



## Effect of weaning on milking behaviour and temperament of Murrah buffaloes

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### ABSTRACT

The study was conducted to compare the milking behaviour and temperament of Murrah buffaloes due to suckling and weaning at different ages. Initially, 42 recently calved buffaloes were selected and assigned alternately in to 3 groups as suckling (Gr 1), weaning at birth (Gr 2) and weaning on 45<sup>th</sup> day (Gr 3). The different behavioural parameters of the buffaloes were recorded for the first 15 days of milking/weaning during each milking. The overall average milk let down time was non-significant among the groups. The average milk yield per milking (morning and evening) was significantly ( $P<0.01$ ) higher in Gr 1 ( $3.44\pm 0.14$  kg) and Gr 2 ( $3.18\pm 0.46$  kg) in comparison to Gr 3 ( $2.24\pm 0.25$  kg). The overall average milking time was significantly ( $P<0.01$ ) higher in Gr 1 ( $4.41\pm 0.14$  min) than Gr 3 ( $3.05\pm 0.21$  min); however milking time in Gr 2 ( $4.29\pm 0.41$  min) was not significantly different from Gr 1. The percent of dams showing *stepping* behaviour in Gr 1, Gr 2 and Gr 3 was 20.23, 27.57 and 44.11, respectively, and the corresponding value for *kicking* behaviour was 2.61, 10.60 and 13.39, respectively. The average number of dams showing *bellowing* behaviour in Gr 1, Gr 2 and Gr 3 was 3.56, 9.09 and 12.66, respectively. Similar trends were observed among the groups as mentioned in stepping and kicking. The percentage of dams which licked calf or looked at milker in Gr 1, Gr 2 and Gr 3 was 34.99, 9.38 and 33.33 respectively. The percentage of dams showing *head shaking* activity during milking operation in Gr 1, Gr 2 and Gr 3 was 26.42, 0.00 and 10.00 percent, respectively. The overall mean milking temperament score was significantly ( $P<0.05$ ) higher in Gr 3 ( $1.73\pm 0.18$ ) than Gr 1 ( $1.20\pm 0.05$ ) and Gr 2 ( $1.48\pm 0.17$ ). The success rate of weaning practice in dairy buffaloes was higher at calving than later stage of lactation.

**Key words:** Behaviour, Milking, Murrah buffalo, Suckling, Weaning

Weaning in buffalo calves is generally not practiced which might be due to fear of let down problem due to strong maternal instinct (Varma and Sastry 1994). Previous studies examined the effect of maternal separation under various management regimens on calf behaviour, but these studies did not conclude about the impact of weaning on milking behaviour and temperament of dams (Sikka *et al.* 2002, Kantharaja 2011). The practice of weaning in dairy cattle is a well established management practice for hygienic milk production and scientific calf feeding. Similarly, if the same weaning system is practiced in *milch* buffaloes, it may give significant advantages as seen in dairy cattle. It is presumed that weaning calves at birth may lead to difficulty in pail/bottle feeding due to maternal instinct. Therefore, alternatively weaning in buffaloes may be done at 45<sup>th</sup> day. When a calf is weaned at 45<sup>th</sup> day, it will be in a position to

consume considerable amount of dry feeds and its survivability may increase even on low intake of whole milk. Simultaneously, weaning at birth and at later stage may also predispose behavioural changes in dams which may affect the success rate of weaning in dairy buffaloes. Keeping this in view, the present study was undertaken to examine the comparative effect of weaning calves at birth and 45<sup>th</sup> day of age on milking behaviour and temperament of Murrah buffaloes.

### MATERIALS AND METHODS

*Location and climatic conditions:* The experiment was conducted on Murrah buffaloes at Cattle and Buffalo Farm of Indian Veterinary Research Institute, Izatnagar, from September 2011 to December 2012. The climatic condition of the place touches both the extremes, viz. cold (approximately 5°C in winter) and hot (approximately 45°C in summer). The relative humidity ranges between 15 and 85 %. The average annual rainfall is about 90 to 120 cm, most of which is received during the month of July to September.

*Experimental animals:* Buffaloes (42) were selected at day of calving and distributed alternately into groups, viz.

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Group 1/Gr 1 (control/suckling): The calves were allowed to suckle their respective dams twice a day from birth to 90 days of age at milking. Group 2/Gr 2 (weaning at birth): calves were weaned from dams immediately after birth. Group 3/Gr 3 (weaning at 45<sup>th</sup> day): calves were allowed to suckle their respective dams for initial 44 days (similar to Gr 1) and thereafter they were weaned at 45<sup>th</sup> day of age. While allocating animals in to groups, parity order of dam was also considered. Initially, 14 buffalo calf-dam pairs were selected in each group, but due to few cases of weaning failures during the experimental period, the final number of calf-dam pairs studied in Gr 2 and Gr 3 were 11 and 10 respectively.

*Recording milking behaviour of dams:* The milking behaviour of buffaloes was recorded twice daily during the milking time for the first 15 days after calving (Gr 1) and weaning (Gr 2 and Gr 3) by direct observation method. The behavioural observation started when calf was allowed suckling in Gr 1, whereas udder stimulation methods were taken as initial point in weaned groups (Gr 2 and Gr 3). Whether the dam allowed the calf to suckle/milker to milk was considered for further observation. In accepted condition, important parameters pertaining to milking behaviour were as below.

*Milk let down time:* The time (sec) required from touching the udders by the calf to complete let down of milk

*Total milking time:* Time (min) required for milking the animal completely (including stripping) after let down of milk.

*Milk yield per milking:* The milk yield (kg) per shift (morning and evening milking hour) was recorded through electronic balance. Based on above mentioned observations, milk flow rate (kg/min) was calculated. The behavioural activities recorded during the milking hours were kicking, stepping, shaking of body, bellowing, licking calf or other objects, tail wagging, defecation, urination, feeding/rumination etc. were also recorded. The milking temperament score was derived for first 15 days of lactation from date of calving (Gr 1) and date of weaning (Gr 2 and Gr 3) during both shifts of milking. The milking temperament scores given to buffaloes during the milking time were as 1: quiet normal milking (without stepping/kicking); 2: slightly restless (only presence of stepping); 3: moderately restless (presence of kicking) and 4: complete reluctant to milk (no milking was allowed to milkman).

#### Statistical analysis

The standard statistical analytical procedures (Snedecor and Cochran 1994) were adopted for analysis of the data under study using Statistical Analysis System (SAS) 9.2 version software.

## RESULTS AND DISCUSSION

*Acceptance of weaning practice:* Out of 14 dam-calf pairs selected in each group, 78.6% and 71.4% of dam-calf pairs were successfully weaned in Gr 2 and Gr 3,

respectively. The weaning practice could not be successful in the rest of calf-dam pairs, because the dams did not permit the milker for milking and could not succeed for let down of milk for more than three or four milking. The dams expressed restlessness, kicking, stepping, continuous bellowing and showed overall very bad temperament during milking hours. The parity order of dams at selection was non-significant among the groups; however due to few case of weaning failures due to temperamental problems, the parity order was significantly ( $P < 0.05$ ) lower in Gr 2 than Gr 1 and Gr 3. The higher weaning rate in Gr 2 than Gr 3 might be due low parity order having less development and experience of maternal bond between calf and dam. On the other hand, a few calves were also reluctant or showed problems while consuming milk; hence they were withdrawn from the experiment. Based on the present study, it was observed that the practice of weaning in buffalo may not be hundred percent successful either weaning at birth or 45<sup>th</sup> day of lactation.

*Milk let down time:* The average milk let down time (sec) of buffalo dams in each shift (morning and evening) is presented in Table 1.

The overall average milk let down time was non-significant among the groups. Similar to the present finding, Ludri (1985) reported non-significant effect of weaning versus suckling on milk let down time. Contrary to our findings, Pramanik (2000) reported milk let down time of buffalo dams were significantly affected by the temperament scores with higher values. On the other hand, Singh *et al.* (2010) reported the milk let down time was influenced significantly by stage of lactation, let down with or without

Table 1. Milk let down time (sec), milk yield (kg), milking time (min) and milking rate (kg/min) of dams from 0–15 days (Gr 1 and 2) or 45–60 days (Gr 3)

Time of milking	Gr 1	Gr 2	Gr 3
Milk let down time (sec)			
Morning	132.86±2.98	132.92±3.77	135.63±4.77
Evening	132.21±4.48	132.36±3.14	136.43±4.29
Average	132.54±3.63	132.64±2.17	136.57±3.42
Milk yield (kg)			
Morning	3.86±0.20 <sup>b</sup>	3.61±0.54 <sup>ab</sup>	2.54±0.38 <sup>a</sup>
Evening	3.01±0.18 <sup>b</sup>	2.76±0.40 <sup>ab</sup>	1.94±0.17 <sup>a</sup>
Average	3.44±0.14 <sup>B</sup>	3.18±0.46 <sup>B</sup>	2.24±0.25 <sup>A</sup>
Milking time (min)			
Morning	4.84±0.18 <sup>B</sup>	4.76±0.49 <sup>B</sup>	3.22±0.31 <sup>A</sup>
Evening	3.98±0.19 <sup>B</sup>	3.82±0.35 <sup>B</sup>	2.89±0.14 <sup>A</sup>
Average	4.41±0.14 <sup>B</sup>	4.29±0.41 <sup>B</sup>	3.05±0.21 <sup>A</sup>
Milking rate (kg/min)			
Morning	0.798±0.013	0.712±0.041	0.728±0.068
Evening	0.751±0.014	0.678±0.051	0.665±0.046
Average	0.775±0.010	0.695±0.045	0.697±0.053

Means bearing different superscripts (a, b) within the row differ significantly ( $P < 0.05$ ); means bearing different superscripts (A, B) within the row differ significantly ( $P < 0.01$ ).

calf. Costa and Reinemann (2004) also observed that buffalo required longer pre-milking stimulation than cows and udder stimulation consisted of milk let down and washing of the udder.

**Milk yield:** The average milk yield (kg) in the morning was significantly ( $P < 0.05$ ) higher in Gr 1 than Gr 3; however milk yield in Gr 2 was not significantly different from Gr 1 or Gr 3. A similar trend for milk yield was observed in the evening shift. The milk yield/shift was significantly ( $P < 0.01$ ) higher in Gr 1 and Gr 2 in comparison to Gr 3 (Table 1). Significant lower milk yield in dams of Gr 3 might be due to changed behaviour and having higher temperament score observed after weaning calves at 45<sup>th</sup> day (Andrea *et al.* 2010). The present findings are in agreement with the findings of Pramanik (2000), who reported that milk yield in morning milking was significantly higher than the evening milking. However, weaning dams at calving had no significant effect on milk yield compared to suckling (Singh *et al.* 2010).

**Milking time:** The overall average milking time was significantly ( $P < 0.01$ ) higher in Gr 1 than Gr 3; however milking time in Gr 2 was not significantly different from Gr 1 (Table 1). Significantly increased milking time in dams of Gr 1 and Gr 2 might be due to higher milk yield in the respective groups as compared with Gr 3. Milking time is directly correlated with milk yield of dams in groups (Singh *et al.* 2010). Similarly, Andrea *et al.* (2010) stated that the mean milking time in lactating buffalo was highly and positively correlated with mean milk production per day.

**Milking rate or milk flow rate:** The overall average milk flow rate in the morning and the evening shift was not significantly different among the groups (Table 1). The present findings are in agreement with the findings of Singh *et al.* (2010) who reported non-significant effect on milk flow rate in buffaloes. However, the milk yield per milking was found to have positive and moderate correlation with milk flow rate (Pramanik 2000). The milk flow rate was also not affected by shift of milking hours (Ludri 1985).

**Milking behaviour of lactating buffalo dams:** The behaviour parameters while milking in dams have been presented in Table 2.

**Allowing calf to suckle/milker to milk:** The proportion of dam which allowed calf to suckle while milking or milker to milk in Gr 1, Gr 2 and Gr 3 were 100 percent. This indicated that all dams in weaning groups showed similar response as suckling group even in the absence of calf.

**Stepping:** The percent of dams which showed stepping behaviour in Gr 1, Gr 2 and Gr 3 was 20.23, 27.57 and 44.11, respectively. Results shows that higher proportion of 45-day weaned dams exhibited slightly higher stepping than zero day weaned dams. This behaviour might be due to change in temperament after sudden weaning from the already established dam-calf relationship.

**Kicking:** This activity in Gr 1- 3 was 2.61, 10.60 and 13.39, respectively. Similar trend was observed in this case as mentioned in stepping. The higher proportion of kicking in both the weaned groups as compared to suckling group

Table 2. Percentage of buffalo dams showing different behavioural activities during 0–15 days (Gr 1, 2) or 45–60 days (Gr 3)

Behavioural activities	Milking shift	Gr 1	Gr 2	Gr 3
Allowed suckling or milking		100	100	100
Stepping	Morning	18.57 <sup>a</sup>	26.06 <sup>a</sup>	42.66 <sup>b</sup>
	Evening	21.90 <sup>a</sup>	29.09 <sup>a</sup>	45.54 <sup>b</sup>
	Average	20.23 <sup>a</sup>	27.57 <sup>a</sup>	44.11 <sup>b</sup>
Kicking	Morning	1.42 <sup>a</sup>	9.69 <sup>b</sup>	14.66 <sup>b</sup>
	Evening	3.80 <sup>a</sup>	11.51 <sup>b</sup>	12.12 <sup>b</sup>
	Average	2.61 <sup>a</sup>	10.60 <sup>b</sup>	13.39 <sup>b</sup>
Bellowing	Morning	3.80 <sup>a</sup>	9.09 <sup>b</sup>	11.33 <sup>b</sup>
	Evening	3.33 <sup>a</sup>	9.09 <sup>b</sup>	14.00 <sup>b</sup>
	Average	3.56 <sup>a</sup>	9.09 <sup>b</sup>	12.66 <sup>b</sup>
Tail wagging	Morning	81.42	74.54	77.33
	Evening	72.85	73.33	69.33
	Average	77.13	73.93	73.33
Licking to calf/ looking at milker	Morning	39.52 <sup>b</sup>	7.87 <sup>a</sup>	32.66 <sup>b</sup>
	Evening	30.47 <sup>b</sup>	10.90 <sup>a</sup>	34.00 <sup>b</sup>
	Average	34.99 <sup>b</sup>	9.38 <sup>a</sup>	33.33 <sup>b</sup>
Defecation	Morning	18.57	19.39	17.33
	Evening	16.19	20.60	16.66
	Average	17.38	19.99	16.99
Urination	Morning	20.47	23.63	16.66
	Evening	13.33	18.18	21.33
	Average	16.90	20.90	18.99
Feeding	Morning	3.33 <sup>a</sup>	24.24 <sup>b</sup>	17.33 <sup>b</sup>
	Evening	6.19 <sup>a</sup>	19.39 <sup>b</sup>	26.00 <sup>b</sup>
	Average	4.76 <sup>a</sup>	21.81 <sup>b</sup>	21.66 <sup>b</sup>
Rumination	Morning	13.33 <sup>a</sup>	11.51 <sup>a</sup>	32.66 <sup>b</sup>
	Evening	11.90 <sup>a</sup>	5.45 <sup>a</sup>	18.66 <sup>b</sup>
	Average	12.61 <sup>a</sup>	8.48 <sup>a</sup>	25.66 <sup>b</sup>
Head shaking	Morning	29.52 <sup>a</sup>	0.00 <sup>b</sup>	10.00 <sup>b</sup>
	Evening	23.33 <sup>a</sup>	0.00 <sup>b</sup>	10.00 <sup>b</sup>
	Average	26.42 <sup>a</sup>	0.00 <sup>b</sup>	10.00 <sup>b</sup>

Means bearing different superscripts (a, b) within the row differ significantly ( $P < 0.05$ ).

might be due to change in temperament after weaning, however, among the weaned groups 45<sup>th</sup> day weaned dams had slightly higher stepping than zero day weaned dams. Cavallina *et al.* (2008) observed that primiparous buffaloes showed more frequently kicking behaviour during milking time over multiparous cows.

**Bellowing:** The percentage of dams showing this activity in Gr 1, Gr 2 and Gr 3 was 3.56, 9.09 and 12.66, respectively. A similar trend was observed in buffaloes in this case as in stepping and kicking. Bellowing is an indication of weaning stress related with some kind of social disruption between dams and calves.

**Tail wagging:** The percentage of dams showing this activity in Gr 1, Gr 2 and Gr 3 was 77.13, 73.93 and 73.33, respectively. This was a common activity observed while milking and is done to repel flies or showing some sort of affection with calves or milkers.

**Licking the calf or looking at the milker:** The overall percentage of this activity in dams for Gr 1, Gr 2 and Gr 3

was 34.99, 9.38 and 33.33, respectively. This behaviour is correlated with the licking of the calf in Gr 1 and with looking at the milker in Gr 2 and Gr 3. Licking of the calf by the dam is an indicative of affection; however, in absence of calves in Gr 2 and Gr 3, the dams showed a tendency to look towards milker which may be a behavioural sign indicating the want of calves. Similar to the present findings, Yadav *et al.* (2009) reported that licking to neonatal calf was one of the most striking behaviour shown by the buffalo cow immediately after parturition. The total duration of licking was longer in heifers than in multiparous cows.

**Defecation:** The overall average percentage of dams showing this activity during milking or 10 min before the start of milking operation in Gr 1, Gr 2 and Gr 3 was 17.38, 19.99 and 16.99, respectively. Defecation in dams was mostly observed before the start of milking operations which is a normal sign of eliminative behaviour of dams before milking.

**Urination:** The overall percentage of dams showing this activity during milking or 10 min before the start of milking operation in Gr 1, Gr 2 and Gr 3 was 16.90, 20.90 and 18.99, respectively. Urination in dams was mostly observed before start of milking operations which is a normal sign of eliminative behaviour of dams before milking (Odyuo *et al.* 1995). The overall frequency of defecation and urination in Murrah buffaloes varied based on the system of rearing (Varma and Tripathi 1980, Tripathi and Pan 1992) and the parity order (Cavallina *et al.* 2008).

**Feeding:** The overall percentage of dams showing this activity during milking operation in Gr 1, Gr 2 and Gr 3 was 4.76, 21.81 and 21.66, respectively. Lesser feeding activity in dams of suckling group might be due to being more involved in licking or showing natural affection to calves. The higher feeding activity showed by both the weaned groups might be due to the absence of calves after weaning giving an alternate option to dams to indulge in other activities while milking.

**Rumination:** The overall percentage of dams showing this activity during milking operation in Gr 1, Gr 2 and Gr 3 was 12.61, 8.48 and 25.66, respectively. The higher proportion of dams showing rumination behaviour was observed in Gr 3 which might be due to change in ingestive behaviour after weaning at 45 days and rumination was correlated with the feeding in the respective groups.

**Head-shaking:** The overall percentage of dams showing this activity during milking operation in Gr 1, Gr 2 and Gr 3 was 26.42, 0.00 and 10.00, respectively. Higher activity in dams of suckling group might be due to the presence of calves while milking which is an indication of care giving behaviour by the dams to the young calves in order to protect them from neighbouring dams. Further, in Gr 3, lower head shaking may be due to temperamental changes in some of the 45<sup>th</sup> day weaned dams.

**Milking temperament score:** The overall average milking temperament score was significantly ( $P < 0.05$ ) higher in Gr 3 than Gr 1 and Gr 2. The temperament score in Gr 2 was not significantly different from either Gr 1 or Gr 3. The

higher milking temperament score in Gr 2 and Gr 3 reflected that the dams in both the weaned groups showed comparatively more stepping, kicking or bellowing during milking with some difficulties as compared to the suckled dams. Similar to the present findings, Dash *et al.* (1976) stated a significantly higher temperament score in buffaloes when milking was changed from twice to thrice daily. Andrea *et al.* (2010) further reported that there was higher incidence of reaction in buffaloes in presence of strangers during milking which lowered the milk production. The temperament of the cows prior to milking, during milking, and after milking was not affected by their milk production; however, the animals milked in the afternoon were significantly less restless than the animals milked in the morning (Gonzaga and Lorenzo 2007).

Based on the present study, it can be concluded that the success rate of weaning in buffaloes could be higher when weaned on day of calving than at a later stage of lactation. The behaviour and milking temperament play a crucial role to make the weaning programme successful. However, weaning in buffalo must be carefully done keeping in view the production and behaviour of dams.

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