



## Precision Dairy Farming Technologies used for Estrus Detection

Presented by Lauren Mayo, University of Kentucky

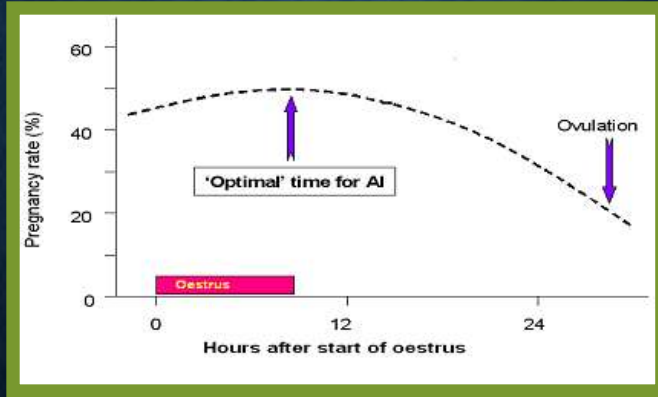


## BACKGROUND

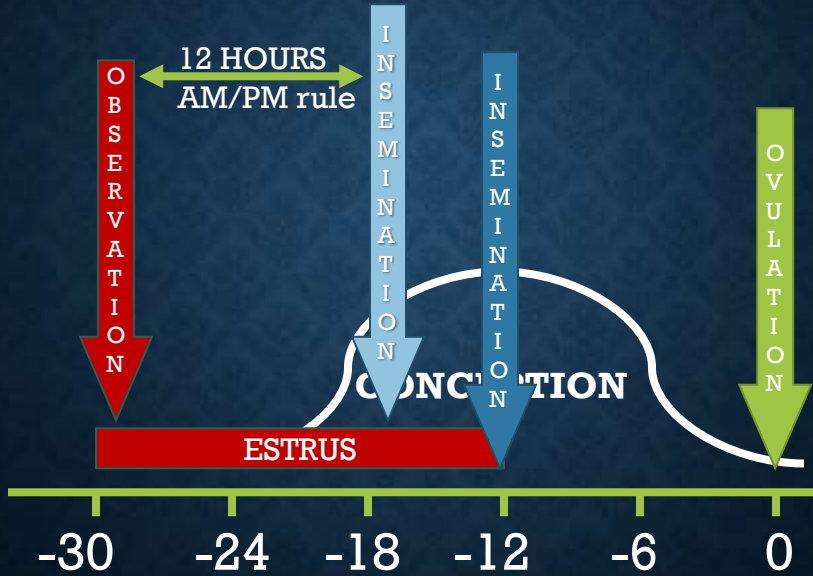
- Inefficient or inaccurate estrus detection causes large economic losses, second only to mastitis (Esslemont and Peeler, 1993)
- Dairy cows show estrus for only 7 hours with varying intensity (Dransfield et al., 1998)
- Estrus detection
  - Traditional
  - Alternatives
- Investment cost



# WHAT DID WE LEARN IN CLASS?



(National Animal Disease Information Service, 2013)



(Silvia, 2012)

## SIGNS OF ESTRUS

### Primary Signs

- Standing Mounts
  - Golden Standard for Visual Observation



### Secondary Signs

- Physical Activity
- Rumination Time
- Temperature
  - Vaginal
  - Body
  - Reticular
  - Tympanic
- Sniffing and Chin Resting

### Endocrine Signals

- Luteinizing Hormone
- Progesterone
- Estradiol



## TRADITIONAL ESTRUS DETECTION



### Common Problems

- Subjective
- Time
- Herd Size
- Facilities
- Efficiency is <40% (Silvia, 2012)

# What if you could do this...



**Heat**

**Non Cycling**

**Lost Calf**

**Cystic**

## from your computer or cell phone?



**AccuBreed™**  
(Rockway Inc., Spring Valley, WI, USA)



**Select Detect™**  
(Select Sires, Plain City, Ohio, USA and Dairymaster, Causeway, Co. Kerry, Ireland)



**Track A Cow (Animart® Inc., Beaver Dam, WI, USA and ENGS, Rosh Pina, Israel)**



**AfAct Pedometer™ Plus**  
(S.A.E. afimilk®, Kibbutz Afikim, Israel)



**HR-Tag™ (SCR Engineers Ltd., Netanya, Israel)**

## UPCOMING STUDY ADDITIONS



Wireless intravaginal  
temperature sensor

**ANEMON**  
(Anemon Animal Estrus  
Monitoring, Saint-Imier,  
Switzerland)



**HeatPhone®**  
(Medria, Châteaugiron,  
France)

## OTHER AUTOMATED ESTRUS DETECTION TOOLS



Ovalert (BouMatic™,  
Madison, WI, USA)



**Heatseeker™ II**  
(BouMatic™, Madison,  
WI, USA)



**Rescounter II+** (GEA  
Farm Technologies, Inc.,  
Naperville, IL, USA)

## OTHER AUTOMATED ESTRUS DETECTION



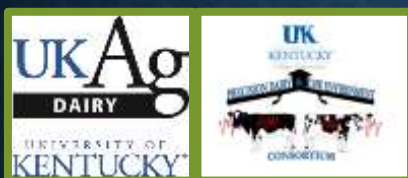
SensOor  
(AGIS Automation/  
CowManager, Harmelen,  
Netherlands)



Herd Navigator™  
(DeLaval™,  
Tumba, Sweden)



SMARTBOW (MKV  
Electronics, Weibern,  
Austria)



## INVESTMENT ANALYSIS OF AUTOMATED ESTRUS DETECTION TECHNOLOGIES

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University of Kentucky

## OBJECTIVE

- Develop a decision-making tool

- User-friendly
- Farm-specific
- Multiple technologies



- Dashboard tools provide interactive interfaces for analysis and decision support

## MODEL OUTPUTS

- Reproductive performance
  - Days open  
(French and Nebel, 2003)
- Investment analysis
  - Years to break even
  - Net present value



## CALCULATIONS NET PRESENT VALUE

- Present value of cash inflows minus present value of cash outflows
- Accounts for the time value of money
- Good investment:  
Net present value  $\geq 0$
- System net present value determined by considering the value associated with a change in days open



## CALCULATIONS OTHER CONSIDERATIONS

- Accounts for costs associated with:
  - Pre-investment estrus detection method
  - Semen usage
  - Pregnancy diagnosis
- 10 year investment period





## LIMITATIONS

- Investment analysis does not consider:
  - Additional benefits of technologies
  - Changes in heifer inventory



Tabs organize information

Description and instructions for user

The screenshot shows a web application with a navigation bar containing tabs: Introduction, Farm Informati..., Repro Managem..., Technology 1, Technology 2, Technology 3, and Results. The main content area is titled "Investment Analysis of Heat Detection Technologies".

The text in the main content area reads:

Heat detection is a major concern on many dairies today. , technologies used to monitor activity and other cow parameters have been to manage heat detection.

This net present value tool can be used to compare up to 3 different heat detection technologies in order to determine which might work best economically on a specific dairy.

To use, change herd and technology information in the input tabs and then review the outcome in the "Results" and "Before vs. After" tabs.

Developed by Karmella Dolecheck and Jeffrey Bewley  
Animal & Food Sciences Department  
University of Kentucky College of Agriculture

On the right side of the page, there is a photograph of cows in a barn and a logo for the University of Kentucky featuring a horse and the text "UK KENTUCKY COLLEGE OF AGRICULTURE" and "CONSERVATION".

Introduction | Farm Information | **Repro Management** | Technology 1 | Technology 2 | Technology 3 | Results

Putting your mouse over any of these buttons will give you a description of what information is being displayed.

Hover buttons explain inputs and results

Herd Size	170	Cull Milk Yield (lbs/d)	37.6
Milk Yield (lbs/d)	76.5	Days in Milk Do Not Breed	35
Milk Price (\$/cwt)	19.52	Voluntary Waiting Period	300
Feed Cost (\$/lb DM)	0.09	Detection Rate	58.7
Replacement Cost	2280.67	Current 1st Service Conception Rate	44.4
Cull Cow Value (\$/lb)	0.75		

Inputs adjustable in multiple ways

Introduction | Farm Information | **Repro Management** | **Technology 1** | Technology 2 | Technology 3 | Results

### Pedometer Plus

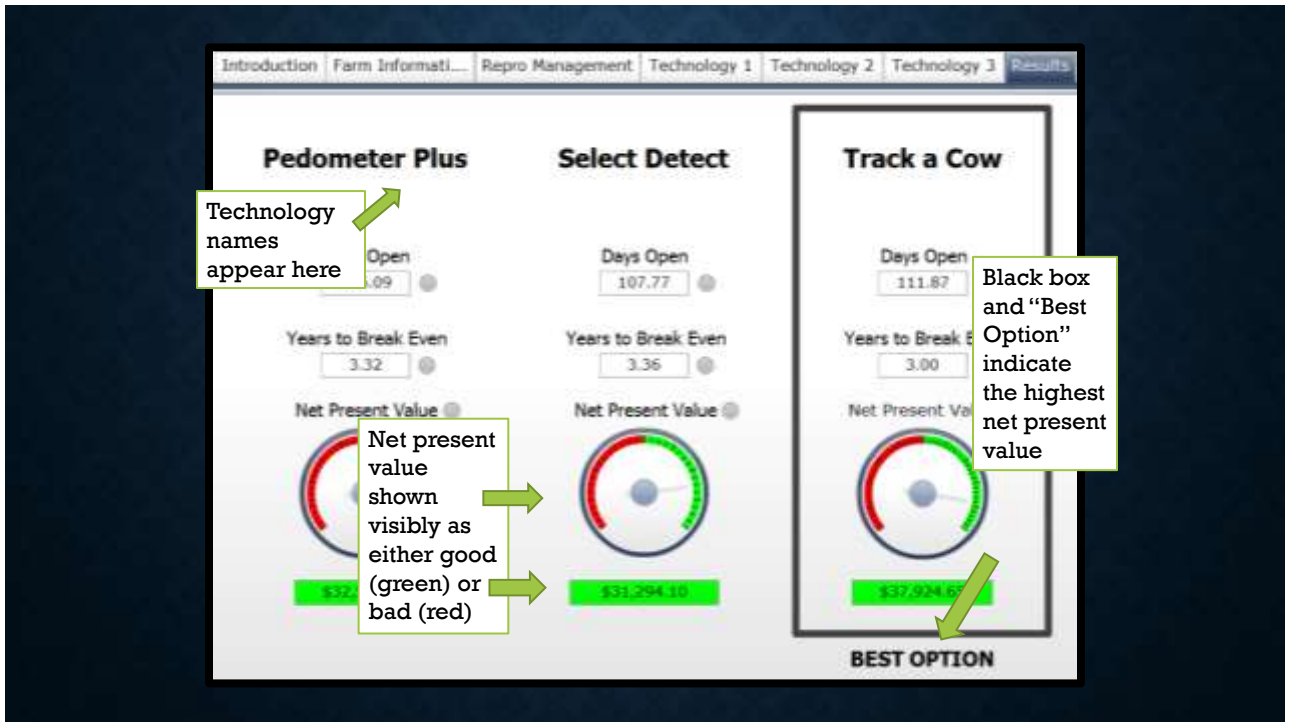
Technology Name: Pedometer Plus

Compare up to 3 different technologies

Number of Cows to Have Tags	170	Discount	8
HDR	70	Change in CR	0
Start-up Cost	12000	% Units to Replace/Year	5
Unit Cost	70	Maintenance Cost/Year	340

Total Initial Cost: [Gauge]

Yearly Upkeep Costs: [Gauge]



## CONCLUSIONS

- Dairy producers considering purchasing an automated estrus detection technology system can use this model as a decision support tool
- The investment analysis results produced by the model depend on accurate information being provided by both the user and technology manufacturers



[www2.ca.uky.edu/afsdairy/HeatDetectionTechnologies](http://www2.ca.uky.edu/afsdairy/HeatDetectionTechnologies)

# QUESTIONS?



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