Evaluating progesterone profiles to improve automated oestrus detection

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The importance of oestrus detection

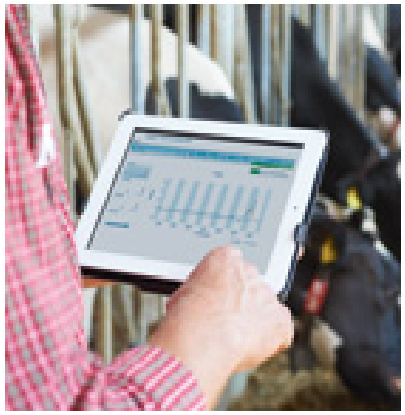
- First insemination between 40-70 DIM is optimal*
  - oestrus detection is a key driver

- Challenges of detection
  - Time consuming
  - Error prone
  - Increased herd sizes

*Inchaisri *et al.*, 2012

Adoption automated oestrus detection

- 20% of Dutch dairy farms have automated systems*



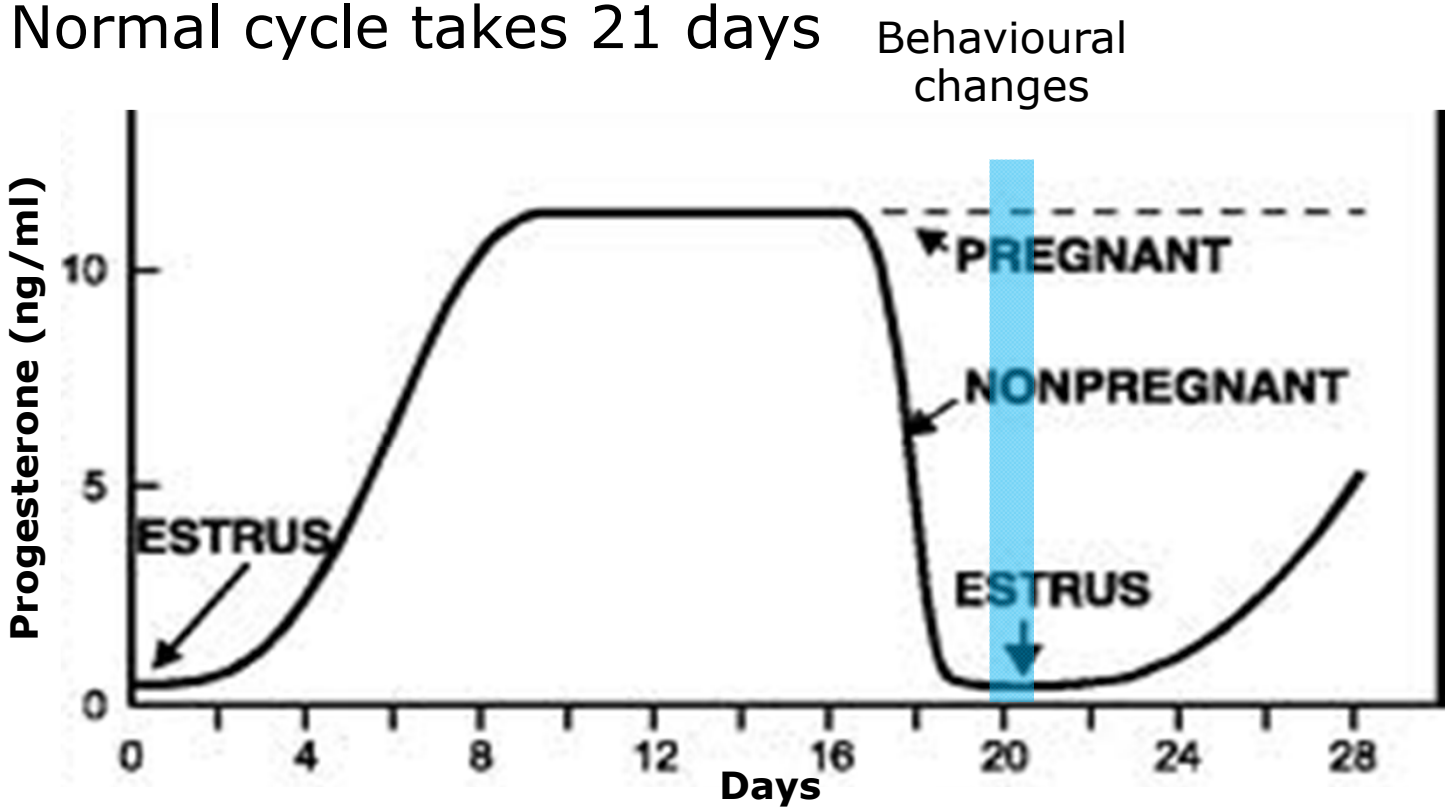
- Appears to be a success story when it all works
  - Sensitivities 80-90% with specificities > 90%**
  - No technical / human errors

*Huijps, 2014, CRV, personal communication

**Rutten *et al.*, 2013

Progesterone and oestrus

- Normal cycle takes 21 days



- Does progesterone affect oestrus behaviour
    - Affect automated oestrus detection?

Aims of this study: gain insight in

- Performance of oestrus detection in the field
- Timing of oestrus alerts
- Use of alerts by farmers
- Effect of combining oestrus alerts on performance
- Effect of progesterone profiles on oestrus detection

Materials and Methods

- 31 cows, 40-70 DIM, not inseminated

	Farm A (450)	Farm B (AMS; 250)
Milk samples for 24 days	Morning milkings Residual milk 12 cows	First milkings Whole milk 19 cows

Progesterone profiles from milk samples

- Commercial on-farm kit
- Analyses 3x a week
    - Including forgone 1 / 2 days
- Profiles created
- Visual assessment of heat
    - According to manual
    - Gold standard

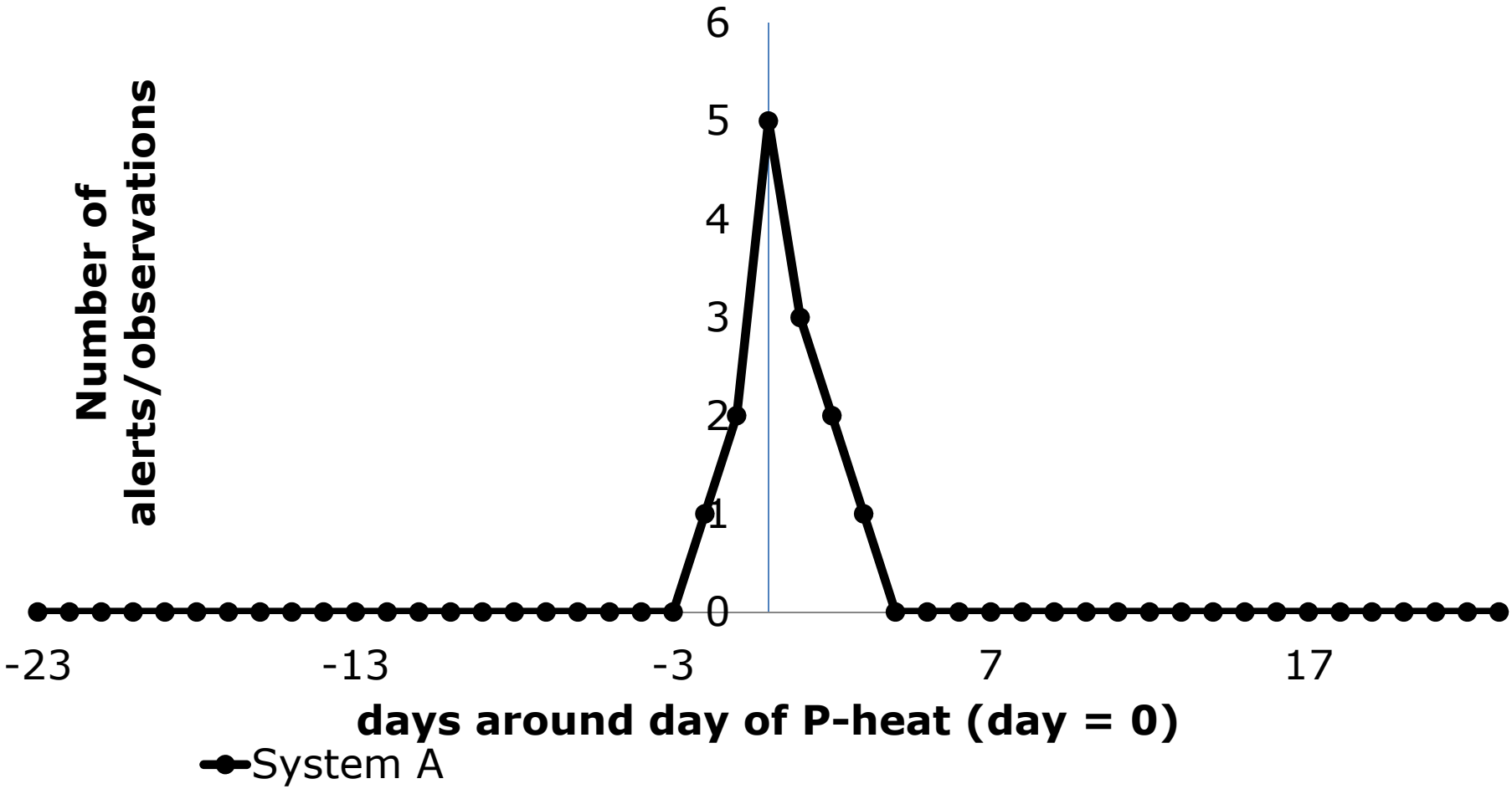
Hormonost-Microlab Farmertest, Biolab, Unterschleissheim, Germany

Results: heats, observations and alerts

- Based on Progesterone (P): 30 heats from 30 cows

	Farm Staff	System		
		A	B	C
Heat observed/alerts generated	15	14	12	31
Heat alerts on day with P-heat	3		9	
Heat alerts on day with P-heat +/- 1 day	9		17	
False positive observations / alerts	6	4	5	18

Results: timing alerts and observations



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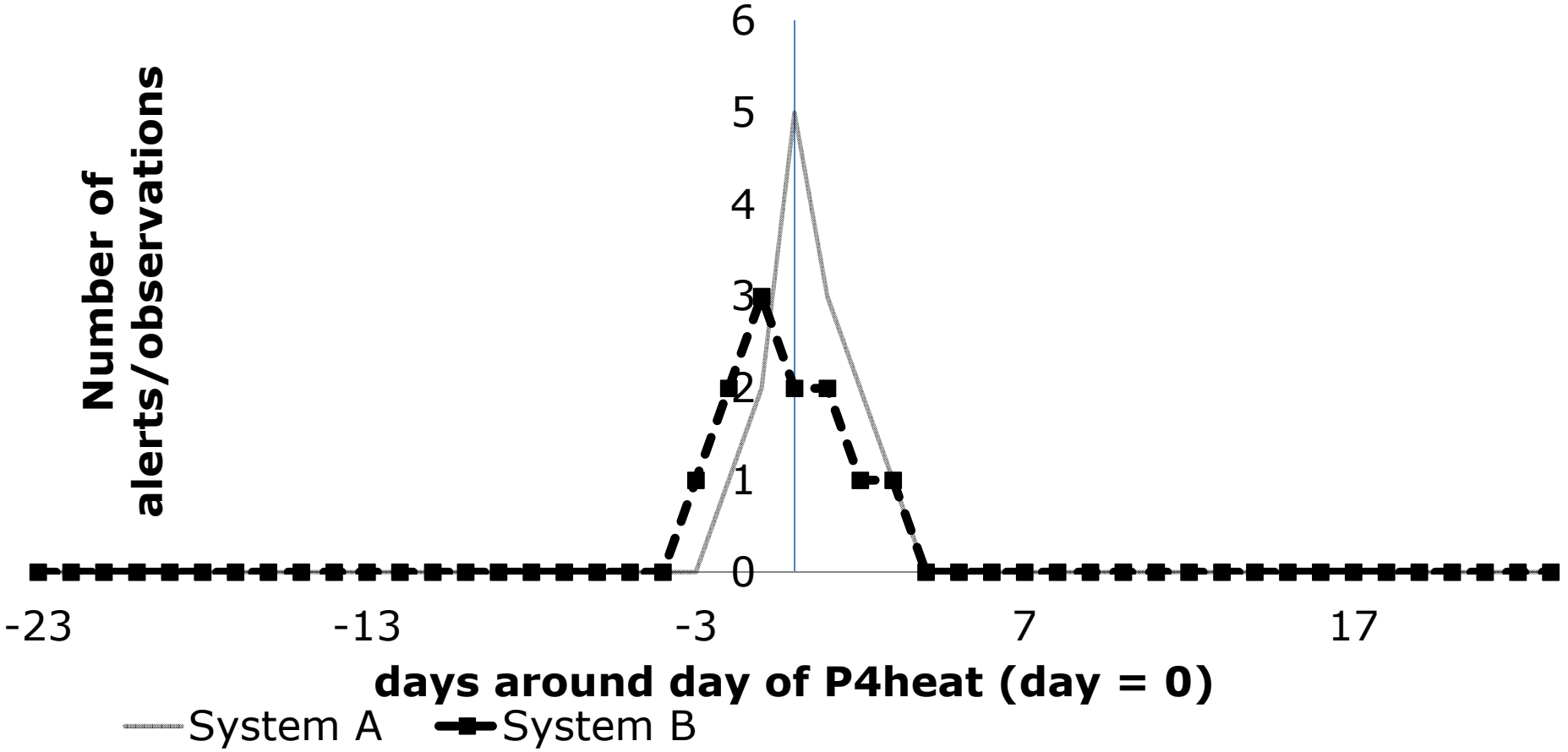

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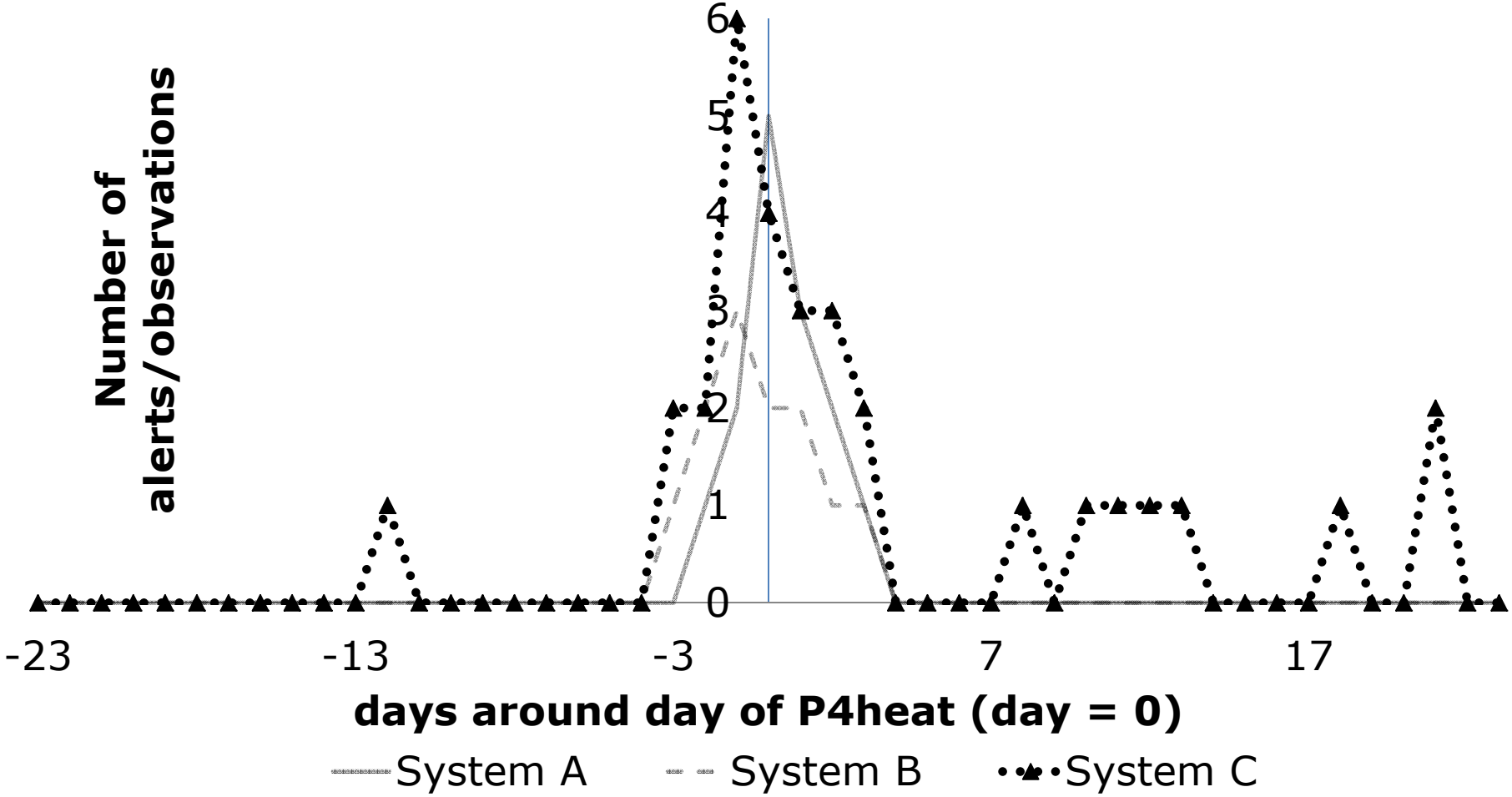

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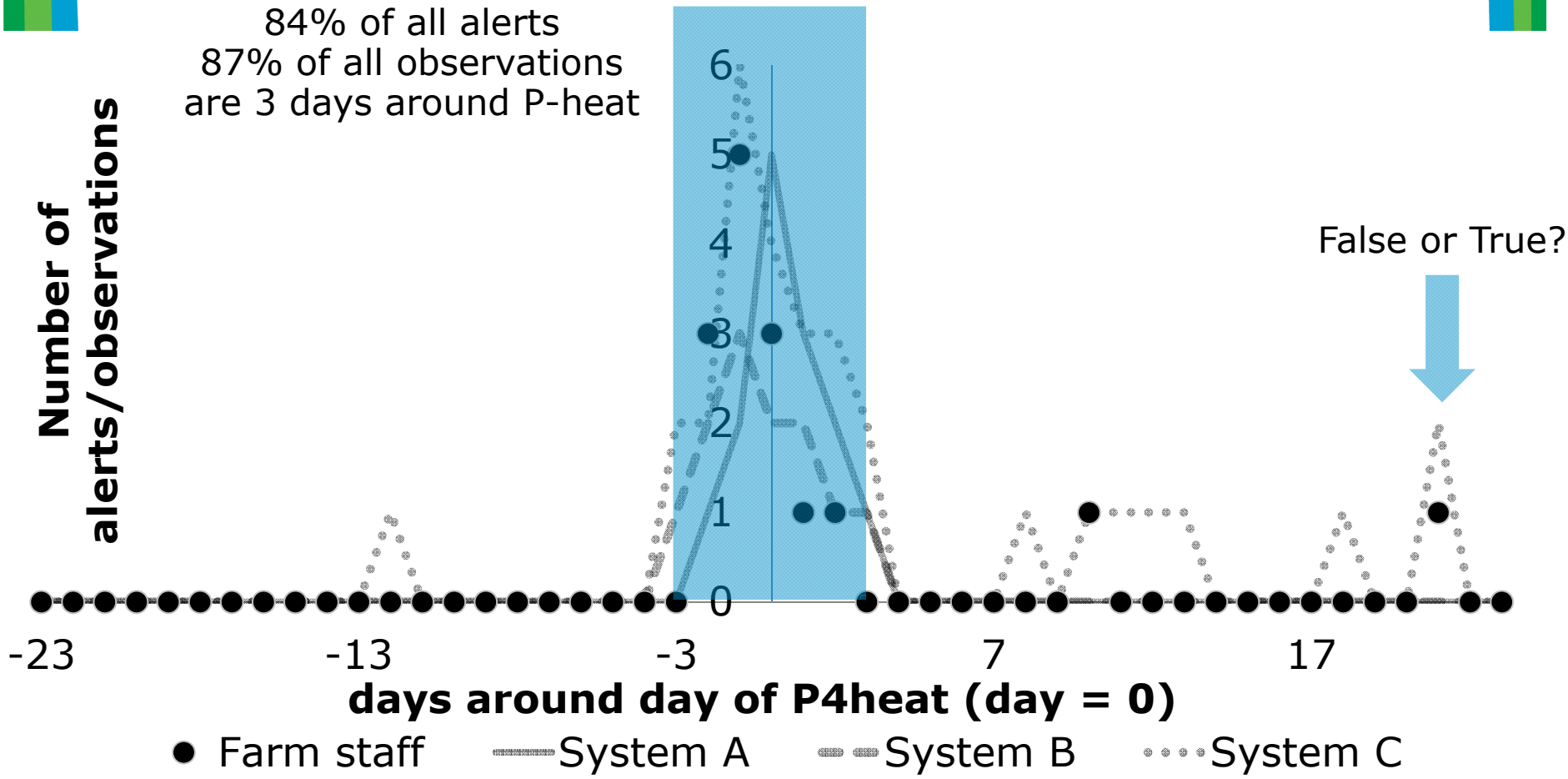


Results: combining detection systems

Using a 1 day time window around a P-heat

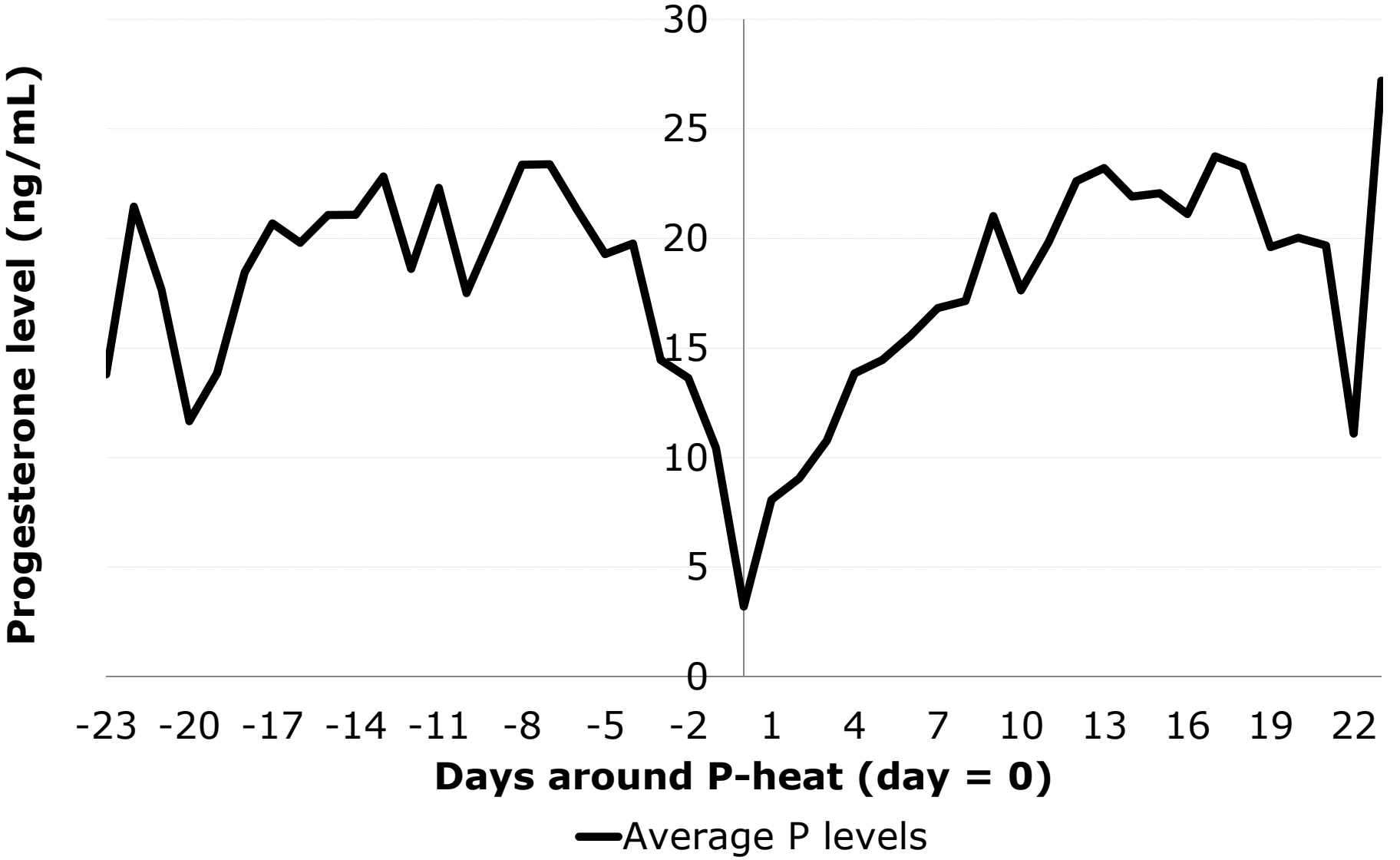
Farm A

- System A: 5 out of 12 P-heats (42%)
- System B: 3 out of 12 P-heats (25%)
- One P-heat additionally detected

Farm B

- System B: 2 out of 18 P-heats (11%)
- System C: 9 out of 18 P-heats (50%)
- No additionally P-heat detected

Results: effect of progesterone profiles



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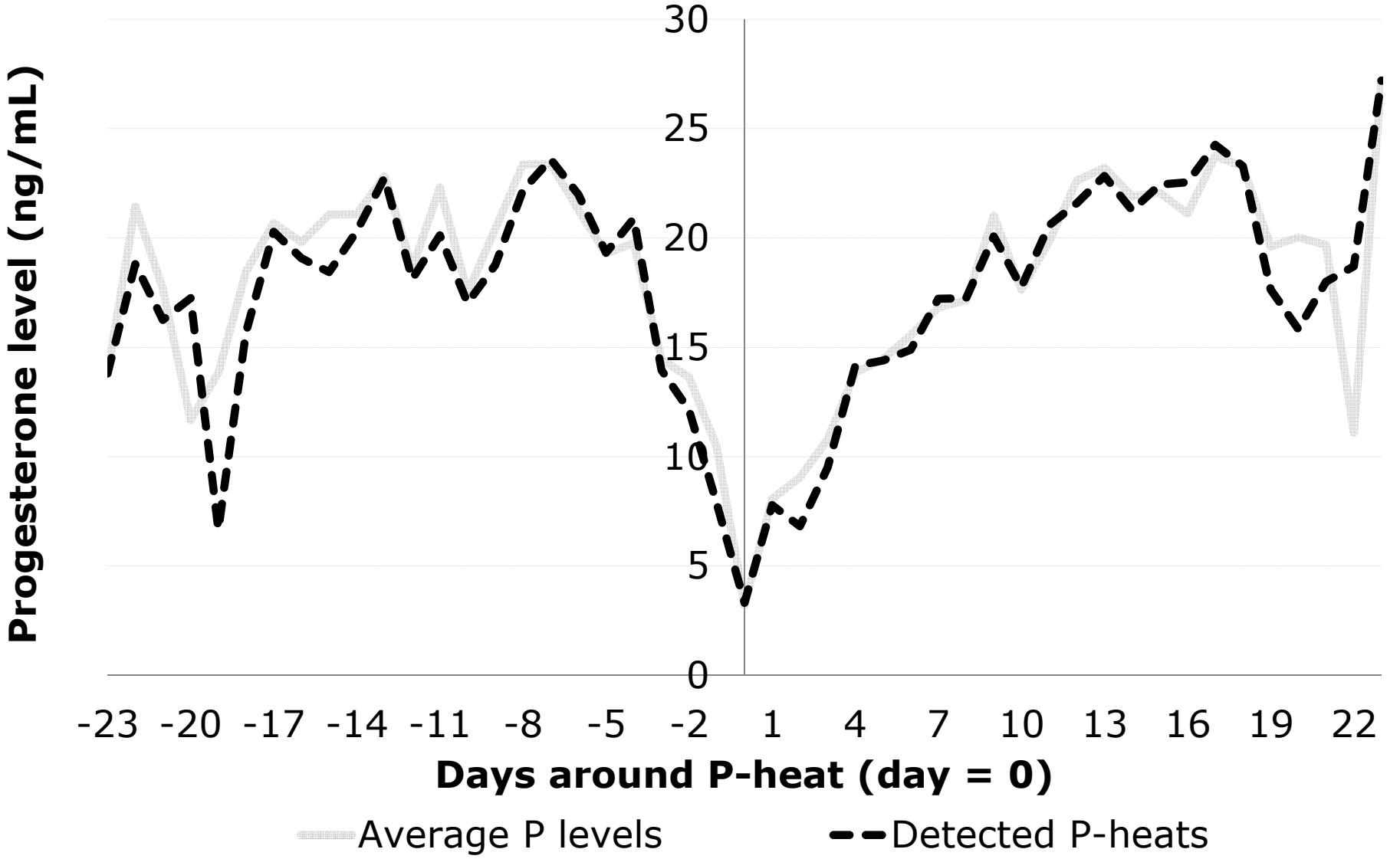

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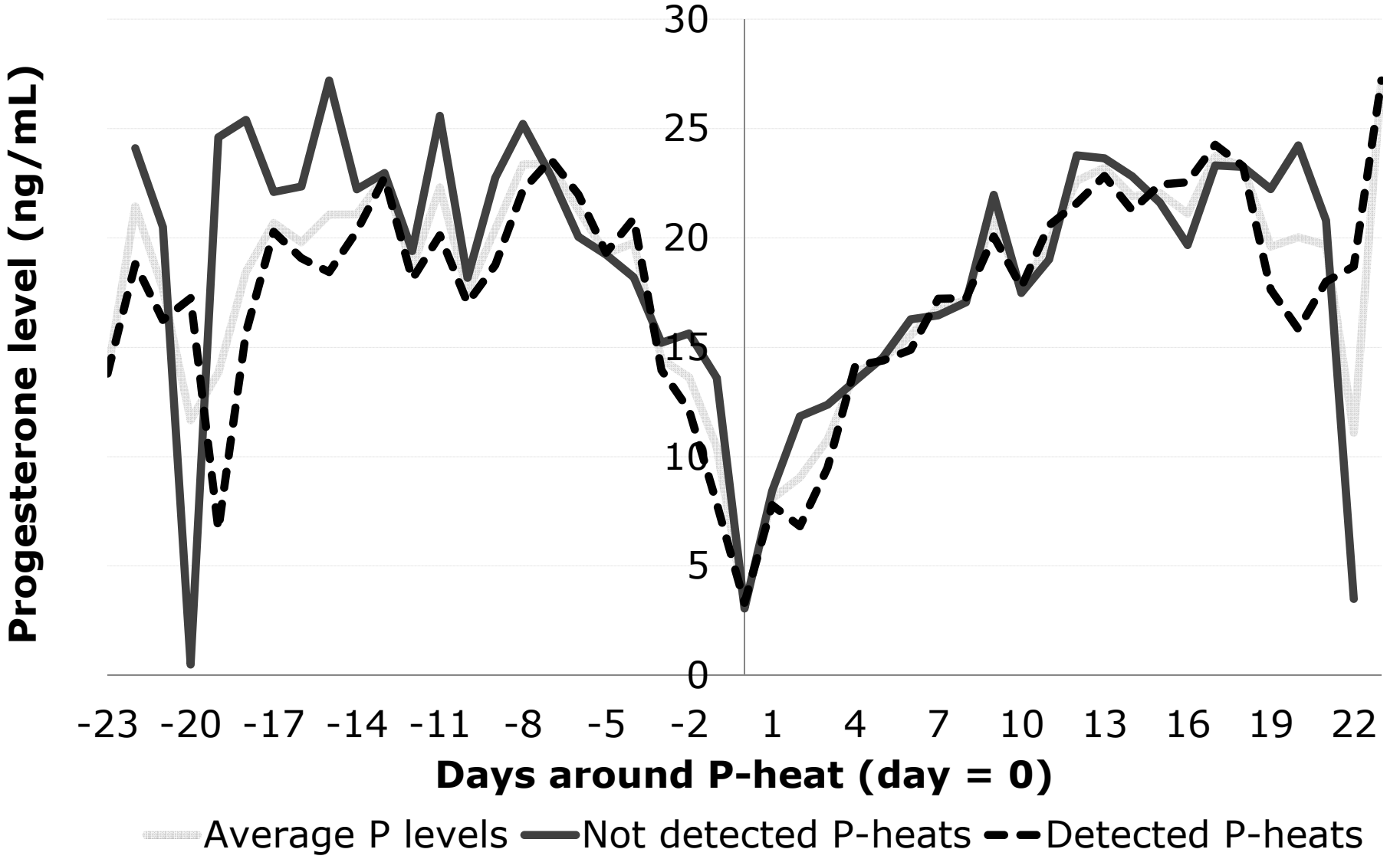

Conclusions

- All 3 systems performed less than expected
  - Expected: 80%*; Found: 25-50%

- Farm staff missed 48% of true positive alerts
  - Not checked alerts / behavioural changes already passed

- Most alerts and observations around 3 days of P-heat

- Progesterone profiles did not differ between (non)detected cows

* Rutten *et al.*, 2012; Kamphuis *et al.*, 2012

Take Home Message

- Farmers miss correctly identified oestrus's

- Progesterone does not affect oestrus behaviour

- Confirm with larger numbers
    - Successful inseminations as gold standard

Acknowledgements

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    - Farmers
    - Farm staff
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SmartDairyFarming