

## METHODOLOGY OF MEASURING STRIP YIELD

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### Introduction

The objectives of this study were to document the distribution of strip yield for two methods of hand collection and two methods of machine collection and to develop recommendations for maximum strip yield criterion for each collection method.

Milk left in the udder after machine milking has been used as a measure of milking performance. This 'strip yield' can be collected by hand or by machine. Hand stripping requires less equipment and enables quarterly data collection but may be variable among operator, is labor intensive, and there exists a risk of second let-down due to time required for complete stripping. Machine stripping, using an entire cluster or a quarter-milker, is more consistent among operator and requires less time and effort.

Machine strip yield has been reported in numerous past studies (Dodd and Foot 1948; Walsh et al. 1970; Mein et al. 1970; McGrath and O'Shea 1972; Gibb and Mein 1976; O'Shea et al. 1980; Roets et al. 1985; Schatzl et al. 1999). Only a few studies could be found in which strip yield was obtained by hand stripping (Swanson and Hinton 1951; Schwiderski 1965; Matthes 1973; Brandsma 1978). No studies were found comparing the amount of strippings between different collection methods.

### Materials and Methods

It became quickly apparent that it was possible to remove milk indefinitely from the quarters of some cows when hand stripping due to second milk let-down and/or slow drainage of alveolar milk. Several methods of hand stripping were assessed to address this problem.

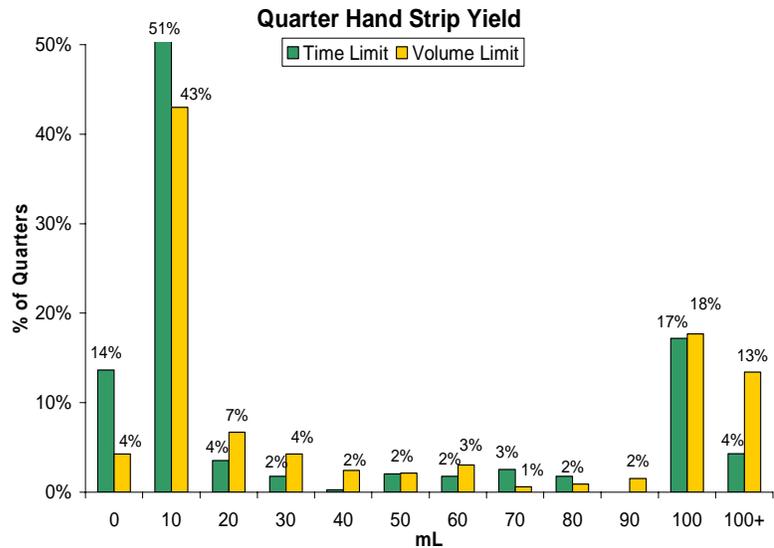
1. A "quick method" of hand stripping was used which limited the collection time to one minute (15 seconds per quarter).
2. A volumetric limit of 100 ml per quarter.
3. A volumetric limit of 500 ml per quarter.

In all methods milk was hand stripped into a graduated cylinder immediately after the milking machine was removed and without oxytocin injection. For the volumetric limit methods, hand stripping was discontinued after the volumetric limit was reached or until no milk could be extracted from a quarter. Several methods of machine stripping were also investigated.

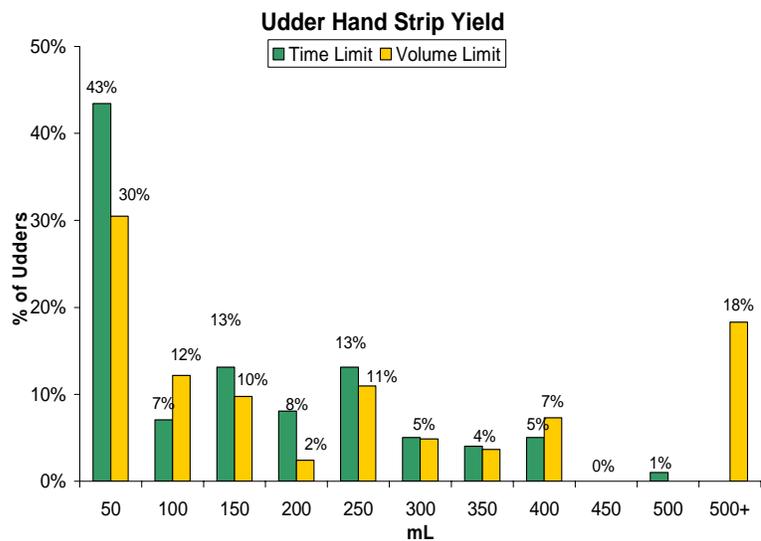
4. The milking cluster was reattached within 30 seconds of automatic cluster removal and downward pressure applied to prevent occlusion of the teat sinus. Machine stripping continued until there was little or no milk flow. The amount of additional milk harvested during machine stripping was recorded using the milk meters installed in the milking parlor.
5. A quarter-milker consisting of a single teatcup and a sealed 500-ml collection vessel. Was applied to each quarter immediately after the cluster was removed. A volumetric limitation of 1500 ml per quarter was applied to avoid complications of a second milk let-down during stripping.

## Results and Discussion

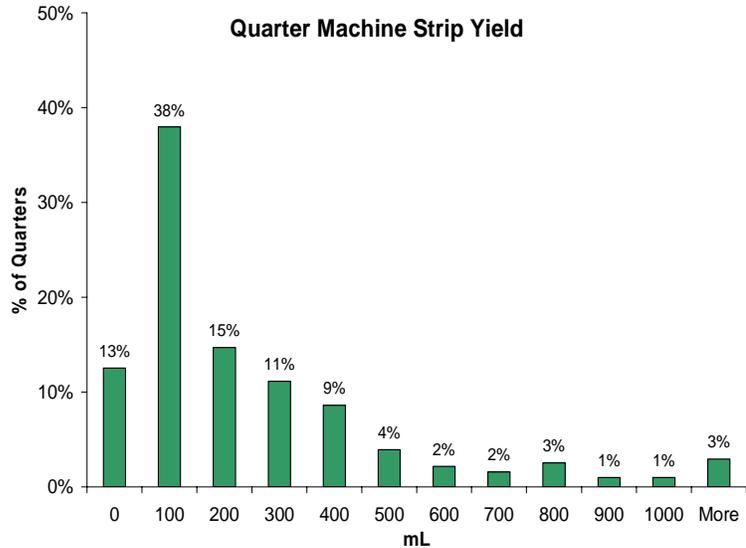
The distribution of strip yield by quarter obtained by two methods of hand collection is shown in the figure to the right. The time limited method attained 10 ml less milk per quarter on average as compared to the volume limited method. Sample sizes for the time limit and volumetric limit methods were 396 and 328 observations, respectively. These distributions suggest a bimodal distribution in which many teats are cleanly milked out with less than 20 ml per quarter and a second distribution of under-milked quarters with more than 100 ml per quarter.



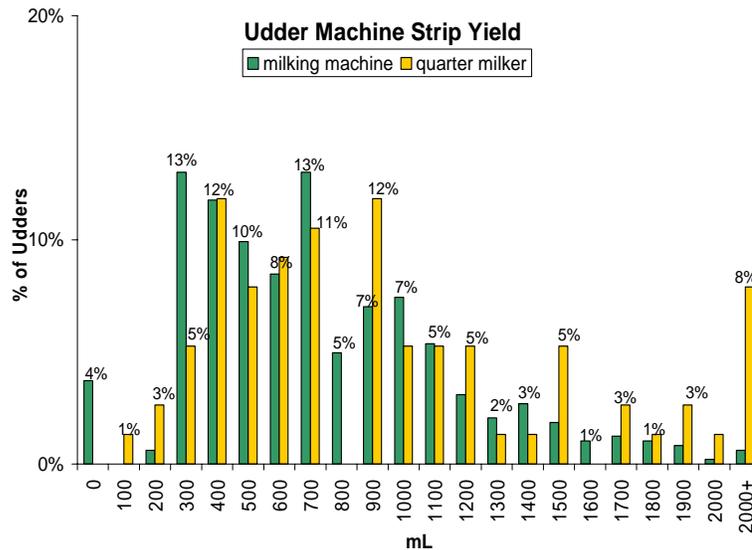
These same data are presented with quarter measurements combined into udder totals in the figure to the right. The time limited method yielded 80 ml less milk on average; all 99 observations of strip yield would have passed the Mein and Reid (1996) criterion of less than 500 ml per udder. The volumetric limitation method, with 82 observations, resulted in 18% of observations failing the Mein and Reid 500 ml criterion. These results suggest that a time limit should be used when reporting strip yields by udder to avoid collection during a second milk let down.



The distribution of strip yield by quarter obtained by the quarter-milker is shown in the figure to the right. The amount of strip yield obtained by machine milking was considerably higher than that obtained by hand milking. It is more difficult to assign a definitive criterion for under-milking from these data.



The distribution of strip yield by udder obtained by two machine collection methods is shown in the figure to the right. Note that the quarter milking results are the same data as presented above, but are pooled into udder totals. Collection with the quarter-milker (76 observations) yielded 240 ml more milk on average than collection with the cluster (484 observations) probably due to the increased time required to use the quarter milker.



## Discussion and Recommendations

Hand stripping should be performed immediately after the machine is removed and should take no more than 1 minute. This will save time and reduce confusing results produced by secondary milk letdown responses. These data suggest that when hand stripping a threshold of > 100 ml per quarter is a good measure of under milking. And that a reasonable goal is that less than 20% of quarters should exceed this value

The amount of milk recovered when machine stripping will be much higher than for hand stripping. A reasonable goal when using a quarter-milking devices is that no more than 10% of quarters should exceed 500 ml. When using a complete milking unit or pooling quarter strip yields by udder, a threshold of about 1500 ml (3.5 lb) per udder as a measure of under milking.

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