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CHANGES OF SELECTED BEHAVIOR IN HIGH PRODUCING DAIRY COWS IN THE TIME OF HEAT

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Successful Artificial Insemination (AI) requires that humans detect the receptive phase of oestrus. There are various ways to detect oestrus in cattle, and behavior plays a key role in each method. The aim of this study was to detect different behaviors using time sampling method in 5-minute intervals and analyzed. Given over a period of 1 week (24 hours) in 34 dairy cows of LLFG Iden recorded these behaviors, in which 11 cows were observed in oestrus. The behavior has been differentiated as follows: feeding, resting and lying including rumination, standing on the walkways or the cubicles and standing rumination, including the duration of milking. The activities presented as percentages of the daily sum shows that the largest changes in the „standing" of the cows are observed. For standing in the time without oestrus 30 % of the day were used. In oestrus increased it to an average of 47 % of the day. The duration of the externally visible oestrus of cows averaged 944 minutes per day, with a very high variability could be determined

Keywords: heat, dairy cows, behavior

Cattle are polyoestrous, meaning they are able to breed year-round. In pasture-based dairy systems and in beef cow–calf operations, breeding is typically managed such that calves are born when grass growth begins. On barn-based dairy farms, cows calve year-round in order to produce a steady supply of milk for human consumption. The duration of the receptive phases of oestrus, where the cow will stand to be mounted, lasts approximately 12 h. Females 'on heat' will stand to be mounted by bulls, but cattle also show female-female mounting. In systems with bulls, female-female mounting can attract the attention of males. In farming systems without males (as is the case in many dairy farms, and in some beef operations), artificial insemination (AI) is used. Successful AI requires that humans detect the receptive phase of oestrus. There are various ways to detect oestrus in cattle, and behavior plays a key role in each method. Cows may be observed for female-female mounting to detect oestrus. Cows also show restless behavior during the receptive phase of oestrus. Automated measures of movement, such as a sensor on a collar or a pedometer attached to the leg, are used to record behavior and detect the increase in activity associated with oestrus.

MATERIALS AND METHODS

The aim of this study was to detect different behaviors using time sampling method in 5-minute intervals and analyzed. Given over a period of 2 week (24 hours) in 34 dairy cows of LLFG Iden recorded these behaviors, in which 11 cows were observed in oestrus. The cows of the group of fresh cows reported a maximum of 60 days post partum, while the high performance of the cows had at least 60 days post partum (Table 1). The selection of the animals were observed for the theoretical oestrus in the corresponding periods of the investigation. The cows in the Fresh group were no inseminating in the time of heat because the time for the first insemination is day 60 of lactation.

The behavior has been differentiated as follows: feeding, resting and lying including rumination, standing on the walkways or the cubicles and standing rumination, including the duration of milking. Symptoms in the cows with the number of signs of heat and the number of stiffness jump tolerations acquired. From these records were calculated the length of oestrus. Each day were taken

Table 1: Animal number and milk amount of the investigated milk cows

	Sum	Fresh group	High-capacity group
Number of animals (n)	34	18	16
Animals in oestrus (n)	11	6	5
Milk yield (kg)	-	$47^{a} \pm 8$	$42^{b} \pm 9$

milk sample from each cow to analyzed progesterone and estradiol.

RESULTS AND DISCUSSION

The feed intake (kg DM / d) and the feeding behavior of the animals were not affected by the occurrence of oestrus significantly. The cows took in the period without oestrus for an average amount of feed of 25,8 ± 2,6 kg DM per day, which decreased during the oestrus to 25,1 ± 2,3 kg DM per day. In the time without heat the cows needs 217 ± 46 minutes for the feed intake and in the time with heat can we found a significant reduction to 171 ± 32 minutes per day. The correlations between time for feed intake and the daily dry matter intake of cows was r = -0,144 (p=0,203).

However significant differences between means were in the time period of the food intake, for the rumination, for lying and standing in the group to be determined (Table 2). The mean duration of resting of cows decreased by 189 minutes (more than 3 hours each day) with a simultaneous reduction in the length of time for rumination by 88 minutes per day. Comparable results for the changes in behavior by cows in Heat can be found by ROLOFF (2013), REITH and HOY (2012) and FÜLLNER (2012). The normal behavior (without oestrus) in the investigation shows an average of 636 minutes for resting and is on a comparable level then other results (SCHNEIDER et al., 2013).

Table 2: Duration of the activities by milk cows with and without oestrus sign

	without oestrus	with oestrus
Feeding (min)	$217^{a} \pm 46$	$171^{b} \pm 32$
Resting (min)	$636^{a} \pm 107$	$447^{b} \pm 102$
Standing (min)	$430^{a} \pm 120$	$680^{b} \pm 129$
Rumination (min)	$532^{a} \pm 60$	$444^{b} \pm 78$

The activities presented as percentages of the daily sum shows that the largest changes in the „standing“ of the cows are observed (figure 1). For standing in the time without oestrus 30 % of the day was used. In oestrus, this figure increased to an average of 47 % of the day. For this, the lying by 13 % and the feeding period will be reduced by 4 % on average, while milking the animals themselves cannot be significantly affected. Between the both groups of fresh cows and high-capacity cows were found differences in the reduction or increasing of the selected behavior while the changes is in the high yielding dairy cows more pronounced. This data are not shown in the paper.

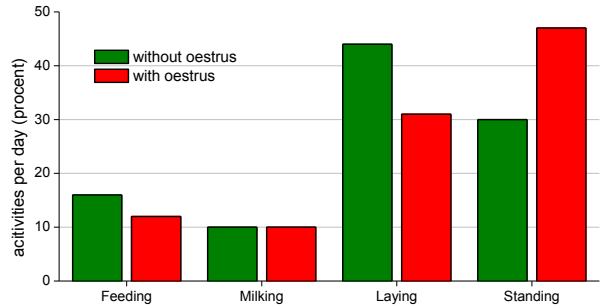

Figure 1: Changes due to the oestrus

The duration of the externally visible oestrus of cows in the investigation averaged 944 minutes per day, with a very high variability could be determined (Table 3). It was found, however, that the number of stiffness jump can vary from 4 to 40 per day. The number of tolerations reported a variation of 5 to 26 days, depending on tolerance status (Table 3). Variation in estrus found WHITE et al. (2002) in beef cattle and other parameters that influence the heat detection gives RAO et al. (2013).

Significant correlations were not found between the oestrus symptoms and the daily milk yield (Table 4). It was found, however, that a significant positive correlation between the duration of both the oestrus and the number of passed tolerations stiffness jump per day. RAO et al. (2013) found that

Table 3: Duration of oestrus, number of stiffness jump and toleration

	Mean ± s	Min - Max
Duration of oestrus (min)	944 ± 273	570 – 1.396
Number of stiffness jump (n)	22 ± 12	4 – 40
Number of toleration (n)	15 ± 7	5 – 26

Table 4: Correlations between the characteristics

	Mkg	Heat - time	Jumping - high	Tolerations
Milk (kg)	1,000	-0,162	-0,001	-0,461
Heat - time (min)		1,000	0,481	0,590*
Jumping - high (n)			1,000	0,696**
Tolerations (n)				1,000

the cows are stands immobile for mounting on her, indicates the she is definitely in heat (NEGUSSI et al., 2002; ROELOFS et al., 2005).

Progesterone (P4) was significant reduced in the time of heat from average 5.9 pg per ml to 1.1 pg per ml. Comparable results are in the investigations of RAO et al. (2013) and SAMAD et al. (2004). The content of estradiol in milk increased in the time of heat (Figure 2) and was also found by DOMENECH et al. (2011).

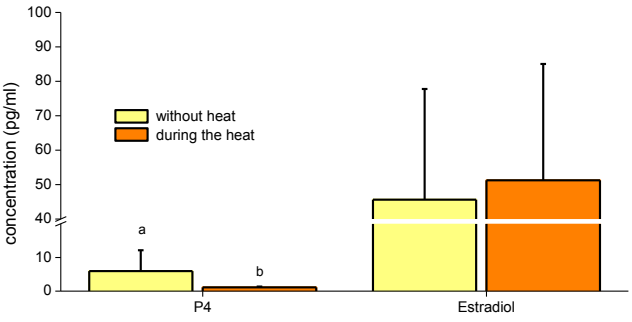

Figure 2: progesterone (P4) and estradiol in milk of cows

CONCLUSIONS

Behavior of cows in heat is significant different to the normally behavior. There were found a significant difference among the animals with extremely variations.

The behavior „standing“ had shown the highest deviation between normally behavior and the behavior in heat. But it is remarkable that we cannot predict the oestrus season.

The development of the visible oestrus signs (in the case landings bounces and tolerances) is defeated by a very high animal-individual development. Nevertheless, the milk amount day showed no significant influence.

For continuing statements the milk tests are to be analysed and check for their practical conversion to. The increase of the data material shows another point of view.

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