

## NOCTURNAL BEHAVIOUR OF BUFFALOES AS RELATED TO THEIR MILK PRODUCTION

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### ABSTRACT

A study was conducted for 16 consecutive nights using a random group of eleven buffaloes to take into account such parameters of nocturnal behaviour as sleep and resting regimes and rhythms of other activities such as feeding, rumination, eliminative behaviour and milk yield. Of 390 minutes (total time of observation per night), the mean cumulative period of sleep in buffaloes was  $81.1 \pm 5.23$  minutes (range : 59-119 minutes). The average standing time was  $142 \pm 7.69$  minutes (range : 110-182 minutes). The mean sternal recumbency time was  $248 \pm 7.69$  minutes (range : 208-280 minutes). The mean rumination time was  $175 \pm 5.91$  minutes; 68 per cent of this was 'sitting' rumination and the remaining was done while standing. The frequency of defaecation and urination during the night-time was  $1.4 \pm 0.07$  and  $1.3 \pm 0.07$  times, respectively. The feeding time constituted from 9.2 to 22.3 per cent of the total observation time per night (390 minutes). The mean morning milk yield of these buffaloes varied from  $3.20 \pm 0.04$  to  $5.10 \pm 0.04$  litres per buffalo. Non-significant correlation coefficients between feeding time and milk yield ( $-0.071$ ) and rumination time and milk yield ( $-0.032$ ) were observed.

### INTRODUCTION

To keep pace with recent trends in research and for simultaneous achievement of high productivity and proper animal welfare, greater knowledge of behaviour of farm animals is essential. This aspect of our livestock, however, has remained neglected. A preliminary study was, therefore, designed on behaviour patterns of buffalo——— one of the most important farm animals in Pakistan.

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This study took into account such component units of nocturnal behaviour of buffaloes as sleep and resting regimes and rhythms of such activities as feeding, rumination, eliminative behaviour and milk yield.

#### MATERIALS AND METHODS

A random group of eleven buffaloes having nearly the same age, body weight and milk yield, was used for this study. The animals were fed *ad libitum*. Strict uniformity was observed in their environmental and managemental conditions. After an adjustment period of four nights, observations on pattern of nocturnal behaviour of buffaloes were made during sixteen consecutive nights, for six and a half hours each night (8.00 p.m. to 2.30 p.m.). Data concerning the following were collected .

- (a) Period of sleep
- (b) Standing and recumbency pattern
- (c) Feeding time
- (d) Rumination time
- (e) Eliminative behaviour
- (f) Morning and evening milk yield (litres)
- (g) Daily air temperature and relative humidity

The observations recorded were pooled to estimate mean values for each buffalo. The range of values for various behavioural parameters, their overall standard errors and coefficients of variation were calculated. Correlation coefficients between milk yield and parameters such as feeding time, rumination time, period of sleep and voiding of faeces were determined.

#### RESULTS AND DISCUSSION

*Period of Sleep :* The mean cumulative period of sleep in buffaloes was  $81.1 \pm 5.23$  minutes with a range of 59-119 minutes. Of the 81.1 minutes sleep, about 93 per cent (75.5 minutes) was exhibited while lying in sternal recumbency with their heads sometimes resting on their flanks and their eyes closed (Table 1). The rest of the sleep (about 7%) was recorded when the buffaloes were either standing or had assumed a posture of full lateral recumbency. The period of sleep was approximately 20.79 per cent of 390 minutes (the period of observation per night).

Table 1. *Nocturnal pattern of sleep in individual buffaloes*

Animal No.	Standing (Min)	Lying (Min)	Full lateral recumbency (Min)	Total sleeping time (Min)	Period of sleep as per cent of *390 minutes
1	1	117	1	119	30.51
2	2	67	5	74	18.97
3	3	83	6	92	23.59
4	2	56	4	62	15.85
5	4	69	8	81	20.77
6	3	83	3	89	22.82
7	3	71	3	77	19.74
8	0	71	3	74	18.97
9	3	93	1	97	24.87
10	1	64	3	68	17.44
11	2	57	0	59	15.13
Overall mean	2.2	75.5	3.4	81.1	20.79
Range	0-4	56-117	0-8	59-119	15.13 - 30.51
S.E	0.35	5.35	0.71	5.23	
C.V	53.52	23.50	69.43	21.40	

\*Total time of nocturnal observation each night.

S. E = Standard error.

C. V = Coefficient of variation.

Ruckebusch (1972) reported that horses, cows and sheep spent the large part of any 24 hours in the wakeful state (88, 83 and 84 per cent, respectively). This was true even during the night-time (71, 68 and 73 per cent, respectively). These data could be interpreted to mean that sleep in buffalo and cattle did not appear to be of the same magnitude, the values being 20.79 and 32.00 per cent during night-time in buffaloes and cows, respectively.

*Standing and Recumbency Pattern :* The average standing time was  $142 \pm 7.69$  minutes with a range from 110-182 minutes (Table 2). Likewise mean sternal recumbency time was  $248 \pm 7.69$  minutes which ranged from 208 to 280 minutes.

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This included both left ( $126 \pm 7.18$  minutes) and right ( $122 \pm 4.16$  minutes) sternal recumbency. Standing time constituted 57.2 per cent of the sternal recumbency time, whereas sternal recumbency occupied 64 per cent of the total time of nocturnal observation (390 minutes). In contrast to 142 minutes standing time, sitting time was 248 minutes, about 43 per cent more than the former.

Table 2. *Nocturnal pattern of standing and recumbency in individual buffaloes*

Animal No.	Standing time (Min)	Sternal recumbency			Standing time as per cent of sternal recumbency	Standing time as per cent of 390 minutes	Sternal recumbency as per cent of 390 minutes
		Left (Min)	Right (Min)	Total (Min)			
1	128*	140	122	262	48.8	33	67
2	122	122	146	268	45.2	31	69
3	126	154	110	264	47.7	32	68
4	147	134	109	243	60.5	38	62
5	114	147	129	276	41.4	29	71
6	110	160	120	280	39.1	28	72
7	149	107	134	241	61.8	38	62
8	169	85	136	221	76.4	43	57
9	134	125	131	256	52.3	34	66
10	179	105	106	211	85.3	46	54
11	182	103	105	208	87.5	47	53
Overall Mean	142	126	122	248	57.2	36	64
Range	110-182	85-260	105-146	208-280	39.1-87.5	28-47	53-72
S.E	7.69	7.18	4.16	7.69			
C.V	17.17	18.95	11.25	10.26			

\*Means of 16 observations.

Fraser 1980 stated that cattle chewing the cud usually rest on their sternums, a posture which could facilitate rumination by increasing abdominal pressure. This explanation tends to support the present finding concerning longer sternal recumbency in buffaloes. Francis (1982) indicated that low air temperature tended to increase the lying time. This, however, was not the case

in the present study since the night temperature was not significantly different from that of day temperature.

*Feeding Time :* The mean feeding time was observed to be  $55.3 \pm 4.98$  minutes with a range from 36.0 to 87.6 minutes. The average feeding time as per cent of the standing time varied from 28.1 to 50.4. Likewise feeding time constituted 9.2 to 22.3 per cent of 390 minutes (total observation time per night). Of the total standing time, the period spent in ingesting feed and 'standing' rumination was almost the same,  $55.3 \pm 4.90$  and  $56.0 \pm 6.34$  minutes (Table 3), respectively.

*Rumination time :* The data summarized in Table 3 indicated that of the 390 minutes observation time, on an average each buffalo spent  $175 \pm 5.91$  minutes in rumination. Of this, most of the time (68%) was spent ruminating while sitting and the remaining rumination was done standing.

The rumination time ranged from 19-91 minutes and 102-153 minutes in standing and sitting positions, respectively. It was further observed that total rumination time (standing and sitting inclusive) varied from 33-51 per cent of total time (390 minutes) of nocturnal observation. This value is noticeably higher than that reported for dairy cattle (16-36%) over 24-hour period (Hafez, 1975). This could be due to the peaceful nocturnal environment that permitted the animals to ruminate undisturbed for prolonged intervals. Like cattle, buffaloes also showed marked preference for rumination during sternal recumbency.

*Eliminative Behaviour :* The buffaloes used in this study on an average defaecated  $1.4 \pm 0.09$  times in 390 minutes, inclusive of the excreta deposited standing and lying. The frequency of passing dung while standing was roughly 3.7 times more than that when lying (Table 4). During the same period, the buffaloes urinated  $1.3 \pm 0.07$  times. The comparative frequency of urination while standing and lying was about the same,  $0.7 \pm 0.10$  and  $0.6 \pm 0.10$ , respectively.

A comparison of the pattern of defaecation and urination in buffaloes as observed in this study during night-time showed that on average the dung ( $1.4 \pm 0.09$  times) was excreted almost as many times as the urine ( $1.3 \pm 0.09$

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**Table 3.** *Mean rumination time of individual buffaloes observed during the experimental period*

Animal No.	Rumination standing		Rumination sitting		Total rumi. time (Min)	Rumination time as per cent of 290 minutes
	Time in minutes	Per cent of total rumi. time	Time in minutes	Per cent of total rumi. time		
1	76	40	116	60	192	49.23
2	19	15	111	85	130	33.33
3	40	26	117	74	157	40.25
4	58	34	111	66	169	43.33
5	46	23	153	77	199	51.02
6	33	18	152	82	185	47.43
7	50	30	115	70	165	42.30
8	73	42	102	58	175	44.87
9	60	33	122	67	182	46.66
10	91	47	102	53	193	49.48
11	70	39	110	61	180	46.15
Overall mean	56	32	119	68	175	44.87
Range	19-91	15-47	102-153	53-85	130-199	33 33-51 02
S.E.	6.34		5.28		5.91	
C.V.	37.54		14.70		11.19	

Rumi. = rumination.

times). These values are based on data for 6.30 hours each night. Their conversion to values for 24 hours by simple multiplication, showed a noticeable difference between buffaloes and cattle in respect of their frequency of elimination. The average value for cattle over 24 hour being 12-18 times and 9 times for defaecation and urination, respectively (Hafez, 1975; Fraser, 1980). During defaecation, the special stance assumed by buffaloes was the same as that typically assumed by cattle (Hafez, 1975).

**Milk Yield :** The mean morning milk production over the experimental period varied from  $3.20 \pm 0.04$  to  $5.10 \pm 0.04$  litres per buffalo. The variation in the milk yield of any of these animals did not exceed 0.4 to 1.0 litre.

Table 4. *Mean values showing eliminative behaviour of buffaloes during nocturnal period of 390 minutes*

Animal No.	Defaecation			Urination		
	Standing (No.)	Recumbent (No.)	Total (No.)	Standing (No.)	Recumbent (No.)	Total (No.)
1	0.8	0.1	0.9	0.6	0.5	1.1
2	0.9	0.4	1.3	0.9	0.4	1.3
3	1.0	0.3	1.3	1.4	0.3	1.7
4	1.5	0.3	1.8	0.4	0.8	1.2
5	0.9	0.4	1.3	0.6	0.7	1.3
6	0.6	0.4	1.0	0.1	1.1	1.2
7	1.3	0.4	1.7	0.8	0.3	1.1
8	1.3	0.5	1.8	0.9	0.3	1.2
9	1.4	0.0	1.4	0.5	1.3	1.8
10	1.4	0.2	1.6	0.9	0.5	1.4
11	1.4	0.1	1.5	0.5	0.6	1.1
Overall mean	1.1	0.3	1.4	0.7	0.6	1.3
Range	0.6-1.5	0.0-0.5	0.9-1.8	0.1-1.4	0.3-1.3	1.1-1.8
S.E.	0.09	0.05	0.09	0.10	0.10	0.07
C.V.	26.77	56.31	21.11	49.48	54.04	18.22

The correlation coefficient between feeding time and morning milk yield was  $-0.071$ , which was non-significant. The negligible effect of feeding time on morning milk yield, as given above, was consequent to the management routine of the herd and showed that feed was provided only during the day-time. Thus the buffaloes consumed the left-over during the night-time. Rumination time and milk yield were also not significantly correlated ( $r = -0.032$ ). Czako (1977) found that milk yield was significantly correlated with both lying time and rumination time, which seemed contrary to the findings of this study. The results of this study are in agreement with those reported by Szilagyi (1978) who found no significant correlation between milk yield and the time spent resting, ruminating and eating.

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The correlation coefficient between milk yield and the number of times faeces voided was 0.194. This relationship was significant ( $P < 0.05$ ). The sleeping time again had non-significant correlation ( $-0.069$ ) with morning milk yield.

### REFERENCES

- Czako, J. 1977. Problems of behaviour in large-scale cattle farms. *World Rev. Anim. Prod.* 13 : 39-47 (Dairy Sci. Abst., 39 : 4188, 1977).
- Francis, P.G. 1982. Management and mastitis. *Appl. Anim. Ethol.* 8 : 401
- Fraser, A. F. 1980. *Farm Animal Behaviour* (2nd edition). Bailliere Tindall, London.
- Hafez, E. S. E. 1975. *The Behaviour of Domestic Animals* (3rd edition). Bailliere Tindall, London.
- Ruckebusch, Y. 1972, The relevance of drowsiness in the circadian cycle of farm animals. *Anim. Behav.* 20 : 637-643.
- Szilagyi, Z. 1978. Relationship between time spent resting and milk yield in Hungarian Simmental cows. *Allattenyesztes*, 27 : 229-236 (Anim. Breed. Abst., 47 : 1214, 1979).