

# Application of Milking Machines for Milk Extraction for Different Domestic Animals

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**ABSTRACT:** India is a vast country in the globe where agriculture is the primary employment, which is intertwined alongside animal husbandry and allied enterprises, dairy being one of the major livestock companies. The dairy industry is important to the economy, which makes the milking process important because milk is a main segment of the dairy industry. There are various methods and techniques of milking, both traditional and modern, to take milk out from cattle that are present in the udder to avoid diseases such as mastitis and milk fever. The study's goal is to examine all elements of milking methods and new technology utilized in various regions of the world. Every area experiences technological improvement, which impacts the profitability of the dairy business, resulting in a rise in the utilization of milk and milk-based products during the previous decade. Traditional, manual, semiautomatic, automated, and robotic milking procedures are available, depending on the farm or cow owner's financial situation. Manual milking is the oldest way, whereas automated milking is a newer and more sophisticated one. As the Indian dairy sector has yet to gain a rightful place as a proper company, the alternative methods of individuals toward dairy will be noticeable in the coming years.

**KEYWORDS:** Bucket, Cattle, Clusters, Dairy, Milking Machine.

## 1. INTRODUCTION

One of the essential food sources for all living things, including people and animals, is milk. Since mothers produced milk for their newborns, it has been utilized throughout history. Since milk is now one of the main sources of energy for living things, the cattle are raised for milk production. The majority of milking activity occurs in the morning and evening, as was the custom of the predecessors. Mammary glands, which create milk and store it within the mother's udder, were present in animals. In many regions of the world, particularly in the most technologically backward nations, the majority of the milking is still done by hand. One of the significant major jobs connected to farming is cattle raising. Cattle excrement is utilized as manure or fertilizer on the farm, while agricultural products are fed to the cattle as fodder. India is one of the major producers of milk in the world and the leading exporter of dairy products and milk [1], [2].

Over the past few decades, a variety of milking methods from “totally automatic milking machines” to “manual milking machines” have been created. Depending on the amount of herds, machinery are used at many farms where there are more animals. The majority of the cattle are cows and buffaloes; above all other nations, India has the most buffaloes. Some of the milk products exported on a worldwide market with milk include milk powder, butter, buttermilk, curds, and cheese. To preserve their body temperature and udder condition, high milk output cows are milked more than twice a day. The United States, India, China, and the European Union are major producers of milk worldwide. As feed management is essential on every farm, increasing the

quality of feeding results in increased milk production. Cows who are fed properly and of high quality produce more milk. The nutritional diet of cattle enhances the quality of the milk; the correct amounts of calcium, protein, and necessary minerals and vitamins must be stated in the diet; if they are absent from the feed, they should be administered orally during the feeding [3]–[5].

There are milking machines now in the global market, used for decades which reduce the labor cost required during the milking of cattle. The milking machines were manual in past but now are automatic due to advancements in technology. Automatic milking machines are used in the market as they reduce labor costs and improve the quality of milk. There are different machines in the market having different components in design and using methodology. The milking machine is mostly used in foreign countries where the milk yield per cow is high or near about 20 liters per day. The machine available before in the market were manual and replaced by automatic which use of sensors make the machines efficient and accurate. There are different companies in the market which manufactures the milking machine and accessories. The use of a milking machine depends on the number of cattle on the farm and the quantity of total milk collection [6]–[9].

The automatic machines used before had high compression, which results in the suction of blood from cattle bodies after completing the suction of milk from the cattle udder. So the sensors were added to the machine that makes the removal of teat cups automatic from teats when milk suction is completed by the machine. The quality of milk is improved as no human contact takes place during the entire procedure from cattle udder to the container. The udder is the body part of female cattle where milk cells prepare the milk and stored it for a calf. The automatic machines used in the market are different depending on the use of the motor. Using artificial intelligence, the fully automatic milking parlors are there in the market which are now able to place teat cups and remove them after milking, so no work is required for any operation so that cattle can give milk any time of the day as they want [10], [11].

## 2. DISCUSSION

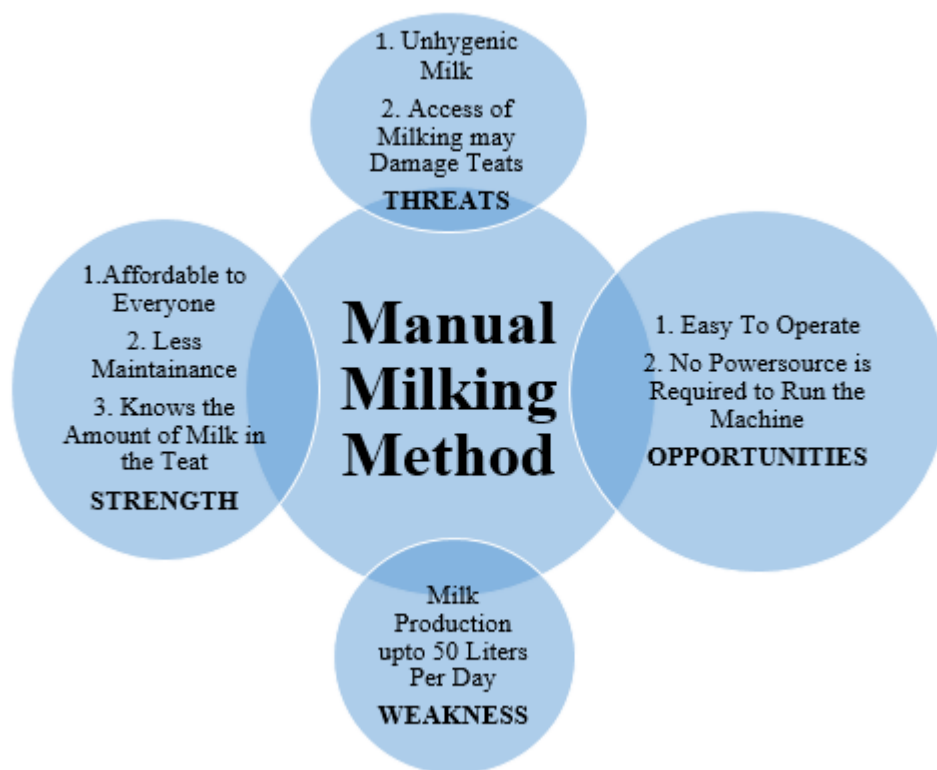
### 2.1. Manual milking:

The milking method mostly used is hand milking as people not afford to buy the modern milking equipment. The milking of a cow is done by using hands, where milk is stored in a milk container. Hand milking method needs the skill to pull the milk in the container, so for milking the milk pumps are used which makes milking easy where the image is of the cow milking process for taking out the colostrum from the udder using a pump where container capacity is up to 2.5-5 liters, container capacity is up to 7-14 liter in which milking is done using hand pressing pump which generates vacuum pressure which helps in the suction of milk from cow teats and stored it in the container through the pipes attached to two milk tubes. Using a hydraulic press the milk is pumped into the container where milk can be pulled out from four teats of a cow by pressing the hand to generate the pressure which can be seen in the pressure meter attached to the machine. The person using these manual devices don't require the skill of milking but the hands and forearms get a pump as the milking need energy and the hands are there only to use.

### 2.2. Automatic milking:

The automatic machine is used mostly by the farmers having cattle more than 2 as it is easy to operate and no hands are used here while milking which saves time. The electric machine is used for milking the cattle, goats, and sheep as it had two milk tubes that pull the milk from the udder to the containe. The electric machine is used for four teats milking at the time so there are now machines that can pump all milk from the cattle teats in less time. The automatic machine with a single cluster arrangement of all four teats tubes with a single motor and container has the capacity of up to 10-20 liter. There are double cluster milking machines that are used for milking the two cattle same time. The double cluster machine may have two motors and two containers assembly together or a double cluster machine with a single motor and container.

Since no hands are employed during milking, the milking machines help to increase milking efficiency while preserving milk quality. Since the Stone Age, people have been milking their animals by hand. Two people can extract the milk from the teats at once, or one person can do it alone. The procedure takes a long time, and the milk becomes unsanitary since the milkman's hands touch it. The manual milking technique comprises both hand milking and manual milling machines since both need the use of hands. A competent individual who is knowledgeable about milking is needed, although anyone may use a machine as long as they are aware of what they are doing. A competent individual who is knowledgeable about milking is needed, although anyone may use a machine as long as they are aware of what they are doing. It takes a lot of effort to extract the milk by hand or by using manual machinery, and hand milking is a laborious operation as shown in Figure 1.



**Figure 1: Illustrates the SWOT Analysis of Manual Milking Method Used By Most of Farmers.**



**Figure 2: Illustrates the SWOT Analysis of Automatic Milking Method which is Now Adapted by Farmers in the World.**

Most often, milking devices that the user operates on the farm are utilised for automated milking. The devices' primary energy source is electricity, and the motor and compressor for regulating pressure are utilised to extract milk from the teats of cows. The SWOT analysis of the automated milking technique to evaluate the benefits and drawbacks is shown in Figure 2. The machines' ability to produce high-quality milk while using less work is their main strength. The updated technique employed on large farms, particularly those with a large number of cattle, is the milking parlour. The goal of creating such a parlour is to milk more animals at once in order to shorten the process.

### 3. CONCLUSION

Milking is one of the most important duties to be completed in any dairy enterprise since milk is a main product, hence extreme caution should be exercised during milking. Regardless of the method used for milking, it is imperative that all milk be removed from the cow's udder due to the risk of "Mastitis" illnesses, which are expensive for farmers to treat. When milking a cow by hand,

the hand is pumped up and there is a good probability that the cow may get kicked. As the pumping process is performed by the user, manual machines require less maintenance but more user involvement. Due to their expensive pricing, automated machines are mostly utilised by farmers with substantial incomes, hence small farmers with one or two cow prefer manual milking over machines. The milking parlour is used to simultaneously milk more than five animals. Farms with more than 50 cattle typically employ the parlour method, whereas those with fewer cattle use automated milking equipment. Robotic milking is a highly sophisticated method of milking in which one to three animals may be milked mechanically anytime the farmer wants. Over 500 cows may be found in the herds of farmers that use robotic milking.

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