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Comparative Approach for Different Types of Milking Machines Used For Milk Extractions by Small Scale Producers

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ABSTRACT: ***India is an agricultural country, and animal husbandry and agriculture are inextricably linked. Agriculture provides cow fodder, while cattle excrement provides fertilizer for agriculture. Hand milking is a traditional form of milking that has been supplanted by mechanical milking equipment. The comparison analysis is conducted for three machines that perform the same job but operate in various ways: a manual press machine, only one cluster solo bucket machine, and only one bucket double clusters machine. The research also aims to better understand the operational efficiency of milking equipment for the benefit of farmers. The hand milking machine is inexpensive, but the person must perform a hand press to maintain the pressure needed for milking, while the single bucket and single cluster machines are suitable for small farmers, while the double clusters single bucket machine is more efficient than the other two because two cattle can be milked simultaneously, but the machine is more expensive. Thus, the usage of a milking machine is determined by the number of cattle on the farm, and the choice of a double clusters machine enhances milk yield while decreasing milking time.***

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

1. INTRODUCTION

Animal husbandry is now developing with the increasing population as the main occupation other than agriculture. The approach of youths is changing towards animal husbandry. There are many foreign breeds and indigenous breeds of cattle in India. The livestock of India is huge and has a high number of cattle including buffalos, cows, and bulls. The cows and buffalos are reared for milk as milk is the main product of the human diet many food items are prepared from milk which is to be consumed in daily food throughout the history of India. Milking is done in the morning and evening every 12 hours interval to get an equal amount of milk. The milking is a 15-20 minutes process if milking is done with hands per cow [1], [2].

The indigenous breeds like Gir, Sahiwal, Kankrej, etc. are less milk productive than foreign breeds like Holstein-Friesian, Jersey, Brown Swiss, etc. There are many milking machines from “fully automatic milking machines” to “manual milking machines”. The use of machines is done in many farms where the number of cattle is more depending on the number of herds the process of milking. The cattle mostly includes cows and buffaloes, India holds the highest number of buffalos in the world. Milk powder, butter, buttermilk, curds, and cheese are some of the milk products exported on a global market with milk. The countries like the United States, India, China, and European Union are important milk producers in the world. The feed which is given to cattle is the main key to getting more quantity of milk [3]–[5].

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The milk production is improved due to improving the quality of feed as the feed management is necessary on every farm, eating proper and good quality feed improves the milk yield of cows. The dry feed and wet feed that is green fodder are necessary for their diet to fulfill the requirement of their body. The milking machines are used in the market to reduce the milking time of cattle so that high milk can be obtained from cattle. Many small-scale milk producers in India are using milking machines. The use of milking machines is increased within the last few years, as the youth is part becoming a part of the dairy industry. The milking is time base task and activity should be done on the time every day, misbalance in time may lead to a milk-related problem within cattle [6], [7].

The study says most mastitis cases including clinical and sub-clinical mastitis are occurred due to incomplete milking of cattle such that some amount of milk is left in the udder of cattle. The hand milking method has a high chance of such cases as the milkman not being able to empty the cattle udder during the milking, which results in big losses on-farm as the mastitis has high treatment costs than other veterinary diseases. The most important thing to avoid mastitis is to take out the milk completely and keep the surrounding cattle clean and disinfected. The milking devices mostly farmers used for milking are single clusters or two clusters for small farms [8], [9].

The focus of the analysis is to understand the difference between machines with different working principles but the same function. The costing, working, and improvements to be done in a machine so that to understand the difference between machines are manual, automatic, and semi-automatic. There are high chances of infection in teats during hand-milking using a machine it can be avoided, the milk quality is maintained as no user contact between milk and user, machine directly carries the milk from teat to container bucket. High-quality milk gets long life which is profitable to farmers. There is an advanced milling process but the small machines are easy to operate and affordable to the common man, hence the demand for these machines will increase with time. Different engineers are working on it to improve the efficiency of milking machines with comfort to animals during milking [10].

2. DISCUSSION

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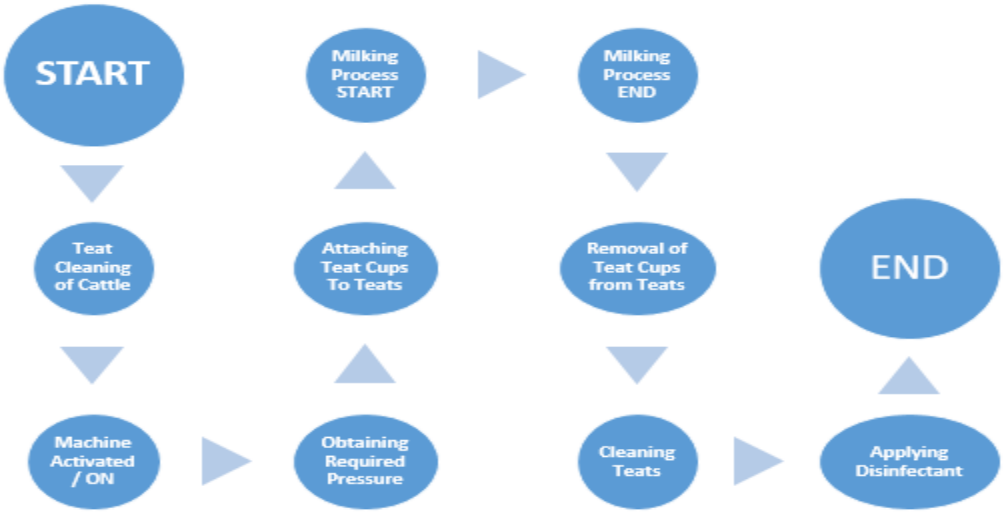

Figure 1: Illustrates the Milking Process in Systematic Manner in Any Cattle Farm

The process of milking is easy and simple some steps are the basic steps and are followed in every milking farm where there are milking animals. The process starts with teat cleaning of cattle with water before milking it is necessary and when it is clean completely the water is wiped out and dried the udder and teat. The machine is activated during this process and gets the required pressure for milking then teat cups are mounted on the cluster and are attached to the teats of cattle. As soon as teat cups are attached the milking process starts and ends within 10 minutes depending on the milk capacity up to 12-15 liters at a time. Teats get smaller after milking so teat cups get removed easily, after removing teat cups the teats are cleaned with water completely, and then they are dried. The disinfectant liquid is used applied to dried teats such that the milking process ends as illustrated in Figure 1.

The machine is manual and doesn't require any power source for working or use. The machine has components milk valve, clusters, control unit, milk can or container, and vacuum pressure gauge. The machine is easy to operate and simple to construct. The handle is used to pump and create the vacuum pressure in the machine so the milk suction is possible. The milk sucking is mostly done when the pulse rate of the machine is above 40 pulses per minute. As the machine is manual the maintenance cost is low but proper cleaning of the machine should be done to maintain the quality of milk and the life of the milk. The machine is light in weight so it is easy to carry when empty. The container capacity is about 10-20 liters made up of steel or non-chemical reactive material.

Automatic machines are used nowadays as most of the technical advancements are done in machines within a few years. The single cluster and single bucket are used for milking one cow at a time. The machine has a motor that is used for transforming motions into pulsations. The machines are with fixed alignment or adjustable alignment depending on the farm requirement. The single cluster machines need low power for working and can work effectively the machines for cow and buffalo are different as the teat arrangement for both animals are different. The

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pulsator is used for the suction of milk from the teats by generating a vacuum. The machine is available in different designs, and motors.

The double cluster milking machine can milk the two cattle the container capacity is up to 20 liters at the same time. The double cluster single bucket milking machines have the attachment of two clusters on one bucket container. The motor power required for getting the required pulse for suction of the machine is more than a single cluster machine. The motor power is more so the machine can be used for 15-20 cattle farms without any problem. The design orientation of the machine is the same as that of a single cluster machine just the change is in the cluster arrangement of machines which changes the size and capacity of the motor. There is a farmer who uses these machines to reduce the milking time on each cattle so the machine is time-saving. The pressure gauge is attached to every milking machine to examine the milking under the required press if pressure rises suction may lead to bleeding from the teats and if the pressure drops the suction is not done properly.

The milking process is done twice daily for milking animals. The results were obtained by using machines on the same animals for one day each to get the exact amount of milk per day. The five milking cows with nearly the same milking capacity and same breed are milked together. The milking is a quick process and should be done timely. Time required by double cluster single bucket machine is less or the half of other machines and milk production is also increased as the cows' are milked in the time. The single cluster single bucket milking machines are mostly used by farmers either they are automatic or manual, the manual machine has less maintenance as compared to other machines.

The number of animals milked by a single cluster machine is one as there are only four teat cups in one cluster. The machines are easy in cleaning as their design is simple and easy to understand by any user. The double cluster machine has heavy power so the compressor for maintaining the pressure is placed in one place and the bucket is moved all over the milking area on the farm up to which the pressure pipelines. The double cluster machine has double speed in than single speed as the double animals are milked at a time in this machine. The manual single cluster and single bucket machine have hand press operation so the user needs to pump the machine to maintain the pulsation rates. The machines are easy, simple, and available in both automatic as well manual depending on the size of the farm

The cost is also a big difference which affects the sale of milking machines, the most of farmers want to by the machine but the cost of machine is unbearable for small farmer with one or two cattle. The machines are used by famers who have the more cattle and are unable to bear labor cost for milking such herds of cattle. The time and milk amount is profitable for the person who use double cluster machine. The milk is the very first and base product of dairy business so it is necessary to improve the milk yield in cattle and improve the production of milk so the dairy business to become profitable. The proper method of milking should be known to the farmer to avoid the milk related health issues in cattle. Thus, any machine should be used to avoid the extra efforts required for milking cattle.

3. CONCLUSION

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The use of machine helps to improve the milk yield in animals while fast milking holds the quantity of milk. The milking activity is time base activity, loss of time may cause trouble to animal due to milking. The most single cluster manual machine is affordable to the farmer but there is loss of time and energy as there is hand-pressing of handle required for till complete milking to maintain the pulsation pressure of machine. In automatic milking machine, the machine itself maintain the pulsation during the process the farmer need to just place the clusters after and before the milking. The cost of manual machine is less as compared to automatic milking machine almost half is searched in market. The manual machine is also useful as it is cheap for small farmers but mostly used machine is single cluster and single bucket milking machine. The cost of double cluster machine is high but the machine can help to improve the productivity of cattle. The people are now getting aware about such machines and trying to install such machine. In next few years most of small scales farmer will start using milking machine as the importance of proper milking is now acknowledged by the people. Thus, the dairy farmers will improve the profits as a business in the milk production.

REFERENCES:

[1] M. Wieland, D. V. Nydam, N. Älveby, P. Wood, and P. D. Virkler, "Short communication: Teat-end shape and udder-level milking characteristics and their associations with machine milking-induced changes in teat tissue condition," *J. Dairy Sci.*, 2018, doi: 10.3168/jds.2018-15057.

[2] J. Besier and R. M. Bruckmaier, "Vacuum levels and milk-flow-dependent vacuum drops affect machine milking performance and teat condition in dairy cows," *J. Dairy Sci.*, 2016, doi: 10.3168/jds.2015-10340.

[3] P. Junga, P. Travnicek, and J. Ruzbarsky, "Monitoring of the machine milking process with application of infrared thermography," *MM Sci. J.*, 2016, doi: 10.17973/MMSJ.2016_09_201652.

[4] M. Wiercioch, A. Luberański, A. Krzyś, D. Skalska, and J. Szlachta, "Impact of the System of Air Supply to a Milking Unit on Selected Parameters of Milking Machine Operation," *Agric. Eng.*, 2016, doi: 10.1515/agriceng-2016-0057.

[5] P. Teixeira, Z. Lopes, J. Azeredo, R. Oliveira, and M. J. Vieira, "Physico-chemical surface characterization of a bacterial population isolated from a milking machine," *Food Microbiol.*, 2005, doi: 10.1016/j.fm.2004.03.010.

[6] C. Vissio, M. Bouman, and A. J. Larriestra, "Milking machine and udder health management factors associated with bulk milk somatic cell count in Uruguayan herds," *Prev. Vet. Med.*, 2018, doi: 10.1016/j.prevetmed.2017.12.011.

[7] H. Jiang, W. Wang, C. Li, and W. Wang, "Innovation, practical benefits and prospects for the future development of automatic milking systems," *Frontiers of Agricultural Science and Engineering*. 2017. doi: 10.15302/J-FASE-2016117.

[8] G. Romero, R. Panzalis, and P. Ruegg, "Relationship of goat milk flow emission variables with milking routine, milking parameters, milking machine characteristics and goat physiology," *Animal*, 2017, doi: 10.1017/S1751731117000623.

[9] V. Dmytriv, I. Dmytriv, Y. Lavryk, and I. Horodeckyy, "Models of adaptation of the milking machines systems," *BIO Web Conf.*, 2018, doi: 10.1051/bioconf/20181002004.

[10] M. A. Thomassen, R. Dalgaard, R. Heijungs, and I. De Boer, "Attributional and consequential LCA of milk production," *Int. J. Life Cycle Assess.*, 2008, doi: 10.1007/s11367-008-0007-y.