Oestrous activity in dairy cows

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Summary

- 46% of cow heat events lasted ≤ 8 h, highlighting the importance of using heat detection aids and 3–4 observations per day.
- Greater oestrous activity was positively associated with fertility sub-index and pregnancy outcome.

Introduction

Correctly identifying cows in heat and inseminating at the correct time is a major limitation to achieving three-week submission rates of 90% and six-week in-calf rates >75%. The Moomonitor is an activity monitor worn around the cow's neck that identifies cows in heat when their movement exceeds an activity threshold. The Flashmate Electronic Heat Detector is a stick-on device placed on the cow's rump that identifies cows in heat when the frequency of contacts exceeds a threshold. A study was undertaken to identify factors associated with oestrous activity. Moomonitor activity devices and Flashmate activity devices were placed on 530 cows in three research herds during the first four weeks of the 2018 breeding season. Cows were inseminated following detection of oestrus based on visual observation, rubbing of tail paint, or activation of the electronic activity devices.

Characterisation of oestrous activity using activity devices

The onset of activity monitor activation varied throughout the day but there were 3–4 periods when the onset of oestrous activity was concentrated (i.e. 02:00 to 03:00, 07:00 to 09:00, 11:00 to 13:00, and 21:00 to 23:00). The timing of oestrous detection differed between the devices. Whereas, 66% of Moomonitor devices were first activated between 19:00 and 07:00, only 40% of Flashmate devices were first activated during the same period.

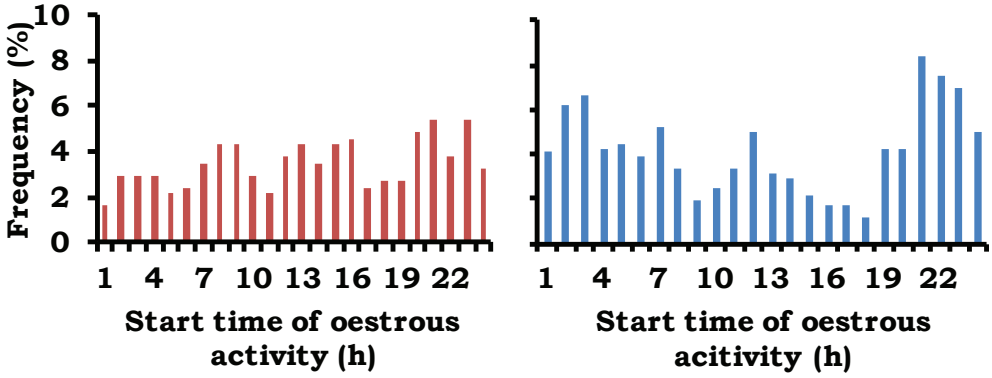

Figure 1. *Variation in detected start of oestrous activity by Flashmate device (left panel) and Moomonitor device (right panel)*

The average duration of Moomonitor-recorded oestrous activity was 17 h 40 min (range 3 h 45 min to 34 h 45 min) and the average duration from the onset of Moomonitor-recorded oestrous activity to AI was 7 h 44 min. The average duration of Flashmate recorded heat events was 8 h 15 min (range 0 h to 22 h 56 min) and the average duration from the onset of Flashmate-recorded heat events to AI was 6 h 32 min. The average number of

Flashmate-detected contacts was 3.8 per hour during a heat event, and the average total number of contacts for a heat event was 16.7. The Moomonitor and Flashmate recorded periods of oestrous activity ≤8 h in 8% and 46% of cows, respectively. The Moomonitor recorded periods of oestrous activity ≥24 h in 18% of cows.

Factor associated with oestrous activity

Factors associated with the duration of Moomonitor recorded oestrous activity included farm (2 h greater in Farm 1 compared with Farm 3), parity (~2 h shorter in parity two cows compared with parity 1, 3 and ≥4) and Fertility sub-index (1 h 48 min shorter in cows with poor Fertility sub-index compared with cows with good Fertility sub-index; Table 1).

Table 1. Factors associated with the duration of Moomonitor-recorded oestrous activity

Farm		Parity		Fert sub-index quartile	
1	18 h 42 min	1	18 h 6 min	- €14 to €41	16 h 30 min
2	17 h 36 min	2	16 h 21 min	€42 to €58	17 h 42 min
3	16 h 40 min	3	18 h 20 min	€59 to €78	18 h 18 min
		≥4	18 h 2 min	€78 to €164	18 h 18 min

Days in milk at AI was associated with the duration of Flashmate-recorded oestrous activity, whereby late-calving cows (14 to 67 d) had a shorter period of oestrous activity compared with early-calving cows (92 to 115 d). The total milk yield during the first five weeks of lactation and the pregnancy outcome following AI were associated with the total number of contacts recorded by the Flashmate device (See Table 2).

Table 2. Factors associated with the total number of contacts recorded by Flashmate device during period of oestrous activity

5 week milk yield quartile		Pregnancy outcome following AI	
290 to 723 kg	19.8 contacts	Pregnant	17.7 contacts
724 to 845 kg	15.5 contacts	Not Pregnant	13.3 contacts
846 to 987 kg	12.4 contacts		
988 to 1,469 kg	14.5 contacts		

Conclusions

Almost half of the cows displayed mounting activity for ≤8h, highlighting the importance of conducting 3–4 periods of oestrous observation daily. The positive association between the duration of oestrous activity and the fertility sub-index indicates that improving EBI fertility sub-index resulted in stronger oestrous expression, and this in turn was associated with greater pregnancy rates.