Refinement in Revolving Milking Stool to Reduce Drudgery among Dairy Women

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ABSTRACT

Dairy farming is subsidiary occupation of rural women in Fazilka district of Punjab, which involves backbreaking tasks as all the activities are carried out in difficult posture. This increases static muscular effort, leading to higher physiological costs and lower productivity. Under On-Farm Testing (OFT) aimed at reducing drudgery for farm women aged 30-50 years, a revolving milking stool with a stand was designed by ICAR-CIWA, Bhubaneswar. Refinement is the process of obtaining a better version of a tool during its development. Initial evaluations, with total scores ranging from 3 to 4, indicated the need for further investigation and required changes to improve the tool based on the observations and opinions of the beneficiaries. During milking, women had to lift the bucket and the revolving stool separately, making handling and carrying difficult. The lack of a fixed bucket increased the risk of milk spilling, leading to wastage. To address these issues and enhance usability and women-friendly features, the refinement work included attaching a fixture to the milking stand to hold the bucket, adjusting the height, and removing sharp edges by adding slight curves to reduce the risk of injury during milking. The improved tool was well-accepted by the women, as it significantly reduced body stress by improving work posture from squatting to sitting.

Key words : *Dairy Farming, Drudgery, Milking stool, Body Posture.*

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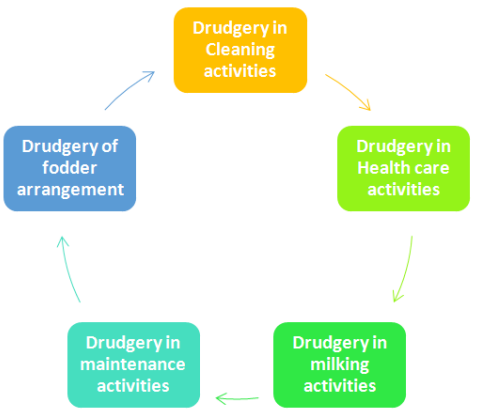
INTRODUCTION

About 50 % of human resource constitutes by women among those 77 % from rural areas specially from small and marginal farming families and landless families. Their main occupation is agriculture and small dairy activities as a main labour. Though concern for the emancipation of rural women has grown, not much has been done to address the real problems of farmwomen facing in dairying activities. They spent their one third time of whole day in arranging fodder for animal, cleaning animal shed, milking and maintaining all equipment's used while performing dairy task.

In this backdrop, Krishi Vigyan Kendra Fazilka (Punjab) made efforts to understand the problems faced by dairy women especially in dairy activities. Following is the diagram showing specific problems of women folk in the district.

Attributing factors for the problems:

The daily work schedule of rural women is very demanding. They shoulder numerous responsibilities both in home/fam and in dairy activities. The activities like fodder arrangement, cleaning of animal shed, health care practices during diseases, milking, and maintenance. The amount of time spent by women per day in field and dairy activities and drudgery of women in Fazilka district is depicted below.



Dig. 1 Drudgery of women in dairy activities

Objectives

The primary objective of this study was to evaluate and refine the revolving milking stool, a tool designed to reduce drudgery and improve the ergonomics of milking. The objectives include:

1. To refine the existing revolving milking stool to make it more user-friendly and reduce milking-related drudgery.
2. To assess the tool's impact on the physical strain, time efficiency, and overall comfort of dairy women.

SITUATION / BACKGROUND : Fazilka district of Punjab is basically based on diversified agricultural activities in which women play a crucial role for performing dairy activities with heavy workload during whole day by traditional methods followed by them. So, to reduce the drudgery among them in dairying specially milking of animals for physiological and psychological aspects. KVK provided the improved revolving milking stool with stand designed by ICAR-CIWA Bhuwaneshwar to farm women accordingly, they were asked to use the tool for milking animals and data were recorded before and after the activity performed. After their opinion of regarding use of tool KVK made refinement to solve their problems especially as to

I. How to reduce the number of hours of exposure of farm women while milking.

ii. How to minimize the drudgery experienced by the women folk.

Problems faced by women in using Revolving milking stool Height of stool was fix not adjustable according to user height.

- The edge of revolving stool was sharp which create chances of injury.
- During milking, women had to lift the bucket and the revolving stool separately handling and carrying was difficult. So it was not easy to handle and carry, Due to non-fixing of the bucket the danger of spilling of milk was felt, chances of wastage of milk was high.

Based on the above problems and the feedback obtained from dairy women the Revolving milking stool with stand was refined by Home scientist of KVK Fazilka at workshop of ICAR-CIPHET, Regional Station, Abohar.

METHDOLOGY

The study was conducted in the selected villages Bhahawalbasi of Fazilka district, where in the OFT was conducted from 2022-2024. The data was collected from the participants as well as dairy women who provided the improved milking tool through self-structured questionnaires focussed group discussion. Those women were suing the tool were consulted for the impact study and the satisfactory results have been recorded.

THE REFINEMENT MADE BY KVK

KVK made following refinements to solve the problems faced by farm women while using Revolving milking stool with stand.

Refinement Process:

The refinement process addressed key issues highlighted by the users:

- Difficulty in handling and carrying the stool and bucket separately.
- Risk of milk spillage due to lack of bucket fixation.
- Safety concerns due to sharp edges on the stool.

KVK experts, in collaboration with ICAR-CIWA Bhubaneswar, made necessary modifications, including:

- Adding a fixture to hold the bucket securely.
- Adjusting the stool height to suit user needs.
- Rounding the sharp edges to minimize injury risks.



Before refinement



After Refinement

Characteristics of Revolving milking stool with stand after Refinement

- Fitted the adjustable clip to hold the bucket during milking.
- Height of stool made adjustable according to user height.
- The edge of revolving stool was sharp in refinement removed the sharp edge by slight curve to reduce the chances of any injury.
- The length and width of the stool is designed as per the squatting anthropometric measurement of rural women by giving adjustable by fixing screw for make it more comfortable.
- The .M.S.Flat, M.S.plate, MS Pipe used material used for stool and stand of steel plate for more comfortable feel
- High quality fiber wheels, Nut and bolt used in stool and stand to make easy movement with animal movement while milking.
- It reduces stress and strain of milkman due to fear in mind that milk will get spilt due to kick of animal. It helps to avoid wastage of milk.

With the above modifications, the milking tool was refined in the year 20023-24. This modified tool was named as "Improved Revolving Milking Stool with Stand" by KVK Fazilka. The women were very much impressed with this improved tool as it fulfilled their demands for refinement. Then this Improved tool was compared with normal Revolving milking stool with stand designed by ICAR-CIWA Bhuvneshwar and traditional squatting method of milking by conducting series of assessments with farm women. The following are the results of assessments.

RESULTS AND DISCUSSION

In this way, the above detailed work of KVK is a classic example of fulfilling its mandate of Technology Assessment, Refinement, Demonstration and Dissemination. In the following procedure with step by step-

Refinement of the Tool

The key modifications made to the revolving milking stool were:

- **Bucket holder:** An attachment was added to securely hold the bucket during milking, reducing the risk of spillage.
- **Height adjustability:** The stool height was made adjustable to accommodate different users.
- **Safety improvements:** Sharp edges were rounded to minimize the risk of injury.
- **Ergonomics:** The stool design was refined to match the squatting anthropometric measurements of rural women.

After these refinements, the tool was retested with the same group of dairy women. The results indicated significant improvements in ease of use, comfort, and reduction in milking time and physical strain.

Impact of the Refined Tool

The refined tool was compared with the traditional squatting method and the original revolving milking stool. The following observations were made:

IMPACT OF The Improved Milking Tool: In view of its importance, Krishi Vigyan Kendra tried to study the impact of improved tool with the following objectives.

- How the refined tool has reduced drudgery of farmwomen in milking activity.
- How improved milking tool has enhanced milking efficiency.
- How improved milking tool has helped in saving time in milking.

OUTPUT: After conducting demonstration women were ready to adopt this improved milking tool for future uses as it reduced drudgery and enhance the efficiency level with less cost of time.

OUTCOME AND IMPACT

Table 1
Job Profile of Beneficiaries

S. No.	Job Profile	Details
1.	No. of years of experience working in agricultural and dairy activities	7-25 years
2.	Working hours per day	8 hours
3.	Number of working days in a week	7 days
4.	Land holding	
	a) Landless	0
	b) Small (1-5 acres)	3
5.	Nature of land	
	a) Irrigated	3
	b) Dry land	0
6.	Possession of land	
	a) Own	3
	b) Lease	0
7.	Occupation of the family	
	a) Agriculture only	0
	b) Agriculture+ Dairy	3
	c) Only Dairy	0
8.	Annual Income of the family in Rs. (average)	1.5-3.0

The beneficiaries of the study primarily have significant experience (ranging from 7 to 25 years) in both agricultural and dairy activities, working approximately 8 hours a day across all seven days of the week. Their agricultural activities focus on irrigated lands, with all having ownership of their land, which is typically small-scale (1-5 acres).

The main occupation of these families is a combination of agriculture and dairy farming, which aligns with their annual income range of Rs. 1.5 - 3.0 lakh. This shows the importance of dairy activities as a key contributor to their livelihoods. There are no landless beneficiaries, and none rely solely on agriculture or dairy farming separately, indicating a diversified approach to farming that integrates both sectors for enhanced economic stability.

Table 2
Health Statusof Beneficiaries

Parameters	
Age (years)	**35-55 years**
BMI Classification	
Under weight (18.5 or less)	**-**
Normal weight (18.5 to 24.99)	**67%**
Over weight (25 to 29.99)	**33%**
Obesity (class 1) (30 to 34.99)	**-**

The health status of the beneficiaries was evaluated based on their Body Mass Index (BMI). The majority (67%) of the beneficiaries fall within the normal weight range (18.5 to 24.99), indicating a healthy weight for their age group. A notable 33% are classified as overweight (BMI between 25 and 29.99), suggesting that they may benefit from health interventions focused on weight management.

Interestingly, none of the beneficiaries were classified as underweight or in the obesity (Class 1) category, reflecting a balance between normal weight and overweight classifications within this group. This provides useful insight into the overall health status of the women, showing a significant portion maintain a healthy weight but also highlighting the need for attention to the 33% who are overweight.

Table 3
Details OF Time Saved in Milking Using Improved Milking Tools

Total no. of improved milking tool usesd	**Time saved per day (minutes) through milking of each animal**	**Time saved for 3 women/day**	**Time saved for 3 women/annum**
03	4 minutes/milking	12 minutes/day	73 hours

The use of improved milking tools has resulted in significant time savings for dairy women. Each dairy woman saves approximately 12 minutes per day by using the improved milking tools. With a total of 3 tools in use, this results in a cumulative time savings of 12 minutes per day for all three women. Over the course of a year, the combined time saved by these 3 women amounts to an impressive 73 hours.

Beyond the time savings, the use of these tools has contributed to a reduction in milking drudgery and physio-psychological stress. This improvement has enhanced the overall well-being of the dairy women, making them feel more comfortable and less burdened by the physical demands of milking. The adoption of these tools not only improves efficiency but also positively impacts the quality of life for women engaged in dairy farming.

Table-4 Matrix Ranking by Dairy Women using revolving milking stool and Improved Milking Tool

Dairy women were facilitated to make a matrix ranking between milking through traditional method, Revolving milking stool with stand and Improved milking tool. The details are given below.

Particulars	Traditional method	Revolving Milking Stool	Improved milking tool	Remarks
Time required for milking/animal	More	Less	Less	The improved tool reduces energy expenditure and time during milking, enhancing efficiency
Easy to carry the tool	Not easy	Easy	Very easy	The improved milking tool is easier to handle and transport, providing convenience to women.
Milk loss	More Chance	Chance	Less chances	The improved tool reduces the risk of milk spillage, contributing to higher yield.
Drudgery in milking	More	Less	Less	Both the stool and the improved tool reduce physical strain, but the improved tool offers greater relief.
Height	-	fixed	Adjustable	The adjustable height of the improved tool provides more flexibility and comfort.
Edge	-	Sharp	Slightly curved	The slightly curved edge of the improved tool offers a safer milking experience.
Comfortable		Comfortable	More comfortable	The improved tool is designed for greater comfort, reducing fatigue during prolonged use.
Continuous attention in		Required	Required	All methods require attention, but the improved tool minimizes effort and discomfort.
Quantity of milk	7 litre	8-9 litre	More than 9 litre	The improved tool yields a higher quantity of milk, benefiting both the dairy
Method Used	Squatting	Sitting	Sitting	Sitting posture is preferred in both modern methods, reducing back strain.
Utensils used	Aluminium	Aluminium and steel	Steel	Steel components in the improved tool offer durability and hygiene.
Hygienic condition	Less	Aware about cleanliness	Maintained cleanliness	The improved tool ensures better hygiene and cleanliness during milking
Milking pattern	Use of write hand	Use of write hand method	Use of both hand	The ability to use both hands with the improved tool allows for more efficient milking.
Efficiency	Less	Increased	Increased	The improved tool significantly boosts milking efficiency.

This matrix highlights the superior performance and acceptability of the Improved Milking Tool among dairy women. The time required for milking and the drudgery associated with traditional methods are considerably reduced with the improved tool. It is easier to carry, more comfortable, and more hygienic compared to the traditional and revolving milking stool methods.

The quantity of milk collected using the improved tool is notably higher, as it facilitates better milking without the risk of significant milk loss. Additionally, the adjustable height and the slightly curved edge contribute to the tool's ergonomic design, making it safer and more comfortable to use.

The efficiency of milking has improved significantly with the adoption of the improved tool, which allows the women to use both hands for milking, enhancing productivity. This tool's benefits are further reflected in the overall reduction of physical strain, leading to better health and well-being for the dairy women.

Overall, the Improved Milking Tool stands out as the most beneficial option, offering enhanced comfort, efficiency, and hygiene, making it the

preferred choice for dairy women aiming to reduce the physical demands and time spent on milking activities.

CONCLUSION

The refinement of the revolving milking stool has significantly reduced the drudgery experienced by dairy women in Fazilka district. The improved tool, with its enhanced features of adjustability, safety, and ease of use, has made milking less physically demanding. By improving posture and reducing the risk of milk spillage, the tool has not only increased milking efficiency but also contributed to the overall well-being of the women. The study demonstrates the positive impact of ergonomic tool design in reducing physical strain and improving the quality of life for rural women engaged in dairy farming.

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