

1.0 Introduction/Background

Manual milking is a tiring operation and now a day it is difficult to find skilled manual milkers. Further a manual milking is difficult in medium and large scale commercial dairy farms. Therefore medium and large scale farmers are using milking parlors or milking machines.

Figure 1 shows the Sri Lankan cattle farms by herd size (relevant data are listed in table 1) according to the department of census and statistics, Sri Lanka (<http://www.statistics.gov.lk/agriculture/index.html> accessed 09/03/2011). Milking parlors are suitable for farmers having over 20 cows. From 10 to 20 cows a milking machine with two clusters would be suitable. Farmers having 5 to 10 cows cannot afford for a milking machine, considering the price of portable milking machines available in the market. Further these milking machines are driven by electric motors and needs mains grid supply. Otherwise an electricity generator is required. Most of the Sri Lankan small scale cattle farmers do not have electricity and even though they have electricity in their homes, the cattle barns are not wired and located in a distant place to the home. Therefore not having electric supply in barns is a major constrain in using milking machines in Sri Lanka.

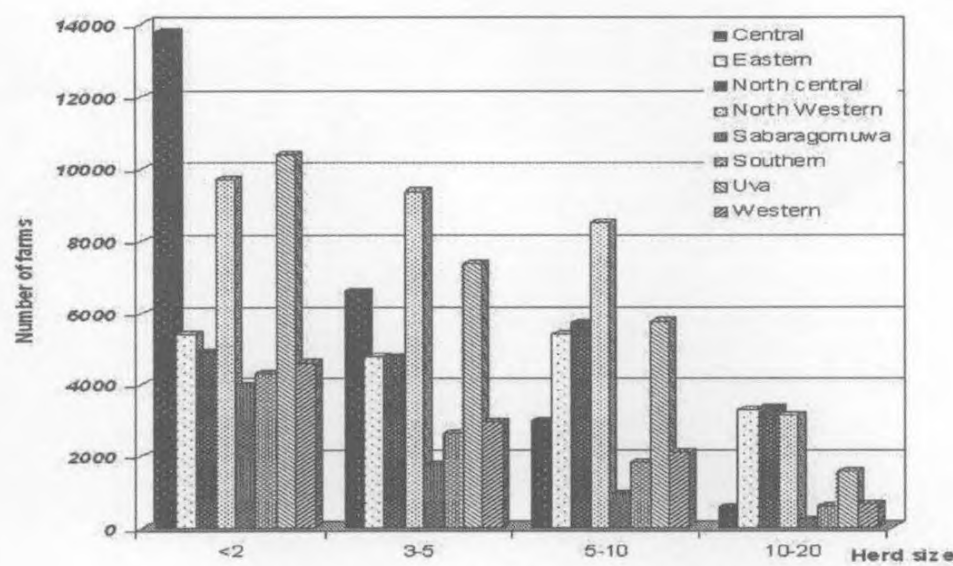


Figure 1. Cattle farms by herd size in Sri Lanka

Table 1. Cattle farms by herd size in Sri Lanka.

Herd size	Provinces							
	Central	Eastern	North central	North Western	Sabaragom uwa	Southern	Uva	Western
<2	13791	5402	4880	9709	3980	4312	10390	4600
3-5	6603	4748	4727	9378	1746	2638	7368	2949
5-10	2972	5379	5712	8496	935	1808	5767	2104
10-20	549	3313	3366	3147	235	576	1585	662
>20	100	2970	2298	1079	62	384	386	121

Figure 2 shows a conventional milking machine available in Sri Lanka. The conventional milking machine uses an electric motor driven vacuum pump with a separate vacuum cylinder which is connected to the milk collecting can to maintain a continuous vacuum. A mechanical device provides the pulsation to extract milk from

the teats. Conventional portable milking machines are on wheels and are unable to lift and carry by a single person.

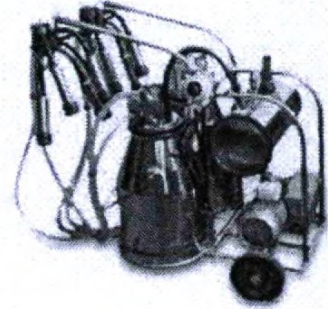


Figure 2. Conventional Portable Milking Machine

The main disadvantages of the conventional milking machines are;

1. The requirement of a main grid power source to power the machine. A majority of small holder milk producers in Sri Lanka do not have main grid power in their cattle sheds.
2. The large amount of power (over 1000W) consumed by the conventional milking machine to build up the vacuum required for machine milking.
3. Limited portability due to the heavy weight (cannot lift and carry) of the machine and also the high cost of conventional milking machines make its use limited in cases where a large number of farmers having one or two cows.

Apart from the above mentioned disadvantages, the limited applicability of a conventional milking machine under small scale producers increases the risk of microbiological contamination of milk by the process of hand milking. Thus the keeping quality and hygienic aspect of milk production needs a solution. Most often there is a tendency by unscrupulous small holder producers to use preservatives harmful to health to increase the keeping quality of milk.

Therefore to overcome above limitations of a conventional portable milking machines, a battery powered lift and carry type (the whole machine weighs less than 10kg including 10 liter milk can) milking machine (Model 1) was designed and tested. The machine consumes lower energy (60W) compared to a conventional milking machine (over 1000W) of similar capacity. Battery charging can be done by a 10W photo-voltaic cell or by a low power (1A) AC battery charger. Figure 3 shows the developed lift and carry type milking machine with the solar cell.



Figure 3. Lift-and-carry type milking machine (Model 1).

Two patents were applied for the milking machine and the teat-cup assembly respectively (Patent Numbers-).

Identification of the problem and justification.

Although the developed solar powered lift and carry type milking machine is tested for the functionality there are several improvements and tests to be carried out before introducing to the farmers.

Major concerns were,

1. Durability of machine parts.
2. Difficulties faced by a farmers during operation at farm level.
3. Udder health using the milking machine.

Therefore this study was focused on the above mentioned concerns and develop technologies necessary to overcome above problems before introducing to the farmers. After this study investigators believe that machine should be ready for mass production to introduce to the farmers.