The Influence of Daily Periods on the Drinking Behavior in Romanian Black and White Primiparous Cows

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Abstract

The study was carried out on 9 Romanian Black and White cows in their first one hundred days of lactation. The aim of this study was to determine some aspect of drinking behavior of the cows in 24 hours that were divided into 3 day periods (intervals): 07:00-14:00 (I1), 14:00-21:00 (I2), 21:00-07:00 (I3). During the experiments, the following drinking behavior aspects were determined: the number of drinkings and the length of drinking periods per 24 hours, in the fibrous-succulents administration order of forages (O1) and succulents-fibrous order (O2). Data was computed by ANOVA/MANOVA. Results showed that the daily periods had an influence on the number of drinkings and drinking length, the lowest number of drinkings occurred during the night interval I3 (4.20) and the highest number together with the longest drinking period occurred in the second interval I2 (12.47 and 1062.50 seconds). In both administration order of forages (O1 and O2) there were a very significant differences ($p<0.001$) between I1 and I2 in favour of I2, between I1 and I3 in favour of I1 and between I2 and I3 in favour of I2, for number of drinkings periods and for length of drinking periods.

Keywords: drinking behavior, primiparous cows, Romanian Black and White Cows

1. Introduction

In dairy cattle, water intake is important for the lactation dairy cows, and it is influenced by many factors: breed, production of milk, the quantity of dry matter ingested the level of protein and salt from the feed, temperature.

The volume of water consumed, according to production of milk, it is estimated to 4-5 l water for each kg of milk [4].

According to level of protein and salt from the feed, water volume intake is: (l / day) = 4,4 x 10.5 x g sodium^3 / day.

The most relevant factors affecting the daily water intake of lactating cows were best combined according the following predictive equation: l/ day = 1.53 x dry matter intake (kg/d)+1.33 x milk yield (kg/d) + 0.89 x dry matter content (%) + 0.57 x minimum temperature (°C) – 0.30 x rainfall (mm/d)- 25.65 [1].

In intensive systems cattle drink more frequently, usually 5-8 times a day [2, 3].

The aim of this paper was to study the drinking behavior in primiparous Romanian Black and White cows during the cold- season.

2. Materials and methods

Investigations were carried out in The Experimental and Didactical Station of the Banat University of Agricultural Sciences and Veterinary Medicine Timişoara, during the autumn-winter season. The biological material in the study was 9 Romanian Black and White cows

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at first freshening, in their first one hundred days of lactation.

In our researches we studied the influence of daily periods of a day on the some aspects that characterized the drinking behavior*:* number of drinkings and the length of the drinking periods according to administration order of forages.

Ration was made of 3 kg concentrates, 6 kg alfalfa hay, and 20 kg grass silage (leguminous and grasses). Dry matter contents for concentrates was 88.72%, for grass silage was 24.82% and for alfalfa hay was 88.96%.

Fodders given in two orders: fibrous-succulents (O1) and succulents-fibrous (O2). The drinking behavior of cows was video recording for two consecutive days, 24 hours⁄day.

For a better interpretation the recorded material was divided in three periods for every 24 hours of surveillance: 07:00 to 14:00 (I1), 14:00 to 21:00 (I2) and 21:00 to 07:00 (I3).

Data obtained from these observations was processed and statistical interpreted with ANOVA-MANOVA.

3. Results and discussion

Averages and significance of differences for the number of water intakes and their duration between I1 (07°°-14°°), I_2 (14°°-21°°), I_3 (21°°-07°°) intervals in the fibrous-succulents (O1) order are presented in Table 1.

In *fibrous-succulents order (O1),* between I1 (07:00-14:00) and I2 (14:00-21:00) intervals, very significant differences ($p<0.001$) was observed for the number of drinking was 3.49 higher, the length of one drinking periods being 536.34 sec. higher and the average length of one drinking period being 26.21 sec. higher in I2 interval than in I1 interval.

Between I1 (07:00-14:00) and I3 (21:00-07:00) intervals, there were two very significant differences ($p<0.001$): the number of drinkings was 4.78 lower and the drinking periods length was short as 289.77 sec. during the night than in I1 interval.

Between I2 (14:00-21:00) and I3 (21:00-07:00) intervals, all differences were very significant ($p<0.001$), in favor of I2 interval: were 8.27 drinking more, duration was 826 sec. higher and the average duration was 26.63 sec. higher in I2 than in I3.

Table 2 presents averages and significance of differences for the number of water intakes and their duration between I1 (07°°-14°°), I_2 (14°°-21°°), I_3 (21°°-07°°) intervals in the succulents - fibrous (O2) order.

In *succulents-fibrous order (O2)*, between I1 (07:00-14:00) and I2 (14:00-21:00) intervals, the differences were very significant ($p<0.001$), in favor of I2 interval, where the number of drinkings was 3.22 higher, the length of periods was 456.00 sec. higher, and the average length of one drinking period being 20.01 sec. higher in I2 interval than in I1 interval.

Between I1 (07:00-14:00) and I3 (21:00-07:00) intervals, there were two very significant differences ($p<0.001$): the number of drinkings was 5.06 lower and the average length of periods was short as 7.48 sec. in I3 than in I1 interval.

Between I2 (14:00-21:00) and I3 (21:00-07:00) intervals, all differences were very significant ($p<0.001$), in favor of I2 interval: were 8.28 drinking more, duration was 811.11 sec. higher and the average duration was 27.49 sec. higher in I2 than in I3.

In Table 3 no longer take into account the order of administration of feed, making the difference between the three hours intervals. And in this case, situation is similar as if case forages administration in two orders.

Between I1 (07:00-14:00) and I2 (14:00-21:00) intervals, the differences were very significant ($p<0.001$), in favor of I2 interval, where the number of drinkings was 3.36 higher, the length of periods was 496.17 sec. higher, and the average length of one drinking period being 23.04 sec. higher in I2 interval than in I1 interval.

Between I1 (07:00-14:00) and I3 (21:00-07:00) intervals, there were two very significant differences ($p<0.001$): number of drinkings was 4.91 lower and drinkings duration was short as 4.09 sec. in I3 than in I1 interval. The average length of periods was short as 4.09 sec. in I3 than in I1 interval, the difference being significant ($p<0.05$).

Between I2 (14:00-21:00) and I3 (21:00-07:00) intervals, all differences were very significant ($p<0.001$), in favor of I2 interval: were 8.27 drinking more, duration was 818.61 sec. higher and the average duration was 27.13 sec. higher in I2 than in I3.

Table 1. Averages and significance of differences for the number of water intakes and their duration between I1 (07°°-14°°), I_2 (14°°-21°°), I_3 (21°°-07°°) intervals in the fibrous-succulents (O1) order

Specification	Interval-order			Differences and significance		
	I_1O1 (07°°-14°°)	I_2O1 (14°°-21°°)	I_3O1 (21°°-07°°)	**I_1O1-I_2O1**	**I_1O1-I_3O1**	**I_2O1-I_3O1**
Number of drinkings	8.95	12.44	4.17	**-3.49*****	**4.78*****	**8.27*****
Duration (sec.)	539.33	1075.67	249.56	**-536.34*****	**289.77*****	**826.11*****
Average length of one drinking period (sec.)	60.26	86.47	59.86	**-26.21*****	0.42^{ns}	**26.63*****

$p<0.05^{*}$, $p<0.01^{**}$, $p<0.001^{***}$

Table 2. Averages and significance of differences for the number of water intakes and their duration between I1 (07°°-14°°), I_2 (14°°-21°°), I_3 (21°°-07°°) intervals in the succulents- fibrous (O2) order

Specification	Interval-order			Differences and significance		
	I_1O2 (07°°-14°°)	I_2O2 (14°°-21°°)	I_3O2 (21°°-07°°)	**I_1O2-I_2O2**	**I_1O2-I_3O2**	**I_2O2-I_3O2**
Number of drinkings	9.28	12.50	4.22	**-3.22*****	**5.06*****	**8.28*****
Duration (sec.)	593.33	1049.33	238.22	**-456.00*****	**355.11*****	**811.11*****
Average length of one drinking period (sec.)	63.93	83.94	56.45	**-20.01*****	**7.48***	**27.49*****

$p<0.05^{*}$, $p<0.01^{**}$, $p<0.001^{***}$

Table 3. Averages and significance of differences for the number of water intakes and their duration between I1 (07°°-14°°), I_2 (14°°-21°°), I_3 (21°°-07°°) ,irrespective to order

Specification	Interval			Differences and significance		
	I_1 (07°°-14°°)	I_2 (14°°-21°°)	I_3 (21°°-07°°)	**I_1-I_2**	**I_1-I_3**	**I_2-I_3**
Number of drinkings	9.11	12.47	4.20	**-3.36*****	**4.91*****	**8.27*****
Duration (sec.)	566.33	1062.50	243.89	**-496.17*****	**322.44*****	**818.61*****
Average length of one drinking period (sec.)	62.16	85.20	58.07	**-23.04*****	**4.09***	**27.13*****

$p<0.05^{*}$, $p<0.01^{**}$, $p<0.001^{***}$

4. Conclusions

- Daily periods had an influence on the number of drinkings and drinking length, the lowest number of drinkings occurred during the night interval I3 (4.20) and the highest number together with the longest drinking period occurred in the second interval I2 (12.47 and 1062.50 seconds).
- In both administration order of forages (O1 and O2) there were a very significant differences ($p<0.001$) between I1 and I2 in favour of I2, between I1 and I3 in favour of I1 and between I2 and I3 in favour of I2, for number of drinkings periods and for length of drinking periods.

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