

# Pilot study: Tactile stimulation of the nipple by a novel breast shield



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## Introduction

To establish and maintain milk production it is important that the lactating breast is both stimulated and emptied sufficiently. The milk ejection reflex (MER) is a vital mechanism in the lactation process, triggered by tactile stimulation of the nipple-areola complex of the mother's breast. The MER occurs much faster due to nipple stimulation by the baby during breastfeeding compared to stimulation patterns of conventional breast pumps during milk expression. Therefore, we aimed to investigate the concept of tactile stimulation, implemented in a novel breast shield designed to mimic the baby, by including active touch of the nipple-areola complex during milk expression.

## Methods

During 6 milk expression sessions of 8 lactating women we collected data on milk weight, comparing the novel breast shield to a conventional breast shield. Milk flow data was calculated from the milk weight measurements. The main outcome parameters were milk weight, expression time and time to MER. Questionnaires were used to capture perception of breast pump performance.

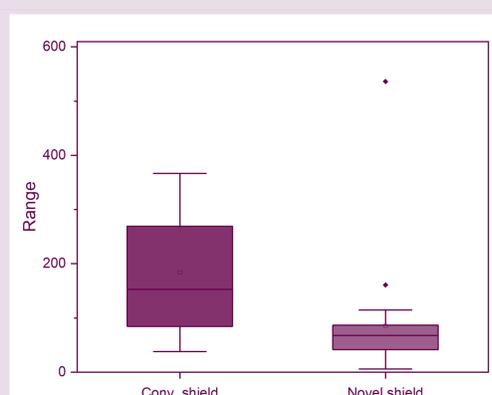
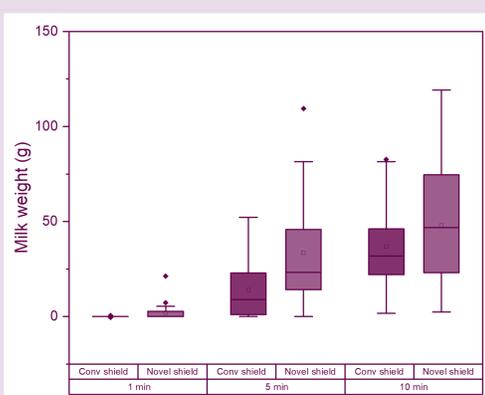
## Results

There was a significant reduction of 1m39s ( $p < 0.05$ ) in time to first milk ejection reflex when using the novel breast shield.

Moreover, the expression time was reduced by 3m39s ( $p < 0.05$ ) compared to the conventional breast shield, with the same amount of milk expressed.

More than double the weight of milk was expressed with the novel breast shield in the first 5 minutes after the start of expression.

Comfort was rated significantly higher with the novel breast shield.



	Novel breast shield Median (SEM) (n=24)	Conventional breast shield Median (SEM) (n=22)	p-value
Total milk weight (g) (both breasts)	58.50 (14.2)	75.80 (13.0)	0.692
Milk weight at 10 min (g) (right breast only)	46.81 (7.6)	31.88 (5.1)	0.116
Milk weight at 5 min (g) (right breast only)	<b>23.25 (5.7)</b>	<b>8.91 (3.3)</b>	<b>0.003</b>
Milk weight at 1 min (g) (right breast only)	<b>0.01 (0.93)</b>	<b>0.00 (0.03)</b>	<b>0.020</b>
Time to milk ejection (s) (right breast only)	<b>67.60 (20.8)</b>	<b>152.80 (23.0)</b>	<b>0.001</b>
Peak milk flow (g/s) (right breast only)	0.22 (0.02)	0.22 (0.02)	0.187
Average milk flow (g/s) (right breast only)	<b>0.08 (0.02)</b>	<b>0.05 (0.01)</b>	<b>0.047</b>
Expression time (min)	<b>11.91 (1.2)</b>	<b>15.13 (1.3)</b>	<b>0.022</b>
Time to reach 50% (min) (from start)	<b>4.42 (0.9)</b>	<b>7.16 (1.0)</b>	<b>0.035</b>
Time to reach 80% (min) (from start)	<b>6.93 (1.0)</b>	<b>9.29 (1.1)</b>	<b>0.015</b>

## Conclusions

This study shows that the novel breast shield with an active touch of the nipple-areola complex designed to mimic natural sucking behavior of a baby, results in more efficient and comfortable milk expression. The measured time to first MER in this study with the novel breast shield is in the same range as the time to first MER during breastfeeding. This shows that the stimulation of the novel breast shield is similar to that of the natural nipple stimulation of the baby.