

Association between postpartum health and subsequent detection of spontaneous estrus by activity monitors in dairy cows



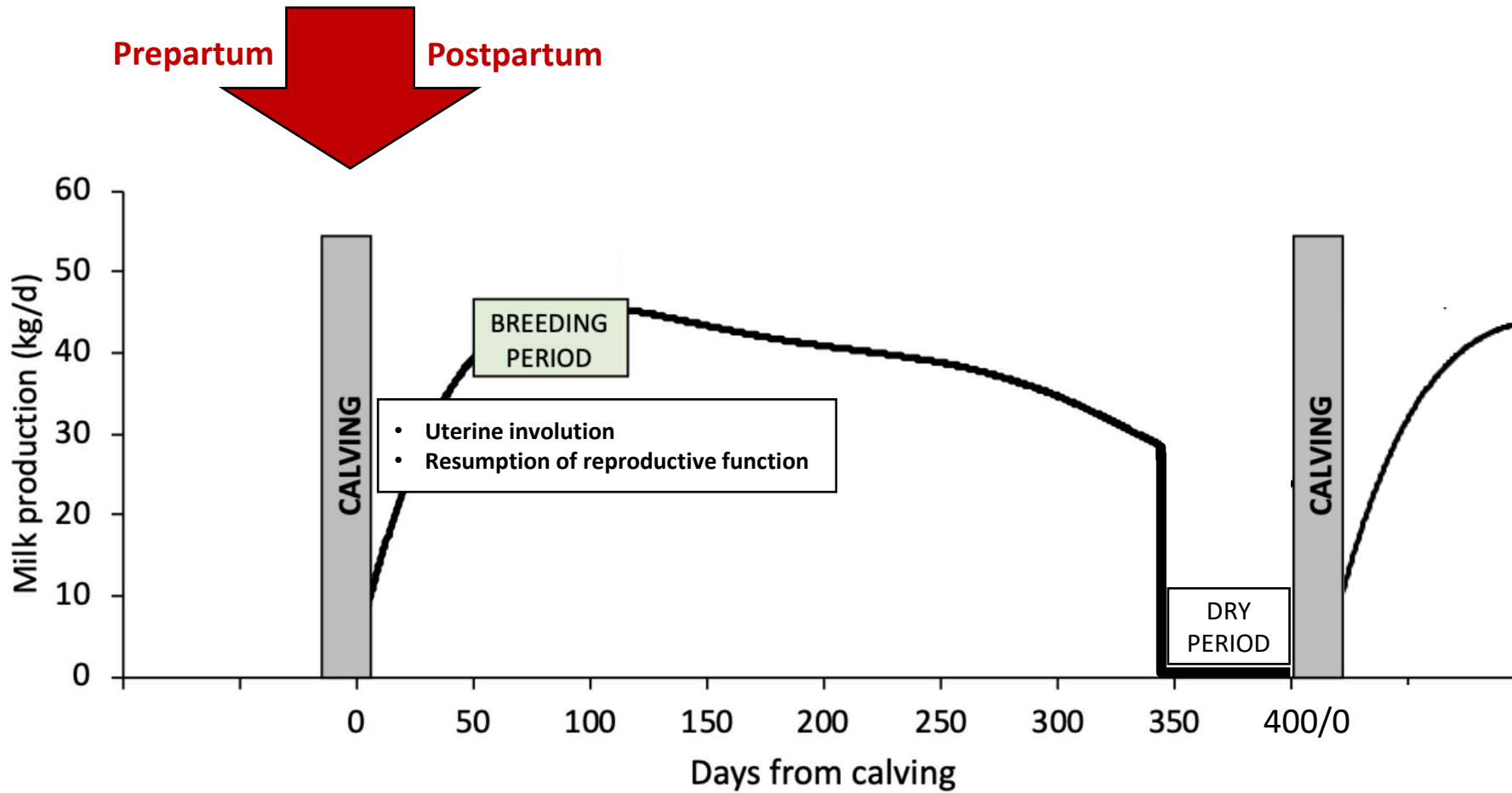
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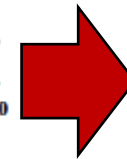
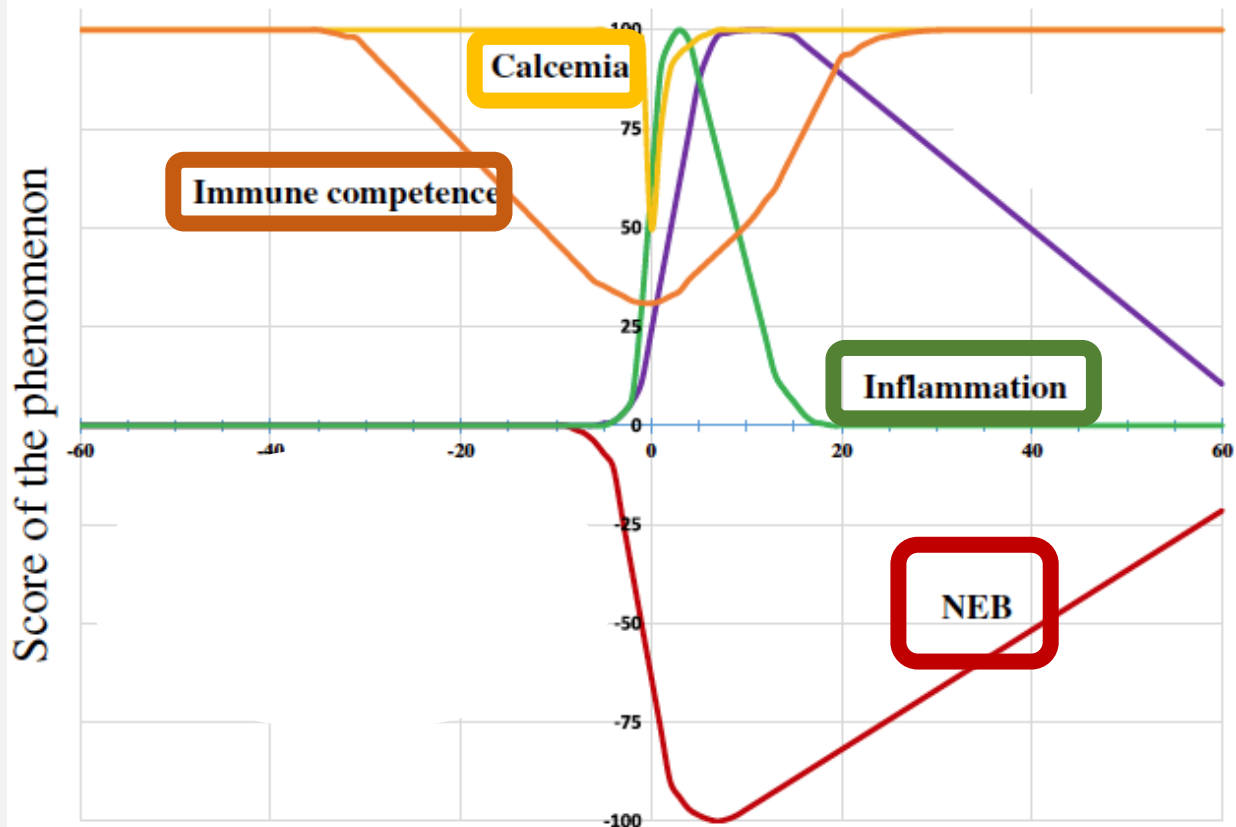
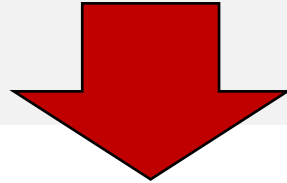
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Transition period

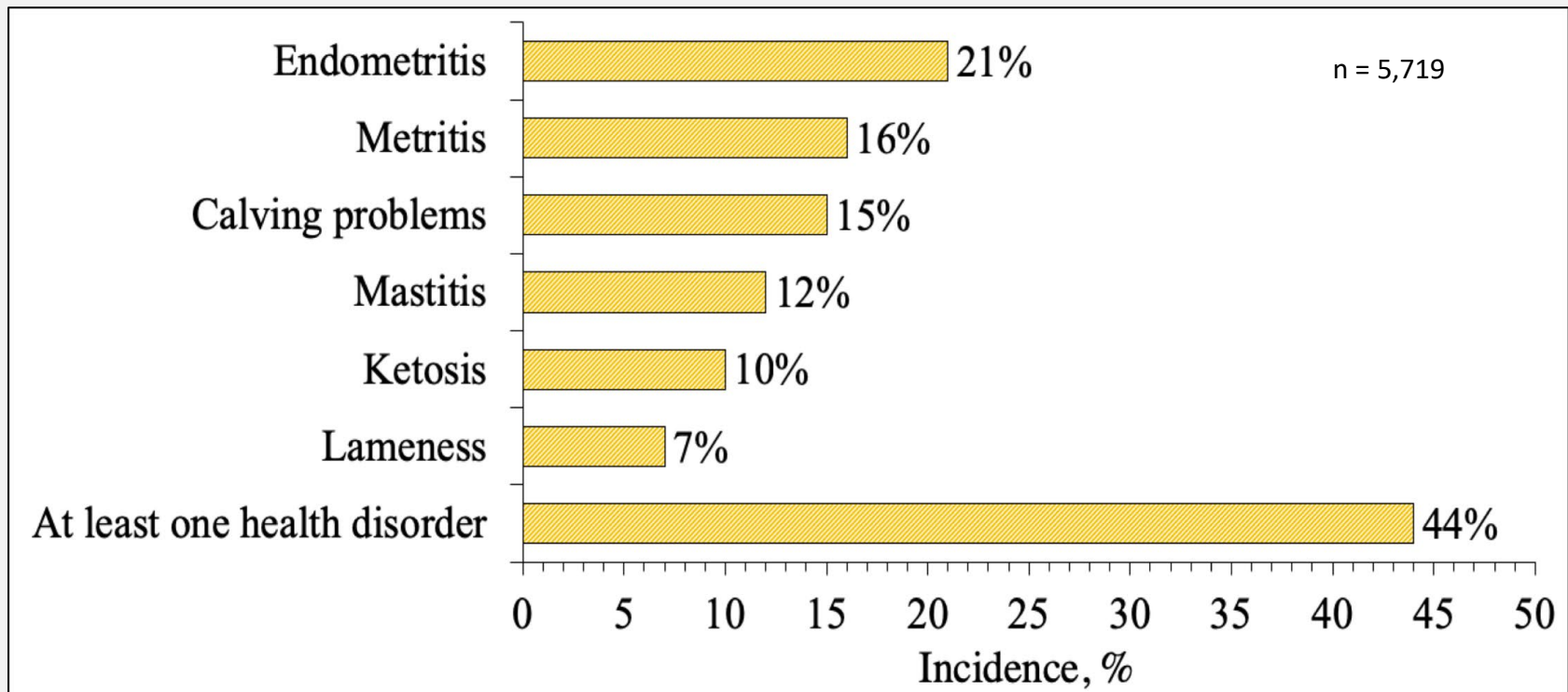


Transition period

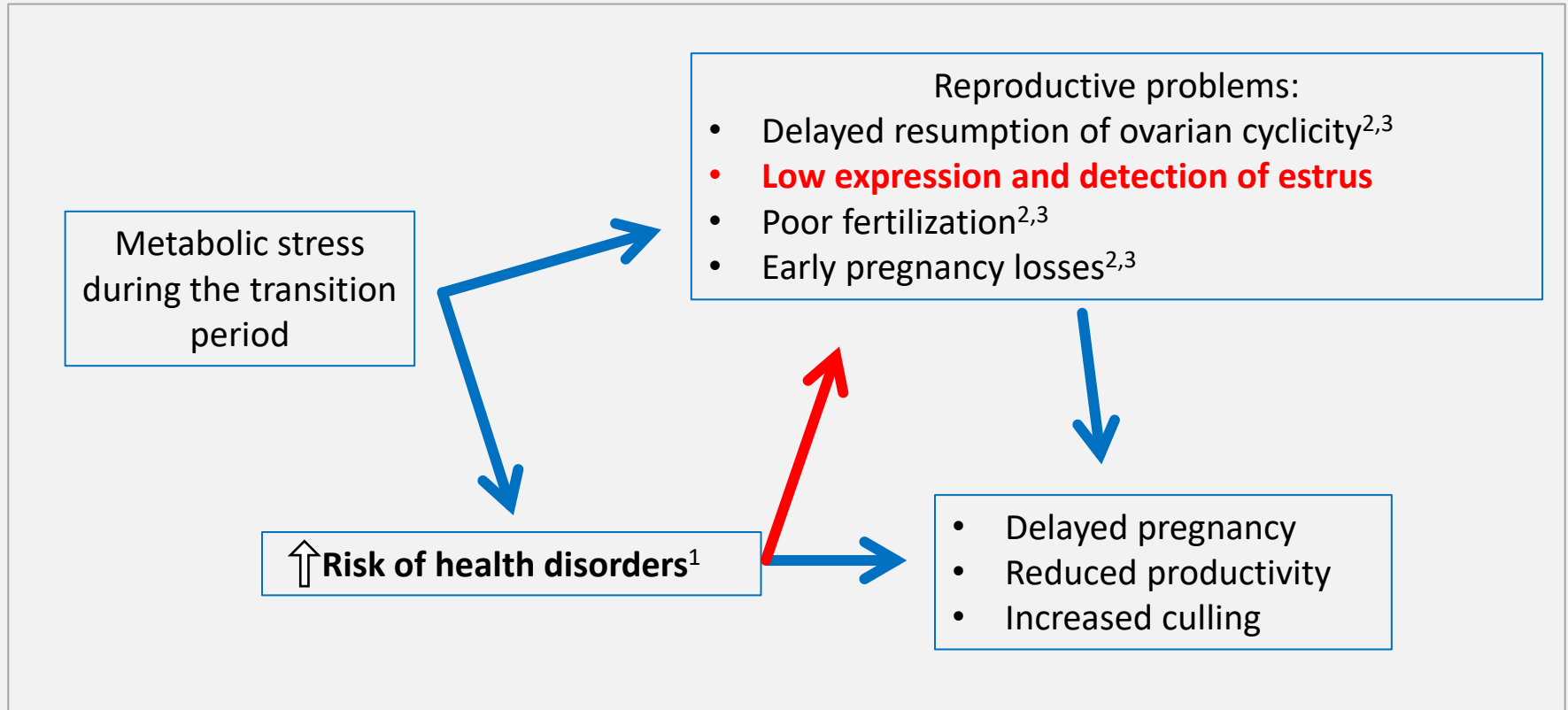
Parturition



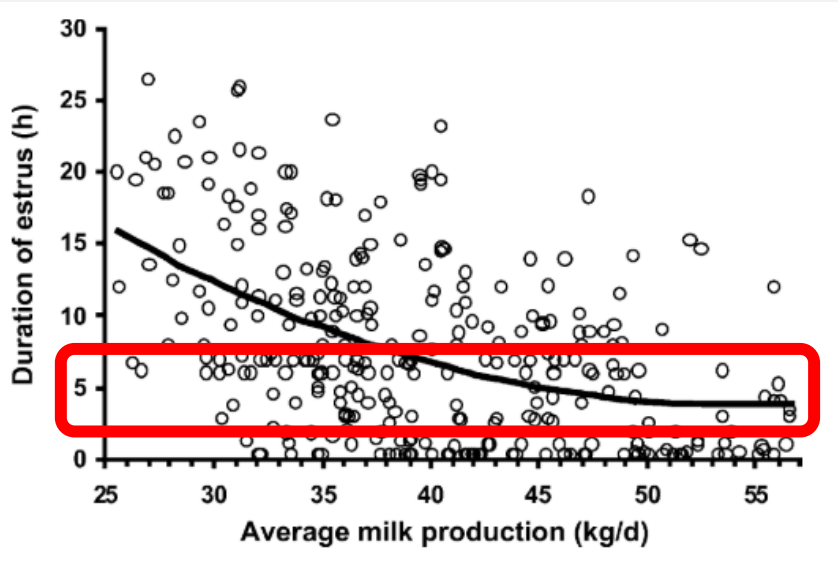
Transition period



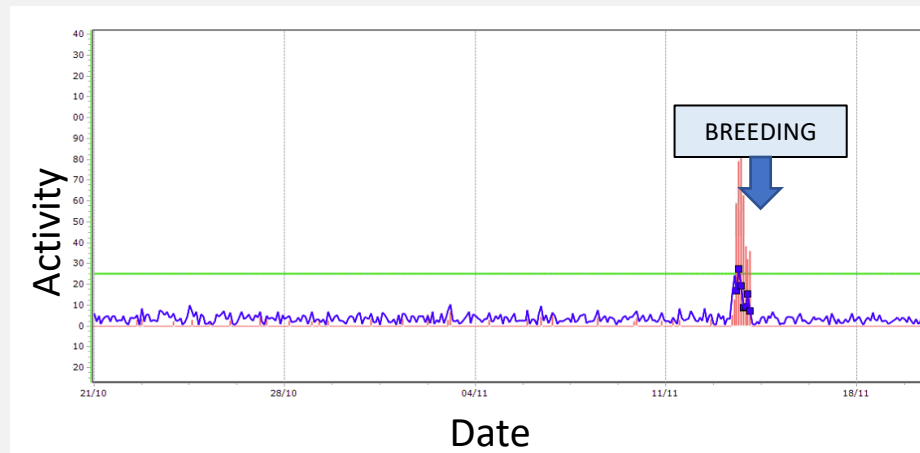
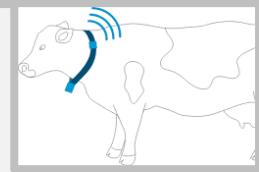
Transition health and fertility



Activity monitors to detect estrus



Lopez et al., 2004



Rationale

- ✓ Better understanding the mechanisms by which **transition health affects** estrus expression and detection will have direct implications for **reproductive management**
- ✓ **Identifying cows** that are more (or less) likely to **be detected in estrus** by activity monitors will allow farmers to more efficiently employ interventions, only when necessary

Objective

- ✓ To identify postpartum health indicators associated with the probability of detection of estrus by activity monitors in Holstein cows



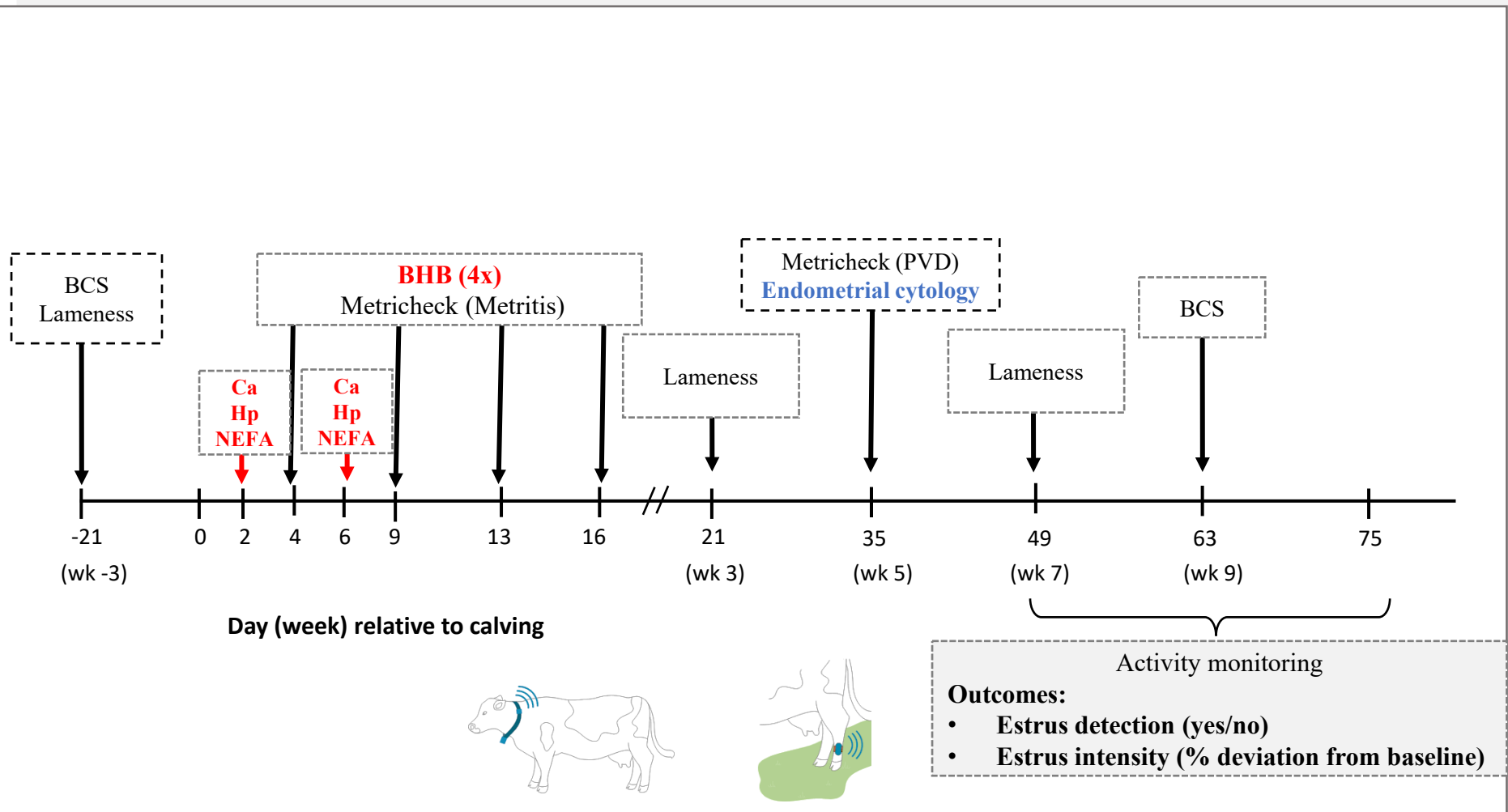
Materials & Methods

- Ongoing prospective observational study in 2 herds in Ontario (~450 lactating cows each)
- Holstein cows (**876/1,300**) were examined between May 2019 and October 2020
- Breeding program primarily based on estrus detection by activity monitors
 - AfiAct (Afimilk, Kibbutz Afikim, Israel) or Lely (SCR Engineers Ltd., Netanya, Israel)
- No hormonal interventions until ~75 DIM



Materials & Methods

Summary of data collection



Materials & Methods

Predictors/independent variables:

- Body condition at wk -3 (≤ 3.25 | 3.50 | ≥ 3.75)
- Body condition at wk 9 (≤ 2.75 | 3.00-3.25 | ≥ 3.50)
- Lameness
- Metabolites (ROC curve cutpoints associated with purulent vaginal discharge at wk 5)

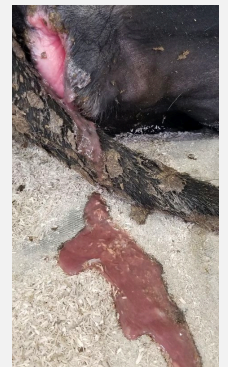
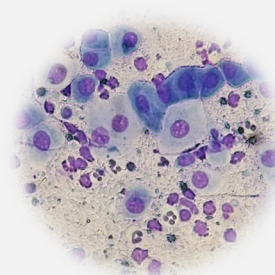
Hypocalcaemia (Calcium ≤ 2.1 mmol/L)

High Hp (≥ 1.0 g/L)

High NEFA (≥ 0.7 mmol/L)

Ketosis (BHB ≥ 1.3 mmol/L)

- **Metritis** (red-brown, watery, foul smelling discharge with or without fever)
- **Purulent vaginal discharge** (PVD)
- **Cytological endometritis**
 $\geq 6\%$ polymorphonuclear cells in endometrial cytology



Materials & Methods

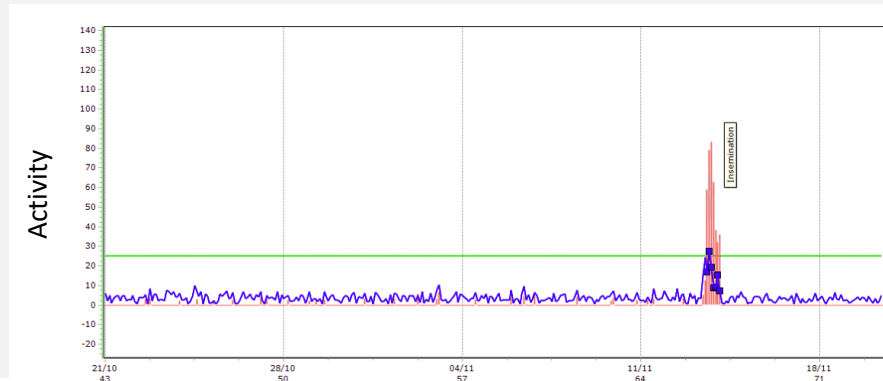
Statistical analysis (SAS Studio 3.8)

Dependent variable/outcome:

- Estrus detected between 50-75 days (predetermined algorithms – yes/no)
- Estrus intensity (% deviation from activity baseline) from 1 herd

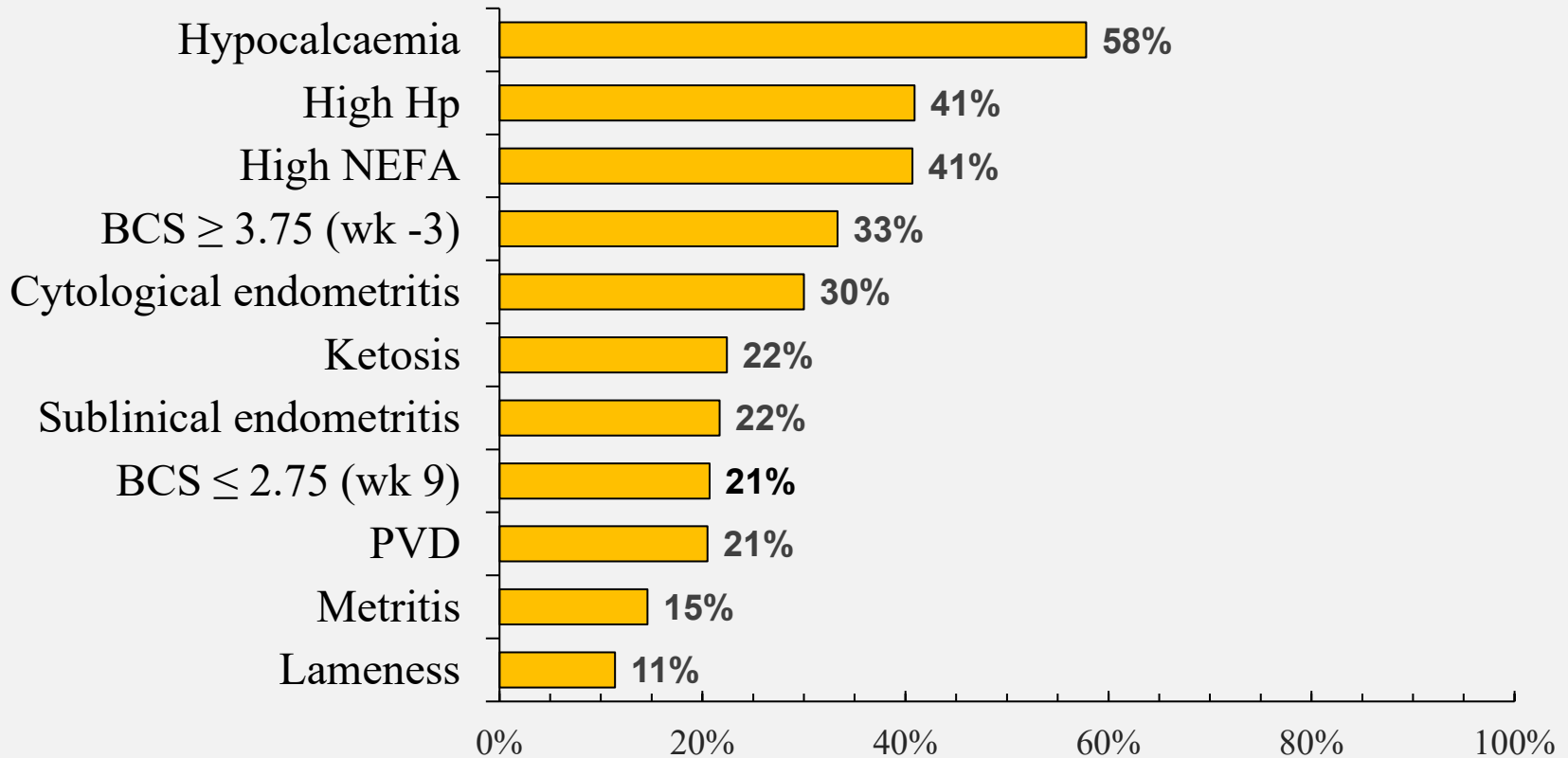
Multivariable logistic/linear regression models including:

- Parity
- Health variables (previously selected in univariable models with $P \leq 0.15$)
- Interactions
- Herd (random)



Results – Incidence risk of factors associated with estrus

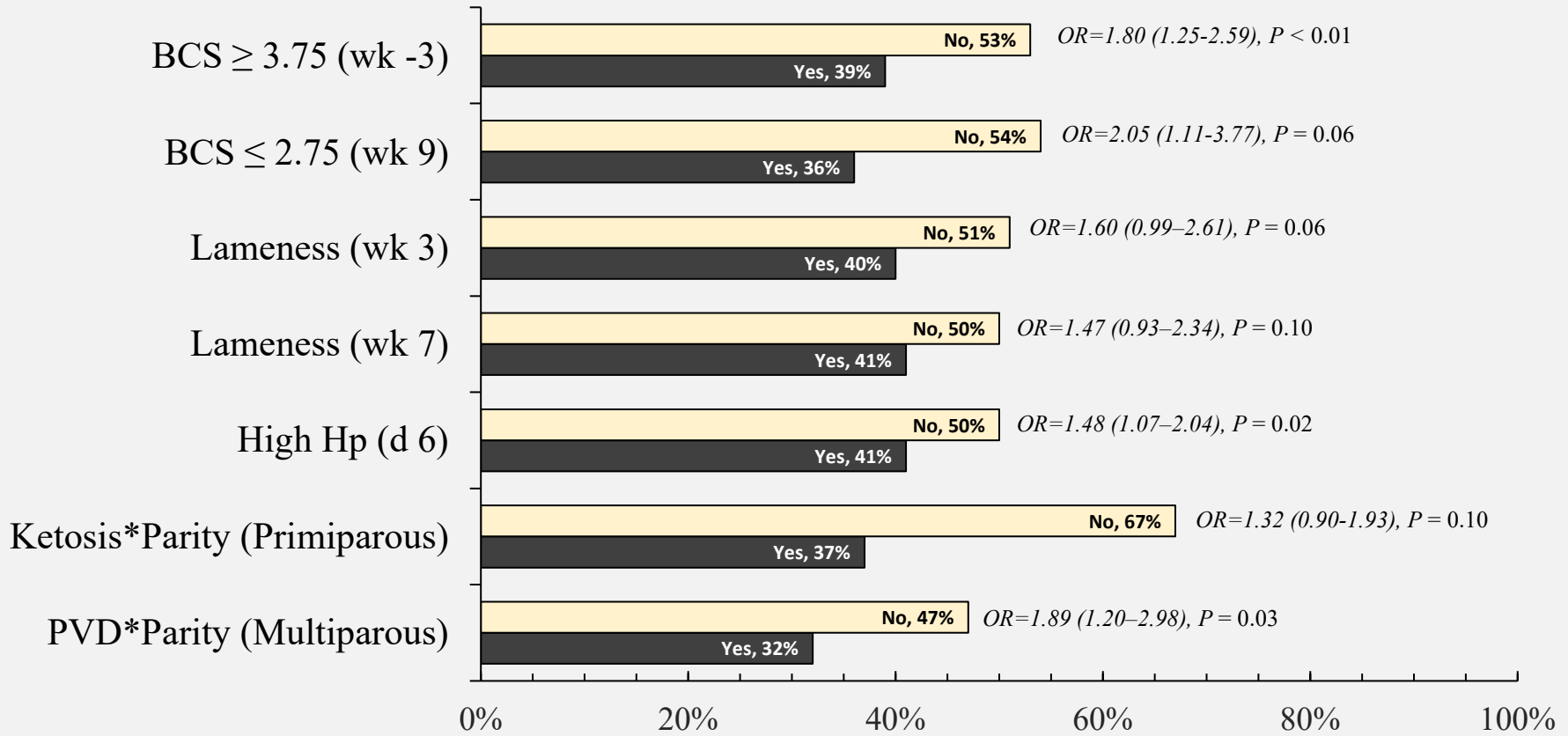
- **72%** of cows detected in estrus by 75 DIM
- **63%** of cows (77% primi and 54% multiparous) detected in estrus between 50–75 DIM



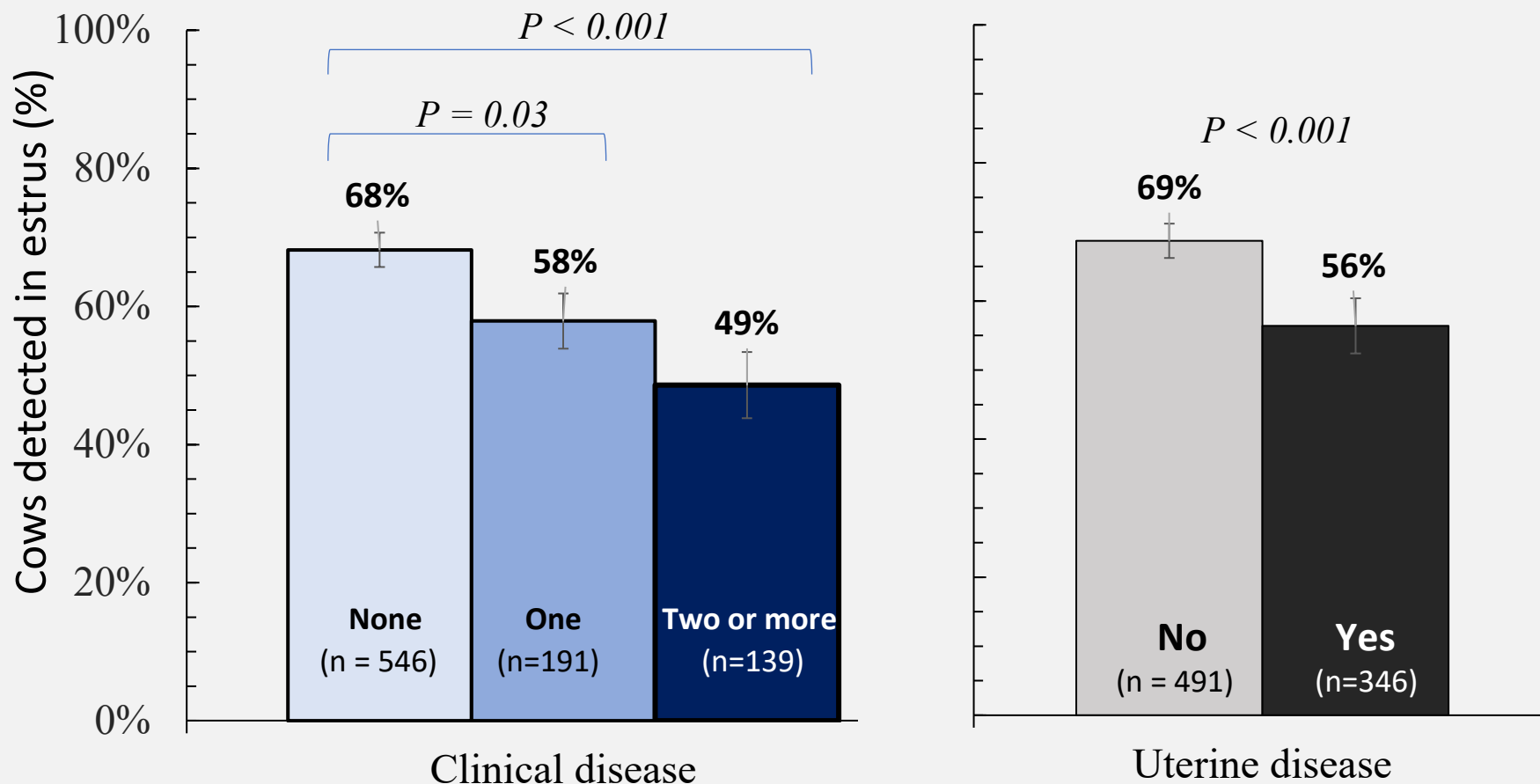
Results – association of risk factors with detection of estrus

Percentage of cows detected in estrus with vs. without health disorder
– Multivariable model (n = 823) –

□ No ■ Yes



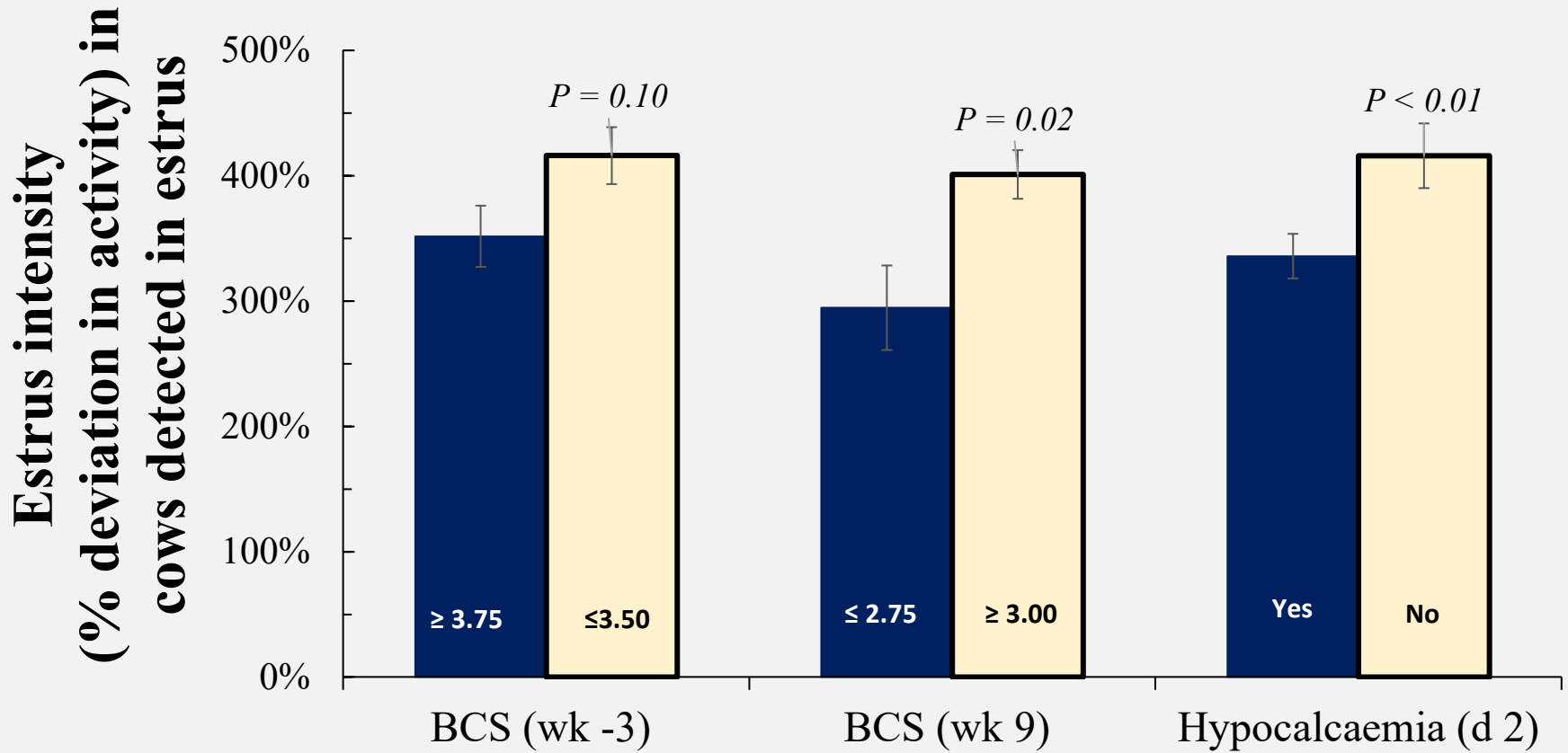
Results – association of risk factors with detection of estrus



Clinical disease = RP, DA, metritis, lameness, endometritis ($\geq 6\%$ PMN) + PVD

Uterine disease = RP, metritis, endometritis ($\geq 6\%$ PMN) or PVD

Results – association of risk factors with estrus intensity (1 herd, 211 events)




Preliminary Conclusions

 Cows were less likely to be **detected in estrus** if they had:

- High body condition before calving (≥ 3.75)
- Low body condition at week 9 (≤ 2.75)

- High haptoglobin at d 6
- Ketosis (primiparous cows)
- PVD (multiparous cows)

- Clinical or uterine disease

 Among cows detected in estrus, **intensity of estrus** was reduced in those that had hypocalcaemia or low body condition at wk 9

Preliminary Conclusions

- Identifying risk factors for reduced estrus expression and detection will allow farmers to more efficiently employ interventions
- Further steps include to better understand the mechanisms by which transition health impairs spontaneous reproductive function, such as:
 - Postpartum ovarian function and “silent ovulation”
 - Ovarian function and maternal recognition/early establishment of pregnancy after breeding
 - Reproductive performance at detected estrus

Acknowledgements

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