

RESEARCHES REGARDING ELIMINATION BEHAVIOUR OF DAIRY COWS DURING TOTAL CONFINEMENT

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Abstract

Aim of the current research was to describe the elimination behaviour in dairy cows during their first 100 days of lactation in winter and summer seasons, during total confinement. Twenty multiparous Romanian Black and White cows were used in the current study, for each season a group of 10 animals. Behaviour was monitored for 48 h each season using 4 video cameras connected to a system of CCBIR type, with a power of 125 fps. Studied traits were: number of defecation periods; frequency of the defecation periods; time length between raising in standing position and first defecation period; number of urination periods; frequency of the urination periods; time length between raising in standing position and first urination period. Highest frequency of the defecation periods was registered during intense human activity in the shed, especially during milking and feeding time, when cows were forced to stand. Average number of defecating periods per 24 h registered during winter season was of 8.60 and of 8.50 periods during summer. Between the two seasons differences were sub traced, only of 0.10 defecation periods, this difference was not significantly statistically ($p>0.05$). During winter registered on average number of urination periods per 24 h of 8.40. A slightly smaller number of urinations were registered during summer season, of 7.35 per 24 h. Registered differences between the two seasons were of 1.05 urination periods, value tested as very significantly ($p<0.001$).

Key words: elimination behaviour; dairy cows; total confinement

INTRODUCTION

Factors that have influence on the quantity of feces and urine are: quantity of feed intake (especially DMI intake), water consumed by the animal, forage type (some have laxative effects), health of the animal, season (influencing by temperatures and relative humidity), movement (lack of movement influence negatively the frequency of excretion behavior), and presence of some stressors factors (e.g. fear or pain). Elimination in cattle is a spontaneous reflex, and has place while the animal is standing or walking. The quantity of matter eliminated in normal conditions, is estimated to be 6-7% of their body weight [1], resulting 40-50 kg of feces, and 15-25 liters of urine per 24 h. Unlike other species, cattle do not mark their territory with urine or feces. But the female urine, could act like a socio-signal for attracting bulls during estrus periods. On average, cows defecate between 8 to 16 times and urinate between 3 to 9 times during a

day's interval [2, 3, 4]. A decrease in excretion has been observed during resting time, most likely due to the lack of movement. Usually cows defecate or urinate soon after changing lying to standing position.

MATERIAL AND METHODS

In the current study twenty multiparous Romanian Black and White cows were used. The cows were housed in a tied stanchion barn at the Didactical Farm of the Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara. The experiments were carried out during winter and summer season, each experimental group consisted in 10 cows. Cows monitored were in their first 100 days of lactation, and had an average daily yield of 15.7 kg the first group (winter season) and of 20.5 kg second group (during summer season). And a mean body weight of the cows of 617 kg during first experiment, and 581.6 kg the animals that

were monitored during summer season. During the first experimental period, cows were fed a diet consisted in 20 kg of corn silage, 8 kg of pasture hay, 3 kg of concentrates and 4 kg of brewer yeast. In summer season, cows received a diet of 30 kg alfalfa fresh feed, 3 kg of concentrates and 4kg of brewer yeast. The forages were offered to the animals in two equal portions each day, at approximately 6:30 and 16:30. The cows were milked twice a day, at approximately 5:00 and 17:00 h. Data regarding environmental temperature was recorded three times per day, at 7:00, 14:00 and 23:00 h. The average air temperature registered inside the barn was 8.1°C during winter and 28.4°C in summer. Cows had free access to a water source 24 h. Elimination behaviour was monitored 24 h, using 4 video cameras (CC9622BIR) connected to a video capture device of 125 frames per second with four channels. Video recordings were analysed by continuous observation for each cow and each period. For a better interpretation of the results, the 24 h interval was divided in three segments. In our research we have registered and studied some specific elimination behaviour patterns, such as number of defecating/urination periods, frequency of elimination process, time length between changing into standing position from lying, and first defecation/urination period.

RESULTS AND DISCUSSION

Averages and dispersion indices for the calculated parameters are presented in tables 1, 2, 3 and 4.

Analysing data from Table 1, it can be observed that average number of defecating periods per 24 hours registered during winter season was of 8.60 and of 8.50 periods during summer season. Between the two seasons differences were sub traced, only of 0.10 defecation periods, this difference was not significantly statistically ($p>0.05$).

Highest frequency of the defecation periods was registered during intense human activity in the shed, especially during milking and feeding time, when cows were forced to stand up.

O relatively lower frequency of the defecating periods can be observed during intense resting and ruminating behavior, especially during night time.

Time length between passing in standing position, and first defecation period was on average of 24.16 minutes during winter and of 26.12 minutes during summer season. During night, average time for this trait is more reduced compared with day time, averages being of 5.65 minutes during winter and 5.50 during summer nights. For this trait, differences registered between the two seasons were not significant statistically ($p>0.05$).

Analysing data from Table 3, it can be observed that cows during winter season registered on average number of urination periods per 24 hours of 8.40.

A slightly smaller number of urinations were registered during summer s season, of 7.35 per 24 hours. Differences between the two seasons are of 1.05 urination periods, value very significantly statistic ($p<0.001$).

O relatively lower frequency of the urination periods was registered during intense rumination and resting periods, especially during night time.

Analysing data from Table 4, it can be observed that time length between passing in standing position and first urination period was registered during winter to be of 20.77 minutes and 21.75 minutes during summer season.

During night time, time length for this trait was much shorter, only of 8.05 minutes during winter season and of 7.30 minutes during summer season. Between the two seasons, differences registered were not significant statistically ($p>0.05$).

Table 1 Averages, dispersion indices, differences and their significance for the number of defecations during winter and summer seasons

Days interval		Winter	Summer
Interval 1 7-14 h	$X \pm S_x$	2.75±0.19	2.10±0.20
	SD	0.85	0.91
Interval 2 14-21 h	$X \pm S_x$	2.95±0.15	2.50±0.18
	SD	0.68	0.82
Interval 3 21-7 h	$X \pm S_x$	2.90±0.17	3.90±0.21
	SD	0.78	0.96
Total 24 h	$X \pm S_x$	8.60±0.19	8.50±0.27
	SD	0.88	1.23
Winter vs. Summer		Interval 1	0,65 *
		Interval 2	0,45 ^{ns}
		Interval 3	- 1.00***
		Total 24 h	0.10 ^{ns}

Table 2 Averages, dispersion indices, differences and their significance for the time length between elevation and first defecation period, during winter and summer seasons

Days interval		Winter	Summer
Interval 1 7-14 h	$X \pm S_x$	35.55±13.30	31.50±9.77
	SD	59.51	43.72
Interval 2 14-21 h	$X \pm S_x$	31.35±10.78	36.20±23.65
	SD	48.21	105.77
Interval 3 21-7 h	$X \pm S_x$	5.65±2.79	5.50±2.19
	SD	12.49	9.83
Total 24 h	$X \pm S_x$	24.16±6.96	26.12±8.34
	SD	31.14	37.49
Winter vs. Summer		Interval 1	4.05 ^{ns}
		Interval 2	- 4.85 ^{ns}
		Interval 3	0.15 ^{ns}
		Total 24 h	- 1.96 ^{ns}

Table 3 Averages, dispersion indices, differences and their significance for the number of urinations during winter and summer seasons

Days interval		Winter	Summer
Interval 1 7-14 h	$X \pm S_x$	2.85±0.15	1.85±0.13
	SD	0.67	0.58
Interval 2 14-21 h	$X \pm S_x$	2.70±0.16	2.25±0.16
	SD	0.73	0.71
Interval 3 21-7 h	$X \pm S_x$	2.90±0.16	3.20±0.21
	SD	0.71	0.95
Total 24 h	$X \pm S_x$	8.40±0.18	7.35±0.25
	SD	0.82	1.13
Winter vs. Summer		Interval 1	1.00 ***
		Interval 2	0.45 ^{ns}
		Interval 3	- 0.30 ^{ns}
		Total 24 h	1.05 ***

Table 4. Averages, dispersion indices, differences and their significance for the time length between elevation and first urination period, during winter and summer seasons

Days interval		Winter	Summer
Interval 1 7-14 h	$X \pm S_x$	30.20±12.95	26.80±7.33
	SD	57.92	32.80
Interval 2 14-21 h	$X \pm S_x$	24.15±6.30	31.25±12.03
	SD	28.21	53.83
Interval 3 21-7 h	$X \pm S_x$	8.05±2.88	7.30±2.88
	SD	12.91	12.90
Total 24 h	$X \pm S_x$	20.77±4.50	21.75±6.37
	SD	20.12	28.52
Winter vs. Summer		Interval 1	3,40 ^{ns}
		Interval 2	- 7.10 ^{ns}
		Interval 3	0,75 ^{ns}
		Total 24 h	- 0.98 ^{ns}

CONCLUSIONS

> Average number of defecating periods per 24 hours registered during winter season was of 8.60 and of 8.50 periods during summer season. Between the two seasons differences were sub traced, only of 0.10 defecation periods, this difference was not significantly statistically ($p > 0.05$).

> Cows during winter season registered on average number of urination periods per 24 hours of 8.40. A slightly smaller number of urinations were registered during summer season, of 7.35 per 24 hours. Differences between the two seasons are of 1.05 urination periods, value very significantly statistic ($p < 0.001$).

> O relatively lower frequency of the urination and defecation periods was

registered during intense rumination and resting periods, especially during night time.

REFERENCES

- [1] Acatincai S.: Etologie – comportamentul animalelor domestice, Agroprint, Timisoara, 2009;
- [2] Aland, A., Lidfors, L., Ekesbo, I.,; Diurnal distribution of dairy cow defecation and urination, Appl. Anim. Behav. Sci, 2002, 78: 43-54;
- [3] Gavojdian D.,; Teza de doctorat – Contributii la cunoasterea unor aspecte privind comportamentul vacilor multipare de rasa Baltata cu negru romaneasca intretinute in sistem legat, USAMVB Timisoara, 2009;
- [4] Sahara, D., Ichikawa, T., Aihara, Y., Kawanishi, H., Nagashima, M.,; Eliminative and reposing behaviour of dairy cows in the stanchion stall barn, Jap. J. Zootech. Sci., 1990, 61: 249-254