

CATEGORIZATION OF CROWDING BEHAVIOUR IN DAIRY COWS DURING SUMMER PERIOD

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ABSTRACT

Crowding of dairy cows housed in cubicles was not scientifically described or categorized at least in available literature. However, when it is about space allowance and density there are number of researches. The aim of this study was to categorize crowding of dairy cows and to give answer about its duration throughout the year, but also to provide milk production characteristic before and during the crowding period. Cows were housed in cubicles. For the aim of this study we calculated the differences between daily milk yields of June 1, compared to July 1, August 1, September 1 and October 1. Cows were divided by the stage of lactation on 3 groups (first: cows on II, second: cows on III and third: cows on IV lactation + higher lact. up to 7th), with 32.7±10 cows in each. In the beginning of experiment (June 1) 55% of cows were up to 100 days of lactation, 31% from 100 – 200 days and 14% >200 days. The cows were monitored with two outdoor network cameras (VIVOTEK technology, IP7330 and PZ6122) from July 2 (approximately 10 days before crowding started) to October 15 (7 days after crowding stop), total of 106 days. We take the snapshots at 14 p.m., because was found that in this period of the day, the crowding if there it is any is always present. To assess the severity of crowding behavior and its characteristics, we developed a scale based to available space per cow and usage of it. We found that in period from July 2, to October 15, 2009 were 84 days when cows were crowded. First crowding was determined at July 11. After that, crowding was almost permanently present until October 8, with shorter breaks. There was found an evident drop in daily mil production after crowding started. Crowding phenomena strongly affects cow's behaviour in one part of the day during summer period. Crowding of dairy cows could contribute to decreasing of milk production and negatively affect comfort of cows.

Key words: crowding, categorization, dairy cows, milk production, environment

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INTRODUCTION

Crowding of dairy cows housed in cubicles was not scientifically described or categorized at least in available literature. However, when it is about space allowance and density there are number of researches. Hurnik et al. (1995) defined crowding as “An unusually high spatial density of animals which may cause discomfort to some or all animals in the group, but not serious deprivation or injury“. Loose housing systems provide dairy cows with the possibility for locomotion and allow them to express a variety of natural behaviours. Furthermore, a well-established social environment may have a positive effect on the adjustment of individuals to the environment through social facilitation and learning, and it has been suggested that a stable social relationship within a herd may be beneficial in reducing the effect of generally stressful conditions (Bouissou et al., 2001; Rousing and Wemelsfelder 2006). King and Gurnell (2010) found that fly disturbance could affect Przewalski horse behaviour, and that the number of flies is related to temperature, with peaking at 22 °C. As this phenomenon in our research was occurred just in summer period, we suggested that it was involved by flies’ infestation.

The aim of this study was to categorize crowding of dairy cows and to give answer about its duration throughout the year, but also to provide milk production characteristic before and after the crowding started.

MATERIAL AND METHODS

Housing, animals and milk production

Cows in research barn were of Czech Fleckvieh breed. Cows were housed in cubicles. The research barn accommodates about 400 cows, separated in 4 batches. There were 1.05 cubicles / cow and the total area per cow (alleys + cubicles) was approximately 6.01 m². The cows were bedded on solid manure, and in alleys was slatted concrete floor. The cows were milked two times per day in an adjacent milking parlour and had free access to a TMR-ration served twice daily. Milk yield parameters were obtained from milking parlour computer system (Farmtec Technology, Czech Republic). For the aim of this study we calculated the differences between daily milk yields of June 1, compared to July 1, August 1, September 1 and October 1. Cows were divided by the stage of lactation on 3 groups (first: cows on II, second: cows on III and third: cows on IV lactation + higher lact. up to 7th), with 32.7±10 cows in each. In the beginning of experiment (June 1) 55% of cows were up to 100 days of lactation, 31% from 100 – 200 days and 14% >200 days.

Observations

The cows were monitored with two outdoor network cameras (VIVOTEK technology, IP7330 and PZ6122) from July 2 (approximately 10 days before crowding started) to October 15 (7 days after crowding stop), total of 106 days. We take the snapshots at 14 p.m., because was found that in this

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period of the day, the crowding if there it is any is always present. As a consequence of everyday farm duties, problems of power supply or other research projects aims, we make presumption in a several cases, based to average daily temperature, humidity and cow's behaviour in neighboring days (approximately 7% of total observations). Totally were assessed 245 snapshots, from both cameras.

Crowding categorization

To assess the severity of crowding behavior and its characteristics, we developed a scale based to available space per cow and usage of it. Crowding was scored into the following categories according to proportion of space occupied:

- 0** No (85 – 100% of used space)
- 1** Low (70 - 84 % of space)
- 2** Medium (55 – 69 % of space)
- 3** Strong (40 – 54 % of space)
- 4** Extreme (< 40% of space)

To assess crowding, for every day was calculated used space of total available space/cow in research batch, but also used space per cow. Used space in batch is presented in percentages, and space/cow in m².

RESULTS AND DISCUSSION*Crowding categorization*

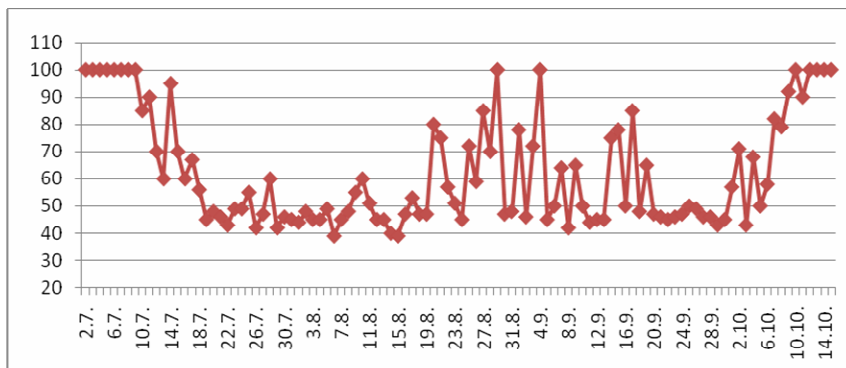
In the table 1, are presented observation results. We found that in period from July 2, to October 15, 2009 were 84 days when cows were crowded (grades 1, 2, 3 and 4; tab. 1). First crowding was determined at July 11. After that, crowding was almost permanently present until October 8, with shorter breaks.

Tab 1., Categorization of crowding behavior at 14:00 during summer peiod

Crowding scale	Used space in %	Days	% of days from 106	Space on cow in m ²
0 – no	85 – 100 %	22	20.75	5.1 – 6.01
1 – low	70 – 84%	13	12.26	4.2 – 5.09
2 – medium	55 – 69%	16	15.09	3.3 – 4.19
3 – strong	40 – 54%	53	50.0	2.4 – 3.29
4 - extreme	< 40%	2	1.88	< 2,39

We found that cows were strong and extreme crowded more than 50% of total assessed days, represented by grades. During that period, all cows used 2.4 – 3.29 m², what implies that they shortened self space allowance for about 50%. Those crowding was not induced by man nor the housing and mechanization activities. The extreme crowding was notified at 2 events at August 5 and 15, when average space per cow was lower than 2.39 m². Cows were crowded 5 – 8 hours daily, and usually between 11 a.m. until 19 p.m..

Graph 1. Used space frequency during crowding season



In the graph 1, we can notice that crowding season starts at about July 10, and almost constantly endure to the first third of October. There were slight decreases in crowding intensity by the end of August and in the beginning of September. After October 8, cows started to spread randomly throughout the research batch.

Milk production

There was found an evident drop in daily mil production after crowding started (Tab. 2). The drop in milk production was the highly expressed in younger cows, cows on II second lactation. The highest milk production drop related to June 1, was at September 1 also in cows on II lactation, and it was 31% lower than that one measured in June. If we calculate that to kg of milk, cows on II lactation at September 1 produced less 9.69 kg of milk, cows on III 4.82 kg and cows from group IV+ decreased their production for 6.38 kilos. With declining in crowding intensity, milk production started to increase. The best recovery was in cows on II lactation. Zejdová et al. (2010) found that cows on fourth lactation had higher milk yield then younger groups of cows (on I, II and III lactations), during the summer period. However crowding of cows in one part of barn could limit food access, through the altered social and life conditions in the barn (Erbez at al., 2010), what surely could affect low ranked cows and their milk productivity.

Tab. 2. Milk production differences between period before crowding start and after

Months/ Lactation	VI	VI - VII	VI - VIII	VI - IX	VI - X
II	100%	-9,5	- 17,4	-31,0	-13,3
III	100%	-1,8	-10,8	-16,2	-9,0
IV+	100%	-12,2	-12,9	-20,0	-15,2

These losses shouldn't be related just to crowding behaviour, but also to season and higher environmental temperatures. Kadzere et al. (2002) claims, that the thermal environment is major factor that can negatively affect milk production of dairy cows.

CONSLUSION

Crowding phenomena strongly affects cow's behaviour in one part of the day during summer period. Crowding of dairy cows could contribute to decreasing together with both, low environment conditions and social relations in of milk production and negatively affect comfort of cows. Cows choose to be crowded a few hours a day despite high summer temperatures. This suggests that some other disturbance had worst influence on cows. Our opinion is that this behaviour is involved by flies. Cows when are crowded probably decrease open body surface to flies and their bites. Environment with its parameters affects livestock and this is very complicated and for man almost inconceivable. The man separated animals from nature, so he need to take responsibility for them and ensure that living conditions are adequate their demands and needs (Chladek, 2004). Scale developed in this study could contribute further researches on this phenomenon.

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