Activity Monitors for Detection of Estrus in Dairy Cows

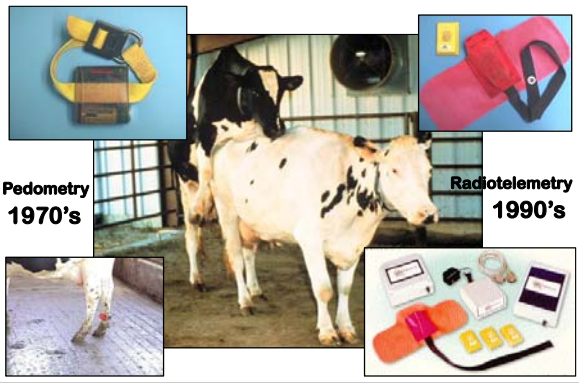
Paul M. Fricke, Ph.D.

P.D. Carvalho, J.O. Giordano, A. Valenza, G. Lopes Jr., M.C. Amundson

DEPARTMENT OF DAIRY SCIENCE
University of Wisconsin-Madison

Detection Aids

Technology

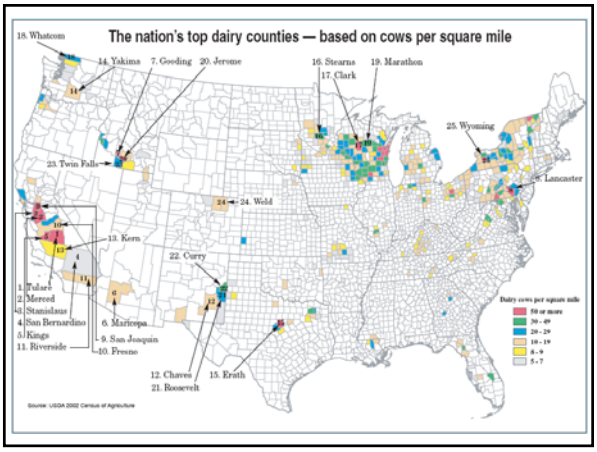


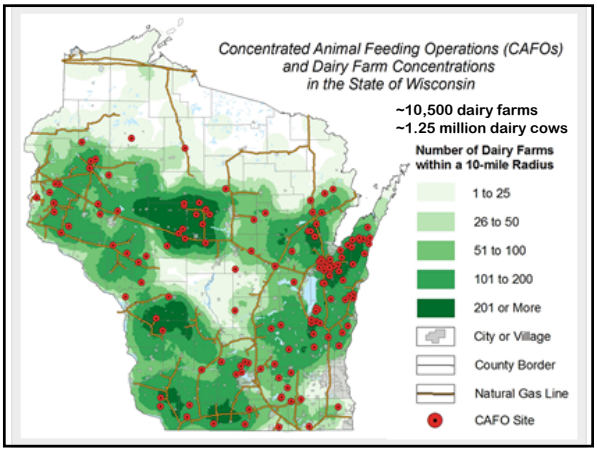
Accelerometer Systems

SCR PRECISE DAIRY FARMING Heatime

DAIRYMASTER

SELECT DETECT
advanced estrus detection technology





SCR Systems in Wisconsin 2014

Email from April 29, 2014

Hello Paul. I am a veterinarian in Fond du Lac county. I recently have had two herds purchase the SCR heat detection system.

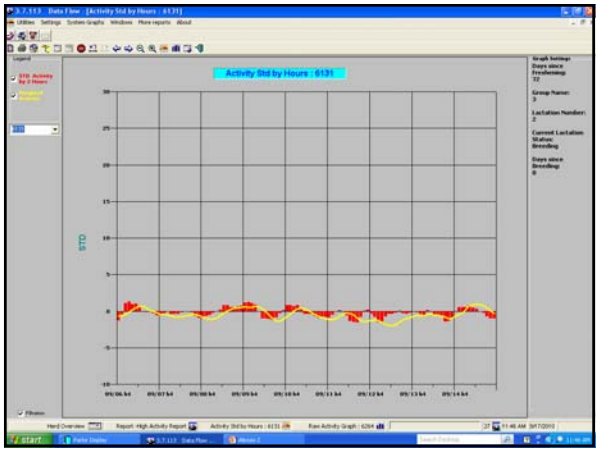
My first question is that one of the dairymen asked me when he should breed the cows. Should he breed them as soon as they show up on the list, or is it better to wait some time before breeding and, if he should wait, how many hours before he should breed them?

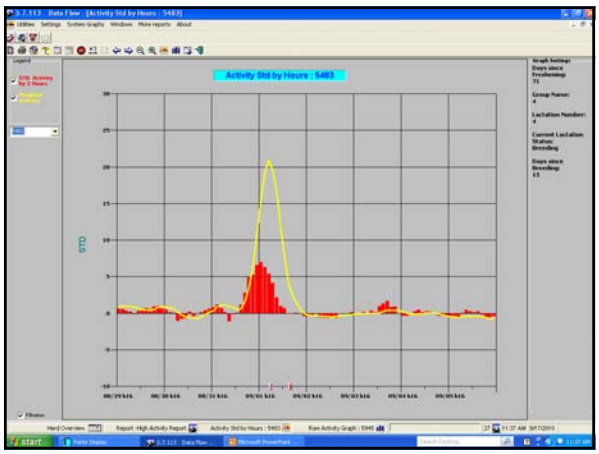
Behavioral Estrus in Dairy Cows

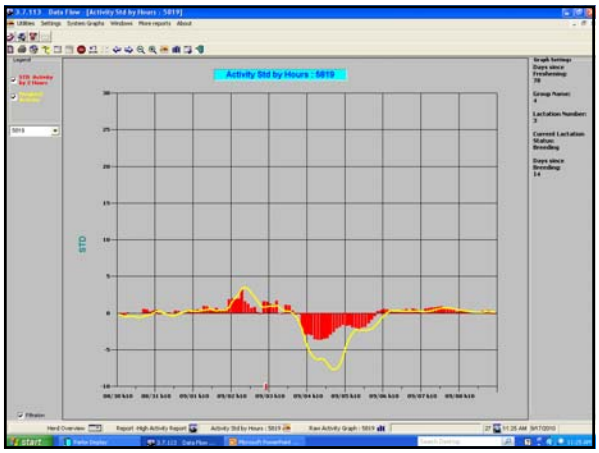
When is the optimal time to AI?

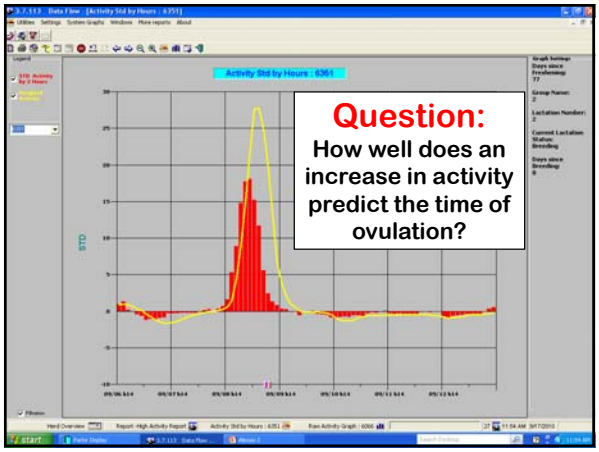
~8 to 12 hours
Before ovulation
= ~12 h
After onset of estrus


PRECISE DAIRY FARMING


Activity Std by Hours : 6131
STD


Activity Std by Hours : 5483
STD





J. Dairy Sci. 95:7115–7127
http://dx.doi.org/10.3168/jds.2012-5639

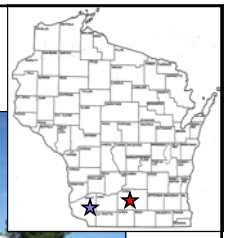
Assessment of an accelerometer system for detection of estrus and treatment with gonadotropin-releasing hormone at the time of insemination in lactating dairy cows

A. Valenza,*†‡[1] J. O. Giordano,*[1] G. Lopes Jr.,*[1] L. Vincenti,‡ M. C. Amundson,* and P. M. Fricke*[2]
*Department of Dairy Science, University of Wisconsin, Madison 53706
†Department of Animal Science, School of Agriculture, University of Turin, Turin, Italy 10095
‡Department of Animal Pathology, School of Veterinary Medicine, University of Turin, Turin, Italy 10095

DEPARTMENT OF
DAIRY SCIENCE
University of Wisconsin-Madison

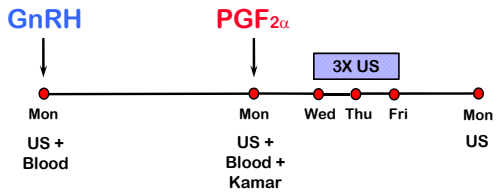
Majestic View Dairy

Lancaster, Wisconsin



Synchronization of estrus

Cows (n = 112) from 46 to 52 DIM were submitted to a G-P protocol to synchronize estrus:

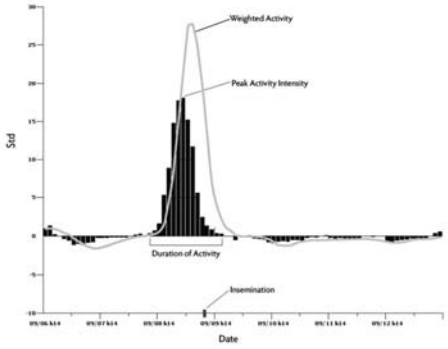


Cows that failed to synchronize (n = 23) were excluded resulting in 89 cows included in the final analysis.

Percentage of cows determined to be in estrus, and distribution of cows by estrous activity and ovulation Valenza et al., 2012; J. Dairy Sci. 95:7115-7127

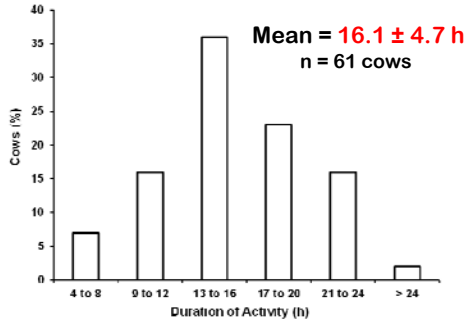
Item	Accelerometer system	Heatmount detectors
	-------- % (n/n) --------	-------- % (n/n) --------
Estrus	71 (63/89)	66 (59/89)
Ovulation	95 (60/63)	93 (55/59)
No ovulation	5 (3/63)	7 (4/59)
No Estrus	29 (26/89)	34 (30/89)
Ovulation	35 (9/26) 10%	47 (14/30)
No ovulation	65 (17/26) 20%	53 (16/30)

Characteristics of Activity



Duration of activity for cows detected in estrus within 7 d after induction of luteolysis

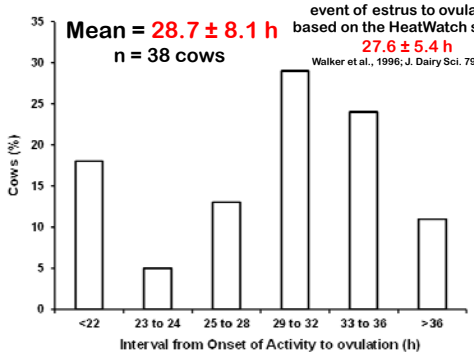
Valenza et al., 2012; J. Dairy Sci. 95:7115-7127



Interval from onset of activity to ovulation

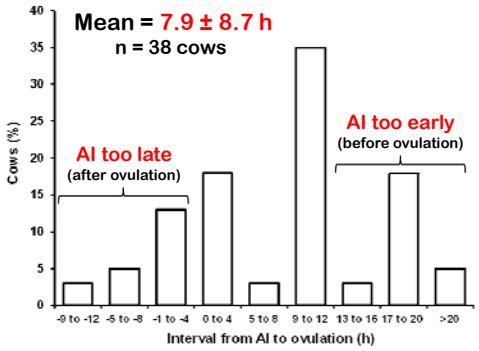
Valenza et al., 2012; J. Dairy Sci. 95:7115-7127

Interval from the first standing event of estrus to ovulation based on the HeatWatch system
27.6 ± 5.4 h
Walker et al., 1996; J. Dairy Sci. 79:1555

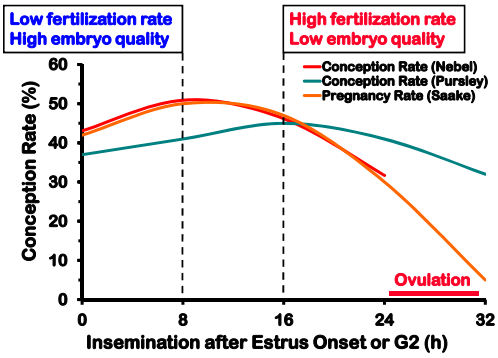


Interval from AI to ovulation

Valenza et al., 2012; J. Dairy Sci. 95:7115-7127

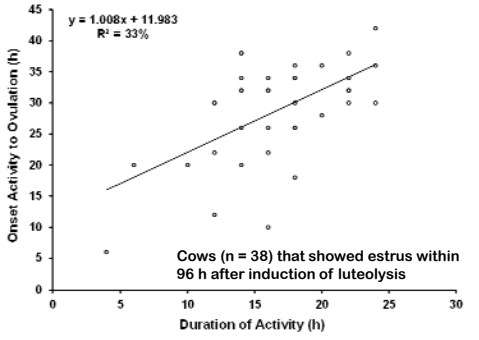


Compromise for Time of AI



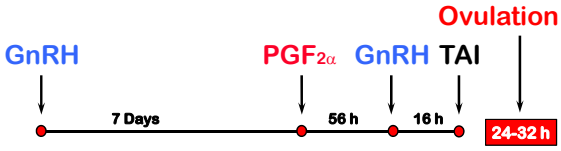
Relationship between duration of activity and the interval from onset of activity to ovulation

Valenza et al., 2012; J. Dairy Sci. 95:7115-7127

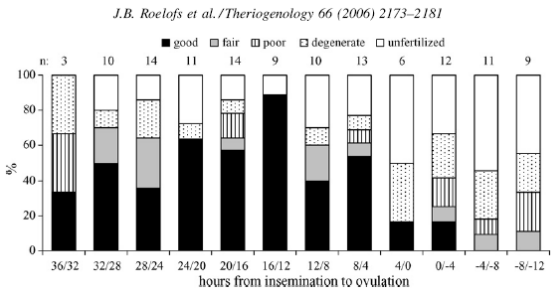


Ovsynch

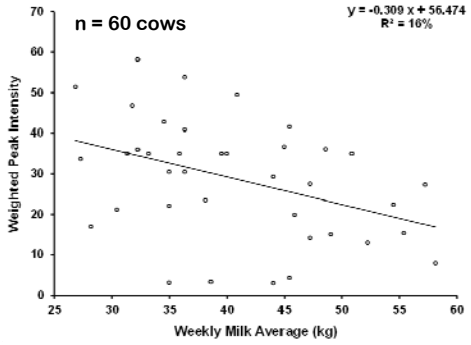
Pursley et al., 1995; Theriogenology 44:915.



Effect of AI to Ovulation Iterval on Embryo Quality

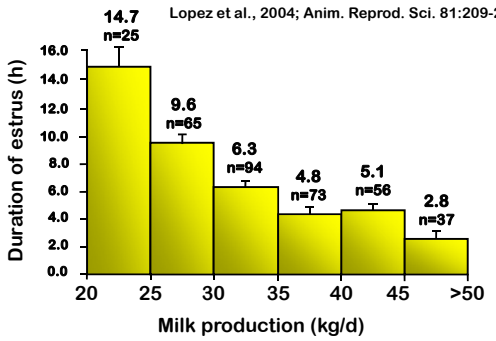


Relationship between milk production and weighted peak intensity Valenza et al., 2012



Duration of estrus in relation to milk production

Lopez et al., 2004; Anim. Reprod. Sci. 81:209-223



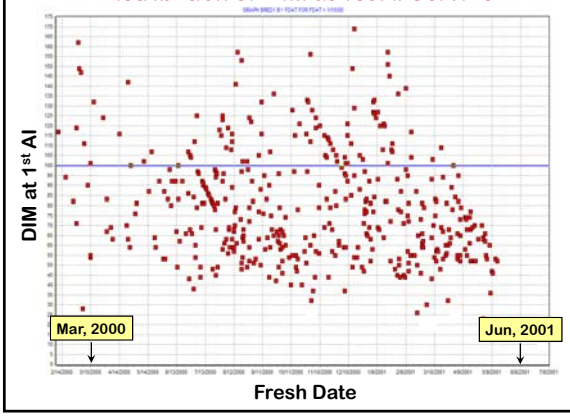
- Analysis included all single ovulations (n=350) except first postpartum ovulations
- Average milk production during the 10 days before estrus

Email from April 29, 2014

Hello Paul. I am a veterinarian in Fond du Lac county. I recently have had two herds purchase the SCR heat detection system.

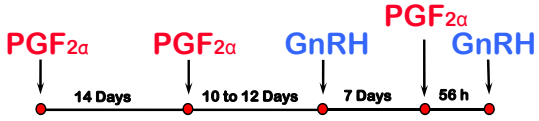
My second question is what kind of breeding protocols work best with the system? Do you suggest presynching the cows? How many DIM before you intervene with a synch program and what program would you suggest?

Distribution of DIM at 1st AI Service

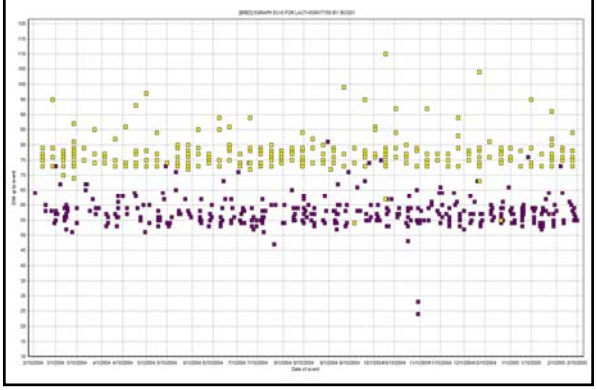


Presynch Ovsynch

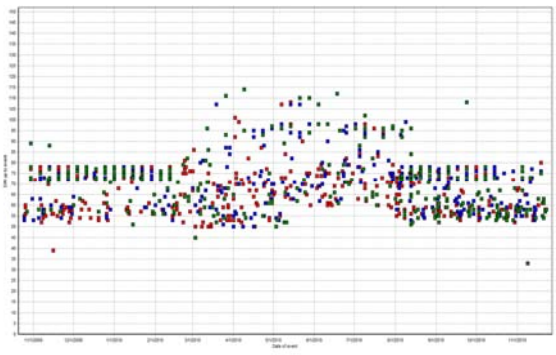
Moriera et al., 2001; J. Dairy Sci. 84:1646-1659.



Presynch-Ovsynch with AI to estrus



Whole-Farm Drug Rehab Program



J. Dairy Sci. 92:5739–5753
doi:10.3168/jds.2009-2226

Genetic parameters for anovulation and pregnancy loss in dairy cattle

R. L. Bamber,*[1] G. E. Shook,*[2] M. C. Wiltbank,* J. E. P. Santos,† and P. M. Fricke*
*Dairy Science Department, University of Wisconsin, Madison 53706
†Department of Animal Sciences, University of Florida, Gainesville 32611-0910

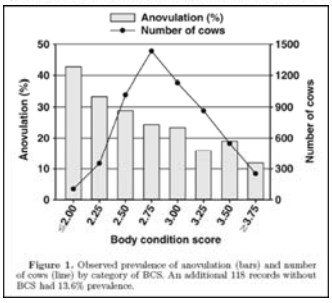


Figure 1. Observed prevalence of anovulation (bars) and number of cows (line) by category of BCS. An additional 118 records without BCS had 13.6% prevalence.

5,818 records from
13 studies in 8 herds
prevalence = 23.3%

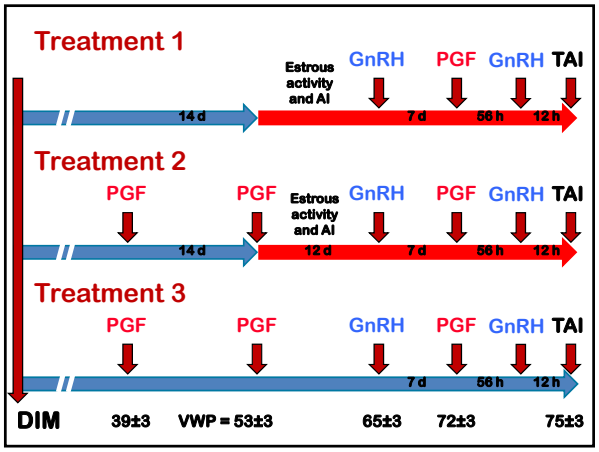
DEPARTMENT OF
DAIRY SCIENCE
University of Wisconsin-Madison

J. Dairy Sci. 97:2771–2781
http://dx.doi.org/10.3168/jds.2013-7366

Reproductive performance of lactating dairy cows managed for first service using timed artificial insemination with or without detection of estrus using an activity-monitoring system

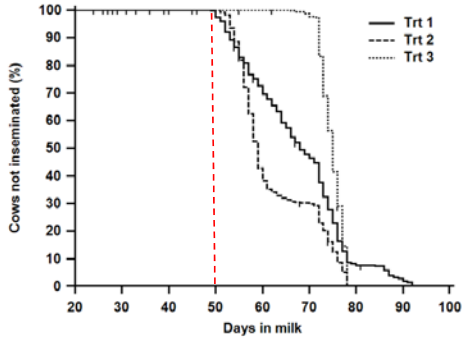
P. M. Fricke,[1] J. O. Giordano,[2] A. Valenza, G. Lopes Jr., M. C. Amundson, and P. D. Carvalho
Department of Dairy Science, University of Wisconsin, Madison 53706

DEPARTMENT OF
DAIRY SCIENCE
University of Wisconsin-Madison

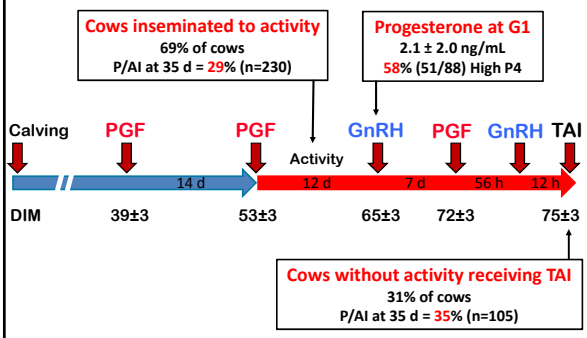


Effect of Treatment on Survival to First AI

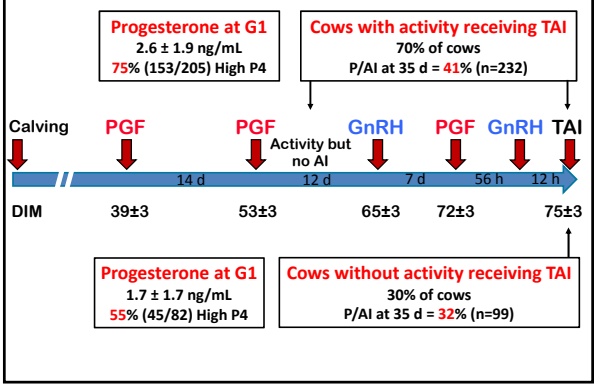
Fricke et al., 2014; J. Dairy Sci. 97:2771-2781.



Treatment 2: Presynch-Ovsynch with AI to activity



Treatment 3: Presynch/Ovsynch with 100% TAI



Effect of treatment and parity on pregnancies per AI (P/AI).

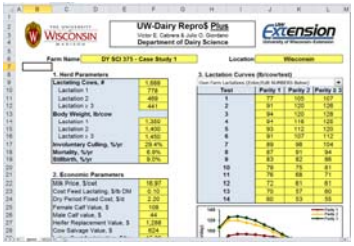
	Parity		
Treatment	Primiparous	Multiparous	P-value
1	36.5 (46/126)	27.7 (56/202)	0.10
2	32.3 (41/127)	30.4 (63/207)	0.72
3	47.3 (61/129)	32.7 (66/202)	0.01
Overall	38.7 (148/382)	30.3 (185/611)	0.01

Fricke et al., 2014; J. Dairy Sci. 97:2771-2781

J. Dairy Sci. 94:6216–6232
doi:10.3168/jds.2011-4376

An economic decision-making support system for selection of reproductive management programs on dairy farms

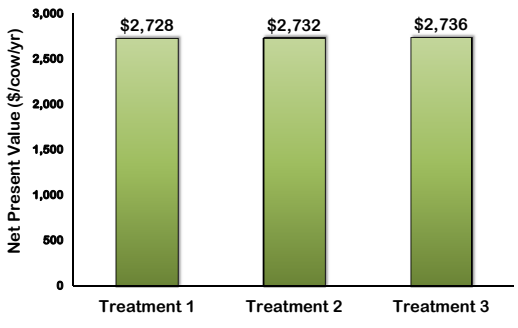
J. O. Giordano, P. M. Fricke, M. C. Wiltbank, and V. E. Cabrera[1]
Department of Dairy Science, University of Wisconsin, Madison 53706



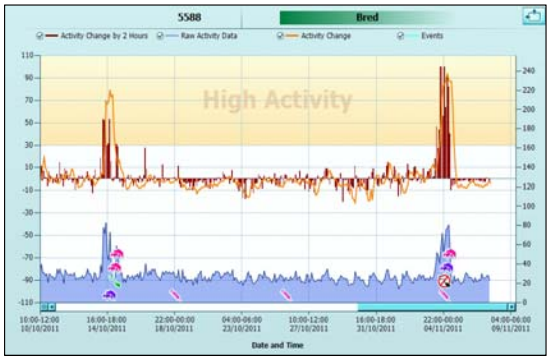
DEPARTMENT OF DAIRY SCIENCE
University of Wisconsin-Madison

Economic comparison

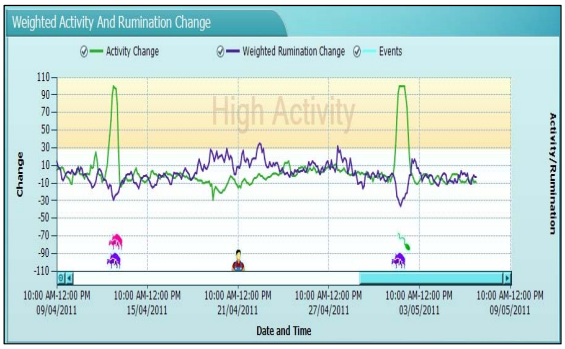
Fricke et al., 2014; J. Dairy Sci. 97:2771-2781



Activity Graph



Activity + Rumination Graph



Summary & Conclusions

- Accelerometer technology is here to stay, and this and other technologies will continue to evolve and improve moving forward.
- Anovular cows represent a significant population of cows in herds that present a problem for accelerometer systems.
- Mean time of AI relative to ovulation determined by the accelerometer system was acceptable for some cows with increased activity; however, variability among cows in the interval from onset of activity to ovulation decreases conception rate to AI.

Summary & Conclusions

- A variety of strategies using a combination of AI based on increased activity and synchronization of ovulation and TAI can be used to submit cows for first AI.
- Some level of synchronization of ovulation and TAI will improve reproductive performance in almost all dairies.
- Conception rates to TAI appear to be greater for cows receiving TAI after a Presynch-Ovsynch protocol compared to cows receiving AI after increased activity.

Thank You!