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Review Article

IMPORTANCE OF SEXUALLY ACTIVE GROUP (SAG) IN ESTRUS DETECTION OF DAIRY COWS

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Abstract: Estrus detection is one of the major challenges in dairy cattle management. Efficient knowledge of estrus symptoms and reliable detection methods are essential for improving the reproductive outcome in dairy herds. A stronger focus on behaviors associated with estrus has been suggested to sustain and improve heat detection. Closeness in animals coming into heat usually congregates and form small groups of three to five animals called Sexually Active Group (SAG). This tendency of estrous cows to approach and remain in the vicinity of other cows, even when other signs of estrus are not expressed is probably known among the farmers. The SAG behavior is associated with estrus and was distributed through the estrous cycle in a pattern similar to secondary estrus signs (SES) behaviors. SAG is a sign of estrous cows in general and it is also expressed by cows alone in estrus and cows not expressing mounting or standing behavior. During standing estrus (STE), the fraction of time spent in SAG increased more than the frequency of initiated SES. A sudden decrease in the fraction of time in SAG may more precisely a signal that a cow is about to end STE. High frequencies of SAG, SES, and social agonistic behaviors were indicators of STE.
Keywords: Dairy Cattle, Estrus signs, Mounting, Standing estrus.

Introduction

Estrus detection challenged by the reported shortening of the estrus period and fewer cows expressing primary estrus signs over the past 30 to 50 years (Dobson et al. 2008). A stronger focus on other behaviors related with estrus has been suggested to sustain and improve estrus detection (Kerbrat and Disenhaus 2004). Kerbrat and Disenhaus (2004) and Sveberg et al. (2011) studied social and sexual behaviors around estrus and reported that the changes in sexual behavior were the best indicators of the estrus period. All behavioral changes that can detect specific stages in estrus, that is, start and end of mounting estrus (MTE) and start and end of STE, should be identified and described, as mounting and standing behaviors are often absent in estrous cows (Orihuela 2000). Identifying signs and understanding behavioral

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patterns associated with specific stages of estrus may improve estrus detection and decisions about the most appropriate time to breed dairy cattle.

Definitions used for stages of the estrous cycle and behavior

Standing estrus (STE) also called as true estrus, STE was defined as the interval between the first and last standing events, at which the cow makes no effort to escape when mounted by other cows. This interval may be shorter than, the mounting period. ***Mounting estrus (MTE)*** also called as estrus, MTE was defined as the interval from the first to the last mount engaged in by the cow going through STE. At least two mounts within 24 hour were required. The period between the start of the MTE and the start of the STE was called as ***Prestand*** and the period between the end of the STE and the end of the MTE was called as ***poststand***. ***Pre-estrus*** was defined as the 24-hour period before MTE and ***post-estrus*** was defined as the 24-hour period after MTE (Sveberg et al. 2013).

Primary estrus sign includes cow remains stationary and the cow makes no effort to escape when mounted by other cows; ***secondary estrus signs (SES)*** includes mount, attempt to mount, anogenital sniff, and chin rest. ***Agonistic behaviors*** include body butt, push away, chase up, chase away, threat, winner, and avoid. Head lean, social lick and rump lick were regarded as other individual social behaviors. Mutual agonistic social behaviors were head butt and play rub (sum of head play and head rub) (Mulleder et al. 2003; Sveberg et al. 2011).

Sexually Active Group (SAG)

Intense female–female interactions, expressed by estrous cows staying close to each other in sexually active groups (**SAG**), were described in the literature as characteristic of cattle as a species. SAG behavior was defined by the following criteria: cow participating in a minimum of one estrus behavior per 5 minutes with its sexually active partner while staying within 3 meter (2 cow lengths) of the partner for at least 5 minutes (Kondo et al. 2003). The duration of SAG started with the first sexual behavior initiated or received (mount, attempt to mount, anogenital sniff, or chin rest) and continued until a period of 5 minutes without sexual behavior had elapsed or until the cow left the group or was left by its SAG partner. Studies identified SAG by recording groups of cows participating in mounting or standing to be mounted (Ramirez-Iglesia et al. 2006; Law et al. 2009). SAG was of very long duration compared with the short duration of the more frequently used sign of mounting. The total duration of SAG was 1.45 hour compared with the total duration of mounts of 38 Sec during MTE (Hurnik et al. 1975).

Sexually Active Group (SAG) fraction

Sveberg et al. (2013) reported that the SAG behavior was associated with estrus and was distributed through the estrous cycle in a pattern similar to SES behaviors. In contrast Law et al. (2009) reported that SAG was not only associated with cows in STE or MTE. In their study, during the pre- and post-estrus periods 4 to 24 hour before MTE and 4 to 24 hour after MTE, no SAG was observed. The increase in SAG during the last 3 hour before MTE and the strong decrease during the poststand period that indicates that the cows join the SAG in pre-estrus (Sveberg et al. 2013; Kilgour et al. 1977) before their first mount and depart the group after the last mount is received (Pennington et al. 1986).

Effect of number of cows in standing estrus on SAG

The high prevalence of SAG during STE and the absence of SAG on the day when no cows were in STE (Sveberg et al. 2013; Ramirez-Iglesia et al. 2006; Law et al. 2009). SAG was also observed during periods when a single cow was in estrus (Sveberg et al. 2013). Sveberg et al. (2013) suggested that SAG was a sign of estrous cows in general that also expressed by cow alone in estrus and cow not expressing mounting or standing behavior. In contrast Williamson et al. (1972) described that the formation of SAG during synchronized breeding, when multiple cows were in estrus at a single time. The author also reported that SAG was 3.6 times more prevalent when 2 cows were in STE simultaneously, compared with cows alone in STE.

Non-estrus cows and SAG

Cows in the luteal phase have been described as expressing sporadic mounting behavior and SES (Sveberg et al. 2011). The cows joined SAG only when one cow was alone in MTE. Cows in different phases of the estrous cycle joined the cow that was alone in estrus in her SAG, but cows close to MTE were more frequent partners. This indicates a preference for other estrous cows as SAG partners and confirms that any cow may join a cow alone in estrus (Sveberg et al. 2013).

Secondary estrus signs and SAG

The distribution of SAG resembled the distribution of SES initiated through the pre-estrus and prestand periods, but increased more distinctly, similar to the increase in receptive behavior, during STE (Sveberg et al. 2013). Kerbrat and Disenhaus 2004) reported that the estrus signs were increased in the hours immediately before and during estrus in agreement with the result of SAG, SES, and agonistic behaviors.

Agonistic behavior and SAG

Sveberg et al. (2013) reported that mutual behaviors (head butt and play rub) followed similar patterns as SAG and SES throughout the estrous cycle and these signs should be regarded as estrus signs (Sveberg et al. 2011). Pre-estrous cows being less prone to agonistic behaviors and more interested in socializing when approaching estrus. The decrease in the agonistic interactions could serve as a pre-estrus sign and warning of estrus to come (Sveberg et al. 2013).

Differences between SAG and SES

Initiated SES increased slightly more than SAG during the last six hour before MTE, but the two variables changed similarly during prestand. The increase in SAG was greater than that of SES received the last six hour before MTE. This indicates that increased SES initiated and SAG are indicators of late pre-estrus at a time when low frequencies of receptive behaviors are probably not detectable. During STE, the fraction of time spent in SAG increased more than the frequency of initiated SES but was similar to the frequency of received SES. During poststand, the fraction of time spent in SAG decreased more than the frequency of SES either initiated or received. A sudden decrease in the fraction of time in SAG may more precisely signal that a cow is about to end STE (Sveberg et al. 2013).

Conclusion

SAG is the sign of estrus of longest duration, although it is not confined only to groups of estrous cows. High frequencies of SAG, SES, and social agonistic behaviors are indicators of STE. A sudden decrease in the fraction of time in SAG may more precisely a signal that a cow is about to end STE. The use of SAG, in combination with agonistic behaviors and SES, could improve estrus detection rates in dairy cattle.

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