

# Automated heat detection

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**New reproductive technologies  
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# Introduction

- Importance of high heat detection rates
- Signs of heat
- Major technological developments
- Considerations to the adoption of this technology

# Why are fertile cows critical to milk production?



- 3 week submission rate
  - Proportion of herd bred in 3 weeks
  - Key driver of herd fertility

**Target: 90%**

**Actual: 71%**

Each missed heat costs  
**€250** per cow

# What signs of heat can we monitor?



- **Visual:**

- Standing to be mounted by herd mates

- **Physiological:**

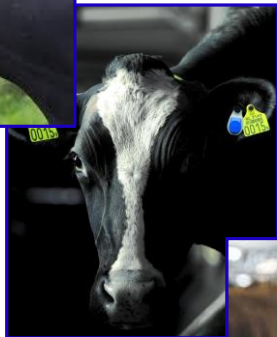
- Hormones ↓ progesterone, ↑ oestradiol
- Physical activity ↑
- Rumination, feed intake ↓

# What heat detection aids are available?

1970s Tail paint



2000s Accelerometers



2010s Touch sensor



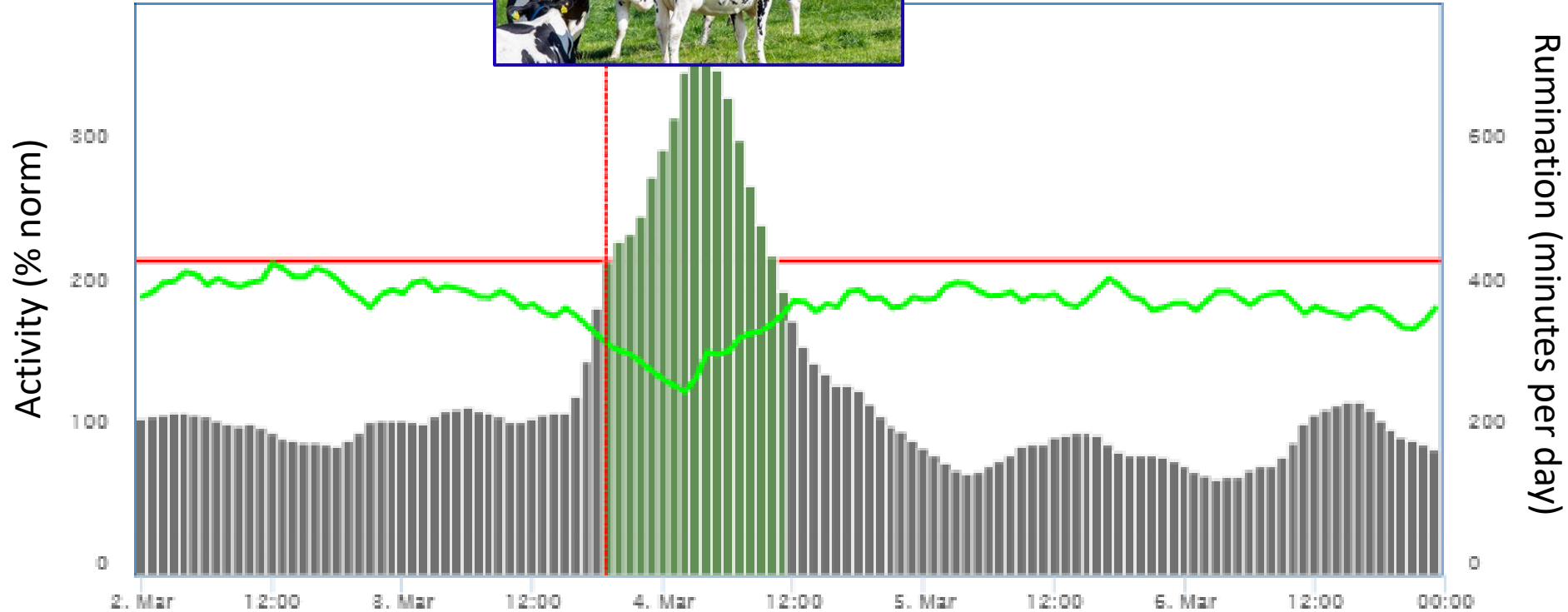
2010s  
Milk progesterone



# How do accelerometers work?



— Ruminating  
— Activity



# How accurately can accelerometers detect heat?

- Progesterone measured in the milk
  - If the animal is in heat
    - » Progesterone levels in the milk are LOW
  - If the animal is not in heat
    - » Progesterone levels in the milk are HIGH

	Progesterone LOW	Progesterone HIGH
Heat alert	True positive	False positive

**90%**

**10%**

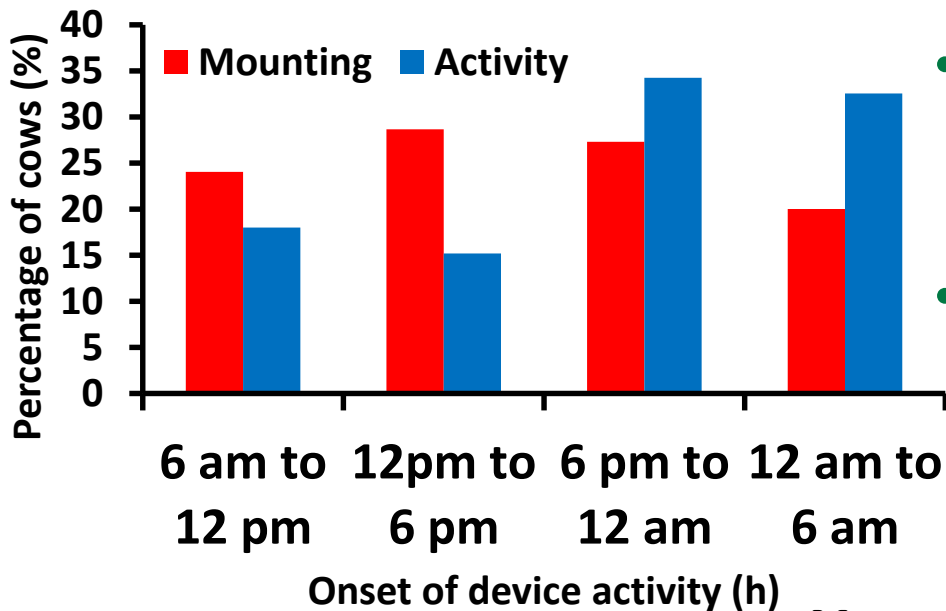


# When and for how long are cows in heat?



- **Mounting behaviour**

- 9 hours
- 55% ≤ 8 hours



- **Activity behaviour**

- 17 hours

- **Other important findings**

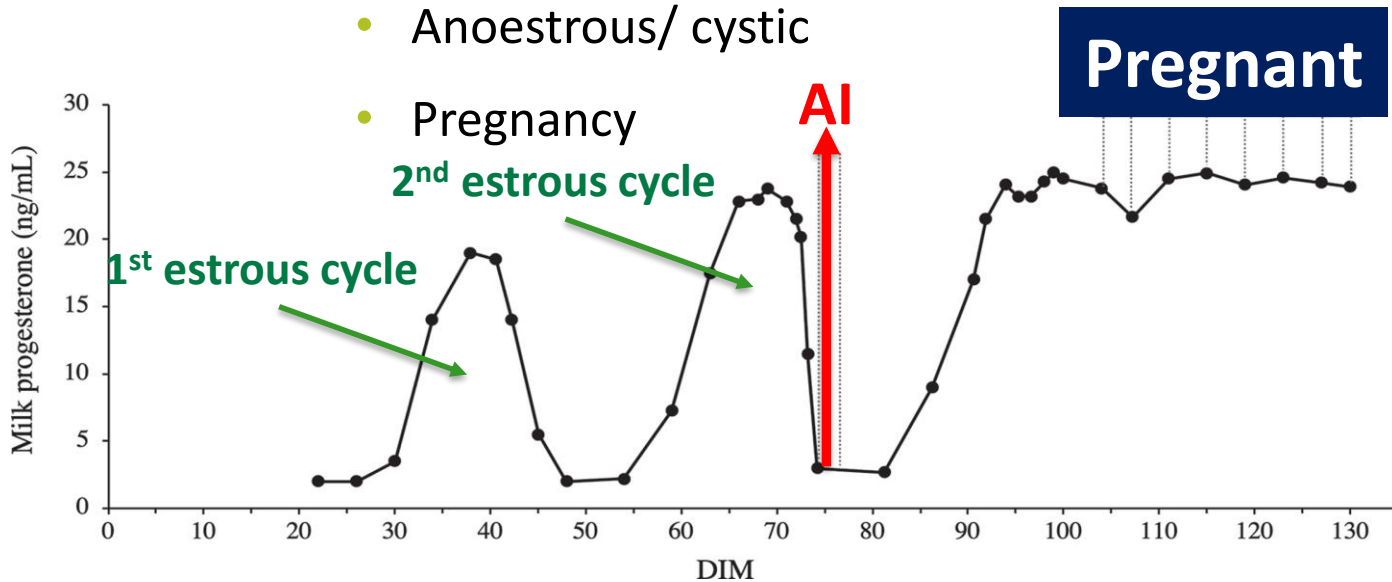
- Late calvers mounted less
- Less fertile when AI early



# How does In-line milk progesterone analysis work?



- Individual and automated milk sampling
- Frequent progesterone analysis
  - Oestrous cycles
  - Anoestrous/ cystic
  - Pregnancy



Bruinjé and Ambrose (2019) J. Dairy Sci.

# Considerations for automated heat detection

# Conclusions

**Thank you for your attention!**