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MACHINE MILKING PERFORMANCE OF NILI-RAVI BUFFALOES ON DIFFERENT PRE-MILKING STIMULATION PRACTICES

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ABSTRACT

Performance of Nili-Ravi buffaloes was evaluated on different stimulations during machine milking. Eighteen buffaloes in 2nd to 3rd lactation were subjected to six different pre-milking stimulation practices each for eight successive milking according to switch over design. Three days adjustment interval was provided before each treatment. Stimulation practices (P) i.e. parlor milking (PM) with no manual stimulation (MS), PM with 1 minute MS, PM with 2 minute MS, out-parlor milking (OM) with no MS, OM with 1 minute MS, and OM with 2 minute MS designated as P1, P2, P3, P4, P5 and P6, respectively. The buffaloes were given free access to green Berseem (*Trifolium alexandrinum*) and concentrate was offered @ 1 kg/ 2.5 kg of milk produced. The data on milk ejection time, machine on time, total milking time, average milk flow rate, and milk yield were analyzed. Shorter milk ejection time (3.11 ± 0.28 minute) and shorter machine on time (12.42 ± 0.35 minute) was recorded in buffaloes on P3. P2 caused shortest total milking time (13.43 ± 0.37 minutes). Milk yield in P4 was lowest (P<0.05). It is concluded that manual pre-milking stimulation along with concentrate feeding improved the milking performance of buffaloes in terms of milk ejection time, machine on time, milk flow rate and total milking time. It is suggested that at least one minute manual stimulation and in parlor concentrate feeding should be done to promote machine milking in buffaloes.

Key words: machine milking**,** buffaloes, manual stimulation, milking performance**.**

INTRODUCTION

The buffaloes are usually known as hard milked. A small change in the milking routine may affect the milkability in buffaloes in terms of disturbed milk ejection or even rapid termination of lactation when the calves die or the usual milker is replaced (Pathak, 1992). The farmers mostly use concentrate and inject able oxytocin for milk let down. The chronic use of oxytocin for milk letdown causes addiction and decreases milk yield (Bruckmaier, 2003). In this scenario, machine milking in buffaloes become quite difficult and researchable field. The modern dairy cattle have fewer problems associated with machine milking because these animals have also been bred for milkability (Bramley, 1992). The buffaloes are not yet well adapted to machine milking and there is a need to develop standard milking practices in buffaloes. The milk ejection reflex is an instinctive neuroendocrine reflex that is not under the conscious control of the animal. It occurs in response to the tactile stimulation of the mammary gland through neuroendocrine reflex arc (Lincoln and Paisley, 1982; Crowley and Armstrong, 1992). Suckling, hand milking and machine milking are known to cause sufficient tactile stimulation to induce milk ejection, although the literature reports differences in the intensity of stimulation caused by suckling and milking machine. The study was conducted to investigate the different pre-milking stimulation practices on milking characteristics during machine milking in Nili-Ravi buffaloes.

MATERIALS AND METHODS

Study was conducted on eighteen lactating Nili-Ravi buffaloes in their first to third parity allocated to six treatments three each according to switch over design. The buffaloes were housed in separate shed under loose housing system close to the milking parlour. Milking period lasted for four days (eight successive milking) after the interval of three days pre-stimulation routine adopted including washing of teats by splashing of water on teats and concentrate feeding during machine milking. The roughage (Berseem and maize) was offered *ad libitum* and concentrate was given @ 1 kg/2.5 kg milk produced to all buffaloes on different stimulation practices. The buffaloes were collected about 10 minutes before milking and entered once and milked twice daily at a vacuum of 50 k Pa, a pulsation rate of 40 cycles/minute and a pulsation ratio of 50 percent in a 10x2 herring bone milking parlor at a time to synchronize possible conditioned stimuli with the onset of a treatment and each animal had equal chance to go first in the milking area. Stimulation practices were in parlor milking (PM) with no manual stimulation (MS), PM+ 1 minute MS, PM+ 2 minute MS, out parlor milking (OM) + no MS, OM+ 1 minute MS and OM+ 2 minute MS

designated as P1, P2, P3, P4, P5 and P6, respectively (Table-1).

Milking performance data on milk ejection time, machine-on time, total milking time, average milk flow rate and milk yield were recorded. SAS computer software was used to check the effects of pre-milking stimuli, lactation stage, and interaction of lactation stage x treatment and fixed effect of animals. The differences observed among the treatments and stages of lactation were subjected to Duncan Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Milk ejection time in buffaloes on P3 was short/early (3.11 ± 0.28) while it was longer on P4 milked out parlor without MS (Table-1). The buffaloes on P4 caused the longest (P<0.01) machine-on time followed by P1, P5, P6, P2 and P3. Total milking time was also longest in buffaloes on P4 followed by P6, P3, P5, P1 and P2, respectively with significant difference with P1 and P2 (Table-1). Shorter milking time was observed on P2 and P1

Table-1 Influence of different pre-milking stimulation practices on milk ejection time, milk flow and milk yield in buffaloes (n=18) while machine milking

Stimuli	Milking performance (Minute)				
	Ejection time	Machine-on time	Total milking time	Milk flow rate (kg/minute)	Milk yield (kg)
P1	4.19±0.30^{a}	13.57±0.37^{a}	13.57±0.37^{a}	0.53±0.02^{a}	4.61±0.13^{a}
P2	3.51±0.29^{a}	12.43±0.37^{b}	13.43±0.37^{a}	0.54±0.03^{a}	4.37±0.18^{a}
P3	3.11±0.28^{b}	12.42±0.35^{b}	14.42±0.35^{ac}	0.47±0.03^{ac}	4.25±0.15^{ac}
P4	7.54±0.50^{c}	15.40±0.61^{c}	15.40±0.61^{bc}	0.30±0.03^{bc}	3.84±0.17^{bc}
P5	4.84±0.62^{a}	13.12±0.77^{ab}	14.12±0.77^{ac}	0.62±0.05^{a}	4.88±0.29^{a}
P6	3.84±0.81^{ab}	12.43±1.01^{ab}	14.43±1.01^{ac}	0.62±0.07^{a}	4.87±0.40^{a}

Means with different superscripts within a column differ significantly (P<0.01)

Parlor milking (PM) **Manual Stimulation** (MS) **Out parlor milking** (OM)
P1= PM without MS **P2=** PM with 1 minute MS **P3=** PM with 2 minutes MS
P4= OM without MS **P5=** OM with 1 minute MS **P6=** OM with 2 minutes MS.

The buffaloes showed a slowest milk flow rate (0.30 ± 0.03 kg/minute) on P4 and similarly milk yield was less followed by P3, P2, P1, P6 and P5, respectively (Table-1).

Milk ejection occurred from 3-8 minutes indicated by the results of the present study however P2 and P3 caused the early milk ejection 3.51 ± 0.29 and 3.11 ± 0.28 minutes, respectively with non significant difference with each other. On the other hand deprivation of feeding during milking and without pre stimulation as in P4, milk ejection time prolonged up to 7.5 minutes. So, for early milk ejection feeding during milking with at least 1 minute manual stimulation is necessary.

Milk ejection did occur early in P1 where milking was done only with concentrate feeding in the absence of tactile stimulating but the milk ejection time was longer indicating that the pulsation movement of the liner alone induces the milk ejection however the milk ejection time prolongs. The work of Svennersten-Sjaunja (2000) in china supports the present results indicating the need of longer duration of stimulation in buffaloes than cattle and reported that stimulation for milk letdown in buffaloes required more time as compared to cows on an average about 2 minutes. The current results are in line with the reports of Dzidic *et al*. (2002), Macuhova *et al.* (2003), Costa and Douglas (2004), Dzidic *et al*. (2004a) and Dzidic *et al.* (2004b) who reported the importance of teat stimulation for early milk let down. They concluded that in automatic milking system, pre-milking teat preparation of 60 seconds and 122 seconds induced milk ejection in cow's independent from stage of lactation. Thomas *et al.* (2005) reported similar findings and found that one minute manual stimulation in Murrah buffaloes with feeding during milking caused the earliest milk ejection i.e. 2.5 minutes whereas Bruckmaier (2005) observed that in low producing animals the pre stimulation of about 1.5 minutes is necessary for early milk ejection.

No doubt the variation in milk ejection time due to animals is non significant however it was noticed that on attachment of milking cluster, some animals started the uninterrupted milk flow. This indicates that even the presence of animals in the milking parlour without the cluster attachment the milk ejection occurs. This finding is in accordance with the results of Hurley (2002), who reported that about 38% of cows responded to conditioned visual and auditory cues, such as the sights and sounds of the milking parlor for milk ejection.

The machine-on time was shortest (12.42±0.35 minutes) with the P3 and P2 (13.57±0.37) but the difference was non-significant. Hence stimulation duration of 1 to 2 minutes is enough along with in-parlour feeding for shortest machine-on time or main milking time. Our findings regarding machine on time are in

agreement with those of Thomas, *et al.* (2005) revealed shortest in buffaloes with in-parlour feeding and 1 minute manual stimulation as compared to without pre-milking stimulation and 1 minute stimulation without in-parlour feeding. Bruckmaier (2005) also reported that application of pre-stimulation resulted in enhanced milking performance compared with milking without stimulation and reported that main milking time was shortest with longest duration of pre-stimulation and vice versa.

It is clear from the results that mean values of total milking time are shorter in those treatments where concentrate feeding during milking was done. This indicated that concentrate feeding during milking reduced total milking time during machine milking and had beneficial role in the milking management of buffaloes. Also the extended stimulation of 2 minutes increased the total milking time (14.42 ± 0.35 minutes) without any beneficial effect on milkability. Svennersten-Sjaunja *et al.* (1995) also reported the positive effect of feeding during milking for enhanced milking related oxytocin secretion and milk production in dairy cows where as feed deprivation produced negative effect on total machine-on time and udder emptying. Thomas *et al.* (2005) reported total machine-on time was shorter in that treatment where in-parlour concentrate feeding and 1 minute manual stimulation was given.

Milk yield was not different significantly for buffaloes milked with premilking manual stimulation as compared with no manual stimulation only when they were given concentrate feed during milking. However the deprivation of feeding during milking and no manual stimulation caused the significant decrease in milk production as indicated in P4. This decrease in milk production is due to inhibition of milk let down by the stress caused by deprivation of feeding during milking. This indicates that for complete emptying of udder stimulation prior to cluster attachment and feeding during milking is necessary because the manual stimulation enhances other milking parameters. The present findings are in agreement to the reports of Thomas *et al.* (2005) who compared different pre milking stimulation practices and found that milk yield was higher with 1 minute manual stimulation and feeding during milking than without manual stimulation. They also reported the inhibition of milk ejection when the animals were milked without concentrate feeding during milking indicating stress caused by deprivation of in parlor feeding.

Conclusion: It may be concluded that manual teat stimulation of at least one minute and concentrate feeding during milking enhanced the milking performance of buffaloes in terms of milk ejection time, milk flow rate and machine-on time. There was no effect on milk production by manual massage however feed deprivation reduced milk yield. It is suggested that the selection of buffaloes should be done for milking traits to promote machine milking.

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