoilage bacteria will breakdown the proteins and lipids in milk as well as the sugars. To prevent the milk from spoiling during yogurt production, most of the spoilage bacteria are killed by heating the milk to 80°C for 30 minutes. Alternatively, one can use commercially available "boxed milk" that has been treated to kill the spoilage organisms. Unopened boxed milk can be stored at room temperature for long periods of time without spoilage (Fabian Eet *al.*, 2006).

We produce low cost yogurt without rennet in room temperature (without incubator), Instead of rennet we use mother culture as a starter.

Protocol: 01
Approximately: 15 servings

Milk	1 Bottle
Milk Powder	100g
Sugar	150g
Gelatin	2 tsp
Vanilla	2 drops
Yogurt	1 cup

This is a production of a creamy yogurt. To make this, we have to boil the milk for 20 minutes in low flame. (80 C) and then add milk powder, sugar, gelatin, vanilla and mix well. Allow the milk to reach 40 C. This is the optimum temperature to introduce the inoculants culture. Then mix the culture well; pour the mixture to an air tight container. Allow it to rest for 8-18 hours. Thereafter we have to transfer that to a refrigerator to control/ shutdown the microbial activity.

Protocol: 02**Approximately: 15 servings**

Non fat milk	1 liter
Sugar	130g
Gelatin	8g
Yogurt	1 cup
Essence	3 drops

It is known as plain yogurt and it can be produce with/ without essence. If we produce it without essence, then it taste great when we add fruit sauces prior to consume. Remaining procedure is same as Protocol 01.

Protocol: 03**Approximately: 07 servings**

Fat free milk	500ml
Custard powder	4.5g
Gelatin	3.5g
Essence	0.5g
Culture	1 cup/less
Sugar	0.12g

We have designed this protocol especially for the diabetic people/ dieters. To make this, Boil the milk in 80⁰ C for 20 minutes. Then remove the fat aseptically, Add and mix other ingredients without mother culture. Allow the culture to cool down (40⁰C). Then Inoculate the culture, Incubate it in room temperature (30⁰C) for 8-18 hrs. Store that in refrigerator.

Discussion and Conclusion

Here we use the mother culture from another yogurt rather than a pure culture. Because when we introduce it directly to the milk, they are sensitive to the temperature and they need to satisfy the other requirements. It needs the incubator for its growth, and there are chances for the contamination. When we inoculate the mother culture from another yogurt, the bacteria's from it easily start to act in the room temperature itself, and this step make farmers to feel comfort. But to do this we have to get a active mother culture. Here our yogurt reflects almost same texture of its mother culture. So it required to get a good culture.

This method guides our farmers to produce low cost quality yogurt without high investment. It helps them to preserve the milk for a longer period and make more profit. When we consider in the profit point, normally one liter milk costs around 75 Rupees (this includes farmers' profit) but when he make 15 yogurts in a 1 liter of milk, he could sell each for 25 Rupees. So the total profit of one liter milk is 375 Rs. But the production cost for fifteen yogurts is 100. Therefore farmer can make extra 275 rupees profit with a liter of milk.

We have already started this training programme in Vavuniya district to encourage farmers to grow more cattle, So that we can locally produce milk to satisfy the local requirement and excess can be preserved in a healthy and useful way..

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