STUDY ON BEHAVIOR OF DAIRY COWS KEPT UNBOUND IN CLOSED SHELTER WITH REST BERTHS FROM BUASVM TIMISOARA DIDACTIC STATION

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Abstract: *In order to increase the productivity of dairy farms is required that the old technology of maintaining the animals in the barn stalls to be replaced by a new technology that allows increasing the number of head of livestock per unit of built area and housing costs to be as low and productivity to be at a high level. Observation was conducted in Didactic Station USAMVB Timisoara on 22 lactating cows of the breeds Friză, Bălțată românească and half breeds of Friză and Bălțată românească. The purpose of this paper is to analyze the behavior of dairy cows during the three segments of the day (morning, afternoon and night), following the timing of rest period, movement and feeding, the way how unbound maintenance technology in closed shelters with individual rest bunks meet the animal requirements and its implications on livestock production and management of its opportunities to obtain higher productions. During the experimental cows were in lactation I-IV. Cows were kept in the shelter closed unbound, each cow having reserved a rest bunk. Cow ration consisted of: hay, corn, silage, fodder beet, concentrates. Observation on the behavior of cows lasted 7 consecutive days and was conducted in March. For an easy identification, each animal was marked on the croup with paint receiving a serial number. Was recorded throughout the experimental period at every 15 minutes how each animal is using time. Based on these observations was calculated the average time of sleeping accommodation usage, the use of the alley, and the time consumption of food within 24 hours. Compared to individual differentiation advantage of feeding and caring of the animals kept bound, free stalling gives them the chance to move freely within the shelter, or between shelter and paddock ,which has positive consequences on the fertility of cows, reproductive youth development and even on milk production. However, animals maintenance in groups allow greater degree of mechanization of works and leads to a significant reduction in labor costs related to bound stalling, but requiring uniformity in age or physiological status of animals.*

Key words: ***dairy cows, behavior, free stalling, closed shelter, rest bunk, movement, food***

INTRODUCTION

The aim of this paper is to analyze the behavior of dairy cows during the three segments of the day (morning, afternoon and night), following the timing of rest period, movement and feeding, the way how unbound maintenance technology in closed shelters with individual rest bunks meet the animal requirements and its implications on livestock production and management of its opportunities to obtain higher productions.

MATERIAL AND METHODS

The research was conducted in Didactic Station USAMVB Timisoara on 22 lactating cows of the breeds Friză, Bălțată românească and half breeds of Friză and Bălțată românească. During the experimental cows were in lactation I-IV. Cows were kept in the shelter closed unbound, each cow having reserved a rest bunk. Cow ration consisted of: hay, corn, silage, fodder beet, concentrates. Observation on the behavior of cows lasted 7 consecutive days and was conducted in March.

For an easy identification, each animal was marked on the croup with paint receiving a serial number. Was recorded throughout the experimental period at every 15 minutes how each animal is using time. Based on these observations was calculated the average time of sleeping accommodation usage, the use of the alley, and the time consumption of food within 24 hours. To know the behavior circadian variations, data were processed separately three times within 24 hours: in the morning between the hours7-14, afternoon, between 14-21 pm, and at night between 21-7.

Experimental period was preceded by a period of adjustment to the unbound maintenance in bunks, which lasted two weeks.

RESULTS AND DISCUSSIONS

1. The average duration of cow's different activities during 24 hours

The main activities carried by cattle in the shelter are: rest, exercise and food consumption.

In table 1, 2 and 3 are given the primary observations of the various activities undertaken by the 22 heads of cows studied during three periods: morning, afternoon and night. It is apparent that different activities vary widely from one individual to another.For example, the period of use of the bunk in the morning ranged from 25.7 minutes for the individual having serial number 15 to 302.1 minutes for the individual having serial number 12.

The alley was used only 32 minutes by the individual having serial number 12 and 263 minutes by the individual having serial number 15.

In terms of feed consumption, variability is reduced, this activity being minimal in case of the individual having serial number 12.(83 minutes) and maximum in case of the individual having serial number 14 (190 minutes).

In table 5 is given the average duration of the various activities throughout 24 hours period. Analyzing time usage within 24 hours cows used rest bunks for 12 hours which is 52.5% of time possible.

It should be noted that in the bunk cows are staying not only in sitting position but also in orthostatic position. Cows prefer to rest in the sitting position, which was 10 hours and 34 minutes (43,7 %) from the possible time, to 2 hours and 4 minutes as was orthostatic position (8,8%) from the possible time.

As long as the animal rests in a sitting position depends largely on convenience, the correct choice of the type of floor which is influencing indirectly in the same time animals health and milk production.

Resting place is appropriate when the floor is dry, soft and has a low thermal conductivity, conditions in which animals rest with pleasure. We found that the cows do not sleep on damp bedding.

The normal resting period at cows is estimated at 35-45% of 24 hours. From our data it follows that the rest period represents 43.7% of 24 hours, which demonstrates that they have provided adequate conditions of comfort for the animals. Characteristic position of rest of the cattle is in sternum-costal decubitus, with forelegs gathered under the trunk, one of the hind legs is gathered under the abdomen and the other is held down. The animal usually takes head up to facilitate gas removal obtained during rumen fermentation by belching. While they are lying cattle are ruminating or sleeping.

Our research showed that cows have used the alley for 6 hours and16 minutes which represents 26% of the possible time. In the time the cows were on the alley, respective 4 hours and 57 minutes the cows were either walking or standing and for an hour and 19 minutes they rested although each animal had its own resting berth.

This occurred due to the cow's individual preferences and possible to the short

adapting period to the new maintenance system.

We mention that from the 22 cows taking into study, a number of 11 did not rest at all on the walking alley, but 6 of them did rest less than 10 minutes and only 3 cows preferred the alley for a longer resting place, somewhere between 250-700 minutes.

The displacement of cows on the walking alley is reduced, performed for reaching to feeding or resting place. Few cows move out of wish, on the alley they prefer the standing position.

Our researches point out that for the feeding process cows spent 5 hours and 12 minutes, meaning 21,5 % of 24 hours.

Off the time used for food consuming, 4 hours and 38 minutes represents the consumption of volume forages, while 34 minutes is the consumption of the concentrate forage.

Also, the investigations revealed that the duration of the feeding process is more shortened in cows maintained free than in those fastened, this being influenced by the size of the feeding place, the animal's hierarchical position, intake structure etc. and it represents 12 up to 20 per cent of 24 hours.

Sustaining the same idea, it has been shown that the duration of the intake consumption is 21,5 % of 24 hours (the superior limit taken from field literature).

This rests in the fact that the maintenance system practiced had assured the cows with an individualized feeding space and a large volume of consumed forage as a consequence to elevated productive level of these cows.

2. Day-time variations of different activities during 24 hours

To this concern we attempted researches following the way of spending time during a whole day: morning, afternoon and night, the data are presented in table nr 4.

The notes revealed that there are important behavior variations during 24 hours, thus the intensive use of the berth (sleeping place) occurs at night when the cows rest average 6 hours and 45 minutes, representing 68,7% of the time possible.

In the morning and in the afternoon the animals used the berth for close a length of time: 3 hours in the morning and 2 hours and 56 minutes in the afternoon, representing 42 % of the time possible.

The time spent in orthostatic position in the berth was also equal: 40 minutes during the afternoon and 45 minutes during the morning.

Some researches laid out day-time variations of the resting interval, variations induced by the seasons. Stanciu G.(1999) shows that cows, in winter, spend more time laying down during the night and the morning, while in summer they spend more time laying down during the day.

It is recommended, the staff's labor program to consider this aspect, meaning that on winter it should be shorter.

From Stanciu and Maria Rosu's (1980) investigations on heifers resulted that during the night they used the berths 72,6% of the possible time, in the morning 22,3% of the possible time and in the afternoon – 25,4 %.

Our observations shown that on the alley, proportional to the time possible, the animals had spend more time in the afternoon – 24,6% of the possible time, while during the morning and night about 25%.

Table 1

The average individual duration of cow's various activities (in minutes) performed in the morning (hours 7-14)

Current number	Registration number	In berths (minutes)			On the alley (minutes)			Food consumption (minutes)		
		Sitting position	Orthostatic position	Total	Sitting position	Movement/ Pause	Total	Forage volume	Concentrates	Total
1.	2	57.8	68.5	126.3	-	158.5	158.5	115.7	23.5	139.2
2.	3	197.1	34.2	231.3	2.1	57.8	59.9	94.2	19.2	113.4
3.	7	77.1	47.1	124.2	2.1	154.2	156.3	126.4	17.1	143.5
4.	8	98.5	38.5	137	2.1	139.2	141.3	126.4	21.4	147.8
5.	9	128.5	107.1	235.6	4.2	68.5	72.7	102.8	15	117.8
6.	12	250.7	51.4	302.1	-	32.1	32.1	72.8	10.7	83.5
7.	13	113.5	139.7	244.2	-	53.2	53.5	107.1	19.2	126.3
8.	14	228.8	21.4	244.2	-	77.1	77.1	79.2	21.4	190.6
9.	15	2.1	23.5	25.7	145.7	117.8	263.5	81.4	19.2	100.6
10.	16	188.5	45	233.5	-	77.1	77.1	94.8	17.1	111.3
11.	17	66.4	25.7	92.1	8.5	143.5	152.1	152.1	23.5	175.6
12.	18	192.8	27.8	250.6	4.2	68.5	98.5	96.4	23.5	119.9
13.	19	173.5	25.7	199.2	-	81.4	81.4	124.2	19.2	143.4
14.	20	171.4	23.5	194.9	-	90	90	107.1	27.8	134.9
15.	21	27.8	55.7	83.5	124.2	92.1	216.3	83.5	21.4	104.9
16.	22	117.8	19.2	137	-	150	150	135	15	150
17.	23	122.1	21.4	143.5	-	115.7	115.7	122.1	23.5	145.6
18.	24	156.4	72.8	229.2	-	79.2	79.2	98.5	19.2	117.7
19.	25	165	21.4	186.4	-	94.2	94.2	109.2	25.7	134.9
20.	26	134.5	42.8	186.3	-	98.5	98.5	98.5	27.8	126.3
21.	27	132.8	10.7	143.5	-	113.5	113.5	130.7	32.1	132.8
22.	28	173.5	23.5	197	2.1	100.7	102.8	98.5	23.5	122
Total		2979.6	980.6	3947.2	339.4	2019.6	2484.1	2684.0	425.4	3484.9
Average		135.4	44.6	180	15.5	91.7	112.9	122	19.3	141.7

Table 2

The average individual duration of cow's various activities (in minutes) performed in the afternoon (hours 14-21)

Current Number	Registration number	In berths (minutes)			On the alley (minutes)			Food consumption (minutes)		
		Sitting position	Orthostatic position	Total	Sitting position	Movement/ Pause	Total	Forage volume	Concentrates	Total
1.	2	66.4	60	126.4	-	127.8	127.8	132.8	15	147.8
2.	3	122.1	40.7	162.8	-	115.7	115.7	95	15	110
3.	7	92.1	53.5	145.6	-	128.5	128.5	135	15	150
4.	8	100.7	19.2	119.9	-	150	150	130.7	15	145.7
5.	9	57.8	90	147.8	25.7	102.8	128.5	135	15	150
6.	12	233.5	42.8	276.3	-	55.7	55.7	83.5	15	98.5
7.	13	122.1	75	197.1	8.5	90	98.5	109.2	15	124.2
8.	14	188.5	15	203.5	-	111.4	111.4	94.2	15	109.2
9.	15	-	12.8	12.8	132.8	143.5	276.3	117.8	15	132.8
10.	16	150	51.4	201.4	-	85.7	85.7	124.2	12.8	137
11.	17	60	51.4	111.4	4.2	150	154.2	180.7	15	145.7
12.	18	220.7	21.4	242.1	-	87.8	87.8	87.8	15	102.8
13.	19	156.4	17.1	173.5	-	105	105	124.2	17.1	141.3
14.	20	201.4	25.7	227.1	-	75	75	109.2	19.2	128.4
15.	21	38.5	55.7	94.2	111.4	100.8	212.2	94.2	17.1	111.3
16.	22	135	42.8	177.8	-	100.7	100.7	126.4	15	141.4
17.	23	188.5	23.5	212	-	87.8	87.8	105	15	120
18.	24	158.5	45	203.5	-	100.7	100.7	94.2	15	109.2
19.	25	165	25.7	190.7	-	94.2	94.2	117.8	15	132.8
20.	26	143.5	51.4	194.9	-	96.4	96.4	128.5	12.8	141.3
21.	27	177.8	23.5	201.3	-	81.4	81.4	126.4	12.8	139.5
22.	28	210	25.7	235.7	-	92.1	81.4	-	15	96.4
Total		2994.8	869.3	3857.8	298.6	2383.0	2565.6	2483.5	331.8	2815.3
Average		136.1	40.3	125.3	13.5	108.3	116.8	112.8	15	127.9

Table 3

The average individual duration of cow's various activities (in minutes) performed in the night (hours 21-7)

Current Number	Registration number	In bunks (minutes)			On the alley (minutes)			Food consumption (minutes)		
		Sitting position	Orthostatic position	Total	Sitting position	Movement/ Rest	Total	Forage volume	Concentrates	Total
1.	2	370	102	472	2.1	90	92.1	34.2	-	34.2
2.	3	394.2	47.1	441.3	-	92.1	92.1	47.1	-	47.1
3.	7	355.7	132	487.7	-	72.8	72.8	47	-	47
4.	8	412.8	25.7	438.5	32.1	90	122.1	32.1	-	32.1
5.	9	233.5	141.4	374.9	38.5	96.4	134.9	100.7	-	100.7
6.	12	408.8	53.5	462.9	-	102.8	102.8	32.1	-	32.1
7.	13	182.1	32.1	214.2	186.4	135	321.4	60	-	60
8.	14	465.7	15	480.7	2.1	87.1	89.2	27.8	2.1	29.9
9.	15	2.1	6.4	8.5	450	102.8	552.8	38.5	-	38.5
10.	16	413.5	42.8	456.3	-	96.4	96.4	55.7	-	55.7
11.	17	313.5	62.1	376.6	30	115.7	145.7	70.7	-	70.7
12.	18	342.1	34.2	376.3	4.2	92.1	122.1	53.5	-	53.5
13.	19	432.8	8.5	441.3	-	79.2	79.2	70.7	-	70.7
14.	20	428.5	15	443.5	-	81.4	81.4	72.8	-	72.8
15.	21	-	17.1	17.1	360	190.7	550.7	38.5	-	38.5
16.	22	473.5	21.4	494.9	-	81.4	81.4	21.4	-	21.4
17.	23	439.2	8.5	447.7	-	94.2	94.2	53.5	2.1	57.6
18.	24	402.8	83.5	486.3	-	87.8	25.7	25.7	-	25.7
19.	25	441.4	25.7	467.1	-	98.5	98.5	27.8	4.2	27.8
20.	26	452.1	25.7	477.8	-	92.1	92.1	27.8	-	27.8
21.	27	422.1	12.8	434.9	-	85.7	85.7	23.5	-	23.5
22.	28	462.8	25.7	488.5	2.1	79.2	81.3	30	-	30
Total		7986.2	938.2	8787.4	1133.3	2143.4	3276.7	984.8	8.4	981.8
Average		363.2	42.6	399.4	51.5	97.4	148.9	44.7	0.38	44.7

Table 4

Day-time variations of cow's different activities during 24 hours

Hours	Specification	In bunks			On the alley			Food consumption		
		Sitting position	Orthostatic position	Total	Sitting position	Movement/ Pause	Total	Forage volume	Concentrates	Total
7-14	Time in hours+	2.15	0.45	3.00	0.15	1.32	1.47	2.02	0.19	2.21
	% of 7 hours	31.5	10.5	42.0	3.5	21.5	25.0	28.5	4.4	32.5
	% of 24 hours	9.3	3.1	12.4	1.0	6.3	7.3	8.4	1.3	9.7
14-21	Time in hours+	2.16	0.40	2.56	0.13	1.48	2.01	1.52	0.15	2.07
	% of 7 hours	32.1	9.4	41.5	3.1	25.5	28.6	26.4	3.5	29.9
	% of 24 hours	9.4	2.7	12.1	0.9	7.4	8.3	7.7	1.0	8.7
21-7	Time in hours+	6.03	0.42	6.45	0.51	1.37	2.28	0.44	-	0.44
	% of 7 hours	60.8	7.0	68.7	8.5	16.2	24.7	7.4	-	7.4
	% of 24 hours	25.0	2.9	27.9	3.5	6.7	10.2	3.0	-	3.0

Table 5

The average duration of cow's different activities during 24 hours

Hours	Specification	In bunks			On the alley			Food consumption		
		Sitting position	Orthostatic position	Total	Sitting position	Movement/ Pause	Total	Forage volume	Concentrates	Total
Daily total (24 h)	Time in hours and minutes	10.34	2.07	12.41	1.19	4.57	6.16	4.38	0.34	5.12
	% of 24 hours	43.7	8.8	52.5	5.5	20.5	26.0	19.2	2.3	21.5

Reposing on the alley took place notably during the night, respectively 51 minutes, in the morning 15 minutes and 13 minutes in the night.

Analyzing these day-time variations of the consumption interval results that in the first part of the day the feeding process lasted for 2 hours and 7 minutes, representing 29,9% of the possible time and during the night it lasted for only 44 minutes, that being 7,4% of the possible time.

The data we obtained chimes with those communicated by STANCIU G. and MARIA ROŞU (1980), whom observed that in heifers the feeding period was of 2 hours and 10 minutes in the morning, 2 hours and 35 minutes in the afternoon and 52 minutes during the night.

CONCLUSIONS

1. Cattle rest period in berths represented 43.7% of 24 hours, falling within normal limits, which demonstrates that they have provided adequate conditions of comfort for the animals.

2. Cows used the alley for 6 hours and16 minutes and the duration of the feeding process was of 5 hours and 12 minutes during 24 hours, falling within normal limits.

3. The most intensive use of the berth (sleeping place) occurs at night when the cows rest average 6 hours and 45 minutes, representing 68,7% of the time possible.

4. Food consumption occurred mainly in the morning and lasted 2 hours and 21 minutes and in the afternoon, when was of 2 hours and 7 minute. Food consumption during the night was reduced to 44 minutes.

RECOMMENDATIONS

1. Shelters with unbounded maintenance and individual resting berths are ensuring for cows an appropriate comfort in the conditions of increasing labor productivity, reason for extending this system of maintenance.

2. It is recommended the upgrading of old household type shelters with bound maintenance to shelters with unbound maintenance.

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