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Parity Effect On Milk Let-Down Time In Mehsana Buffaloes

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Abstract | An experiment was conducted to study the effect of parity on milk let- down time in Mehsana buffaloes. Twenty four Mehsana buffaloes were divided into four groups on the basis of parity (1-4 lactation) and maintained under uniform feeding and housing conditions. Data on let down time for different parity buffaloes were collected six days in a month at morning and evening milking for six months. The average let down time was more in evening milking for the month of August, September, November and January, while it was more in morning in the month of October and December and the difference was not-significant.The average let down time for Mehsana buffaloes in Lactation-I (L1), Lactation-II (L2), Lactation-III (L3) and Lactation-IV (L4) was 71.15, 69.22, 62.30 and 56.65 sec., respectively, with overall average of 64.83 sec. The differences were significant (P<0.01) among lactation. Decreasing trend was observed for let down time with increasing number of parity. The average let down time was more during morning milking (65.58 sec) than evening (64.09 sec.) however the difference was not-significant.

Keywords | Milking behaviour, Milk let down, Mehsana buffalo, Parity

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INTRODUCTION

Milk harvesting is an art and science as well as it is the most important aspects on a dairy farm management, which has a direct bearing on profitability of dairy business (Bhagat et al., 1992). India has emerged as leading milk producer country in the world and produced 155.5 million tones during 2015-16 with an annual growth rate of 6.27% (DAHD, 2016). Preparing the buffaloes for milking is an important task for dairymen for harvesting clean and optimum milk, in optimum time with minimum disturbance to the animals.Milk Let down time affects the milk yield and negatively correlated with the milk yield. Milk let down is influenced by anatomical, physiological, sanitary, different parity, stage of lactation and environmental factors (Ambrod et al., 2009, 2010; Caria et al., 2011; Thomas et al., 2004).

The anatomy of buffalo teats is slightly different from cattle teats. The epithelium of the streak canal and sphincter muscle around it is thicker and more compact in buffaloes than in cattle. More force is therefore required to open the streak canal. In cattle, the milk is synthesized in the alveoli and is periodically transferred to the large ducts and cisterns of the mammary gland and the teat. Whereas in the buffalo, the milk is held in the upper, glandular part of the udder, in the alveoli and small ducts. Hence, in buffaloes milk stored in cisternal cavity and directly available before milking ranges 5.0 to 7.6% of total milk (Thomas et al., 2004; Ambrod et al., 2009) and it is lower than recorded in

dairy cattle of about 20%. The milk is expelled to the cistern only during actual milk ejection. Because of the little cistern milk between milking, in the teat cisterns, the teats are collapsed and soft before let down. This is contradictory to the bovine cow, where the teats can be very hard and firm due to the presence of milk in the teat cistern. Due to their slow milk ejection reflex and their thicker sphincter muscle around the streak canal in comparison with the dairy cows buffaloes are known to be slow and "hard milker" (Tangorra et al., 2017). The milk ejection reflex appears to be inherited to some extent but it is also a product of the environment. In buffaloes, the let down time averages 2 min. but may be as long as 10 min.

The most important part of milking routine is to stimulate the "milk let down" response of dairy animal. Like in cattle milk let down in buffaloes occurs in response to the elevated oxytocin concentrations (Bruckmaier and Blum, 1998; Thomas et al., 2005). Buffalos have considerable problem in letdown of milk, as a result milk yield is adversely affected (Tomar, 1988). There are various factors which affect the let down of milk. Parity influences behavior in the milking-parlor and milk let down time. The lactation number has significant effect on milk letdown time, milking time and rate of milk flow in Murrah buffaloes and letdown time was least in the first lactation and increased with lactation number (Dash et al., 1976). Present study was undertaken with the objective to study the effect of parity on the let-down of milk in Mehsana buffaloes.

MATERIAL AND METHODS

The study was conducted on 24 Mehsana buffaloes at Livestock Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar (Gujarat). Lactating buffaloes of different parity (First to fourth lactation) were selected 10 days to 2 months after calving and hand milked twice a day;at 4:00 am and 4:00 pm. The buffaloes were kept under the uniform routine feeding and management conditions of the farm. All the animals were healthy and average milk production of the animals was about 8 lit/day. All the animals were vaccinated and dewormed as per the herd health calendar of the farm. Milking buffaloes were brought from the yard, where they were housed loose, to the milking byre and were tied. Prior to the milking, concentrate feed '*Banasdan*' (compound cattle feed) was fed at the rate of 50 percent of daily milk production in addition to the maintenance allowance of 1 kg. Milking routine begun with cleaning the teats with water and drying them with a clean towel. After cleaning each buffalo's own calf was allowed to suck before and after each milking. The calves were allowed to suckle all four teats during pre-stimulation. On letting down of milk the calves were tied in front of dams. Let down time was recorded from touching of teat by calf to the first drop of milk drawn in the pail and recorded with the help of stop watch. The observations were recorded two times in a day, and 6 days in a month for six months. Statistical analysis was carried out using following statistical model with six replications.

$Y_{ijk} = \mu + L_j + m_k + (Lm)_{jk} + E_{ijk}$

Where,

Y_{ijk} = Response of j^{th} levels of lactation and k^{th} levels of month in j^{th} replication

μ = Overall mean,

L_j = Effect due to main j^{th} levels of lactation

m_k = Effect due to k^{th} levels of month

$(Lm)_{jk}$ = Interaction effect due to j^{th} level of lactation and k^{th} levels of month

E_{ijk} = Error

RESULT AND DISCUSSION

Average milking time was 350.79 s which was the lowest in first lactation (336.25s). Average milk yield per milking was 4.08 liter/time which was the lowest in first lactation (3.54 lit.) followed by third lactation (4.07 lit.), second lactation (4.27 lit.) and fourth lactation (4.44 lit.). Average let down time for milking Mehsana buffaloes of different lactations (Table 1) during the experimental period was 64.83 s with a range from 51.75 to 86.30 s, which was the highest in the first lactation (71.15 s) followed by second lactation (69.22 s), third lactation (62.30 s) and fourth lactation (56.65 s) and the difference was highly significant ($P<0.01$). The maximum time was recorded in second lactation in August, while minimum time was recorded in fourth lactation in the month of November. In all the months except December, significant differences were found due to different lactations (Table 2). The average let down time was more during morning milking (65.58 s) than evening (64.09 s) however the difference was not-significant. Month wise analysis shows that average let down time has no definite pattern; it was higher during evening milking for the month of August, September, November and January, while for the month of October and December it was higher during the morning milking.

The let-down time observed among buffaloes in this herd (64.83 s) was lower than (106 s) that reported by Dash et al. (1976) in Muraah buffaloes. In the Mediterranean Italian breed, Borghese et al. (2007) found a mean time from stimulation to milk letdown of 133±14 s, with no difference between morning and evening milkings. In Murrah buffaloes, Thomas et al. (2004) found times until milk let down of 69 s versus 154 s in two groups with a different concentrate feeding during milking, which highlights the importance of concentrate feeding during milking. Average let down time recorded in present study is also lower than previously reported 73.19 s and 67.99 s by Shiralkar and Dave (1975) and Anand et al. (2010), respectively, in Kankrej cows. However Chauhan et al. (2014) recorded

Table 1: Average let down time (seconds) for milking in Mehsana buffaloes of different lactations and months

Months	Time of milking (seconds)	Lactation order				Average (seconds)
		L_1	L_2	L_3	L_4	
August	Morning (T_1)	71.85	88.15	72.20	51.10	70.83
	Evening (T_2)	72.00	84.45	71.35	62.65	72.61
	Average	71.93	86.30	71.78	56.88	71.72
September	Morning (T_1)	73.60	63.95	57.10	53.15	61.95
	Evening (T_2)	71.93	64.95	64.35	53.53	63.69
	Average	72.77	64.45	60.73	53.34	62.82
October	Morning (T_1)	79.40	79.22	66.82	63.00	72.11
	Evening (T_2)	79.60	69.37	63.06	58.30	67.58
	Average	79.50	74.29	64.94	60.65	69.85
November	Morning (T_1)	70.20	64.50	61.50	49.80	61.50
	Evening (T_2)	74.00	69.00	63.80	53.70	65.13
	Average	72.10	66.75	62.65	51.75	63.31
December	Morning (T_1)	78.92	74.50	62.65	74.55	72.65
	Evening (T_2)	65.40	65.60	57.00	55.60	60.90
	Average	72.16	70.05	59.83	65.07	66.78
January	Morning (T_1)	58.25	53.45	53.06	52.93	54.42
	Evening (T_2)	58.65	53.50	54.73	51.53	54.60
	Average	58.45	53.48	53.90	52.33	54.51
	Overall Average	71.15	69.22	62.30	56.65	64.83

Table 2: Test of significance for let down time in different months, time, lactations and interaction between time and lactations

Months	Treatment	Time (T)	Lactation (L)	TxL
August	S.Em.	1.308	1.850	2.616
	C.D.	NS	5.332*	7.54*
September	S.Em.	1.164	1.646	2.327
	C.D.	NS	4.743**	NS
October	S.Em.	1.773	2.508	3.547
	C.D.	NS	7.228**	NS
November	S.Em.	1.772	2.507	3.545
	C.D.	NS	7.225**	NS
December	S.Em.	2.718	3.843	5.435
	C.D.	7.832**	NS	NS
January	S.Em.	1.118	1.580	2.235
	C.D.	NS	4.555*	NS

*Significant P < 0.05, ** Highly significant P < 0.01, NS = Not-significant

lower let down time (56.65 s) in the Kankrej cows maintained at organized herd. Ludri et al. (1982) and Chauhan et al. (2014) reported that the cattle breed like Sahiwal, Kankrej and Swiss x Sahiwal take less time for let down than the buffaloes. The time from start of tactile teat stimulation until onset of milk ejection normally ranges from 40s to more than 2 min. and increases with a decreasing degree of udder filling in cattle (Bruckmmaier and Wellnitz, 2008). The degree of udder filling is low during the later stages of lactation and during short intervals from previous milk removal. Average letdown time in the present study was found optimum and this might be due to better management and good milking environment at our experiment station. Shahid et al. (2012) concluded that manual teat stimulation of at least one minute and concentrate feeding during milking enhanced the milking performance in terms of milk ejection time and milk flow rate of Nili Ravi buffaloes.

The let down time showed linear decreasing tendency as the parity advances. Average maximum letdown time (71.15 s) was observed in first lactation while average minimum letdown time (56.65 s) was observed in fourth lactation and the difference was highly significant (P<0.01). Dash et al. (1976) reported that lactation number has significant effect on letdown time in Muraah buffaloes and it was least in the first lactation and decrease thereafter. But, Rangel et al. (2014) reported that primiparous Murrah buffaloes were more reactive and produced less milk and had slightly higher let down time, which did not vary in comparison with multiparous females. Multiparous buffaloes are more accustomed to the parlour environment than their primiparous counterparts. Milking in unknown am-

bient resulted in milk ejection inhibition mainly in primiparous cows when first time milked (Bruckmaier et al., 1992) since it is a new experience for these animals to but a gradual transferring of these animals to unknown ambient make the Oxytocin release to a normal level (Bruckmaier et al., 1996). High let down time in first lactation buffaloes of in the experiment might be due to less acquaintance of buffaloes with milking barn routine and it decreases as the parity advances. Boselli et al. (2014) observed that 2 min. pre-stimulation is enough for the removal of alveolar milk fraction in Mediterranean Italian buffalo and therefore could be considered more favourable than oxytocin treatment because of collateral effects. Pre-stimulation must be introduced as milking routine as this practice increases the milk ejection and reduces the milking time with economic advantage for farmers and with welfare advantages for the animals (Boselli et al., 2014). Hence, first time calvers should be given teat manipulation before calving and pre-stimulation before milking for quick let down of milk.

There was no definite tendency in let down time in different months in Mehsana buffaloes. The differences in let down time due to months, lactations and interaction between months and lactations were highly significant ($P<0.01$). Chauhan et al. (2013) reported let down time significantly ($P<0.01$) reduced in cold and dry season compared to hot and humid season in the Kankrej cows at the same station. This might be due to more stress on animals in hot and humid season.

CONCLUSIONS

The average time required for letdown is affected by the parity in the Mehsana buffaloes and it decreases as the parity advances. The differences in let down time due to months, lactation and interaction between months and lactations were highly significant. Timing of milking (morning and evening) has no significant effect on milk let down. First time calvers should be given teat manipulation before calving and pre-stimulation must be introduced as milking routine as this practice increases the milk ejection and reduces the milking time with economic advantage for farmers and with welfare advantages for the animals.

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CONFLICT OF INTEREST

There is no conflict of interest with any of the party either directly or indirectly to the content of this article.

AUTHORS CONTRIBUTION

HAP and JBP designed the study. HAP and HDC conducted the experiment and analysed the data. AKS drafted and revised the manuscript. All the authors have read and approved the final manuscript.

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