Effect of early weaning on milking behaviour, production and reproduction of Tharparkar cows

Vipin Kumar Upadhyay, A K S Tomar, B H M Patel, D M Golher, S Sahu and P K Bharti

Abstract The present study was conducted to see the effect of weaning on the performance of newly calved Tharparkar cattle reared at Cattle & Buffalo Farm (Livestock Production and Management Section), Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh (India). A total of 14 Tharparkar cows were selected as per their due date of calving and randomly divided into two equal groups i.e. Suckling (G1) and Weaning (G2). The animals in the weaning group (n=7) were separated from their calves just after calving and animals in suckling (n=7) group were allowed to suckle twice daily. Various parameters were observed like milking temperament, milking behaviour traits i.e. let down time, milk flow rate, milking time; productive and reproductive performance. The temperament score of weaned cows (2.45±0.18) was higher than sucking cows (2.22±0.23). There was highly significant effect (P<0.01) on milking behavioural traits as the daily per milking yield, milking time and milk flow rate were lower in weaned as compared to suckling cows whereas let down time of weaned cows was higher than suckling counterparts. The daily milk yield and total milk yield were higher in suckling group. The overall mean of days to express first heat after calving was more for suckling (69.40±22.03 days) as compared to weaned (42.86±10.29 days) cows whereas service period was 109.00 d v/s 82.33±11.84 d. Present findings provide baseline information on weaning system of rearing of Indigenous breed of cattle. It is concluded that weaning effect can enhance the conception rates and reduce calving to conception interval in postpartum Tharparkar cows but milk production has declined during early lactation which imparts its effect on lactation yield. Weaning in indigenous cattle can be done but it should be practiced judiciously with giving due care to the welfare of animal and their calves.

Keywords: Tharparkar cattle, suckling, weaning, milking behaviour, milk production, reproduction

Introduction

The animal husbandry and agriculture are intrinsically linked to each other in most of the Asian countries including India. India, with huge livestock assets of 529.7 million heads encompassing 199.08 million heads of cattle and 105.34 million heads of buffaloes (DAHDF 2007) ranks first in milk production which expressed a gradual increase from 20 million tons (1960) to 115 million tons (2010-11). Milk is the main output of livestock sector accounting for 66.7% of the total value of output of livestock. The share of milk production in 2010-11 by exotic/crossbred cows, indigenous/non-descript cows, buffaloes and goats was 24.3%, 20.8%, 51.2% and 3.8% of total milk production, respectively (BAHS 2012). The productive performance of livestock including cattle depends on their genetic makeup, feeding, temperament, behaviour and management conditions etc. Temperament can be defined as the type and level of reaction of an animal to its entire environment (Phillips 2002). Temperament depends on physiological and genetic factors as well as experience and learning. Prolonged postpartum anoestrus is a major limitation to achieve an optimal reproductive efficiency and suckling is one of the main factors that influence the length of the postpartum anoestrus period (Stagg et al. 1998). If suckling is continuously practiced during lactation, it blocks ovulation with the consequent long period of postpartum anoestrus, contributing to lesser reproductive efficiency (Wettemann 1994).
Early weaning produced an increase in ovulation and pregnancy rates in pluriparous anoestrous cows (Callejas et al. 1999).

**Materials and Methods**

The relevant data were generated and recorded based on trial planned on fourteen newly calved Tharparkar cattle, based on availability, reared at Cattle and Buffalo Farm, Livestock Production and Management Section, Indian Veterinary Research Institute (IVRI), Izatnagar, Bareilly, Uttar Pradesh (India), situated at 28.22°N latitude, 79.22°E longitude and at an altitude of 568 feet above mean sea level (MSL). The climatic condition is extremely hot during summers (May-June) and very cold during winters (December-February). The total annual rainfall ranges from 90 to 120 cm. The institute has 165 hectares of well irrigated fodder cultivation land to ensure round the year supply of green fodder to these animals.

**Description of experimental animals**

As per the plan, a total of 14 Tharparkar cows were selected and randomly and alternatively allocated to suckling (G 1) and weaning (G 2) groups (seven in each) from September-2012 to end of February-2013 for experiment. The G 1 allowed suckling twice a day before/after milking from birth to 90 days of age, while in G 2; calves were weaned immediately after birth. The cows were maintained under loose housing system at the Institute Cattle and Buffalo Farm. Suckling by calf was allowed twice (Morning and Evening) daily during milking time only. The actual contact time was 5 minutes prior to milking to 15 minutes post-milking. During milking the calf was tied in front of the dam. During other parts of the day, the calves were kept separated in a pen with open railings, and in sight of their dams. All cows were parity-wise uniformly distributed in both the groups and were free from history of any reproductive disorder. They were maintained in loose houses under similar management conditions and were stall-fed with free access to concentrate mixture and fodder provided in open paddock area twice a day apart from feeding concentrate during milking time. Fresh and clean drinking water was made available throughout day and night. All the animals were hand-milked twice daily until the end of the experiment.

**Milking behaviour of dam**

The milking behaviour of Tharparkar cows were observed based on Tulloh (1961) direct observation method, twice daily during the milking time for first 30 days after calving. The parameters studied were milking temperament, letdown time, milking time, milk flow rate, etc. Technique as suggested by Tulloh, 1961 was followed with slight modification for observation of Milking temperament (1 - Docile, 2 - Slightly restless, 3 - Restless, 4 - Aggressive) of Tharparkar cows as follows.

- **Docile**: Stand quietly, rarely move, never give trouble, not affected by whole procedure; ideal milker
- **Slightly restless**: Move frequently, flick tail occasionally, snorting, give very less trouble
- **Restless**: Move almost continuously, flick tail frequently, snorts, lift leg, kick occasionally
- **Aggressive**: Appear very restless, struggles violently, kick frequently, attacks on observer, very difficult to handle

**Milk letdown time (MLT)**

It is the duration (sec) between touching udder and the complete letdown of milk. Complete letdown of milk was determined by observing the following phenomenon: (1) when teats are engorged with milk (2) the teat looks glossy, lubricating and waxy (3) good flow of milk should come out after pressing the teat. It was recorded with the help of stop watch.

**Total milking time (TMT)**

Time required for milking the animal after letdown of milk.

**Total milk yield per milking (TMY/milking)**

After complete milking, the yield was recorded with a weighing balance and measured in kg at each milking. Total milk yield (in suckling cows it was sum of milk yield by hand milking and milk suckled by calf) for 90 days at morning and evening milking were recorded.

**Average milk flow rate (MFR)**: It was calculated as follows:

\[
MFR (Kg/min) = \frac{\text{Milk yield per milking (kg)}}{\text{Total milking time (min)}}
\]

**Production parameters**

Production parameters such as daily morning and evening milk production per milking, daily total milk yield and total milk yield upto 90 days were recorded.

**Reproductive parameters**

Reproductive parameters such as days to express first heat (after calving), days to first A.I. and service period were recorded.
Statistical analysis of data

The available data were classified as per the rearing systems (suckling and weaned). The standard statistical procedures were adopted for analysis of the generated data using SPSS 17 version.

Results and Discussion

Milking behaviour

There was no significant effect of system of rearing on temperament score of Tharparkar cattle. Though, the differences were statistically non-significant, the temperament score of cows in weaning system (2.45±0.18) was higher than those under suckling system (2.22±0.23) which may be due to the weaning stress in the weaned Tharparkar cattle.

There was highly significant effect ($P<0.01$) of early weaning on milking behaviour traits (Table 1). The letdown time was higher for the weaning group which has higher temperament score in comparison to suckling group. Similar to present findings, Pramanik (2000, unpublished) reported that temperament score had significant effect on letdown time. Reddy et al. (1987) also reported that the letdown time increased with increase in temperament score. Similar to present findings, Sinha (2011, unpublished) reported that the temperament score have negative effect on milk flow rate whereas positive correlation to letdown time.

The daily yield per milking, milking time and milk flow rate were lower in dams of weaned calves as compared to dams of suckling calves whereas let down time in dams of weaned Tharparkar cattle calves was higher than their suckled counterparts. It might be due to the strong mothering instinct of native Tharparkar indigenous cattle breed and higher temperament score of dams of weaned Tharparkar cattle calves. Suckling of the calf gave maximum stimulation effect resulting in let-down of milk earlier as the milk ejection reflex is an innate reflex that is not under conscious control of the animal and occurs in response to tactile stimulation of the mammary gland. Samuelsson and Svennersten (1996) documented a stronger effect of the suckling stimulus on oxytocin release. When milking is performed in the presence of the calf, suckling induces higher oxytocin release than machine milking (Akers and Lefcourt 1982; Tancin et al. 1994).

The increase in milk flow rate may have been caused due to suckling by their calves resulting in complete let down of milk whereas the weaned cows give some trouble to the milker while milking resulting in longer time spent on milking with reduced milk flow rate. Saini and Kamboj (2012, unpublished) reported almost similar trend of mean milk flow rate in buffaloes in which the weaned group (0.670± 0.12) showed lower value in comparison to buffaloes milked after milk let-down stimulus provided by using dummy calves (0.830± 0.12 kg/ min). Roshanfekr et al.(2010) also reported almost similar findings of average milk flow under hand milking in Khuzestan buffaloes. Kumar et al. (2006) also reported higher milk flow rate (645 g/min) in buffaloes suckled by their calves than those buffaloes milking without the presence of calves (615 g/min). Dash et al. (1976) reported that the rate of milk flow was higher in suckled buffaloes (0.926 kg/min) as compared to weaned group of buffaloes (0.884 kg/min).

Saini and Kamboj (2012, unpublished) reported the higher milking time in buffaloes in which the calves borne were weaned from them immediately after their birth whereas by using a dummy calves it was lower (10.64± 0.55 V/S 10.41± 0.99 min) which was in contrast to our finding in Tharparkar cattle. Dash et al. (1976) reported the weaned buffaloes had higher milking time (4.28 min) as compared to suckled buffaloes (3.77 min).

Regarding productive performance of Tharparkar cows in the present study it was found that the suckling group performed better as they produced more milk in comparison to weaned group (Table 1). Similar to present findings, Krohn et al. (2001) stated that free suckling can stimulate the subsequent milk production, probably with an increase of up to 20%. There was significant effect ($P<0.05$) of early weaning on 2nd month's total milk yield as well as per day milk yield. The 2nd months total and per day yields of suckling and weaning groups were 279.64±30.53 kg v/s 162.79±43.27 kg and 9.32±1.02 kg/d v/s 5.43±1.44 kg/d respectively (Table 1). The results obtained in the present study are in agreement with the findings of Usmani and Inskipe (1989) who reported that limited-suckled (beginning on the day of calving, half the buffaloes in each group was allowed to nurse their calves twice daily for 2 min before milking) Nili-Ravi buffaloes produced more milk than non-suckled (buffaloes in remaining half of each group were weaned within 72 h after birth) buffaloes (536±16 vs. 485±12 kg, respectively) for first 75 days of lactation. The findings in the present study are further corroborated by the findings of Saini and Kamboj (2012, unpublished) who reported that the daily milk yield over the period of 9 weeks after calving were significantly ($P<0.05$) higher in Murrah buffaloes milked after milk let down stimulus provided by using a dummy buffalo as compared to buffaloes in which the calves borne were weaned from them immediately after their birth. Kamboj et al.(2011) reported the mean daily milk yield in natural suckled and organically managed buffaloes was 7.94kg per day and in weaned and conventionally managed buffaloes was 7.29 kg per day in Murrah buffaloes.

Reproductive performance

Days to express first heat after calving

In the present study no significant effects of rearing system were evident on days to express first heat after calving in...
Table 1  Effect of weaning on milking behaviour, production and reproduction performance of Tharparkar cattle

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Suckling</th>
<th>Weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let-down time (sec)**</td>
<td>48.14±0.33</td>
<td>90.42±0.92</td>
</tr>
<tr>
<td>Milking time (min)**</td>
<td>3.40±0.05</td>
<td>3.05±0.05</td>
</tr>
<tr>
<td>Milk flow rate (kg/min)**</td>
<td>0.63±0.01</td>
<td>0.56±0.01</td>
</tr>
<tr>
<td>Daily yield per milking (kg)**</td>
<td>2.20±0.05</td>
<td>1.78±0.05</td>
</tr>
<tr>
<td>Temperament score NS</td>
<td>2.22±0.23</td>
<td>2.45±0.18</td>
</tr>
<tr>
<td>Per day milk yield (kg/d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-30 dNS</td>
<td>4.28±0.51</td>
<td>3.50±0.66</td>
</tr>
<tr>
<td>31-60 dNS</td>
<td>9.32±1.02</td>
<td>5.43±1.44</td>
</tr>
<tr>
<td>61-90 dNS</td>
<td>7.92±1.23</td>
<td>4.44±1.39</td>
</tr>
<tr>
<td>0-90 dNS</td>
<td>7.18±0.90</td>
<td>4.45±1.15</td>
</tr>
<tr>
<td>Total milk yield (kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-30 d</td>
<td>128.43±15.18</td>
<td>104.86±19.90</td>
</tr>
<tr>
<td>31-60 d</td>
<td>279.64±30.53</td>
<td>162.79±43.27</td>
</tr>
<tr>
<td>61-90 d</td>
<td>237.71±36.76</td>
<td>133.14±41.56</td>
</tr>
<tr>
<td>0-90 d</td>
<td>645.79±80.75</td>
<td>400.79±103.60</td>
</tr>
<tr>
<td>Reproductive performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days to first heat after calving (d)</td>
<td>69.40±22.03</td>
<td>42.86±10.29</td>
</tr>
<tr>
<td>Service period (d)</td>
<td>109.00±2.00</td>
<td>82.33±11.84</td>
</tr>
</tbody>
</table>

NS= Non-significant; *= significant at P<0.05; **= significant at P<0.01

Tharparkar cattle. Though values for mean of days to express first heat after calving was more for dams of suckling calves (69.40±22.03 v/s 42.86±10.29 days) as compared to that in dams of weaned calves (Table 1). Margerison et al. (2002) reported that cows suckled by their own calves had a longer interval from calving to first oestrus than the cows suckled by other calves. Moreover similar reports were also observed in purebred and crossbred cows, where days from calving to ovulation were higher in cows subjected to restricted suckling than the cows which were not allowed calf suckling (Short et al. 1972; Mejia et al. 1998; Msanga and Bryant, 2003; Boonbrahm et al. 2004; Yilma et al. 2006; Mendoza et al. 2010; Escobedo-Amezcua et al. 2010). Similarly Kantharaja (2011, unpublished) reported that the postpartum interval to resumption of first estrus was shorter for weaned buffaloes than suckling buffaloes. Similar findings were reported by Rijasnaz et al. (2012) in buffaloes, where the interval from calving to the onset of behavioural oestrus was significantly (P<0.01) shorter in weaned than suckled (53.3±7.52 vs. 128.0±9.94 days) buffaloes. These results are consistent with the reports of Perera (2011) who reported that dairy buffaloes managed with no suckling resume oestrus cyclicity by 30-60 days after calving. The present finding that weaned Tharparkar cattle resumed behavioural estrus earlier possibly indicated towards a rapid response of these animals to LH release. Significantly prolonged interval to first postpartum ovulation is may be due to suppressive effect, when the cows receives an adequate stimuli from their own calf or from an unrelated calf to which she has bonding, this bond between the dam and the offspring is established through complex mechanisms that include visual, sensory and olfactory cues (Stevenson et al. 1997). Early weaning is effective in removing the suppressive effects of suckling from the hypothalamo-hypophyseal-gonadal axis (Bell et al. 1998). Whereas, weaning after day 45 postpartum did not affect the duration of postpartum anoestrus (Yavas and Walton 2000).

Service period

Dams of suckling calves had more mean for service period (109.00 days) than the dams of weaned calves (82.33±11.84 days) though difference was statistically insignificant (Table 1). Similar findings were reported by Saika et al. (1988) where service period was reduced by 72 days in dams of weaned buffalo calves as compared to their suckling counterparts. This is also in agreement with the report of Jainuddin (1988) who suggested that weaning reduced the incidence of postpartum anoestrus. Montiel and Ahuja (2005) supported this fact in
Bos indicus cows too who reported that early weaning increased pregnancy rates in some herds, but response varied widely. This was further supported by the reports of Abeygunawardena et al. (1995) who concluded that suckling ad libitum in buffaloes resulted in lower conception rates. Weaning by Day 60 or 90 did not improve postpartum fertility (Qureshi and Ahmad 2008). Whereas, considering the fertility response of weaning induced estrous cycles, the results of this study conclude that weaning effect can enhance the conception rates and reduce calving to conception interval in postpartum Tharparkar cattle. The higher proportion of animals became cyclic within 30 days of weaning indicated weaning-mediated effect on postpartum reproduction in Tharparkar cattle.

Conclusions

Present findings provide baseline information on weaning system of rearing Indigenous breed of cattle. Considering the fertility response of weaning induced estrous cycles, so it is concluded that weaning effect can enhance the conception rates and reduce calving to conception interval in postpartum Tharparkar cows but milk production has declined during early lactation which imparts its effect on lactation yield. Therefore weaning in indigenous cattle should be practiced judiciously with giving due care to the welfare of animal and their calves.

Acknowledgements

Authors are highly thankful to Director, IVRI for providing all the facilities to carry out this research work at Cattle and Buffalo Farm, Livestock Production and Management Section, Indian Veterinary Research Institute (IVRI), Izatnagar.

References

Abeygunawardena H, Kuruwita YV, Perera BMAO (1995) SARCE/NARESA Regional Symposium on the Role of the Buffalo in Rural Development in Asia, Plant Genetic Resource Center, Sri Lanka


Sinha RRK (2011) Studies on body condition score and milking temperament

Stagg K, Spicer LJ, Sreenan JM, Roche JF, Diskin MG (1998) Effect of calf isolation on follicular wave dynamics, gonadotropin and metabolic hormone changes, and interval to first ovulation in beef cows fed either of two energy levels postpartum. Biological Reproduction 59: 777-783


